APM TECHNOLOGIES

PROFESSIONAL INNOVATIVE BRANDING SERVICE

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Momentum 400S/H Series
Single/three Phase Programmable AC Power Supply

User Manual

Part NO. 18950-780-00

Contents

Version PA, Updated June 2024

Preface

Dear Customer,
Thank you for using this Momentum 400S/H series single/three phase programmable AC power supply, a product developed & manufactured by APM Technologies. We sincerely hope this product will meet your needs.

The sections outlined in this user manual are suitable for the following product models.

Models	Voltage	Current *1	Power	Output Phase	Height
MS420VAC650W	210V/420V	6A/3A	650VA	1Φ	1/2 2U
MS420VAC1050W	210V/420V	10A/5A	1050VA	1Φ	2U
MS420VAC2100W	210V/420V	21A/10.5A	2100VA	1Φ	2U
MS420VAC3100W	210V/420V	30A/15A	3100VA	1Φ	3U
MS420VAC4100W	210V/420V	39A/19.5A	4100VA	1Φ	3U
MS420VAC6000W	210V/420V	60A/30A	6000VA	1Φ	3U
MST420VAC2100W	210V/420V	3Φ: 7A/3.5A 1Φ: 21A/10.5A	2100VA	1Φ/3Φ	3U
MST420VAC3000W	210V/420V	3Φ: 10A/5A 1Φ: 30A/15A	3000VA	1Φ/3Φ	3U
MST420VAC4500W	210V/420V	3Φ: 14.4A/7.2A 1Φ: 43.2A/21.6A	4500VA	1Φ/3Φ	3U
MST420VAC6000W	210V/420V	3Φ: 20A/10A 1Φ: 60A/30A	6000VA	1Φ/3Φ	3U
MST420VAC9000W	210V/420V	3Φ: 40A/20A 1Φ: 120A/60A	9000VA	1Φ/3Φ	6U
MST420VAC12000W	210V/420V	3Φ: 40A/20A 1Φ: 120A/60A	12000VA	1Φ/3Φ	6U
MST820VAC12000W	420V/820V	3Φ: 20A/10A 1Φ: 60A/30A	12000VA	1Φ/3Φ	6U
MST420VAC15000W	210V/420V	3Φ: 47.6A/23.8A 1Φ: 142.8A/71.4A	15000VA	1Φ/3Φ	9U
MST420VAC18000W	210V/420V	3Φ: 55.2A/27.6A 1Φ: 165.6A/82.8A	18000VA	1Φ/3Φ	9U

*1 The current is the maximum current in the rated voltage range.

Momentum 400S/H series single/three phase programmable AC power supply are divided into Advanced Version, Professional Version and Professional-HF Version according to the characteristic of power sources' application area. The following table lists the difference between the three versions and optional functions.

Function Description	Advanced Version	Professional Version	Professional-HF Version
Output Frequency Range	10~2500Hz	10~2500Hz	10~5000Hz
Programmable Output Impedance Function	Not Supported	Standard,it meets IEC61000-3-3 test requirements	Standard,it meets IEC61000-3-3 test requirements
Harmonic/Inter-harmonic Generation Simulation and Measurement Function	Not Supported	Harmonic components can be up to 50 orders	Harmonic components can be up to 50 orders
DDS Waveform Generation Function	Not Supported	Standard	Standard
Built-in IEC standards	IEC61000-4-11	IEC61000-4-11; IEC61000-4-13; IEC61000-4-14; IEC61000-4-17; IEC61000-4-28; IEC61000-4-29; IEC61000-4-34	IEC61000-4-11; IEC61000-4-13; IEC61000-4-14; IEC61000-4-17; IEC61000-4-28; IEC61000-4-29; IEC61000-4-34
Aviation Specific Voltage Curve	Not Supported	Not Supported	Boeing 787B3-0147A/B/C(B787); Airbus AMD24 C(A400M); AVSTD; MIL-STD-1399-300B;

Important Symbols


Warning!

This symbol highlights situations that are potentially dangerous, and highlights essential information that must be understood by the user.


Caution!

This symbol highlights the precautions that users need to take to avoid potential injury while operating equipment.


Note

This symbol highlights an important instruction that needs to be read before using the equipment.

This symbol indicates risk of exposure to high voltage and shock hazard.

This symbol indicates components of the supply that can be at high temperatures. Avoid touching these areas during or immediately after operation of the supply to prevent burns.

This symbol indicates that a grounded connection is required before operating the equipment. The input terminal with this label must be grounded to prevent possible electric shock.

In this manual, panel buttons are denoted by [ ], and software buttons / options are in bold type.

1 About this Manual

1.1 Scope

This manual provides the reader with detailed product information, as well as installation, operation and maintenance instructions. This manual also provides our company contact information, so that you may provide us with any comments about the performance of our products, so that we can continue to improve our product quality and level of service.

1.2 Targeted Audience

This manual is intended for product users and technical support personnel that are involved with installing, operating, and maintaining the product. Readers must be familiar with basic electrical and mechanical schematics.

1.3 Use of this Manual and Legal Notices

The content of this manual will continue to be updated and revised, as errors and discrepancies are inevitable. Please check for the latest version of this manual and further information at: www.apmtech.cn.

2 Unpacking

The procedures outlined in the following section should be followed when first unpacking a power supply from its box.

2.1 List of Contents

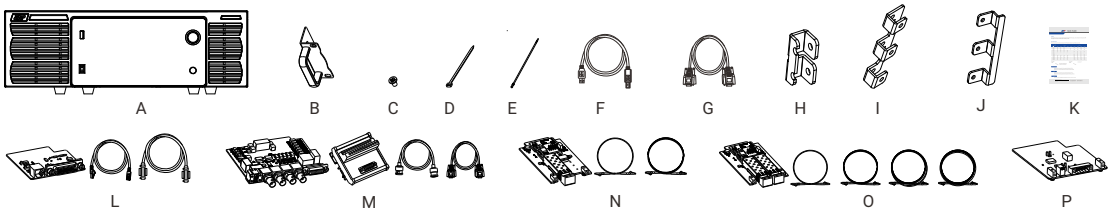
The following accessories are included with each AC power supply. The user should check that all components listed in the table below are present. If one or more of these is missing upon coming inspection of the product, please contact APM Technologies customer service.

Note that AC input and DC output wiring, grid connection devices are NOT included with the power supply.

Please visit our website enpps.apmtech.cn to download the operation manual, programming manual and monitoring software.

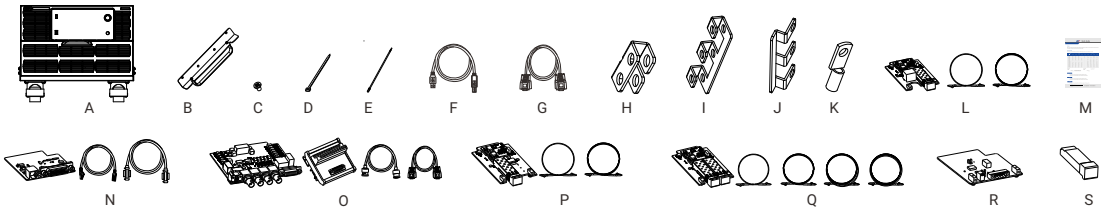
2.1.1 Packing List of 2U, 3U Models

No.	Descriptions	Quantity	Remarks
A	MOMENTUM 400S/H series power supply	1	As ordered
B	Rack mount handles	2	Standard
C	Stainless steel countersunk head screwM4*8	6(1Φ), 8(1Φ/3Φ)	Standard
D	Self-locking nylon cable tie	7(1Φ), 12(1Φ/3Φ)	Standard
E	Cord band	1	Standard
F	USB communication cable	1	Standard
G	RS232 communication cable	1	Standard
H	Output series copper bar	2	Standard (Applicable to MST420,MH350 models)
I	Output parallel copper bar 1	1	Standard (Applicable to MST420,MH350 models)
J	Output parallel copper bar 2	1	Standard (Applicable to MST420,MH350 models)
K	Quick installation guide	1	Standard
L	GPIB & LAN communication interface (contains communication cable)	1	Optional
M	External control (contains communication cable & terminal blocks)	1	Optional
N	Fiber parallel card-cabinet (contains communication cable X2)	1	Optional
O	Fiber parallel card-system (contains communication cable X4)	1	Optional
P	CAN communication interface	1	Optional



Packing List of 6U, 9U Models

No.	Descriptions	Quantity	Remarks
A	MOMENTUM 400S/H series power supply	1	As ordered
B	Rack mount handles	2	Standard
C	Stainless steel countersunk head screwM4*8	8	Standard
D	Self-locking nylon cable tie	12	Standard
E	Cord band	1	Standard
F	USB communication cable	1	Standard
G	RS232 communication cable	1	Standard
H	Output series copper bar	2	Standard (Applicable to MST420,MH350 models)
I	Output parallel copper bar 1	1	Standard (Applicable to MST420,MH350 models)
J	Output parallel copper bar 2	1	Standard (Applicable to MST420,MH350 models)
K	Marine series copper terminal	7	Standard
L	Optical module communication card (contains communication cable X2)	1	Standard (Applicable to MH700 models)
M	Quick installation guide	1	Standard
N	GPIB & LAN communication interface (contains communication cable)	1	Optional
O	External control (contains communication cable & terminal blocks)	1	Optional
P	Fiber parallel card-cabinet (contains communication cable X2)	1	Optional (Applicable to MST420,MST820,MH350 models)
Q	Fiber parallel card-system (contains communication cable X4)	1	Optional (Applicable to MST420,MST820,MH350 models)
R	CAN communication interface	1	Optional
S	Optical module	1	Optional (Applicable to MH700 models)



2.2 Checking for Shipping Damage

All APM Technologies products have undergone stringent testing before delivery, but inevitably damage can happen during transportation. Once you receive the product, please immediately check for damage to the product. If you find damage related to the product delivery, please notify the transport company immediately. Make sure to document the damage with photos, and send them to us so that we can provide you with the best service.

Caution!

- Due to the large weight of the power supply, it is recommended that two people work together in removing the packing from the supply.
- The power supply should not be carried by the front facing handles as they are not designed to carry the entire weight of the supply. The front facing handles are present to assist in sliding the supply in and out of cabinets.

2.3 Product Failure and Maintenance

In the unlikely event of product failure, please contact APM Technologies or its dealer in time to provide the serial number, detailed failure information and pictures of the faulty product to help us identify the cause of the failure. If the product need to be sent for repair, please pack it with the original packing material.
During the warranty period, the customer shall bear the freight and insurance costs for returning to the maintenance center, and APM bear the return cost to customer.
Please do not return the product without authorization from APM.

3 Products Introduction

3.1 General Description

Momentum 400S/H series single/three phase programmable AC power supply use high frequency isolation and active PFC technology for efficient AC/DC output. New UI touch design, combined with the software's strong testing function, easily complete complex programming. Global universal input voltage, multiple output modes one-click switch, applicable to various test scenarios. Innovative and compact topology, modular design of centralized control, the high power density (3U/6kVA, 5kHz) to meet the market, the expansion needs of 768kVA can be met through high-speed fiber optic technology. The high-precision power meter and oscilloscope function provide precise measurement function, save the test cost and operation time.

3.2 Product Features

- Full touch panel design, humanized UI interactive experience.
- Output frequency: 10~5000Hz/DC, adjustable voltage and frequency output change rate.
- Voltage specification: 420VAC, 820VAC.
- Output mode: AC, DC, AC+DC.
- Seamless transition of voltage gears, current multiplication output.
- Support Global universal input voltage.
- Support single-phase, three-phase, reverse phase, multi-channel output mode, can simulate three-phase unbalance, three-phase harmonic unbalance, phase missing, phase sequence reverse connection and other tests.*1
- Optical fiber parallel technology, strong anti-interference, near-zero delay, supports up to 768kVA expansion.*2
- Working mode: constant voltage (CV), constant current (CC).
- Settable ON/OFF Phase Angle of Output Waveform, 0~359.9°.
- High output crest factor to meet surge testing.
- Built-in oscilloscope function, real-time monitoring waveform curve.(Coming soon)
- Built-in high-precision power meter, real-time measurement of electrical parameters.
- Power sweep function.
- Power Line Disturbance Function(PLD).
- DDS arbitrary function generator.*3
- Harmonic/inter-harmonic generation simulation and measurement function.*3
- Support external analog input control and TTL electrical level output(Optional).
- Built-in aviation test standards.*4
- OCP/OVP/OPP/OTP/Reentry transition protection function.
- Standard USB, RS232, RS485 communication interface, optional GPIB&LAN or CAN.
- Three functional versions, the best cost-effective to meet the needsof different application fields.

*1 MS420 units only support single phase
*2 650W units is not support
*3 Only professional version/Professional-HF version supports
*4 Only Professional-HF version supports

3.3 Operating Instructions

This product is a precision instrument, please read this manual carefully before use. In order to ensure measurement accuracy, it is recommended that a calibration check be performed on this product every year by the dealer or suitably trained personnel.

3.4 Operating Environments

1. These power supplies must be used in a clean and dry laboratory or test facility environment with an ambient temperature between 0°C and 50°C, and a maximum relative humidity of 95% at 45°C, or 80% at 50°C.
2. Do not use this power supply in a high ambient temperature environment.
3. Fans cool the power supply by drawing air through the front intake and exhaust the air out its rear face. Please assure that 20 cm of non-obstructed space is allowed in front of, and behind the unit, for proper air flow.
4. Do not operate this product in an environment that contains a significant amount of dust, is subject to strong vibrations, is exposed to direct sunlight, or contains corrosive gases.
5. If grid power is not stable such as frequently power outage, please connect 3 phase breaker with default phase and undervoltage module in input terminal of power. It is to protect power supply.

3.5 Protect Storage

Please store this product in an area with a temperature between -20 °C and 70 °C. Please keep it in the original carton or other similar packaging and store it in a cool & dry place, if the product is not in use for a long period.

3.6 Maintenance and Cleaning

Before cleaning, assure that the input power cord is disconnected. To clean the product's exterior, use a small amount of non-aqueous cleaning solution such as isopropyl alcohol on a clean cloth or a brush or sponge. Do not use corrosive or abrasive cleaning solutions to clean this product. The front panel display can be cleaned with lens cleaning cloth damped with lens cleaning solution. The clearing of dust buildup internal to the supply must be carried out with a low-pressure air gun. Extensive cleaning is best performed by an authorized dealer on behalf of the user.

3.7 Power Supply Voltage

Ensure that the AC input voltage to be connected is within the product's operating specification before wiring the source connections.

Caution!

- The protective safety earth/ground connection must be connected before and disconnected after the AC line and neutral wires. All approved AC power connectors are designed to meet this requirement. If the input wires are directly connected to an AC mains circuit, assure that the mains voltage is deactivated prior to connecting or disconnecting the input.

3.8 Fuse

The AC input fuses installed inside the product are designed to protect the input from major failures and should not fail under normal operating conditions. Therefore, any sign of fuse failure is an indication that other parts of the product could be damaged. If the input fuse(s) fail, were commend that the product be sent back to the factory or dealer for repair.

Warning!

- No user serviceable components are enclosed. Do not disassemble the power supply's enclosure/case to replace the fuse, as there is a danger of sustaining an electric shock.

3.9 Warm-up Time

Once the power supply is switched on, the start-up routine commences and only after it is finished will all features of the unit be operable. However, in order to achieve the specified operating accuracy, it is recommended to allow the power supply to operate for a warm-up time of 30 minutes before activating its output.

3.10 Unit Shutdown

When you have completed operating the unit, please assure that the front panel power switch is set to the “OFF” position. Please note that after the AC power is switched off the internal fan will continue to run for a few seconds to allow the internal capacitors to discharge.

3.11 Operation Precautions

1. When the unit is first turned on, the AC output is normally disabled. It can be activated by pressing the output activation button located on the front panel, or by remote control command.

2. Before activating the AC output, check that all the setting values of the power supply are in accordance with the load requirements.

3.12 Start Procedure

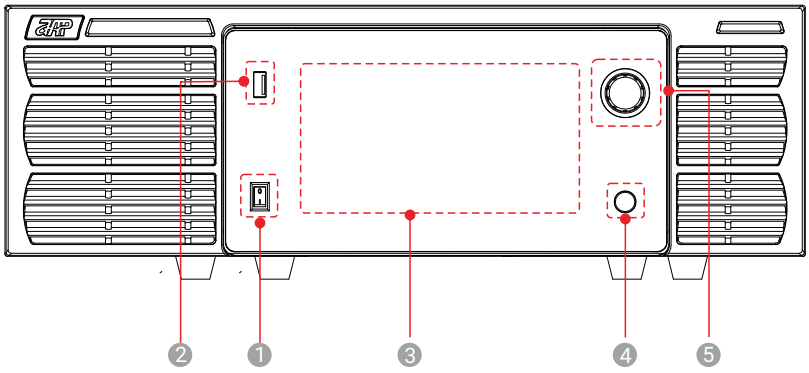
Use the power warping switch which located on the left side of the front panel to turn on the power and the startup screen will look like the following.

After several seconds, the LCD screen will display the start-up hardware verification and self-tests page.

Please contact APM customer service for support if there are any failed items on this self-checking page. The diagnostics will take several seconds to complete. Once the unit completes the self-tests, the display screen will revert to the main page.

4 Panel Description

4.1 Front Panel Description



❶ Power Switch

User could directly turn on/off power supply by switch.

❷ USB Port

This USB port on the front panel is for data transfers and firmware upgrades.

❸ LCD Touch Screen

Colorful touch screen could display all setting, measurement, menu and warning information. It is available to input parameter and setting via touch screen. User could click on screen directly. All green character is available to set. When click set area, numeric keypad will display on screen to input. After that, press [Enter] to complete whole process. To cancel, please press [ESC].

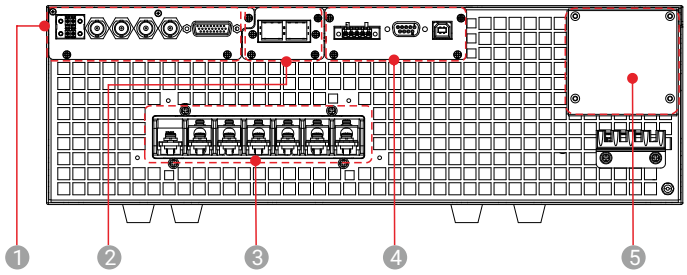
❹ Output switch

Control power output on/off. Press and the ON/OFF key lights up, indicating that the power output is ON. Press again and the ON/OFF key goes OFF, indicating that the power supply is OFF.

❺ Rotary Knob

No	Name	Description
1	Rotary knob fine tuning	After the parameter you want to set is selected by touch screen, a digital input box will appear on the display interface. When the knob is turned, the digital input box will disappear. By default, a horizontal line will appear below the decimal place. Then, you can short press the middle button of the knob to switch to the next digit, turn it clockwise, the parameter will increase, and at the same time the backlight of the knob will flash clockwise, turn it counterclockwise, the parameter will decrease, and the backlight of the knob will flash counterclockwise at the same time. Click the blank area of the screen to exit the fine-tuning setting.
2	Short press knob	① After the self-test fails, click OK at the lower right corner of the self-test interface to enter the power supply
		② Series/parallel connection setting, as master unit, cannot cancel/return after the search fails.
		③ Series/parallel connection setting, as slave unit, cannot be unlocked after saving.
		④ Unlock in remote mode
		⑤ Programmable function Step activates scan function. After trigger, no ESC return key.
		⑥ After trigger test mode, unable to close test result.
		⑦ Unable to restart during hard ware upgrade
		⑧ Unable to stop buzzing when trigger warning.
		⑨ Unlock Latch mode in external control

4.2 Rear Panel Description



❶ Analog I/O Interface Card (optional)

❷ SYSTEM BUS optical fiber interface (optional)

❸ Output terminal

❹ RS485/RS232/USB communication interface, LAN & GPIB Interface Card (optional), CAN Interface Card (optional)*

❺ AC power input terminal

* If LAN&GPIB or CAN communication is selected, the communication interface card will be installed in the same position instead of the standard one.

5 Menu Operation

5.1 Menu Structure

The table below shows the entire menu system in a single document. Each menu item will be covered in subsequent sections in more detail. All screens can be accessed using the touch screen.

Menu				Description
Setting				
	Output/Measurement（It can be divided into three channels）			
		Mode		
			3 phase	Set 3 phase mode
			1 phase/Reverse	Set 1phase/reverse mode
			Multi-channel	Set multi-channel mode
		Coupling		
			AC	Set AC coupling mode
			DC	Set DC coupling mode
			AC+DC	Set AC + DC coupling mode
		V Range		
			High（420V）	Set voltage high
			Low（210V）	Set voltage low
			AUTO	Set voltage automatic
		I Range		
			Low	Set current low
			Middle	Set current middle
			High	Set current high
			AUTO	Set current automatic
		Zo Program		
			Enabled/Disable	Enable/disable impedance
			Impedance	Set impedance
			Inductive reactance	Set inductive reactance
		Degress		
			ON Degress	Set the start Angle of the output waveform
			OFF Degress	Set the end Angle of the output waveform

		Voltage Slope		
			Vac S/R	Set AC voltage slope
			Vdc S/R	Set DC voltage slope
			Vdc off S/R	Set DC voltage drop slope
		Frequency Slope		
			F S/R	Set frequency slope
		Current Slope		
			Idc S/R	Set DC cruuent slope
		Waveform A/B		
			SINE/SQUARE/ CSINE/FIXED/USER	Setting Waveform
		Loop Speed		
			Slowly	Enable slowly
			Quickly	Enable quickly
		CC/CV Prior		
			CC Prior	Set CC mode as priority
			CV Prior	Set CV mode as priority
			Delay	Set delay time
		ALC_Mode		
			ON	ALC enabled (automatically turns off output outside adjustment range)
			REG	ALC enabled (keep output out of regulation range, voltage deviates from set value)
			OFF	Close ALC
		Delay		
			ON Delay	Set the output delay time for opening a channel
			OFF	Set the output delay time for closing a channel
	Limits（It can be divided into three channels）			
		AC Vlimit		
			Vlimit-H/V	Set the maximum AC voltage limit
			Vlimit-L/V	Set the minimum AC voltage limit
		Ilimit		
			Ilimit-H/A	Set the maximum current limit
			Ilimit-L/A	Set the minimum current limit
		DC Vlimit		
			Vlimit-H/V	Set the maximum DC voltage limit
			Vlimit-L/V	Set the minimum DC voltage limit
		Flimit		
			Flimit-H/V	Set the maximum frequency limit
			Flimit-L/V	Set the minimum frequency limit

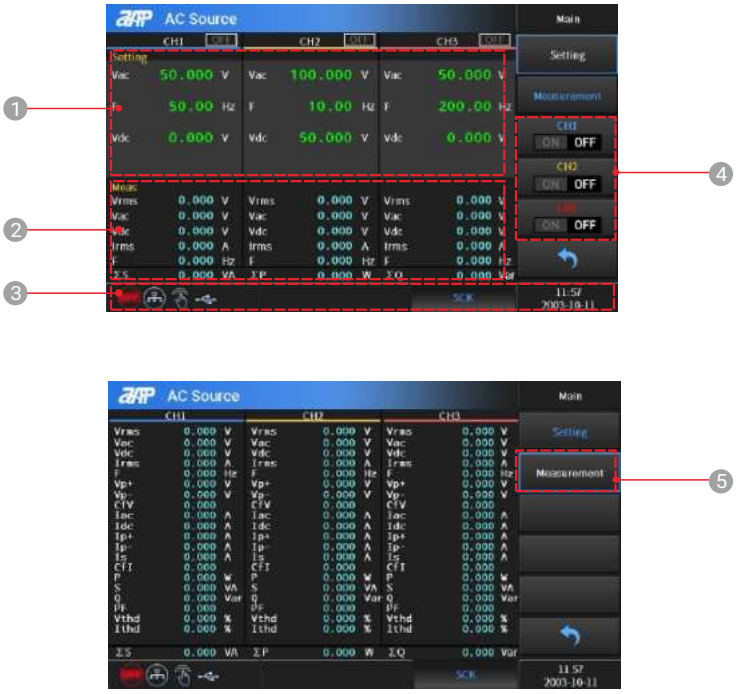
	Protection（It can be divided into three channels）			
		OVP		
			Enable	Enable Over Voltage Protection
			Delay(s)	Set the OVP delay time
			Level(V)	Set the OVP level
		OCP		
			Enable	Enable Over Current Protection
			Delay(s)	Set the OCP delay time
			Level(A)	Set the OCP level
		OFP		
			Enable	Enable Over Frequency Protection
			Delay(s)	Set the OFP delay time
			Level(Hz)	Set the OFP level
		OCP(peak)		
			Enable	Enabled the over-current peak protection function
			Delay(s)	Set the peak over-current protection delay time
			Level(A)	Set the peak over-current protection value
		OPP		
			Enable	Enable Over Power Protection
			Delay(s)	Set the OPP delay time
			Level(W)	Set the OPP level
		RMP		
			Enable	Enable the Regulation Mode Protection function
			Delay(s)	Set the RMP delay time
			Range	CV-CC or CC-CV, this function turns off the output when the output mode is changed
System Setup				
	Remote Setup			
		RS232		RS232 communication settings
		RS485		SRS485 communication settings
		USB/GPIB		USB/GPIB communication settings
		LAN		Ethernet communication settings
		CAN		CAN communication settings
	Config			
		Buzzer		Enable (ON) or disable (OFF) the audible indicator function
		P/O Sta.		Set the default output parameters V, I, P, R, at Power-On
		P-out		Set the output enable control as either On with the set parameter values at shutdown or to OFF when the input power is turned on

Menu			Description
	EXT Control		
		Setup (It can be divided into three channels)	External control mode settings
		Monitor	Monitor for external control mode
	User Password		To enable the password to enter Limits and Protections menus
	LCD Setup		
		Display	LCD brightness control
		Date/Time	Date & Time setting
		Color Test	LCD screen color accuracy test
		Black Screen	Used for LCD screen saver
		LED	For knob backlight on and off
	Language		The supported languages are english, simplified chinese, and tranditional chinese
	Data Logging Function		
		Enable	Enable the date logging gunction
		Sampling Type	Select the sampling type
		Sampling period	Set the sampling period
		Sampling time	Set the sampling time
		Trigger source	Select the trigger mode
		Export	Export the recorded data
Series/Parallel			
	Single-Machine State		Select the status mode of the single machine
	Master-Machine State		Select the status mode of the master machine
	Master-Slave State		Select the status mode of the slave machine
PLD Testing（It can be divided into three channels)			
	List Mode		
		Step	Edit the setting parameters in the list
		Save	Saves the list to the memory
		Load	Loads saved list files into the units settings
		Import	Import list parameter
		Export	Export list parameter
	Sequence Mode		
		Step	Edit the setting parameters in the sequence
		Save	Saves the sequence to the memory
		Load	Loads saved sequence files into the units settings
		Import	Import sequence parameter
		Export	Export sequence parameter

	Step Mode		
		Step	Edit the setting parameters in the step
		Save	Saves the step to the memory
		Load	Loads saved step files into the units settings
		Import	Import step parameter
		Export	Export step parameter
	Pulse Mode		
		Step	Edit the setting parameters in the pulse
		Save	Saves the pulse to the memory
		Load	Loads saved pulse files into the units settings
		Import	Import pulse parameter
		Export	Export pulse parameter
Advanced Function (Can be divided into three channels)			
	Test Mode		GO/NG testing function
	Transient		This function can be used to simulate changes in the mains, such as surges or sinking waves
	Dimmer		Adjust the intensity of the light
	IEC standards		Sets IEC standards
	Counting Func		Current/Voltage counter test
	Oscilloscope		View waveform
Backup/Restore			Save and read all set parameters
Maintainance			
	System Information		View power supply information
	Run Information (Can be divided into three channels)		Power module running information
	Recall Default (Can be divided into three channels)		Used to restore power supplies to factory Settings
	Firmware Upgrade (Can be divided into three channels)		Used for firmware update
	Warning Log		Records alarms about power supplies
	Calibration (Can be divided into three channels)		Power precision calibration
	Password Reset		Used to reset LXI password and user password
	License		Used to view the device ID
Professional Function			

5.2 Main Page

The main menu is automatically entered after the power startup self-test. Output setting parameters and measurement parameters are displayed at the top of the main menu screen, device status is displayed at the bottom of the screen, and multi-channel independent output switch is displayed on the right side of the screen.



❶ Set parameters in power mode

The four output parameters of AC voltage and DC voltage, current (set in CC mode) and frequency can be set in this area.

❷ Main interface measurement parameter area in power mode

The eight parameters of AC voltage and DC voltage, root mean square current and root mean square voltage, frequency and apparent power, reactive power and active power can be read back in this area.

❸ Status Bar

The status bar displays the active Operation Mode, Local or Remote states, Alarm information, and the date and time.

Shortcut key: include screen lock/ screen shot/ enter to main menu/back to navigation page/ IEC Standards.

❹ Soft Keys

It is used for three-channel independent switch output in touch screen operation mode.

❺ Measurement parameter area

The measurement parameters from top to bottom are root mean square voltage, AC voltage, DC voltage, root mean square current, frequency, positive peak voltage, negative peak voltage, voltage peak factor, AC current. DC current, positive peak current, negative peak current, surge current, current peak factor, active power, apparent power, reactive power, output power factor, voltage distortion, current distortion, power factor.

The last line from left to right is the total apparent power, total active power, and total reactive power.

5.3 Navigation Page

Clicking the **SCK** key on the status bar allows you to return to the navigation interface.

5.4 Operation Modes

This series of power supplies can be divided into three channels to support three modes of operation: panel control mode, remote control mode, and external control mode. The first two operation modes can be switched through computer control, and changing the control mode will not affect the output parameters of the power supply. In remote control mode, the power supply screen will be locked, and the knob can be short-pressed to unlock it. If the specified control mode is not stored before shutting down, the operation mode will default to panel control mode upon the next restart.

5.5 Output Setting

In the setting, the user can click the required function menu to access the three-channel specified channel, and the multi-channel is used as a demonstration below.

- Output
- Measurement
- Limitation
- Protection

5.5.1 Output

Output menu includes outpu mode, Coupling, V Range, I Range, Zo Program, ON Degress, OFF Degress, Vac S/R, Vdc S/R, F S/R, Vdc off S/R, Idc S/R, ZoR, ZoL, Waveform A/B(Waveform Preview), CC/CV Prior, Loop Speed, ALC_Mode, ON Delay and OFF Delay.

5.5.1.1 Output Mode

This menu can set the output mode of the power supply, including 3 phase mode, 1 phase mode, reverse mode, and multi-channel mode.

5.5.1.2 Coupling

This menu can set the power coupling mode, including AC mode, DC mode, and AC+DC mode.

5.5.1.3 V Range

This menu can set the voltage gear (range) of the power supply, including 420V, 210V, automatic.

5.5.1.4 I Range

This menu can set the current gear (range) of the power supply, including low, medium, high, automatic.

5.5.1.5 Zo Program and impedance reactance

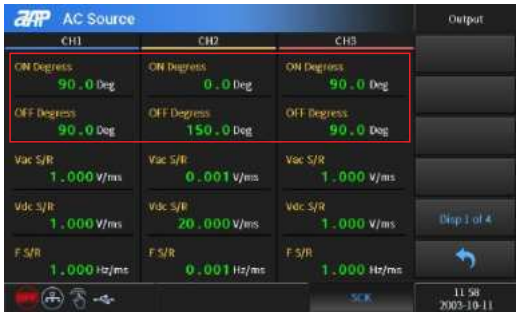
This menu can set whether to enable or disable the Zo program of the power supply (Professional version function, this article is compiled as Advanced version)

Disable: The impedance and inductive reactance in more Settings can not be set at the same time.

Enable: Impedance and inductive reactance can be set after enabling.

5.5.1.6 Degress

Degress includes a ON Degress and OFF Degress.



ON Degress: When the output is turned on, the ON degress of the output waveform can be set to 0~359.9°.

OFF Degress: When the output is turned off, the OFF degress of the output waveform can be set to 0~359.9°.

5.5.1.7 Slope

The slope includes AC voltage slope, DC voltage slope, frequency slope, DC voltage drop slope, and DC current slope.

Vac S/R: Used to test the rise slope of AC voltage.
Vdc S/R: Used to test the rise slope of DC voltage.
F S/R: Used to test the slope of switching frequency.
Vdc off S/R: Used to test the drop slope of DC voltage.
Idc S/R: Used to test the slope of DC current.

5.5.1.8 Waveform A/B and Waveform Preview

Waveform A/B Used to select the output waveform, can be set sine wave, csine, square wave, fixed, user.
Waveform Preview View the output waveform.

5.5.1.9 Zo CC/CV Prior

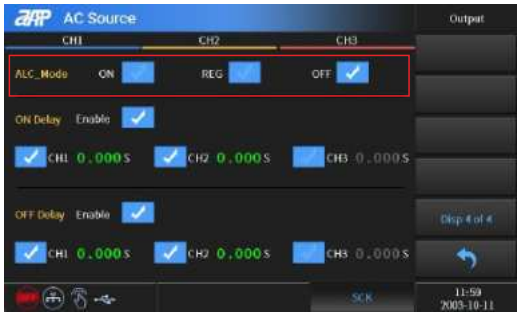
This menu provides the CC/CV priority function, allowing the user to select the appropriate mode according to the test requirements, so that the output is voltage high speed (CV priority) or current no overshoot (CC priority) mode. It can set the delay time.

5.5.1.10 Loop Speed

This menu provides the function of cycle speed. When the voltage ring is set to the slow ring, the frequency of the main interface can be set in the range of 10Hz-2KHz. If the original set frequency exceeds 2KHz, the main interface automatically changes to 2KHz; When the voltage ring is set to the fast ring, the frequency can be set completely (the frequency can be set in the range of 10Hz-5KHz). The default voltage ring is a slow ring, and the logic is performed by the switch of the fast and slow voltage ring and the set frequency. The switch of the fast and slow voltage loop takes precedence over the frequency setting. The switch of the fast and slow voltage ring can only be changed when the output is OFF.

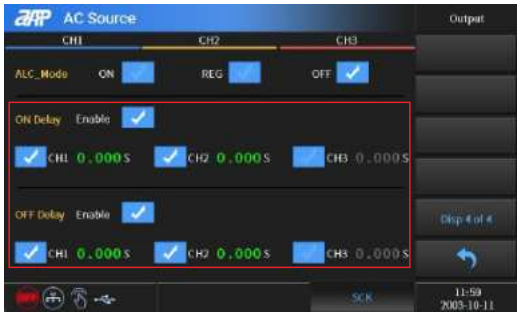
5.5.1.11 ALC_Mode

This menu provides the ALC_Mode function. ON: Enables the ALC (output is automatically turned off when it exceeds the adjustment range). REG: ALC is enabled (the output beyond the adjustment range remains on, but the voltage deviates from the set value and does not cause a fault state); OFF: Disables the ALC.



5.5.1.12 Delay

This menu can set the output ON Delay and OFF Delay.



ON Delay: After this function is enabled, the Delay TAB is displayed on the main screen. You can control multiple channels to start output according to the set delay time.
ON Delay time: 0-10s, default is 0.000s, after pressing ON/OFF to open the output of the channel time.
OFF Delay: After this function is enabled, the Delay TAB is displayed on the main screen. You can control multiple channels to shut down output according to the set delay time.
OFF Delay time: 0-10s, default is 0.000s, after pressing ON/OFF to close the output of the channel time.

5.5.2 Measurement

The user can set the measurement parameters. In the right status bar, you can set the average value, Is delay, and Is interval.

5.5.3 Limitation

The limits include AC voltage limits, DC voltage limits, current limits, and frequency limits.

5.5.3.1 Vac Limit

This menu can set the upper limit and lower limit of the AC voltage, which is used to limit the output AC voltage of the main interface.

5.5.3.2 Vdc Limit

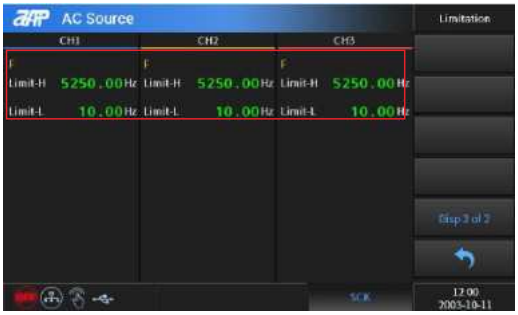
This menu can set the upper limit and lower limit of the DC voltage, which is used to limit the output DC voltage of the main interface.

5.5.3.3 I Limit

This menu can set the upper limit and lower limit of the current, which is used to limit the output current of the main interface.

5.5.3.4 F Limit

This menu can set the upper limit and lower limit of the frequency, which is used to limit the output frequency of the main interface.



5.5.4 Protections

User defined output protection levels can be defined for output Over Voltage (OVP), output Over Current (OCP), output Over Power (OPP), output Under Voltage (UVP), output Under Current (UCP) and output Regulation Mode (RMP). Other essential protections such as Over-Temperature Protection (OTP) of the source are always enabled but these cannot be adjusted from the factory setting. Output RMS protection can also be defined from this menu. To edit a particular protection setting, enter its page by selecting it with the soft keys or touch screen.

5.5.4.1 OVP (Over Voltage Protection)

The Over Voltage Protection (OVP) threshold range is adjustable from 0.0V to 1.10 times the units' rated output voltage. The associated delay time value can be set from 1ms to 10s.

5.5.4.2 OCP (Over Current Protection)

The Over Current Protection (OCP) threshold range is adjustable from 0.0A to 1.10 times the units maximum rated current. The associated delay time setting can be set from 1ms to 10s.

5.5.4.3 OCP peak (Over peak current protection)

The Over Peak Current Protection (OCP peak) threshold range is adjustable from 0.000A to 1.10 times the units maximum rated current. The associated delay time setting can be set from 1ms to 10s.

5.5.4.4 OFP (Over Frequency Protection)

The Over Frequency Protection (OFP) threshold range is adjustable from 10Hz to 1.10 times the units' rated output voltage. The associated delay time value can be set from 1ms to 10s.

5.5.4.5 OPP (Over Power Protection)

The Over-Power Protection (OPP) threshold range is adjustable from 0.0W to 1.1 times the units rated power. The associated delay time setting can be set from 1ms to 10s.

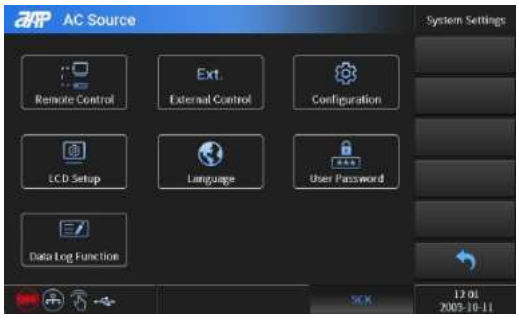
5.5.4.6 RMP (Regulation Mode Protection)

The Regulation Mode Protection function is an optional protection mechanism that will turn off the output when the output mode transitions between CV and CC mode. The protection can be chosen to engage on either the transition from CV to CC mode, or the transition from CC to CV mode. Only one of these two conditions can be enabled at any one time. The delay between the protected transition event and the RMP can be set with the delay time.

5.6 System Setup

The following menu options are available on the System Setup page:

- Remote Setup
- External Control
- Configuration
- LCD Setup
- Language
- User Password
- Data Log Function



5.6.1 Remote Setup

The remote setup page provides access to all six available remote communication interface configuration pages:

- RS232
- RS485
- USB/GPIB
- LAN
- CAN

Note

- For your particular unit(s) some of Remote Setup configuration pages may be not supported because the RS232, RS485, LAN, GPIB and CAN interfaces are optional.

5.6.1.1. RS232 Settings

From the Remote Setup page, press the **RS232** soft key to enable and change the RS232 interface settings. Set the Baud-rate, Parity and Stop bits fields to the desired settings using the check boxes.

The R232 parameters are:
Enable: On/Off.
Length: Fixed at 8.
Baud Rate: 9600, 19200, 38400, 57600, 115200, 256000.
Parity: NONE, ODD, EVEN.
StopBits: 1, 1.5, 2.

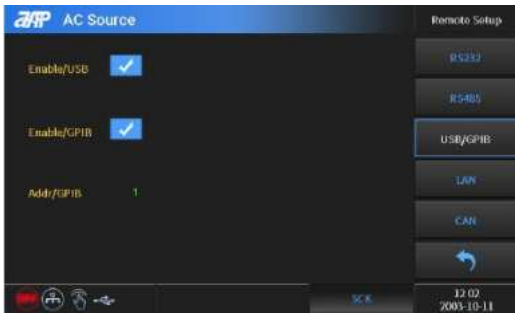
5.6.1.2 RS485 Settings

From the Remote Setup page, press the **RS485** soft key to enable and change the RS485 interface settings. Set the Address, Baud-rate, Parity, Mode, and Stop bits fields to the desired settings using the check boxes.

The R485 parameters are:
Enable: On/Off.
Length: Fixed at 8.
Addr (Address): 1~254
BaudRate: 9600, 19200, 38400, 57600, 115200, 256000.
Parity: NONE, ODD, EVEN.
Mode: SCPI, Modbus.
StopBits: 1, 1.5, 2.

5.6.1.3 USB/GPIB Settings

From the Remote Setup page, press the **USB/GPIB** soft key to enable and change the USB/GPIB interface settings. Set communication mode GPIB address to the desired value if relevant.



The USB/GPIB parameters are:
Enable/USB: On/Off (enables USB communication mode).
Enable/GPIB: On/Off (enables GPIB communication mode).
GPIB Address: 1~30.

5.6.1.4 LAN Settings

From the Remote Setup page, press the **LAN** soft key to enable and change the LAN interface settings and addresses.

- info
- IP-Conf.
- Serv-Conf.

5.6.1.4.1 Info

Press the device **info** button to display the LAN read back information.

5.6.1.4.2 IP-Conf.

Press the **IP-Conf.** select key to enter the IP configuration screen.

IP-Conf. The configuration parameters as follow:

IP-Mode: Automatic: The IP address and other parameters are automatically configured.
Manual: Manually set the following parameters. The default value is manual.

IP Address: Specifies the IP address. The default value is 192.168.1.100.

SubNet: Set the subnet mask. The default value is 255.255.255.0.

Gateway: Set the gateway address. The default value is 192.168.1.1.

Socket Port: Set the port number. The default value is 2001.

5.6.1.4.3 Serv-Conf.

Press the **Serv-Conf.** select key to enter the Serv configuration screen.

Serv-Conf. The configuration parameters as follow:

MDNS: Enables or disables the mDNS service. The default value is disabled.

PING: PING switch. After this function is enabled, users can use the ping tool to check network connectivity and view IP addresses.Disabling the Ping responder minimizes an unauthorized person's ability to find a connection and change the configuration of the LXI device.The default value is enabled.

Telnet-scpi: Telnet-scpi switch. After this function is enabled, the SCPI protocol can be used for communication. The default value is disabled.

Web: Web function switch. After this function is enabled, you can enter the web page control interface in the browser. The default value is disabled.

VXI-11: Enables or disables the VXI-11 service. The default value is disabled.

Raw-socket: Raw-socket Indicates the Raw socket function switch. After this function is enabled, the Rawsocket can be used for communication. The default value is disabled.

5.6.1.5 CAN

From the Remote Setup page, press the **CAN** soft key to enable and change CAN interface settings.

The CAN parameters are:

Enable: enables CAN communication mode.

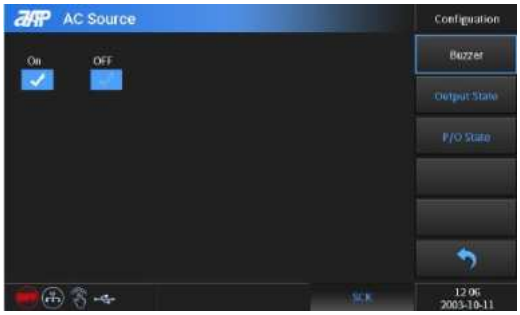
Addr: 0~127.

BaudRate: 10K, 100K, 250K, 400K, 500K, 1000K.

5.6.2 Configuration

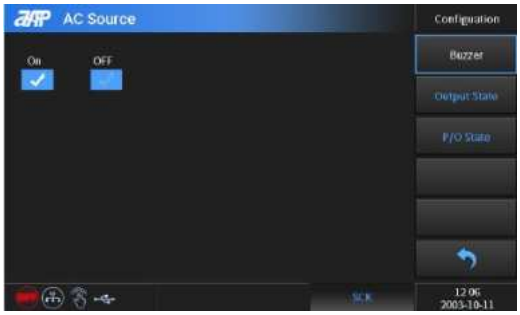
The System setting page is used to configure the following resources of the power source:

- Buzzer
- Output State
- P/O State (Power On State)



5.6.2.1 Buzzer

The audible indication buzzer can be turned on or off by selecting ON or OFF in the System Setup menu. When turned ON, an audible beep will sound each time a key or rotary knob is pressed. If audible indication is not desired, turn the buzzer sound OFF.

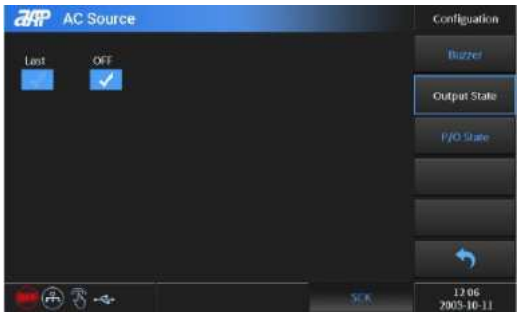


5.6.2.2 Output State

The Power on Output State controls whether or not the output is enabled directly after power on. The following the two options are available:

Last: The power supply will save the output settings in effect when it was last powered off, and will recall this same setting at power on.

OFF: The output of the power supply will remain off at power on.



5.6.2.3 P/O State (Power On State)

The Power On State function allows the source to be set to the previous voltage, current, power, and resistance values upon unit startup. Available selections are:

Last: The power supply will store the settings in effect when the supply was last powered off, and will recall the same settings at power on. This means the unit will power up in the same conditions as when it was turned off.

User: In this mode, a user-defined configuration can be assigned for recall when the power source is turned on. This means the power supply will always turn on with the values of this specific configuration. One can set the parameters shown under the P/O Setting heading near the bottom of the page to the desired values.

Off: The power source will NOT store any settings when it is powered off and will initialize with factory defaults at the next power on.

5.6.3 External Control

The power supply can be controlled and monitored using external digital and analog signals connected to the appropriate terminals on the back panel.

Note

- Before you begin, please read these important notes about the use of the external control interface:

1. Before any hardware is connected to the analog interface, the user must ensure that the external hardware will not apply signal levels exceeding the maximum ratings of the interface (Please see table below to learn of these maximum signal levels).

2. Set signal pins such as Vset, Iset, Pset and Rset (if R mode is activated), cannot be left floating while using the control interface. If any inputs are not used for adjustment, they can be connected to a defined level such as VREF, which will act as the maximum value or connected to analog ground to act as the minimum value.

5.6.3.1 Setup

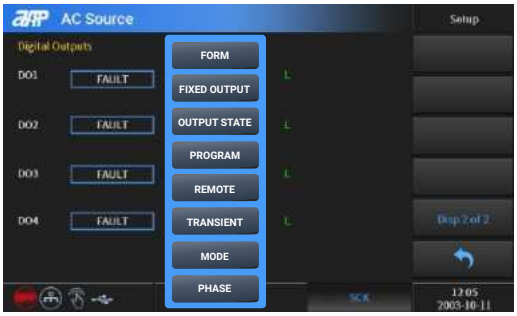
The external control Setup page defines the active levels of signals and event triggers depending on the needs of the test setup.

The external control parameters are:
EXT Control: Enables/disable external control mode.
VREF: The External Control reference voltage, can be set to either 5V or 10V.
Prohibition of output: selection and closing of the forced prohibition of output mode.
When the option is closed, this function is turned off; open mode: after the external input level signal is set, it will enter the forced prohibition of output mode. After the input level is reversed, no other action is required. Just turn off the forced prohibition output mode directly; latch mode: after the external input level signal is set, it will enter the forced prohibition output mode, and at the same time this mode enters the locked state. When the input level signal is reversed, it will not exit the forced prohibition In output mode, press the middle button of the knob on the front panel or send EXTERN:LACHCLEAR to release the locked state before exiting the forced prohibition output mode; the default is enabled. (This function can also be used without entering the external control mode)

Digital Inputs

No	Name	Description	Notes
1	AI_ENABLE (fixed to DI1)		Analog input enable switch, voltage range is 0-30V, Imax=1mA; When input for analog quantity: Analog input enabled =LOW, Ulow<1V; (Factory default) If analog input is disabled =HIGH, Uhigh > 4V
2	1PH/3PH		The interface can be configured to select three-phase or single-phase output. The default value is 1PH. Three-phase and single-phase modes: three-phase =Low, Ulow<1V; single-phase =HIGH, Ulow > 4V; can be programmed to determine high/low level valid.
3	RECALL1	Combines with RECALL2, save the first 3 groups of voltages in the call quick settings	Voltage range is 0-30V, Imax=1mA; 0=LOW, Ulow< 1V; 1=HIGH, Uhigh > 4V. 0/0 --VS RECA1/RECA2 Disabled and inactive (factory default) 0/1 --VS RECA1/RECA2 The first set of parameters in the quick Settings 1/0 --VS RECA1/RECA2 The second set of parameters in the quick setting 1/1 --VS RECA1/RECA2 Thethird set of parameters in the quick settings
4	RECALL2	Combines with RECALL1, save the first 3 groups of voltages in the call quick settings	
5	Disable output	Output switch lock, used to force output off	Voltage range is 0-30V, Imax=1mA; The output is controlled by EXT-ON. 1V; (Factory default) Forcible shutdown =HIGH, Uhigh > 4V; Programmable to determine high/low level valid

6	SYNC_IN	Phase Sync Input indicates phase and frequency synchronization signals. In single-phase mode, enter the square wave frequency. Decided, the voltage value of the external control interface should be able to set when the three-phase mode, the B/C phase according to the three-phase phase relationship, Based on the A-phase Sync In, the voltage value should also be set in the external control interface. This function cannot be used at the same time with AI1-4. The configuration screen should enable/disable the switch	Voltage range is 0-30V, Imax=1mA; Off =LOW; 1V; (Factory default) On =HIGH, Uhigh > 4V; Configuration switch = Disable Programmable to determine high/low level valid



Digital Outputs

No	Name	Description	Notes
1	FAULT	The fault output always works regardless of whether it is enabled or disabled by external control.	When Uce=0.3V, Imax=-8mA, No fault =LOW, Ulow< 1V; (Factory default) If yes =HIGH, Uhigh > 4V. Programmable to determine high/low level valid
2	FORM		When the output is in FORMWAVE (B), this pin turns off the opposite level, otherwise the default level is maintained.
3	FIXED OUTPUT		At output, there is a pulse of 64uS when the set voltage changes, and the set voltage is synchronized with the final output voltage, with a delay of up to 64uS
4	OUTPUT STATE	The product output indication always works regardless of whether it is enabled or disabled by external control	The factory default Uce=0.3V, Imax=-8mA Product no output =LOW, Ulow< 1V; (Factory default) Product output =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
5	PROGRAM		When the output is working in Pluse, List, Step mode, this pin will turn off the opposite level, otherwise maintain the default level.
6	REMOTE		Remote/Local/external control, this pin will turn off the opposite level, otherwise maintain the default level
7	TRANSIENT		When the voltage set value changes during output, this pin will send the opposite level of 64uS, otherwise maintain the default level.
8	MODE		When the output is operating in DC mode, this pin turns off the opposite level, otherwise (AC, AC+DC) maintains the default level.
9	PHASE		When the output is operating in single phase/reverse mode, this pin will turn off the opposite level, otherwise maintain the default level. Single/invert one level; Three-phase/multichannel one level

5.6.3.2 Monitor

The Monitor page displays the state and polarity of the external control module pins. This page is for information purposes only as no settings can be configured using it.

Digital Inputs Monitoring Instructions

No	Name	Description
1	AI_ENABLE	The default configuration parameter is L level. In this case, L-ENA is displayed when the external input is low, and H-DISA is displayed when the external input is high
2	1PH/3PH	The default configuration parameters are 1PH and H level. In this case, the external input high level displays H-1PH, and the low level displays L-3PH
3	INHIBIT	The default configuration parameter is H level. In this case, H-ENA is displayed when the external input is hight, and L-DISA is displayed when the external input is low
4	SYNC_IN	The default configuration parameter is L level. In this case, L-ENA is displayed when the external input is low, and H-DISA is displayed when the external input is high

Digital outputs Monitoring Instructions

No	Name	Description
1	REMOTE	The default configuration parameter is H level. L-DISA is displayed for panel control and H-DISA is displayed for remote control
2	MODE	The default configuration parameter is L level. L-ac is displayed in AC mode, H-DC is displayed in DC mode, and H-AC+DC is displayed in AC+DC mode
3	FORM	When the output is in FORMWAVE (B), this pin turns off the opposite level, otherwise the default level is maintained. H-DISA is displayed on high levels and L-DISA is displayed on low levels
4	OUTPUT STATE	The default configuration parameter is H level. If the internal digital output is high, H-on is displayed, and L-OFF is displayed

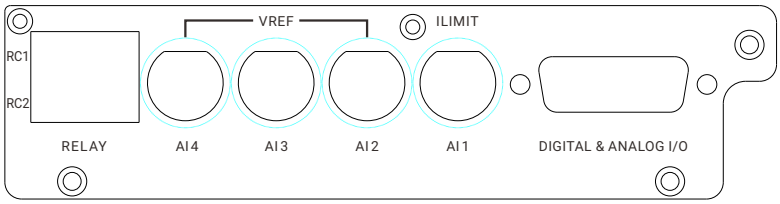
Analog Inputs Setting Instructions

No	Name	Description	Notes
1	AI1 A_VMON	Set the A-phase voltage RMS value, 0-5V/0-10V corresponds to 0... 100% of (Unom*1.05)	Accuracy: <0.2%Umax
2	AI2 B_VMON	Set the B-phase voltage RMS value, 0-5V/0-10V corresponds to 0... 100% of (Unom*1.05) *Note 1/2-2U products, single-phase output products do not have this function	Accuracy: <0.2%Umax
3	AI3 C_VMON	Set the C-phase voltage RMS value, 0-5V/0-10V corresponds to 0... 100% of (Unom*1.05) *Note 1/2-2U products, single-phase output products do not have this function	Accuracy: <0.2%Umax
4	AI4 Imon	Set the limit of RMS value of each phase current, 0-5V/0-10V corresponds to 0... 100% of (Unom*1.05)	Accuracy: <0.2%Umax

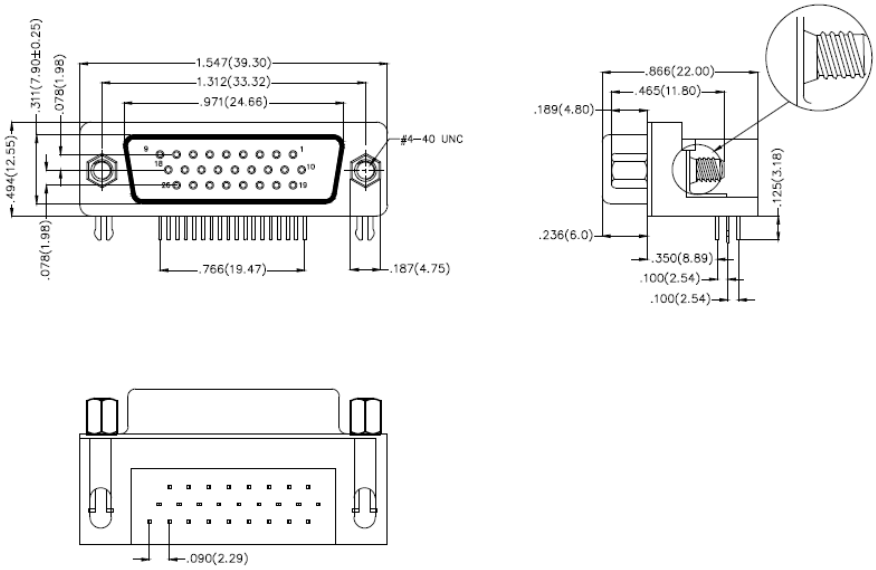
Analog outputs Setting Instructions

No	Name	Description	Notes
1	AO1 A_VMON	A-phase voltage monitoring signal of RM	0-5V/0-10V corresponds to 0... 100% of (Unom*1.05)
2	AO2 B_VMON	B-phase voltage monitoring signal of RM	0-5V/0-10V corresponds to 0... 100% of (Unom*1.05) *Note 1/2-2U products, single-phase output products do not have this function
3	AO3 C_VMON	C-phase voltage monitoring signal of RM	0-5V/0-10V corresponds to 0... 100% of (Unom*1.05) *Note 1/2-2U products, single-phase output products do not have this function
4	AO4 VA/VAR/WATTS	Total power of each phase	Optional VA,VAR,Watts (default VA) 0-5V/0-10V corresponds to 0...100% of (P_nom*1.05)

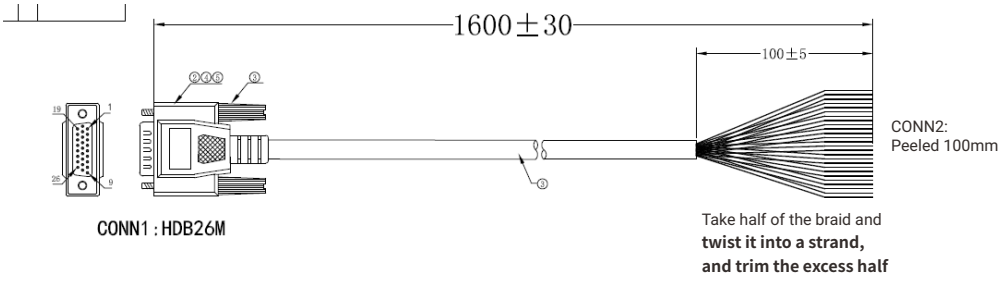
External Control Adapter Card (Optional)



Provides the external simulation input control function and the simulation output of the internal signal, the terminal is 26P DB connector.



This interface can program 0-full scale output voltages or currents by connecting external voltages (0-5V/0-10V) or external resistors (0K-5KoHMS/0K-10KoHMS), while monitoring the current output voltages and currents through analog monitoring functions (0V-5V/0-10V). The bandwidth of the analog signal is less than 5KHz, and any waveform is supported within the signal bandwidth, and when the programmed signal frequency or amplitude exceeds the output capacity, it will be automatically limited.



Wiring diagram: **Core wire sorting color can not be changed**

CONN1	CONN2	CONN1	CONN2
1	Yellow	15	white
2	Yellow and black	16	white and black
3	Red	17	Pink
4	Red and black	18	Pink and black
5	Brown	19	Purple
6	Brown and white	20	Purple and white
7	Light blue	21	Gray
8	Light Blue Black	22	Gray and black
9	Light Blue Green	23	Orannge
10	Light Blue Yellow	24	Orange Black
11	Green	25	Pink and white
12	Green and black	26	Pink and yellow
13	Blue	Shell	Knitting
14	Blue and white		

The DB26 terminal signal list is as follows:

PIN	Name	Type	Description	Notes
1	1PH/3PH	Digital Input	Three-phase and single-phase outputs are optional	Three-phase and single-phase modes: Three phases =Low. 1V; Single-phase =HIGH, Ulow>4V; Programmable to determine high/low level valid
2	AI_ENABLE	Digital Input	Analog input enable switch	Voltage range is 0-30V, Imax=1mA; When input for analog: Analog input enabled=LOW, Ulow<1V; (Factory default) Analog input disabled=HIGH, Uhigh>4V;
3	RECALL1	Digital Input	Combines with RECALL2, save the first 3 groups of voltages in the call quick settings	Voltage range is 0-30V, Imax=1mA; 0=LOW, Ulow<1V; 1=HIGH, Uhigh>4V; 0/0 ---VS RECA1/RECA2 Disabled and inactive (factory default) 0/1 ---VS RECA1/RECA2 The first set of parameters in the quick Settings 1/0 ---VS RECA1/RECA2 The second set of parameters in the quick Settings 1/1 ---VS RECA1/RECA2 The third set of parameters in the quick Settings
4	RECALL2	Digital Input	Combines with RECALL1, save the first 3 groups of voltages in the call quick settings	
5	INHIBIT	Digital Input	The output switch lock is used to force off the output of the product; The addition of 3 options (OFF/LIVE/LATCing) is mainly added according to the current non-standard requirements	Voltage range is 0-30V, Imax=1mA; The output is controlled by EXT-ON. 1V; (Factory default) Forcible shutdown =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
6	SYNC_IN	Digital Input	Phase Sync Input indicates phase and frequency synchronization signals. When the mode is single-phase, the frequency is determined by the input square wave frequency. The voltage value can be set on the external control interface. When the mode is three-phase, the B/C phase is three-phase phase and the A phase is Sync In phase Also, the voltage value should be able to be set in the external control interface. This function cannot be used at the same time with AI1-4. The configuration screen should enable/disable the switch	Voltage range is 0-30V, Imax=1mA; The output is controlled by EXT-ON. 1V; (Factory default) Forcible shutdown =HIGH, Uhigh > 4V; Programmable to determine high/low level valid

PIN	Name	Type	Description	Notes
7	DGND	Digital ground	Digital power supply reference plane	
8	AGND	Analog ground	Analog power reference plane	
9	VREF	Analog output	5V/10VREF	Imax=0.1A; VREF can be set in the panel, corresponding to 5V/10V respectively
10	SYNC_OUT	Digital output	Phase A gives a pulse when it crosses zero Always working without being enabled or enabled by external controls	When Uce=0.3V, Imax=-8mA,Umax=30V No trigger =Low, Ulow<1V; If triggered =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
11	OUTPUT STATE	Digital output	The product output indication always works regardless of whether it is enabled or disabled by external control	The factory default Uce=0.3V, Imax=-8mA Product no output =LOW, Ulow< 1V; (Factory default) Product output =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
12	FAULT	Digital output	The fault output always works regardless of whether it is enabled or disabled by external control.	Voltage range is 0-30V, Imax=1mA; The output is controlled by EXT-ON. 1V; (Factory default) Forcible shutdown =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
13	DO1	Digital output	Configurable: FAULT FORM FIXED OUTPUT OUTPUT STATE PROGRAM REMOTE TRANSIENT MODE PHASE PHASE(When the output is working in single phase/reverse mode, this pin will turn off the opposite level, otherwise maintain the default level. Always working without being enabled or enabled by external controls * Note 1/2-2U products, single-phase output products have this pin, but no PHASE setting function.	Factory default REMOTE When Uce=0.3V, Imax=-8mA, Umax=30V Panel control =Low, ulow; 1V; Remote control =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
14	DO2	Digital output		Factory default MODE(AC,DC,AC+DC) When Uce=0.3V, Imax=-8mA, Umax=30V AC=Low, Ulow<1V; AC+DC, DC=HIGH, Uhigh > 4V; Programmable to determine high/low level valid
15	DO3	Digital output		Factory default FORM When Uce=0.3V, Imax=-8mA, Umax=30V 1 phase=LOW, Ulow<1V ; 3 phase=HIGH, Uhigh >4V; Programmable to determine high/low level valid
16	DO4	Digital output		Factory default OUTPUT STATE When Uce=0.3V, Imax=-8mA, Umax=30V 1 phase=LOW, Ulow<1V ; 3 phase=HIGH, Uhigh >4V; Programmable to determine high/low level valid
17	A_VMON	Analog output	A-phase voltage monitoring signal of RMS	Analog quantity RMS value of each phase voltage, -5V-5V/-10V-10V correspondence 0...100% of (U_nom*1.05)
18	B_VMON	Analog output	B-phase voltage monitoring signal of RMS *Note 1/2-2U products, single-phase output products do not have this function	Analog quantity RMS value of each phase voltage, -5V-5V/-10V-10V Correspondence 0...100% of (U_nom*1.05)
19	OUTPUT_ ON	Digital input	Signal input, external control switch	Voltage range is 0-30V, Imax=1mA Off =LOW; 1V; (Factory default) On =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
20	EXT_EN	Digital input	External control force entry signal	Voltage range is 0-30V, Imax=1mA; Interface configuration decision mode =LOW, Ulow< 1V; (Factory default), Forced external control =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
21	TRIG_ON	Digital input	Transient Trigger Input, which can be used to trigger lists, etc	Voltage range is 0-30V, Imax=1mA; No trigger =Low, Ulow< 1V; If triggered =HIGH, Uhigh > 4V; Programmable to determine high/low level valid
22	TRANSIENT	Digital output	Function Strobe, List output when/output status/parameter changes are not affected by external control enabled or disabled, always work.	When Uce=0.3V, Imax=-8mA,Umax=30V No trigger =Low, Ulow< 1V; If triggered =HIGH, Uhigh > 4V; Programmable to determine high/low level valid

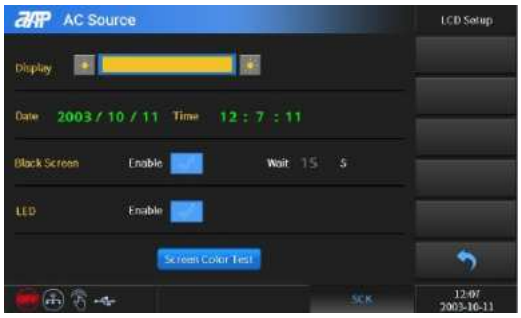
PIN	Name	Type	Description	Notes
23	DGND	Digital ground	Digital power supply reference plane	
24	AGND	Analog ground	Analog power reference plane	
25	C_VMON	Analog output	C-phase voltage monitoring signal of RMS *Note 1/2-2U products, single-phase output products do not have this function Note: The 1/2-2U model here is RS485-A	Analog quantity RMS value of each phase voltage, -5V-5V/-10V-10V correspondence 0...100% of (U_nom*1.05)
26	VA/VAR/ WATTS	Analog output	Total power of each phase Note: The 1/2-2U model here is RS485-B	Analog quantity power of each phase, Optional VA,VAR,Watts (default VA) -5V-5V/-10V-10V correspondence 0...100% of (U_nom*1.05)

Note

- If the EXT-EN signal is true, the enable will override the EXT Control Disable setting.

5.6.4 LCD Setup

From this menu, the user can set the brightness, date, on/off and time of the screen, on/off of the knob backlight and screen color test.



5.6.5 Language

The language section changes the language in which all menus appear. The supported languages are English, Simplified Chinese, and Traditional Chinese.

5.6.6 User Password

You can use this menu to enter the user - defined password setting screen.
(The original password: 702358)

5.6.7 Data Logging

Users can access the data logging function through this menu.

Enable: This function is enabled after you tick the box. By default, it is disabled.

Sampling Type: up to 6 parameters can be selected to save, a total of 21 parameters can be selected, can be repeatedly selected, select hidden display hidden;

Sampling period: Set the sampling period to 1s, 2s, 5s, and 10s. The default value is 1s.

Sampling time: Enter the sampling time,the maximum value is 100000s. The default value is 0.

Trigger source: You can choose immediate and manual, immediate mode: after selection, start and stop will pop up, click "start" to start recording data, click "stop" to stop recording data, for recording data before output; Manual mode: Return to the main interface and click ON before recording data, and click OFF to stop.

5.7 Series/Parallel

The series/parallel menu includes:

- Single State
- Master State
- Slave State

In this menu, you can set the single state, master state and slave state according to customer requirements, see Chapter 6 for details.

Note

- Only when the module specifications of each channel are the same can series parallel.

5.8 Advanced Function

This series of power supply supports the following advanced function:

- Test Mode
- Transient
- Triac Dimmer
- IEC Standard
- Counting Function
- Oscilloscope

5.8.1 Test Mode

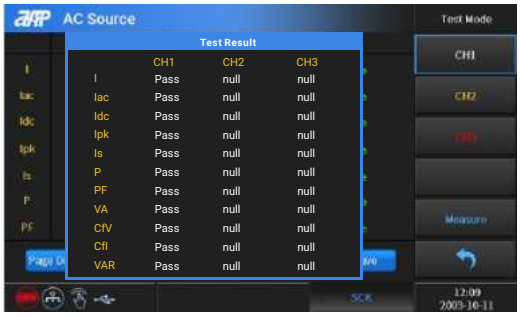
The Test Mode compares measurement values against a user defined set of measurement high and low limits, and shows a PASS or FAIL result if one or more measurements are out of range. This mode is useful for production test applications. Measurements include U, I, P and R.

Measure: Measure all parameters, you can click single channel trigger and all trigger.

Enable All: Enable all the parameters comparison at the same time.
Disable All: Disable all the parameters comparison at the same time.
Trigger: To run a limit test.

Save: Save the settings to memory when entry is complete.
Test Time: Duration of measurement and limit compare period. The test time will take effect only if enabled.
Delay Time: Time delay between enabling the output of the power source and the start of measurement pass/fail testing in seconds.
Time Left: Time to wait after end of Test time to turn output OFF.

Press the **Trigger** soft key to run a limit test. Once the output is turned on, after Delay time, the measurements will start and compare against the limits set for the period of time programmed. test result will be displayed when the total time period is over. Press the **Cancel** key to close the test result.



5.8.2 Transient

This function can be used to simulate changes in the mains, such as surges or sinking waves, to detect whether the object under test can operate normally in harsh environments.

The Settings and measurements on the left side follow the Settings and measurements on the main interface.

Mode: The trigger mode is executed, the trigger signal arrives, and the notch wave is generated. You can choose to generate the notch immediately or specify the starting angle to generate the notch wave.
Action: It is displayed only when the trigger mode is selected. You can select immediate or Angle.
Immediate: immediate generation of surges/traps; Angle: Produces a surge/trap at a specific Angle.

Trigger source: It can choose manual, remote, external control.
Starting Angle: Produces a crater at the Angle specified by this parameter. In immediate trigger mode, this parameter has no meaning.
Angle width: Set the width of the surge/trap.
Symmetry: On/off to control whether the positive and negative cycles are symmetrical to produce a notch wave. If starting Angle + Angle width > 180° is always off.
Repeat Count: the number of successive trapping waves.
Peroid Count: The number of cycles that produce a spike/notch. This parameter is only meaningful in periodic mode. This setting is used in combination with the number of repetitions. For example, if the number of repetitions is set to 5 and the period is set to 10, five spikes/traps occur in every 10 periods.
Value Select: Optional percentage and Settings.
Percentage: The change amplitude is the percentage of the instantaneous value of the current voltage; **Setting:** Specifies the value mode, specifying how many V drops to.

The measurement in the selection bar on the right, refer to the measurement in test mode.

5.8.3 Triac Dimmer

This function adjusts the active power by setting the phase Angle for the front, or the invisibility of the waveform along the back to adjust the light intensity.

Set the Vac, F, Vdc, and I parameters on the main screen.

Edge: Set phase Angle front waveform fade, or back waveform fade.

Angle: Set the beginning Angle of waveform invisibility.

Trigger: Click to trigger waveform output, and the trigger key position will be displayed as stop.

The measurement in the selection bar on the right, refer to the measurement in test mode.

5.8.4 IEC Standard

This function is based on IEC61000-4-11 voltage dip and voltage gradient two test items, built-in test waveform in line with grade standards Can be directly adjusted, you can also choose user-defined set output parameters. (The gray part cannot be modified)

Standard: Test level selection.
Category: Optional interrupts, voltage dips, and voltage variations. The interrupt can choose 2 types /3 types/users; Voltage dip optional 2 class /3 class/user; Voltage change optional standard/custom. Voltage Range: Fixed according to the gear and cannot be modified. User-defined can be set by oneself.
Count: It can be set in the range of 0 to 65535, 0 represents infinite cycle.
Unom: Fixed voltage, not modifiable. User-defined can be set by oneself.
Frequency: Set frequency parameters.
%: Residual voltage after the drop is the percentage of the reference voltage.
Cycle: Dip duration.
Start Degree: The Angle at which the drop voltage begins.
Repeat: Temporarily decrease the number of repetitions.
Interval: A time interval.
td: The time when the set voltage drops from the standard voltage to the ratio, expressed in cycles, the calculation of time can refer to the frequency, Fixed at 0 in standard mode.

ts: The duration of the ratio, expressed in periods, the calculation of time can refer to the frequency, fixed at 1 in standard mode.
ti: The time when the set voltage rises from the ratio to the standard voltage, expressed in cycles, the calculation of time can refer to the frequency, which is fixed at 25 in the standard mode.
Rate: The percentage of falling voltage in the voltage gradient.
Save: parameter save.
Load: Download parameters.
Diagram: It can preview the test waveform outline.

The measurement in the selection bar on the right, refer to the measurement in test mode.

5.8.5 Counting Function

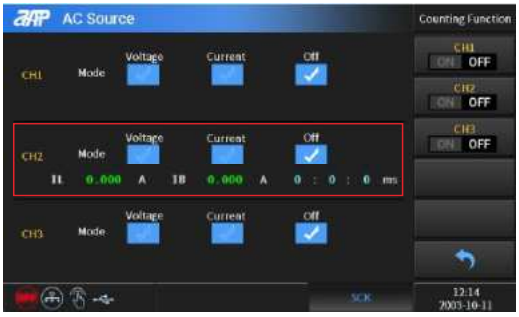
This function offers testing of the cutoff time of a breaker or a fuse.

The options include Voltage, Current and OFF.

In the voltage counting mode, set the basic output parameters according to the test requirements. After clicking the IL parameter setting area, a numeric keyboard will pop up on the screen, select the desired number to input, and press [Enter] after completion. IL stands for the counting stop current.

After the setting, press the [On/Off] key to turn on the output. The count starts from when output voltage has reached the setting and stop until the breaker or fuse is open.

In the current counting mode, set the basic output parameters according to the test requirements. After clicking the IL and Ib parameter setting area, a numeric keyboard will pop up on the screen, select the desired number to input, and press [Enter] after completion, IL is the counting load stop current, and Ib is the start counting current.



After the setting, press the [On/Off] key to turn on the output. The count starts from when output current has reached Ib setting and stop until the breaker or fuse is open, when the output current is less than IL setting.

5.8.6 Oscilloscope (Coming soon)

Description on the left:
Setting: Follow the parameters on the main screen.
Measurement: Displays the read-back value.

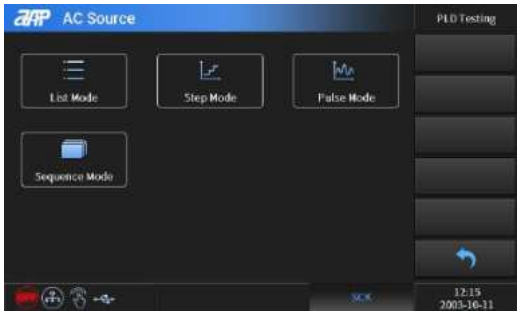
Waveform display interface key description:
Voltage/current/time: Adjust the value represented by each cell of voltage/current/time in the current oscilloscope interface;
U↑: When the trigger voltage is displayed, adjust the voltage trigger line. When the trigger source is current, the trigger current value is displayed here.
Settings: Click Settings to display the waveform;
Single machine: Used for a single trigger. The display is ready during the trigger process and stops when the trigger is complete.
Run/Stop: Stops or starts the oscilloscope function.
AutoSet: Automatically adjusts the scale of the appropriate vertical axis.

Click A/B/C on the right side to set the voltage/current/frequency of A/B/C phase respectively.
Enable: mV/kV,mA/kA Sets the value of voltage and current represented by each bar.
Time: Sets the value of each column of time.
Trigger Source: indicates the trigger source that generates the trigger condition.
Trigger Level: The level at which the trigger slope passes. If the trigger source signal passes the set trigger level according to the specified trigger slope, the trigger occurs. Turn the knob to adjust the trigger level. Change the size of trigger level, the change of trigger level can be observed on the screen.
Delay: Trigger delay adjustment. For example, if the value is set to 1ms, the trigger is delayed by 1ms.
Mode: indicates the trigger mode. The value can be Auto or Normal.
a. Automatic mode: When triggered during the pause time, update the display waveform;
When no trigger occurs during the pause time, the display waveform is automatically updated.
b. Normal mode: When triggered, update the display; When not triggered, the display is not updated.
Slope: Trigger source selection. You can select the rising and falling edge of voltage or current.

5.9 PLD Testing

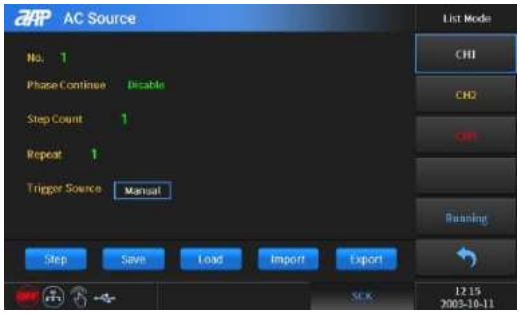
This page allows the user to program an output sequence in one of the following modes:

- List Mode
- Step Mode
- Pulse Mode
- Sequence Mode



5.9.1 List Mode

Click the **List Mode** selection button to enter the list mode interface.



Parameter setting range:

NO. : Set file names, ranging from 1 to 36 for each channel.
Phase connection: Optional enable and disable;
Enable: The starting Angle of each sequence will act according to the set value of each sequence.
Disabled: The starting Angle of each sequence will automatically change with the final output Angle of the previous sequence.
When set to enable, the angles of each sequence are considered invalid Settings.
Step Count: Set the total number of steps in the current list file, which can range from 1 through 12.
Repeat: The number of cycles of this file, set the range from 0 to 9999, 0 represents infinite cycles.
Trigger Source: manual and external control can be selected.

Step: Edit the setting parameters in the list.
Save: Saves the list to the memory when entry is completed.
Download: Load data button, after clicking will not automatically jump to the running interface.
Import: After inserting the U disk, the list file in the U disk can be imported into the list mode.
Export: After inserting the U disk, the list file can be imported into the U disk.

In the steps interface, the user can add and edit the steps in the list.

The descriptions of the each setting in the list file editor is as follows:
Step No: Changes with the change of steps.
Vac start: Set the parameters of AC voltage starting waveform.
Vac end: Set the waveform parameters of AC end voltage.
Vdc start: Set the DC start waveform parameters.
Vdc end: Set the DC end waveform parameters.
F start: Set the frequency start waveform parameters.
F end: Set the frequency end waveform parameters.
Degree: Waveform starting phase degree.
Base: Can be set duration or time, the current number of steps, this change with the Base changes, the default 10.
Trigger: Set the current step file running mode.
Continue: After running the current step, proceed to the next step.
Step: Keep the current output after running the current step and continue by default.
Count: Current Step execution times, 0-9999, 0 represents infinite loop, default 10
Waveform: Select waveform A/B.

Press the **Running** key to enter the run screen.

The available options on the list execution page are:
Trigger: Begins the execution of the selected list file.
Stop: Stop the list execution.
Trigger All: Begins the execution of all list file.
Stop All: Stop all the list execution.

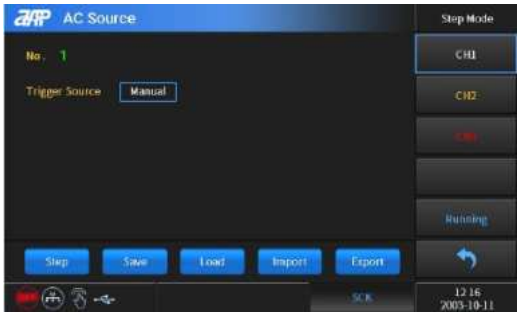
The progress of the list file execution can be seen in the bottom of the screen, showing the user which step is being executed, what repeat number the test is on, and test timing.

Note

- If the transient execution mode is set to Step, the output state will hold on the last step until the next pressing of the Trigger key.
- If a list execution is interrupted by pressing the Stop key, when in Cont mode it will start at the beginning of the list or when in Step mode it will resume from the current step.

5.9.2 Step Mode

The step mode allows the output state to perform a step function, changing any combination of voltage, current, power, or resistance. The step function consists of two points, which should differ in value across the available voltage, current, power, or resistance settings.



The available menu options are:

NO. : Step file NO.

Trigger Source: manual and external control can be selected.

Step: Edit the setting parameters in the step.

Save: Save the step to memory when entry is complete.

Download: Load data button, after clicking will not automatically jump to the running interface.

Import: After inserting the U disk, the step file in the U disk can be imported into the step mode.

Export: After inserting the U disk, the step file can be imported into the U disk.

To begin making a step file, press the **Step** soft key to enter the step file editor.
Write a new step file by selecting an unused step number, or edit an existing step by selecting an already allocated step number.

The available menu options are:

Vac, Vdc, F: The initial value at the beginning of the step mode.

ΔVac, ΔVdc, ΔF: Set the step value.

Degree: The starting phase degree of each step.

Count: The number of times the current step is executed. The value ranges from 0 to 9999. 0 indicates infinite loop.

Dwell: The time of each step.

Power Sweep: Maximum power point scanning.

Waveform: Select waveform A/B.

Press the **Running** key to enter the run screen.

The available options on the step execution page are:

Trigger: Begins the execution of the selected step file.

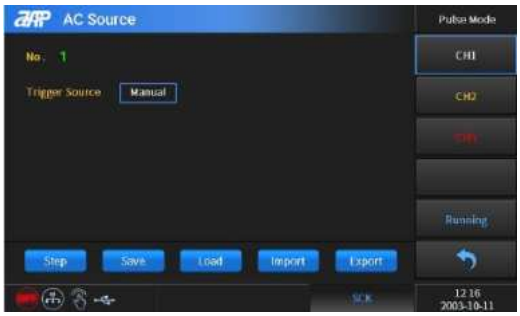
Stop: Stop the step execution.

Trigger All: Begins the execution of all step file.

Stop All: Stop all the step execution.

The progress of the step function test is displayed near the bottom of the screen. This window will update in real time as the step file is running, showing the total run time and time remaining in the test.

5.9.3 Pulse Mode



NO. : Step file NO.
Trigger Source: manual and external control can be selected.
Step: Edit the setting parameters in the pulse.
Save: Save the pulse to memory when entry is complete.
Download: Load data button, after clicking will not automatically jump to the running interface.
Import: After inserting the U disk, the pulse file in the U disk can be imported into the step mode.
Export: After inserting the U disk, the pulse file can be imported into the U disk.

To begin making a step file, press the **Step** soft key to enter the pulse file editor.
Write a new pulse file by selecting an unused pulse number, or edit an existing pulse by selecting an already allocated pulse number.

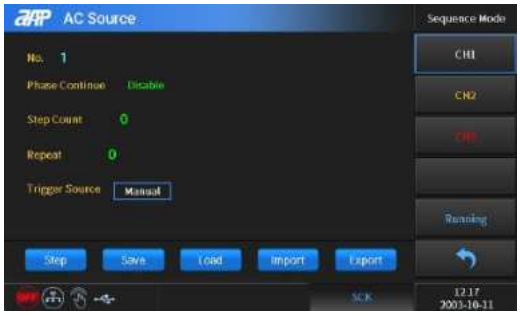
The available menu options are:
Vac, Vdc, F: Pulse waveform parameters.
Duty cycle: The proportion of the pulse waveform in a single cycle.
Degree: Waveform starting phase degree.
Count: The number of times the pulse file is executed, ranging from 0 to 9999, where 0 represents infinite loop.
Period: total cycle length.
Start: duration of main interface output before entering pulse mode.
Waveform: Select waveform A/B.

Press the **Running** key to enter the run screen.

The available options on the pulse execution page are:
Trigger: Begins the execution of the selected pulse file.
Stop: Stop the pulse execution.
Trigger All: Begins the execution of all pulse file.
Stop All: Stop all the pulse execution.

5.9.4 Sequence Mode

The Sequence mode allows the user to construct long sequences using multiple pre saved list files.



NO. : Set file names.
Phase connection: Optional enable and disable;
Step Count: Set the total number of steps in the current list file.
Repeat: Sets the maximum number of cycles for all list files.
Trigger Source: manual and external control can be selected.
Step: Edit the setting parameters in the sequence.
Save: Saves the sequence to the memory when entry is completed.
Download: Load data button, after clicking will not automatically jump to the running interface.
Import: After inserting the U disk, the sequence file in the U disk can be imported into the list mode.
Export: After inserting the U disk, the sequence file can be imported into the U disk.

To begin making a sequence file, one or more list files should previously be saved in memory as per the List Mode section of this manual. Press the **Step** soft key to make or edit sequence files in the sequence File editor. To edit an existing sequence saved in memory, select its number in the sequence number field. A sequence file consists of steps just like a list file, except each sequence step executes an entire list file before continuing to another sequence step. To begin a new sequence file, select an unused sequence number before adding any entries.

The available menu options are:
No: Sequence file name.
List: Select the list file.
Cycle: The number of cycles for this list files.
Mode: Set the running mode of the current Step file, Cont(after running the current step, continue to run the next step), Step(after running the current step, keep the current output, you need to press the trigger key to trigger the next step)

Press the  key return to the Program page.

Press the **Running** key to enter the run screen.

The available options on the list execution page are:
Trigger: Begins the execution of the selected sequence file.
Stop: Stop the sequence execution.
Trigger All: Begins the execution of all sequence file.
Stop All: Stop all the sequence execution.

The progress of the sequence file execution can be seen in the bottom of the screen, showing the user which step is being executed, what repeat number the test is on, and test timing.

5.10 Backup/Restore

This menu function is used to back up/restore the parameters set by the customer to the machine. Can be stored in 10 groups of non-volatile memory.

1) Press the **Save** selection key, the number keyboard will be displayed on the screen, select the required number to Enter, press [Enter] to confirm, save the current parameter in the specified storage area.

2) Press the **Read** selection key, the number keyboard will be displayed on the screen, select the required number to Enter, press the [Enter] key to confirm, the parameters will be taken out from the specified storage area to use.

3) Press the **Delete** selection key, the number keyboard will pop up on the screen, select the required number to Enter, press the [Enter] key to confirm, the parameter will be deleted from the specified storage area.

5.11 Maintainance

The Maintainance page contains some miscellaneous system settings. The following items can be configured from this page:

- System Information
- Run Information
- Recall Default
- Firmware Upgrade
- Warning Log
- Calibration
- Password Reset
- License

5.11.1 System Information

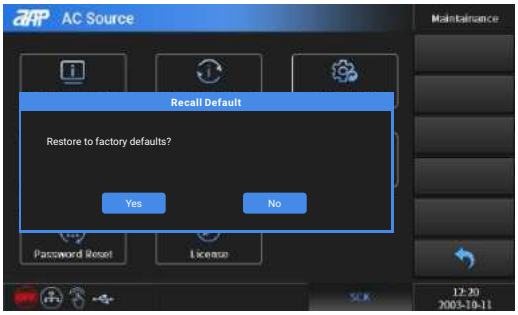
This page is for informational purposes only. The user may be asked to provide some of the information shown on this screen to assist customer service for remote service and diagnostics.

5.11.2 Run Information

This menu provides power modules (rectifier modules in the table above; The following table shows the running information of the inverter module, which depends on the internal module connection mode, and is not the information of the specified module.

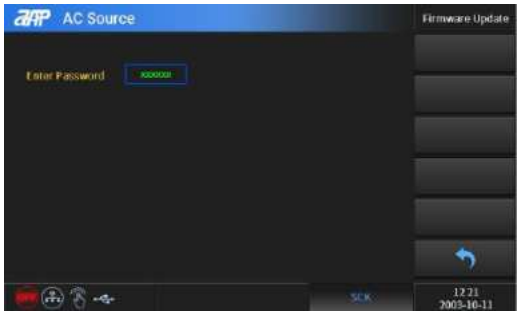
5.11.3 Recall Defaults

The Recall Defaults pop-up page can be used to recall the original factory (default) settings of the power supply. Doing so will erase the current parameter settings and replace them with the default values.



5.11.4 Firmware Update

This page is used to initiate firmware updates. The APM factory or dealer will provide updated firmware to the user if an update is recommended.(Password: 739961)

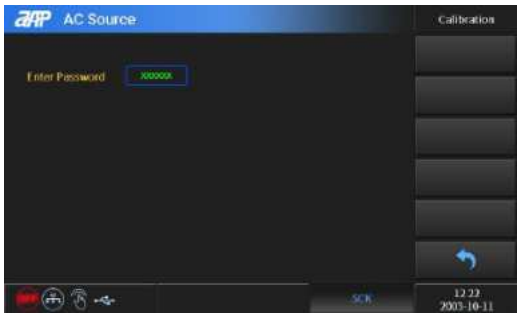


5.11.5 Warning Log

The warning log tracks all error and warning messages that have been generated by the power supply. For each event in the log a time and date stamp, error code, and a short description of the event is included.

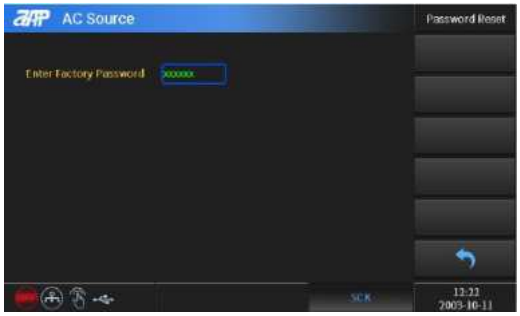
5.11.6 Calibration

For calibration information, refer to Section 7.



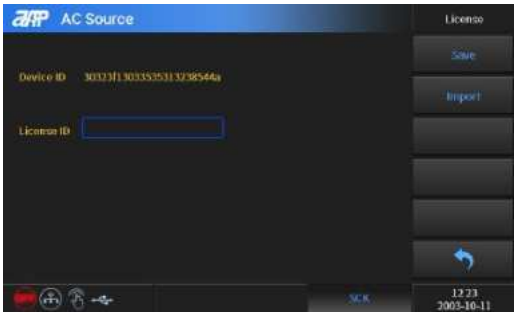
5.11.7 Password Reset

This interface password is the factory password(201204), the highest level password, used to reset the LXI password and user password.



5.11.8 License

This menu is used to enter device licenses.



6 Parallel/Series

Two or more power supplies of the same model can be connected in series or parallel to increase voltage current or current capabilities. Before two or more supplies can be operated in this manner, a Master/Slave connection must be made between all the supplies using the rear panel Master/Slave connectors and cables.

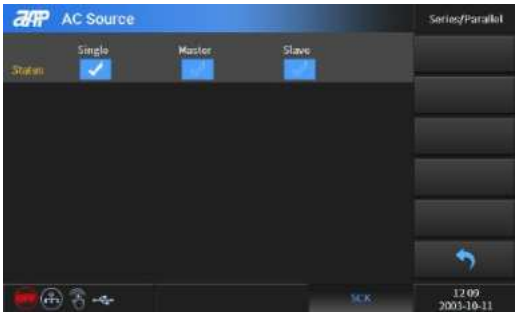
Up to 100 supplies of this series (99 slaves and 1 master) can be connected in parallel to increase output power and current. Up to two units of this series can be connected in series to increase output voltage.

Warning!

- DO NOT connect units in both series and parallel at the same time.
- DO NOT connect different models in series or parallel. All units must be the same model number.
- DO NOT exceed the number of maximum number of units connected in series or parallel.
- Always configure the slave units first, then set up the Master unit in Parallel or Series mode as appropriate.
- There can only be one Master unit in any Master/Slave configuration.
- Each Slave number must be unique or the Master/Slave connection cannot be set.

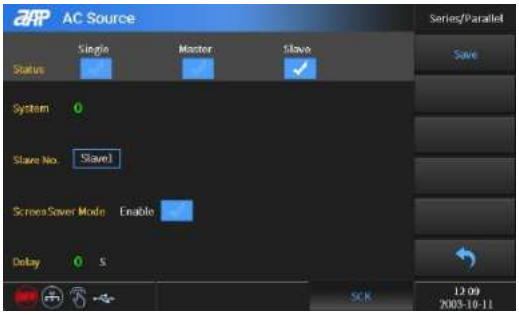
6.1 Single State

Click the **Serial/Parallel** icon on the navigation interface to enter the master/slave Settings menu. Status After the Single machine option is selected, the system is in the single machine state.



6.2 Slave Synchronization

Click the **Serial/Parallel** icon on the navigation interface to enter the master/slave Settings menu. Status Select the slave option and set the slave number. The value ranges from 1 to 15. In parallel mode, there can be one master and 15 slaves. In series mode, there can be only one master and one slave.



Status: Select the slave option.
System: The value ranges from 1 to 10.
Slave No.: Set the slave number.
Screen Saver Mode: Select enable slave screen saver mode.
Delay: Enter screen saver mode after this delay setting time.
Save: Click this button to make all settings take effect.

6.3 Master Synchronization

Tap the **Serial/Parallel** icon on the navigation interface to enter the master/slave settings menu. Status Select the **Master** option.

Output Mode: The user can select parallel or series mode according to the output connection mode.
Keep After Power OFF: If YES is selected, the power will save the master-slave relationship after shutdown, please turn on the slave first and then the master when you turn on again, you can save the step of resetting. If NO is selected, the power supply will release the master-slave relationship after shutdown.
Number of Slaves: This is the number of all slaves in the system, and the set number should be the same as the actual number of slaves. After the above parameters are set, press the search key, the power master will search for all slaves, and a window will appear and display the search results.

Note

- When powering on a set of connected sources, turn on all Slaves before turning on the Master source.
- It is recommended to turn off the connected sources in the Master-slave system together, or an error OFF-LINE may be displayed. It is normal to give an alarm when turning off the units in sequence and which will not affect the Master-slave system established automatically next time.

6.4 Disable Master-slave Configuration

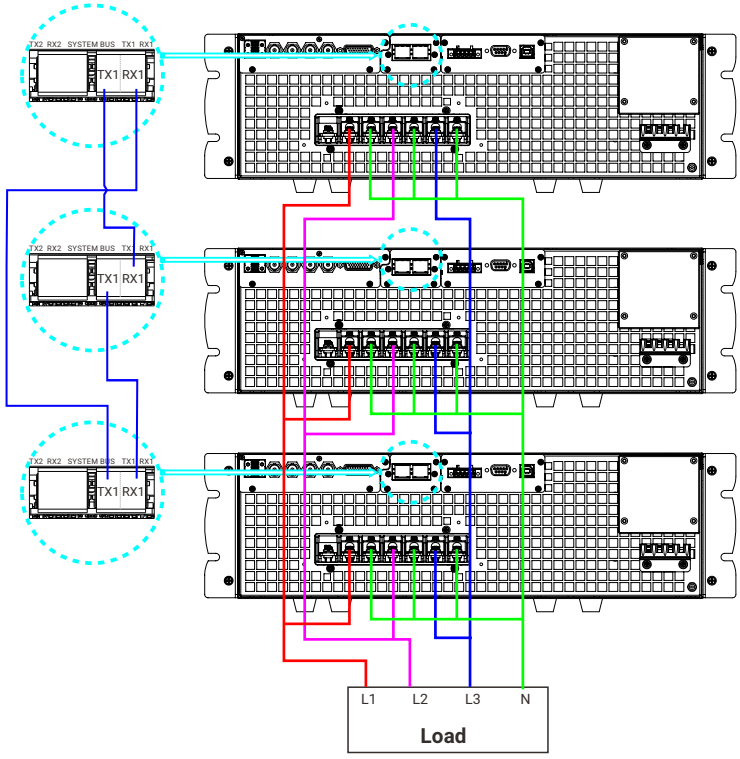
To disable the Master-slave configuration, first set the Master unit to Single Mode, then the slave unit(s). Remove System Bus cables and paralleled DC output wires to complete the process.

6.5 Parallel Mode Connection Diagram

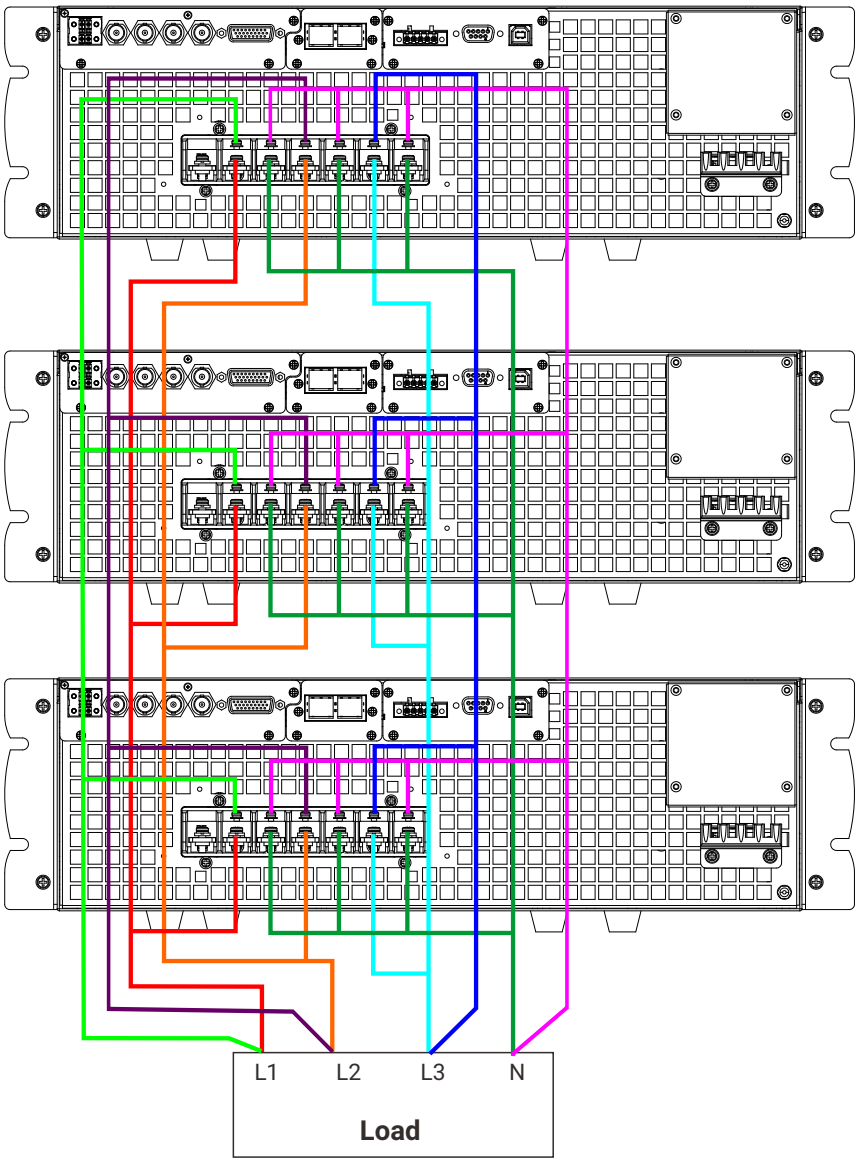
6.5.1 External parallel

1) Parallel Output Cable

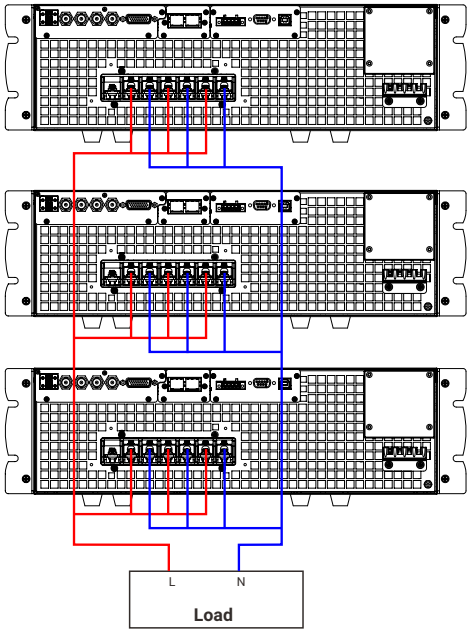
Three-phase mode or multi-channel mode single machine parallel N (with copper busbar can be parallel N end) multiple machines in parallel.



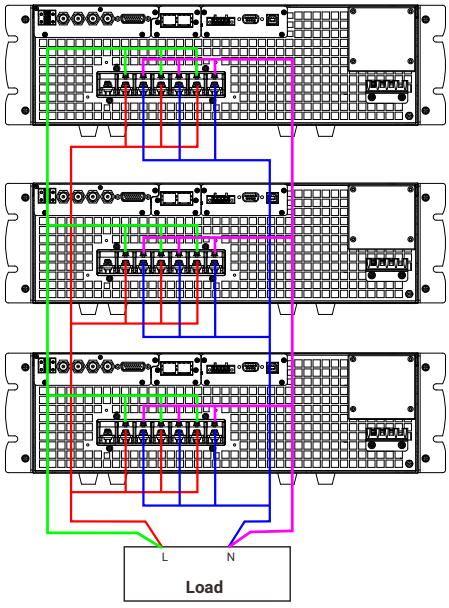
In three-phase mode or multi-channel mode, the remote sampling cable of a single machine in parallel with N (there is a copper busbar to connect the N end) are connected in parallel with multiple machines (there is no copper sheet at the output end, connect the remote sampling cable (the upper screw position) and the output copper sheet (the lower screw position), and connect them to the L or N end of the load through the upper and lower cables respectively). This connection method applies to the case where the cable between the output end and the load is too long.



Single-phase mode single machine parallel L and N (with copper busbars to connect L/N ends separately) multiple machines in parallel.



In single-phase mode, the remote sampling cables of a single machine in parallel with L and N (there is a copper busbar to connect the L/N ends separately) are connected to multiple machines in parallel (there is no copper sheet at the output end to connect the remote sampling cable (the upper screw position) and the output copper sheet (the lower screw position), and connect them to the L or N end of the load through the upper and lower cables respectively). This connection method applies to the case where the cable between the output end and the load is too long.

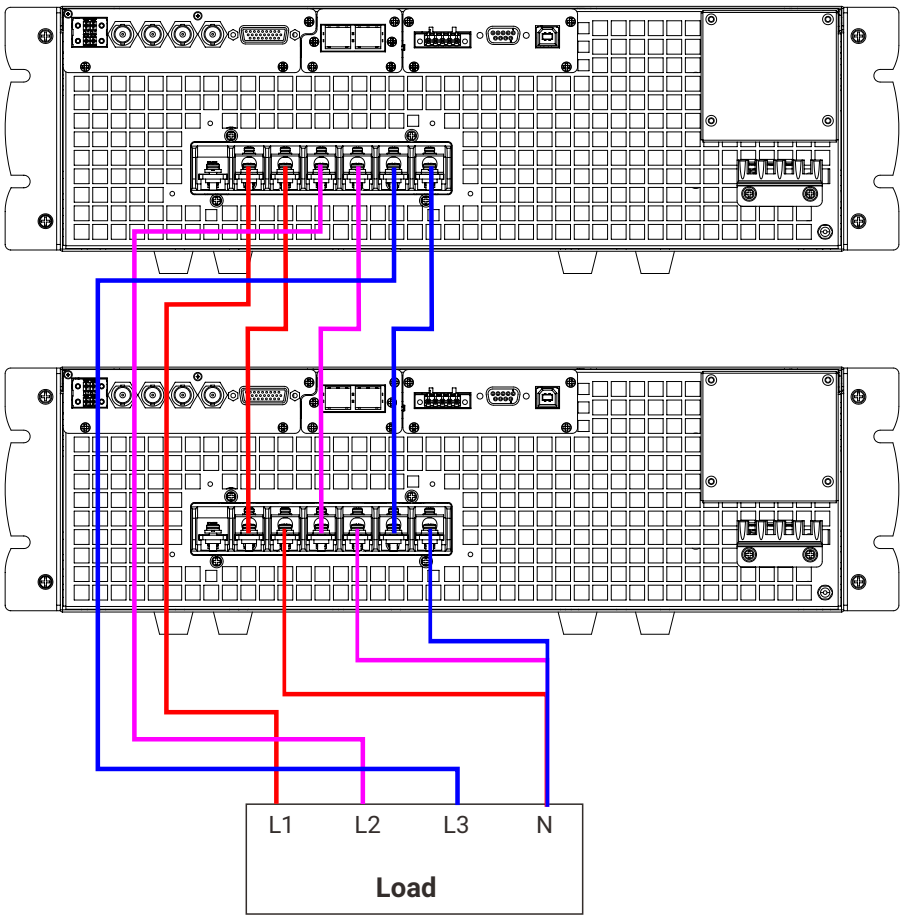


6.6 Series Mode Connection Diagram

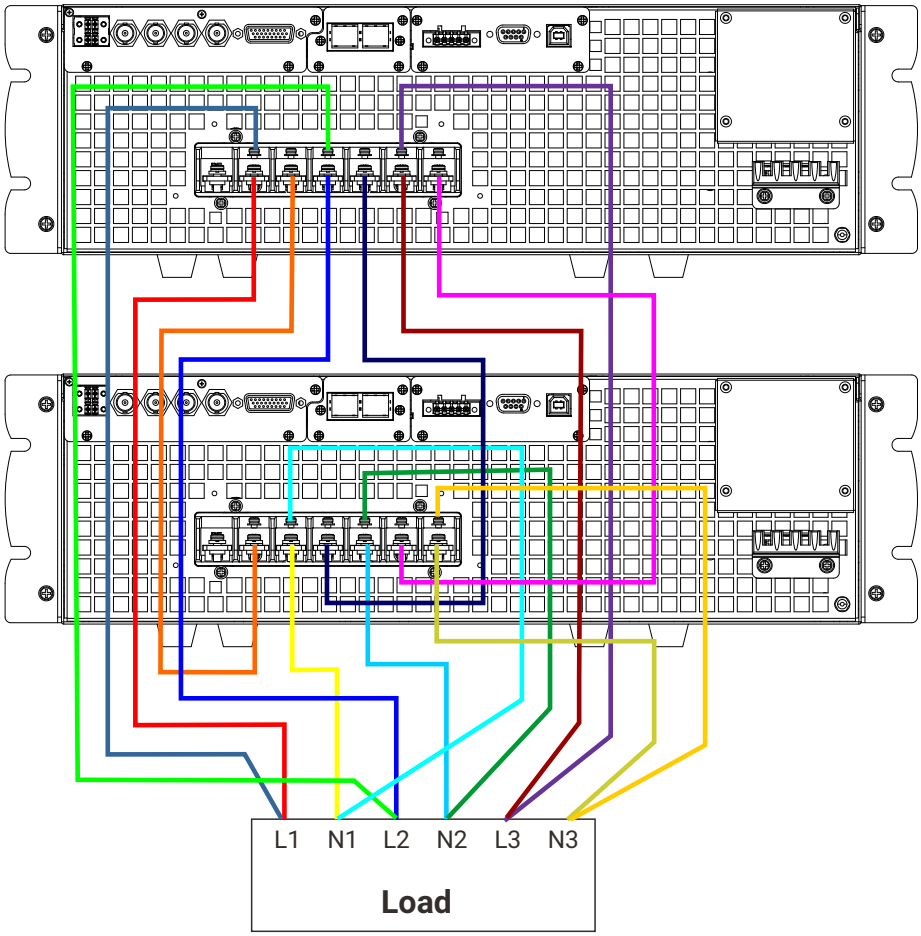
6.6.1 External series

1) Series output cable (up to two units connected in series)

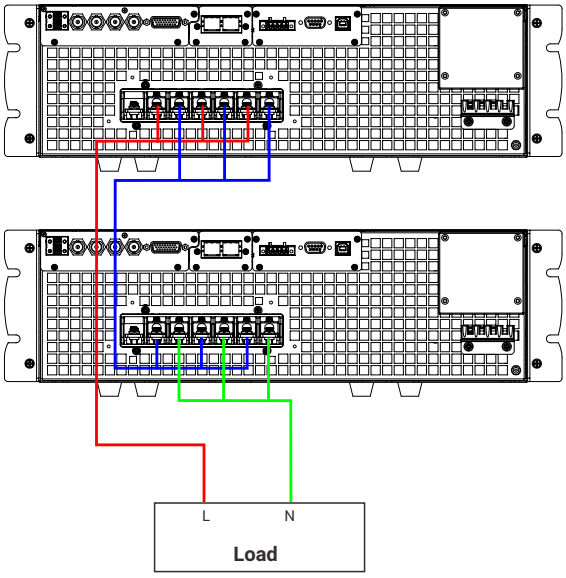
Series connection in three-phase mode or multi-channel mode.



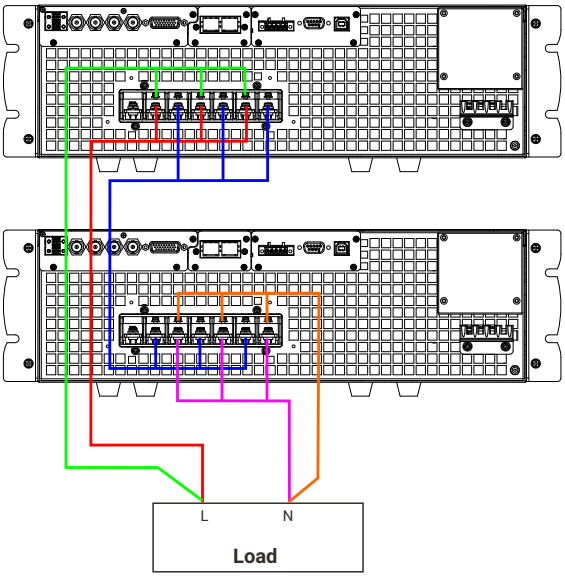
The remote sampling cable of three-phase mode or multi-channel mode is connected in series with two machines (there is no copper sheet at the output end to connect the remote sampling cable (upper screw position) and the output copper sheet (lower screw position), and connect them to the L or N end of the load through the upper and lower cables respectively; the output end where the remote sampling cable is not connected has a copper sheet connection). This connection method applies to the case where the cable between the output end and the load is too long.



Single-phase mode single machine parallel L and N (with copper busbars to connect L/N ends separately) dual machines in series.



In single-phase mode, the remote sampling cable of a single machine in parallel with L and N (there is a copper busbar to connect the L/N ends respectively) is connected in series with two machines (there is no copper sheet at the output end to connect the remote sampling cable (the upper screw position) and the output copper sheet (the lower screw position), and connect them to the L or N end of the load through the upper and lower cables respectively; the output end where the remote sampling cable is not connected has a copper sheet connection). This connection method applies to the case where the cable between the output end and the load is too long.



7 Calibration

All APM instruments are factory calibrated prior to shipment. The recommended calibration interval for this series of power supply is one year. Calibrate only as needed.

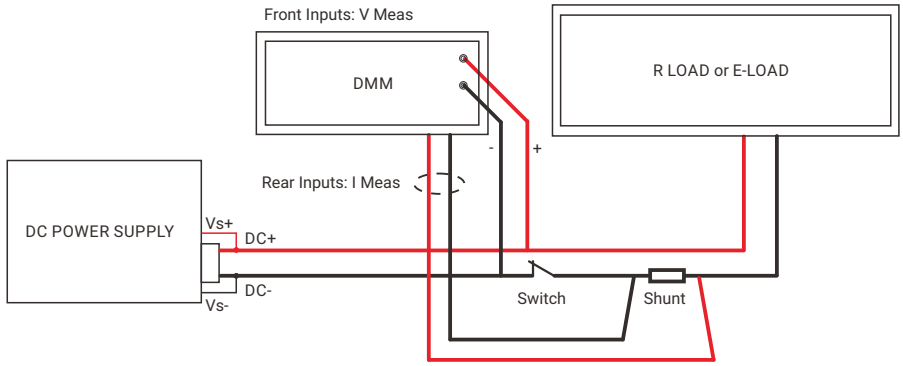
7.1 Calibration Equipment required

The following equipment is required to perform a calibration on any power supply of this series.

Item	Type	Rating
1	Digital Multimeters	Calibrated 6 or more digit rated for maximum DC supply output voltage.
2	Current Shunt	Precision Shunt Resistor, 0.01ohm, 0.005% accuracy.
3	Adjustable Resistive or Programmable Load	Suitable for maximum DC supply output current.

7.2 Calibration Equipment Setup

The calibration equipment should be connected as shown in the diagram below.



Note

- The DMM is used for both voltage and current measurements, requiring the operator to switch between two probing locations. Alternatively, a second DMM may be used for current measurements instead if preferred.
- The switch shown is used to disconnect any load when performing voltage calibrations.

7.3 Power Mode Calibration Procedure

The power source is calibrated through the front panel interface. There are no mechanical calibration adjustments inside the unit, so there is no need to remove the top cover.

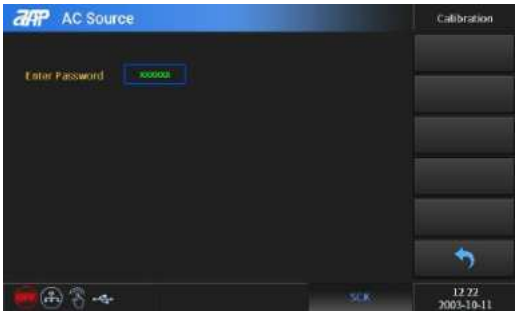
The following items require routine calibration:
AC V Set & Meas - Calibrate output AC voltage and measured values.
DC V Set & Meas - Calibrate output DC voltage and measured values.
HF SET - Calibrates the output AC high frequency voltage
AC I Set & Meas - Calibrate Set output AC current and measured value.
DC I Set & Meas - Calibrate Set output DC current and measured value.

The **Clear** soft key can be used to clear improper calibration values if necessary. The user can perform their own calibration if needed. However, it is recommended that a calibration lab perform these calibrations to ensure traceability to national standards.

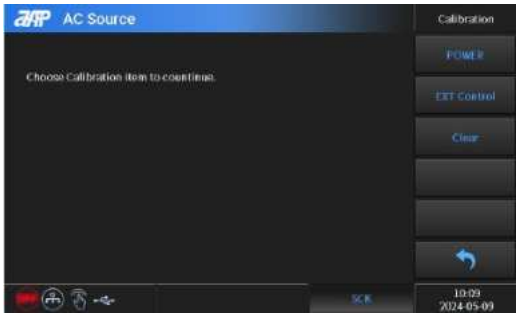
Each calibration algorithm uses two data points, one for the low range of the selected parameter and another for the high range of the selected parameter. The low range is always calibrated first, after which the high range calibration becomes available. In each calibration, the user enters a set value for the source to output according to its meters, and then the user will enter the true value of the setting according to an accurate multimeter.

7.3.1 Accessing Calibration Mode

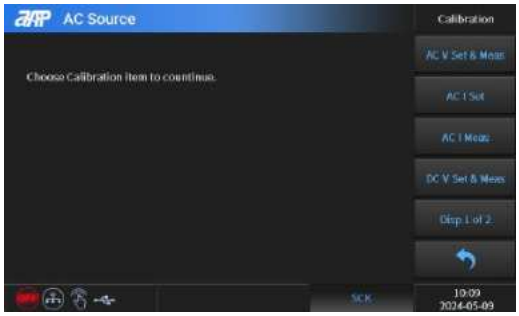
Click the **Maintenance** icon on the navigation interface to enter the menu interface, select the precision **Calibration** icon to enter the following interface.

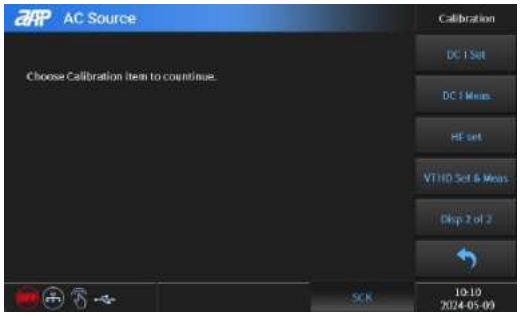


Press on the “Enter Password” field and enter the number “739961” as the password. Press the [Enter] key to confirm. The user can now select the Power mode to continue.



Tap **POWER** to enter the power calibration screen.





7.3.2 Voltage Setting & Measurement Calibration

Note

- When calibrating the source's voltage meter, no load should be applied to the source output.

Press the **AC V Set & Meas** key.
Select the calibrated AC voltage gear 420V /210V.

There are only two calibration points under this menu. Set the frequency at 200Hz, calibrate the low voltage point first, and the user can use the default value or reset the calibration point according to the specification range of the calibration instrument.

AC calibration point: 420V low voltage 50V, high voltage 300V; 210V Low voltage 50V, high voltage 150V. The calibration actual value and the readback value are the same calibration point.

Calibrate the actual value: Click the low voltage setting value, enter the user defined low voltage value by using the touch keyboard numbers, and click [Enter] to confirm. Wait for 5 seconds, click the measurement value, enter the reading value of the external digital multimeter through the touch screen digital keypad, and then click [Enter] to confirm. Then click Continue high voltage calibration, the same as the above low voltage calibration process, click save after high voltage calibration, if the output is displayed successfully, the calibration is successful.

Calibrate the readback value: Click the Settings in the status bar on the right to change to measurement, and the calibration process is consistent with the actual value above. There is no need to change the read-back value because it will automatically get the read-back value.

Press the **DC V Set & Meas** key.
Select the calibrated DC voltage gear 520V /26V.

DC calibration point: 520V low voltage -400V, medium voltage 0V, high voltage 400V; 60V low voltage -200V, medium voltage 0V, high voltage 200V.

The actual calibration value and the readback value are the same calibration point. The middle voltage is not calibrated when the readback value is calibrated. The system automatically skips the middle voltage. Refer to AC calibration for the calibration process. Input low voltage Note the positive and negative.

Press **HF set** to enter High Frequency Calibration (AC).
Select the calibrated AC voltage gear 420V /210V.

Select the calibrated gear to enter this interface. Select the corresponding channel. Only one channel can be calibrated at a time, and three channels cannot be calibrated simultaneously.
Set the 420V file to 200V, input the corresponding voltage measurement value of each frequency in turn, and click Save,until 5KHZ. Repeat the calibration twice.
Set the 210V file to 100V, input the corresponding voltage measurement value of each frequency in turn, and click Save,until 5KHZ. Repeat the calibration twice.

Note:
The recommended set value to use in low range voltage calibration (VL-SET) is between 2% to 18% rated voltage. The recommended set value to use in high range voltage calibration (VH-SET) is in the range of 82% to 98% rated output voltage.

7.3.3 Current Setting & Measurement Calibration

Note

- Please make sure the load in connected (switch is closed) before current calibration.
- Set the proper voltage and current based on the specification range of the calibration instruments.
- Apply a load resistance that forces the supply to operate in CC mode during current calibration. When using a programmable load, setup the load in CV mode, and set load voltage to be a little lower than the set voltage of the power supply.

There are only two calibration points under this menu. The low current point is calibrated first, and the user can use the default value or reset the calibration point according to the specification range of the calibration instrument.

Press **AC I Set** to enter the AC calibration screen (CC mode).

AC current setting calibration point: low current 4A, high current 16A.

AC current setting calibration, need to confirm the adjustable resistance value, first input the voltage, then set the current calibration point value, and then input the current value measured by the current measuring instrument. For example, adjust the resistance to 25Ω, calibration interface low voltage 100V, low current input 4A, and measure the actual input current. Then click Continue to enter high current calibration, the process is consistent with low current.

Press **AC I Meas** to enter the AC calibration screen (CV mode).

AC current measurement calibration point: low low current 0.5A, high current 0.8A; Mid-range low current 1A, high current 5A; High grade low current 4A, high current 16A. The frequency is set at 200Hz.

AC current measurement and calibration, only set the voltage, and then input the actual current, read back the power supply will automatically read, the specific load reference AC current setting calibration

Press **DC I Set** to enter the DC calibration screen (CV mode).

DC is positive and negative, P is positive, N is negative, the calibration steps are the same, pay attention to the positive and negative.

DC current setting calibration point: low current 4A, high current 16A.

DC current setting calibration, need to confirm the adjustable resistance value, first input the voltage, then set the current calibration point value, and then input the current value measured by the current measuring instrument. For example, adjust the resistance to 25Ω, calibration interface low voltage 100V, low current input 4A, and measure the actual input current. Then click Continue to enter high current calibration, the process is consistent with low current.

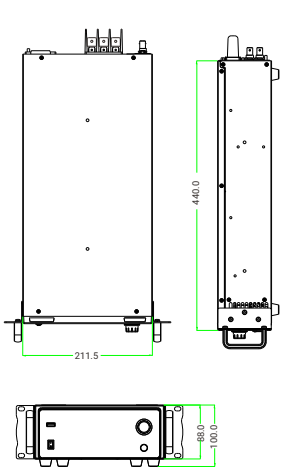
Press **DC I Meas** to enter the DC calibration screen (CV mode).

DC current measurement calibration point: low low current ±0.5A, high current ±0.8A; Mid-range low current ±1A, high current ±5A; High grade low current ±4A, high current ±16A.

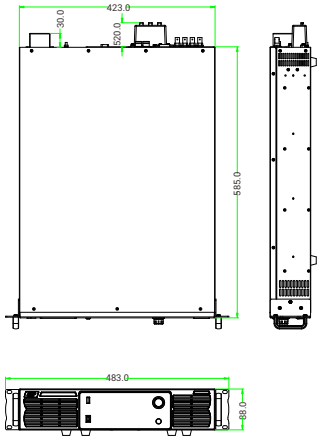
DC Current measurement calibration, only set the voltage, and then input the actual current, read back the power supply will automatically read, the specific load reference AC current measurement calibration. Note the pluses and minuses of DC.

8 Installation

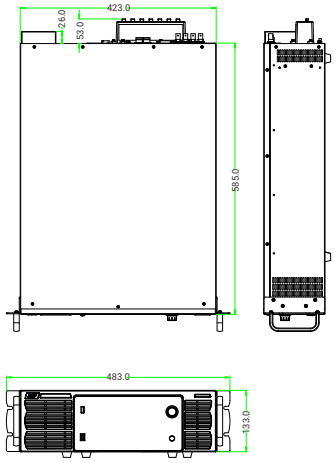
8.1 Product Dimensions



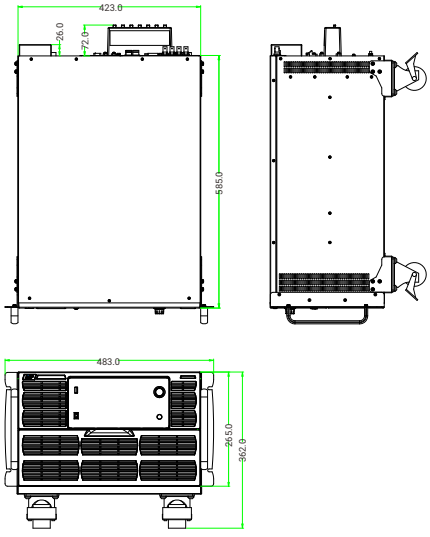
Dimensions of 1/2 2U Models (mm)



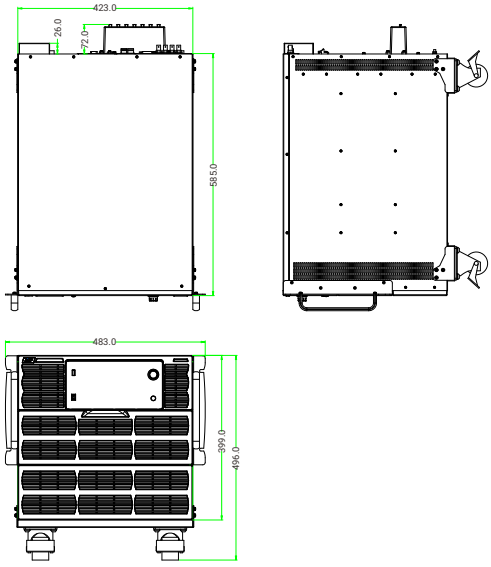
Dimensions of 2U Models (mm)



Dimensions of 3U Models (mm)



Dimensions of 6U Models (mm)



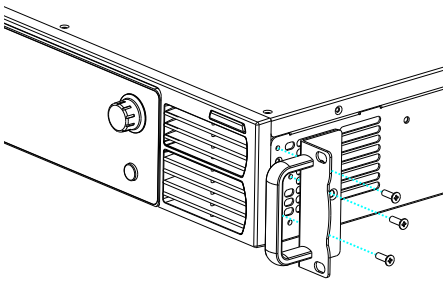
Dimensions of 9U Models (mm)

8.2 Installing Rack Mount Handles

Caution!

- The handles on the front side of the device are for rack manipulations, but are not designed to carry the whole weight of the supply. The supply should not be carried by the handles.

Install the rack mount handles provided in the ship kit onto the power source before mounting the unit in a rack. Refer to the illustration right for correct assembly. The handle screws are included in the ship kit.



8.3 Installation of An Optional Interface Card

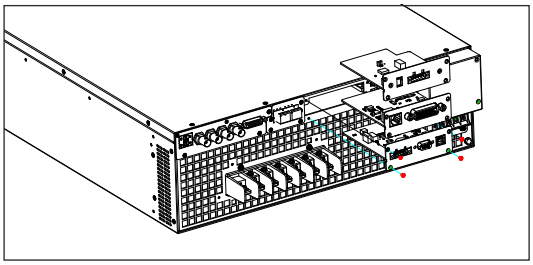
Caution!

- ESD protection procedures must be used when inserting or exchanging an interface card.
- The unit must be powered off before insertion or removal of an interface card.
- Do not insert hardware other than the specified interface card.
- If an interface card is removed or not used it is strongly recommended to install the card slot cover in order to avoid internal buildup of foreign particulate matter. Internal buildup of dust or particulate matter increases the risk of arc failure and shock hazards.

This series of power supply provides optional interface cards. The interface slot is located on the rear panel, making it easy to install and swap interface cards.

Installation steps:

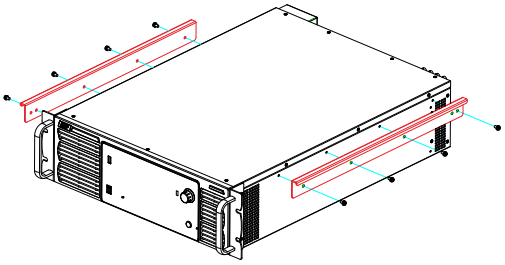
1. Use a suitable screw driver to remove the slot cover.
2. Insert the interface card into the slot to ensure proper alignment. When inserting, take care to keep it as parallel as possible to the native rear panel. Ensure that the interface card is properly connected to the internal connection of the power supply.
3. Tighten the screws. After installation, the interface card is ready for use. The unit can now be controlled through the new interface.



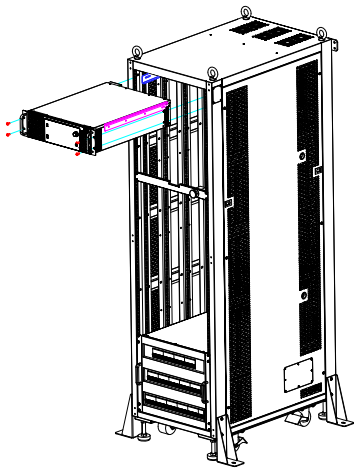
8.4 Shelf Mounting Diagram of The Unit

This series of power supply can be mounted in a standard 19-inch rack panel or cabinet. If using rack mount slides are desired, the user can select the optional rack-mount slide kit at the time of their order. Refer to the figures below for assembly instructions.

There are two parts in the rack-mount slide kit.
Part A (below in red color) attaches to each side of the source as shown below. To prevent internal damage to the source, use the screws provided with the rack-mount kit.



Part B, L-bracket supports (below in blue color) will be installed inside the cabinet. Once part B has been installed, the source can be inserted and slid to the end of the cabinet.



8.5 Input Connection

Warning!

- The connection of the AC input terminals should only be carried out by qualified personnel!
- The AC input connections must include a disconnect device (an external switch or circuit -breaker) as part of the installation. The disconnect device must be suitably located and easily reached and must be marked as the disconnecting device for the equipment. The disconnect device must disconnect all line conductors simultaneously.
- Be sure to disconnect the AC mains before any attempt to access the AC input terminals.
- Prior to connecting the AC power source to the local mains, it is important to check the product label on the unit to verify that its AC input configuration matches the local utility power.
- The power earth (PE) conductors are essential for safe operation and must always be used! Potential shock hazards exist if an earthed conductor not connected to the chassis earth terminal.
- After disconnecting grid power, ALWAYS wait at least 1 minute, then use a Digital Voltmeter (DMM) in VDC Mode to check for any residual DC voltage from each Line terminal to the Chassis ground stud to check for safe voltage levels (< 5 Vdc) before touching the unit or any terminal blocks or pins.

Note

- Instruction not to position the equipment so that it is difficult to operate the disconnecting device.
- The AC input cable should be double insulated, and should have a safe operating temperature of 60°C minimum. The cable must meet the maximum input current rating. Refer to the table below to assist in choosing cable and breaker sizes.

Enter wire requirements-For the input voltage at 1ψ2-wire

Nominal Power	L		N		PE		Input Breaker
	Wire Size	Imax	Wire Size	Imax	Wire Size	Imax	
650W	1.5mm^2	7.1A	1.5mm^2	7.1A	1.5mm^2	7.1A	10A
1050W	2.5mm^2	12.5A	2.5mm^2	12.5A	2.5mm^2	12.5A	16A
1500W	2.5mm^2	9.4A	2.5mm^2	9.4A	2.5mm^2	9.4A	16A
2100W	4.0mm^2	13A	4.0mm^2	13A	4.0mm^2	13A	16A
3100W	4.0mm^2	19.2A	4.0mm^2	19.2A	4.0mm^2	19.2A	32A
4000W	6.0mm^2	24.8A	6.0mm^2	24.8A	6.0mm^2	24.8A	32A
5000W	6.0mm^2	31A	6.0mm^2	31A	6.0mm^2	31A	40A
6000W	6.0mm^2	37A	6.0mm^2	37A	6.0mm^2	37A	63A

Note: 600W/1050W/1500W can use 16A standard plug wire

Electrical system	American standard (full voltage, 90V~265V)	
Power specification	Output power≤1200W	Output power>1200W
AC input mode	Socket	Lock screw
Matching input cable	16A cable with plug with relevant electrical system	Standard three-core cable without plug

Electrical system	European/national standard(Limit voltage section，184V~265V)		
Power specification	Output power≤1500W	Output power≤2500W	Output power>2500W
AC input mode	Socket	Socket	Lock screw
Matching input cable	10A cable with plug with relevant electrical system	16A cable with plug with relevant electrical system	Standard three-core cable without plug

Note: For European or national standard power supply need to modify the input fuse specifications.

MST series input wire requirements-For the input voltage at 3ψ4-wire/MST

Nominal Power	L1/L2/L3		N		PE		Input Breaker
	Wire Size	Imax	Wire Size	Imax	Wire Size	Imax	
2.1kW	1.5mm^2	7.2A	1.5mm^2	7.2A	1.5mm^2	7.2A	10A
3.1kW	2.5mm^2	10.8A	2.5mm^2	10.8A	2.5mm^2	10.8A	16A
4kW	2.5mm^2	14.3A	2.5mm^2	14.3A	2.5mm^2	14.3A	20A
6kW	4.0mm^2	22A	4.0mm^2	22A	4.0mm^2	22A	32A
9KW	6.0mm^2	33A	6.0mm^2	33A	6.0mm^2	33A	40A
12kW	10mm^2	44A	6.0mm^2	44A	6.0mm^2	44A	63A
15kW	16mm^2	73.5A	16mm^2	73.5A	16mm^2	73.5A	100A
18kW	16mm^2	88A	16mm^2	88A	16mm^2	88A	100A

MH series input wire requirements-For the input voltage at 3ψ3-wire/MH

Nominal Power	L1/L2/L3		N		PE		Input Breaker
	Wire Size	Imax	Wire Size	Imax	Wire Size	Imax	
10kW	10mm^2	36.7A	NS	NS	10mm^2	36.7A	63A
13kW	10mm^2	31.8A	NS	NS	10mm^2	31.8A	63A
15kW	10mm^2	36.7A	NS	NS	10mm^2	36.7A	63A
30kW	16mm^2	73.5A	NS	NS	16mm^2	73.5A	100A
42kW	25mm^2	105A	NS	NS	25mm^2	105A	125A

When 10KW is used in the domestic 3P400/3P480 grid, the following wires can be used

Nominal Power	L1/L2/L3		N		PE		Input Breaker
	Wire Size	Imax	Wire Size	Imax	Wire Size	Imax	
10kW	6mm^2	24.5A	NS	NS	6mm^2	24.5A	32A

Connecting the AC input:

1. Unscrew and remove the input terminal's protective cover from the rear face of the supply.
2. Strip off insulation from the end of each wire in the power cable, leaving approximately 12mm of bare wire exposed.
3. Push up the white terminal.

4. Insert the input cables into the corresponding terminal sockets respectively
5. Press back down on the white terminal to make sure the cable is firmly held in place
6. Replace the protective cover to avoid electric shock.

8.6 Connection to AC Loads

Warning!

- Always disconnect the AC mains before accessing the input or output connections.
- The protective cover must be tightly secured to meet the safety requirements.

Caution!

- Consider the following issues when connecting to a load.

1. Ensure the wires connecting to the load meet maximum current and temperature requirements.
2. Ensure that the insulation of the wire has a voltage rating greater than the maximum output voltage of the supply or series connection of supplies.
3. In the case of an application with high nominal current and thick cables, it is necessary to take into account the weight of the cable and the strain imposed on the cable. A strain relief should be used on the cable, especially when mounted in a 19" cabinet or similar.
4. Load wires noise and impedance effect.

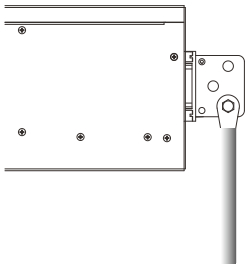
Refer to the table below to select cable size. Also consider temperature rating of the copper wires and voltage drop to the load.

Rated Current of equipment (A)	Minimum Conduct Sizes		Rated Current of equipment (A)	Minimum Conduct Sizes	
	Nominal Cross -sectional Area (mm²)	AWG or kcmil		Nominal Cross -sectional Area (mm²)	AWG or kcmil
13~16	1.5	14	125~160	50	0
16~25	2.5	12	160~190	70	000
25~32	4	10	190~230	95	0000
32~40	6	8	230~260	120	250 kcmil
40~63	10	6	260~300	150	300 kcmil
63~80	16	4	300~340	185	400 kcmil
80~100	25	2	340~400	240	500 kcmil
100~125	35	1	400~460	300	600 kcmil

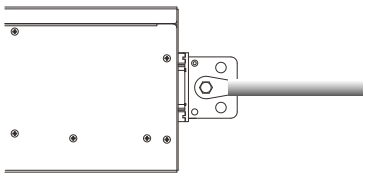
Wiring diagram of AC terminal:

As shown in the figure, there are two wiring methods for the AC terminal, and the user can

1. Up and down 90°, no bending radius, saving depth space, ideal for ATE system integration.



2. Horizontal wiring, large bending radius, saving height and space, ideal for desktop workstations.



9 Troubleshooting

Problem	Troubleshooting and Solutions

告警表完善后更新

10 Recycling and Disposal

Do not discard this device and its accessories as solid waste. Please assure that this unit is properly recycled at the end of its lifetime per your local government regulations.

11 Contact Us

If you have any questions about APM's Momentum 400S/H series single/three phase programmable AC power supply, please contact us per the contact information below. We will be happy to promptly answer any of your questions.

APM Technologies
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Land line: +86-769 8698 9800
Website: www.apmtechate.com
E-mail: overseas@apmtech.cn

Appendix A Specifications

Model		MS420VAC650W	MS420VAC1050W
Input			
Voltage	1 Phase	100~132Vac 187~300Vac	
Current	1 Phase	Max. 9.4A(L-N)	Max. 14.5A(L-N)
Connection	1 Phase	L, N, PE	
Frequency		45~65Hz	
Fuse (Internal)		2* T10A	2* T15A
Power Factor		>0.97 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)
Input Power		Max. 780VA	Max. 1.35kVA
Efficiency (Full Load, 50~5000Hz/DC)		>68.8% (Rate: 110Vac) >69.6% (Rate: 220Vac)	>79.0% (Rate: 110Vac) >80.0% (Rate: 220Vac)
AC Output			
AC Output Power		650VA	1050VA
Phase		1 Phase	
Voltage (AC/AC+DC)	Range [1]	L: 0~210Vac H: 0~420Vac AUTO	
	Resolution	≤0.02V (AC and AC+DC mode)	
	Accuracy	0.1% of actual + 0.1%F.S., DC mode 0.025%F.S. @ 10~100Hz, AC mode 0.1% of actual + 0.1%F.S. @ 101~500Hz, AC mode 0.1% of actual + 0.2%F.S. @ 101~500Hz, AC+ DC mode 0.1% of actual + 0.2%F.S. @ 501~1000Hz, AC mode 0.1% of actual + 0.3%F.S. @ 501~1000Hz, AC+ DC mode 0.1% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.1% of actual + 0.5%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual + 0.6%F.S. @ 2001~3000Hz, AC mode 0.1% of actual + 0.7%F.S. @ 2001~3000Hz, AC+ DC mode 0.1% of actual + 0.8%F.S. @ 3001~4000Hz, AC mode 0.1% of actual + 0.9%F.S. @ 3001~4000Hz, AC+ DC mode 0.1% of actual + 1%F.S. @ 4001~5000Hz, AC mode 0.1% of actual + 1.1%F.S. @ 4001~5000Hz, AC+ DC mode Valid from 5% of full-scale to 210VAC(RMS)/260VDC in low-range and 420VAC(RMS)/520VDC in high-range; with sense leads connected.	
	Display Bits	0.001V	
Max. Current (r.m.s)	0~210V (L)	6A	10A
	0~420V (H)	3A	5A
	Display Bits	0.0001A	
	Resolution	L: 0.5mA, H: 0.25mA	L: 1mA, H: 0.5mA
Max. Current (Peak)	0~210V (L)	30Apk	50Apk
	0~420V (H)	15Apk	25Apk
Frequency	Range	Advanced Version: 10~2500Hz Professional Version: 10~2500Hz Profession-HF Version: 10~5000Hz	
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~ 5000Hz;	
	Accuracy	0.01% of actual + 0.005Hz @10~81.99Hz 0.01% of actual + 0.025Hz @ 82~819.99Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency set specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.	
Total Harmonic Distortion (THD)		<0.3% @ 10~100Hz, 50~210Vac/100~420Vac (Resistive Load) <0.5% @ 101~500Hz, 50~210Vac/100~420Vac (Resistive Load) <1% @ 501~1000Hz, 50~210Vac/100~420Vac (Resistive Load) <2% @ 1001~2000Hz, 50~210Vac/100~420Vac (Resistive Load) <3% @ 2001~3000Hz, 50~210Vac/100~420Vac (Resistive Load) <4% @ 3001~4000Hz, 50~210Vac/100~420Vac (Resistive Load) <5% @ 4001~5000Hz, 50~210Vac/100~420Vac (Resistive Load) Note: 15V <Vout< 50V (L range) can be extended 15 times, Less Than 6.3V, no range. Note: 30V <Vout< 100V (H range) can be extended 30 times, Less Than 12.6V, no range.	

Model		MS420VAC650W	MS420VAC1050W
Crest Factor (CF)		≤5	
Load Regulation(ALC=ON)		0.1% of actual+0.1%F.S. @10~1000Hz, AC mode 0.1% of actual+0.2%F.S. @10~1000Hz, AC+ DC mode 0.1% of actual+0.3%F.S. @1001~2000Hz, AC mode 0.1% of actual+0.4%F.S. @1001~2000Hz, AC+ DC mode 0.1% of actual+0.5%F.S. @2001~3000Hz, AC mode 0.1% of actual+0.6%F.S. @2001~3000Hz, AC+ DC mode 0.1% of actual+0.7%F.S. @3001~4000Hz, AC mode 0.1% of actual+0.8%F.S. @3001~4000Hz, AC+ DC mode 0.1% of actual+0.9%F.S. @4001~5000Hz, AC mode 0.1% of actual+1.0%F.S. @4001~5000Hz, AC+ DC mode Valid from 5% to 100% of full-scale with sense leads connected.	
Line Regulation	ALC=ON	0.05%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac; 0.025%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac; Input voltage change in ±10%, DC output or 10Hz~5000Hz AC output.	
	ALC=OFF	0.1%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac; 0.05%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac; Input voltage change in ±10%, DC output or 10Hz~800Hz AC output.	
Phase Angle (Starting / Ending)	Range	0~360°	
	Resolution	0.4 °	
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;	
Current CC Fold Mode	Range	5~200%F.S. (AC Output Voltage: Low-Range 50~210Vac, High-Range 100~420Vac) 7~200%F.S. (DC Output Voltage: Low-Range 50~260Vdc, High-Range 100~520Vdc)	
	Resolution	10mA	20mA
	Accuracy	0.3% of actual + 0.4%F.S. @ 10~500Hz, DC / AC mode 0.3% of actual + 0.5%F.S. @ 10~500Hz, DC + AC mode Valid from 5% of full scale to 100% of full-scale. 0.3% of actual + 0.5%F.S. @ 501Hz~1200Hz, DC / AC mode 0.3% of actual + 0.6%F.S. @ 501Hz~1200Hz, DC + AC mode Valid from 5% of full-scale to 200% of full-scale. Note: Above 1.2KHZ, No Rang, only for refernce.	
	Response Time	<180mS	
Noise Level, Typical (r.m.s)		450mV, Low-range; 700mV, High-range; at ≥40Hz outputfrequency; bandwidth, 20kHz to 1MHZ;	
DC Output			
DC Output Power		650W	1050W
Voltage (DC)	Range	Low-range: ±260Vdc High-range: ±520Vdc AUTO	
	Resolution	20mV	
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.	
Max. Current (DC)	0~260V (L)	4.8A	8.4A
	0~520V (H)	2.4A	4.2A
	Accuracy	±(0.25% of actual + 0.25% of full-scale); valid from 5% of full-scale to 100% of full-scale.	
DC Offset Voltage, Typical		20mVDC, ≥40Hz	
Ripple&Noise(r.m.s)/ (Pk-Pk)	Low-Range	400mV(r.m.s), 2V(Pk-Pk) bandwidth, 10Hz to 1MHz	
	High-Range	700mV(r.m.s), 4V(Pk-Pk)high-range bandwidth, 10Hz to 1MHz.	
Programmable Output Impedance[2]		0Ω + 200μH ~ 1Ω + 1mH	
Harmonics & Inter-harmonics Simulation[2]		10Hz to 5kHz; 2nd to 50th harmonic, 48KHz BW max[3]	
Measurement			
Voltage (AC + DC)	Range	AC 0~420Vac DC 0~520Vdc AC + DC 0-520V(RMS)	
	Resolution	20mV	
	Accuracy (r.m.s)	0.1% of actual+ 0.1%F.S. @ 10~1000Hz, AC mode 0.1% of actual+ 0.2%F.S. @ 10~1000Hz, AC+ DC mode 0.1% of actual+ 0.3%F.S. @ 1001~2000Hz, AC mode 0.1% of actual+ 0.4%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual+ 0.5%F.S. @ 2001~3000Hz, AC mode 0.1% of actual+ 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.1% of actual+ 0.7%F.S. @ 3001~4000Hz, AC mode 0.1% of actual+ 0.8%F.S. @ 3001~4000Hz, AC + DC mode 0.1% of actual+ 0.9%F.S. @ 4001~5000Hz, AC mode 0.1% of actual+ 1.0%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% to 100% of full-scale with sense leads connected.	

Model		MS420VAC650W	MS420VAC1050W
Voltage (DC)	Range	DC 0~520Vdc	
	Resolution	20mV	
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.	
Frequency	Range	10~5000Hz	
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~5000Hz;	
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.91Hz 0.01% of actual + 0.025Hz @ 82~819.1Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency measurement specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.	
Current (r.m.s)	Range	0~110% F.S. (H: F.S.=100% Irms, M: F.S.=25% Irms, L: F.S.=5% Irms)	
	Resolution	L: 0.5mA, H: 0.25mA	L: 1mA, H: 0.5mA
	Accuracy	0.3% of actual + 0.3%F.S. @ 10~1000Hz, AC mode 0.3% of actual + 0.4%F.S. @ 10~1000Hz, AC + DC mode 0.3% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.3% of actual + 0.5%F.S. @ 1001~2000Hz, AC + DC mode 0.3% of actual + 0.5%F.S. @ 2001~3000Hz, AC mode 0.3% of actual + 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.3% of actual + 0.6%F.S. @ 3001~4000Hz, AC mode 0.3% of actual + 0.7%F.S. @ 3001~4000Hz, AC + DC mode 0.3% of actual + 0.7%F.S. @ 4001~5000Hz, AC mode 0.3% of actual + 0.8%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.	
Current (Peak)	Range	0~110% F.S. (H: F.S.=100% Ipeak, M: F.S.=25% Ipeak, L: F.S.=5% Ipeak)	
	Resolution	L: 2.5mA, H: 1.25mA	L: 5mA, H: 2.5mA
	Accuracy	0.4% of actual + 0.6%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 0.8%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.0%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.1%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.2%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 1.4%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 1.5%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.	
Power (Watts)	Range	0~650W	0~1050W
	Resolution	0.25W	0.5W
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode	
Power Apparent (VA)	Range	0~650VA	0~1050VA
	Resolution	0.25VA	0.5VA
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode	

Model		MS420VAC650W	MS420VAC1050W
Power Resistive (VAR)	Range	0~650VAR	0~1050VAR
	Resolution	0.25VAR	0.5VAR
	Accuracy	$\sqrt{(VA)^2-(W)^2}$, Calculated value	
Power Factor (PF)	Range	0~1.000	
	Resolution	0.001	
	Accuracy	2%F.S.	
Phase	Range	0~360.0°	
	Resolution	0.4 °	
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;	
Harmonic[2]		2~50 orders	
Extra Function			
Remote Sense		5V(rms), Max. Total power less than rated power.	
Slew Rate	Range	AC Voltage: 0.001-10000.00V/mS and Disable	
		DC Voltage: 0.001-10000.00V/mS and Disable	
		Frequency: 0.001-1600.000Hz/ms and Disable	
Transient Generator (only for 15~70Hz)	Range	Trans-Start: 0.0~66.5ms/10Hz, Resolution: 0.1ms	
		Trans-Volt: -260V ~ +260V(L), -520V ~ +520V(H), Resolution: 0.1V	
		Trans-Time: 0.0~66.5ms/10Hz, Resolution: 0.1ms	
		Trans-Count: 0~9999, Constant	
Calibration Function		Built-in calibration function	
Multi-operation[4]	Parallel Output	Max. 64 Units (Option: Optical fiber parallel card)	
	Series Output	Max. 2 Units (Option: Optical fiber parallel card)	
General			
Graphic Display		5" Color touch LCD	
Operation Key Feature		Switch key, Rotary Knob, USB port for transfer and upgrading firmware	
Rack mount Handles		Yes	
FAN		Temperature Control	
Protection Circuits		OVP, OCP, OPP, OFP, RMP	
Interface		USB, RS232, RS484 (Standard) ; GPIB&LAN, CAN (Optional)	
Remote Control Input/Output (Option)			
Analog input		Set A/B/C phase voltage RMS, set current limit.	
Analog output		A/B/C phase output voltage RMS value monitoring, output power monitoring.	
Digital input		Single/three output mode selection, external control function enable selection, power output ON/OFF state control, enable analog input control, stored data recall, output suppression (OFF/LIVE/LATCHING), phase/frequency synchronization signal, List file run trigger.	
Digital output		Power output ON/OFF status indicator, fault status indicator, List file output/output status change/parameter change indicator.	
Environment			
Operating Temperature		0°C~50°C	
Storage Temperature		-20°C~70°C	
Fan Noise			
Altitude		2000m	
Relative Humidity		<95%, non-condensing≤45°C; <80%, non-condensing≤50°C	
Temperature Coefficient		≤100ppm/°C F.S. (Voltage); ≤20 ppm/°C F.S. (Current); 10ppm/°C.F.S. (Frequency)	
Mechanical			
Dimensions (W*H*D)		211.5 x 88 x 440 mm	423 x 88 x 585 mm
Package Dimensions (W*H*D)		396 x 278 x 641 mm	638 x 303 x 875 mm
Unit Weight		18kg	17kg
Shipping Weight		22kg	23kg
Regulatory Compliance			
EMC		CE marked for EMC Directive 2014/30/EU/EN61326-1: 2013 Class A for emissions and immunity standard as required for EU CE Mark. FCC Verification of conformity for CFR 47 Part 15 of the FCC Rules.	
Safety		It meets the safety requirements of EU EN 61010-1:2010 for electrical equipment used in measurement, control and laboratories.	
CE Mark		Installation Overvoltage Category II; Pollution Degree 2; Class II equipment; indoor use only.	
Isolation Voltage		2828VDC, AC output to chassis; 2828VDC, AC input to chassis; 4242VDC, AC input to AC output	
RoHS		Meet to EU Directive 2011/65/EU for restriction of hazardous substances in Electrical and Electronic Equipment.	

[1] According to the output frequency, the AC output voltage will be reduced, and the rated voltage can be output within 3500Hz;
At low level, the maximum output voltage is 187.5V at 4000Hz, and the maximum output voltage is 150V at 5000HZ. The calculation formula is: output voltage =750000/ output frequency.
At high level, the maximum output voltage is 375V at 4000Hz, and the maximum output voltage is 300V at 5000HZ. The calculation formula is: output voltage =1500000/ output frequency.
[2] Only professional version/Professional-HF version support these functions.
[3] According to the output frequency, the number of harmonics will be reduced, up to 50 timeswithin 960Hz, up to 16 times at 3000Hz, up to 9 times at 5000Hz,
the calculation formula is : harmonic number =48000/ output frequency.
[4] It is suggest to derate to 90% output in parallel connection.

All specifications are subject to change without notice.

Model		MS420VAC2100W	MS420VAC3100W	MS420VAC4100W	MS420VAC6000W
Input					
Voltage	1 Phase	100~132Vac 187~300Vac	100~132Vac, Derating to 50% of rated power 187~300Vac		
	3 Phase	Not supported	Not supported	Not supported	187~300Vac, Derating to 50% of rated power 340~460Vac
Current	1 Phase	Max. 27.6A(L-N)	Max. 21.7A(L-N)	Max. 27.6A(L-N)	Max. 41A(L-N)
	3 Phase	Not supported	Not supported	Not supported	Max. 23.6A(L-L)
Connection	1 Phase	L, N, PE	L, N, PE	L, N, PE	L, N, PE (need to short-circuit all L1-L3 and then input as L)
	3 Phase	Not supported	Not supported	Not supported	L1,L2,L3, N,PE; Only for 3-Phase 4 Wire Y type/Neutral Required
Frequency		45~65Hz			
Fuse (Internal)		4* T15A	4* T15A	4* T20A	6* T20A
Power Factor		>0.97 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)
Input Power		Max. 3.3kVA	Max. 4.2kVA	Max. 4.8kVA	Max. 7.2kVA
Efficiency (Full Load, 50~5000Hz/DC)		>80% (Rate: 110Vac) >81.0% (Rate: 220Vac)	>73.4% (Rate: 110Vac) >82.3% (Rate: 220Vac)	>76.6% (Rate: 100/120Vac) >83.8% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >83.4% (Rate: 220Vac)
AC Output					
AC Output Power		2100VA	3100VA	4100VA	6000VA
Phase		1 Phase			
Voltage (AC/AC+DC)	Range[1]	L: 0~210Vac H: 0~420Vac AUTO			
	Resolution	≤0.02V (AC and AC+DC mode)			
	Accuracy	0.1% of actual + 0.1%F.S., DC mode 0.025%F.S. @ 10~100Hz, AC mode 0.1% of actual + 0.1%F.S. @ 101~500Hz, AC mode 0.1% of actual + 0.2%F.S. @ 101~500Hz, AC+ DC mode 0.1% of actual + 0.2%F.S. @ 501~1000Hz, AC mode 0.1% of actual + 0.3%F.S. @ 501~1000Hz, AC+ DC mode 0.1% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.1% of actual + 0.5%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual + 0.6%F.S. @ 2001~3000Hz, AC mode 0.1% of actual + 0.7%F.S. @ 2001~3000Hz, AC+ DC mode 0.1% of actual + 0.8%F.S. @ 3001~4000Hz, AC mode 0.1% of actual + 0.9%F.S. @ 3001~4000Hz, AC+ DC mode 0.1% of actual + 1%F.S. @ 4001~5000Hz, AC mode 0.1% of actual + 1.1%F.S. @ 4001~5000Hz, AC+ DC mode Valid from 5% of full-scale to 210VAC(RMS)/260VDC in low-range and 420VAC(RMS)/520VDC in high-range; with sense leads connected.			
	Display Bits	0.001V			
Max. Current (r.m.s)	0~210V (L)	21A	30A	39A	60A
	0~420V (H)	10.5A	15A	19.5A	30A
	Display Bits	0.001A			
	Resolution	L: 2.5mA, H: 1.25mA		L: 5mA, H: 2.5mA	
Max. Current (Peak)	0~210V (L)	105Apk	150Apk	195Apk	300Apk
	0~420V (H)	52.5Apk	75Apk	97.5Apk	150Apk
Frequency	Range	Advanced Version: 10~2500Hz Professional Version: 10~2500Hz Profession-HF Version: 10~5000Hz			
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.99Hz 0.01% of actual + 0.025Hz @ 82~819.99Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency set specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Total Harmonic Distortion (THD)		<0.3% @ 10~100Hz, 50~210Vac/100~420Vac (Resistive Load) <0.5% @ 101~500Hz, 50~210Vac/100~420Vac (Resistive Load) <1% @ 501~1000Hz, 50~210Vac/100~420Vac (Resistive Load) <2% @ 1001~2000Hz, 50~210Vac/100~420Vac (Resistive Load) <3% @ 2001~3000Hz, 50~210Vac/100~420Vac (Resistive Load) <4% @ 3001~4000Hz, 50~210Vac/100~420Vac (Resistive Load) <5% @ 4001~5000Hz, 50~210Vac/100~420Vac (Resistive Load) Note: 15V <Vout< 50V (L range) can be extended 1.5 times, Less Than 15V, no range. Note: 30V <Vout< 100V (H range) can be extended 1.5 times, Less Than 30V, no range.			

Model		MS420VAC2100W	MS420VAC3100W	MS420VAC4100W	MS420VAC6000W
Crest Factor (CF)		≤5			
Load Regulation(ALC=ON)		0.1% of actual+0.1%F.S. @10~1000Hz, AC mode 0.1% of actual+0.2%F.S. @10~1000Hz, AC+ DC mode 0.1% of actual+0.3%F.S. @1001~2000Hz, AC mode 0.1% of actual+0.4%F.S. @1001~2000Hz, AC+ DC mode 0.1% of actual+0.5%F.S. @2001~3000Hz, AC mode 0.1% of actual+0.6%F.S. @2001~3000Hz, AC+ DC mode 0.1% of actual+0.7%F.S. @3001~4000Hz, AC mode 0.1% of actual+0.8%F.S. @3001~4000Hz, AC+ DC mode 0.1% of actual+0.9%F.S. @4001~5000Hz, AC mode 0.1% of actual+1.0%F.S. @4001~5000Hz, AC+ DC mode Valid from 5% to 100% of full-scale with sense leads connected.			
Line Regulation	ALC=ON	0.05%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.025%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~5000Hz AC output.			
	ALC=OFF	0.1%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.05%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~800Hz AC output.			
Phase Angle (Starting / Ending)	Range	0~360°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Current CC Fold Mode	Range	5~200%F.S. (AC Output Voltage: Low-Range 50~210Vac, High-Range 100~420Vac) 7~200%F.S. (DC Output Voltage: Low-Range 50~260Vdc, High-Range 100~520Vdc)			
	Resolution	35mA	35mA	70mA	70mA
	Accuracy	0.3% of actual + 0.4%F.S. @ 10~500Hz, DC / AC mode 0.3% of actual + 0.5%F.S. @ 10~500Hz, DC + AC mode Valid from 5% of full scale to 100% of full-scale. 0.3% of actual + 0.5%F.S. @ 501Hz~1200Hz, DC / AC mode 0.3% of actual + 0.6%F.S. @ 501Hz~1200Hz, DC + AC mode Valid from 5% of full-scale to 200% of full-scale. Note: Above 1.2KHZ, No Rang, only for refernce.			
	Response Time	<180mS			
Noise Level, Typical (r.m.s)		450mV, Low-range; 700mV, High-range; at ≥40Hz outputfrequency; bandwidth, 20kHz to 1MHz;			
DC Output					
DC Output Power		2100W	3100W	4100W	6000W
Voltage (DC)	Range	Low-range: ±260Vdc High-range: ±520Vdc AUTO			
	Resolution	20mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Max. Current (DC)	0~260V (L)	16.2A	24A	31.2A	46.8A
	0~520V (H)	8.1A	12A	15.6A	23.4A
	Accuracy	±(0.25% of actual + 0.25% of full-scale); valid from 5% of full-scale to 100% of full-scale.			
DC Offset Voltage, Typical		20mVDC, ≥40Hz			
Ripple&Noise(r.m.s)/ (Pk-Pk)	Low-Range	400 mV(r.m.s), 2V(Pk-Pk) bandwidth, 10Hz to 1MHz			
	High-Range	700mV(r.m.s), 4V(Pk-Pk)high-range bandwidth, 10Hz to 1MHz.			
Programmable Output Impedance[2]		0Ω + 200μH ~ 1Ω + 1mH			
Harmonics & Inter-harmonics Simulation[3]		10Hz to 5kHz; 2nd to 50th harmonic, 48KHz BW max[3]			
Measurement					
Voltage (AC + DC)	Range	AC 0~420Vac DC 0~520Vdc AC + DC 0-520V(RMS)			
	Resolution	20mV			
	Accuracy (r.m.s)	0.1% of actual+ 0.1%F.S. @ 10~1000Hz, AC mode 0.1% of actual+ 0.2%F.S. @ 10~1000Hz, AC+ DC mode 0.1% of actual+ 0.3%F.S. @ 1001~2000Hz, AC mode 0.1% of actual+ 0.4%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual+ 0.5%F.S. @ 2001~3000Hz, AC mode 0.1% of actual+ 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.1% of actual+ 0.7%F.S. @ 3001~4000Hz, AC mode 0.1% of actual+ 0.8%F.S. @ 3001~4000Hz, AC + DC mode 0.1% of actual+ 0.9%F.S. @ 4001~5000Hz, AC mode 0.1% of actual+ 1.0%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% to 100% of full-scale with sense leads connected.			

Model		MS420VAC2100W	MS420VAC3100W	MS420VAC4100W	MS420VAC6000W
Voltage (DC)	Range	DC 0~520Vdc			
	Resolution	20 mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Frequency	Range	10~5000Hz			
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.91Hz 0.01% of actual + 0.025Hz @ 82~819.1Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency measurement specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Current (r.m.s)	Range	0~110% F.S. (H: F.S.=100% Irms, M: F.S.=25% Irms, L: F.S.=5% Irms)			
	Resolution	L: 3mA, H: 1.5mA		L: 6mA, H: 3mA	
	Accuracy	0.3% of actual + 0.3%F.S. @ 10~1000Hz, AC mode 0.3% of actual + 0.4%F.S. @ 10~1000Hz, AC + DC mode 0.3% of actual + 0.5%F.S. @ 1001~2000Hz, AC mode 0.3% of actual + 0.6%F.S. @ 1001~2000Hz, AC + DC mode 0.3% of actual + 0.7%F.S. @ 2001~3000Hz, AC mode 0.3% of actual + 0.8%F.S. @ 2001~3000Hz, AC + DC mode 0.3% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.3% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.3% of actual + 1.1%F.S. @ 4001~5000Hz, AC mode 0.3% of actual + 1.2%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Current (Peak)	Range	0~110% F.S. (H: F.S.=100% Ipeak, M: F.S.=25% Ipeak, L: F.S.=5% Ipeak)			
	Resolution	L: 12.5mA, H: 6.25mA		L: 30mA, H: 15mA	
	Accuracy	0.4% of actual + 0.6%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 0.7%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 0.8%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 0.8%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 1.0%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 1.1%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Power (Watts)	Range	0~2100W	0~3100W	0~4100W	0~6000W
	Resolution	1.5W	1.5W	3W	3W
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			
Power Apparent (VA)	Range	0~2100VA	0~3100VA	0~4100VA	0~6000VA
	Resolution	1.5VA	1.5VA	3VA	3VA
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			

Model		MS420VAC2100W	MS420VAC3100W	MS420VAC4100W	MS420VAC6000W
Power Resistive (VAR)	Range	0~2100VAR	0~3100VAR	0~4100VAR	0~6000VAR
	Resolution	1.5VAR	1.5VAR	3VAR	3VAR
	Accuracy	$\sqrt{(VA)^2-(W)^2}$, Calculated value			
Power Factor (PF)	Range	0~1.000			
	Resolution	0.001			
	Accuracy	2%F.S.			
Phase	Range	0~360.0°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Harmonic[2]		2~50 orders			
Extra Function					
Remote Sense		5V(rms), Max. Total power less than rated power.			
Slew Rate	Range	AC Voltage: 0.001-10000.00V/ms and Disable			
		DC Voltage: 0.001-10000.00V/ms and Disable			
		Frequency: 0.001-1600.000Hz/ms and Disable			
Transient Generator (only for 15~70Hz)	Range	Trans-Start: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Volt: -260V ~ +260V(L), -520V ~ +520V(H), Resolution: 0.1V			
		Trans-Time: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Count: 0~9999, Constant			
Calibration Function		Built-in calibration function			
Multi-operation[4]	Parallel Output	Max. 64 Units (Option: Optical fiber parallel card)			
	Series Output	Max. 2 Units (Option: Optical fiber parallel card)			
General					
Graphic Display		5" Color touch LCD	7" Color touch LCD		
Operation Key Feature		Switch key, Rotary Knob, USB port for transfer and upgrading firmware			
Rack mount Handles		Yes			
FAN		Temperature Control			
Protection Circuits		OVP, OCP, OPP, OFP, RMP			
Interface		USB, RS232, RS484 (Standard) ; GPIB&LAN, CAN (Optional)			
Remote Control Input/Output (Option)					
Analog input		Set A/B/C phase voltage RMS, set current limit.			
Analog output		A/B/C phase output voltage RMS value monitoring, output power monitoring.			
Digital input		Single/three output mode selection, external control function enable selection, power output ON/OFF state control, enable analog input control, stored data recall, output suppression (OFF/LIVE/LATCHING), phase/frequency synchronization signal, List file run trigger.			
Digital output		Power output ON/OFF status indicator, fault status indicator, List file output/output status change/parameter change indicator.			
Galvanic Isolation to the Device		2121VDC			
Environment					
Operating Temperature		0°C~50°C			
Storage Temperature		-20°C~70°C			
Fan Noise					
Altitude		2000m			
Relative Humidity		<95%, non-condensing≤45°C; <80%, non-condensing≤50°C			
Temperature Coefficient		≤100ppm/°C F.S. (Voltage); ≤200ppm/°C F.S. (Current); 10ppm/°C.F.S. (Frequency)			
Mechanical					
Dimensions (W*H*D)		423 x 88 x 585 mm	423 x 133 x 585 mm	423 x 133 x 585 mm	423 x 133 x 585 mm
Package Dimensions (W*H*D)		638 x 303 x 875 mm	638 x 347 x 875 mm	638 x 347 x 875 mm	638 x 347 x 875 mm
Unit Weight		19.5kg	28.5kg	33.2kg	36kg
Shipping Weight		25.5kg	34.5kg	39.2kg	44.5kg
Regulatory Compliance					
EMC		CE marked for EMC Directive 2014/30/EU/EN61326-1: 2013 Class A for emissions and immunity standard as required for EU CE Mark. FCC Verification of conformity for CFR 47 Part 15 of the FCC Rules.			
Safety		It meets the safety requirements of EU EN 61010-1:2010 for electrical equipment used in measurement, control and laboratories.			
CE Mark		Installation Overvoltage Category II; Pollution Degree 2; Class II equipment; indoor use only.			
Isolation Voltage		2828VDC, AC output to chassis; 2828VDC, AC input to chassis; 4242VDC, AC input to AC output			
RoHS		Meet to EU Directive 2011/65/EU for restriction of hazardous substances in Electrical and Electronic Equipment.			

[1] According to the output frequency, the AC output voltage will be reduced, and the rated voltage can be output within 3500Hz;
At low level, the maximum output voltage is 187.5V at 4000Hz, and the maximum output voltage is 150V at 5000HZ. The calculation formula is: output voltage =750000/ output frequency.
At high level, the maximum output voltage is 375V at 4000Hz, and the maximum output voltage is 300V at 5000HZ. The calculation formula is: output voltage =1500000/ output frequency.
[2] Only professional version/Professional-HF version support these functions.
[3] According to the output frequency, the number of harmonics will be reduced, up to 50 timeswithin 960Hz, up to 16 times at 3000Hz, up to 9 times at 5000Hz,
the calculation formula is : harmonic number =48000/ output frequency.
[4] It is suggest to derate to 90% output in parallel connection.

All specifications are subject to change without notice.

Model		MST420VAC2100W	MST420VAC3000W	MST420VAC4500W	MST420VAC6000W
Input					
Voltage	1 Phase	100~132Vac 187~300Vac		100~132Vac, Derating to 50% of rated power 187~300Vac	
	3 Phase	187~300Vac 340~460Vac		187~300Vac, Derating to 50% of rated power 340~460Vac	
Current	1 Phase	Max. 28.5A(L-N)	Max. 38A(L-N)	Max. 31.8A(L-N)	Max. 41A(L-N)
	3 Phase	Max. 16.4A(L-L)	Max. 21.9A(L-L)	Max. 18.3A(L-L)	Max. 23.6A(L-L)
Connection	1 Phase	L, N, PE (need to short-circuit all L1-L3 and then input as L)			
	3 Phase	Not supported		L1,L2,L3, N,PE; Only for 3-Phase 4 Wire Y type/Neutral Required	
Frequency		45~65Hz			
Fuse (Internal)		6* T15A	6* T20A	6* T20A	6* T20A
Power Factor		>0.98 (Rate Input Voltage, Full Load)	>0.97 (Rate Input Voltage, Full Load)	>0.97 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)
Input Power		Max. 3.2kVA	Max. 4kVA	Max. 5.8kVA	Max. 67.2kVA
Efficiency (Full Load, 50~5000Hz/DC)		>75.5% (Rate: 110Vac) >75.8% (Rate: 220Vac)	>79.0% (Rate: 110Vac) >80.3% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >81.8% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >83.4% (Rate: 220Vac)
AC Output					
AC Output Power		2100VA	3000VA	4500VA	6000VA
Phase		1 Phase / 3Phase			
Voltage (AC/AC+DC)	Range[n]	L: 0~210Vac H: 0~420Vac AUTO			
	Resolution	≤0.02V (AC and AC+DC mode)			
	Accuracy	0.1% of actual + 0.1%F.S., DC mode 0.025%F.S. @ 10~100Hz, AC mode 0.1% of actual + 0.1%F.S. @ 101~500Hz, AC mode 0.1% of actual + 0.2%F.S. @ 101~500Hz, AC+ DC mode 0.1% of actual + 0.2%F.S. @ 501~1000Hz, AC mode 0.1% of actual + 0.3%F.S. @ 501~1000Hz, AC+ DC mode 0.1% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.1% of actual + 0.5%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual + 0.6%F.S. @ 2001~3000Hz, AC mode 0.1% of actual + 0.7%F.S. @ 2001~3000Hz, AC+ DC mode 0.1% of actual + 0.8%F.S. @ 3001~4000Hz, AC mode 0.1% of actual + 0.9%F.S. @ 3001~4000Hz, AC+ DC mode 0.1% of actual + 1%F.S. @ 4001~5000Hz, AC mode 0.1% of actual + 1.1%F.S. @ 4001~5000Hz, AC+ DC mode Valid from 5% of full-scale to 210VAC(RMS)/260VDC in low-range and 420VAC(RMS)/520VDC in high-range; with sense leads connected.			
	Display Bits	0.001V			
Max. Current (r.m.s)	0~210V (L)	3 Phase: 7A 1 Phase: 21A	3 Phase: 10A 1 Phase: 30A	3 Phase: 14.4A 1 Phase: 43.2A	3 Phase: 20A 1 Phase: 60A
	0~420V (H)	3 Phase: 3.5A 1 Phase: 10.5A	3 Phase: 5A 1 Phase: 15A	3 Phase: 7.2A 1 Phase: 21.6A	3 Phase: 10A 1 Phase: 30A
	Display Bits	0.001A			
	Resolution	3 Phase: 1mA(L), 0.5mA(H) 1 Phase: 3mA(L), 1.5mA(H)		3 Phase: 2mA(L), 1mA(H) 1 Phase: 6mA(L), 3mA(H)	
Max. Current (Peak)	0~210V (L)	3 Phase: 35Apk 1 Phase: 105Apk	3 Phase: 50Apk 1 Phase: 150Apk	3 Phase: 72Apk 1 Phase: 216Apk	3 Phase: 100Apk 1 Phase: 300Apk
	0~420V (H)	3 Phase: 17.5Apk 1 Phase: 52.5Apk	3 Phase: 25Apk 1 Phase: 75Apk	3 Phase: 36Apk 1 Phase: 108Apk	3 Phase: 50Apk 1 Phase: 150Apk
Frequency	Range	Advanced Version: 10~2500Hz Professional Version: 10~2500Hz Profession-HF Version: 10~5000Hz			
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @10~81.99Hz 0.01% of actual + 0.025Hz @ 82~819.99Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency set specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Total Harmonic Distortion (THD)		<0.3% @ 10~100Hz, 50~210Vac/100~420Vac (Resistive Load) <0.5% @ 101~500Hz, 50~210Vac/100~420Vac (Resistive Load) <1% @ 501~1000Hz, 50~210Vac/100~420Vac (Resistive Load) <2% @ 1001~2000Hz, 50~210Vac/100~420Vac (Resistive Load) <3% @ 2001~3000Hz, 50~210Vac/100~420Vac (Resistive Load) <4% @ 3001~4000Hz, 50~210Vac/100~420Vac (Resistive Load) <5% @ 4001~5000Hz, 50~210Vac/100~420Vac (Resistive Load) Note: 15V <Vout< 50V (L range) can be extended 1.5 times, Less Than 15V, no range. Note: 30V <Vout< 100V (H range) can be extended 1.5 times, Less Than 30V, no range.			

Model		MST420VAC2100W	MST420VAC3000W	MST420VAC4500W	MST420VAC6000W
Crest Factor (CF)		≤5			
Load Regulation(ALC=ON)		0.1% of actual+0.1%F.S. @10~1000Hz, AC mode 0.1% of actual+0.2%F.S. @10~1000Hz, AC+ DC mode 0.1% of actual+0.3%F.S. @1001~2000Hz, AC mode 0.1% of actual+0.4%F.S. @1001~2000Hz, AC+ DC mode 0.1% of actual+0.5%F.S. @2001~3000Hz, AC mode 0.1% of actual+0.6%F.S. @2001~3000Hz, AC+ DC mode 0.1% of actual+0.7%F.S. @3001~4000Hz, AC mode 0.1% of actual+0.8%F.S. @3001~4000Hz, AC+ DC mode 0.1% of actual+0.9%F.S. @4001~5000Hz, AC mode 0.1% of actual+1.0%F.S. @4001~5000Hz, AC+ DC mode Valid from 5% to 100% of full-scale with sense leads connected.			
Line Regulation	ALC=ON	0.05%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac; 0.025%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac; Input voltage change in ±10%, DC output or 10Hz~5000Hz AC output.			
	ALC=OFF	0.1%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac; 0.05%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac; Input voltage change in ±10%, DC output or 10Hz~800Hz AC output.			
Phase Angle (Starting / Ending)	Range	0~360°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Current CC Fold Mode	Range	5~200%F.S. (AC Output Voltage: Low-Range 50~210Vac, High-Range 100~420Vac) 7~200%F.S. (DC Output Voltage: Low-Range 50~260Vdc, High-Range 100~520Vdc)			
	Resolution	3 Phase: 15mA 1 Phase: 45mA	3 Phase: 15mA 1 Phase: 45mA	3 Phase: 25mA 1 Phase: 75mA	3 Phase: 25mA 1 Phase: 75mA
	Accuracy	0.3% of actual + 0.4%F.S. @ 10~500Hz, DC / AC mode 0.3% of actual + 0.5%F.S. @ 10~500Hz, DC + AC mode Valid from 5% of full scale to 100% of full-scale. 0.3% of actual + 0.5%F.S. @ 501Hz~1200Hz, DC / AC mode 0.3% of actual + 0.6%F.S. @ 501Hz~1200Hz, DC + AC mode Valid from 5% of full-scale to 200% of full-scale. Note: Above 1.2KHZ, No Rang, only for refernce.			
	Response Time	<180mS			
Noise Level, Typical (r.m.s)		450mV, Low-range; 700mV, High-range; at ≥40Hz outputfrequency; bandwidth, 20kHz to 1MHz;			
DC Output					
DC Output Power		2100W	3000W	4500W	6000W
Voltage (DC)	Range	Low-range: ±260Vdc High-range: ±520Vdc AUTO			
	Resolution	20mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Max. Current (DC)	0~260V (L)	5.4A (Every phase)	8.0A (Every phase)	11.6A (Every phase)	15.6A (Every phase)
	0~520V (H)	2.7A (Every phase)	4.0A (Every phase)	5.8A (Every phase)	7.8A (Every phase)
	Accuracy	±(0.25% of actual + 0.25% of full-scale); valid from 5% of full-scale to 100% of full-scale.			
DC Offset Voltage, Typical		20mVDC, ≥40Hz			
Ripple&Noise(r.m.s)/ (Pk-Pk)	Low-Range	400mV(r.m.s), 2V(Pk-Pk) bandwidth, 10Hz to 1MHz			
	High-Range	700mV(r.m.s), 4V(Pk-Pk)high-range bandwidth, 10Hz to 1MHz.			
Programmable Output Impedance[2]		0Ω + 200μH ~ 1Ω + 1mH			
Harmonics & Inter-harmonics Simulation[2]		10Hz to 5kHz; 2nd to 50th harmonic, 48KHz BW max[3]			
Measurement					
Voltage (AC + DC)	Range	AC 0~420Vac DC 0~520Vdc AC + DC 0-520V(RMS)			
	Resolution	20mV			
	Accuracy (r.m.s)	0.1% of actual+ 0.1%F.S. @ 10~1000Hz, AC mode 0.1% of actual+ 0.2%F.S. @ 10~1000Hz, AC+ DC mode 0.1% of actual+ 0.3%F.S. @ 1001~2000Hz, AC mode 0.1% of actual+ 0.4%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual+ 0.5%F.S. @ 2001~3000Hz, AC mode 0.1% of actual+ 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.1% of actual+ 0.7%F.S. @ 3001~4000Hz, AC mode 0.1% of actual+ 0.8%F.S. @ 3001~4000Hz, AC + DC mode 0.1% of actual+ 0.9%F.S. @ 4001~5000Hz, AC mode 0.1% of actual+ 1.0%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% to 100% of full-scale with sense leads connected.			

Model		MST420VAC2100W	MST420VAC3000W	MST420VAC4500W	MST420VAC6000W
Voltage (DC)	Range	DC 0~520Vdc			
	Resolution	20mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Frequency	Range	10~5000Hz			
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~ 5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.91Hz 0.01% of actual + 0.025Hz @ 82~819.1Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency measurement specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Current (r.m.s)	Range	0~110% F.S. (H: F.S.=100% Irms, M: F.S.=25% Irms, L: F.S.=5% Irms)			
	Resolution	3 Phase: 1mA(L), 0.5mA(H) 1 Phase: 3mA(L), 1.5mA(H)		3 Phase: 2mA(L), 1mA(H) 1 Phase: 6mA(L), 3mA(H)	
	Accuracy	0.3% of actual + 0.3%F.S. @ 10~1000Hz, AC mode 0.3% of actual + 0.4%F.S. @ 10~1000Hz, AC + DC mode 0.3% of actual + 0.5%F.S. @ 1001~2000Hz, AC mode 0.3% of actual + 0.6%F.S. @ 1001~2000Hz, AC + DC mode 0.3% of actual + 0.7%F.S. @ 2001~3000Hz, AC mode 0.3% of actual + 0.8%F.S. @ 2001~3000Hz, AC + DC mode 0.3% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.3% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.3% of actual + 1.17%F.S. @ 4001~5000Hz, AC mode 0.3% of actual + 1.2%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Current (Peak)	Range	0~110% F.S. (H: F.S.=100% Ipeak, M: F.S.=25% Ipeak, L: F.S.=5% Ipeak)			
	Resolution	3 Phase: 5mA(L), 2.5mA(H) 1 Phase: 15mA(L), 7.5mA(H)		3 Phase: 10mA(L), 5mA(H) 1 Phase: 30mA(L), 15mA(H)	
	Accuracy	0.4% of actual + 0.6%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 0.7%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 0.8%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 0.8%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 1.0%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 1.1%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Power (Watts)	Range	0~2100W	0~3000W	0~4500W	0~6000W
	Resolution	3 Phase: 0.5W 1 Phase: 1.5W	3 Phase: 0.5W 1 Phase: 1.5W	3 Phase: 1W 1 Phase: 3W	3 Phase: 1W 1 Phase: 3W
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			
Power Apparent (VA)	Range	0~2100VA	0~3000VA	0~4500VA	0~6000VA
	Resolution	3 Phase: 0.5VA 1 Phase: 1.5VA	3 Phase: 0.5VA 1 Phase: 1.5VA	3 Phase: 1VA 1 Phase: 3VA	3 Phase: 1VA 1 Phase: 3VA
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			

Model		MST420VAC2100W	MST420VAC3000W	MST420VAC4500W	MST420VAC6000W
Power Resistive (VAR)	Range	0~2100VAR	0~3000VAR	0~4500VAR	0~6000VAR
	Resolution	3 Phase: 0.5VAR 1 Phase: 1.5VAR	3 Phase: 0.5VAR 1 Phase: 1.5VAR	3 Phase: 1VAR 1 Phase: 3VAR	3 Phase: 1VAR 1 Phase: 3VAR
	Accuracy	$\sqrt{(VA)^2-(W)^2}$, Calculated value			
Power Factor (PF)	Range	0~1.000			
	Resolution	0.001			
	Accuracy	2%F.S.			
Phase	Range	0~360.0°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Harmonic[2]		2~50 orders			
Extra Function					
Remote Sense		5V(rms), Max. Total power less than rated power.			
Slew Rate	Range	AC Voltage: 0.001-10000.00V/ms and Disable			
		DC Voltage: 0.001-10000.00V/ms and Disable			
		Frequency: 0.001-1600.000Hz/ms and Disable			
Transient Generator (only for 15~70Hz)	Range	Trans-Start: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Volt: -260V ~ +260V(L), -520V ~ +520V(H), Resolution: 0.1V			
		Trans-Time: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Count: 0~9999, Constant			
Calibration Function		Built-in calibration function			
Multi-operation[4]	Parallel Output	Max. 64 Units (Option: Optical fiber parallel card)			
	Series Output	Max. 2 Units (Option: Optical fiber parallel card)			
General					
Graphic Display		7" Color touch LCD			
Operation Key Feature		Switch key, Rotary Knob, USB port for transfer and upgrading firmware			
Rack mount Handles		Yes			
FAN		Temperature Control			
Protection Circuits		OVP, OCP, OPP, OFP, RMP			
Interface		USB, RS232, RS484 (Standard) ; GPIB&LAN, CAN (Optional)			
Remote Control Input/Output (Option)					
Analog input		Set A/B/C phase voltage RMS, set current limit.			
Analog output		A/B/C phase output voltage RMS value monitoring, output power monitoring.			
Digital input		Single/three output mode selection, external control function enable selection, power output ON/OFF state control, enable analog input control, stored data recall, output suppression (OFF/LIVE/LATCHING), phase/frequency synchronization signal, List file run trigger.			
Digital output		Power output ON/OFF status indicator, fault status indicator, List file output/output status change/parameter change indicator.			
Environment					
Operating Temperature		0°C~50°C			
Storage Temperature		-20°C~70°C			
Fan Noise					
Altitude		2000m			
Relative Humidity		<95%, non-condensing≤45°C; <80%, non-condensing≤50°C			
Temperature Coefficient		≤100ppm/°C F.S. (Voltage); ≤200ppm/°C F.S. (Current); 10ppm/°C.F.S. (Frequency)			
Mechanical					
Dimensions (W*H*D)		423 x 133 x 585 mm			
Package Dimensions (W*H*D)		638 x 347 x 875 mm			
Unit Weight		34kg	34kg	36kg	36kg
Shipping Weight		40kg	40kg	44.5kg	44.5kg
EMC		CE marked for EMC Directive 2014/30/EU/EN61326-1: 2013 Class A for emissions and immunity standard as required for EU CE Mark. FCC Verification of conformity for CFR 47 Part 15 of the FCC Rules.			
Safety		It meets the safety requirements of EU EN 61010-1:2010 for electrical equipment used in measurement, control and laboratories.			
CE Mark		Installation Overvoltage Category II; Pollution Degree 2; Class II equipment; indoor use only.			
Isolation Voltage		2828VDC, AC output to chassis; 2828VDC, AC input to chassis; 4242VDC, AC input to AC output			
RoHS		Meet to EU Directive 2011/65/EU for restriction of hazardous substances in Electrical and Electronic Equipment.			

[1] According to the output frequency, the AC output voltage will be reduced, and the rated voltage can be output within 3500Hz;
At low level, the maximum output voltage is 187.5V at 4000Hz, and the maximum output voltage is 150V at 5000HZ. The calculation formula is: output voltage =750000/ output frequency.
At high level, the maximum output voltage is 375V at 4000Hz, and the maximum output voltage is 300V at 5000HZ. The calculation formula is: output voltage =1500000/ output frequency.
[2] Only professional version/Professional-HF version support these functions.
[3] According to the output frequency, the number of harmonics will be reduced, up to 50 timeswithin 960Hz, up to 16 times at 3000Hz, up to 9 times at 5000Hz,
the calculation formula is : harmonic number =48000/ output frequency.
[4] It is suggest to derate to 90% output in parallel connection.

All specifications are subject to change without notice.

Model		MST420VAC9000W	MST420VAC12000W	MST420VAC15000W	MST420VAC18000W
Input					
Voltage	3 Phase	187~300Vac, Derating to 50% of rated power 340~460Vac			
Current	3 Phase	Max. 35.5A(L-L)	Max. 47.4A(L-L)	Max. 59.2A(L-L)	Max. 71A(L-L)
Connection	3 Phase	L1,L2,L3, N,PE; Only for 3-Phase 4 Wire Y type/Neutral Required			
Frequency		45~65Hz			
Fuse (Internal)		12* T15A	12* T20A	18* T15A	18* T20A
Power Factor		>0.97 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)	>0.97 (Rate Input Voltage, Full Load)	>0.98 (Rate Input Voltage, Full Load)
Input Power		Max. 10.8kVA	Max. 14.4kVA	Max. 18kVA	Max. 21.6kVA
Efficiency (Full Load, 50~5000Hz/DC)		>72.5% (Rate: 110Vac) >81.8% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >83.4% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >81.8% (Rate: 220Vac)	>72.5% (Rate: 110Vac) >83.4% (Rate: 220Vac)
AC Output					
AC Output Power		9000VA	12000VA	15000VA	18000VA
Phase		1 Phase / 3Phase			
Voltage (AC/AC+DC)	Range[1]	L: 0~210Vac H: 0~420Vac AUTO			
	Resolution	≤0.02V (AC and AC+DC mode)			
	Accuracy	0.1% of actual + 0.1%F.S., DC mode 0.025%F.S. @ 10~100Hz, AC mode 0.1% of actual + 0.1%F.S. @ 101~500Hz, AC mode 0.1% of actual + 0.2%F.S. @ 101~500Hz, AC+ DC mode 0.1% of actual + 0.2%F.S. @ 501~1000Hz, AC mode 0.1% of actual + 0.3%F.S. @ 501~1000Hz, AC+ DC mode 0.1% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.1% of actual + 0.5%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual + 0.6%F.S. @ 2001~3000Hz, AC mode 0.1% of actual + 0.7%F.S. @ 2001~3000Hz, AC+ DC mode 0.1% of actual + 0.8%F.S. @ 3001~4000Hz, AC mode 0.1% of actual + 0.9%F.S. @ 3001~4000Hz, AC+ DC mode 0.1% of actual + 1%F.S. @ 4001~5000Hz, AC mode 0.1% of actual + 1.1%F.S. @ 4001~5000Hz, AC+ DC mode Valid from 5% of full-scale to 210VAC(RMS)/260VDC in low-range and 420VAC(RMS)/520VDC in high-range; with sense leads connected.			
	Display Bits	0.001V			
Max. Current (r.m.s)	0~210V (L)	3 Phase: 40A 1 Phase: 120A	3 Phase: 40A 1 Phase: 120A	3 Phase: 47.6A 1 Phase: 142.8A	3 Phase: 55.2A 1 Phase: 165.6A
	0~420V (H)	3 Phase: 20A 1 Phase: 60A	3 Phase: 20A 1 Phase: 60A	3 Phase: 23.8A 1 Phase: 71.4A	3 Phase: 27.6A 1 Phase: 82.8A
	Display Bits	0.001A			
	Resolution	3 Phase: 4mA(L), 2mA(H) 1 Phase: 12mA(L), 6mA(H)		3 Phase: 6mA(L), 3mA(H) 1 Phase: 18mA(L), 9mA(H)	
Max. Current (Peak)	0~210V (L)	3 Phase: 200Apk 1 Phase: 600Apk	3 Phase: 200Apk 1 Phase: 600Apk	3 Phase: 238Apk 1 Phase: 714Apk	3 Phase: 276Apk 1 Phase: 828Apk
	0~420V (H)	3 Phase: 100Apk 1 Phase: 300Apk	3 Phase: 100Apk 1 Phase: 300Apk	3 Phase: 119Apk 1 Phase: 357Apk	3 Phase: 138Apk 1 Phase: 414Apk
Frequency	Range	Advanced Version: 10~2500Hz Professional Version: 10~2500Hz Profession-HF Version: 10~5000Hz			
	Resolution	0.01 Hz @ 10~81.99 Hz; 0.05 Hz @ 82~819.99 Hz; 0.1Hz @ 820~5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @10~81.99Hz 0.01% of actual + 0.025Hz @ 82~819.99Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency set specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Total Harmonic Distortion (THD)		<0.3% @ 10~100Hz, 50~210Vac/100~420Vac (Resistive Load) <0.5% @ 101~500Hz, 50~210Vac/100~420Vac (Resistive Load) <1% @ 501~1000Hz, 50~210Vac/100~420Vac (Resistive Load) <2% @ 1001~2000Hz, 50~210Vac/100~420Vac (Resistive Load) <3% @ 2001~3000Hz, 50~210Vac/100~420Vac (Resistive Load) <4% @ 3001~4000Hz, 50~210Vac/100~420Vac (Resistive Load) <5% @ 4001~5000Hz, 50~210Vac/100~420Vac (Resistive Load) Note: 15V <Vout< 50V (L range) can be extended 1.5 times, Less Than 15V, no range. Note: 30V <Vout< 100V (H range) can be extended 1.5 times, Less Than 30V, no range.			

Model		MST420VAC9000W	MST420VAC12000W	MST420VAC15000W	MST420VAC18000W
Crest Factor (CF)		≤5			
Load Regulation(ALC=ON)		0.1% of actual+0.1%F.S. @10~1000Hz, AC mode 0.1% of actual+0.2%F.S. @10~1000Hz, AC+ DC mode 0.1% of actual+0.3%F.S. @1001~2000Hz, AC mode 0.1% of actual+0.4%F.S. @1001~2000Hz, AC+ DC mode 0.1% of actual+0.5%F.S. @2001~3000Hz, AC mode 0.1% of actual+0.6%F.S. @2001~3000Hz, AC+ DC mode 0.1% of actual+0.7%F.S. @3001~4000Hz, AC mode 0.1% of actual+0.8%F.S. @3001~4000Hz, AC+ DC mode 0.1% of actual+0.9%F.S. @4001~5000Hz, AC mode 0.1% of actual+1.0%F.S. @4001~5000Hz, AC+ DC mode Valid from 5% to 100% of full-scale with sense leads connected.			
Line Regulation	ALC=ON	0.05%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.025%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~5000Hz AC output.			
	ALC=OFF	0.1%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.05%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~800Hz AC output.			
Phase Angle (Starting / Ending)	Range	0~360°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Current CC Fold Mode	Range	5~200%F.S. (AC Output Voltage: Low-Range 50~210Vac, High-Range 100~420Vac) 7~200%F.S. (DC Output Voltage: Low-Range 50~260Vdc, High-Range 100~520Vdc)			
	Resolution	3 Phase: 50mA 1 Phase: 150mA	3 Phase: 50mA 1 Phase: 150mA	3 Phase: 75mA 1 Phase: 225mA	3 Phase: 75mA 1 Phase: 225mA
	Accuracy	0.3% of actual + 0.4%F.S. @ 10~500Hz, DC / AC mode 0.3% of actual + 0.5%F.S. @ 10~500Hz, DC + AC mode Valid from 5% of full scale to 100% of full-scale. 0.3% of actual + 0.5%F.S. @ 501Hz~1200Hz, DC / AC mode 0.3% of actual + 0.6%F.S. @ 501Hz~1200Hz, DC + AC mode Valid from 5% of full-scale to 200% of full-scale. Note: Above 1.2KHZ, No Rang, only for refernce.			
	Response Time	<180mS			
Noise Level, Typical (r.m.s)		450mV, Low-range; 700mV, High-range; at ≥40Hz outputfrequency; bandwidth, 20kHz to 1MHz;			
DC Output					
DC Output Power		9000W	12000W	15000W	18000W
Voltage (DC)	Range	Low-range: ±260Vdc High-range: ±520Vdc AUTO			
	Resolution	20mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Max. Current (DC)	0~260V (L)	31.2A (Every phase)	31.2A (Every phase)	36.6A (Every phase)	42A (Every phase)
	0~520V (H)	15.6A (Every phase)	15.6A (Every phase)	18.3A (Every phase)	21A (Every phase)
	Accuracy	±(0.25% of actual + 0.25% of full-scale); valid from 5% of full-scale to 100% of full-scale.			
DC Offset Voltage, Typical		20mVDC, ≥40Hz			
Ripple&Noise(r.m.s)/ (Pk-Pk)	Low-Range	400mV(r.m.s), 2V(Pk-Pk) bandwidth, 10 Hz to 1 MHz			
	High-Range	700mV(r.m.s), 4V(Pk-Pk)high-range bandwidth, 10Hz to 1MHz.			
Programmable Output Impedance[2]		0Ω + 200μH ~ 1Ω + 1mH			
Harmonics & Inter-harmonics Simulation[3]		10Hz to 5kHz; 2nd to 50th harmonic, 48KHz BW max[3]			
Measurement					
Voltage (AC + DC)	Range	AC 0~420Vac DC 0~520Vdc AC + DC 0-520V(RMS)			
	Resolution	20mV			
	Accuracy (r.m.s)	0.1% of actual+ 0.1%F.S. @ 10~1000Hz, AC mode 0.1% of actual+ 0.2%F.S. @ 10~1000Hz, AC+ DC mode 0.1% of actual+ 0.3%F.S. @ 1001~2000Hz, AC mode 0.1% of actual+ 0.4%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual+ 0.5%F.S. @ 2001~3000Hz, AC mode 0.1% of actual+ 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.1% of actual+ 0.7%F.S. @ 3001~4000Hz, AC mode 0.1% of actual+ 0.8%F.S. @ 3001~4000Hz, AC + DC mode 0.1% of actual+ 0.9%F.S. @ 4001~5000Hz, AC mode 0.1% of actual+ 1.0%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% to 100% of full-scale with sense leads connected.			

Model		MST420VAC9000W	MST420VAC12000W	MST420VAC15000W	MST420VAC18000W
Voltage (DC)	Range	DC 0~520Vdc			
	Resolution	20mV			
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 260VDC, and in high-range from 5% of full-scale to 520VDC; with sense leads connected.			
Frequency	Range	10~5000Hz			
	Resolution	0.01Hz @ 10~81.99Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~ 5000Hz;			
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.91Hz 0.01% of actual + 0.025Hz @ 82~819.1Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency measurement specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.			
Current (r.m.s)	Range	0~110% F.S. (H: F.S.=100% Irms, M: F.S.=25% Irms, L: F.S.=5% Irms)			
	Resolution	3 Phase: 4mA(L), 2mA(H) 1 Phase: 12mA(L), 6mA(H)		3 Phase: 6mA(L), 3mA(H) 1 Phase: 18mA(L), 9mA(H)	
	Accuracy	0.3% of actual + 0.3%F.S. @ 10~1000Hz, AC mode 0.3% of actual + 0.4%F.S. @ 10~1000Hz, AC + DC mode 0.3% of actual + 0.5%F.S. @ 1001~2000Hz, AC mode 0.3% of actual + 0.6%F.S. @ 1001~2000Hz, AC + DC mode 0.3% of actual + 0.7%F.S. @ 2001~3000Hz, AC mode 0.3% of actual + 0.8%F.S. @ 2001~3000Hz, AC + DC mode 0.3% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.3% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.3% of actual + 1.1%F.S. @ 4001~5000Hz, AC mode 0.3% of actual + 1.2%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Current (Peak)	Range	0~110% F.S. (H: F.S.=100% Ipeak, M: F.S.=25% Ipeak, L: F.S.=5% Ipeak)			
	Resolution	3 Phase: 20mA(L), 10mA(H) 1 Phase: 60mA(L), 30mA(H)		3 Phase: 30mA(L), 15mA(H) 1 Phase: 90mA(L), 45mA(H)	
	Accuracy	0.4% of actual + 0.6%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 0.7%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 0.8%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 0.8%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 1.0%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 1.1%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.			
Power (Watts)	Range	0~9000W	0~12000W	0~15000W	0~18000W
	Resolution	3 Phase: 2W 1 Phase: 6W	3 Phase: 2W 1 Phase: 6W	3 Phase: 4W 1 Phase: 12W	3 Phase: 4W 1 Phase: 12W
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			
Power Apparent (VA)	Range	0~9000VA	0~12000VA	0~15000VA	0~18000VA
	Resolution	3 Phase: 2VA 1 Phase: 6VA	3 Phase: 2VA 1 Phase: 6VA	3 Phase: 4VA 1 Phase: 12VA	3 Phase: 4VA 1 Phase: 12VA
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode			

Model		MST420VAC9000W	MST420VAC12000W	MST420VAC15000W	MST420VAC18000W
Power Resistive (VAR)	Range	0~9000VAR	0~12000VAR	0~15000VAR	0~18000VAR
	Resolution	3 Phase: 2VAR 1 Phase: 6VAR	3 Phase: 2VAR 1 Phase: 6VAR	3 Phase: 4VAR 1 Phase: 12VAR	3 Phase: 4VAR 1 Phase: 12VAR
	Accuracy	$\sqrt{(VA)^2-(W)^2}$, Calculated value			
Power Factor (PF)	Range	0~1.000			
	Resolution	0.001			
	Accuracy	2%F.S.			
Phase	Range	0~360.0°			
	Resolution	0.4 °			
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;			
Harmonic[2]		2~50 orders			
Extra Function					
Remote Sense		5V(rms), Max. Total power less than rated power.			
Slew Rate	Range	AC Voltage: 0.001-10000.00V/ms and Disable			
		DC Voltage: 0.001-10000.00V/ms and Disable			
		Frequency: 0.001-1600.000Hz/ms and Disable			
Transient Generator (only for 15~70Hz)	Range	Trans-Start: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Volt: -260V ~ +260V(L), -520V ~ +520V(H), Resolution: 0.1V			
		Trans-Time: 0.0~66.5ms/10Hz, Resolution: 0.1ms			
		Trans-Count: 0~9999, Constant			
Calibration Function		Built-in calibration function			
Multi-operation[4]	Parallel Output	Max. 64 Units (Option: Optical fiber parallel card)			
	Series Output	Max. 2 Units (Option: Optical fiber parallel card)			
General					
Graphic Display		7" Color touch LCD			
Operation Key Feature		Switch key, Rotary Knob, USB port for transfer and upgrading firmware			
Rack mount Handles		Yes			
FAN		Temperature Control			
Protection Circuits		OVP, OCP, OPP, OFP, RMP			
Interface		USB, RS232, RS484 (Standard) ; GPIB&LAN, CAN (Optional)			
Remote Control Input/Output (Option)					
Analog input		Set A/B/C phase voltage RMS, set current limit.			
Analog output		A/B/C phase output voltage RMS value monitoring, output power monitoring.			
Digital input		Single/three output mode selection, external control function enable selection, power output ON/OFF state control, enable analog input control, stored data recall, output suppression (OFF/LIVE/LATCHING), phase/frequency synchronization signal, List file run trigger.			
Digital output		Power output ON/OFF status indicator, fault status indicator, List file output/output status change/parameter change indicator.			
Environment					
Operating Temperature		0°C~50°C			
Storage Temperature		-20°C~70°C			
Fan Noise					
Altitude		2000m			
Relative Humidity		<95%, non-condensing≤45°C; <80%, non-condensing≤50°C			
Temperature Coefficient		≤100ppm/°C F.S. (Voltage); ≤200ppm/°C F.S. (Current); 10ppm/°C.F.S. (Frequency)			
Mechanical					
Dimensions (W*H*D)		423 x 265 x 585 mm	423 x 265 x 585 mm	423 x 399 x 585 mm	423 x 399 x 585 mm
Package Dimensions (W*H*D)		553 x 536 x 785 mm	553 x 536 x 785 mm	553 x 668 x 785 mm	553 x 668 x 785 mm
Unit Weight		-	-	104kg	104kg
Shipping Weight		-	-	110kg	110kg
Regulatory Compliance					
EMC		CE marked for EMC Directive 2014/30/EU/EN61326-1: 2013 Class A for emissions and immunity standard as required for EU CE Mark. FCC Verification of conformity for CFR 47 Part 15 of the FCC Rules.			
Safety		It meets the safety requirements of EU EN 61010-1:2010 for electrical equipment used in measurement, control and laboratories.			
CE Mark		Installation Overvoltage Category II; Pollution Degree 2; Class II equipment; indoor use only.			
Isolation Voltage		2828VDC, AC output to chassis; 2828VDC, AC input to chassis; 4242VDC, AC input to AC output			
RoHS		Meet to EU Directive 2011/65/EU for restriction of hazardous substances in Electrical and Electronic Equipment.			

[1] According to the output frequency, the AC output voltage will be reduced, and the rated voltage can be output within 3500Hz;
At low level, the maximum output voltage is 187.5V at 4000Hz, and the maximum output voltage is 150V at 5000HZ. The calculation formula is: output voltage =750000/ output frequency.
At high level, the maximum output voltage is 375V at 4000Hz, and the maximum output voltage is 300V at 5000HZ. The calculation formula is: output voltage =1500000/ output frequency.
[2] Only professional version/Professional-HF version support these functions.
[3] According to the output frequency, the number of harmonics will be reduced, up to 50 timeswithin 960Hz, up to 16 times at 3000Hz, up to 9 times at 5000Hz,
the calculation formula is : harmonic number =48000/ output frequency.
[4] It is suggest to derate to 90% output in parallel connection.

All specifications are subject to change without notice.

Model		MST820VAC12000W
Input		
Voltage	3 Phase	187~300Vac, Reduced to 50% rated power 340~460Vac
Current	3 Phase	Max. 47.4A(L-L)
Connection	3 Phase	L1,L2,L3, N,PE; Only for 3-Phase 4 Wire Y type/Neutral Required
Frequency		45~65Hz
Fuse (Internal)		12* T20A
Power Factor		>0.98 (Rate Input Voltage, Full Load)
Input Power		Max. 14.4kVA
Efficiency (Full Load, 50~5000Hz/DC)		>72.5% (Rate: 110Vac) >83.4% (Rate: 220Vac)
AC Output		
AC Output Power		12000VA
Phase		1 Phase / 3Phase
Voltage (AC/AC+DC)	Range[1]	L: 0~420Vac H: 0~820Vac AUTO
	Resolution	≤0.04V (AC and AC+DC mode)
	Accuracy	0.1% of actual + 0.1%F.S., DC mode 0.025%F.S. @ 10~100Hz, AC mode 0.1% of actual + 0.1%F.S. @ 101~500Hz, AC mode 0.1% of actual + 0.2%F.S. @ 101~500Hz, AC+ DC mode 0.1% of actual + 0.2%F.S. @ 501~1000Hz, AC mode 0.1% of actual + 0.3%F.S. @ 501~1000Hz, AC+ DC mode 0.1% of actual + 0.4%F.S. @ 1001~2000Hz, AC mode 0.1% of actual + 0.5%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual + 0.6%F.S. @ 2001~3000Hz, AC mode 0.1% of actual + 0.7%F.S. @ 2001~3000Hz, AC+ DC mode 0.1% of actual + 0.8%F.S. @ 3001~4000Hz, AC mode 0.1% of actual + 0.9%F.S. @ 3001~4000Hz, AC+ DC mode 0.1% of actual + 1%F.S. @ 4001~5000Hz, AC mode 0.1% of actual + 1.1%F.S. @ 4001~5000Hz, AC+ DC mode Valid from 5% of full-scale to 420VAC(RMS)/520VDC in low-range and 820VAC(RMS)/1040VDC in high-range; with sense leads connected.
	Display Bits	0.001V
Max. Current (r.m.s)	0~420V (L)	3 Phase: 20A 1 Phase: 60A
	0~820V (H)	3 Phase: 10A 1 Phase: 30A
	Display Bits	0.001A
	Resolution	3 Phase: 2mA(L), 1mA(H) 1 Phase: 6mA(L), 3mA(H)
Max. Current (Peak)	0~420V (L)	3 Phase: 100Apk 1 Phase: 300Apk
	0~820V (H)	3 Phase: 50Apk 1 Phase: 150Apk
Frequency	Range	Advanced Version: 10~2500Hz Professional Version: 10~2500Hz Profession-HF Version: 10~5000Hz
	Resolution	0.01 Hz @ 10~81.99 Hz; 0.05 Hz @ 82~819.99 Hz; 0.1Hz @ 820~ 5000Hz;
	Accuracy	0.01% of actual + 0.005Hz @10~81.99Hz 0.01% of actual + 0.025Hz @ 82~819.99Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency set specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.
Total Harmonic Distortion (THD)		<0.3% @ 10~100Hz, 100~420Vac/200~820Vac (Resistive Load) <0.5% @ 101~500Hz, 100~420Vac/200~820Vac (Resistive Load) <1% @ 501~1000Hz, 100~420Vac/200~820Vac (Resistive Load) <2% @ 1001~2000Hz, 100~420Vac/200~820Vac (Resistive Load) <3% @ 2001~3000Hz, 100~420Vac/200~820Vac (Resistive Load) <4% @ 3001~4000Hz, 100~420Vac/200~820Vac (Resistive Load) <5% @ 4001~5000Hz, 100~420Vac/200~820Vac (Resistive Load) Note: 30V <Vout< 100V (L range) can be extended 1.5 times, Less Than 30V, no range. Note: 60V <Vout< 200V (H range) can be extended 1.5 times, Less Than 60V, no range.

Model		MST820VAC12000W
Crest Factor (CF)		≤5
Load Regulation(ALC=ON)		0.1% of actual+0.1%F.S. @10~1000Hz, AC mode 0.1% of actual+0.2%F.S. @10~1000Hz, AC+ DC mode 0.1% of actual+0.3%F.S. @1001~2000Hz, AC mode 0.1% of actual+0.4%F.S. @1001~2000Hz, AC+ DC mode 0.1% of actual+0.5%F.S. @2001~3000Hz, AC mode 0.1% of actual+0.6%F.S. @2001~3000Hz, AC+ DC mode 0.1% of actual+0.7%F.S. @3001~4000Hz, AC mode 0.1% of actual+0.8%F.S. @3001~4000Hz, AC+ DC mode 0.1% of actual+0.9%F.S. @4001~5000Hz, AC mode 0.1% of actual+1.0%F.S. @4001~5000Hz, AC+ DC mode Valid from 5% to 100% of full-scale with sense leads connected.
Line Regulation	ALC=ON	0.05%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.025%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~5000Hz AC output.
	ALC=OFF	0.1%F.S. @ 1Φ100-132Vac/ 3ΦY187-300Vac； 0.05%F.S. @ 1Φ187-300Vac/ 3ΦY340-460Vac； Input voltage change in ±10%, DC output or 10Hz~800Hz AC output.
Phase Angle (Starting / Ending)	Range	0~360°
	Resolution	0.4 °
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;
Current CC Fold Mode	Range	5~200%F.S. (AC Output Voltage: Low-Range 100~420Vac, High-Range 200~820Vac) 7~200%F.S. (DC Output Voltage: Low-Range 100~520Vdc, High-Range 200~1040Vdc)
	Resolution	3 Phase: 25mA 1 Phase: 75mA
	Accuracy	0.3% of actual + 0.4%F.S. @ 10~500Hz, DC / AC mode 0.3% of actual + 0.5%F.S. @ 10~500Hz, DC + AC mode Valid from 5% of full scale to 100% of full-scale. 0.3% of actual + 0.5%F.S. @ 501Hz~1200Hz, DC / AC mode 0.3% of actual + 0.6%F.S. @ 501Hz~1200Hz, DC + AC mode Valid from 5% of full-scale to 200% of full-scale. Note: Above 1.2KHZ, No Rang, only for refernce.
	Response Time	<180mS
Noise Level, Typical (r.m.s)		900mV, Low-range; 1400mV, High-range; at ≥40Hz outputfrequency; bandwidth, 20kHz to 1MHz;
DC Output		
DC Output Power		12000W
Voltage (DC)	Range	Low-range: ±520Vdc High-range: ±1040Vdc AUTO
	Resolution	40mV
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 520VDC, and in high-range from 5% of full-scale to 1040VDC; with sense leads connected.
Max. Current (DC)	0~520V (L)	15.6A (Every phase)
	0~1040V (H)	7.8A (Every phase)
	Accuracy	±(0.25% of actual + 0.25% of full-scale); valid from 5% of full-scale to 100% of full-scale.
DC Offset Voltage, Typical		40mVDC, ≥40Hz
Ripple&Noise(r.m.s)/ (Pk-Pk)	Low-Range	800mV(r.m.s), 4V(Pk-Pk) bandwidth, 10Hz to 1MHz
	High-Range	1400mV(r.m.s), 8V(Pk-Pk) bandwidth, 10Hz to 1MHz
Programmable Output Impedance[2]		0Ω + 200μH ~ 1Ω + 1mH
Harmonics & Inter-harmonics Simulation[3]		10Hz to 5 kHz; 2nd to 50th harmonic, 48KHz BW max[3]
Measurement		
Voltage (AC + DC)	Range	AC 0~820Vac DC 0~1040Vdc AC + DC 0-1040V(RMS)
	Resolution	40mV
	Accuracy (r.m.s)	0.1% of actual+ 0.1%F.S. @ 10~1000Hz, AC mode 0.1% of actual+ 0.2%F.S. @ 10~1000Hz, AC+ DC mode 0.1% of actual+ 0.3%F.S. @ 1001~2000Hz, AC mode 0.1% of actual+ 0.4%F.S. @ 1001~2000Hz, AC+ DC mode 0.1% of actual+ 0.5%F.S. @ 2001~3000Hz, AC mode 0.1% of actual+ 0.6%F.S. @ 2001~3000Hz, AC + DC mode 0.1% of actual+ 0.7%F.S. @ 3001~4000Hz, AC mode 0.1% of actual+ 0.8%F.S. @ 3001~4000Hz, AC + DC mode 0.1% of actual+ 0.9%F.S. @ 4001~5000Hz, AC mode 0.1% of actual+ 1.0%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% to 100% of full-scale with sense leads connected.

Model		MST820VAC12000W
Voltage (DC)	Range	DC 0~1040Vdc
	Resolution	40mV
	Accuracy	±(0.1% of actual + 0.1% of full-scale); valid in low-range from 5% of full-scale to 520VDC, and in high-range from 5% of full-scale to 1040VDC; with sense leads connected.
Frequency	Range	10~5000Hz
	Resolution	0.01Hz @ 10~81.9 Hz; 0.05Hz @ 82~819.99Hz; 0.1Hz @ 820~5000Hz;
	Accuracy	0.01% of actual + 0.005Hz @ 10~81.91Hz 0.01% of actual + 0.025Hz @ 82~819.1Hz 0.01% of actual + 0.05Hz @ 820~1000Hz 0.1% of actual + 0.05Hz @ 1001~5000Hz Frequency measurement specifications valid for output voltage >5% of full-scale. Note: 4.2V <Vout< 10.5V (L range) can be extended 1.5 times, Less Than 4.2V, no range. 8.4V <Vout< 21.0V (H range) can be extended 1.5 times, Less Than 8.4V, no range.
Current (r.m.s)	Range	0~110% F.S. (H: F.S.=100% Irms, M: F.S.=25% Irms, L: F.S.=5% Irms)
	Resolution	3 Phase: 2mA(L), 1mA(H) 1 Phase: 6mA(L), 3mA(H)
	Accuracy	0.3% of actual + 0.3%F.S. @ 10~1000Hz, AC mode 0.3% of actual + 0.4%F.S. @ 10~1000Hz, AC + DC mode 0.3% of actual + 0.5%F.S. @ 1001~2000Hz, AC mode 0.3% of actual + 0.6%F.S. @ 1001~2000Hz, AC + DC mode 0.3% of actual + 0.7%F.S. @ 2001~3000Hz, AC mode 0.3% of actual + 0.8%F.S. @ 2001~3000Hz, AC + DC mode 0.3% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.3% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.3% of actual + 1.1%F.S. @ 4001~5000Hz, AC mode 0.3% of actual + 1.2%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.
Current (Peak)	Range	0~110% F.S. (H: F.S.=100% Ipeak, M: F.S.=25% Ipeak, L: F.S.=5% Ipeak)
	Resolution	3 Phase: 10mA(L), 5mA(H) 1 Phase: 30mA(L), 15mA(H)
	Accuracy	0.4% of actual + 0.6%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 0.7%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 0.8%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 0.8%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 0.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 1.0%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 1.0%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 1.1%F.S. @ 4001~5000Hz, AC + DC mode Valid from 5% of full-scale to 100% of full-scale.
Power (Watts)	Range	0~12000W
	Resolution	3 Phase: 2W 1 Phase: 6W
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hzz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hzz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hzz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hzz, AC + DC mode
Power Apparent (VA)	Range	0~12000VA
	Resolution	3 Phase: 2VA 1 Phase: 6VA
	Accuracy	0.4% of actual + 0.7%F.S. @ 10~1000Hz, AC mode 0.4% of actual + 0.9%F.S. @ 10~1000Hz, AC + DC mode 0.4% of actual + 1.1%F.S. @ 1001~2000Hz, AC mode 0.4% of actual + 1.3%F.S. @ 1001~2000Hz, AC + DC mode 0.4% of actual + 1.5%F.S. @ 2001~3000Hz, AC mode 0.4% of actual + 1.7%F.S. @ 2001~3000Hz, AC + DC mode 0.4% of actual + 1.9%F.S. @ 3001~4000Hz, AC mode 0.4% of actual + 2.1%F.S. @ 3001~4000Hz, AC + DC mode 0.4% of actual + 2.3%F.S. @ 4001~5000Hz, AC mode 0.4% of actual + 2.5%F.S. @ 4001~5000Hz, AC + DC mode

Model		MST820VAC12000W
Power Resistive (VAR)	Range	0~12000VAR
	Resolution	3 Phase: 2VAR 1 Phase: 6VAR
	Accuracy	$\sqrt{(VA)^2-(W)^2}$, Calculated value
Power Factor (PF)	Range	0~1.000
	Resolution	0.001
	Accuracy	2%F.S.
Phase	Range	0~360.0°
	Resolution	0.4 °
	Accuracy	1° @ 10~100Hz; 2° @ 101~1200Hz; 3° @ 1201~2200Hz; 4° @ 2201~3200Hz; 5° @ 3201~4200Hz; 6° @ 4201~5000Hz;
Harmonic[2]		2~50 orders
Extra Function		
Remote Sense		10V(rms), Max. Total power less than rated power.
Slew Rate	Range	AC Voltage: 0.001-10000.00V/ms and Disable
		DC Voltage: 0.001-10000.00V/ms and Disable
		Frequency: 0.001-1600.000Hz/ms and Disable
Transient Generator (only for 15~70Hz)	Range	Trans-Start: 0.0~66.5ms/10Hz, Resolution: 0.1ms
		Trans-Volt: -520V~ + 520V(L), -1040V~+1040V(H), Resolution: 0.2V
		Trans-Time: 0.0~66.5ms/10Hz, Resolution: 0.1ms
		Trans-Count: 0~9999, Constant
Calibration Function		Built-in calibration function
Multi-operation[4]	Parallel Output	Max. 10 Units (Option: Optical fiber parallel card)
	Series Output	Not supported
General		
Graphic Display		7" Color touch LCD
Operation Key Feature		Switch key, Rotary Knob, USB port for transfer and upgrading firmware
Rack mount Handles		Yes
FAN		Temperature Control
Protection Circuits		OVP, OCP, OPP, OFP, RMP
Interface		USB, RS232, RS484 (Standard) ; GPIB&LAN, CAN (Optional)
Remote Control Input/Output (Option)		
Analog input		Set A/B/C phase voltage RMS, set current limit.
Analog output		A/B/C phase output voltage RMS value monitoring, output power monitoring.
Digital input		Single/three output mode selection, external control function enable selection, power output ON/OFF state control, enable analog input control, stored data recall, output suppression (OFF/LIVE/LATCHING), phase/frequency synchronization signal, List file run trigger.
Digital output		Power output ON/OFF status indicator, fault status indicator, List file output/output status change/parameter change indicator.
Environment		
Operating Temperature		0°C~50°C
Storage Temperature		-20°C~70°C
Fan Noise		
Altitude		2000m
Relative Humidity		<95%, non-condensing≤45°C; <80%, non-condensing≤50°C
Temperature Coefficient		≤100ppm/°C F.S. (Voltage); ≤200ppm/°C F.S. (Current); 10ppm/°C.F.S. (Frequency)
Mechanical		
Dimensions (W*H*D)		423 x 265 x 585 mm
Package Dimensions (W*H*D)		553 x 536x 784 mm
Unit Weight		-
Shipping Weight		-
Regulatory Compliance		
EMC		CE marked for EMC Directive 2014/30/EU/EN61326-1: 2013 Class A for emissions and immunity standard as required for EU CE Mark. FCC Verification of conformity for CFR 47 Part 15 of the FCC Rules.
Safety		It meets the safety requirements of EU EN 61010-1:2010 for electrical equipment used in measurement, control and laboratories.
CE Mark		Installation Overvoltage Category II; Pollution Degree 2; Class II equipment; indoor use only.
Isolation Voltage		3500VDC, AC output to chassis; 2828VDC, AC input to chassis; 5040VDC, AC input to AC output
RoHS		Meet to EU Directive 2011/65/EU for restriction of hazardous substances in Electrical and Electronic Equipment.

[1] According to the output frequency, the AC output voltage will be reduced, and the rated voltage can be output within 3500Hz;
At low level, the maximum output voltage is 187.5V at 4000Hz, and the maximum output voltage is 150V at 5000HZ. The calculation formula is: output voltage =750000/ output frequency.
At high level, the maximum output voltage is 375V at 4000Hz, and the maximum output voltage is 300V at 5000HZ. The calculation formula is: output voltage =1500000/ output frequency.
[2] Only professional version/Professional-HF version support these functions.
[3] According to the output frequency, the number of harmonics will be reduced, up to 50 timeswithin 960Hz, up to 16 times at 3000Hz, up to 9 times at 5000Hz,
the calculation formula is : harmonic number =48000/ output frequency.
[4] It is suggest to derate to 90% output in parallel connection.

All specifications are subject to change without notice.

Appendix B Warranty

Thank you for purchasing the Momentum 400S/H series single/three phase programmable AC power supply of APM Technologies (referred to hereafter as “APM”). In order for you to use our products properly, APM provides you with the standard warranty service as stipulated below. Please read the following instructions carefully.

This warranty is applicable to APM's Programmable AC Power Supply.

All quality warranties and services offered by your distributors are not subject to or covered by this warranty card. Our company bears no responsibility for honoring any commitment or warranty in the respect for quality warranty or services made by the distributors.

Warranty Period

1. The warranty period of APM Momentum 400S/H series single/three phase programmable AC power supply is 2 (two) years unless otherwise agreed to in writing by APM.

2. The warranty period will not be extended or recalculated after a product or component replacement; repaired or replaced products are covered for the remainder of the original warranty period and subject to the conditions outlined in the original warranty.

Warranty Terms

1. In case of product malfunction within the warranty period, please send both the scanned copy of the warranty card and purchasing invoice to the APM Customer Service by email. APM will provide services for maintenance or replacement of defected products or components according to the actual conditions. Whatever method we may adopt, APM always strives to provide you with the highest standard and utmost professional after-sales services.

2. In case of product replacement, all replaced or exchanged parts which are removed under this warranty will become the property of APM. Please promptly return the original product and components to the original place of purchase so that APM can receive the replaced items in a reasonable period of time.

Liability Waiver

APM reserves the rights to refuse product warranty service under the following circumstances:

1. The product is out of warranty period.

2. Inability to provide the purchasing invoice issued either by the product distributer or the installer besides of unable to determine the product manufacturer as APM.

3. APM logo or product label is missing or not readable.

4. Product is without an warranty sticker or warranty stick is damaged.

5. Accessories included with each product are not in the product warranty scope.

6. Defects or damages caused by or resulting from inadequate or improper repairs carried out by any person, entity or service facility which is not authorized by APM to perform warranty services on its behalf.

7. Defects or damages caused by or resulting from failure to comply with the operating instructions and contents specified in the related product manuals.

8. Defects or damages due to operation in very harsh environments that are beyond the limitations specified in this product manual.

9. Defects or damages due to the use of non-standard parts or software or parts which are not developed or manufactured by APM.

10. Defects or damages caused by or resulting from force majeure (including but not limited to lightning, immersion in liquid, etc.).

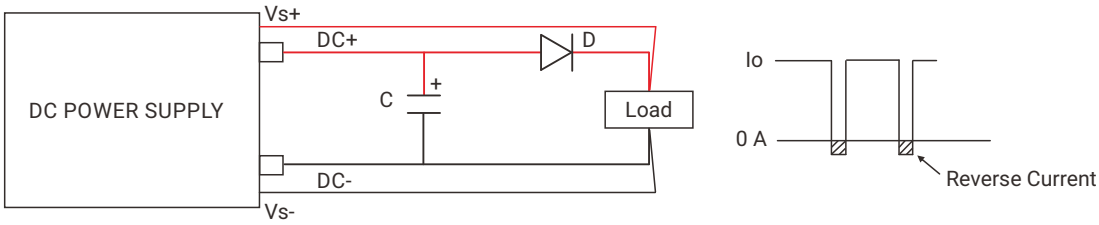
11. Defects or damages caused by or resulting from accidents or negligent use(including but not limited to transportation, storage, connection to incompatible voltage, improper operation, etc.).

12. Cosmetic defects or damages that do not affect normal operation of the product.

In the case of malfunction caused by one of the above-mentioned circumstances, APM or its authorized service facility is willing to provide paid service in response to the customer's request.

Appendix C Application Notes

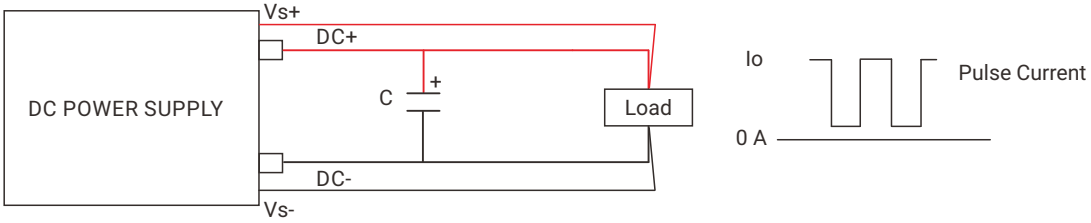
1. If the power supply is connected to a inductance load such as motor, connect a diode in series with the output port to prevent the load current from reversing and damage the power supply. The added capacitor (1000MF~10000uF) will smooth the output voltage.



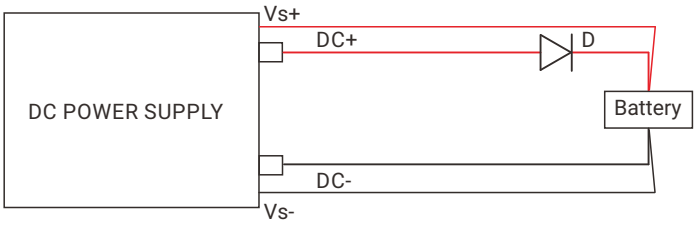
Caution!

- It is recommended to add a suitable circuit to absorb the reverse EMF generated by motor to ensure the safety of the operation.

2. For pulse current type load, or switchable power load applications, if the output cable is longer than 50cm, strand the load cable and parallel the capacitance at the load input to prevent any unexpected oscillation from occurring.



3. For battery application, connect a diode in series with the output port to prevent the load current from reversing.



Schedule

Product Information		
Distributor	Company Name	
	Contact Person	
	Phone Code	
	Address	
User's Information		
User	Name	
	Phone Code	
	Address	
	Fax	
	E-mail	
Product Malfunction Information		
Model		
Serial No.		
Warranty Period		
Date of Malfunction	Signature	Malfunction Description & Solutions

Please stick the product Serial number here.

20240621

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