MPE-3000CM

Single Output, 3000W Compact, Enclosed AC/DC Power Supplies

Key Features:

- 3,000W Output Power
- Universal 85-264 VAC In
- EN 62368 Approved
- Over Current Protection
- Over Voltage Protection
- Built-In Active PFC
- Meets EN 55032 B
- Efficiency to 93%
- Built-In DC Fans
- AC or DC Input
- Reinforced Insulation

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions		Min.	Typ.	Max.	Units
Input Voltage Range	Rated Input		100		240	VAC
	AC Input		85		277	
	DC Input		120		390	VDC
Input Frequency			47		63	Hz
Input Current	See Model Selection Guide					
Leakage Current	240 VAC 60Hz	Earth Current			0.5	mA
		Touch Current			0.1	
Power Factor	Full Load	115 VAC	0.99			---
		230 VAC	0.95			
Inrush Current, Cold Start		115 VAC		20		A Pk
		230 VAC		40		
Start-Up Delay	115/230 VAC, normal temp, rated load				3	s
Input Under Voltage Protection	Start (Vin drops from high to low)		60			VAC
	Release (Vin rises from low to high)				85	
Input Fuse	Built-in fuse			25		A

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	Full Load Range			±1.0		%
Line Regulation, At Rated Load	Rated load			±0.5		%
Load Regulation	0% - 100% load			±0.5		%
Ripple & Noise (20 MHz), See Note 2	Main Output	12/24V			150	mV p-p
		48V			250	
	Auxiliary Output				100	
Hold-Up Time	Full input voltage			14		ms
Temperature Coefficient				±0.03		%/°C
Standby Power Consumption		115 VAC		17.22		W
		230 VAC		15.76		
Temperature Derating	-40°C to +50°C		0			%/°C
	+50°C to +85°C		2.5			
AC Input Voltage Derating	12V	85 - 90 VAC	6			%/VAC
		90 - 180 VAC		1500		W
		180 - 277 VAC		2400		
	24/48V	85 - 90 VAC	6			%/VAC
		90 - 180 VAC		1500		W
		180 - 277 VAC		3000		
DC Input Voltage Derating	12V	120 - 180 VDC	1.25			%/VDC
		180 - 350 VDC		1500		W
		350 - 390 VDC		2400		
	24/28V	120 - 180 VDC	1.25			%/VDC
		180 - 350 VDC		1500		W
		350 - 390 VDC		3000		
Over Current Protection	Constant current state, self-recovery					
Short Circuit Protection, See Note 3	Continuous (Autorecovery)					

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, See Note 4	Input to Output	4,000			VAC
	Input to Ground	2,000			
	Output to Ground	1,500			
Isolation Resistance	See Note 5	100			MΩ
Isolation Level	Input to Output		2 x MOPP		
	Input to Ground		1 x MOPP		
	Output to Ground		1 x MOPP		
Switching Frequency	PFC Circuit		65		kHz
	DC-DC Circuit		82		
	Auxiliary Circuit		65		

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+85	°C
Storage Temperature Range		-40		+85	°C
Over Temperature Protection	Activation			+70	°C
	Deactivation	+50			
Cooling	Forced Air Convection (26.63CFM) (See Derating Curves)				
Operating Humidity	Non-Condensing	10		95	%RH
Storage Humidity		20		90	

Physical

Size	11.00 x 7.00 x 2.50 in. (See Mechanical Drawing on Page 5)
Weight	119.93 oz (3.4kg) (See Mechanical Drawing on Page 5)
Case Material	SUS 304

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	250			kHours
Safety Standards	See Model Selection Guide				
Safety Class	Class I				

MicroPower Direct
46 Eastman Street
Unit 1
Easton, MA 02375
USA

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F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com

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Model Selection Guide

UL	Model Number		Input Current (A Max) 115 VAC	Input Current (A Max) 230 VAC	Output Voltage (VDC)	Output Adjust Range (VDC)	Output Current (A) Rated	Output Current (A) % Min.	Output Power (W)	Over Voltage Protection (VDC) See Note 6	Max Output Capacitance (μF)	Efficiency (%, Typ)
	MPE-3000CM-12	Main	16.5	17.5	12	9 - 15	200	0	2140	25	32000	90
		Aux			12	2.4 - 15	0.8		9.6		470	
	MPE-3000CM-24	Main	16.5	17.5	24	18 - 30	125	0	3010	35	20000	92
		Aux			12	4.8 - 30	0.8		9.6		470	
▪	MPE-3000CM-48	Main	16.5	17.5	48	36 - 60	62.5	0	3010	70	10000	93
		Aux			12	9.6 - 60	0.8		9.6		470	
	* MPE-3000CMU-48 has UL/cUL 62368 recognition (UL certificate). Contact factory for safety standard status of other models.											

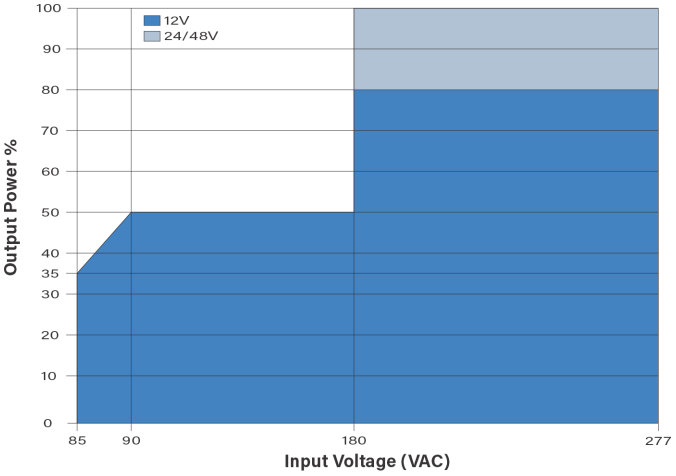
Notes:

1. Before applying power to the unit, confirm that pin 1 (PS ON) and pin 2 (SGND) on the control signal connection terminal are connected (see page 5). If not, the unit will not turn on. Contact the factory for more information.
2. Output ripple is measured at 20 MHz bandwidth using 0.1 μF and 47 μF capacitors connected in parallel as close to the power supply terminals as possible.
3. Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers <5 seconds after the fault condition is removed.
4. Input-output and input-ground isolation are tested for 60 seconds with a leakage current of <10 mA.
5. Insulation resistance is given for input - output, input - ground and output - ground. It is tested at 500 VDC, ambient temperature 25±5°C, 95%RH.
6. After an overvoltage fault the unit must be power recycled (or the PS ON signal must be used to recover.
7. All units include an on-board slow blow fuse.
8. During CE/RE testing a magnetic bead (nickel-zinc ferrite) should be coupled with the output load line. The power supply is considered a component of the system during such testing. All items are tested on a metal plate and should be combined with the final equipment for EMC confirmation. Call the factory for more information.
10. When multiple units are connected in parallel, the sub-module shunts a single machine above 50% of the rated load.
11. A room temperature derating of 5°C/1000m is needed for operating alititude greater than 2000m.
12. The output voltage can be adjusting by the ADJ knob. Turn clockwise to decrease and counterclockwise to increase.

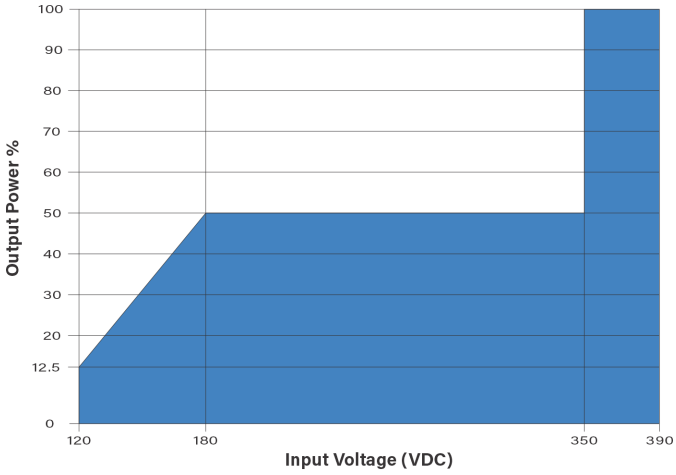
Function Specifications

Function	Operating Conditions		Min	Typ	Max	Unit
Remote Control	Input V Range	Turn On V (JP1300 pin 1 and pin 2 are short)			0.5	V
	Load Range	Turn Off V (JP1300 pin 1 and 2 are open)	2.0		5.0	
DC OK Signal	Input V Range	Power On		0	0.5	V
	Load Range	Power Off	10		12	
Oring	Supports direct parallel use. Acheives 7+1 parallel redundancy					
Current Share Acc.	See Note 10			±10		%
LED Signal	Indicates Main Output Status	Normal Output	Steady Green			
		Abnormal Output Protected	Steady Red			
		Power Off (AC without Input)	Turned Off			
Remote Sense	Total compensation voltage (+Vs/-Vs shorted to +Vo/-Vo)			200		mV
SDA, SCL			Internal 2.4 k pull up resistor to internal 3.3V			

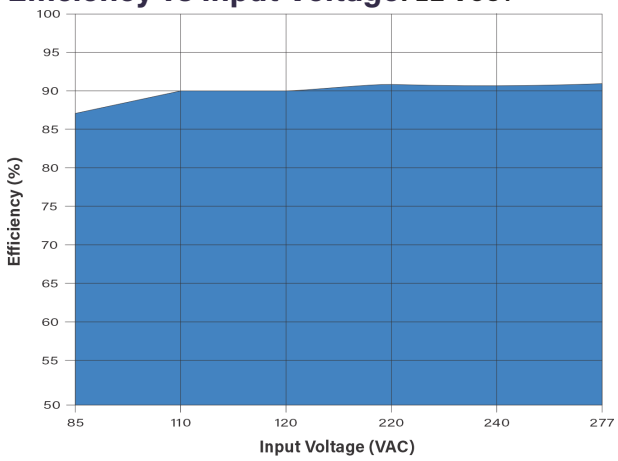
Input Voltage Derating (AC Input)



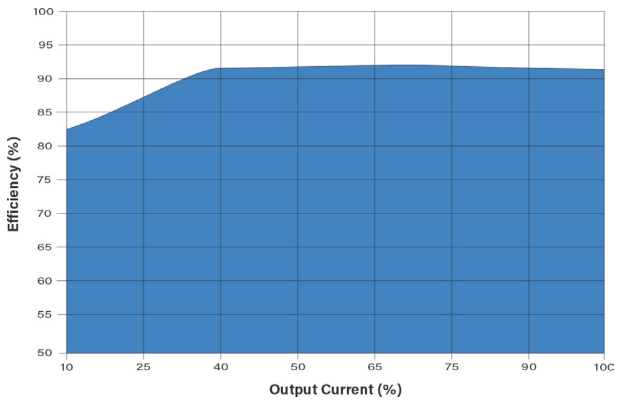
Temperature Derating (DC Input)



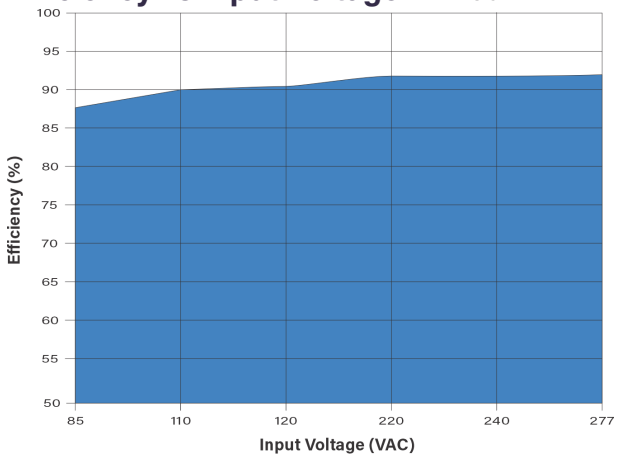
Efficiency vs Input Voltage: 12 VOUT



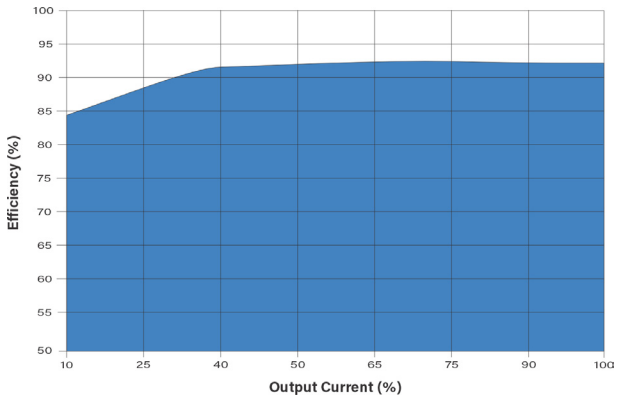
Efficiency vs Output Load: 12 VOUT



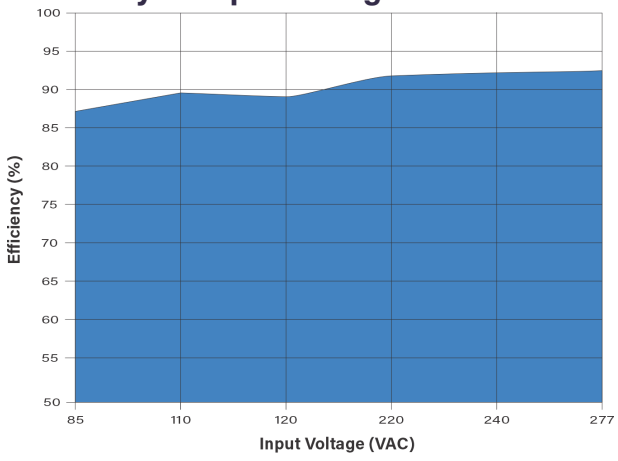
Efficiency vs Input Voltage: 24 VOUT



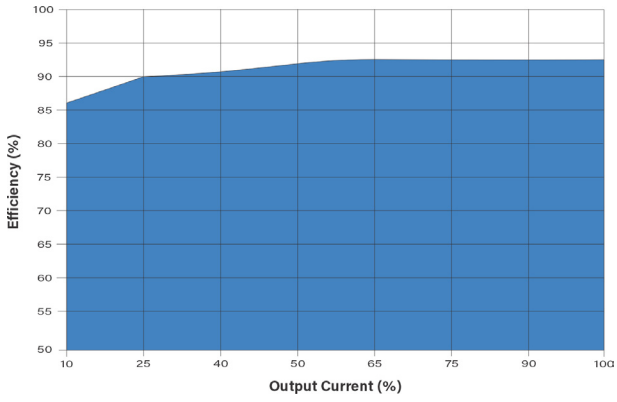
Efficiency vs Output Load: 24 VOUT



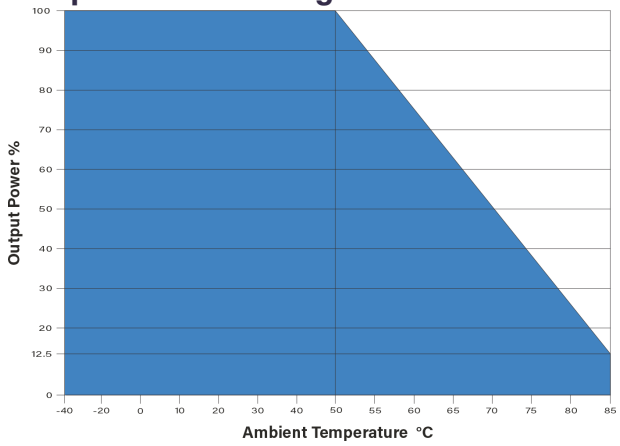
Efficiency vs Input Voltage: 48 VOUT



Efficiency vs Output Load: 48 VOUT



Temperature Derating



EMC

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR 32/EN 55032		Class A
Conducted Emissions	CISPR 32/EN 55032		Class A
Harmonic Current	IEC/EN 61000-3-2		Class A/D
ESD	IEC/EN 61000-4-2	A	±8 KV Contact
			±15 KV Air
RS	IEC/EN 61000-4-3	A	10V/m
EFT	IEC/EN 61000-4-4	A	±4 kV
Surge	IEC/EN 61000-4-5	A	±2 KV L-L
			±4 KV L-G
CS	IEC/EN 61000-4-6	A	10 Vrms
MS	IEC/EN 61000-4-8	A	30A/m
Voltage Dips	IEC/EN 61000-4-11	B	0% Un* 1 period, 40% Un* 10/12 periods (50/60Hz), 70% Un* 25/30 periods (50/60Hz)

MPD has a very wide range of high performance AC/DC power supplies ranging from 600W UChannel units to 1W units in miniature Single-In-Line (SIP) packages. All are designed and certified to international safety and EMC/EMI standards.
We have AC/DC supplies approved for use in medical equipment, DIN rail supplies, "Green" energy supplies and constant power supplies.
We also offer a wide variety of DC/DC converters, POL regulators and IGBT drivers. All products are available with short lead times. Call today for complete information or product samples. Or go to our website:

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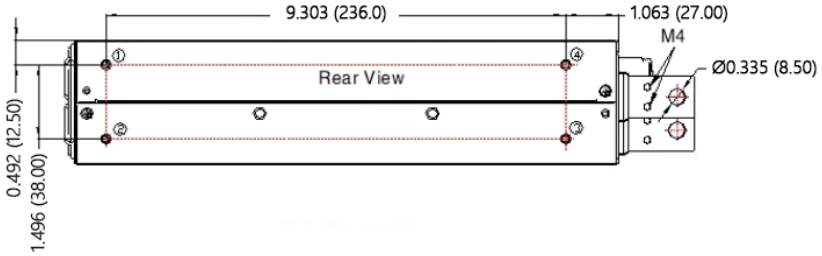
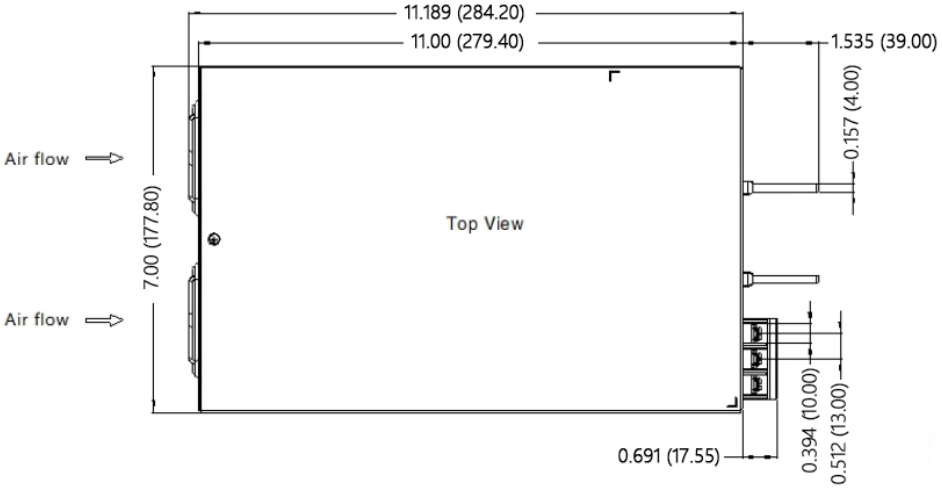
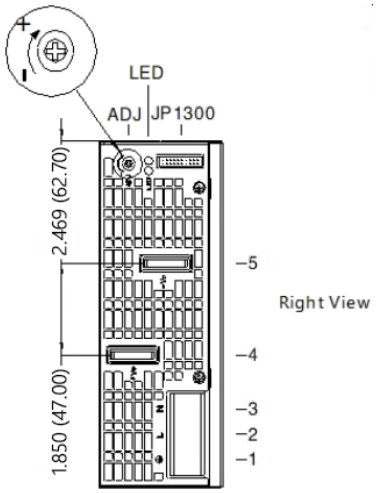
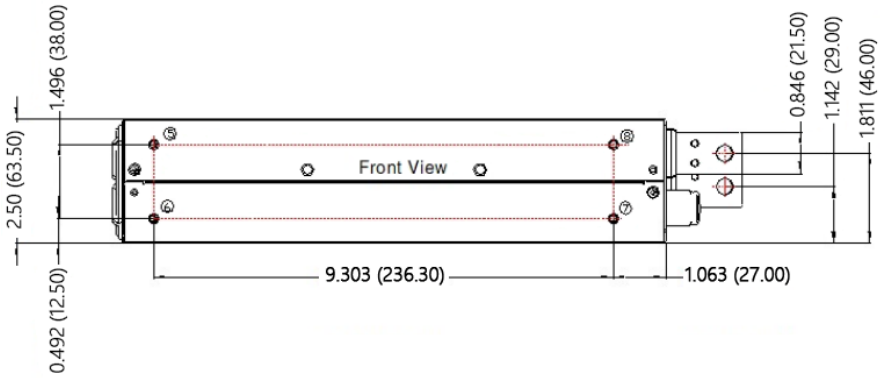
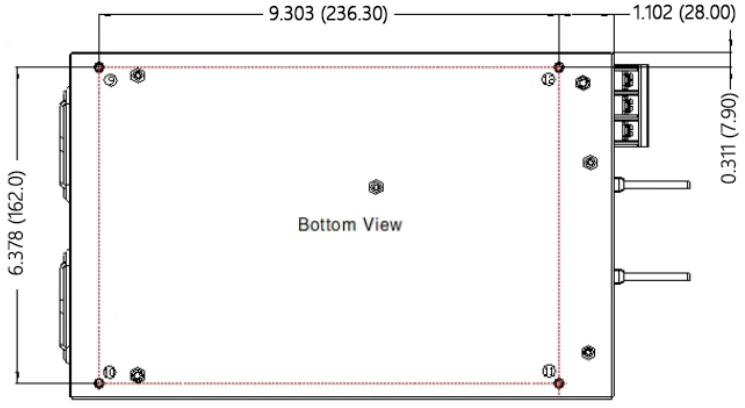
Mechanical Dimensions











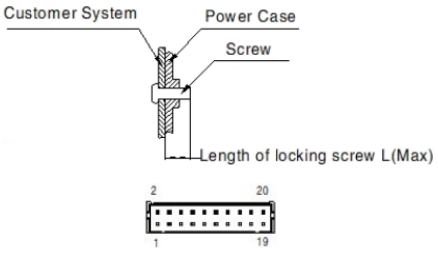
Case Connections

Position	Screw	Max L	Max Torque
1 - 8	M3	3 mm	0.9N•m

Connections

- Wire range - 22 -12 AWG
- Pin 1, 2, 3 Tightening Torque: M4, 0.9 N•m
- Pin 4, 5 Tightening Torque: M5, 2.3N•m

Pin	Function
1	GND
2	AC(L)
3	AC(N)
4	+Vo
5	-Vo



Pin	Function
1	PS_ON/OFF
2	SGND
3	AGND
4	AC_OK
5	WP_EN
6	SGND
7	+Vo2
8	DC_OK
9	+Vo2
10	SNGD

Pin	Function
11	SCL
12	VS+
13	SDA
14	VPROG
15	Current Share
16	A0
17	A1
18	VS-
19	A2
20	AGND

Notes:

- All dimensions are typical in inches (mm)
- LED: Output status indicator LED
- ADJ: Output adjustable resistor
- General tolerances: ±0.039 (±1.00)
- Weight: 119.93 oz (3.4kg)

Connectors:

- Connector: JST PHDR-20VS or equivalent
- Terminal: JST SPHD-002T-P0.5 or equivalent

MPE-3000CM Power Supply Application Notes

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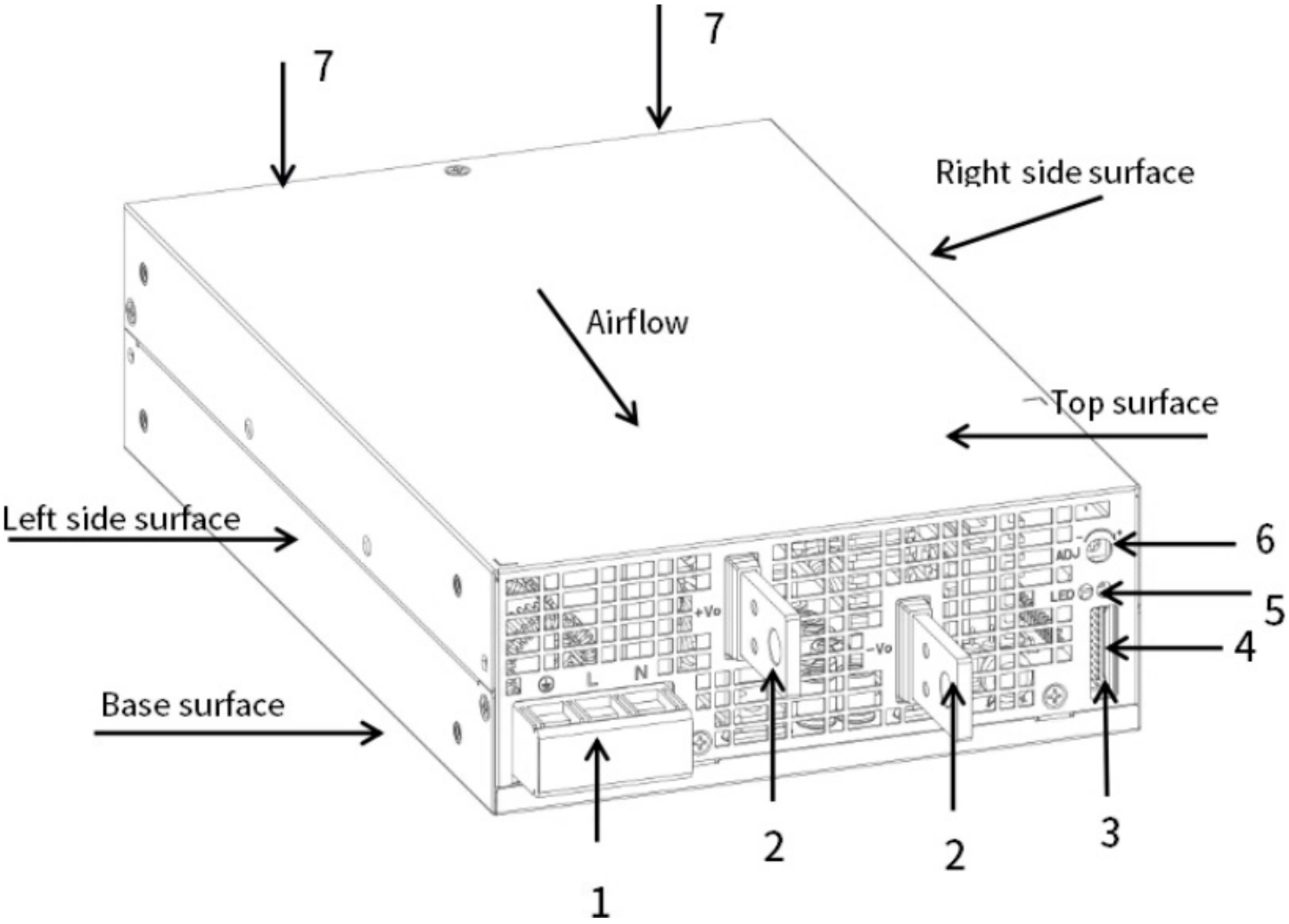
Overview

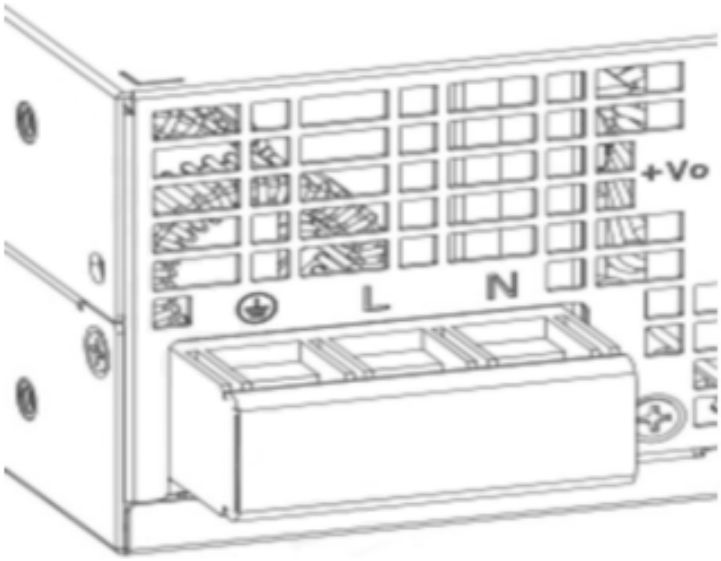


Overview description:

1. AC/DC input terminal (J1)
2. DC main output terminal (+Vo, -Vo)
3. Auxiliary output terminal (JP1300 +Vo2: Pin 7, 9; SGND: Pin 2, 6, 10)
4. Signal connection press the terminal (JP1300)
5. Green and red display LED lights
6. Output voltage regulation resistor
7. Fans

1.1 AC/DC Input Terminal Block (J1)

The input terminal J1, as a standard 3-pin fence welding terminal with upper cover. The spacing of the pins is 10mm.



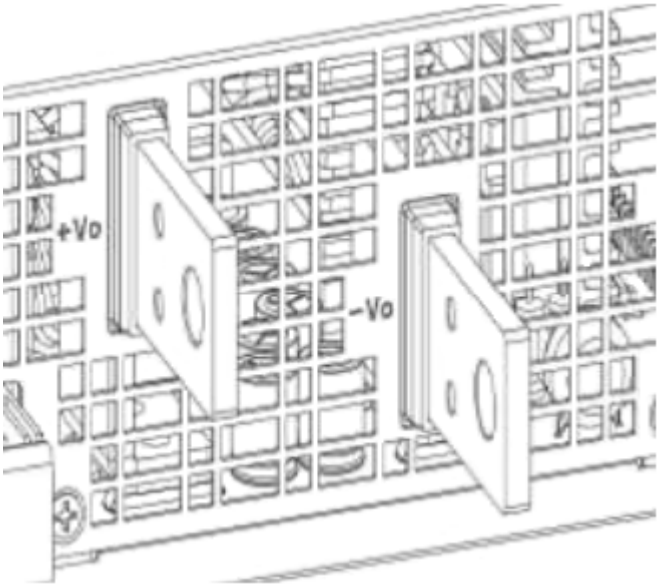
Pin	Features
L	Line (Phase)
N	Neutral
GND	Ground/Earth

Wire size: 16-10AWG

Torque: M4/0.9N▪m (max)

1.2 Main DC Output Terminal (+Vo, -Vo)

The output terminal uses two standard screw lock type metal terminals. The pin spacing between each is 45mm.



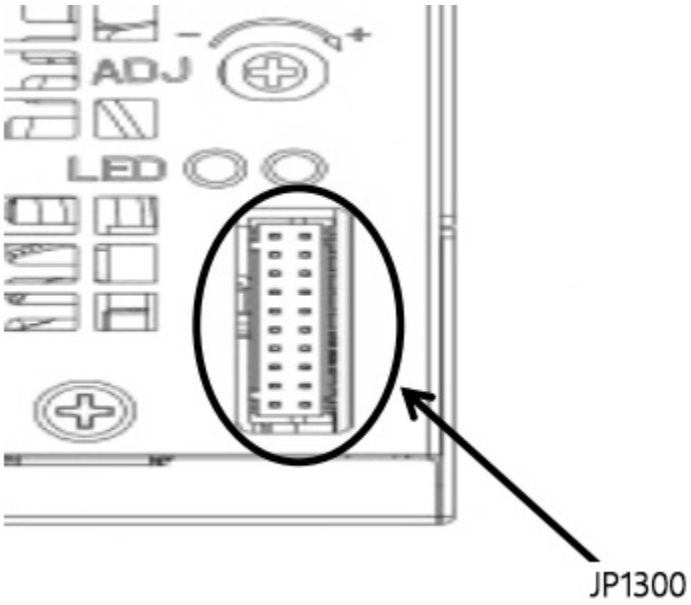
Pin	Features
+Vo	Main Output +
-Vo	Main Output -

Torque: M8/13.5N▪m (max)

M4/0.9N▪m (max)

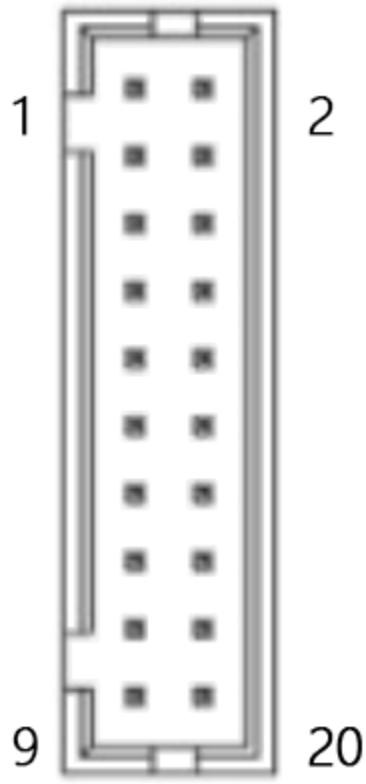
1.3 Auxiliary DC Output Terminal (+Vo2: Pin 7, 9; SGND: Pin 2, 6, 10)

The auxiliary output terminal with a standard terminal of 2.0mm pitch.



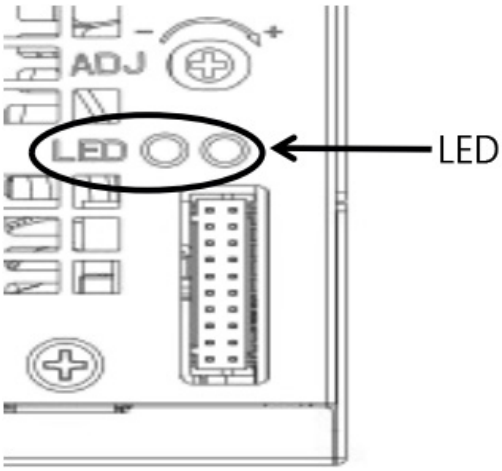
Pin	Label	Features
7, 9	+Vo2	Auxiliary DC Output -
2, 6, 10	SGND	Auxiliary DC Output +

1.4 Signal Port (JP1300)



Pin	Label	Features
1	PS_ON/OFF	Remote control signal
2	SGND	Aux terminal reference ground
3	AGND	Signal terminal reference ground
4	AC_OK	AC_OK signal
5	WP-EN	External storage terminal
6	SGND	Aux terminal reference ground
7	+Vo2	Auxiliary path output positive terminal
8	DC_OK	DC_OK signal
9	+Vo2	Auxiliary path output positive terminal
10	SGND	Aux terminal reference ground
11	SCL	I2C communication line
12	VS+	Remote compensation positive terminal
13	SDA	I2C communication line
14	VPROG	Adjustable software output
15	Current Share	Current sharing bus
16	A0	ADDRESS code 0
17	A1	ADDRESS code 1
18	VS-	Remote compensation negative terminal
19	A2	ADDRESS code 2
20	AGND	Signal terminal reference ground

1.5 Green and Red Status Display LED Lights

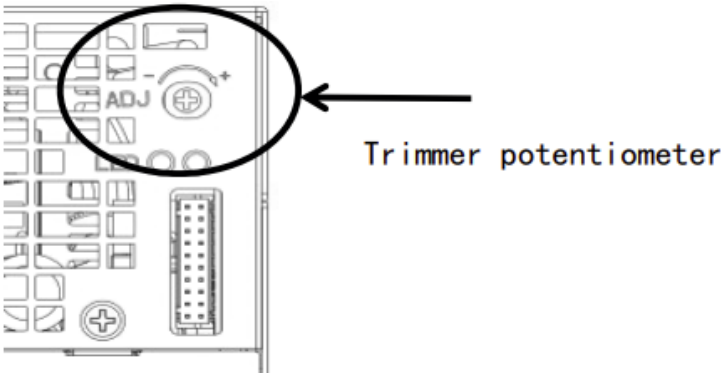


Two kinds of LED lights indicate different working states of the power supply:

Green LED	Red LED	Status
ON	OFF	Normal work
OFF	ON	Main alarm
OFF	OFF	No input

1.6 Output Voltage Adjustment Knob

Turn counterclockwise to increase output voltage.



Model	Rated Output Voltage (V)	Adjustable Output Voltage Range (V)
MPE-3000CM-12	12	9 - 15
MPE-3000CM-24	24	18 - 30
MPE-3000CM-48	48	36 - 60

If you want wider output voltage regulation (beyond the range of adjustable resistance regulation), as shown ion the table below, you can use the following two methods.

Model	Rated Output Voltage (V)	Adjustable Output Voltage Range (V)
MPE-3000CM-12	12	2.4 - 15
MPE-3000CM-24	24	4.8 - 30
MPE-3000CM-48	48	9.6 - 60

Method 1: PM Bus Regulation

The set output voltage is adjusted through PMBus host communication. When the given value of the upper computer is minimum and the adjustable resistance is adjusted to the minimum, it corresponds to the minimum output voltage. When the given value of the upper computer is maximum and the adjustable resistance is adjusted to the maximum, it corresponds to the highest output voltage. For example, the model MPE-3000CM-24, rated output 24VDC, needs to be adjusted to 4.8VDC, and at the same time adjust the voltage to the minimum, then the output voltage will become 4.8VDC.

Method 2: Signal Voltage Regulation

Connect pin 14 (VPROG) on the JP1300 terminal to 0V and adjust the adjustable resistance to the lowest output voltage. When pin 14 (VPROG) is externally connected to 5V and the adjustable resistance is adjusted to the maximum, it corresponds to the highest output voltage. For example, the model MPE-3000CM-24, rated output 24VDC, needs to be adjusted to 4.8VDC, the operation is as follows: the signal voltage to 0VDC, and at the same time adjust the adjustable resistor to the minimum voltage counterclockwse, then the output will become 4.8VDC.

2. Function Manual

2.1 Input Requirements

The AC input voltage and DC input voltage must be within the defined voltage range (refer to the datasheet), otherwise the power supply may not work properly or even malfunction. The internal L and N line of the power supply have been connected in series with a 300V 25A fuse. For better protection, it is recommended that customers use a circuit breaker not greater than 25A (non-mandatory requirement).

2.2 Output Requirements

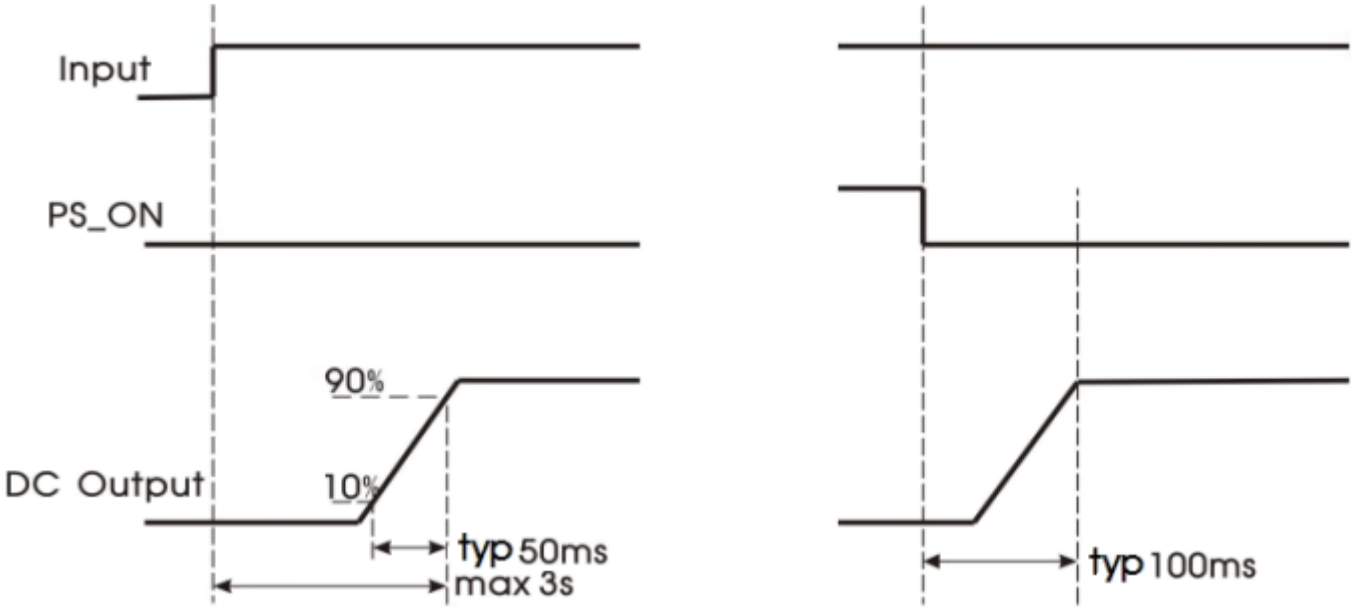
Main Output

At any voltage value, the maximum output current and power must not exceed the rated/specified value. the output current must not exceed the maximum output current value.

Auxiliary Output

The auxiliary circuit supports a maximum current of 12V/0.8A

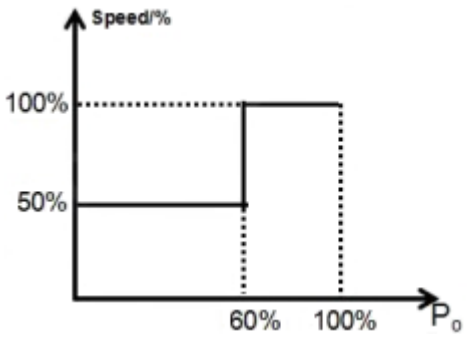
2.3 Start-Up Timing

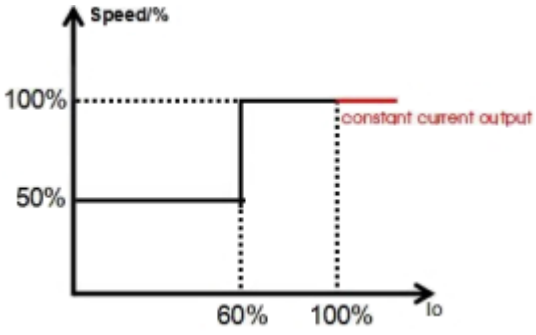


Item	Operating Conditions		Min.	Typ.	Max.	Unit
Power-Off Hold Time	Room temperature, full load	115 VAC	14			ms
		230 VAC	14			
Start Delay Time					3	s

2.4 Fan Speed Control

Fan speed control is determined by output power and output voltage at the same time. Refer to the following curve for fan speed change:



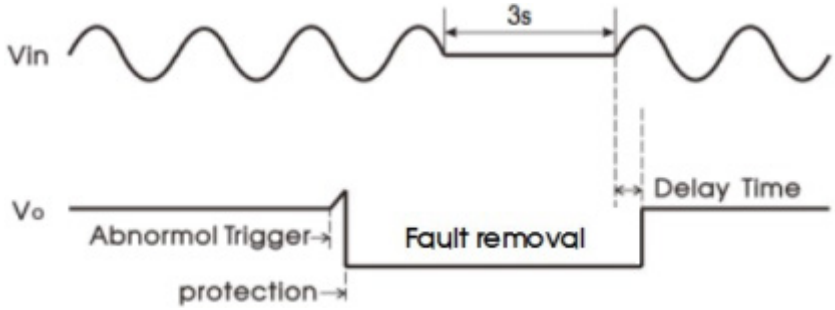


Po/Io: Rated output voltage

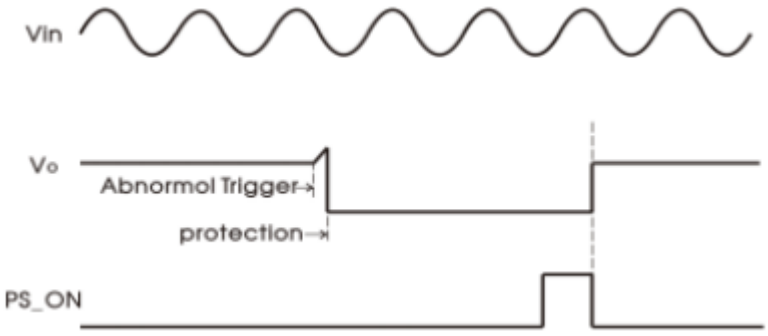
2.5 Output Over Voltage Protection (OVP)

Main Output

The over voltage protection function is used to close the main output when the outut voltage reaches the protection voltage value. When the main circuit over voltage protection occurs, the main circuit output voltage of the module will be shut off, and the auxiliary circuit output will not be affected. The main circuit output can be restored after disconnecting the input power for at least 3 seconds.



In addition, it can be quickly restarted by the PS ON signal:



Auxiliary Output

When the auxi8liary circuit voltage reaches 16VDC (maximum value), the auxiliary output will be in hiccup status, and the main output voltage turns off until the auxiliary output returns to normal after the fault is eliminated.

2.6 Output Constant Current Protection (OCP)

Main Curcuit Overcurrent

If in CC load mode, when the current exceeds the constant current point, the output enters hiccup mode; when the over current state is released, the output returns to normal.

If in CR/CV load mode, the relationship among the output current, voltage and resistance is shown in the following curve:

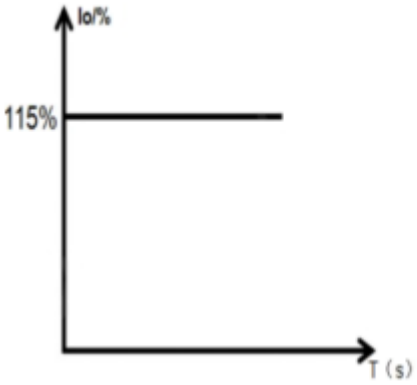


Fig. 1

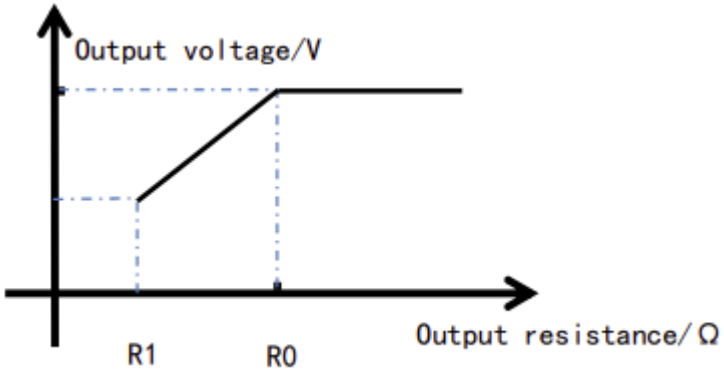


Fig. 2

When the product enters the constant current state, the output state circulates as shown in Fig. 1, working for 5s and protection for 3.5s, until the constant current state is released.

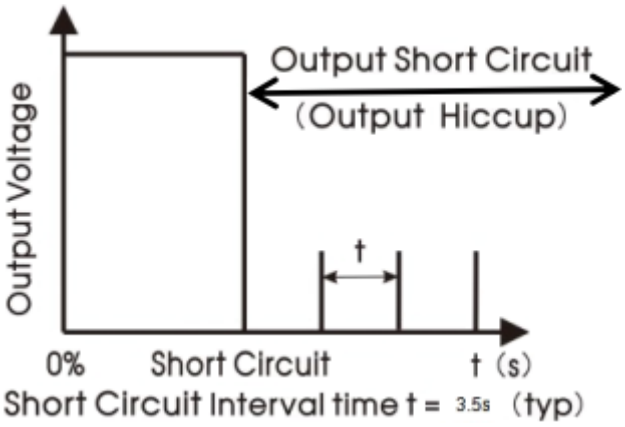
In Fig. 2 above, the slope corresponding to section R1 - R0 is the corresponding output current / when the current is constant.

Auxiliary Circuit Overcurrent

When the auxiliary output current exceeds 130% (typ.) of the rated current, turn off the main output. After the overflow state is removed, the main route automatically recovers output after restart.

2.7 Output Short Circuit Protection (SCP)

When the main output is short-circuited, the power output is in CC mode (the overtemperature protection is not triggered). Fig. 1 shows 2.6 seconds after the short-circuit is removed, the power module will automatically return to normal and the auxiliary output will not be affected. When the auxiliary output is short-circuited, the main circuit will have no output.



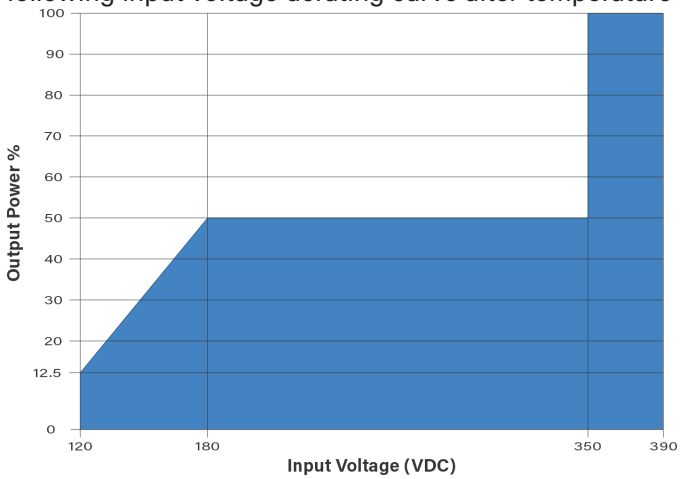
2.8 Over Temperature Protection (OTP)

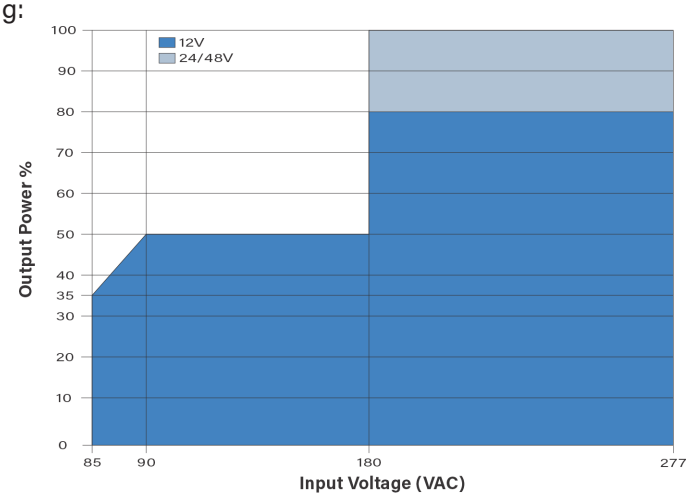
When the ambient temperature of the power supply exceeds the rated temperature for a period of time, the power supply will be turned off and will resume normal operation after the ambient temperature drops to the set value.

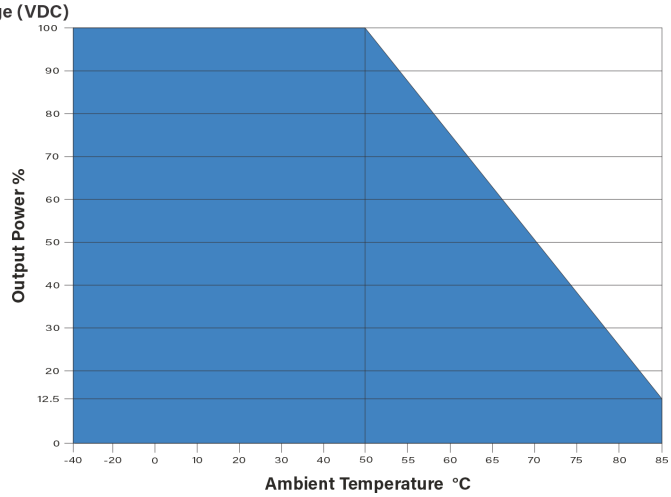
2.9 Output Power Derating

When the input voltage is greater than 180VAC (or 350VDC), it is only needed to derate according to the temperature derating curve.

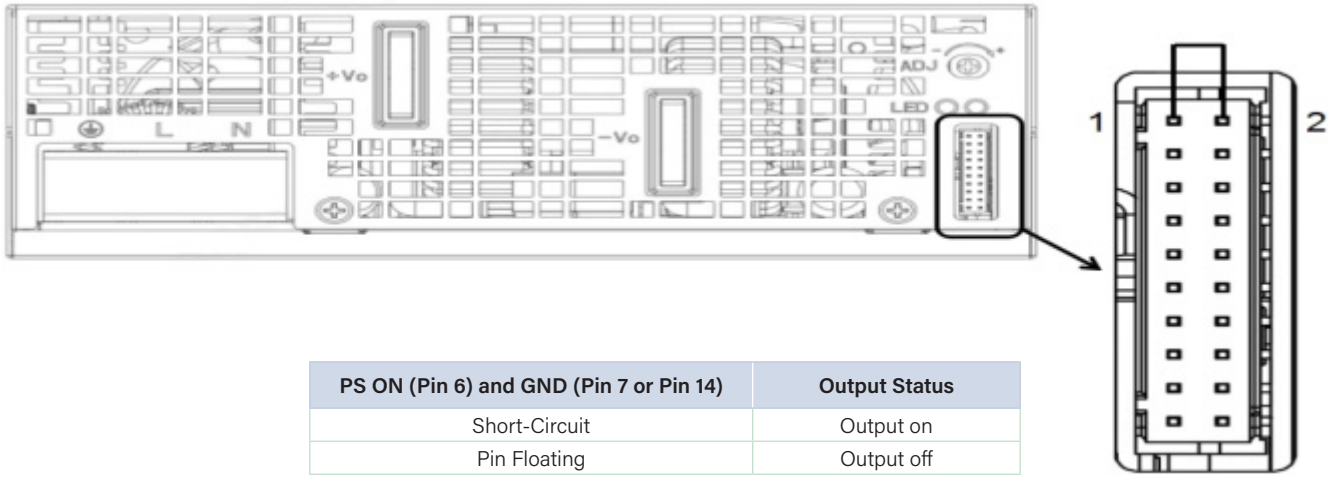
When the input voltage is lower than 180VAC (or 350VDC), the output power will be derated according to the following input voltage derating curve after temperature derating:







2.10 Remote Control



PS ON (Pin 6) and GND (Pin 7 or Pin 14)	Output Status
Short-Circuit	Output on
Pin Floating	Output off

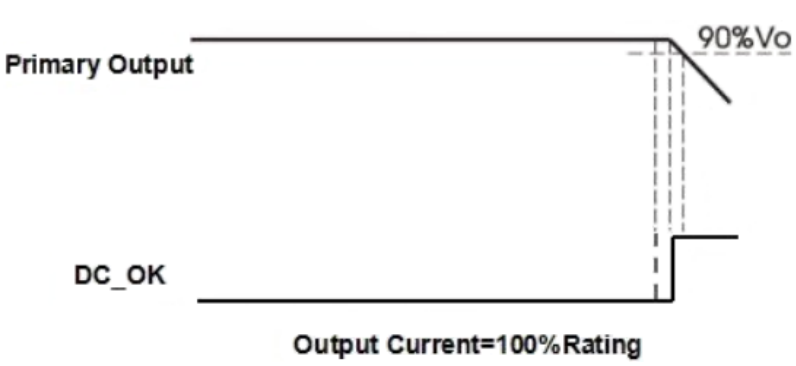
If the input terminal of the power module has been connected to a power source, the PS ON signal pin can ve used to control the on and off of the main output, and the PS ON signal does not affect the output voltage of the auxiliary circuit.

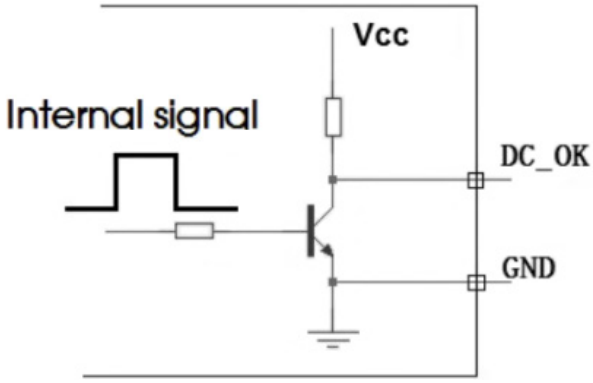
Note: The internal PS ON imput impedance of the module is 5.1K.

2.11 DC OK Signal

The DC OK signal is used to monitor whether the power supply is working normally, and the signal is at pin 8 of the signal terminal JP1300.

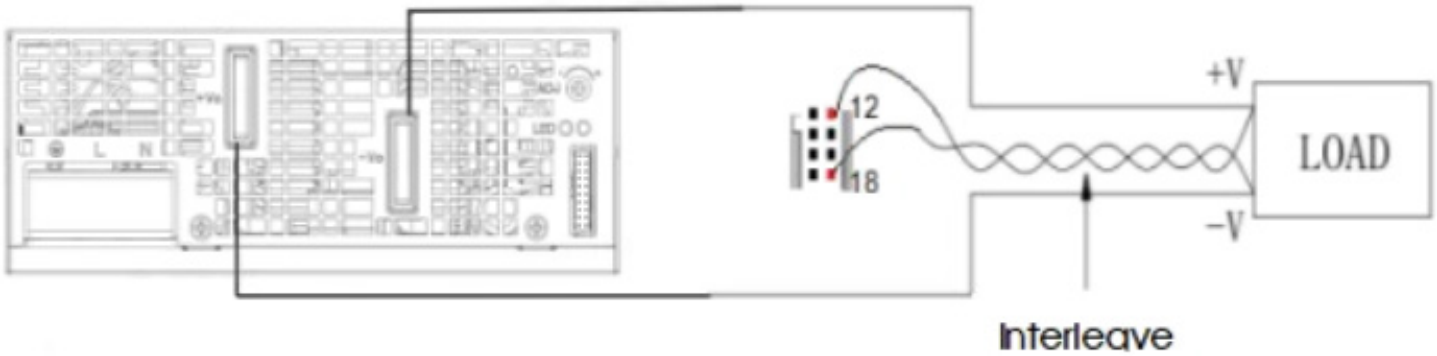
Note: When the DC OK signal is connected to the external circuit, the impedance of the external circuit (i.e. betwen pin 8 and 2, 6, 10 of JP1300) is no less than 10kΩ.





DC OK (Pin 8) and GND (Pin 2, 6, 10)	Output Status
0 - 0.5V	Output on
10 - 12V	Output off

2.12 Remote Compensation



1. Vs+ and Vs- cannot be shorted or reversed, otherwise the power module will be damaged.
2. Before powering on the product, please confirm whether the control signal connection terminal (JP1300) Pin 1 (PS_ ON/OFF) and Pin 2 (SGND) short-circuit jumper cap are connected. If not, the product has no output. When the control signal connection terminal (JP1300) of the product is externally connected as a whole, please ensure that Pin 1 and Pin 2 are short-circuit connected.
3. Pin 12 and Pin 18 of the signal terminal JP1300 can compensate the voltage drop on the output cable.
4. The remote compensation circuit can compensate up to 200mV cable voltage drop. This voltage includes the sum of the cable drop connected to the output positive terminal and the output negative terminal.
5. If you need to use the remote compensation function, the signal pin needs to be connected with the load end with a twisted pair cable.

2.13 Parallel Operation

2.13.1 Redundancy

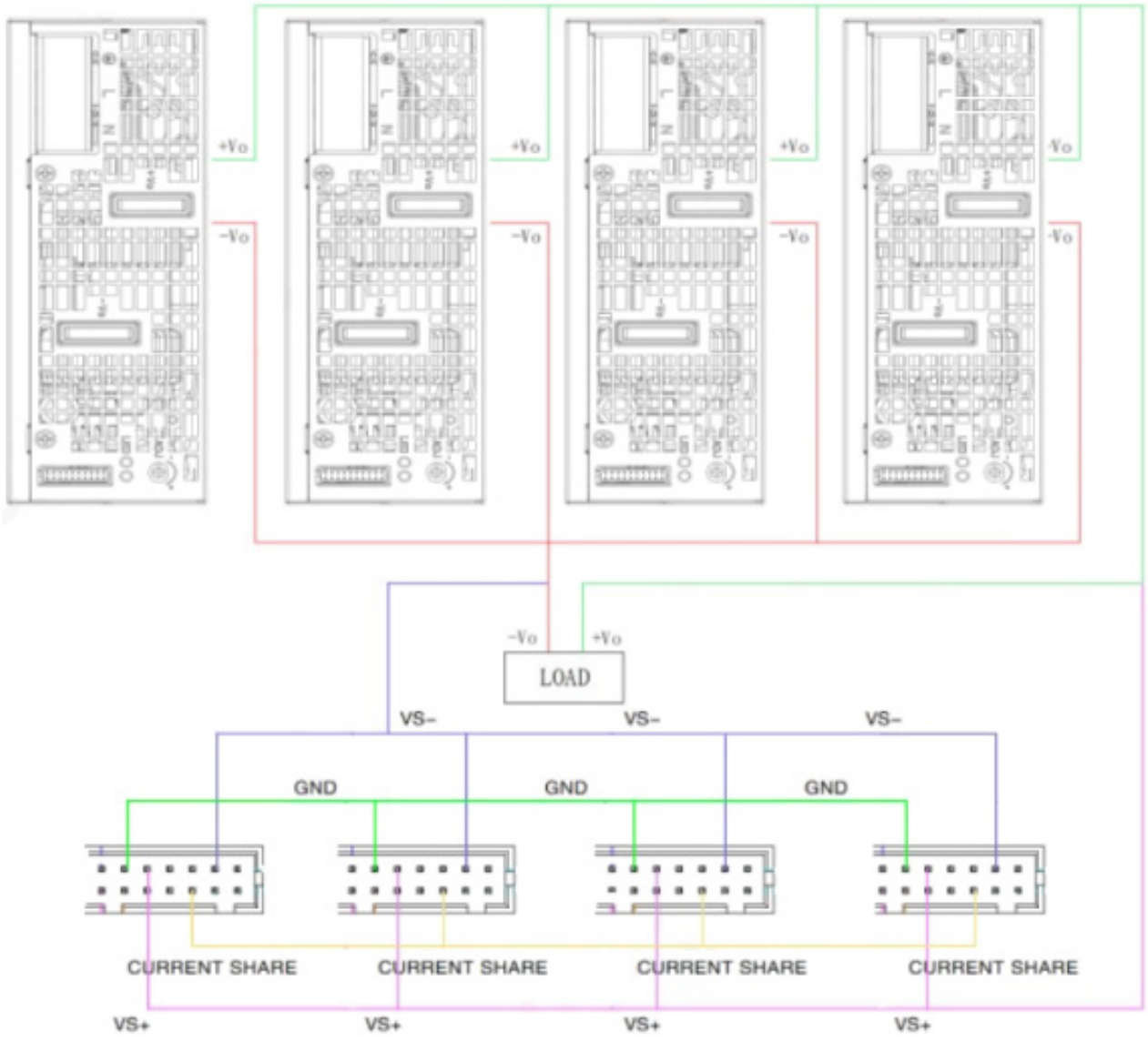
The power module output can be connected in parallel to ahieve redundancy, therby improving system reliability. The maximum power of the redundant system needs to be derated to ensure that the redundant system can still meet the rated load requirements when a power supply module fails. The current common practice is to construct a redundant system by the N+1 method, that is, N+1 power supplies are connecte din parallel, to support the maximum load current N * *Io*max, where *Io*max is the rated output current of each power supply. For example, the rated output current of each power suply is 40A, and 7+1 units are connected in parallel to construct a 7 * 40A = 120A redundant system.

The power module supports 7+1 parallel operation.

2.13.2 Current Sharing

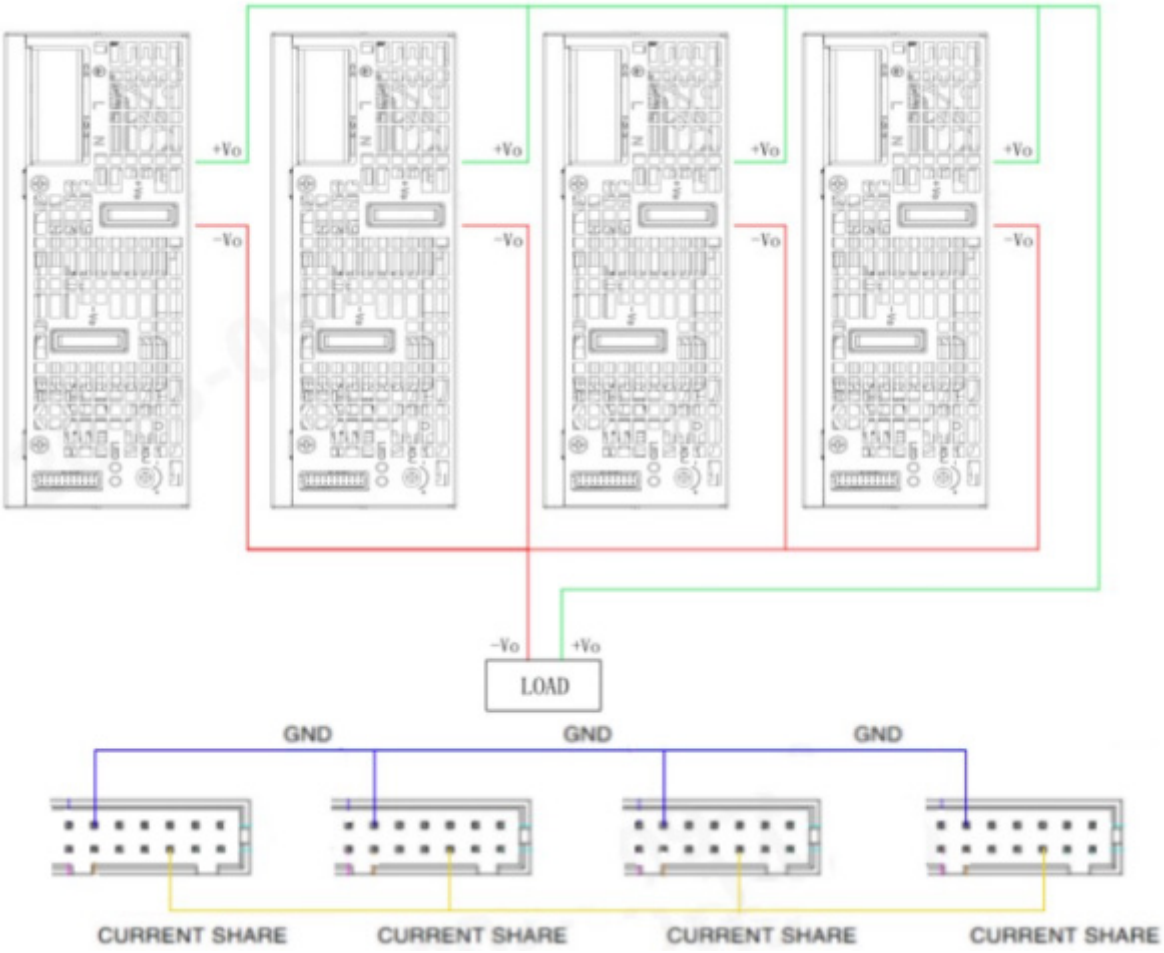
Method 1: Current sharing bus and remote compensation lines are both connected.

For load line loss ≤ 200mV, and the output voltage difference of each single module ≤ 50mV, this type of connection is recommended to obtain a better line-end output voltage and current sharing effect.



Method 2: Only the current sharing bus is connected, and the remote compensation bus is not connected.

For the load line loss ≤ 200mV, or the output voltage difference of each single module cannot or does not need to be accurately adjusted to ≤ 50mV, this type of connection is recommended to obtain a better current sharing effect of the parallel machine. In thesame way, when the load loss is unknown or meets the specifications under the first connection method, it is recommended to replace it with this connection method. The wiring method of the current sharing function is shown below:



Note: 1. When using in parallel, the number of parallel modules cannot exceed 8.

2. Before powering on the product, please confirm whether the control signal connection terminal (JP1300) Pin 1 (PS_ON/OFF) and Pin 2 (SGND) short-circuit jumper cap are connected. If not, the product has no output. When the control signal connection terminal (CN7) of the product is externally connected as a whole, please ensure that Pin 1 and Pin 2 are short-circuit connected. Please refer to the application note 2.10 Remote Control.

When power modules work in parallel, there is an internal active current sharing circuit to ensure that the current between each module is balanced.

The active curent sharing circuit adopts the automatic master-slave current sharing method. Each sharing bus signal (CURRENT SHARE BUS). When working in parallel, the current sharing bus of all power modules must be connected together. The current sharing bus signal is located at Pin 15 of JP1300.

The output voltage of each power module will affect the current sharing accuracy. the output voltage of the power module is the rated voltage ±50mV. In practical applications, if the output voltage value neds to be adjusted, the output voltage of all parallel power supply modules needs to be adjusted to the same voltage. The recomended voltage range is: Target Voltage Value ±50mV.

After the output load of each powr module is greater than 50% of the rated load, the current sharing accuracy should be ±5%. The current sharing calculation formula is:

Current Sharing Accuracy = ((*Io*max - *Io*min) / Iomax) * 100%

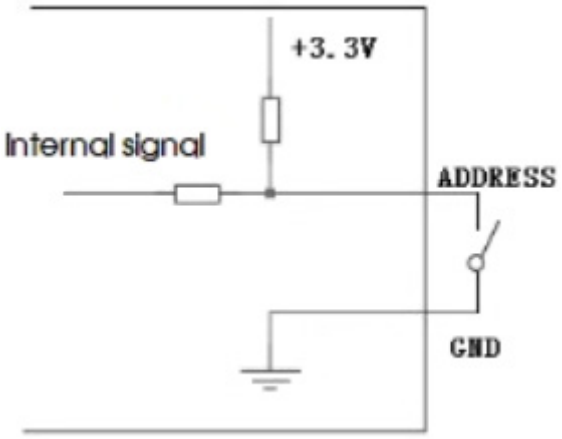
*Io*max: the maximum output current value in parallel power supply modules.

*Io*min: the minimum output current value in parallel power supply modules.

2.14 I2C Communication Address

In the parallel system, if you need to identify the power module information, you need to set the I2C communication address for each parallel power module, and exchange data with the host computer through I2C. The setting of the communication address is determined by Pins 16, 17 and 19 of the signal terminal JP1300. When these three pins are short-circuited with Pin 3 or 20 of JP1300, it will be low level (L, voltage range 0 - 1.31V). When disconnected, it is high level (H, voltage range 1.99 - 3.3V). The specific address number is shown in the table below:

ADDRESS 2	ADDRESS 1	ADDRESS 0	ADDRESS NUMBER
L	L	L	0
L	L	H	1
L	H	L	2
L	H	H	3
H	L	L	4
H	L	H	5
H	H	L	6
H	H	H	7



The internal pull-up resistance value of the power module is 10kΩ, and the external impedance can be matched according to the actual application to meet the high and low voltage range.

3. Installation Requirements

3.1 Safety Information

Warning: Risk of electric shock

During high voltage operation

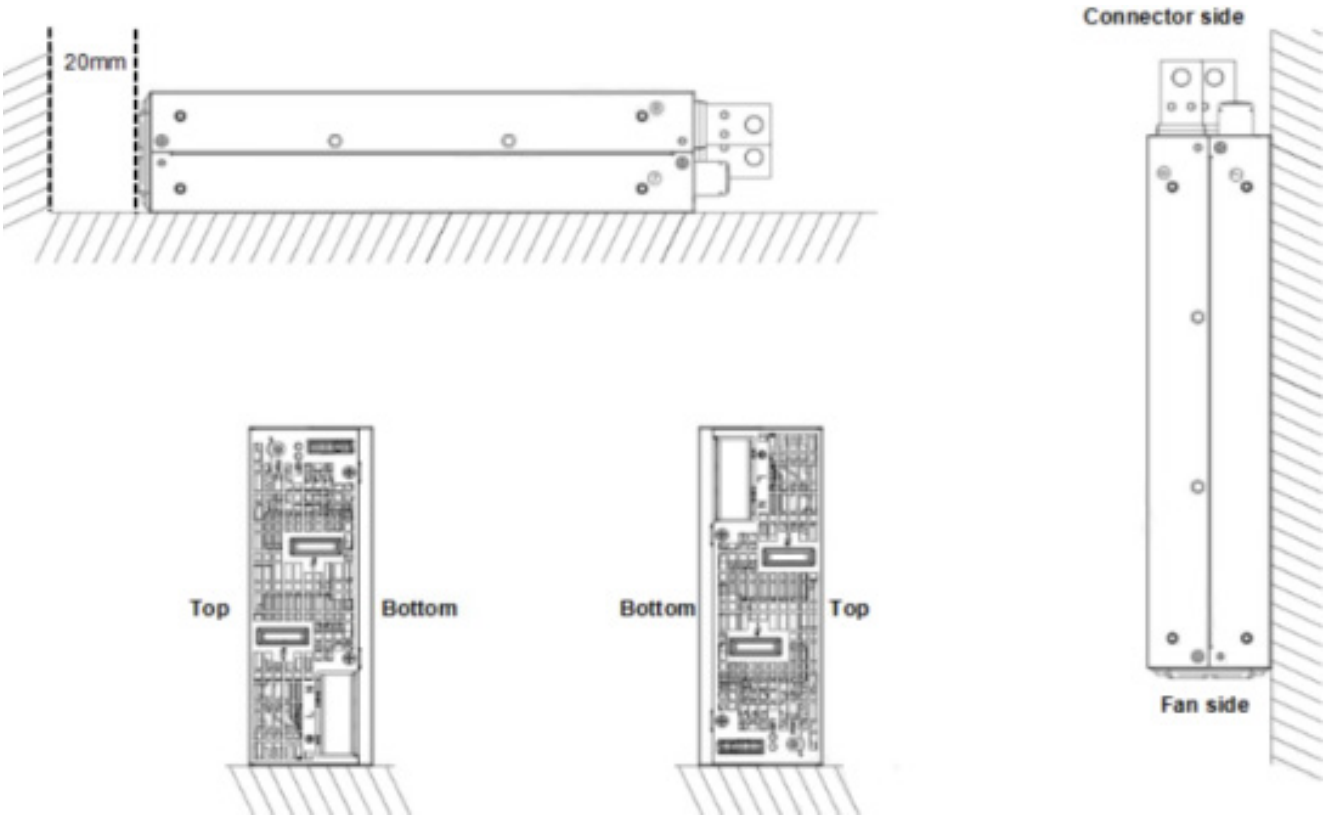
- The power supply module is disconnected from the input DC or the AC power and replaced for at least one minute before starting to operate it.
- When installing the input wire to the power module, please connect the ground terminal first, and then the N line.
- When removing the input wire, please remove the L wire and the N wire first, and then remove the ground wire.
- When disassembling, make sure that no objects fall into the power module.
- Pay attention to high temperature.
- After th power module is working in a high temperature environment, wait for its shell to cool down before operating.
- This product needs to be installed by professionals and needs to be used with other equipment.

3.2 Safety Requirements

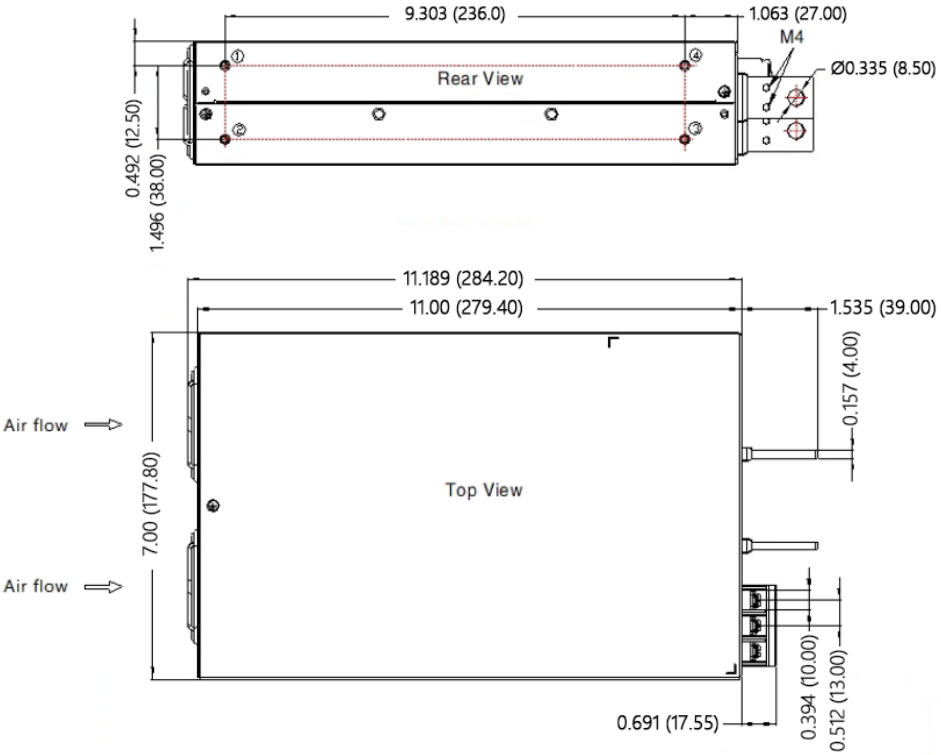
When installing, pay attention to the primary side and the protective ground, the creep distance and the eletrical clearance of the primary side and the secondary side. Refer to EN60601-1.

3.3 Installation Method

Standard mounting orientation:

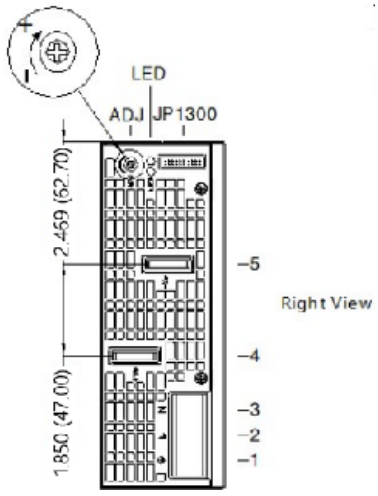


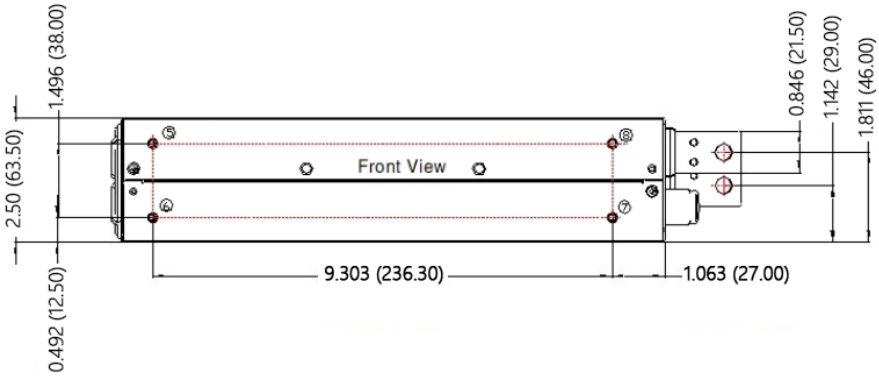
Position of mounting holes:

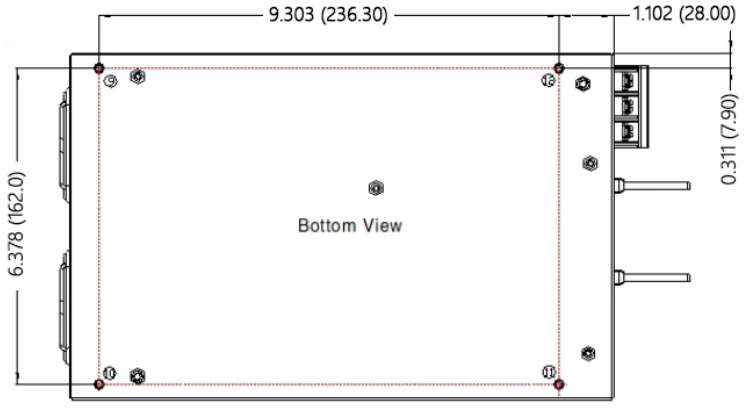


Case Connections

Position	Screw	Max L	Max Torque
1 - 8	M3	3 mm	0.9N•m



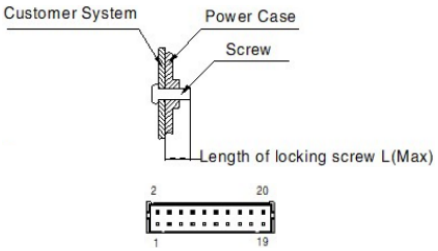




Connections

- Wire range - 22 -12 AWG
- Pin 1, 2, 3 Tightening Torque: M4, 0.9 N•m
- Pin 4, 5 Tightening Torque: M5, 2.3N•m

Pin	Function
1	GND
2	AC(L)
3	AC(N)
4	+Vo
5	-Vo



Pin	Function
1	PS_ON/OFF
2	SGND
3	AGND
4	AC_OK
5	WP_EN
6	SGND
7	+Vo2
8	DC_OK
9	+Vo2
10	SNGD

Pin	Function
11	SCL
12	VS+
13	SDA
14	VPROG
15	Current Share
16	A0
17	A1
18	VS-
19	A2
20	AGND

Connectors:

- Connector: JST PHDR-20VS or equivalent
- Terminal: JST SPHD-002T-P0.5 or equivalent

Note: The fan panel cannot be blocked by other objects,and a distance of at least 20mm must be maintained, otherwise it will affect the heat dissipation and performance of the power module.

4. Communication Protocol

The MPE-3000CM series power modules support standard communication protocols and manage and monitor the power modules through the I2C bus.

Command	Command Name	Access Type	Data Byte	Default	Data Layout	Description
00h	PAGE	Read Byte	1	00h		Read the currently selected page index number (0-Page0 corresponding main channel).
01h	OPERATION	Read/Write Byte	1	80h		This command is used to remotely switch on and off the system. The alarm is cleared once when the system starts. 0x80: power on 0x40: power off
02h	ON_OFF_CONFIG	Read/Write Byte	1	1Ch		Output the default value of the on-off control feature: 0x1D Bit4: 0 - The power module is powered on at any time regardless of the status of the control pin. 1 - The power module is not powered on before the pin control and command operation (set in bit 3:0). Bit 3: 0 - Ignore the CMD command word of the bus to start and stop the power module 1 - According to the bus start command, the power module starts the output. According to the Bit 2, the power module needs to set the control pin for the power module to start the output. Bit 2: 0 - Power module ignore control pin (power module switch is controlled only by CMD command). 1 - The power module starts after the control pin is installed. According to Bit 3, you need to run the command power module to start output. Bit 1: 0 - Active low level (start output with low power module). 1 - Active high level (high power module to start output). Bit 0: Reserved
03h	CLEAR_FAULTS	Send Byte	0		N/A	This command is used to clear the current page fault. After receiving this command, the exisitng fault alarms can be cleared. This command can only be cleared for all page faults.
10h	WRITE_PROTECT	Read/Write Byte	1	80h		This command is used to control the write operations on the PMBus device. 0x80: All write operations except the 10h command are prohibited. 0x40: All write operations except 10h, 00h, and 01h commands are prohibited. 00: Enables the write operation of all writable commands.
15h	STORE_USER_ALL	Send Byte	0		N/A	Copy the entire contents of the running memory into non-volatile storage memory.

Command	Command Name	Access Type	Data Byte	Default	Data Layout	Description
19h	CAPABILITY	Read Byte	1	A0h		Communication capability query command. Bit 7: PEC Verification 0 - PEC is not supported. 1 - PEC is supported. Bit 6 to Bit 5: Indicates the maximum bus rate. 00 - Maximum bus speed 100kHz 01 - Maximum bus speed 400KHz Bit 4: SMbaler #: 0 - The SMbaler # alarm signal is not supported. 1 - Support SMbaler # alarm signal Bit 3 to Bit 0: Reserved
20h	VOUT_MODE	Read Byte	1	17h	Linear16	Output related data format definition. 0x17: The data representing the output voltage is in Linear16 format, with Q= -9 data format.
21h	VOUT_COMMAND	Read/Write Byte	2	24.0	Linear16	Set the output voltage to the Linear16 data format, Q= -9. The value ranged from 0 to 24.
35h	VIN_OFF	Read Byte	2	70.0	Linear11	Input voltage start value
36h	VIN_OFF	Read Byte	2	60.0	Linear11	Input voltage protection value
3Ah	FA_CONFIG_1_2	Read Byte	1	99h		Fan configuration Bit 7: Indicates whether Position 1 has a fan 0 - No fan 1 - No fan Bit 6: Format of the fan speed control command 0 - Duty cycle (default) 1 - RPM Bit 5 to 4: Speed is measured in pulses per second Bit 4 - 1, Bit 5 - 0 Bit 3: Indicates whether Position 2 has a fan 0 - No fan 1 - No fan Bit 2: Format of the fan speed control command 0 - Duty cycle (default) 1 - RPM Bit 1 to 0: The speed is measured in pulses per second
3Bh	FAN_COMMAND_1	Read/Write Word	2	0	Linear11	Fan speed control command, percentage control, Linear11 data format. The set speed is higher than the speed required by the power supply.
40h	VOUT_OV_FAULT_LIMIT	Read Byte	2	34.0	Linear16	The output overvoltage protection point of the power module is Linear16 and Q= -9.
41h	VOUT_OV_FAULT_ RESPONSE	Read Byte	1	0xB8		Output overvoltage protection response: 3.5s restart
42h	VOUT_OV_WARN_LIMIT	Read Byte	2	32.0	Linear16	The value of the power module output overvoltage alarm is Linear16, with Q= -9.
46h	IOUT_OC_FAULT_LIMIT	Read Byte	2	175.0	Linear11	Power module overcurrent protection point
47h	IOUT_OC_FAULT_ RESPONSE	Read Byte	1	0xF8		Output overcurrent protection response: 3.5s restart
4Fh	OT_FAULT_LIMIT	Read Byte	2	119.0°C	Linear11	Power module overtemperature protection point
50h	OT_FAULT_RESPONSE	Read Byte	1	0xC0		Power module overtemperature protection response: restart the power module after ovetemperature recovery
51h	OT_WARN_LIMIT	Read Byte	2	116.0°C	Linear11	The power module overtemperature warning point is Linear11 data format
68h	POUT_OP_FAULT_LIMIT	Read Byte	2	3600.0	Linear11	Output overload protection point of the power module

Command	Command Name	Access Type	Data Byte	Default	Data Layout	Description
69h	POUT_OP_FAULT_ RESPONSE	Read Byte	1	0xF8		Output overload protection response: 3.5s restart
6Ah	POUT_OP_WARN_LIMIT	Read Byte	2	3450.0	Linear11	Power module output overload alarm
78h	STATUS_BYTE	Read Byte	1	00h		The low power status byte is mapped from status bytes such as STATUS_VOUT Bit 7: Reserved Bit 6: OFF Bit 5: VOUT_OV_FAULT Bit 4: IOUT_OC_FAULT Bit 3: Reserved Bit 2: TEMPERATURE Bit 1: CML Bit 0: Reserved
79h	STATUS_WORD	Read Word	2	0000h		Power status double bytes, mapped by status bytes such as STATUS_VOUT Low byte Bit 7: Reserved Bit 6: OFF Bit 5: VOUT_OV_FAULT Bit 4: IOUT_OC_FAULT Bit 3: Reserved Bit 2: TEMPERATURE Bit 1: CML Bit 0: Reserved High Byte Bit 7: VOUT Bit 6: IOUT/POUT Bit 5: Reserved Bit 4: MFRSPECIFIC Bit 3: Power_GOOD# Bit 2: FANS Bit 1: Reserved Bit 0: Reserved
7Ah	STATUS_VOUT	Read/Write Byte	1	00h		The output voltage is related to the power supply. write 1 clear the alarm. If the fault persists, reset the power supply. Bit 7: VOUT_OV_FAULT Bit 6: VOUT_OV_WARNING Bit 5: Reserved Bit 4: Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved
7Dh	STATUS_TEMP	Read/Write Byte	1	00h		If the status is related to the temperature of the power supply, write 1. Clear the alarm. If the fault persists, reset the power supply. Bit 7: OTP_FAULT Bit 6: OTP_WARNING Bit 5: Reserved Bit 4: Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved Bit 0: Reserved

Command	Command Name	Access Type	Data Byte	Default	Data Layout	Description
7Eh	STATUS_CML	Read/Write Byte	1	00h		If the status is related to the temperature of the power supply, write 1. Clear the alarm. If the fault persists, reset the power supply. Bit 7: OTP_FAULT Bit 6: OTP Warning Communication, storage, or logic-related status Bit 7: Invalid or unsupported command received Bit 6: Invalid or unsupported data received Bit 5: Packet error check failed Bit 4: Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved Bit 0: Reserved Bit 5: Reserved Bit 4: Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved Bit 0: Reserved
80h	STATUS_MFR_SPECIFIC	Read/Write Byte	1			The status is defined by the power supply manufacturer.
81h	STATUS_FANS_1_2	Read/Write Byte	1			1 clear the alarm. If the fault persists, reset the fan module. Bit 7: Fan 1 fault Bit 6: Fan 2 fault Bit 5: Resrved Bit 4: Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved Bit 0: Reserved
88h	READ_VIN	Read Word	2		Linear11	Input voltage value, Linear11 data format.
8Bh	READ_VOUT	Read Word	2		Linear16	Output voltage value, Linear16 data format, Q= -9.
8Ch	READ_IOUT	Read Word	2		Linear11	Output current value, Linear11 data format.
8Dh	READ_TEMPERATURE_1	Read Word	2		Linear11	Power side hot spot temperature, Linear11 data format.
90h	READ_FAN_SPEED_1	Read Word	2		Linear11	Fan speed, unit: RPM, n=0, Linear11 data format.
91h	READ_FAN_SPEED_2	Read Word	2		Linear11	Fan speed, unit: RPM, n=0, Linear11 data format.
96h	READ_POUT	Read Word	2		Linear11	Output power value, Linear11 data format.
98h	PMBUS_REVISION	Read Byte	1	22h		Indicates the PMBus version V1.2
99h	MFR_ID	Block Read	Var	/	ASCII	Manufacturer code, ASCII character string, maximum 32 characters.
9Ah	MFR_MODEL	Block Read	Var	AMF3000	ASCII	The value is an ASCII character string with a maximum of 32 characters.
9Bh	MFR_REVISION	Block Read	Var	1.0	ASCII	Product version number. The value is a string of up to 32 ASCII characters.
9Ch	MFR_LOCATION	Block Read	Var	WH	ASCII	The value of an ASCII character string with a maximum of 32 characters.
9Dh	MFR_DATE	Block Read	10	2023-02-27	ASCII	The value is an ASCII character string with a maximum of 32 characters.
9Eh	MFR_SERIAL	Block Read	Var	123456789	ASCII	Product serial number, ASCII string, maximum 32 characters.