AC/DC 3000W Enclosed Switching Power Supply

LMF3000-22Bxx Series

MORNSUN®

RoHS

FEATURES

- Universal 180 - 277VAC or 254 - 390VDC Input voltage
- Wide adjustable output voltage range
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range: -40℃ to +85℃
- High efficiency, high reliability
- Active PFC
- High I/O isolation test voltage up to 4000VAC
- Supports 2+1 parallel redundancy
- Output short circuit, over-current, over-voltage, over-temperature protection
- 5 years warranty
- Operating altitude up to 5000m
- Comply with IEC/UL/EN/BS EN62368, GB4943

LMF3000-22Bxx series is one of Mornsun's enclosed AC-DC switching power supply. It features universal AC input and at the same time accepts DC input voltage, cost-effective, low no load power consumption, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC performance and meet IEC/EN/UL/BS EN62368, GB4943, standards and they are widely used in areas of industrial, LED, street light control, electricity, security, telecommunications, smart home etc.

Selection Guide

Certification	Part No.	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Adjustable Range of Output Voltage Vo1(V)		Efficiency 230VAC (%) Typ.	Maximum Capacitive Load at normal temperature (μF)
				ADJ	Vprog		
--	LMF3000-22B12	2400	12V/200A	9.0-15.5	2.4-15.5	88	20000
	LMF3000-22B24	3000	24V/125A	17.5-30	4.8-30	90.5	20000
	LMF3000-22B48	3000	48V/62.5A	36-60	9.6-60	92	10000

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Rated input (Certified voltage)		200	--	240	VAC
	AC input		180	--	277	
	DC input		254	--	390	VDC
Input Voltage Frequency	Rated input (Certified voltage)		47	--	63	Hz
	AC input		47	--	63	
Input Current	Rated input (Certified voltage)		--	--	20	A
	230VAC		--	--	16	
Inrush Current	230VAC	Cold start	--	50	--	
Power Factor	230VAC	Normal temperature, full load	PF≥0.95			
Start-up Delay Time	230VAC, normal temperature, rated load		--	--	3	s
Input Fuse*	Built-in fuse		--	25	--	A
Input Under-voltage Protection	Under-voltage protection start (Input voltage drops from high to low)		140	--	170	VAC
	Under-voltage protection release (Input voltage rises from low to high)		150	--	180	
Hot Plug			Unavailable			

Note: *A fuse is installed on the middle line of the power supply, the mains shall be disconnected to de-energize the phase conductors.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full load range		--	±1	--	%
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0% - 100% load		--	±0.5	--	
Minimum Load			0	--	--	
Ripple & Noise*	20MHz bandwidth, (peak-to-peak value)	12V/24V	--	--	150	mV
		48V	--	--	200	
Temperature Coefficient			--	±0.03	--	%/℃
Hold-up Time	230VAC, rated load		10	--	--	ms
Short Circuit Protection	Pin1 and Pin2 of the CON3 are short-circuit connected		Constant current limit, output voltage turn off after 5s, self-recover			
	Pin1 and Pin2 of the CON3 are open		Constant current limit			
Over-current Protection	Pin1 and Pin2 of the CON3 are short-circuit connected		Constant current limit, output voltage turn off after 5s, self-recover			
	Pin1 and Pin2 of the CON3 are open		Constant current limit			
Over-voltage Protection	12V		≤19VDC (Output voltage turn off, self-recover)			
	24V		≤35VDC (Output voltage turn off, self-recover)			
	48V		≤64VDC (Output voltage turn off, self-recover)			
Over-temperature Protection	230VAC, 100% load	Over-temperature protection start	--	--	90	℃
		Over-temperature protection release	50	--	--	

Note: *The "Tip and barrel method" is used for ripple and noise test (12"), output parallel 47uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to Enclosed Switching Power Supply Application Notes for specific information.

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Test	Input - ⏚	Electric strength test for 1min., leakage current <10mA		2000	--	--	VAC
	Input - output			4000	--	--	
	Output - ⏚			1500	--	--	
Insulation Resistance	Input - ⏚	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC		100	--	--	MΩ
	Input - output			100	--	--	
	Output - ⏚			100	--	--	
Operating Temperature				-40	--	85	℃
Storage Temperature				-40	--	85	
Operating Humidity		Non-condensing		10	--	95	%RH
Storage Humidity				20	--	90	
Power Derating		Operating temperature derating	-40℃ to +50℃	0	--	--	%/℃
			+50℃ to +85℃	2.5	--	--	
		Input voltage derating	AC Input 180VAC-277VAC	0	--	--	%/VAC
			DC Input 254VDC-390VDC	0	--	--	%/VAC
Leakage Current		240VAC, 60Hz	Touch current	<0.5mA			
			Earth leakage current	<2mA			
Safety Standards				Design refer to IEC/EN/UL/BS EN62368-1, GB4943.1			
Safety Class				CLASS I			
MTBF		MIL-HDBK-217F@25℃		≥250,000 h			
Warranty		Ambient temperature: ≤85℃		5 years			

General Specifications

Case Material	Metal (SPCC)
Dimensions	279.40mm x 177.80mm x 63.50mm
Weight	3200g (Typ.)
Cooling Method	Forced cooling

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32 EN55032	150kHz—30MHz	CLASS B
	RE	CISPR32 EN55032	30MHz—1GHz	CLASS A
	Harmonic current	IEC/EN61000-3-2		CLASS A and CLASS D
Immunity*	ESD	IEC/EN61000-4-2	Contact ±8KV/Air ±15KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	80MHz – 1GHz 10V/m	
	EFT	IEC/EN61000-4-4	±4KV, (5 or 100)kHz	
	Surge	IEC/EN61000-4-5	line to line ±2KV/line to ground ±4KV	
	MS	IEC/EN61000-4-8	30A/m	
	CS	IEC/EN61000-4-6	0.15MHz - 80MHz 10Vr.m.s	
	Voltage dips	IEC/EN61000-4-11	70% U_n* , 25/30 periods (50/60Hz) 40% U_n* ,10/12 periods (50/60Hz) 0% U_n*, 1 periods	Perf. Criteria B

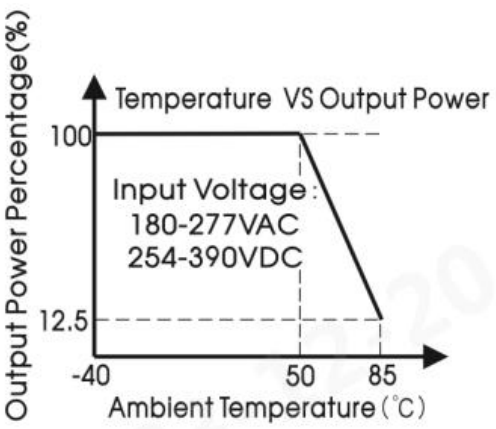
Note: 1. *Un is the maximum input nominal voltage.
2. *perf. Criteria:
A: The equipment shall continue to operate as intended without operator intervention;
B: After the test, the equipment shall continue to operate as intended without operator intervention;
C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

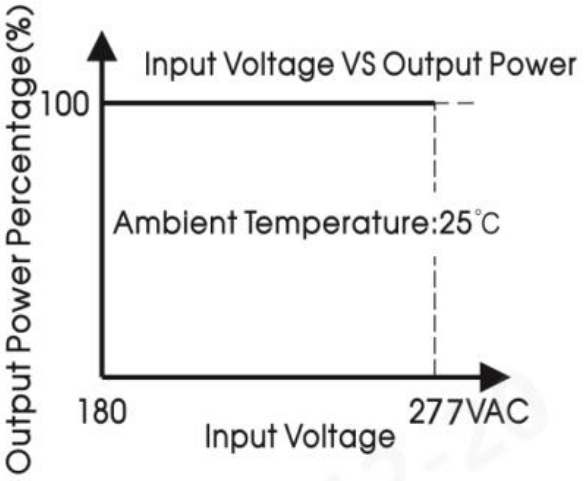
Functional Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Remote Control Switch*			RCG/RC(Pin7 and Pin8 of the CON2 are short) and AUXG/AUX (Pin3 and Pin4 of the CON3 are short)			
Remote Sense	The total compensated voltage value of +S and -S (Pin1 and Pin2 of the CON2) when they are shorted to both ends of the output load (+S to +Vo, -S to -Vo) respectively		--	250	--	mV
Oring			Support direct parallel use, achieve 2+1 parallel redundancy			
LED Signal	Main output status indication	Normal output	Green on			
		Abnormal output, protected	Red on			
		Power off (AC without Input)	Light off			

Note: * Please refer to LMF3000-22Bxx Series Power Supply Application Notes: 2.8 Remote control.

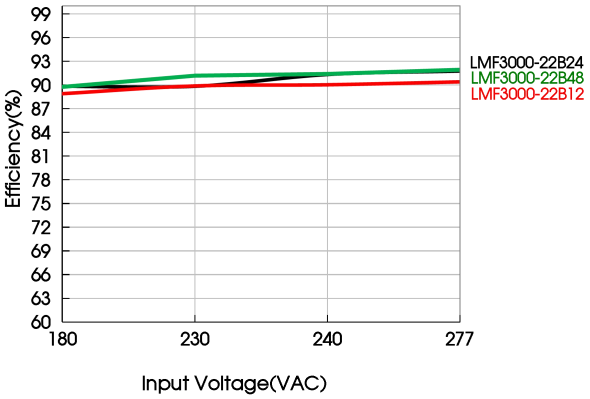
Product Characteristic Curve



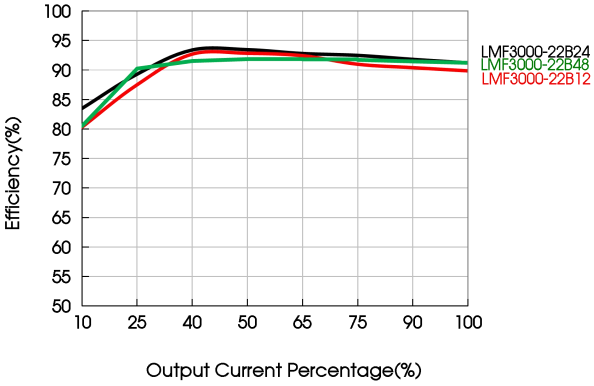


Note: This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.

Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load(Vin=230VAC)

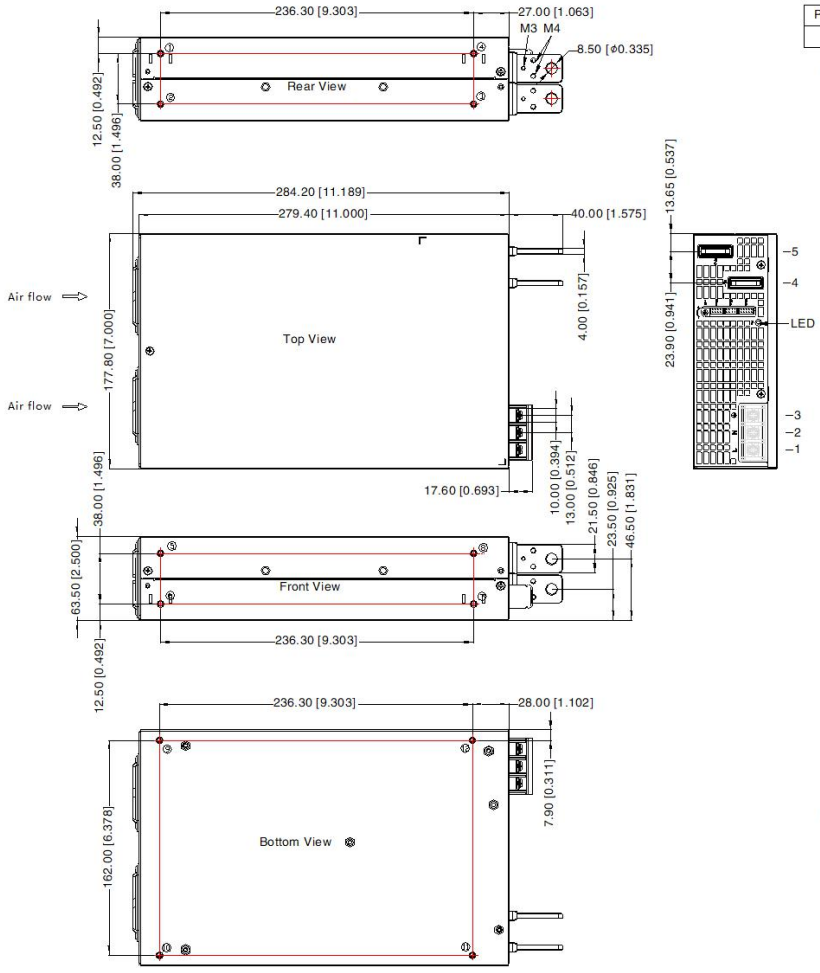


Note:

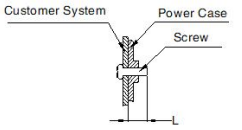
The product is equipped with a built-in cooling fan. Keep the air intake clear of debris. If the environment cannot meet this requirement, a fanless model is recommended.

Dimensions and Recommended Layout

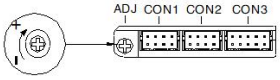
THIRD ANGLE PROJECTION



Position	Screw Spec.	L(Max)	Torque(Max)
①-⑤	M4	4mm	0.9N・m



Pin-Out	
Pin	Mark
1	AC(L)
2	AC(N)
3	⏚
4	-Vo
5	+Vo



CON1&CON2(Signal output)

Pin-Out				Customer Connector
Pin	Mark	Pin	Mark	
1	-S	2	+S	Connector: JST PHDR-8VS or equivalent Terminal: JST SPHD-002T-P0.5 or equivalent
3	-S	4	Current_share	
5	PV	6	PS	
7	RCG	8	RC	

CON3(Signal output)

Pin-Out				Customer Connector
Pin	Mark	Pin	Mark	
1	OLP	2	OL-SD	Connector: JST PHDR-10VS or equivalent Terminal: JST SPHD-002T-P0.5 or equivalent
3	AUXG	4	AUX	
5	RCG	6	RC	
7	P OK GND2	8	P OK2	
9	P OK GND	10	P OK	

Connector wires range

Pro. No	Input connector(Pin1,2,3)	Output connector(Pin4,5)
12V	16-10AWG	000AWG
24V		2-000AWG
48V		8-000AWG
Screw/torque	M4/Max 0.9N・m	M8/Max 8.8N・m M4/Max 0.9N・m M3/Max 0.4N・m

Note:
Unit: mm[inch]
LED: Output status indicator LED
ADJ: Output adjustable resistor
General tolerances: ±1.00[±0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220625
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity <75%RH with nominal input voltage and rated output load;
3. The room temperature derating of 5℃/1000m is needed for operating altitude greater than 2000m;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. In order to improve the efficiency at high input voltage, there will be audible noise generated, but it does not affect product performance and reliability;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. The out case needs to be connected to PE (⏚) of system when the terminal equipment in operating;
9. The output voltage can be adjusted by the ADJ, clockwise to increase;
10. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
11. The power supply is considered a component which will be installed into a terminal equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

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LMF3000-22Bxx Power Supply Application Note

Content

1. Overview description

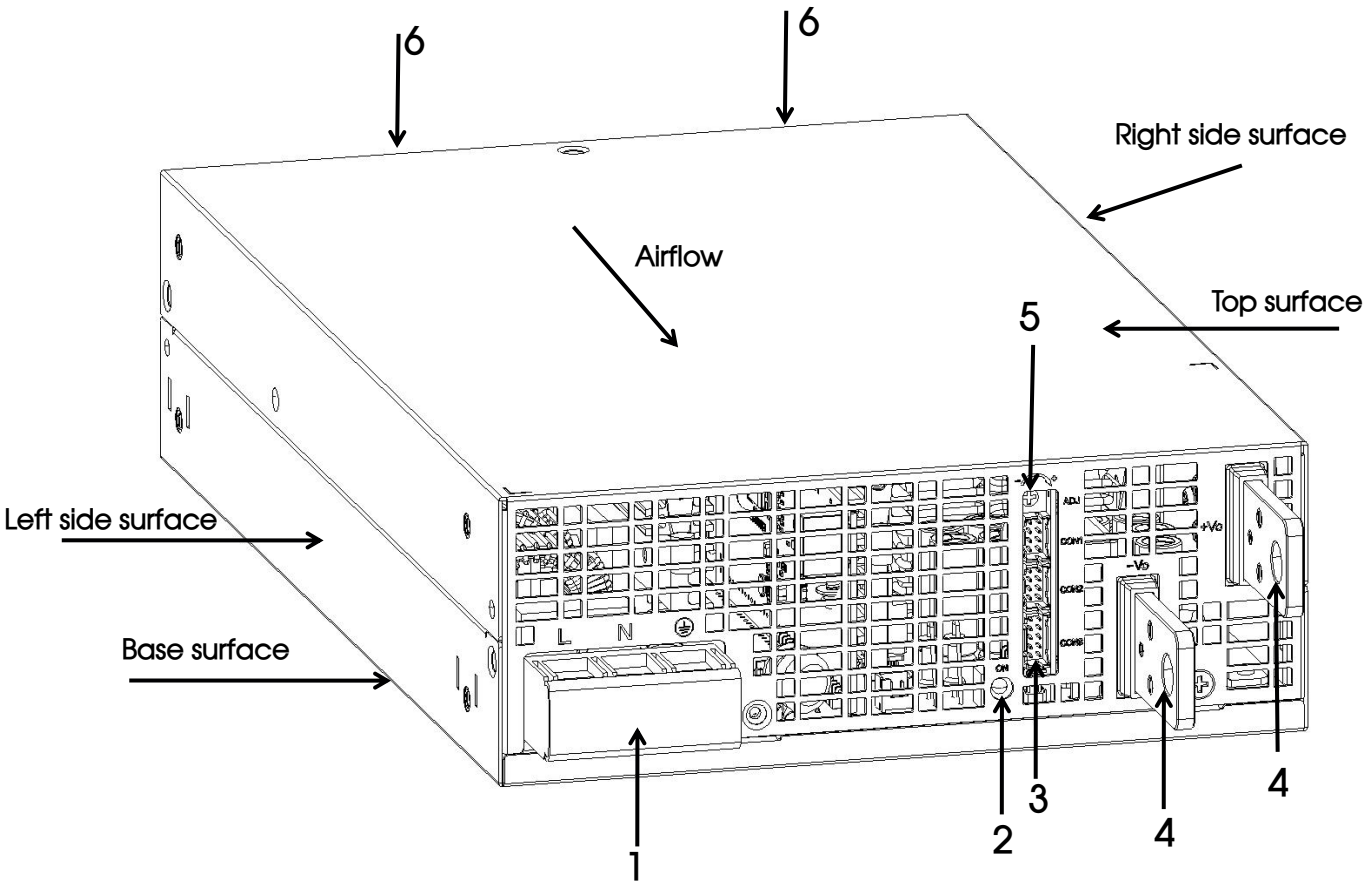
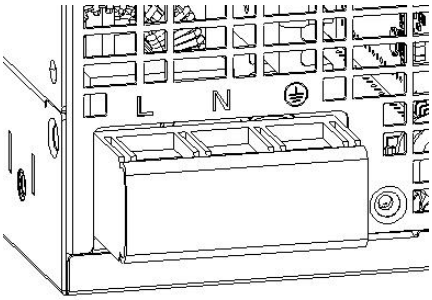


Fig. 1: Appearance information of LMF3000-22Bxx

Overview description:
1. AC/DC input terminal (J1)
2. LED light
3. Signal connection press the terminal (JP1300)
4. DC main output terminal (+Vo, -Vo)
5. Output voltage regulation resistor
6. Fans

1.1 AC/DC input terminal block (J1)

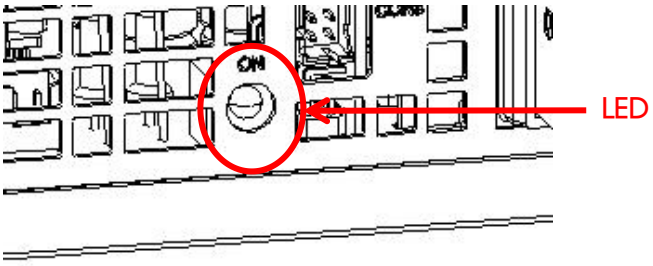
The input terminal J1, as a standard 3-pin fence welding terminal with upper cover, the center spacing of the pins is 13mm.



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

Wire size: 16-10AWG
Torque: M4/0.9N·m (max)

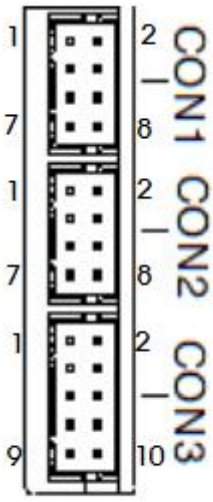
1.2 LED light



LED lights indicate difference working states of the power supply:

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

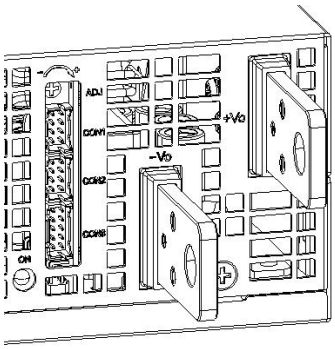
1.3 Signal port (CON1, CON2, CON3)



Signal port	Pin	Label	Features
CON1 & CON2	1	-S	Remote compensation negative terminal
	2	+S	Remote compensation positive terminal
	3	-S	Remote compensation negative terminal
	4	Current_share	Current sharing bus
	5	PV	External adjustable voltage reference input
	6	PS	5V benchmark input foot
	7	RCG	Remote control signal ground
	8	RC	Remote control signal
CON3	1	CLP	Select the foot for overload protection mode
	2	CL- SD	Select the foot for overload protection mode
	3	AUXG	Internal 12V signal ground
	4	AUX	Internal 12V signal
	5	RCG	Remote control signal ground
	6	RC	Remote control signal
	7	P OK GND2	Power OK2 signal ground
	8	P OK2	Power OK2 signal
	9	P OK GND	Power OK signal ground
	10	P OK	Power OK signal

1.4 Main DC output terminal (+Vo, -Vo)

The output terminal uses two standard screw lock type metal terminals, the pin spacing between each is 23.9mm.

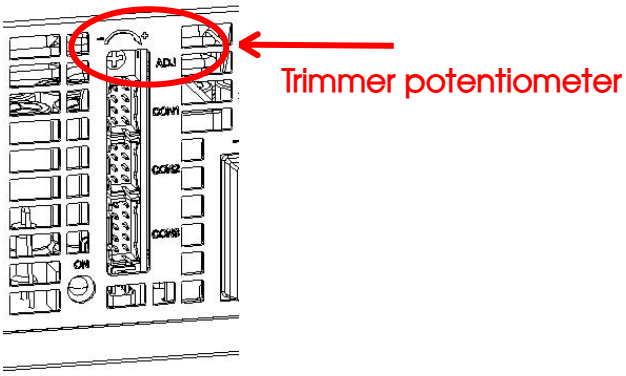


Torque: M8/13.5N·m (max)
M4/0.9N·m (max)

Pin	Features
+Vo	Main output +
-Vo	Main output -

1.5 Output voltage adjustment knob

Turn counterclockwise to increase output voltage



Model	Rated Output Voltage	Adjustable Range Of Output Voltage
LMF3000-22B12	12V	9.0-15.5
LMF3000-22B24	24V	17.5-30
LMF3000-22B48	48V	36-60

For wider output voltage regulation (beyond the range of adjustable resistor regulation) as shown in the following table, you can use the following methods:

Model	Rated Output Voltage	Adjustable Range Of Output Voltage
LMF3000-22B12	12V	2.4-15.5
LMF3000-22B24	24V	4.8-30
LMF3000-22B48	48V	9.6-60

Signal voltage regulation

Connect an external DC voltage between PV and -S of CON2, and connect +S & +Vo, -S & -Vo as shown in Fig. 1.

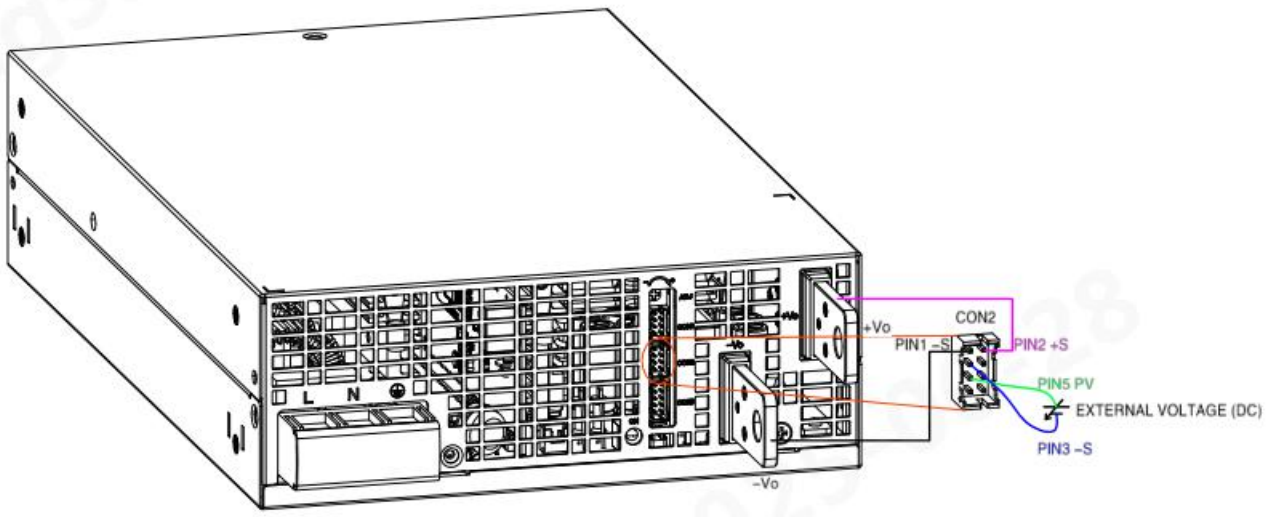
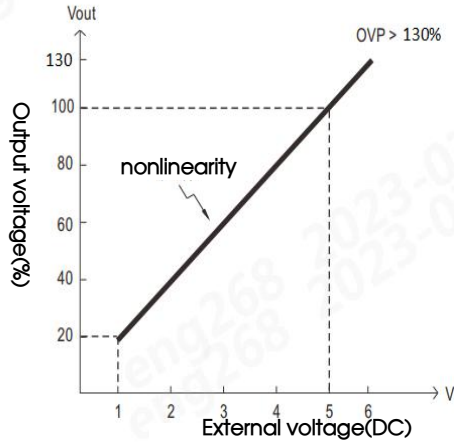


Fig. 1



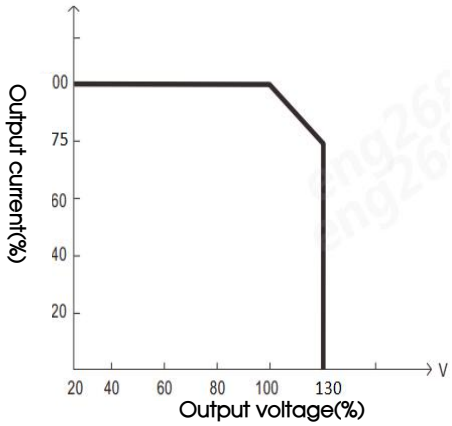


Fig. 2 The rated current varies with the output voltage adjustment

Note: 1. When a wider output voltage regulation function is needed, please make sure that the PV (Pin3) and PS (Pin4) of CON1 or CON2 are not connected, otherwise the internal parts will be damaged, resulting in damage to the power supply.

2. For example, the selection of LMF3000-22B24, rated output 24Vdc, need to adjust to 4.8Vdc, the operation is as follows: first, with the default connection of PV and PS, adjust the output voltage to the rated value of 24Vac, disconnect PV and PS, connect the external voltage 1V between PV and -S, 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 data-sheet), otherwise the power supply may not work properly or even malfunction. The internal L and N line of the power module 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

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.

2.3 Output over-voltage protection (OVP)

The over-voltage protection function is to close the main output when the output voltage reaches the protection voltage value. When the over-voltage protection occurs, the output voltage is turned off, and then restarted.

2.4 Output constant-current protection (OCP)

① Plug in the short-circuit connector of CON3, as shown in Fig.1. The output constant-current protection mode will shut down after 5S with constant current limit delay, and then restart and restore.

② Remove the short-circuit connector of CON3, as shown in Fig.2. The output constant-current protection mode will be continuous constant current limit.

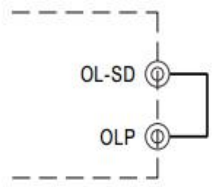


Fig.1 Plug in the short-circuit connector of CON3
(Pin1 and Pin2 of CON3 are short-circuit connected)

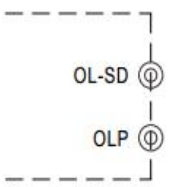


Fig.2 Remove the short-circuit connector of CON3
(Pin1 and Pin2 of CON3 are open)

2.5 Output short circuit protection (SCP)

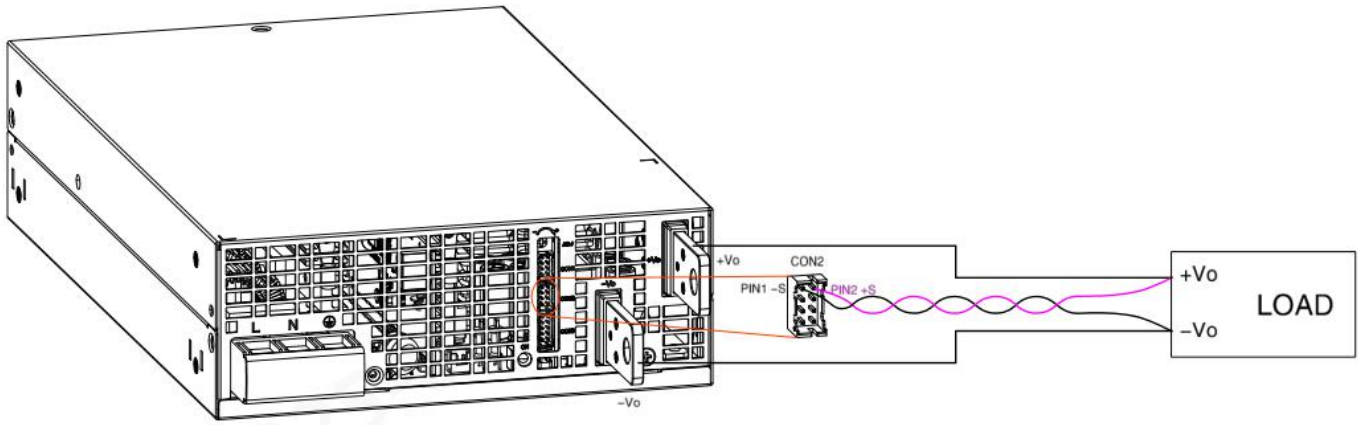
①Plug in the short-circuit connector of CON3, as shown in Fig.1. The output short circuit protection mode will shut down after 5S with constant current limit delay, and then restart and restore.

②Remove the short-circuit connector of CON3, as shown in Fig.2. The output short circuit protection mode will be continuous constant current limit.

2.6 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 the power supply will resume normal operation after the ambient temperature drops to the set value.

2.7 Remote compensation



Note:

1. +S and -S cannot be shorted or reversed, otherwise the power module will be damaged.

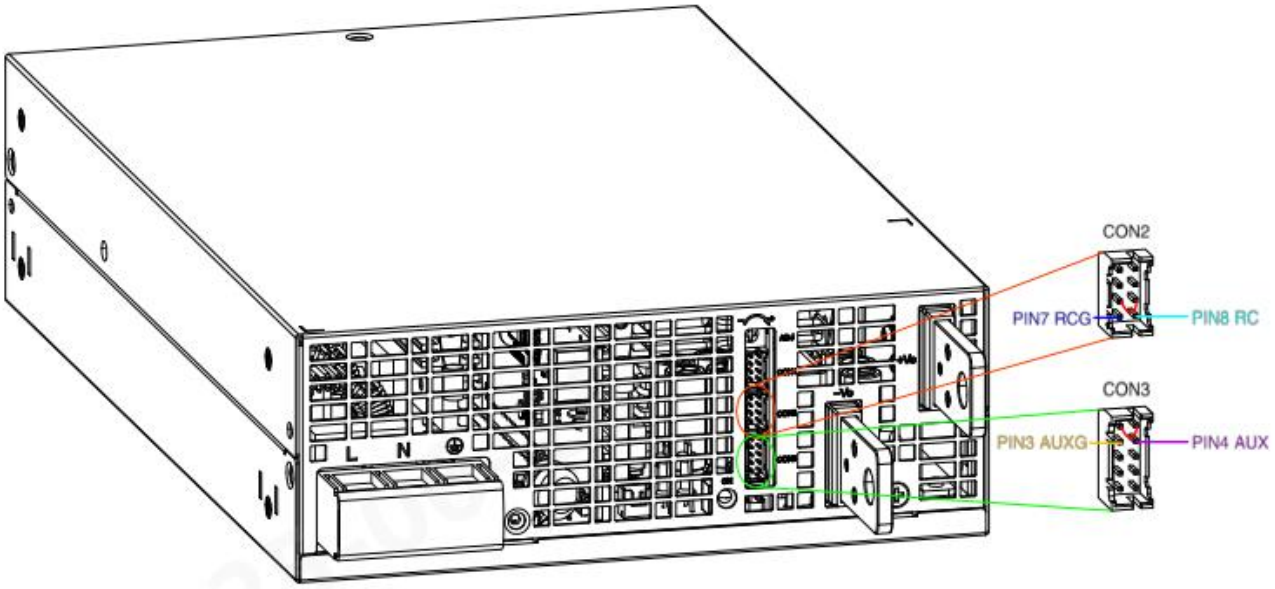
2. Pin 1 and Pin 2 of the signal terminal CON2 can compensate the voltage drop on the output cable.

4. The remote compensation circuit can compensate 250mV 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.

2.8 Remote control

Configure CON2 and CON3 as shown below to activate the remote on/off function.



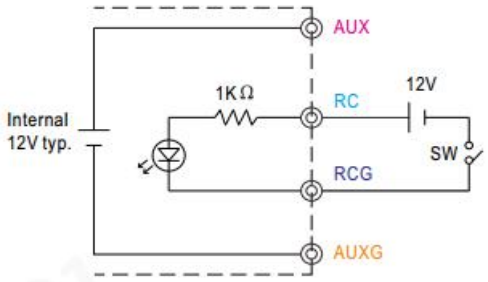


Fig.1 With external voltage

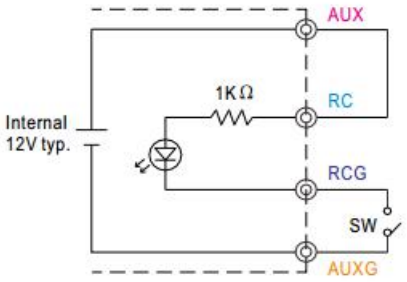


Fig.2 With external voltage Use internal 12V auxiliary output

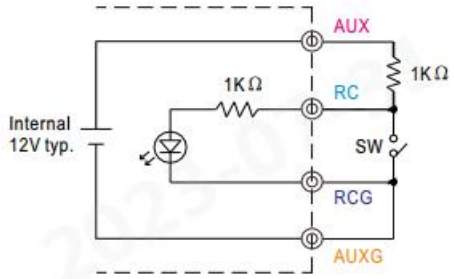


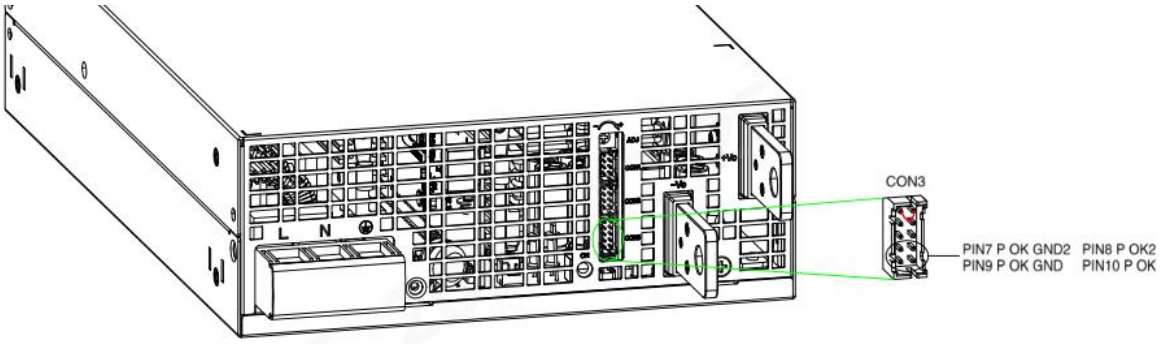
Fig.3 With external voltage Use internal 12V auxiliary output

Connection method:

		Fig.1	Fig.2	Fig.3
SW Logic	Power supply output ON	SW Open	SW Open	SW Close
	Power supply output OFF	SW Close	SW Close	SW Open

2.9 Alarm output

The alarm signal is sent via CON3 "P OK" & "P OK GND" and "P OK2" & "P OK GND2"



Feature	Description	Alarm output (P OK, TTL signal)	Alarm output (P OK2, relay triggered)
P OK	When the output voltage of power supply is higher than 80% of the rate output voltage, the signal is low and the power supply is normal	Low (At 10mA, Max. 0.5V)	Low (At 500mA, Max. 0.5V)
	When the output voltage of power supply is lower than 80% of the rate output voltage, the signal is high and the power supply is turned off	High or open (External voltage, Max.10mA)	High or open (External voltage, Max. 500mA)

Table 1 Alarm explanation

Normal internal circuit of power supply:

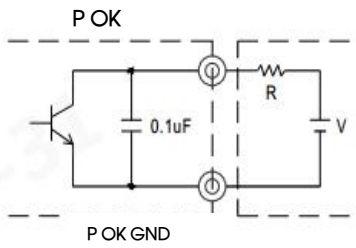


Fig.1 Method of opening collector
(Maximum suction current 10mA, Max. 30V）

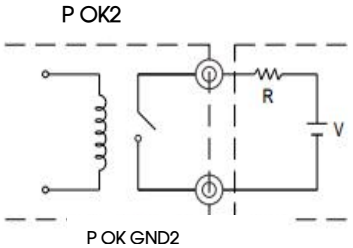
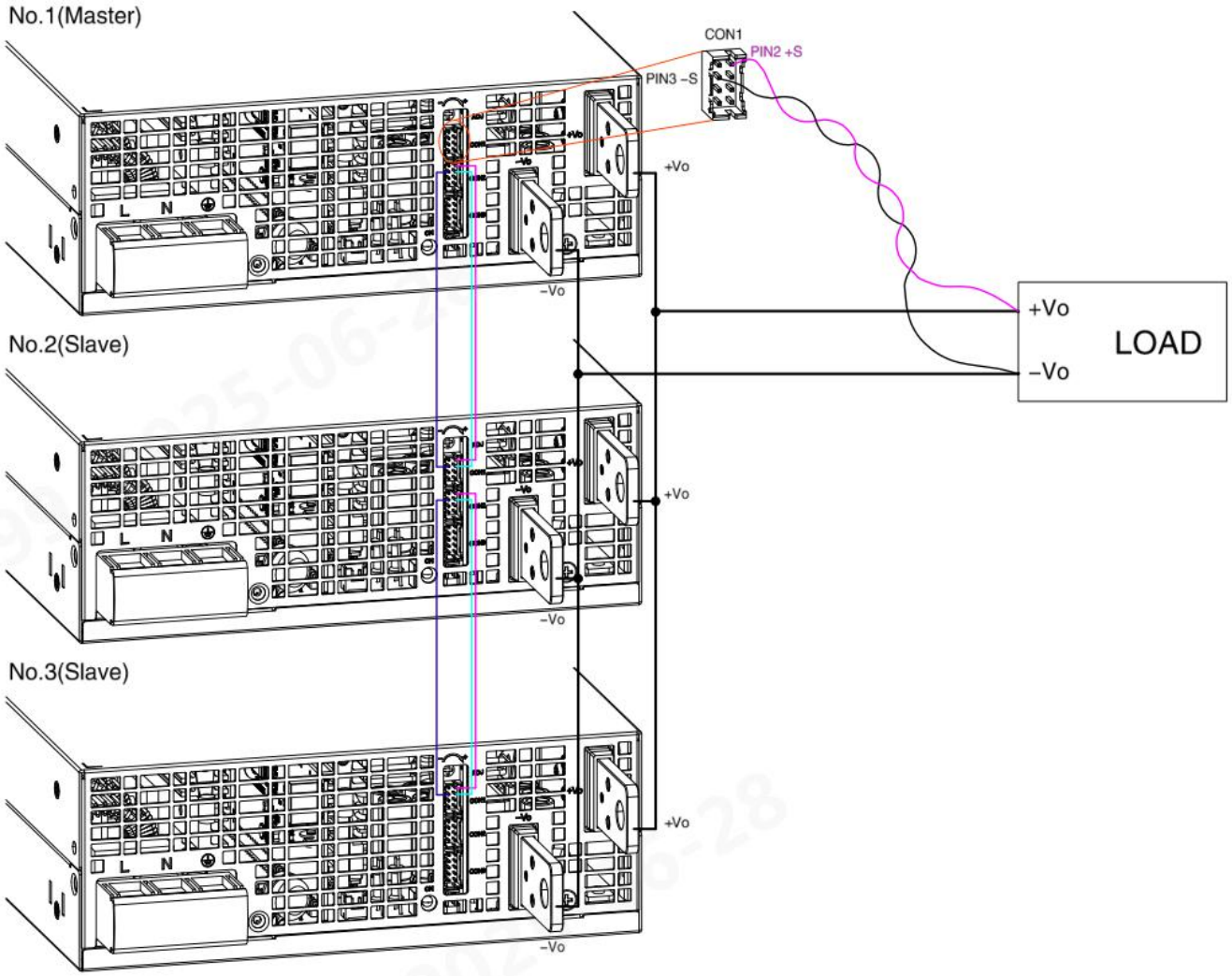


Fig.2 relay，total 10W
(Maximum suction current 500mA, Max. 20V)

2.10 Current sharing

The power supply has a built-in active current sharing function and can be paralleled up to 2 units to provide higher output power.



Note:1. In parallel operation, the output voltage adjustment function is unavailable.

2. The power supply should be connected in parallel with short, thick wires and then connected to the load.

3. The output voltage difference between parallel units should be less than 200mV.

4. The total output current must not exceed the calculated value of the following equation:
   (Output current in parallel)=(Rated current of each group)*(Class number)*0.9
5. When the total output current is less than 3% of the total rated current, or when the number of power supplies of 3% of the rated current of each unit, the current of each power supply may not reach full equilibrium.

2.11 Three-phase connection

Users can use three MORNSUN power supplies connected to a three-phase power system, please refer to the wiring diagram below.

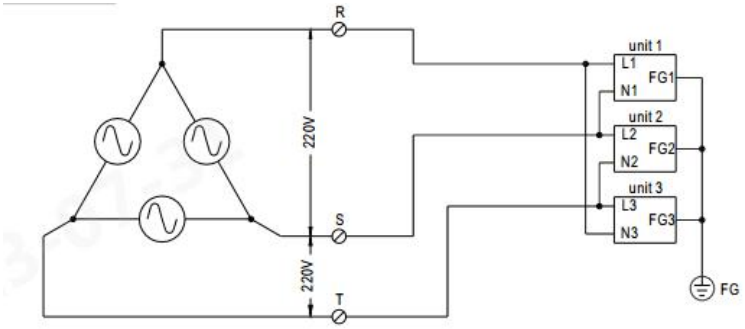


Fig.1 Three-phase three-wire 220VAC system

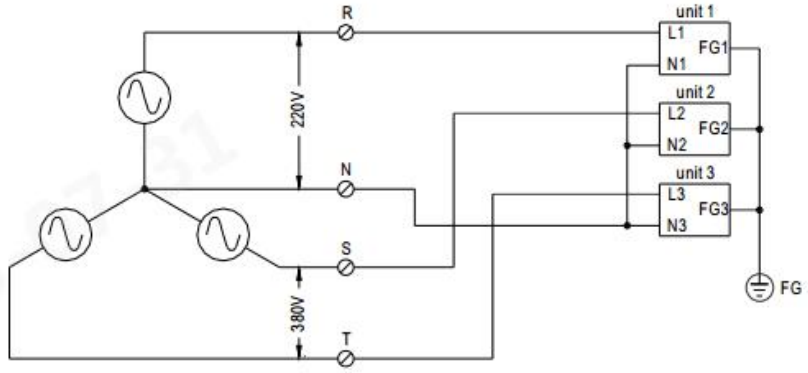


Fig.2 Three-phase four-wire 220/380VAC system

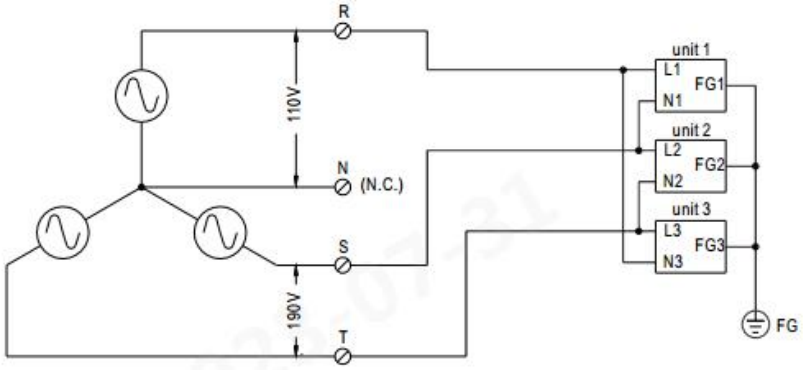


Fig.3 Three-phase four-wire 190/110VAC system

3. Installation requirements

3.1 Safety introduction

Warning: Risk of electric shock

During high voltage operating

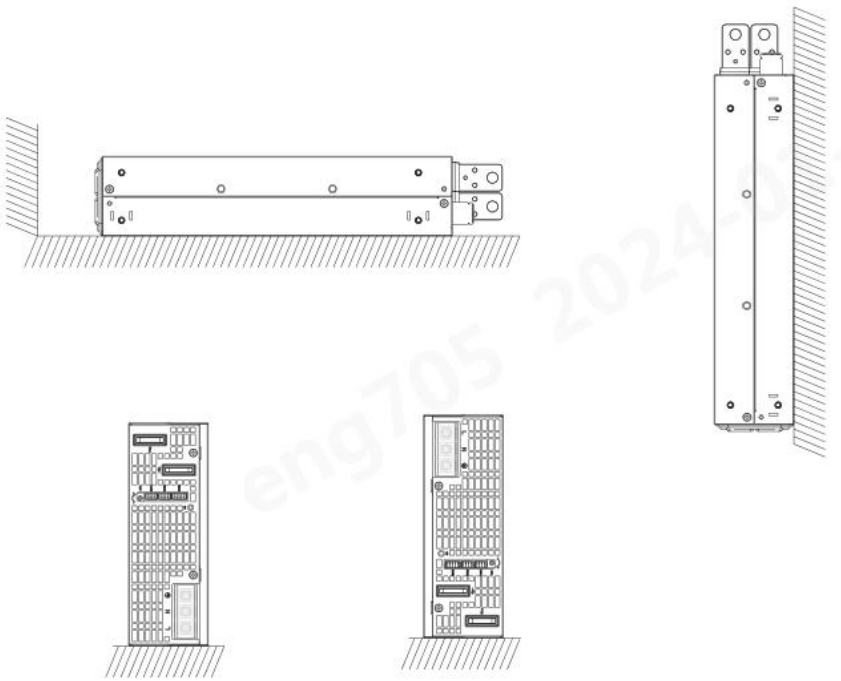
- The power supply module is disconnected from the input DC or the AC power and placed for at least one minute before starting to operate it.
- When installing the input wire to the power module, please connect the ground terminal first, and then connect the L line and the N line.
- When removing the 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 the 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

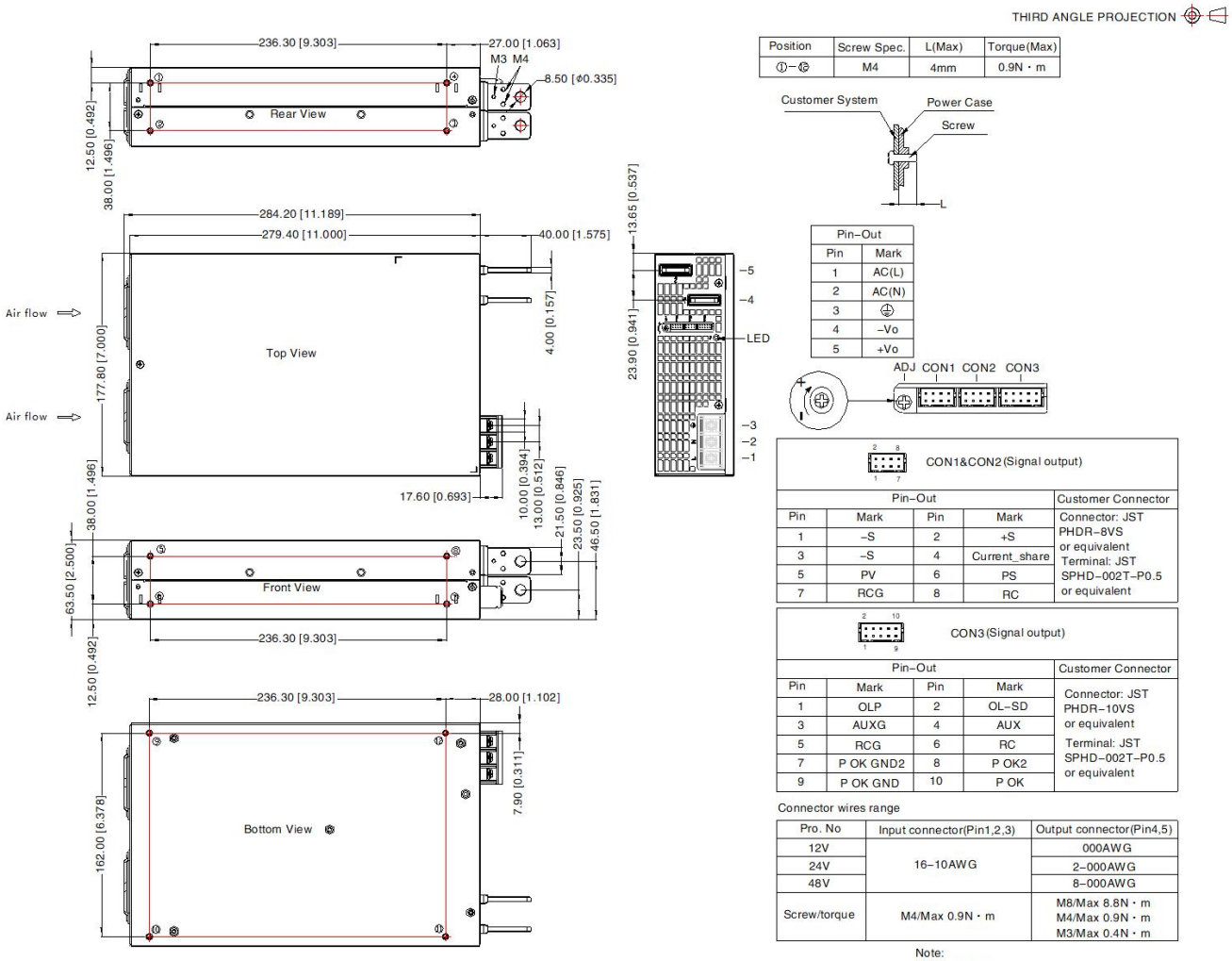
When installing, pay attention to the primary side and the protective ground, the creep distance and the electrical clearance of the primary side and the secondary side.

3.3 Installation method

Standard mounting orientation:



Position of mounting holes:



Position	Screw Spec.	L(Max)	Torque(Max)
①–⑤	M4	4mm	0.9N・m

Pin–Out	
Pin	Mark
1	AC(L)
2	AC(N)
3	⏚
4	–Vo
5	+Vo

CON1&CON2 (Signal output)

Pin–Out				Customer Connector
Pin	Mark	Pin	Mark	
1	–S	2	+S	Connector: JST PHDR–8VS or equivalent Terminal: JST SPHD–002T–P0.5 or equivalent
3	–S	4	Current_share	
5	PV	6	PS	
7	RCG	8	RC	

CON3 (Signal output)

Pin–Out				Customer Connector
Pin	Mark	Pin	Mark	
1	OLP	2	OL–SD	Connector: JST PHDR–10VS or equivalent Terminal: JST SPHD–002T–P0.5 or equivalent
3	AUXG	4	AUX	
5	RCG	6	RC	
7	P OK GND2	8	P OK2	
9	P OK GND	10	P OK	

Connector wires range

Pro. No	Input connector(Pin1,2,3)	Output connector(Pin4,5)
12V	16–10AWG	000AWG
24V		2–000AWG
48V		8–000AWG
Screw/torque	M4/Max 0.9N・m	M8/Max 8.8N・m M4/Max 0.9N・m M3/Max 0.4N・m

Note:
Unit: mm[inch]
LED: Output status indicator LED
ADJ: Output adjustable resistor
General tolerances: ±1.00[±0.039]

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.