AC/DC 5000W Enclosed Switching Power Supply

LMF5000-25Bxx Series

MORNSUN®

RoHS

FEATURES

- Input voltage range: 3W+PE△196-305VAC or 3W+N+PE Y 340-530VAC
- Compatible with multiple input modes: 3-phase 4-wire, 3-phase 3-wire, single-phase and DC
- PF value up to 0.98
- Operating ambient temperature range: -40℃ to +70℃
- Low standby power consumption, high efficiency, low ripple & noise
- 20%-120% Ultra-wide range of voltage and current adjustment
- Parallel current sharing up to 20000W (3+1)
- 485 communication
- Double-sided conformal coating
- High I/O isolation test voltage up to 4000VAC
- Output short circuit, over-current, over-voltage, over-temperature protection
- Operating altitude up to 5000m
- OVC Ⅱ
- 5 years warranty
- Comply with IEC/EN/UL/BS EN62368

LMF5000-25Bxx 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/EN61000-4, CISPR32/EN55032, IEC/EN/UL/BS EN62368 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.*	Cooling Method	Output Power (W)*	Nominal Output Voltage and Current (Vo/Io)	Adjustable Range of Output Voltage ADJ(V)	Efficiency at 230VAC (%) Typ.	Maximum Capacitive Load at normal temperature (μF)
--	LMF5000-25B24	Air cooling	4800	24V/200A	23.5-28.8	90	100000

Note: *Under any conditions, the total power of the product should not exceed the rated power. When the output voltage is increased, the total output power cannot exceed the rated output power; when the output voltage is decreased, the output current cannot exceed the rated output current.

Input Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
Input Voltage Range	Rated input (Certified voltage)	3W+N+PE, Y Or 3W+PE, △	Phase voltage	220	--	277	VAC
	AC input	3W+N+PE, Y	Phase voltage	196	--	305	
			Line voltage	340	--	530	
		3W+PE, △		196	--	305	
	Single-phase input *			196	--	305	
	DC input *			277	--	430	VDC
Input Voltage Frequency	Rated input (Certified voltage)			47	--	63	Hz
	AC input			47	--	63	
Input Current	Rated input (Certified voltage)			--	--	8	A
	230VAC-3W+PE △			--	--	15	
	400VAC-3W+N+PE Y			--	--	9	
Inrush Current	230VAC-3W+PE △	Cold start		--	45	75	
	400VAC-3W+N+PE Y			--	30	50	
Inrush Current Integral (I^2t)	230VAC-3W+PE △			--	121.5	337.5	A^2s
	400VAC-3W+N+PE Y			--	54	150	

Power Factor	△ 230VAC (Y 400VAC)	0.95	0.98	--	--
Start-up Delay Time	△ 230VAC (Y 400VAC), rated load	--	2200	--	ms
Input Fuse	Built-in fuse	--	16	--	A
Input Under-voltage Protection	Under-voltage protection start (Input voltage drops from high to low)	170	--	--	VAC
	Under-voltage protection release (Input voltage rises from low to high)	--	--	196	
Hot Plug		Unavailable			

Note: 1. *Some performance of the product may not be satisfied in single-phase input and DC input, such as output ripple&noise, hold time, etc;
2. *Without special instructions, all performance of the product are measured at 230V, room temperature 25℃ and rated load.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full load range (normal temperature)		--	±1	--	%
	Full load range (High and Low temperature)		--	±3	--	
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0% - 100% load		--	±0.5	--	
Minimum Load			0	--	--	
Stand-by Power Consumption			--	20	--	W
Ripple & Noise*	20MHz bandwidth (peak-peak value)	230VAC-3W+PE △	--	--	150	mV
		400VAC-3W+N+PE Y	--	--	150	
Temperature Coefficient			--	±0.03	--	%/℃
Hold-up Time	230VAC, 75% load		20	--	--	ms
	230VAC, rated load		14	--	--	
Short Circuit Protection	Restart and restore after the short circuit disappear		Turn off the output after 5s (typ.) of constant current operation, and restore after restart			
Over-current Protection	230VAC, rated load	Normal temperature	110% - 150% Io, two protection modes are available for self-recovery: A. Constant current B. The output voltage will be turned off after constant current lasting for 5s and will recover after restarting.			
		Low temperature, high temperature	⩾110%Io, two protection modes are available for self-recovery: A. Constant current B. The output voltage will be turned off after constant current lasting for 5s and will recover after restarting.			
Over-voltage Protection	24V		⩽35V (Output voltage off, restart after recovery or clamp)			
Over-temperature Protection	230VAC, 100% full load	Over-temperature protection start	--	--	95	℃
		Over-temperature protection release	50	--	--	
Auxiliary power	12V		12V/0.1A (Used as a signal power supply only)			

Note: 1.*The "Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to Enclosed Switching Power Supply Application Notes for specific information.
2. *Without special instructions, all performance of the product are measured at 230V, room temperature 25℃ and rated load.

General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Test*	Input - ⏚	Electric strength test for 1min., leakage current <15mA	2000	--	--	VAC
	Input - output	Electric strength test for 1min., leakage current <20mA	4000	--	--	
	Output - ⏚	Electric strength test for 1min., leakage current <15mA	500	--	--	
Insulation Resistance	Input - ⏚	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation	100	--	--	MΩ
	Input - output		100	--	--	

	Output - ⏚	Test voltage: 500VDC		100	--	--	
Isolation level	Input - ⏚			1 x MOPP			
	Input - output			2 x MOPP			
	Output - ⏚			1 x MOPP			
Operating Temperature				-40	--	+70	℃
Storage Temperature				-40	--	+85	
Operating Humidity		Non-condensing		10	--	95	%RH
Storage Humidity				20	--	90	
Switching Frequency		PFC		--	65	--	KHz
		DC-DC		62	--	110	
		Auxiliary source		--	65	--	
Power Derating		Operating temperature derating	-40℃ to -30℃	6	--	--	%/℃
			+50℃ to +70℃	2.5	--	--	
Leakage Current		277VAC, 60Hz	Touch current	<3.5mA			
Safety Standards				Design refer to IEC/EN/UL/BS EN62368-1			
Safety Class				CLASS I			
MTBF		MIL-HDBK-217F@25℃		658,3979 h			
Warranty		Ambient temperature: <40℃		5 years			

Note: *The discharge tube screw on the side of the casing should be removed when testing the withstand voltage and then added back after the test.

Functional Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
PS_ON Input Signal	Power on	PS_ON high	5	--	18	V
	Power off	PS_ON low	0	--	0.8	
Accuracy of current sharing*	3+1 When multiple machines are connected in parallel, the sub-module shunt more than 50% of the rated load of every machine		--	±5	--	%
Remote compensation	The total compensated voltage value when VS+ and VS- (Pin 7 and Pin 5 of CON2 or CON3) are shorted to both ends of the output load ((VS+ to +Vo, VS- to -Vo), respectively		--	0.3	--	V
LED Signal	Main output status indication	Normal output	Green on			
		Abnormal output, protected	Red on			
		Power off (AC without Input)	Light off			
External output voltage adjustment*	The output voltage can be adjusted by the external DC power supply. The DC power supply voltage ranges from 1 to 6VDC, corresponding to the output voltage range of 20%-120%Io		4.8	--	28.8	V
External output current adjustment*	The output current can be adjusted by the external DC power supply. The DC power supply voltage ranges from 1 to 6VDC, corresponding to the output voltage range of 20%-120%Io		40	--	240	A
Select the over-current protection mode*	Different over-current protection modes can be selected by adjusting the DIP Switch 1 of the product		By default, the output is turned off after 5s of over-current and the output is restored after restart			
			When the DIP Switch 1 is selected ON, the output voltage is not less than 50% Vo, which is a long-term constant current. When the output voltage is below 50% Vo, the output will be turned off after 5 seconds and restored after restarting.			
AC_FAIL			Input voltage loss alarm signal			
FAN_FAIL			Fan fault alarm signal			
DC_OK			A normal alarm signal is generated			
485 communication			RS485 A and RS485 B communicate			

Note: 1.*The voltage difference between each prototype should not exceed 0.2V during current sharing test.
2.*When the DC power supply is adjusted from high to low voltage, the floating OVP protection may be triggered under light load or no load.
3.*When the output voltage and current are adjusted, the actual output voltage and current will have a precision difference of about 10% from the given value of the external power supply. The output voltage or current can be adjusted to the set value by continuing to adjust the external power supply value. When the constant currernt value is >100%Io, long-term work may start OTP protection.
4.*When selecting the external voltage regulation, external current regulation and over-current protection modes, it is required to wait until the auxiliary power is completely powered off before switching the switch.

Environmental Characteristics

Item	Operating Conditions	Standard
High and Low Temperature Working	+70℃, -40℃	GB2423.1, IEC60068-2-1
Sinusoidal Vibration	10 - 500Hz, 2g, three directions of X, Y, Z axis	GB2423.10, IEC60068-2-6
Alternating Hot and Humid	+25℃, 95%RH ±60℃, 95%RH	GB2423.4, IEC60068-2-30
Low Temperature Storage	-40℃	GB2423.1, IEC60068-2-1
High Temperature Storage	+85℃	GB2423.2, IEC60068-2-2
High Temperature Aging	+50℃	GB2423.2, IEC60068-2-2
Normal Temperature Aging	+25℃	GB2423.1, IEC60068-2-1
Temperature Shock	-40℃ to +70℃	GB2423.22, IEC60068-2-14
Packaging Drop	1m, one corner, three edges and six sides	GB2423.8, IEC68-2-32

General Specifications

Case Material	Metal (AL5052, SPCC, SGCC)
Dimensions	460.00mm x 211.00mm x 83.50mm
Weight	7300g (Typ.)
Cooling Method	Built-in fan, forced air cooling

Electromagnetic Compatibility (EMC)*

Emissions	CE (Input port)	CISPR32 EN55032 150K - 30MHz		CLASS A
	RE	CISPR32 EN55032 30MHz -1GHz		CLASS A
	Harmonic current	IEC/EN61000-3-2		CLASS A and CLASS D
	Voltage flicker	EN61000-3-3		perf. Criteria B
Immunity	ESD	IEC/EN61000-4-2	Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	
	EFT (Input port)	IEC/EN61000-4-4	±4KV	
	Surge (Input port)	IEC/EN61000-4-5	line-line ±2KV/line-PE ±4KV	
	MS	IEC/EN61000-4-8	30A/m	
	AC power port harmonics	IEC61000-4-13	CLASS 3	
	Harmonic and network signal			
	Low frequency immunity			
	CS	IEC/EN61000-4-6	0.15 - 80MHz 10Vr.m.s	
	Voltage dips	IEC/EN61000-4-11	>95% dip 0.5 periods	perf. Criteria B
			30% dip 25 periods	perf. Criteria B
	Voltage interruption	IEC/EN61000-4-11	>95% interruptions 250 periods	perf. Criteria C

Note: 1. *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.
2. *An additional 100cm*80cm*2mm iron plate is required for EMI testing.

Product Characteristic Curve

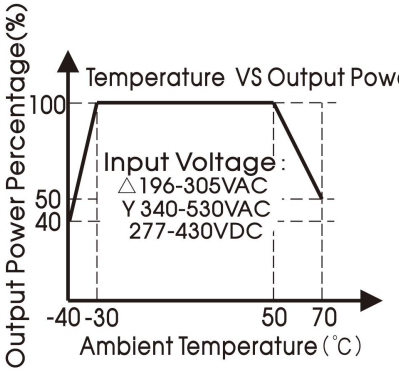


Figure 1

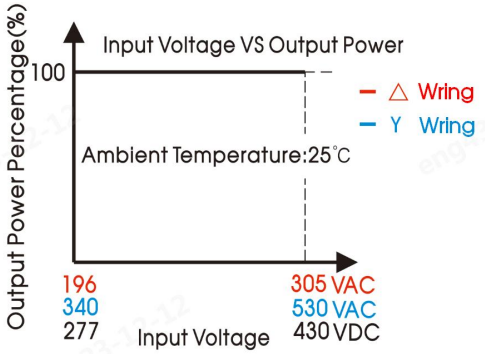


Figure 2

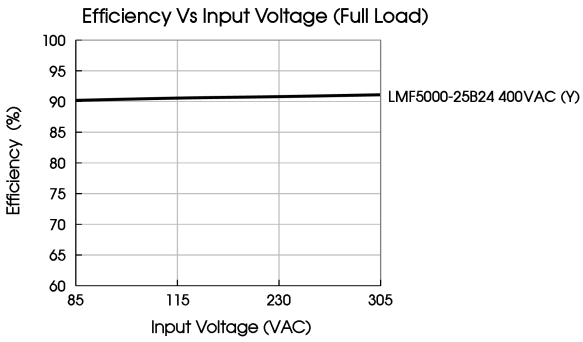


Figure 3

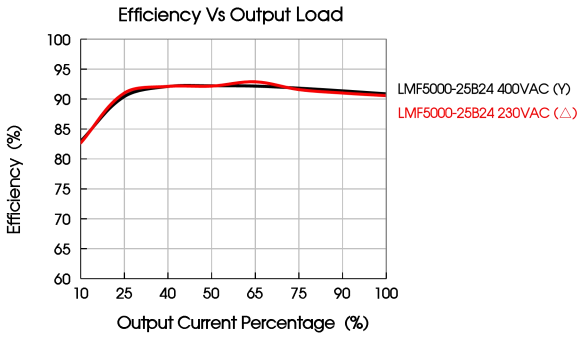
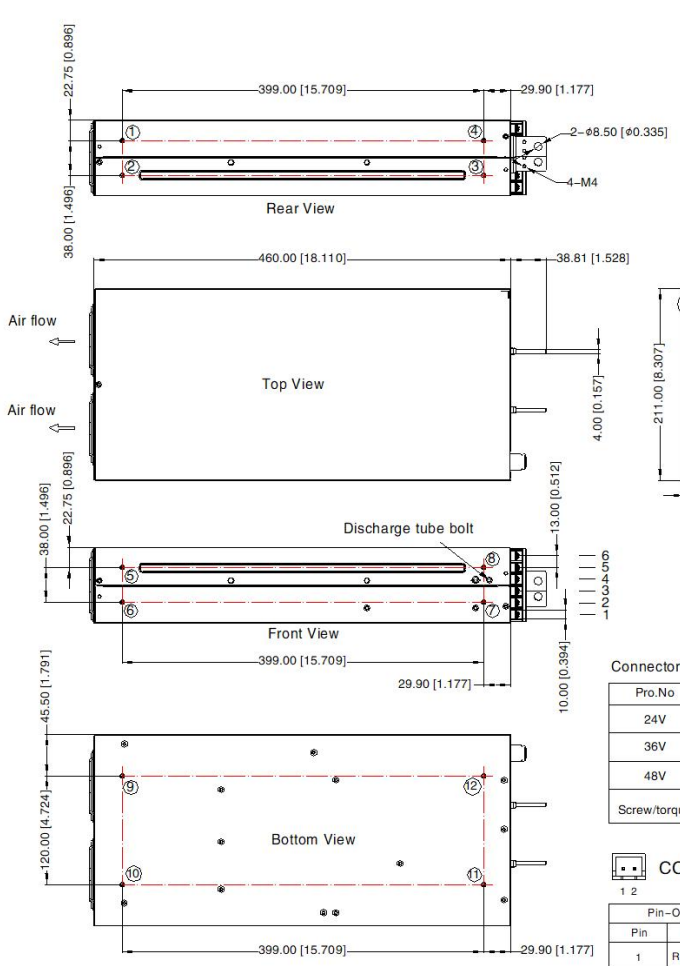
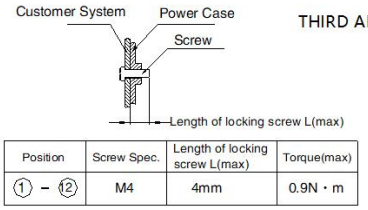


Figure 4

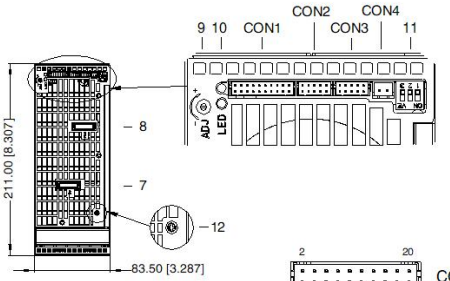
Dimensions and Recommended Layout





Position	Screw Spec.	Length of locking screw L(max)	Torque(max)
① – ⑫	M4	4mm	0.9N · m

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Mark
1	L1
2	N1
3	L2
4	N2
5	L3
6	N3
7	–Vo
8	+Vo
9	ADJ adjustable resistor
10	LED
11	DPI SW
12	⏚

Connector wires range:

Pro.No	Input connector	Output connector
24V	16–10 AWG	000 AWG
36V	16–10 AWG	0 AWG
48V	16–10 AWG	4 AWG
Screw/torque	M4, Max 1.2N · m	M8, Max 13.5N · m

CON4

Pin-Out		Customer Connector
Pin	Mark	
1	RS485 A	Connector: JST XHP or equivalent Terminal: JST SXH-001T-P06 or equivalent
2	RS485 B	

CON1

Pin-Out				Customer Connector
Pin	Mark	Pin	Mark	
1	AC FAIL1	2	FAN FAIL1	Connector: JST PHDR or equivalent Terminal: JST SPHD-002T-P05 or equivalent
3	AC FAIL1 GND	4	FAN FAIL1 GND	
5	OTP1 GND	6	DC OK1 GND	
7	OTP1	8	DC OK1	
9	OTP2 GND	10	FAN FAIL2 GND	
11	OTP2	12	FAN FAIL2	
13	-Vo (signal)	14	AC FAIL2	
15	+Vo (signal)	16	AC FAIL2 GND	
17	GND AUX	18	DC OK2	
19	12V AUX	20	DC OK2 GND	

CON2/CON3

Pin-Out				Customer Connector
Pin	Mark	Pin	Mark	
1	PC+	2	RC+	Connector: JST PHDR or equivalent Terminal: JST SPHD-002T-P05 or equivalent
3	PC–	4	RC–	
5	VS–	6	PV+	
7	VS+	8	PV–	
9	CS–	10	CS+	

Note:
Unit: mm[inch]
General tolerances: ± 1.00[± 0.039]
Pin1–6 connector tightening torque: M4, 0.9N · m max.

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220676;
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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LMF5000-25Bxx Power Supply Application Manual

Content

1. Appearance

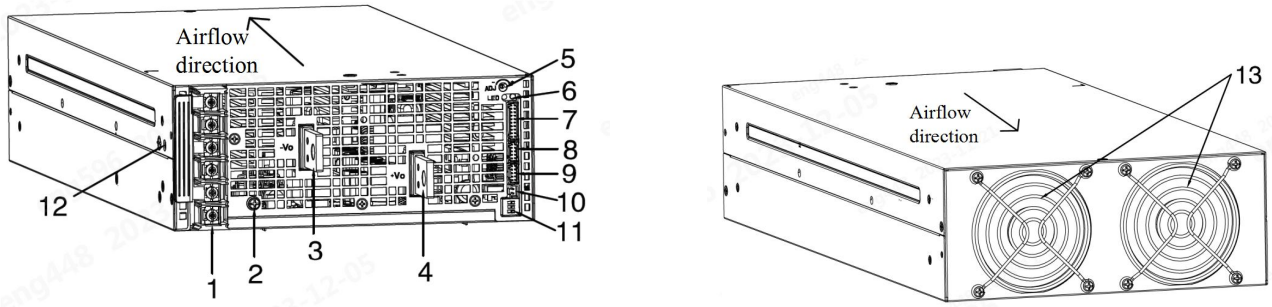


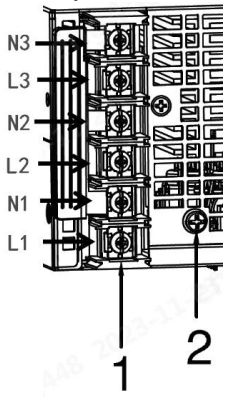
Figure 1: LMF5000-25Bxx appearance information

Composition description:

1. Input terminal (J1)
2. Ground screw (PE)
3. Output terminal negative (J2)
4. Output terminal positive (J3)
5. Output voltage regulation (ADJ)
6. Green and red status display LED lights
7. Signal connection terminal (CON1)
8. Signal connection terminal (CON2)
9. Signal connection terminal (CON3)
10. 485 Communication terminal (CON4)
11. Working mode selection switch
12. Discharge tube screw
13. Fan

1.1 Input terminal (J1)

The input terminal J1 uses standard 6-pin fence-welded terminal with covers.

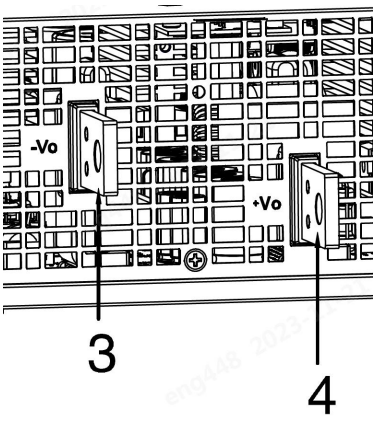


Number	PIN	Function
1	L1/L2/L3	Line (Phase)
	N1/N2/N3	Neutral
2	⏚	Ground/Earth

Wire size: 16-10AWG
Torque: 1.2Nm

1.2 Main output terminal (J2, J3)

The output terminal adopts two metal copper bar terminals J2 and J3.

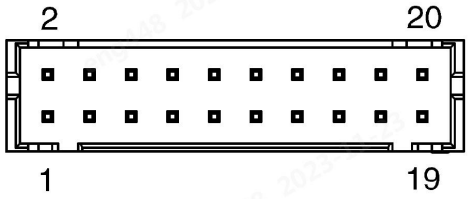


Number	PIN	Function
3	-Vo	Main output -
4	+Vo	Main output +

Wire size: 000 AWG
Torque: 13.5Nm

1.3 Signal connection terminal

(1) CON1 signal terminal

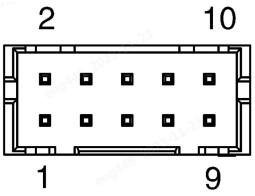


Connector	JST PHDR series or equivalent
Terminal	JST SPD-002T-P05 or equivalent

PIN	Function	Description
1	AC_FAIL1	AC fail warning signal+
2	FAN_FAIL1	Fan fail warning signal+
3	AC_FAIL1_GND	AC fail warning signal-
4	FAN_FAIL1_GND	Fan fail warning signal-
5	OTP1_GND	Over temperature protection warning signal-
6	DC_OK1_GND	DC_OK warning function-
7	OTP1	Over temperature protection warning signal+
8	DC_OK1	DC_OK warning function+
9	OTP2_GND	Over temperature protection warning signal-
10	FAN_FAIL2_GND	Fan fail warning signal-
11	OTP2	Over temperature protection warning signal+
12	FAN_FAIL2	Fan fail warning signal+
13	-Vo (signal)	Output voltage negative, for signal sampling only
14	AC_FAIL2	AC fail warning signal+
15	+Vo (signal)	Output voltage positive, for signal sampling only
16	AC_FAIL2_GND	AC fail warning signal-
17	GND_AUX	12V auxiliary power supply-
18	DC_OK2	DC_OK warning function+

19	12V_AUX	12V auxiliary power supply+
20	DC_OK2_GND	DC_OK warning function-

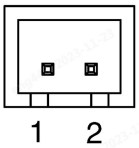
(2) CON2 and CON3 signal terminal (Internal connection)



Connector	JST PHDR series or equivalent
Terminal	JST SPD-002T-P05 or equivalent

PIN	Function	Description
1	PC+	External current regulation signal+
2	RC+	Remote on-off signal+
3	PC-	External current regulation signal-
4	RC-	Remote on-off signal-
5	VS-	Remote compensation signal-
6	PV+	External voltage regulation signal+
7	VS+	Remote compensation signal+
8	PV-	External voltage regulation signal-
9	CS-	Current sharing bus signal-
10	CS+	Current sharing bus signal+

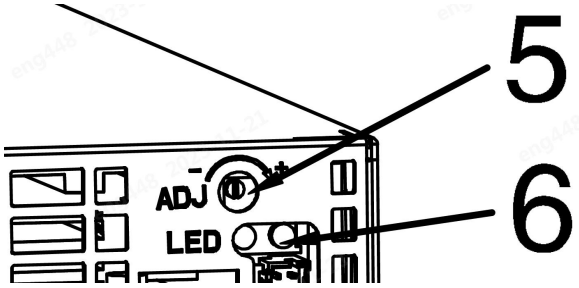
(3) CON4 signal terminal



Connector	JST XHP series or equivalent
Terminal	JST SXH-001T-P06 or equivalent

PIN	Function	Description
1	RS485_A	485 Communication A
2	RS485_B	485 Communication B

1.4 Output voltage regulation and LED light



The adjustable range of the output voltage adjustment resistor (clockwise rotation increases the output voltage)

ID	Model number	Rated output voltage	Output voltage adjustable range
5	LMF5000-25B24	24V	23.5 - 28.8V

Two types of LED lights indicate different working statuses of the power supply:

ID	Green light	Red light	Status
6	ON	OFF	Normal operation
	OFF	ON	Main road or auxiliary load alarm
	OFF	OFF	No AC input

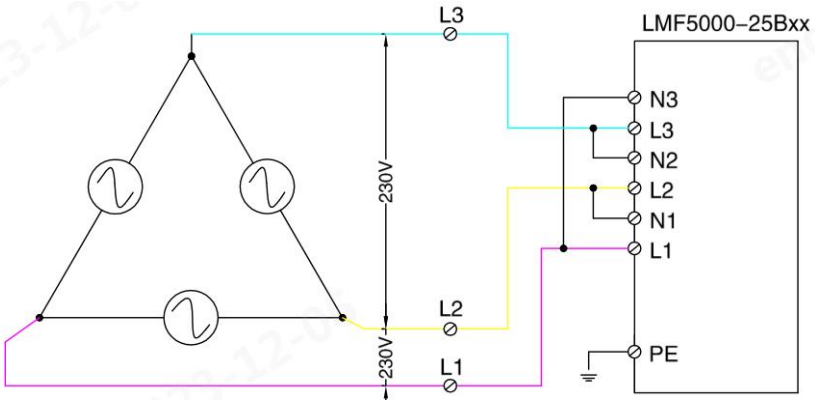
2. Function manual

2.1 Input requirement

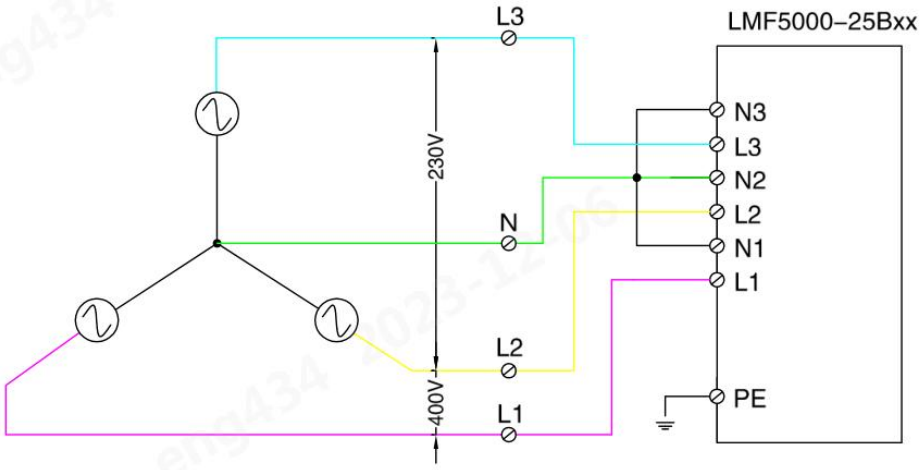
The AC input voltage and DC input voltage must be within the defined voltage range (refer to the data sheet), otherwise the power supply may not work properly or even malfunction.

The internal L line of the power module have been connected in series with a 600VAC 16A fuse. For better protection, it is recommended that customers use a circuit breaker not exceeding 16A for enhanced protection (non-mandatory requirement).

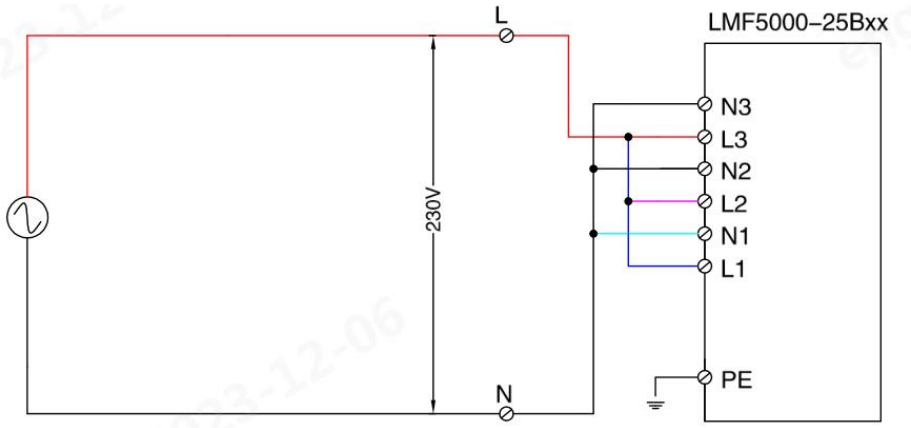
(1) 3-phase 3-wire/△ 230VAC wiring method



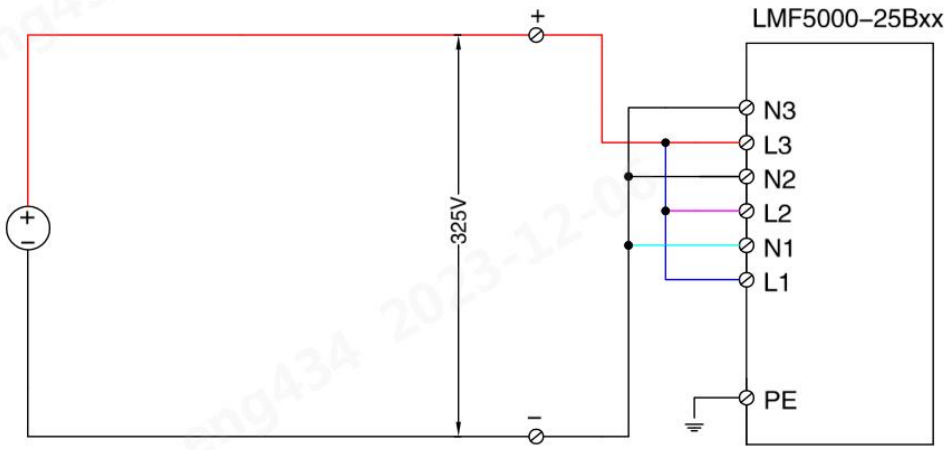
(2) 3-phase 4-wire/Y 400VAC wiring method



(3) 1-phase 2-wire/230VAC wiring method: LMF5000-25Bxx product can also work with 1-phase 2-wire 196-305VAC input, please refer to the following wiring method. When working in the 1-phase 2-wire wiring method, some specification characteristics may not meet the defined specification values (such as ripple, etc). If any problems occur, please contact our FAE.



(4) DC input wiring method: LMF5000-25Bxx product can also support DC input 277-430VDC to work, as shown in the figure below of DC input wiring method.



2.2 Output requirement

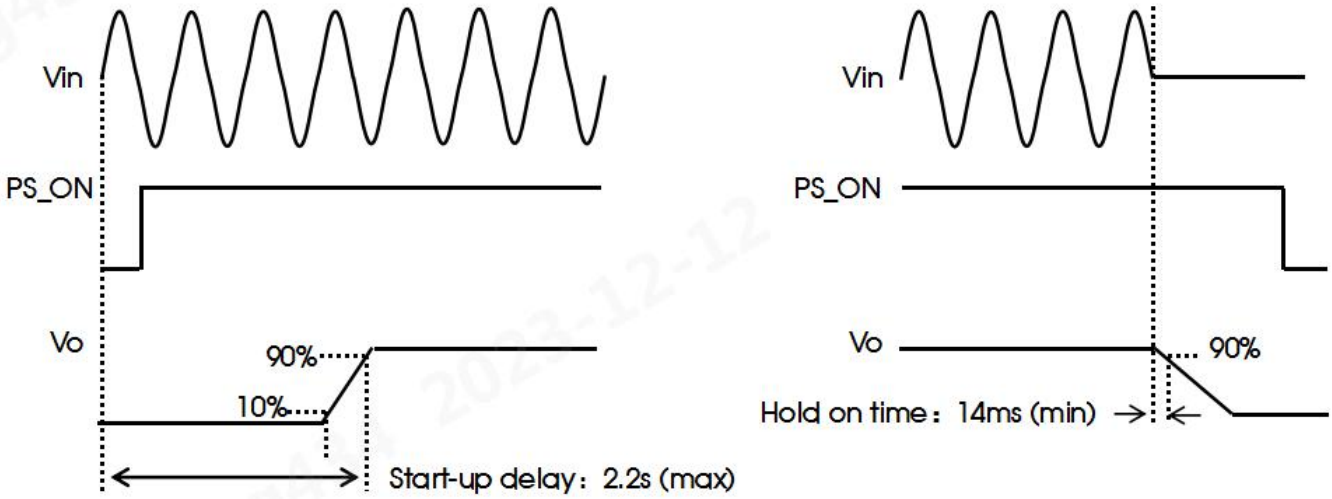
Main output

At any input voltage, 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 0.1A and is only used to supply power to the switch signal.

2.3 Start-up/Shut-down process



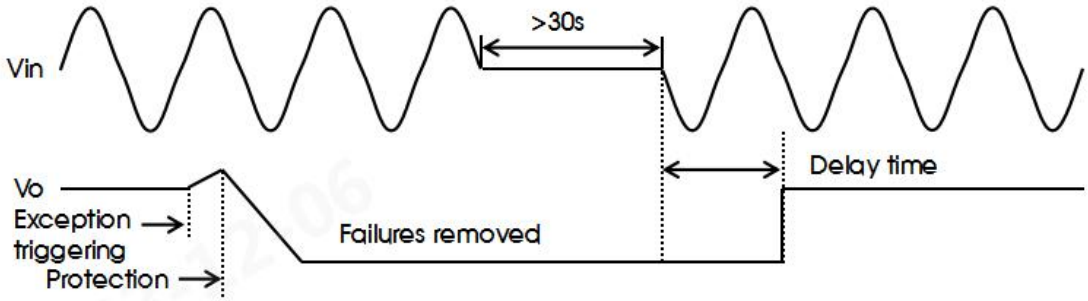
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Power-off Hold Time	230VAC at room temperature and full load	75% Io	20	--	--	ms
		100% Io	14	--	--	
Start Delay Time	230VAC at room temperature and full load		--	--	2.2	s

2.4 Fan speed control

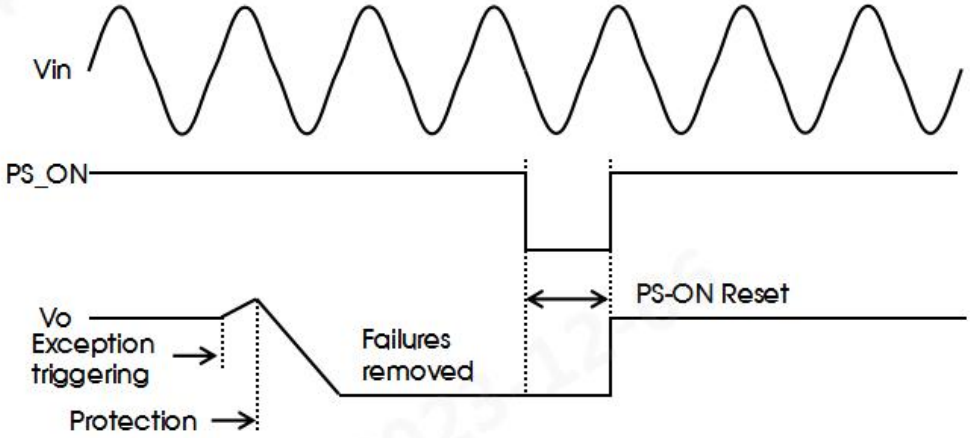
The speed of the fan is jointly determined by the ambient temperature, output current, and output power and is linearly adjusted. To ensure the reliability of the product, the fan will continue to rotate at a minimum speed of 35%. The fan speed will increase with the increase of current, and the maximum adjustment can be up to 100%. The maximum speed adjustment of power compensation is 70%, and the maximum compensation value of power compensation and current compensation is taken. When the temperature is greater than 50℃, the fan temperature compensation reaches the maximum, and the fan will rotate at full speed.

2.5 Output over voltage protection (OVP)

The over-voltage protection function is to turn off the main output when the output voltage reaches the protection voltage value. When the main circuit over voltage protection occurs, the main 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 30 seconds.

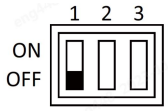


In addition, it can also be quickly restarted and restored by PS_ON signal:



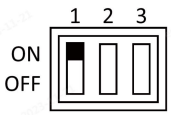
2.6 Output over current protection (OCP)

(1) Continuous constant current mode

Switch DIP-SW position-1 is set to mode 

, When the output is overloaded or the output voltage is 50% higher than the rated output voltage, it works in long-term constant current mode (long-term constant current may trigger OTP protection).

(2) Delayed shutdown mode

Switch DIP-SW position-1 is set to mode 

, when the output is overloaded or short-circuited, the output is turned off after 5s(typ), and the output is restarted after the fault is rectified.

2.7 Output short-circuit protection (SCP)

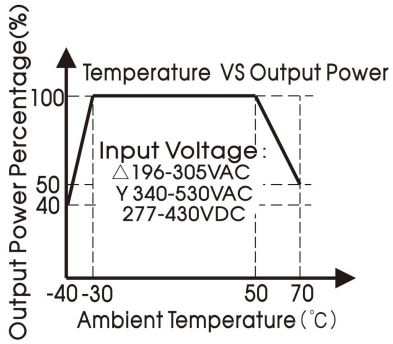
When a short circuit occurs in the output, the constant current protection is triggered. The output will be turned off after 5s (typ), and the output will restart after the fault is rectified.

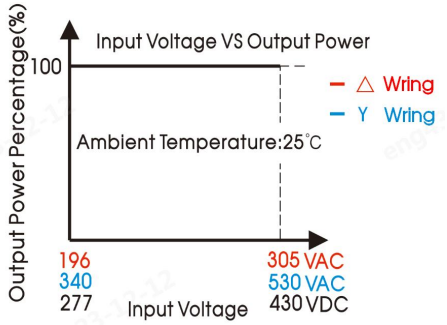
2.8 Over temperature protection (OTP)

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

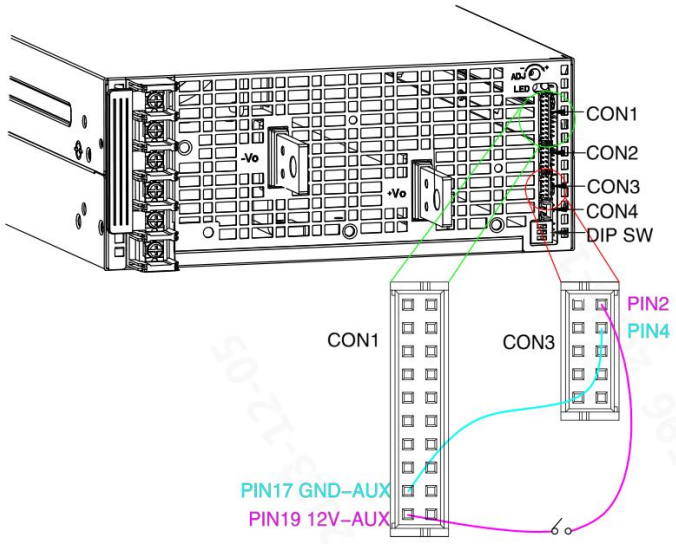
2.9 Output power derates

When ambient temperature is higher than 50℃ or lower than -30℃, perform power derating according to the derating curve;





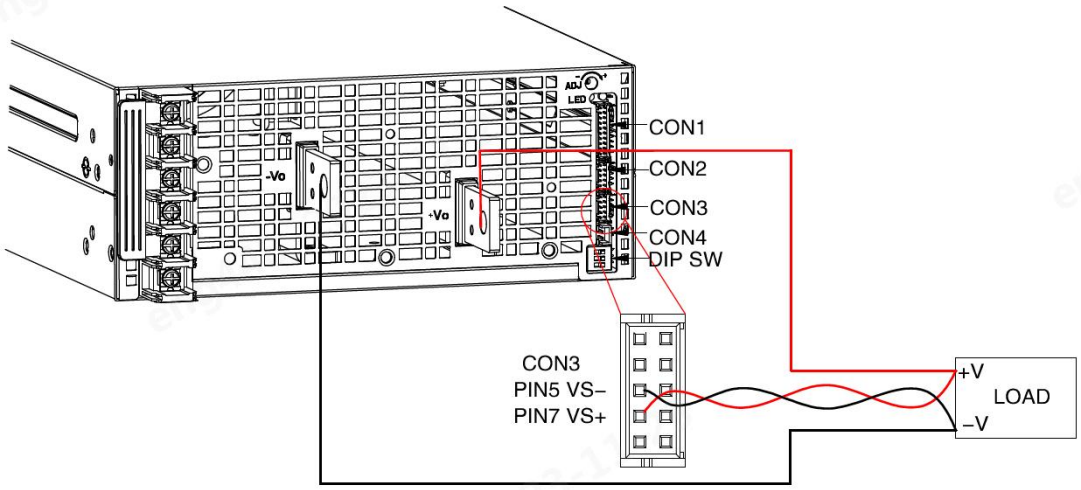
2.10 Remote switch



Between on/off (CON2 or CON3 PIN2) and 12V-AUX (CON1 PIN19)	Output state
Switch on (short circuit)	Output on
Switch off (open circuit)	Output off

In addition, the PS_ON function of the power module can also directly add 5V-18V voltage between PIN2 and PIN4 of CON2 or CON3 through the external control voltage, and the power module starts; when the external voltage ranges from 0V-0.8V, the power module shuts down.

2.11 Remote compensation



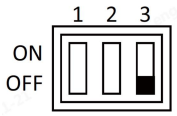
The PIN7 and PIN5 pins of signal terminal CON2 or CON3 compensate the voltage drop on the output cable up to 0.3V.

Note: (1) VS+ and VS- cannot be shorted or reversed, otherwise the power module will be damaged. If the remote compensation function is required, the signal pin needs to be connected to the load terminal using a twisted pair.

(2) If the remote compensation function is not necessary, the connection of the VS+ and VS- terminals should be protected from noise and interference signal (VS+ and VS- are connected to the output +Vo and -Vo by default).

2.12 Output voltage adjustment

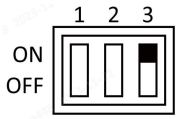
(1) Adjust by semi-fixed variable resistor (ADJ)

(a) Switch DIP-SW position-3 sets mode 

.

(b) The output voltage can be adjusted by ADJ, and the adjustment range is 23.5V-28.8V.

(2) Adjust by external voltage

(a) Switch DIP-SW position-3 sets mode 

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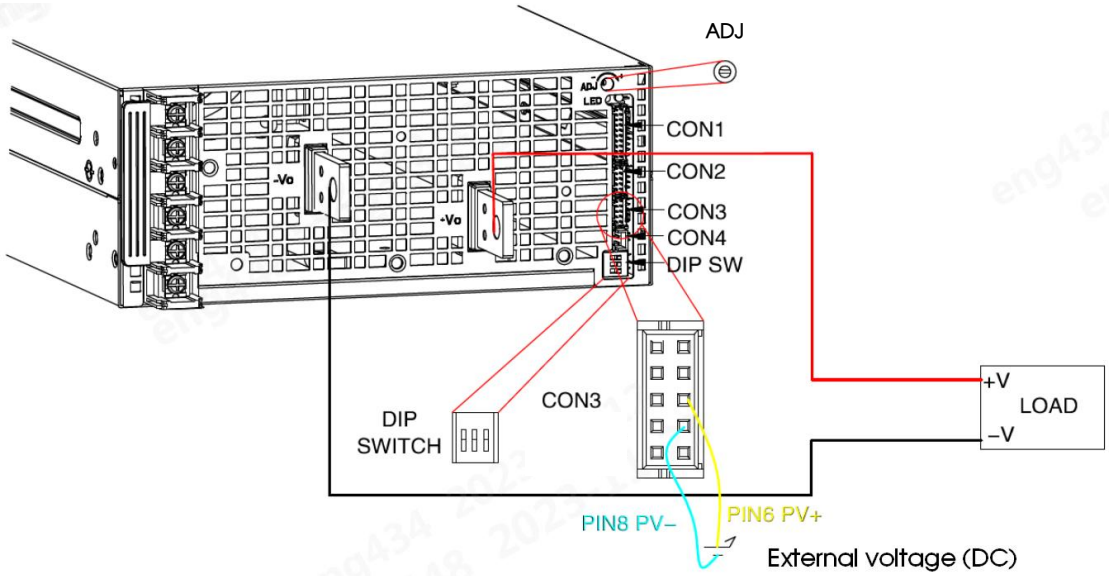
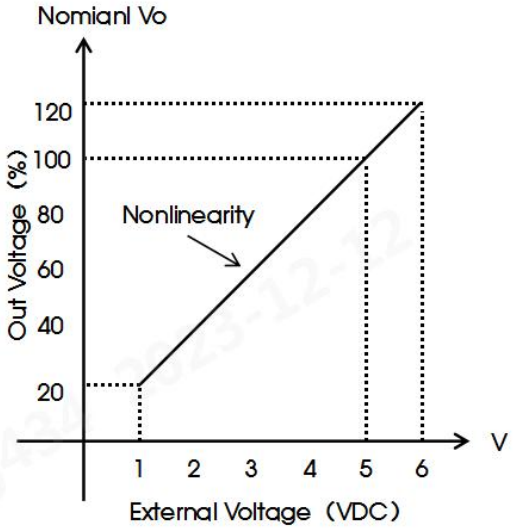
(b) By adding an external voltage between PIN6 PV+ and PIN8 PV- of CON2 or CON3 , the output voltage is adjustable from 20% to 120% of the rated voltage.

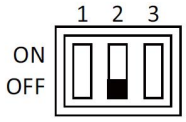


Note: In light load or no load, the product floating OVP protection may be triggered when the external voltage is adjusted from high to low. It is advised to shut down the external voltage to the lowest level and then adjust it upward. When the external voltage is the lowest or highest, the corresponding output constant current value and the voltage on the curve have a certain accuracy difference. To obtain the corresponding output current, it is recommended to fine-tune the external voltage.



2.13 Output current adjustment

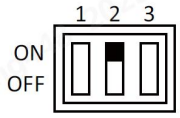
(1) Default overload constant current protection value

(a) Switch DIP-SW position-2 sets mode 

.

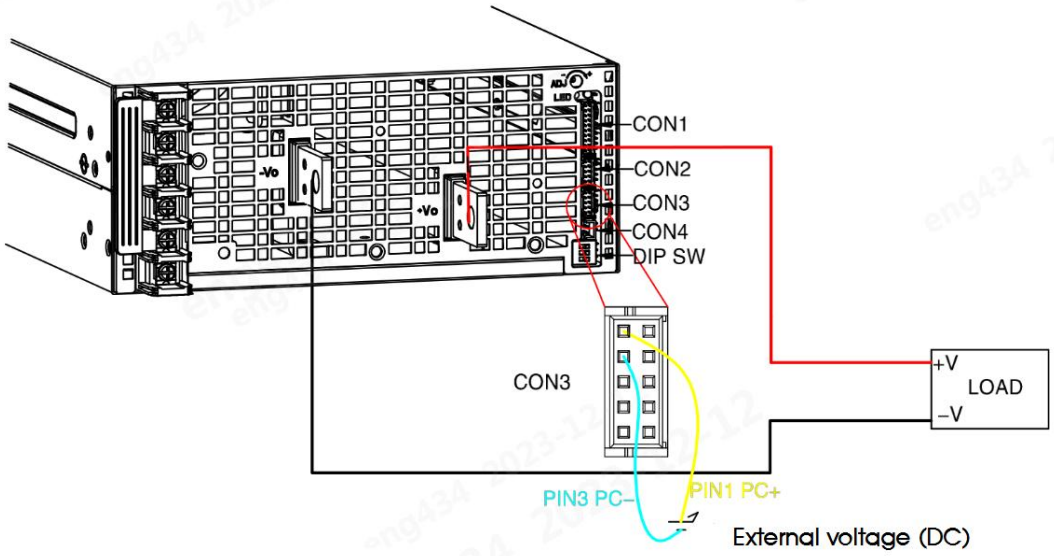
(b) The output constant current value is the default value.

(2) External constant current adjustment

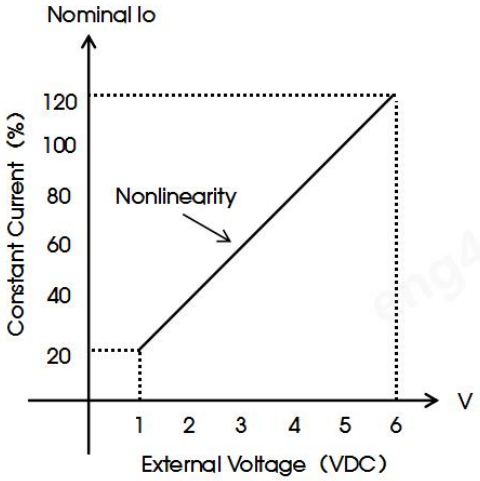
(a) Switch DIP-SW position-2 sets mode 

.

(b) By adding an external voltage between PIN1 PC+ and PIN3 PC- of CON2 or CON3 , the output voltage is adjustable from 20% to 120% of the rated current.



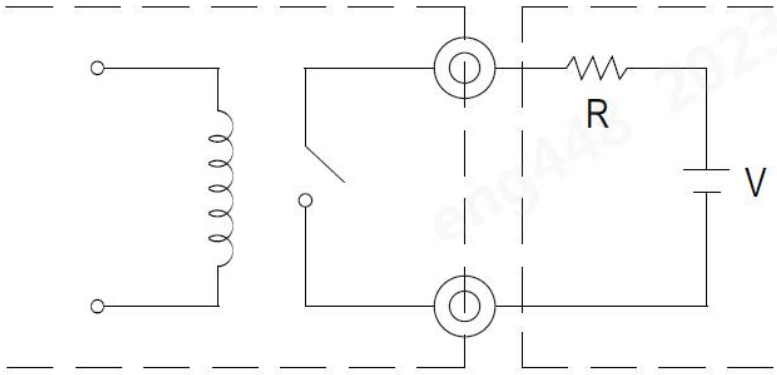
Note: When the external voltage is at the lowest or highest, the corresponding output constant current value and the voltage on the curve have a certain accuracy difference. To obtain the corresponding output current, it is recommended to fine-tune the external voltage.



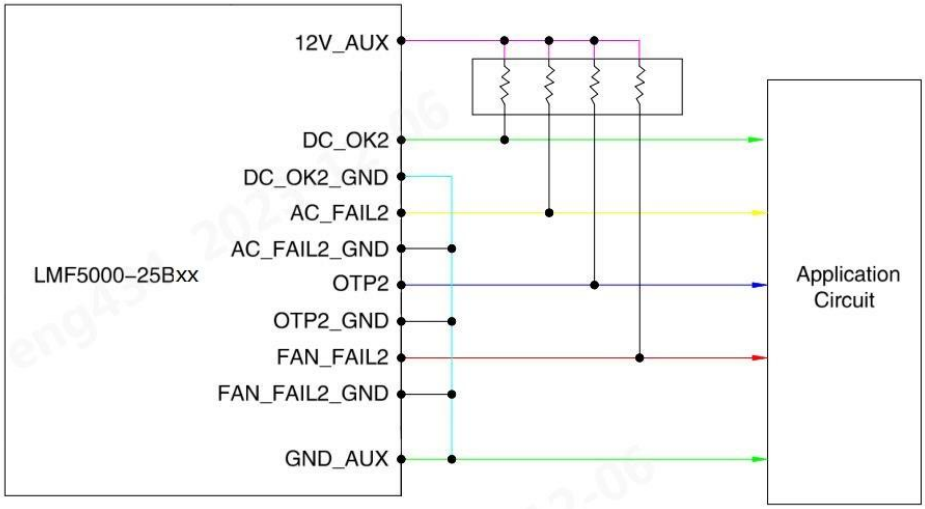
2.14 Alarm signal output

There are four alarm signals in CON1, and two output circuits can be selected for each signal.

(1) Relay contact output {(OTP1, OTP1-GND); (DC-OK1, DC-OK1-GND); (AC-FAIL1, AC-FAIL1-GND); (FAN-FAIL1, FAN-FAIL1-GND)} normally open contact. An alarm is generated when a short circuit occurs. The maximum capacity of the relay contact is 30V/1A.



(2) Open collector output {(OTP2, OTP2-GND); (DC-OK2, DC-OK2-GND); (AC-FAIL2, AC-FAIL2-GND); (FAN-FAIL2, FAN-FAIL2-GND)} as shown in the figure below. This function requires an external voltage source. These signals are isolated from the output, with a maximum absorbed current of 10mA and a maximum external voltage of 20V (there is a 24V regulator inside the circuit).



2.15 Parallel current sharing

(1) The power module has an active current sharing function and supports a maximum of 4 parallel outputs. In parallel operation, the output voltage difference between each power module must be meet≤0.2V.

(2) When power modules are connected in parallel, there is an active current-sharing circuit inside to ensure that the current between each module is balanced. Each power module has a current-sharing bus, and when connected in parallel, all current-sharing buses of the power modules must be connected together. The current-sharing bus signal is located on the PIN10 CS+ and PIN9 CS- pins of CON2 or CON3.

After the output load of each power module exceeds 50% of the rated load , the current sharing accuracy is required to be ±5%. The current sharing calculation formula is:

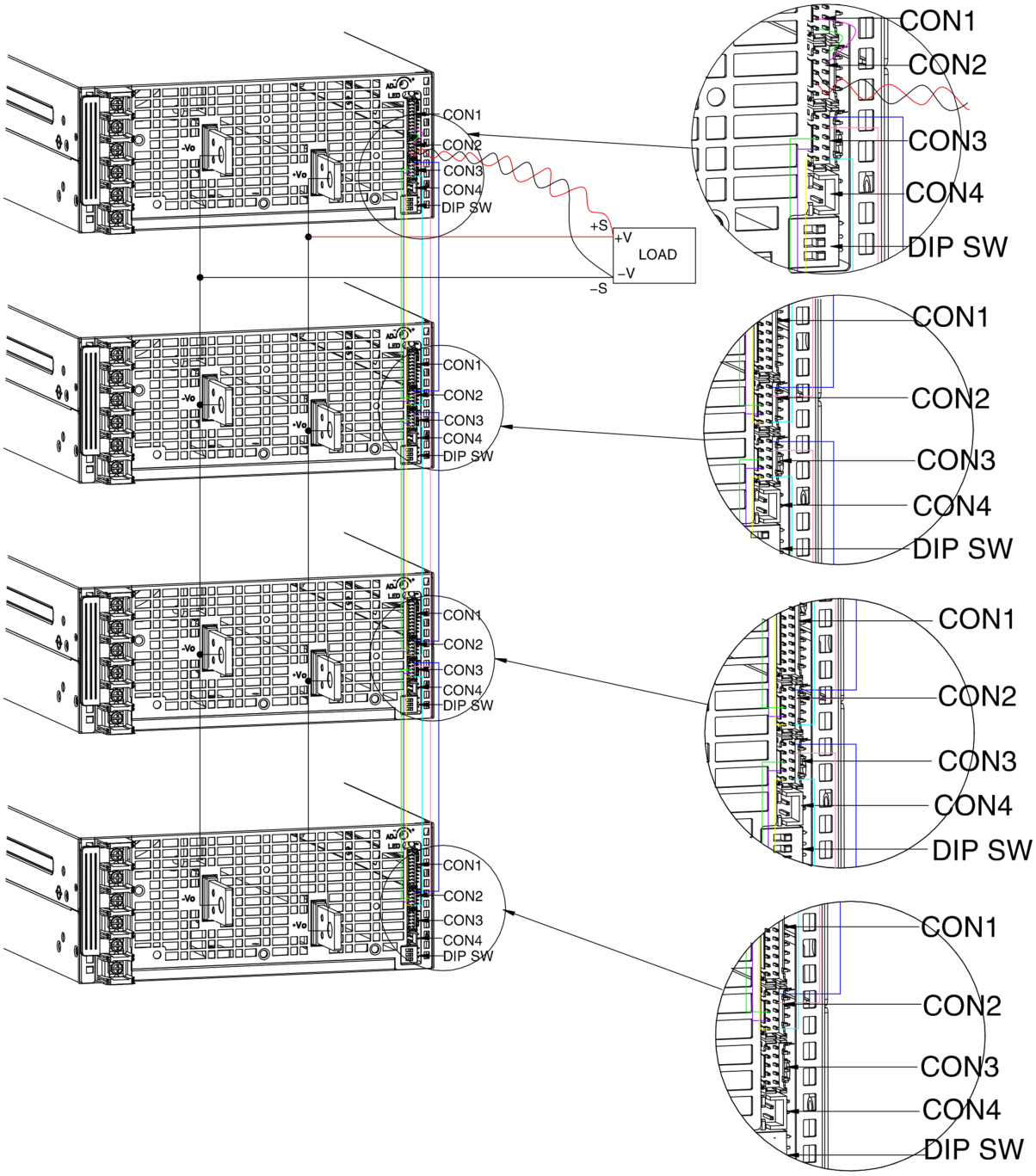
$$\text{Current sharing accuracy}=\frac{Io\max - Io\min}{Io\max + Io\min}*100\%$$

Iomax: Maximum output current value of power modules connected in parallel

Iomin: Minimum output current value of power modules connected in parallel

(3) VS+, VS-, CS+, CS- and RC+, RC- need to be connected in parallel to each other.

(4) When power modules are connected in parallel, the remote compensation sampling line must be connected to the main power module. And the remote compensation sampling line needs to be at least 30cm away from the input line.



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 requirement

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 refer to EN62368.

4. Communication protocol

The LMF5000-25Bxx power supply adopts the standard Modbus communication protocol, and can read the product information, real-time working status and fault information of the power supply through the Modbus command. The LMF5000-25Bxx power communication hardware circuit uses RS485 bus. The receiving and sending terminals must be consistent. If they are inconsistent, add hardware circuits for level conversion.

Baud rate: 38400 Baud/S (default)

Data bits: 8 bits

Start bit: 1 bit

Stop bit: 1 bit

Parity check bit: No

The maximum delay allowed between bytes within a frame is 20ms, and incomplete data frames received beyond this delay time will be discarded.

The delay time between frames should be greater than 200 ms.

4.1 Register definition table

Register address	Parameter	Read or Write	Parameter description
0-63	Product information	Read	0-17 bytes for product manufacturer information; 18-35 bytes indicates the product model information; 36-53 bytes for product origin information; 54-71 bytes is the production data of the product; 72-89 bytes indicates the bar-code information of the product; 92-109 bytes indicates the firmware version information; The above information is character data. Before modifying the parameter, it is required to write 0xBC to the write protection Enable register (address 68) and modify the parameter.
66	Communication address	Write	The IP address ranges from 1 to 254. Before modifying the parameter, it is required to write 0xAC to the write protection Enable register (address 68) and modify the parameter.
67	Baud rate setting	Write	0:9600bit/s 1:19200bit/s 2:38400bit/s 3:76800bit/s Before modifying the parameter, it is required to write 0xAC to the write protection Enable register (address 68) and modify the parameter.
68	Write protection enable	Write	Enable parameter modification when the register is written to the secret key.
69	Preceding state	Read	Bit0: AC input state 0--Abnormal 1--Normal Bit2: BUS voltage state 0--Abnormal 1--Normal
70	Post state	Read	Bit0: AC input state--relay output 1--Abnormal 0--Normal Bit1: Over temperature protection--relay output 1--Abnormal 0--Normal Bit2: Fan fault--relay output 1--Abnormal 0--Normal Bit5: Output voltage state 0--Abnormal 1--Normal Bit11: PS_ON signal state 0--Power off 1--Power on Bit13: Output voltage state--relay output 0--Abnormal 1--Normal Bit14: Modbus switch control state 0--Power off 1--Power on
71	Trouble code	Read	Bit0: Output over voltage--hardware 0--Normal 1--Fail Bit1: Output over voltage--software 0--Normal 1--Fail Bit2: Constant current--delay protection 0--Normal 1--Abnormal Bit3: Long-term constant current exception protection 0--Normal 1--Abnormal

			Bit4: External regulating voltage signal 0--Normal 1--Abnormal Bit5: External regulating current signal 0--Normal 1--Abnormal Bit6: Over temperature protection 0--Normal 1--Abnormal Bit7: Fan fault 0--Normal 1--Abnormal
74-75	Set voltage	Read	The value is a single-precision floating-point number and the data format is big-endian, unit V
80-81	Output voltage	Read	The value is a single-precision floating-point number and the data format is big-endian, unit V
82-83	Output current	Read	The value is a single-precision floating-point number and the data format is big-endian, unit A
84-85	Output power	Read	The value is a single-precision floating-point number and the data format is big-endian, unit W
86-87	Ambient temperature	Read	The value is a single-precision floating-point number and the data format is big-endian, unit ℃
88-89	Hot spot temperature	Read	The value is a single-precision floating-point number and the data format is big-endian, unit ℃

4.2 Instruction data format description

(1) The upper computer sends instructions

Address	Function code	Register origin address (high type)	Register origin address (low type)	Number of registers (high type)	Number of registers (low type)	CRC16 checking (low type)	CRC16 checking (high type)
01	03	XX	XX	XX	XX	XX	XX

(2) Power return data

Address	Function code	Number of bytes	The value of register 0 (high type)	The value of register 0 (low type)	...	The value of register x (high type)	The value of register x (low type)	CRC16 checking (low type)	CRC16 checking (high type)
01	03	XX	XX	XX	...	XX	XX	XX	XX

Note：The data in the preceding commands is hexadecimal.

For more details, please contact MORNSUN FAE.