AC/DC 480W DIN-Rail Power Supply

LITF480-26Bxx Series

MORNSUN®

RoHS

FEATURES

- Three-phase 320-600VAC
- Active PFC
- Operating ambient temperature range: -30℃ to +70℃
- Standard DIN-Rail mounting
- High efficiency, high reliability
- Output short circuit, over-current, over-voltage, over-temperature protection
- Fault alarm function
- LED indicator for output status
- Double-sided conformal coating, salt-spray proof
- Safety according to IEC/EN/UL/BS EN62368, UL/EN61010-1, UL508, UL/EN61010-2-201

LITF480-26Bxx is Mornsun AC-DC three-phase Din-Rail switching power supply. It features cost-effective, high efficiency and high reliability. With 150% power reserve, enough to support starting DC motor or capacitive load and other heavy load. These converters offer excellent EMC performance and meet IEC/EN/UL62368, UL/EN61010-1, UL508, UL/EN61010-2-201 standards and they are widely used in areas of industrial control equipment, factory automation and mechanical and electrical equipment and other industrial control fields.

Selection Guide

Certification	Part No.	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Output Voltage Adjustable Range ADJ (V)	Efficiency at 230VAC (%) Typ.	Max. Capacitive Load (μF)
--	LITF480-26B24	480	24V/20A	24-28	95	20000
	LITF480-26B36		36V/13.3A	36-42	95.3	13000
	LITF480-26B48		48V/10A	48-56	95.6	10000

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	AC input		320	--	600	VAC
	DC input		450	--	800	VDC
Input Voltage Frequency			47	--	63	Hz
Input Current	400VAC		--	--	1.0	A
	480VAC		--	--	0.8	
Inrush Current	400VAC	Cold start	--	3	10	
	480VAC		--	3	10	
Power Factor	400VAC	Normal temperature, rated load	PF≥0.92			
	480VAC		PF≥0.92			
Leakage Current	480VAC		<2mA			
Hot Plug			Unavailable			

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	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	--	mV

Temperature Coefficient		--	±0.03	--	%/℃
Minimum Load		--	0	--	%
Dynamic minimum Load		10	--	--	%
Standby power	400VAC	--	8.2	12	W
	480VAC	--	10	15	
Hold-up Time	400VAC	18	22	--	ms
	480VAC	18	22	--	
Short Circuit Protection		continuous, self-recover			
Over-current Protection	120% - 150% Io	120% - 150% Io, enter constant current mode after 4.5s of normal output, automatic recover after fault condition is removed			
	⩾150% Io	⩾150% Io, enter constant current mode, automatic recover after fault condition is removed			
Over-voltage Protection	24V	⩽35VDC (Hiccup, self-recover)			
	36V	⩽53VDC (Hiccup, self-recover)			
	48V	⩽60VDC (Hiccup, self-recover)			
Over-temperature Protection	Over-temperature Protection start	--	--	85	℃
	Over-temperature Protection release	65	--	--	

Note: *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.

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Test	Input - ⏚	test for 1min., leakage current<5mA		2500	--	--	VAC
	Input - Output			4000	--	--	
	Output - ⏚	test for 1min., leakage current<10mA		500	--	--	
	Output - DC OK	test for 1min., leakage current<1mA		500	--	--	
Insulation Resistance	Input - ⏚	Environment temperature: 25±5℃ Relative humidity: <95%, Non-condensing Test voltage: 500VDC		50	--	--	MΩ
	Input - Output			50	--	--	
	Output - ⏚			50	--	--	
Operating Temperature				-30	--	70	℃
Storage Temperature				-40	--	85	
Storage Humidity		Non-condensing		20	--	90	%RH
Operating Humidity				10	--	95	
Switching Frequency*		PFC		40	--	300	kHz
		DC-DC		60	--	150	
Power Derating		Operating temperature derating	+60℃ to +70℃	2.5	--	--	%/℃
		Input voltage derating	320VAC - 350VAC	0.667	--	--	%/VAC
Safety Standard				Design refer to IEC/EN/UL/BS EN62368-1, UL/EN61010-1, UL508, UL/EN61010-2-201			
Safety Class				CLASS I			
MTBF		MIL-HDBK-217F@25℃		⩾250,000 h			

Note: *The power supply has two converters with two different switching frequencies.

Mechanical Specifications

Case Material	Metal (AL5052, SPCC)
Dimensions	80.0 x 124.0x 127.0 mm
Weight	1250g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

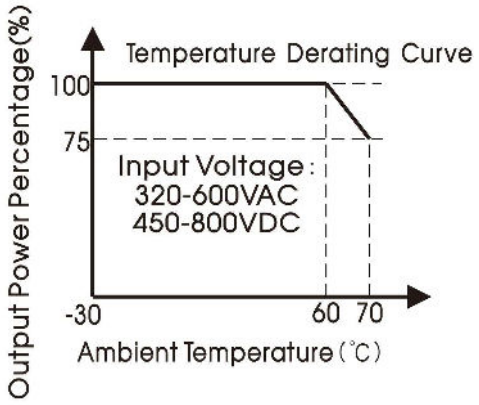
Emissions	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
	Harmonic current	IEC/EN61000-3-2 CLASS A	
	Voltage flicker	IEC/EN61000-3-3 Fulfilled	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN 61000-4-3 20V/m	perf. Criteria A
	EFT (input)	IEC/EN 61000-4-4 ±4KV	perf. Criteria A
	EFT (output)	IEC/EN 61000-4-4 ±4KV	perf. Criteria A
	EFT (DC_OK)	IEC/EN 61000-4-4 ±4KV	perf. Criteria A
	Surge (input)	IEC/EN 61000-4-5 line to line ±2KV/line to PE, ±4KV	perf. Criteria A
	Surge (output)	IEC/EN 61000-4-5 Vo+ to Vo-, ±500V; Vo+/Vo- to PE, ±1KV	perf. Criteria A
	Surge (DC_OK)	IEC/EN 61000-4-5 DC_OK to PE, ±1KV	perf. Criteria A
	CS	IEC/EN61000-4-6 20 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%, 70%	perf. Criteria A
	Intercom interference test	MS-SOP-DQC-007	perf. Criteria A

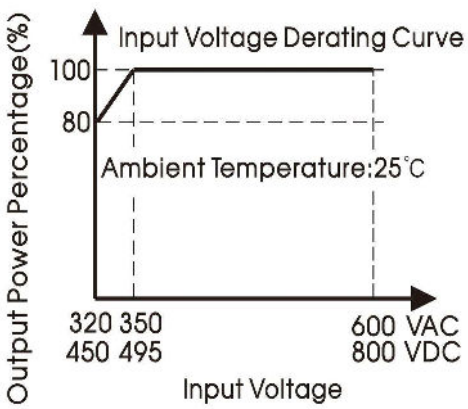
Functional Specifications

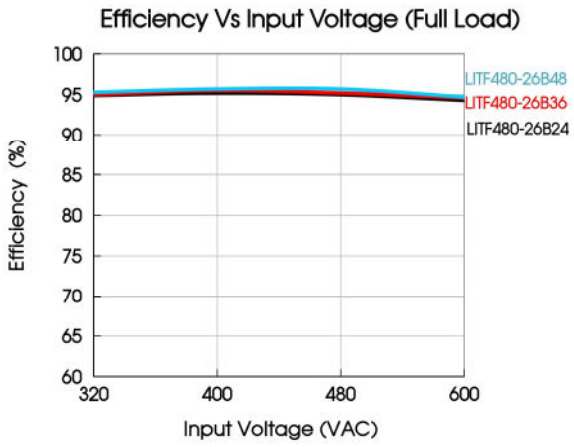
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Remote Control Switch	0 - 0.8VDC power turn-on		0	--	0.8	VDC
	4 - 20VDC power turn-off		4	--	20	
DC_OK Signal	Full input voltage range, full load range	DC-OK power on	0.95Vo - Vo			
		DC-OK power off	<0.90Vo			
Oring*			Support direct parallel use, achieve 2+1 parallel redundancy			
Current Sharing Accuracy*	When multiple are connected in parallel, the sub-module shunts a single machine above 50% of the rated load.		--	±5	--	%
LED Signal	Main output status indication	Normal output >95%	Green On			
		Load >110% Io or over-temperature protection	Red On			
		Power Off (AC Without Input) or PSon off	Turn-off			
RS485-H, RS485-L			RS485 communication			

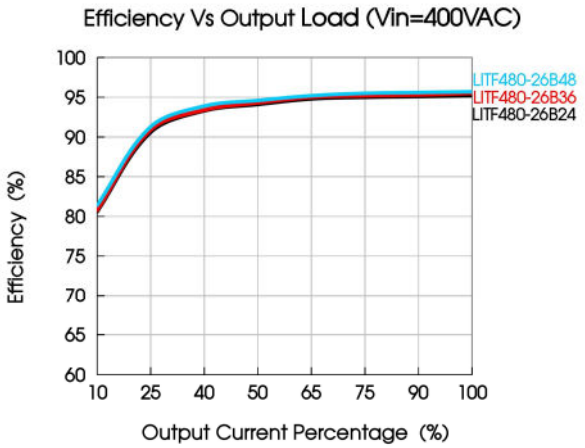
Note: 1*. For all applications, please refer to LITF480-26Bxx Series Power Supply Application Notes.
2*.When multiple prototypes work with current sharing, the output voltage deviation of each prototype working alone shall not exceed 100mV.

Product Characteristic Curve



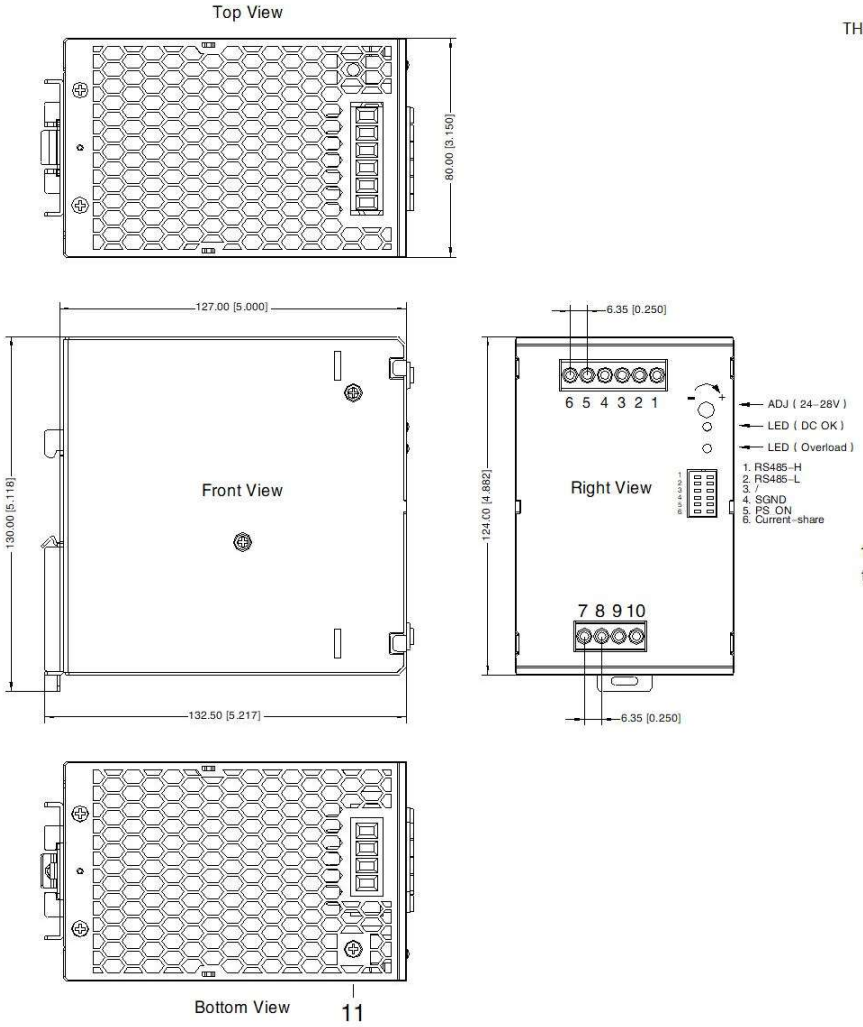






Note: 1. With an AC input voltage between 320 - 350VAC/450 - 495VDC the output power must be derated as per the temperature derating curves;
2. This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun's FAE.
3. The operating temperature and the ambient temperature are determined according to the air temperature at 2cm below the power supply.

Dimensions and Recommended Layout



THIRD ANGLE PROJECTION

Pin-Out	
Pin	Mark
1	DC OK
2	
3	-Vo
4	-Vo
5	+Vo
6	+Vo
7	L1
8	L2
9	L3
10	⏚

10、11 any position must be connected to the earth(⏚)

Note:
Unit: mm[inch]
ADJ: Output adjustable resistor
Wire range: Input: 28-10 AWG
Output: 28-10 AWG
Input Tightening torque: Max 0.5 N·m
Output Tightening torque: Max 0.5 N·m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com, Packaging bag number: 58220306;
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 3.5℃/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 the earth (⏚)of system when the terminal equipment in operating;
9. The output voltage can be adjusted by the ADJ, clockwise to decrease;
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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LITF480-26Bxx Power Supply Application Notes

Content

1. Mechanical Specification

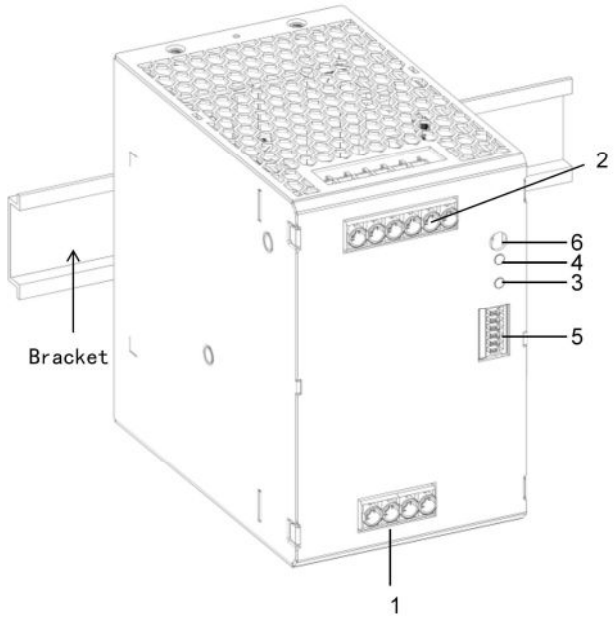
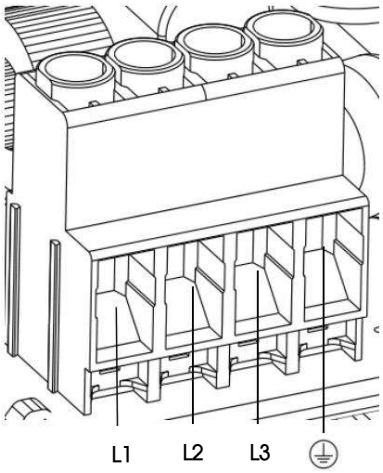


Figure 1: LITF480-26Bxx Appearance Information

Structure Instruction	
1	Input terminal (CN1)
2	Output terminal (CN2)
3	Red status display LED lights
4	Green status display LED lights
5	Signal connection terminal (CN5)
6	Output voltage adjustment knob

1.1 Input Terminal (CN1)

4 Position 6.35 mm Barrier Terminal Blocks is used as Input terminal.

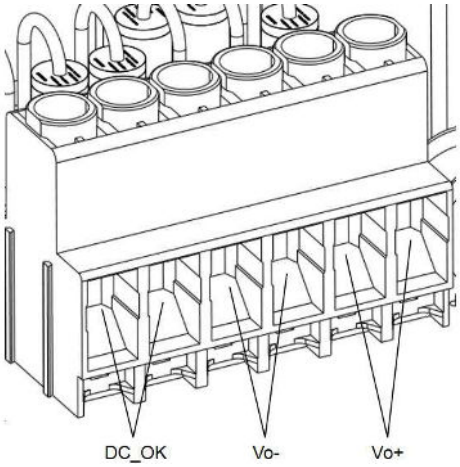


Line size: 28-10AWG
Torque: 0.5Nm

Pin	Features
L1	Fire line
L2	Fire line
L3	Fire line
⏚	Protective Grounding

1.2 Output Terminal (CN2)

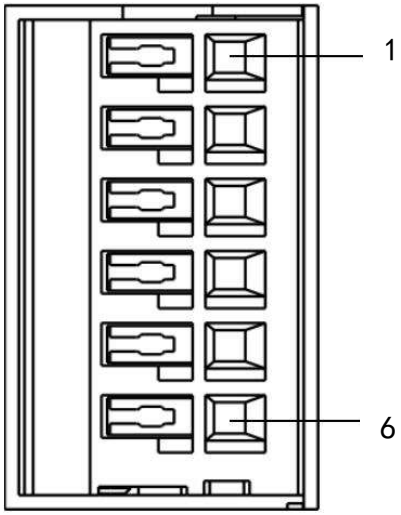
6 Position 6.35 mm Barrier Terminal Blocks is used as Output terminal.



Pin	Features
Vo+	Positive output
Vo-	Negative output
DC_OK	Judge output is normal

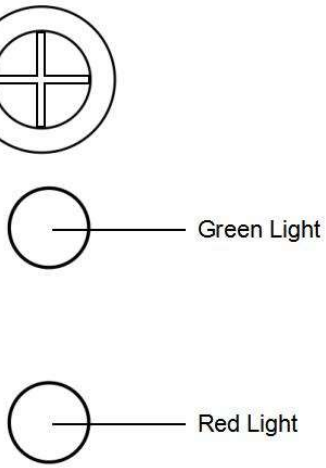
Line size: 4-12AWG
Torque: 2.3Nm

1.3 Signal Connection Terminal (CN5)



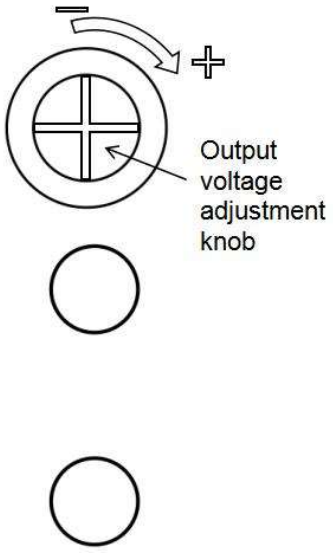
Pin	Mark	Features
1	RS485_H	Serial communication
2	RS485_L	Serial communication
3	/	/
4*	SGND	Signal terminal reference ground
5	PS_ON	Remote control signal
6	C.S	Current sharing
Note: *The reference ground of all pins on the signal terminal is pin 4.		

1.4 Red And Green Status Display LEDS



Green Light	Red Light	State*
Light On	Light Off	Normal work
Light On	Light On	Peak power operation or about to enter over temperature protection
Light Off	Light On	Constant current mode
Light Off	Light Off	No AC input
Note: *The LED lights indicate different working states of the power supply		

1.5 Output voltage adjustment knob



Model	Rated Output Voltage	Output Voltage Adjustable Range
LITF480-26B24	24VDC	24-28VDC
LITF480-26B36	36VDC	36-42VDC
LITF480-26B48	48VDC	48-56VDC

2. Function Manual

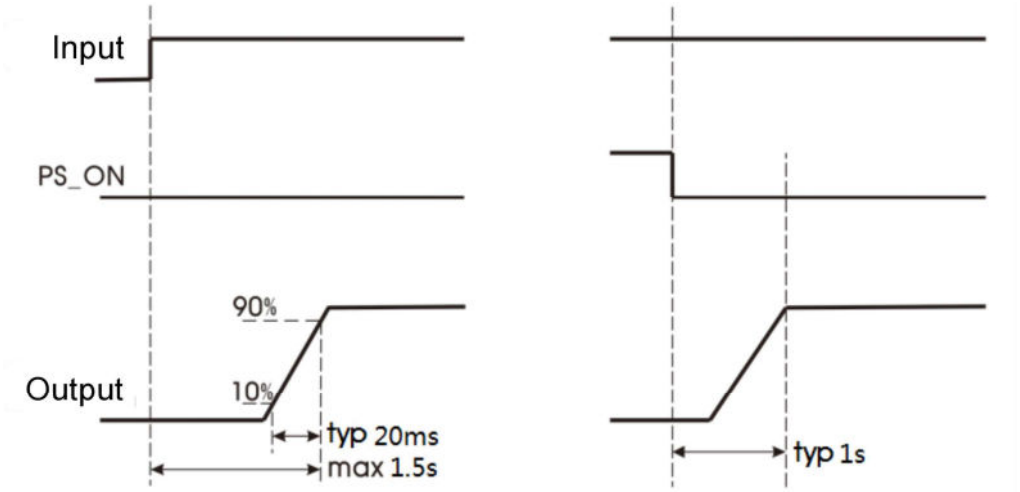
2.1 Input Requirements

The AC input voltage and DC input voltage must be within the defined amount of electricity (reference data sheet), otherwise the power supply may not work properly or even malfunction. A 500V/4A fuse has been connected in series between the L1/L2 /L3 line inside the power supply. For better protection of the module, it is recommended that customers use a circuit breaker of no more than 4A. (Just for strengthen the protective purpose, not essential requirements)

2.2 Output Requirements

At any output voltage value, if it is necessary to operate normally, the highest pull current and power must not exceed the rated specified value, and the output current must not exceed the maximum output current value.

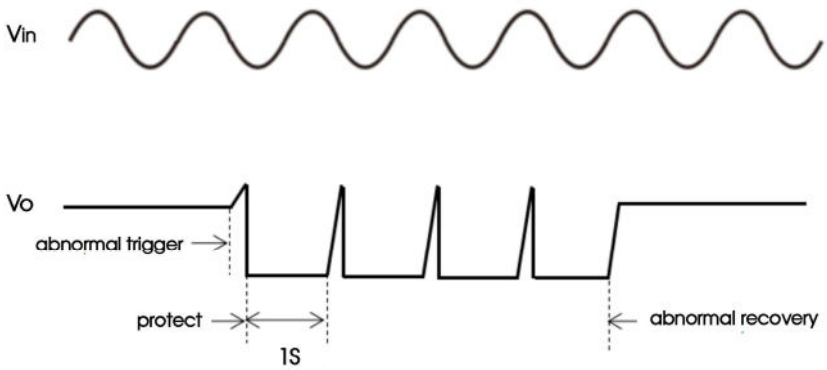
2.3 Starting Time



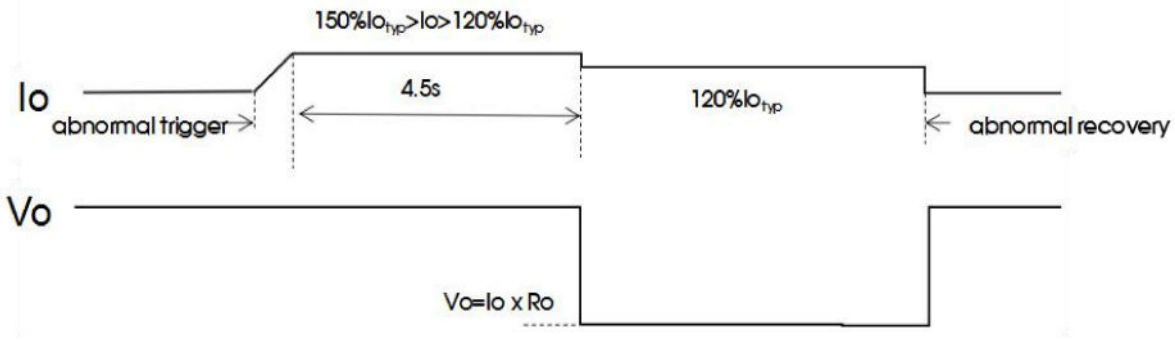
Item	Working conditions	Min.	Typ.	Max.	Unit
Start-up delay time	400VAC, full load	--	--	1.5	s

2.4 Output Over-Voltage Protection (OVP)

The main circuit output will be off when the output voltage reaches the over-voltage protection value. When it occurs, the output enters the hiccup mode with 1s. After the abnormal removed, the output returns to normal.

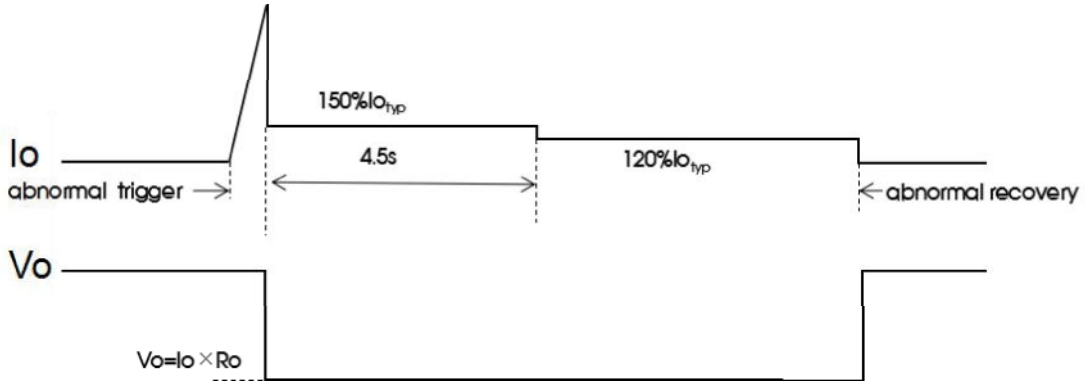


2.5 Output Over-Current and Short Circuit protection (OCP And SCP)



Constant current mode 1

Constant current mode 1: When the output current exceeds 120% of the rated output current and does not exceed 150% of the rated output current, the output will work normally for 4.5S and then enter the constant current mode, the constant current is 120% of the rated output current, and the output voltage drop, after the abnormal removed, self-recovery.



Constant current mode 2

Constant current mode 2: When the output current exceeds 150% of the rated output current, the provision will enter the constant current model, the current size will maintain a 150% rated output of 4.5S, then enter 120% rated output current, while the output voltage will fall. After the over-current exception, self-recover.

Note: The output voltage at constant current is determined by the output load, that is, Vo =Io x Ro. Where Io represents the current value at constant current. Ro means output load value.

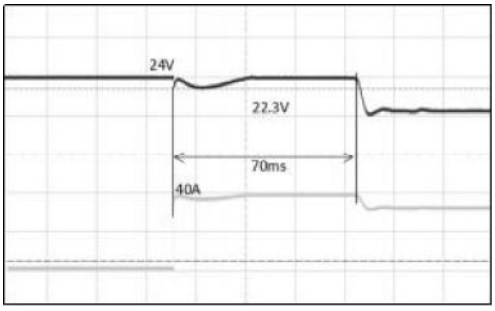
2.6 Peak Current Capabilities

The power supply is capable of outputting peak currents higher than certain short-term currents (up to several milliseconds).

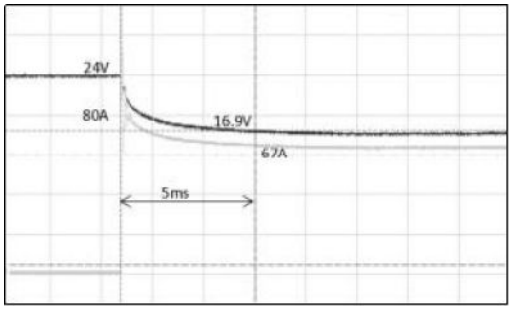
This feature is helpful for loads with high current demands. Solenoids, contactors, and pneumatic modules typically have steady-state coils and pull-in coils.

Peak current capability also ensures safe operation of the circuit breaker behind the load circuit. The load branches are usually protected separately by circuit breakers or fuses. If a branch circuit is shorted or overloaded, a fuse or circuit breaker requires a certain amount of overcurrent to open in time. This prevents voltage dips in adjacent circuits.

When the output current is large, there will be a voltage sag at the output terminal, while maintaining a large current output for a certain period of time, see the figure below for details.



40A peak load (resistive) for 70ms, the output voltage drops from 24V to 22.3V



80A peak load (resistive) for 5ms, the output voltage drops from 24V to 16.9V

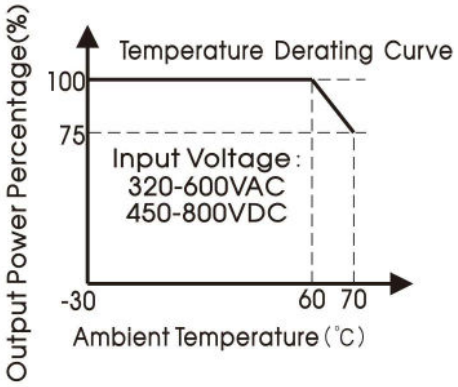
Voltage dip at peak current	Typical value	From 24V to 22.3V	40A, 70ms duration, resistive load
	Typical value	From 24V to 16.9V	80A, 5ms duration, resistive load

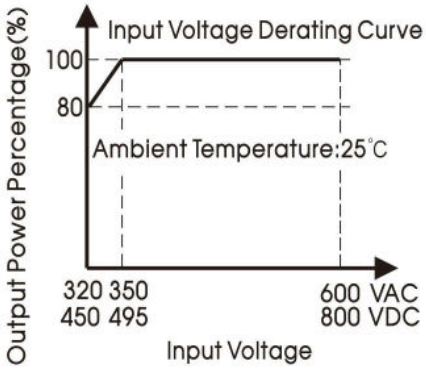
2.7 Over Temperature Protection (OTP)

When the ambient temperature of the power supply exceeds the rated temperature for a period of time, the power supply will turn off the output and enter the hiccup state. After the ambient temperature drops to the set value, the power supply will resume normal operation.

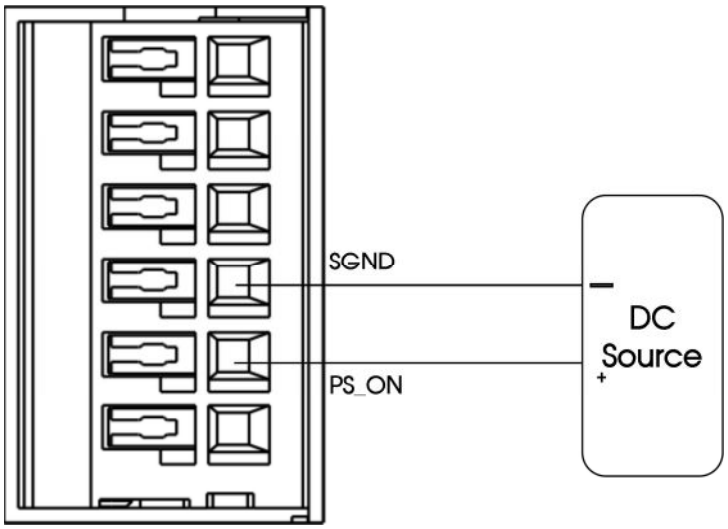
2.8 Output Power Derating

When the input voltage is greater than 350VAC (or 495VDC), only need to derate according to the temperature derating curve; When the input voltage is lower than 350VAC (or 495VDC), the output power will be derated according to the following input voltage derating curve requirements after the temperature derating.





2.9 Remote Control Switch

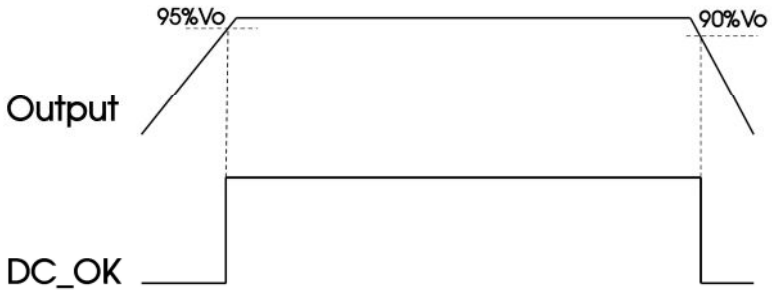


Between PS_ON (Pin5) and SGND (Pin4) Switch	Output Status
DC Source power supply voltage is less than 0.8VDC	Normal output
DC Source supply voltage is greater than 4VDC less than 20VDC	Output Off

If the power module is connected to the power supply, it can be controlled by the external voltage between the PS_ON signal pin and SGND.

2.10 DC_OK Signal

The DC_OK signal is used to monitor whether the power supply is working normally. This signal is on the DC_OK pin of the output terminal CN2. When the output is greater than 95% of the rated voltage of the output, the DC_OK signal is activated, the DC_OK at the output terminal is connected, and the green light is on at the same time. When the output voltage is less than 90% of the rated voltage of the output, the DC_OK of the output terminal is disconnected, and the green light is off at the same time.



2.11 Used in series

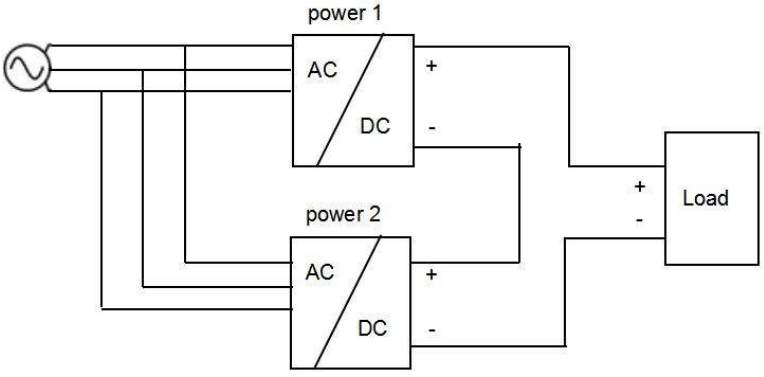
Voltages in excess of 60Vdc are no longer considered Safety Extra Low Voltage Circuits (SELV) and can therefore be dangerous. When installing such voltages, it must be protected against touch.

Please avoid generating feedback voltage to the output terminals (eg from a decelerating motor or battery).

Keep a 15mm (left/right) installation gap between the two power supplies and avoid installing the power supplies on top of each other. Do not connect the power supplies in series in an installation orientation other than the standard installation orientation (input terminals down).

Note that leakage current, electromagnetic interference, inrush current and harmonics will increase when multiple power supplies are used.

Refer to the figure below for the wiring method:



2.12 Work in parallel

2.12.1 Redundancy

Power module outputs can be connected in parallel for redundancy, increasing system reliability. The maximum power of the redundant system needs to be de-rated to ensure that the redundant system can still meet the rated load requirements when a power supply module fails. Currently, the common practice is to build a redundant system by the N+1 method, that is, N+1 power supplies are connected in parallel. Support the maximum load current N*Iomax, where Iomax is the rated output current of each power supply, for example, the rated output current of each power supply is 20A, and 2+1 are connected in parallel, thus constructing a 2*20A=40A redundant system.

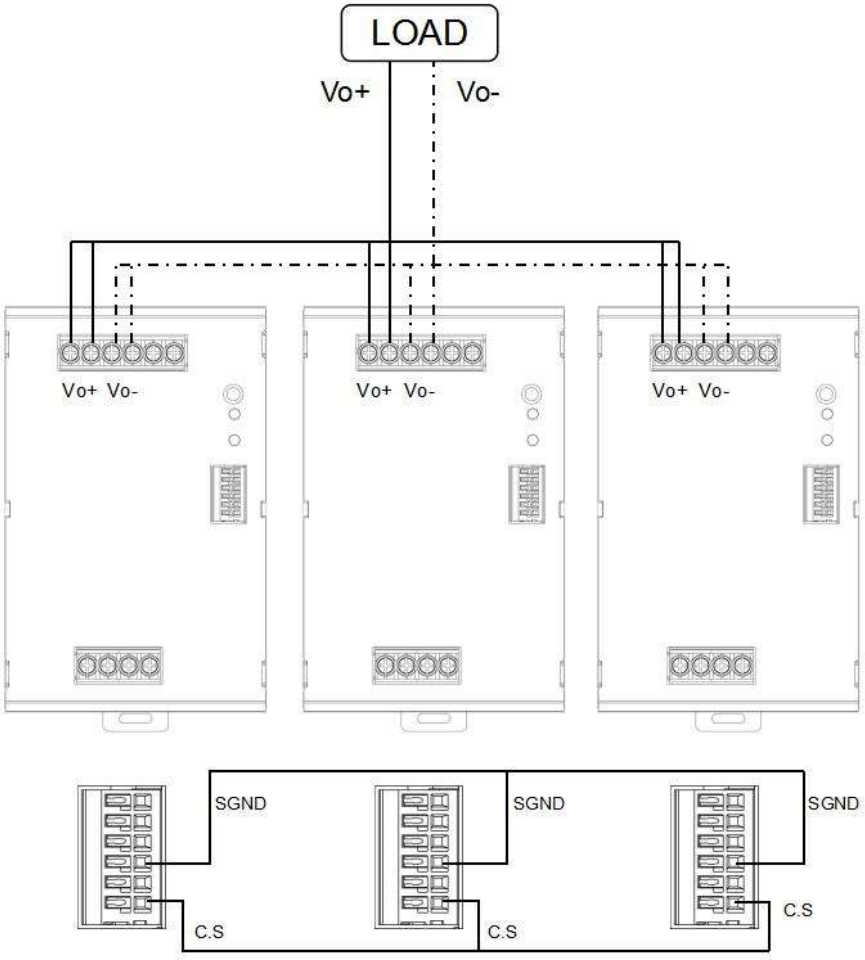
The power module supports 2+1 parallel redundant operation.

The Oring circuit is used inside the power module, and when any one of the power modules in parallel fails, it will not affect the work of other power modules.

2.12.2 Current Share

The current sharing bus (current_share) between multiple machines is short-circuited with each other, and SGND is short-circuited with each other at the same time.

The output voltage difference of each single module is less than or equal to 100mV, and a better comprehensive effect of line terminal output voltage and current sharing can be obtained. The wiring method of the current sharing function is shown in the following figure:



Note: 1. When used in parallel, the number of parallel modules cannot exceed 3.

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

The active current sharing circuit adopts the automatic master-slave current sharing method. Each power supply module has a current sharing bus signal (C.S). When working in parallel, the current sharing buses of all power modules must be connected together. The current sharing bus signal is located at pin 5 of CN5. At the same time, it is necessary to connect the signal terminals SGND of the power module together, and the SGND of the signal terminal is located at pin 4 of CN5.

The output voltage of each power module will affect the current sharing accuracy. The output voltage of the power module is rated voltage ±100mV. In practical applications, if the output voltage value needs to be adjusted, the output voltages of all parallel power modules need to be adjusted to the same voltage. The recommended voltage range is: target voltage value ±100mV.

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

$$\text{Power supply 1's average accuracy} = \frac{Io_1 - (Io_1 + Io_2)/2}{(Io_1 + Io_2)/2} * 100\%$$

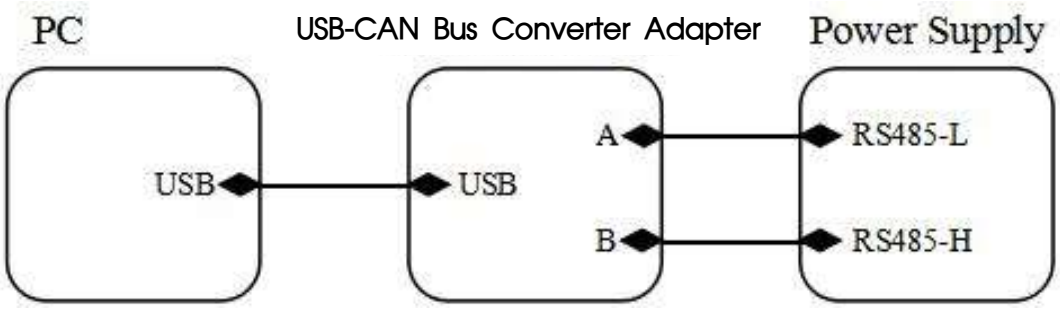
$$\text{Power supply 2's average accuracy} = \frac{Io_2 - (Io_1 + Io_2)/2}{(Io_1 + Io_2)/2} * 100\%$$

Io_1: The output current value of the power supply 1 in the parallel power module.

Io_2: The output current value of the power supply 2 in the parallel power module.

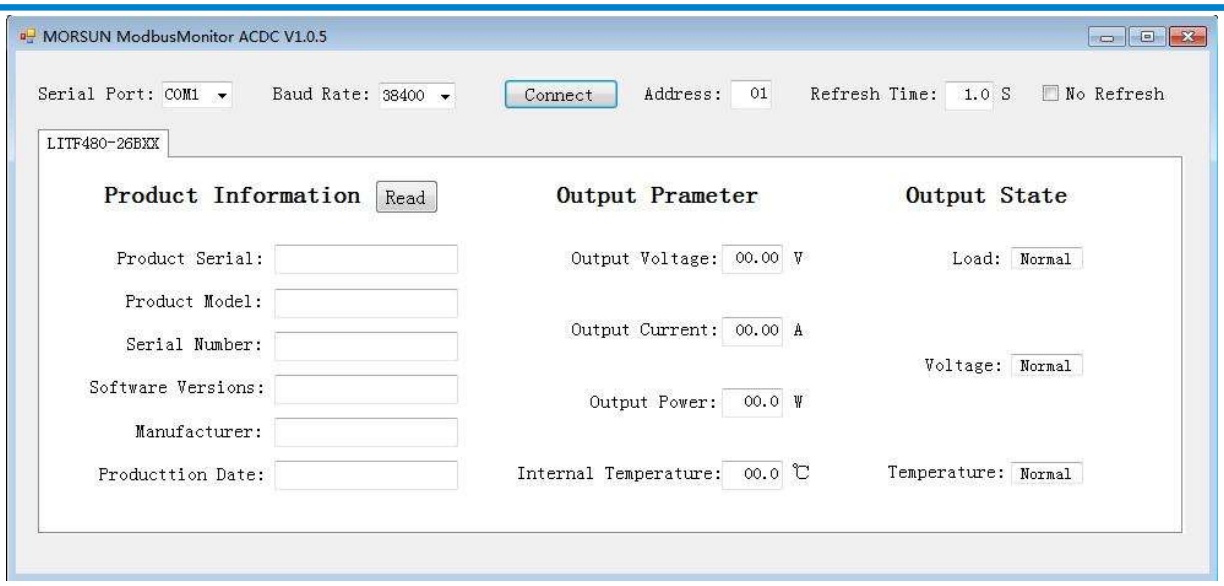
2.13 PC Monitoring

In a parallel system, if you need to identify the information of the power modules, you need to monitor each parallel power module by the host computer. The connection diagram is as follows:



That is: Connect the RS485-L and RS485-H of the signal terminal to the USB interface module

When the host computer communication is turned on, you can see the following monitoring screen

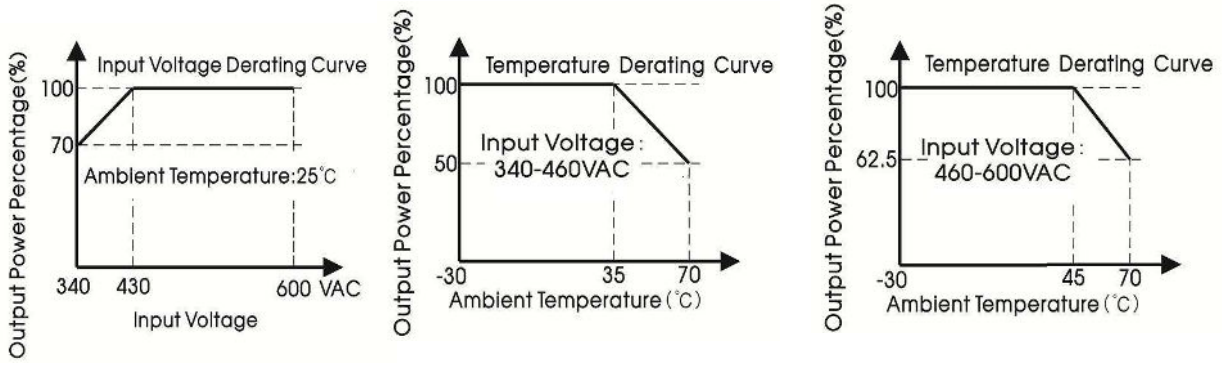


Note: After the serial port is successfully opened, the information of "output parameter" and "output state" will be automatically obtained, and the "product information" needs to be manually clicked on the read case after the "product information".

2.14 Available in 3-phase 2-wire systems

This power supply can also be used for permanent operation of two-wire in a three-phase system.

When operating the two-wire in a three-phase system, the output power must be derated according to the following curve, and the input operating voltage can only operate at 340VAC-600VAC. Exceeding this derating limit for a long time will cause the power supply to overheat and shut down.

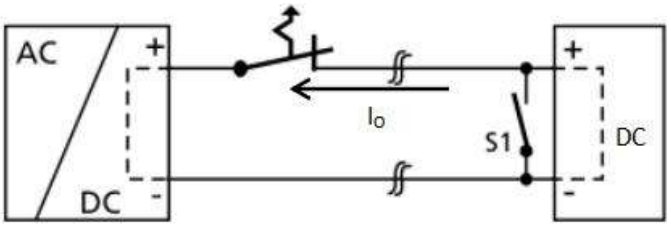


Note: Basic performance such as electromagnetic compatibility performance, hold-up time, loss and output ripple are different from three-phase operation. This working method is not covered in the certification, and operation two wires in a three-phase system does not meet the safety certification.

2.15 Back Voltage Load

Loads such as decelerating motors, inductors can feed voltage back into the power supply. This property is also known as feedback voltage resistance or resistance to opposing electromagnetic forces.

The power supply is resistant to voltage back into the supply by the load and will not fail regardless of whether the power supply is on or off. The function diagram as below:



Maximum allowable feedback voltage	
Model	Maximum feedback voltage
LITF480-26B24	35VDC
LITF480-26B36	63VDC
LITF480-26B48	63VDC

3.Installation Requirements

3.1 Safety Introduction

WARNING: RISK OF ELECTRIC SHOCK DURING HIGH VOLTAGE WORKING WITH THIS EQUIPMENT

- After the power module is disconnected from the input AC or DC power, leave it for at least one minute before starting to operate it.
- When installing the input cable to the power module, first connect the ground terminal, and then connect the L1, L2 and L3 cables.
- When removing the input wire, first remove the L1 wire, L2 wire and L3 wire, and then remove the ground wire
- When disassembling and assembling, make sure that no objects fall into the inside of the power module.
- Be careful of high temperature burns
- After the power module works in a high temperature environment, wait for its shell to cool before operating it.
- 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 creepage distance and electrical clearance of the primary side and the secondary side meet the safety requirements, refer to EN/UL61010.

3.3 Installation method

Installation direction: When installing, the port of the output end should be upward, and the port of the input end should be downward. (See below)