MEAN WELL DIRECT

500W Single Output with PFC Function

# USP-500 series



■ Features :

- Universal AC input / Full range
- Built in active PFC circuit compliance to EN61000-3-2
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Free air convection for 400W and 500W with 23.5CFM forced air
- High power density 6.2w/in$^3$
- AC input active surge current limiting
- U-bracket low profile:41mm
- Current sharing(1+1) for 24V and 48V models (Optional)
- Built-in remote ON-OFF control
- Built-in remote sense function
- Built in DC OK active signal
- 3 years warranty

## SPECIFICATION

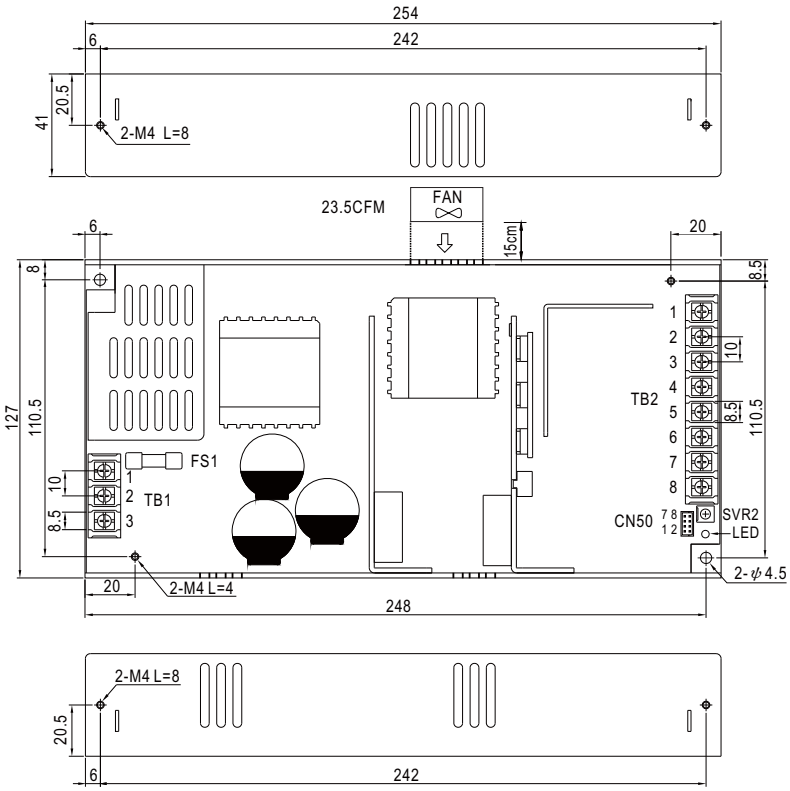
| MODEL | | USP-500-5 | USP-500-12 | USP-500-15 | USP-500-24 | USP-500-48 |
|---|---|---|---|---|---|---|
| OUTPUT | DC VOLTAGE | 5V | 12V | 15V | 24V | 48V |
| | RATED CURRENT | 80A | 42A | 33.5A | 21A | 10.5A |
| | CURRENT RANGE (convection) | 0 ~ 60A | 0 ~ 33A | 0 ~ 27A | 0 ~ 17A | 0 ~ 8.5A |
| | CURRENT RANGE (23.5CFM FAN) | 0 ~ 80A | 0 ~ 42A | 0 ~ 33.5A | 0 ~ 21A | 0 ~ 10.5A |
| | RATED POWER (convection) | 300W | 396W | 405W | 408W | 408W |
| | RATED POWER (23.5CFM FAN) | 400W | 504W | 502.5W | 504W | 504W |
| | RIPPLE & NOISE (max.) Note.2 | 80mVp-p | 100mVp-p | 100mVp-p | 150mVp-p | 150mVp-p |
| | VOLTAGE ADJ. RANGE | 4.5 ~ 5.5V | 10.8 ~ 13.2V | 13.5 ~ 16.5V | 21.6 ~ 27V | 43.2 ~ 52.8V |
| | VOLTAGE TOLERANCE Note.3 | ±2.0% | ±2.0% | ±2.0% | ±2.0% | ±2.0% |
| | LINE REGULATION | ±0.5% | ±0.5% | ±0.5% | ±0.5% | ±0.5% |
| | LOAD REGULATION | ±2.0% | ±1.0% | ±1.0% | ±1.0% | ±1.0% |
| | SETUP, RISE TIME | 1500ms, 80ms/230VAC 3100ms, 80ms/115VAC at full load | | | | |
| | HOLD UP TIME (Typ.) | 20ms/230VAC 20ms/115VAC at full load | | | | |
| INPUT | VOLTAGE RANGE Note.5 | 90 ~ 264VAC 127 ~ 370VDC | | | | |
| | FREQUENCY RANGE | 47 ~ 63Hz | | | | |
| | POWER FACTOR (Typ.) | 0.95/230VAC 0.98/115VAC at full load | | | | |
| | EFFICIENCY (Typ.) | 85% | 90% | 90% | 89% | 90% |
| | AC CURRENT (Typ.) | 6A/115VAC 2.6A/230VAC | | | | |
| | INRUSH CURRENT (Typ.) | 30A/115VAC 50A/230VAC | | | | |
| | LEAKAGE CURRENT | <2mA / 240VAC | | | | |
| PROTECTION | OVERLOAD | 105 ~ 130% rated output power | | | | |
| | | Protection type : Constant current limiting, unit will shut down after 3 sec. ,re-power on to recover | | | | |
| | OVER VOLTAGE | 5.7 ~ 7V | 13.5 ~ 16V | 17 ~ 21V | 27.8 ~ 32.4V | 53 ~ 64.8V |
| | | Protection type : Shut down o/p voltage, re-power to recover | | | | |
| | OVER TEMPERATURE | 85℃ ±5℃ (TSW1 : detect on heatsink of o/p diode) | | | | |
| | | 95℃ ±5℃(5V),100℃(12V,15V,24V,48V) (TSW2 : detect on heatsink of power transistor) | | | | |
| | | Protection type : Shut down o/p voltage with auto-recovery | | | | |
| FUNCTION | REMOTE ON/OFF CONTROL | RC+/RC-: 0~0.8V power on ; 4~10V power off | | | | |
| | DC-OK SIGNAL | PSU turn on : 3.3V ~ 5.6V ; PSU turn off: 0 ~ 1V | | | | |
| ENVIRONMENT | WORKING TEMP. | -20 ~ +70℃ (Refer to "Derating Curve") | | | | |
| | WORKING HUMIDITY | 20 ~ 90% RH non-condensing | | | | |
| | STORAGE TEMP., HUMIDITY | -40 ~ +85℃, 10 ~ 95% RH | | | | |
| | TEMP. COEFFICIENT | ±0.03%/℃ (0 ~ 50℃) | | | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes | | | | |
| SAFETY & EMC (Note 4) | SAFETY STANDARDS | UL60950-1, TUV EN60950-1 approved | | | | |
| | WITHSTAND VOLTAGE | I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC | | | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH | | | | |
| | EMC EMISSION | Compliance to EN55022 (CISPR22) Class B, EN61000-3-2,-3 | | | | |
| | EMC IMMUNITY | Compliance to EN61000-4-2,3,4,5,6,8,11, EN55024, EN61000-6-2, heavy industry level, criteria A | | | | |
| OTHERS | MTBF | 129.8K hrs min. MIL-HDBK-217F (25℃) | | | | |
| | DIMENSION | 254*127*41mm (L*W*H) | | | | |
| | PACKING | 1.6Kg; 6pcs/10.6Kg/0.7CUFT | | | | |

**NOTE**

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 360mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to “EMI testing of component power supplies.” (as available on http://www.meanwell.com)
5. Derating may be needed under low input voltages. Please check the derating curve for more details.

## ■ Mechanical Specification

Case No. 963A-D Unit:mm




AC Input Terminal
Pin No. Assignment

| Pin No. | Assignment |
|---|---|
| 1 | AC/L |
| 2 | AC/N |
| 3 | FG ⏚ |

DC Output Terminal
Pin No. Assignment

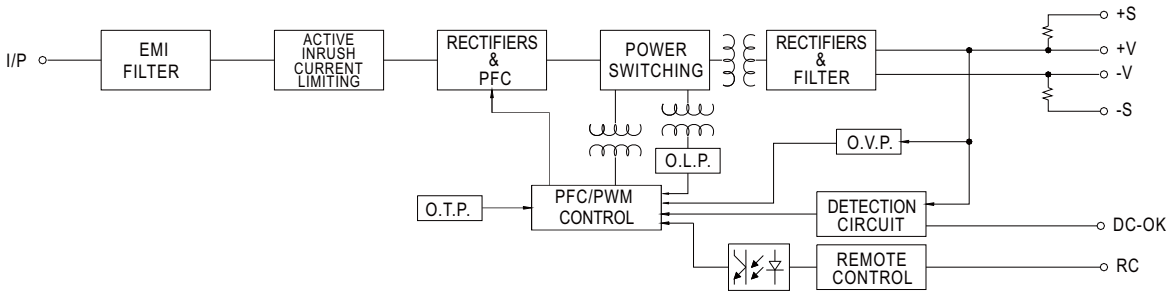
| Pin No. | Assignment |
|---|---|
| 1~4 | DC OUTPUT -V |
| 5~8 | DC OUTPUT +V |

Connector Pin No. Assignment (CN50) :
JST B8B-PHDSS or equivalent

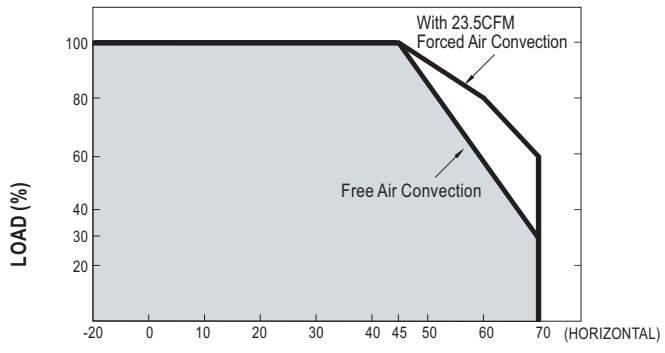
| Pin No. | Assignment | Mating Housing | Terminal |
|---|---|---|---|
| 1 | CS(Optional) | JST PHD-08VS or equivalent | JST SPHD-002T-P0.5 or equivalent |
| 2,8 | -S | | |
| 3 | RC- | | |
| 4 | RC+ | | |
| 5 | GND | | |
| 6 | DC-OK | | |
| 7 | +S | | |

## ■ Block Diagram

fosc : 100KHz

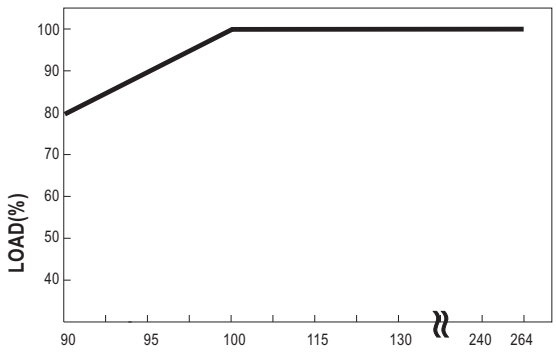



## ■ Derating Curve




AMBIENT TEMPERATURE (℃)

## ■ Static Characteristics




INPUT VOLTAGE (V) 60Hz



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## ■ Function Description of CN50

| Pin No. | Function | Description |
|---|---|---|
| 1 | CS (Optional) | Current sharing signal. When units are connected in parallel, the CS pins of the units should be connected to allow current balance between units. |
| 2,8 | -S | Negative sensing. The -S signal should be connected to the negative terminal of the load. The -S and +S leads should be twisted in pair to minimize noise pick-up effect. The maximum line drop compensation is 0.5V. |
| 3 | RC- | Return for RC+ signal input. |
| 4 | RC+ | Turns the output on and off by electrical or dry contact between pin 4 ( RC+) and pin 3 (RC-). 0~0.8V: Power ON, 4~10V: Power OFF. |
| 5 | GND | This pin connects to the negative terminal (-V). Return for DC_OK signal output. |
| 6 | DC-OK | DC-OK signal is a TTL level signal, referenced to pin6(DC-OK GND). High when PSU turns on. |
| 7 | +S | Positive sensing. The +S signal should be connected to the positive terminal of the load. The +S and -S leads should be twisted in pair to minimize noise pick-up effect. The maximum line drop compensation is 0.5V. |

## ■ Function Manual

### 1.Remote Control

The PSU can be turned ON/OFF by using the "Remote Control" function.

| Between RC+(pin4) and RC-(pin3) | Output Status |
|---|---|
| SW OFF (0 ~ 0.8V) | ON |
| SW ON (4 ~ 10V) | OFF |

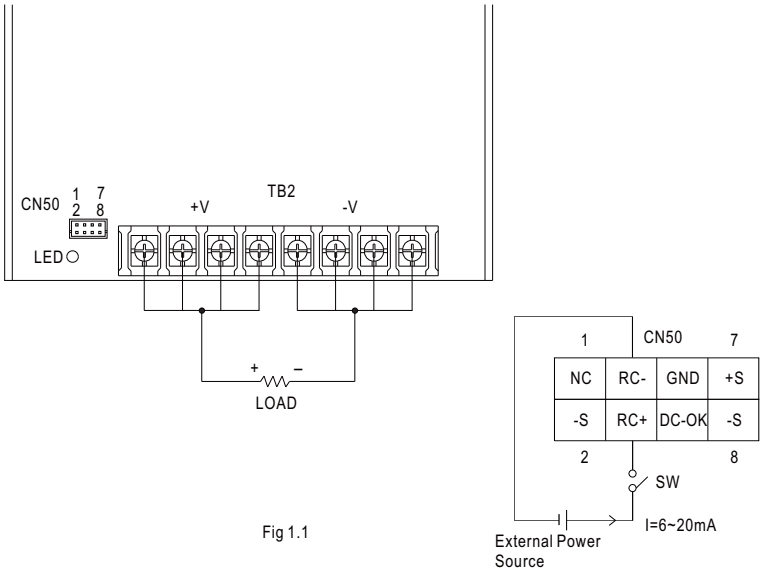



Fig 1.1

### 2.DC-OK Signal

DC-OK signal is a TTL level signal. High when PSU turns on.

| Between DC-OK(pin6) and GND(pin5) | Output Status |
|---|---|
| 3.3 ~ 5.6V | ON |
| 0 ~ 1V | OFF |

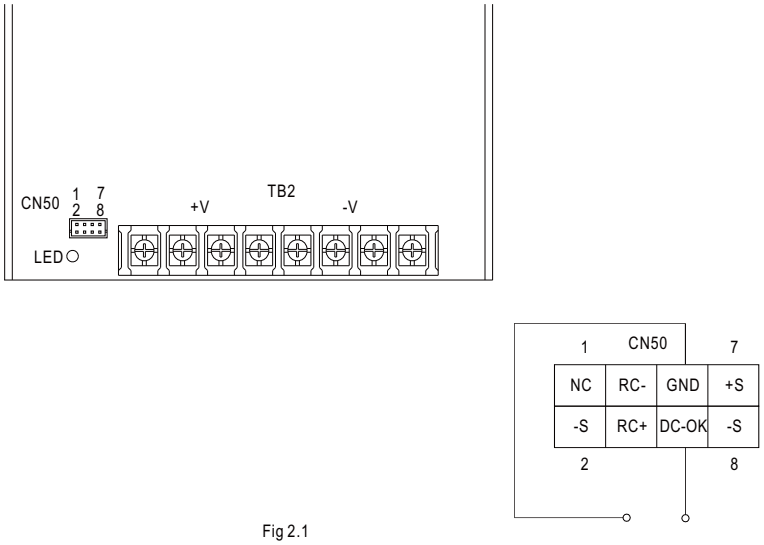



Fig 2.1



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### 3.Remote Sense

The remote sensing compensates voltage drop on the load wiring up to 0.5V.

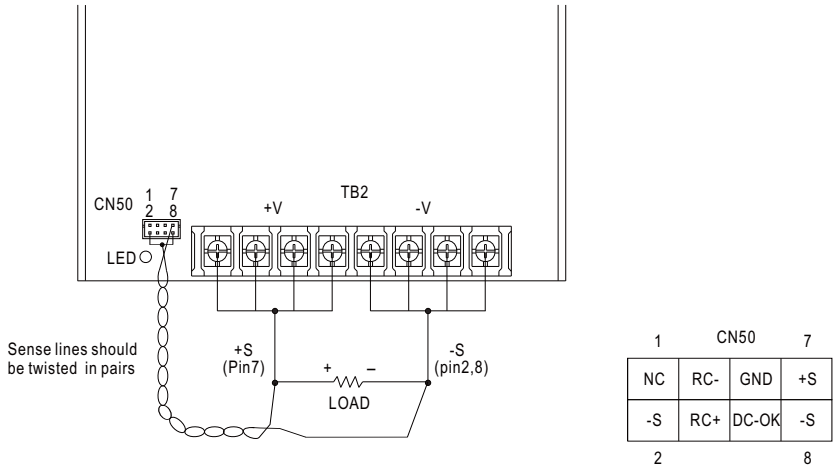



Fig 3.1

### 4.Current Sharing with Remote Sensing (Optional for 24V & 48V)

USP-500 has the built-in active current sharing function and can be connected in parallel to provide higher output power :

(1)Parallel operation is available by connecting the units shown as below.
(+S,-S,CS and GND are connected mutually in parallel).

(2)Difference of output voltages among parallel units should be less than 2%.

(3)The total output current must not exceed the value determined by the following equation.
(output current at parallel operation)=(Rated current per unit)×(Number of unit)×0.9

(4)In parallel operation 2 units is the maximum, please consult the manufacturer for applications of more connecting in parallel.

(5)The power supplies should be paralleled using short and large diameter wiring and then connected to the load.

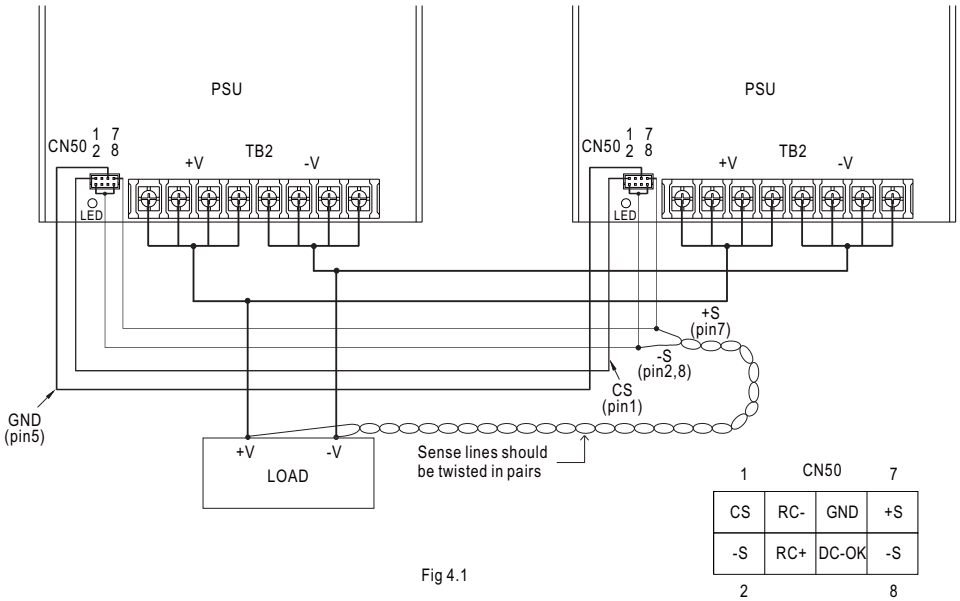



Fig 4.1

Note : 1.In parallel connection, maybe only one unit (master) operate if the total output load is less than 2% of rated load condition.
The other PSU (slave) may go into standby mode and its output LED and relay will not turn on.
2.2% min. of dummy load is required.



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