



## Features

- Universal AC input / Full range
- Built-in active PFC function, PF>0.95
- High efficiency up to 94%
- Withstand 300VAC surge input for 5 seconds
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Medical safety approved (2xMOPP)
- Suitable for BF application with appropriate system consideration
- Built-in cooling fan ON-OFF control
- Current sharing up to 4000W (3+1)
- Built-in DC OK signal
- Built-in remote ON-OFF control
- Standby 5V@0.3A
- Built-in remote sense function
- No load power consumption<0.75W (Note.6)
- 5 years warranty

## Applications

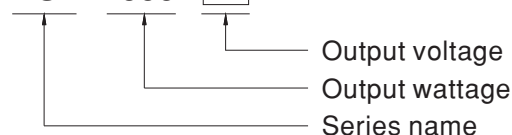
- MRI scanner
- CT and PET scanner
- Medical bed
- Surgery table
- Medical measurement device

## Description

MSP-1000 is a single output enclosed type AC/DC power supply delivering 1000 W output power for a wide range of medical applications. The entire series operates for 90~264 VAC input voltage and supplies different output voltages between 12 V and 48 V that can satisfy the demands for all kinds of medical equipments. Meanwhile, the circuitry design meets the international medical standards, 2x MOPP, suitable for medical electrical devices. MSP-1000 is equipped with various built-in functions such as auxiliary power, remote sense and remote on-off control, offering vast design flexibility for the purpose of using control solutions.

## Model Encoding / Order Information

**MSP-1000-12**



## SPECIFICATION

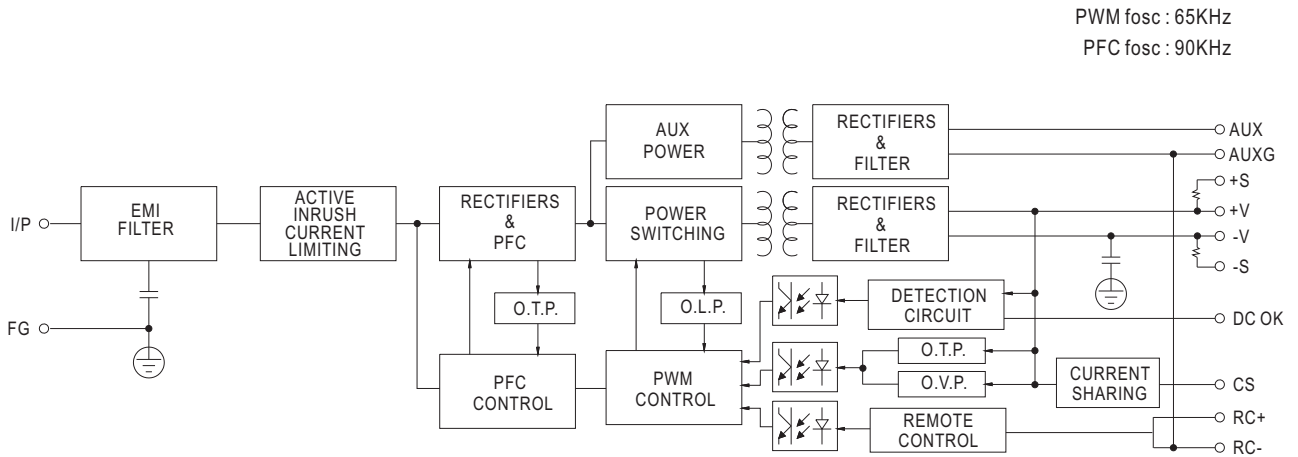
| MODEL                    |                                             | MSP-1000-12                                                                                                                           | MSP-1000-15                                       | MSP-1000-24                                                            | MSP-1000-48 |
|--------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|-------------|
| OUTPUT                   | DC VOLTAGE                                  | 12V                                                                                                                                   | 15V                                               | 24V                                                                    | 48V         |
|                          | RATED CURRENT                               | 80A                                                                                                                                   | 64A                                               | 42A                                                                    | 21A         |
|                          | CURRENT RANGE                               | 0 ~ 80A                                                                                                                               | 0 ~ 64A                                           | 0 ~ 42A                                                                | 0 ~ 21A     |
|                          | RATED POWER                                 | 960W (max. 1000W for 3 sec.)                                                                                                          | 960W (max. 1000W for 3 sec.)                      | 1008W                                                                  | 1008W       |
|                          | RIPPLE & NOISE (max.) <small>Note.2</small> | 150mVp-p                                                                                                                              | 150mVp-p                                          | 200mVp-p                                                               | 250mVp-p    |
|                          | VOLTAGE ADJ. RANGE                          | 11 ~ 14V                                                                                                                              | 14 ~ 17V                                          | 22 ~ 28V                                                               | 46 ~ 56V    |
|                          | VOLTAGE TOLERANCE <small>Note.3</small>     | ± 2.0%                                                                                                                                | ± 1.5%                                            | ± 1.0%                                                                 | ± 1.0%      |
|                          | LINE REGULATION                             | ± 0.5%                                                                                                                                | ± 0.5%                                            | ± 0.5%                                                                 | ± 0.5%      |
|                          | LOAD REGULATION                             | ± 2.0%                                                                                                                                | ± 1.5%                                            | ± 0.5%                                                                 | ± 0.5%      |
|                          | SETUP, RISE TIME                            | 1000ms, 50ms/230VAC      2000ms, 50ms/115VAC at full load                                                                             |                                                   |                                                                        |             |
| HOLD UP TIME (Typ.)      | 16ms/230VAC      16ms/115VAC at full load   |                                                                                                                                       |                                                   |                                                                        |             |
| INPUT                    | VOLTAGE RANGE <small>Note.4</small>         | 90 ~ 264VAC(300VAC for 5 sec.)      127 ~ 370VDC                                                                                      |                                                   |                                                                        |             |
|                          | FREQUENCY RANGE                             | 47 ~ 63Hz                                                                                                                             |                                                   |                                                                        |             |
|                          | POWER FACTOR (Typ.)                         | PF>0.95/230VAC      PF>0.98/115VAC at full load                                                                                       |                                                   |                                                                        |             |
|                          | EFFICIENCY (Typ.)                           | 91.5%                                                                                                                                 | 92%                                               | 93%                                                                    | 94%         |
|                          | AC CURRENT (Typ.)                           | 8.5A/115VAC      5A/230VAC                                                                                                            |                                                   |                                                                        |             |
|                          | INRUSH CURRENT (Typ.)                       | 20A/115VAC      40A/230VAC                                                                                                            |                                                   |                                                                        |             |
|                          | LEAKAGE CURRENT                             | Earth leakage current < 360μA/264VAC , Touch leakage current < 100μA/264VAC                                                           |                                                   |                                                                        |             |
| PROTECTION               | OVERLOAD                                    | 105 ~ 135% rated output power<br>Protection type : Constant current limiting, recovers automatically after fault condition is removed |                                                   |                                                                        |             |
|                          | OVER VOLTAGE                                | 14.5 ~ 16.5V                                                                                                                          | 18.2 ~ 20.6V                                      | 29 ~ 33V                                                               | 58 ~ 65V    |
|                          |                                             | Protection type : Shut down o/p voltage, re-power on to recover                                                                       |                                                   |                                                                        |             |
|                          | OVER TEMPERATURE                            | Shut down o/p voltage, recovers automatically after temperature goes down                                                             |                                                   |                                                                        |             |
| FUNCTION                 | CURRENT SHARING                             | Up to 4000W or (3+1) units. Please refer to the Function Manual.                                                                      |                                                   |                                                                        |             |
|                          | REMOTE ON-OFF CONTROL                       | Power ON : short; Power OFF : open. Please refer to the Function Manual.                                                              |                                                   |                                                                        |             |
|                          | REMOTE SENSE                                | Compensate voltage drop on the load wiring up to 0.5V. Please refer to the Function Manual.                                           |                                                   |                                                                        |             |
|                          | DC-OK SIGNAL                                | The TTL signal out, PSU turn on = 3.3 ~ 5.6V ; PSU turn off = 0 ~ 1V. Please refer to the Function Manual.                            |                                                   |                                                                        |             |
|                          | 5V STANDBY                                  | 5VSB : 5V@0.3A ; tolerance ± 5%, ripple : 50mVp-p(max.)                                                                               |                                                   |                                                                        |             |
|                          | FAN CONTROL                                 | Fan on/off by NTC(RT50) or 30% load min.                                                                                              |                                                   |                                                                        |             |
| ENVIRONMENT              | WORKING TEMP.                               | -40 ~ +70°C (Refer to "Derating Curve")                                                                                               |                                                   |                                                                        |             |
|                          | WORKING HUMIDITY                            | 20 ~ 90% RH non-condensing                                                                                                            |                                                   |                                                                        |             |
|                          | STORAGE TEMP., HUMIDITY                     | -40 ~ +85°C, 10 ~ 95% RH non-condensing                                                                                               |                                                   |                                                                        |             |
|                          | TEMP. COEFFICIENT                           | ± 0.03%/°C (0 ~ 50°C)                                                                                                                 |                                                   |                                                                        |             |
|                          | VIBRATION                                   | 10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes                                                                          |                                                   |                                                                        |             |
| SAFETY & EMC<br>(Note 8) | SAFETY STANDARDS                            | ANSI/AAMI ES60601-1, IEC60601-1 ; CAN/CSA-C22.2 No.60601-1:14-Edition 3 approved; Design refer to BS EN/EN60601-1, BS EN/EN62368-1    |                                                   |                                                                        |             |
|                          | ISOLATION LEVEL                             | Primary-Secondary: 2×MOPP, Primary-Earth: 1×MOPP, Secondary-Earth: 1×MOPP                                                             |                                                   |                                                                        |             |
|                          | WITHSTAND VOLTAGE                           | I/P-O/P:4.5KVAC    I/P-FG:2KVAC    O/P-FG:1.5KVAC                                                                                     |                                                   |                                                                        |             |
|                          | ISOLATION RESISTANCE                        | I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C / 70% RH                                                                            |                                                   |                                                                        |             |
|                          | EMC EMISSION                                | Parameter                                                                                                                             | Standard                                          | Test Level / Note                                                      |             |
|                          |                                             | Conducted                                                                                                                             | BS EN/EN55032 (CISPR32) / BS EN/EN55011 (CISPR11) | Class B                                                                |             |
|                          |                                             | Radiated                                                                                                                              | BS EN/EN55032 (CISPR32) / BS EN/EN55011 (CISPR11) | Class B                                                                |             |
|                          |                                             | Harmonic Current                                                                                                                      | BS EN/EN61000-3-2                                 | Class A                                                                |             |
|                          |                                             | Voltage Flicker                                                                                                                       | BS EN/EN61000-3-3                                 | -----                                                                  |             |
|                          | EMC IMMUNITY                                | BS EN/EN60601-1-2                                                                                                                     |                                                   |                                                                        |             |
|                          |                                             | Parameter                                                                                                                             | Standard                                          | Test Level / Note                                                      |             |
|                          |                                             | ESD                                                                                                                                   | BS EN/EN61000-4-2                                 | Level 4, 15KV air ; Level 4, 8KV contact                               |             |
|                          |                                             | Radiated                                                                                                                              | BS EN/EN61000-4-3                                 | Level 3                                                                |             |
|                          |                                             | EFT / Burst                                                                                                                           | BS EN/EN61000-4-4                                 | Level 3                                                                |             |
|                          |                                             | Surge                                                                                                                                 | BS EN/EN61000-4-5                                 | Level 4, 2KV/Line-Line 4KV/Line-Earth                                  |             |
|                          |                                             | Conducted                                                                                                                             | BS EN/EN61000-4-6                                 | Level 3                                                                |             |
|                          |                                             | Magnetic Field                                                                                                                        | BS EN/EN61000-4-8                                 | Level 4                                                                |             |
|                          |                                             | Voltage Dips and Interruptions                                                                                                        | BS EN/EN61000-4-11                                | 100% dip 1 periods, 30% dip 25 periods, 100% interruptions 250 periods |             |
| OTHERS                   | MTBF                                        | 286.3K hrs min.    Telcordia SR-332 (Bellcore) ; 105.7K hrs min.    MIL-HDBK-217F (25°C)                                              |                                                   |                                                                        |             |
|                          | DIMENSION                                   | 218*105*63.5mm (L*W*H)                                                                                                                |                                                   |                                                                        |             |
|                          | PACKING                                     | 1.53Kg;8pcs/13.3Kg/1.34CUFT                                                                                                           |                                                   |                                                                        |             |

**NOTE**

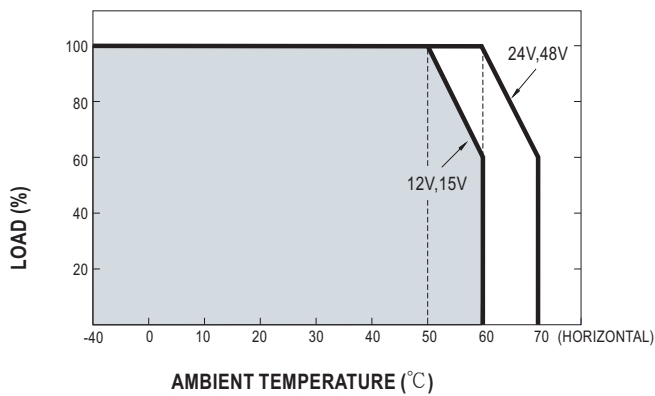
- All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.
- Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1 $\mu$ f & 47 $\mu$ f parallel capacitor.
- Tolerance : includes set up tolerance, line regulation and load regulation.
- Derating may be needed under low input voltages. Please check the derating curve for more details.
- Length of set up time is measured at first cold start. Turning ON/OFF the power supply may lead to increase of the set up time.
- No load power consumption<0.75W when RC+ & RC- (CN100 pin3,4) open.
- When the input voltage is less than 40VAC, the SPS may exhibit degradation of performance. The final product manufacturers must re-confirm this deviation that does not affect basic safety or essential performance.
- 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\*700mm 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>)
- The ambient temperature derating of 3.5°C/1000m with fanless models and of 5°C/1000m with fan models for operating altitude higher than 2000m(6500ft).

※ Product Liability Disclaimer : For detailed information, please refer to <https://www.meanwell.com/serviceDisclaimer.aspx>

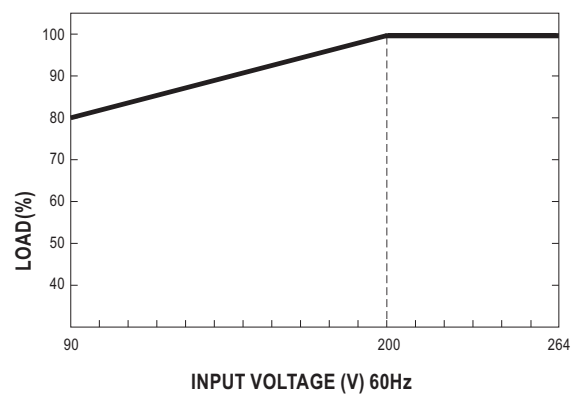
## Block Diagram



## Derating Curve



## Output Derating VS Input Voltage



## Function Description of CN100

| Pin No. | Function | Description                                                                                                                                                                                                           |
|---------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | AUXG     | Auxiliary voltage output ground.                                                                                                                                                                                      |
| 2       | AUX      | Auxiliary voltage output, 4.75~5.25V, referenced to pin 1(AUXG). The maximum load current is 0.3A. This output is not controlled by the "remote ON/OFF control".                                                      |
| 3       | RC+      | Turns the output on and off by electrical or dry contact between pin 4 (RC-), Short: Power ON, Open: Power OFF.                                                                                                       |
| 4       | RC-      | Remote control ground.                                                                                                                                                                                                |
| 5       | CS       | Current sharing signal. When units are connected in parallel, the CS pins of the units should be connected to allow current balance between units.                                                                    |
| 6,8     | GND      | This pin connects to the negative terminal(-V). Return for DC-OK signal output.                                                                                                                                       |
| 7       | DC-OK    | DC-OK signal is a TTL level signal, referenced to pin8(DC-OK GND). High when PSU turns on.                                                                                                                            |
| 9       | +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. |
| 10      | -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. |

## Function Manual

### 1.Remote Sense

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

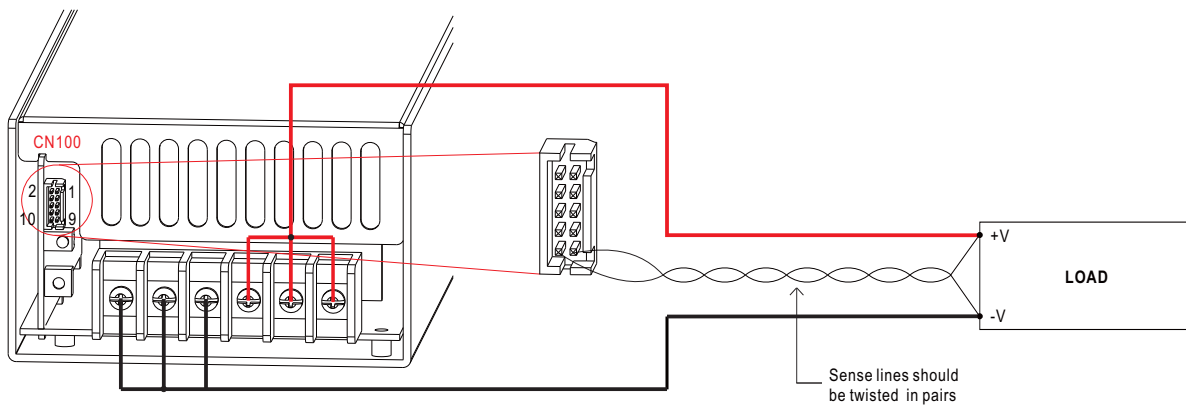


Fig 1.1

### 2.DC-OK Signal

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

| Between DC-OK(pin7) and GND(pin6,8) | Output Status |
|-------------------------------------|---------------|
| 3.3 ~ 5.6V                          | ON            |
| 0 ~ 1V                              | OFF           |

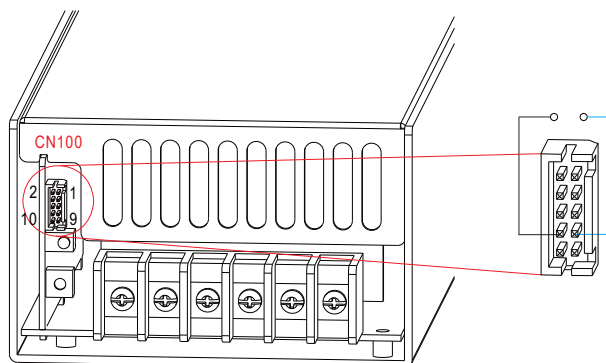
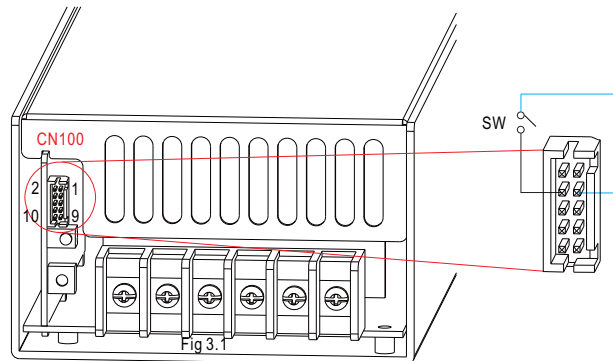


Fig 2.1

### 3.Remote ON-OFF Control

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

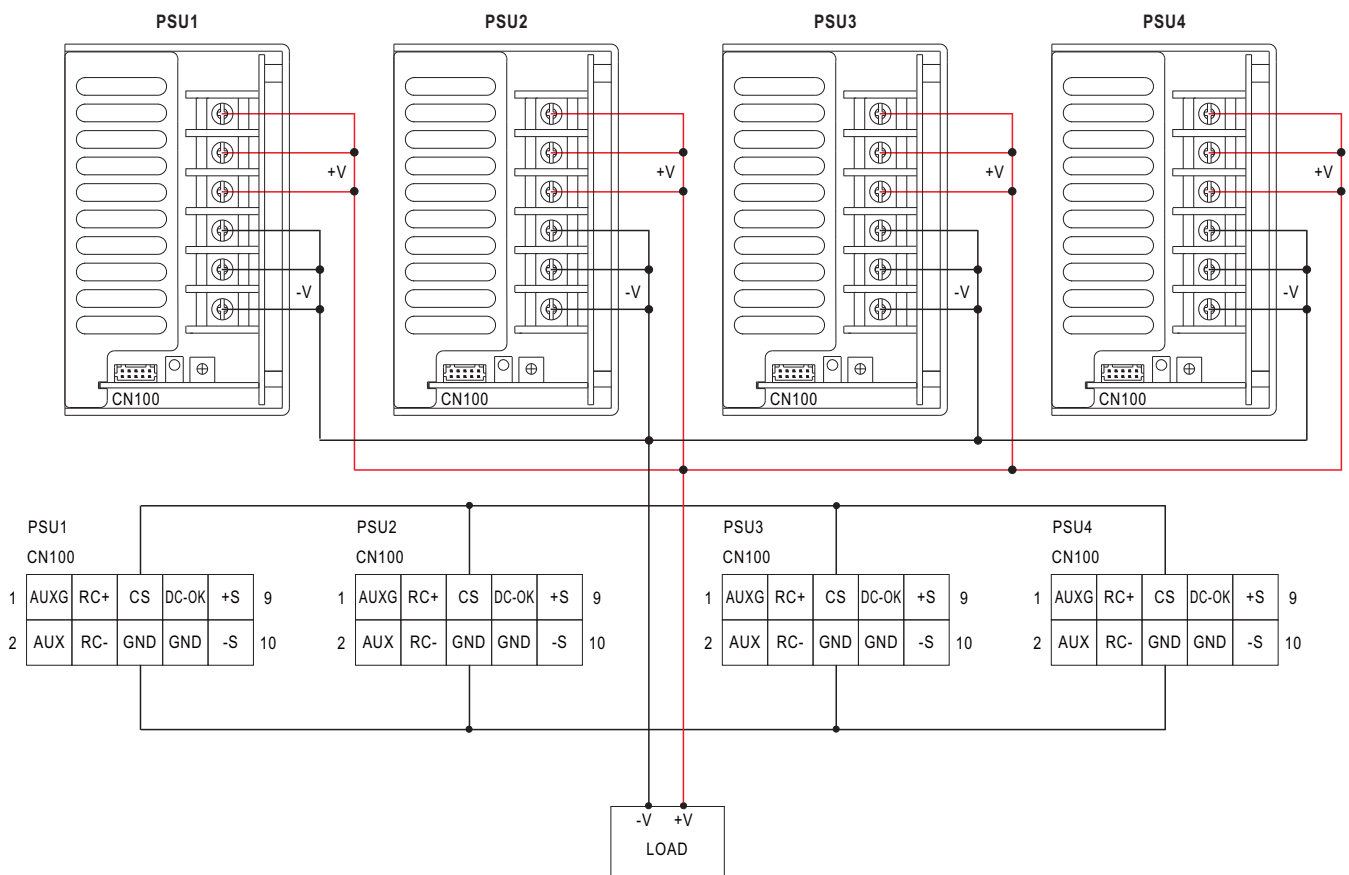
| Between RC+(pin3) and RC-(pin4) | Output Status |
|---------------------------------|---------------|
| SW ON (Short)                   | ON            |
| SW OFF (Open)                   | OFF           |



### 4.Current Sharing

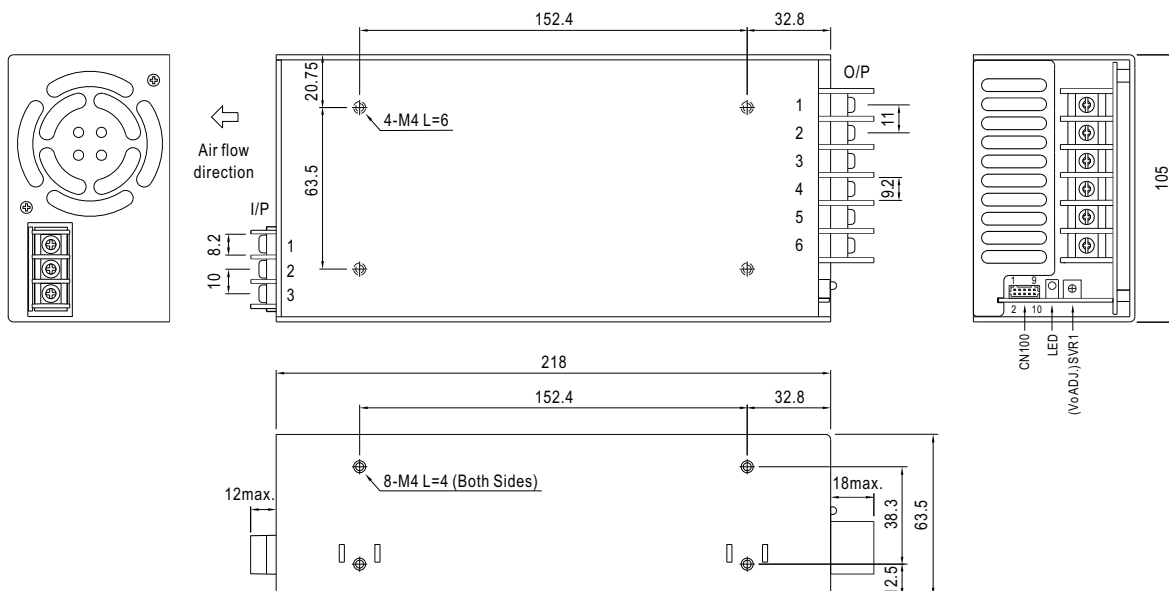
MSP-1000 has the built-in active current sharing function and can be connected in parallel, up to 4 units, to provide higher output power as exhibited below :

- ※The power supplies should be paralleled using short and large diameter wiring and then connected to the load.
- ※ Difference of output voltages among parallel units should be less than 0.2V.
- ※ The total output current must not exceed the value determined by the following equation:  
Maximum output current at parallel operation=(Rated current per unit) × (Number of unit) × 0.9
- ※ When the total output current is less than 5% of the total rated current, or say (5% of Rated current per unit) × (Number of unit) the current shared among units may not be fully balanced.



## ■ Mechanical Specification

Case No. 977      Unit:mm



### AC Input Terminal Pin No. Assignment

| Pin No. | Assignment |
|---------|------------|
| 1       | AC/L       |
| 2       | AC/N       |
| 3       | FG $\perp$ |

### DC Output Terminal Pin No. Assignment

| Pin No. | Assignment |
|---------|------------|
| 1~3     | +V         |
| 4~6     | -V         |

Connector Pin No. Assignment(CN100) : HRS DF11-10DP-2DS or equivalent

| Pin No. | Assignment | Pin No. | Assignment | Mating Housing                 | Terminal                       |
|---------|------------|---------|------------|--------------------------------|--------------------------------|
| 1       | AUXG       | 6,8     | GND        | HRS DF11-10DS<br>or equivalent | HRS DF11-**SC<br>or equivalent |
| 2       | AUX        | 7       | DC-OK      |                                |                                |
| 3       | RC+        | 9       | +S         |                                |                                |
| 4       | RC-        | 10      | -S         |                                |                                |
| 5       | CS         |         |            |                                |                                |

**■ Installation Manual**

Please refer to : <http://www.meanwell.com/manual.html>