



## GRUBER Electric Ges.m.b.H.

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Komponenten für Steuerungsbau und Industrieelektronik



### ■ Features :

- Universal AC input / Full range
- Built-in active PFC function, PF>0.94
- High efficiency up to 89%
- Withstand 300VAC surge input for 5 seconds
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in cooling fan ON-OFF control
- 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.7)
- Current sharing up to 2400W (3+1) (24V,36V,48V)
- 5 years warranty

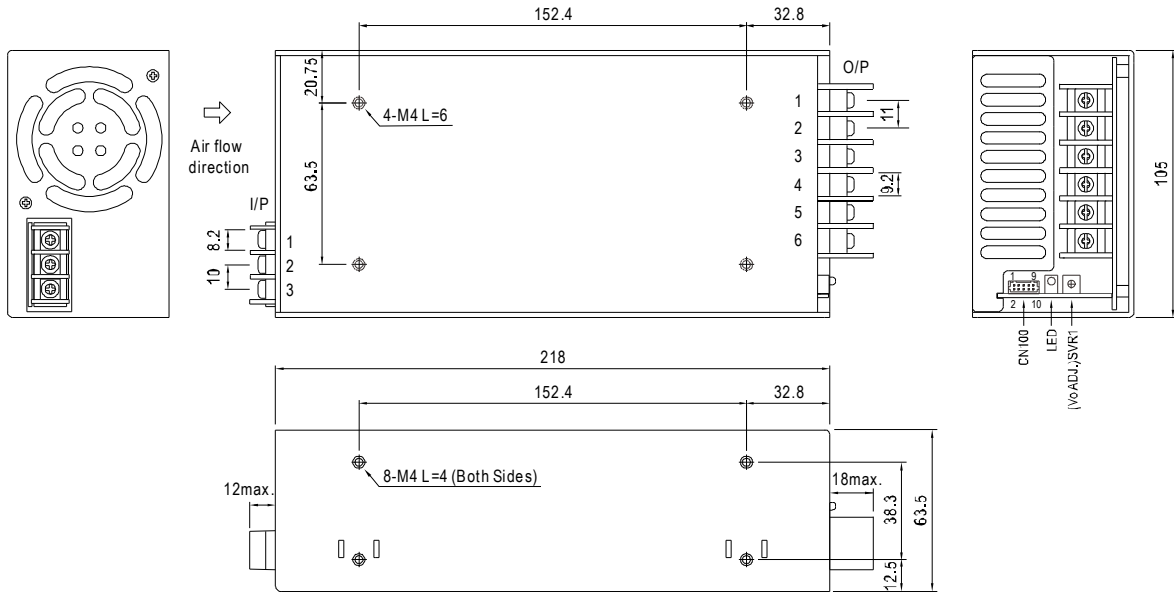


### SPECIFICATION

| MODEL                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HRPG-600-3.3                                                                                                                          | HRPG-600-5 | HRPG-600-7.5 | HRPG-600-12  | HRPG-600-15  | HRPG-600-24  | HRPG-600-36  | HRPG-600-48  |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| OUTPUT                   | DC VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3.3V                                                                                                                                  | 5V         | 7.5V         | 12V          | 15V          | 24V          | 36V          | 48V          |
|                          | RATED CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 120A                                                                                                                                  | 120A       | 80A          | 53A          | 43A          | 27A          | 17.5A        | 13A          |
|                          | CURRENT RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 ~ 120A                                                                                                                              | 0 ~ 120A   | 0 ~ 80A      | 0 ~ 53A      | 0 ~ 43A      | 0 ~ 27A      | 0 ~ 17.5A    | 0 ~ 13A      |
|                          | RATED POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 396W                                                                                                                                  | 600W       | 600W         | 636W         | 645W         | 648W         | 630W         | 624W         |
|                          | RIPPLE & NOISE (max.) <small>Note.2</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 100mVp-p                                                                                                                              | 100mVp-p   | 100mVp-p     | 120mVp-p     | 150mVp-p     | 150mVp-p     | 200mVp-p     | 240mVp-p     |
|                          | VOLTAGE ADJ. RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.8 ~ 3.8V                                                                                                                            | 4.3 ~ 5.8V | 6.8 ~ 9V     | 10.2 ~ 13.8V | 13.5 ~ 18V   | 21.6 ~ 28.8V | 28.8 ~ 39.6V | 40.8 ~ 55.2V |
|                          | VOLTAGE TOLERANCE <small>Note.3</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ±2.0%                                                                                                                                 | ±2.0%      | ±2.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%        |
|                          | LINE REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ±0.5%                                                                                                                                 | ±0.5%      | ±0.5%        | ±0.3%        | ±0.3%        | ±0.2%        | ±0.2%        | ±0.2%        |
|                          | LOAD REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ±1.0%                                                                                                                                 | ±1.0%      | ±1.0%        | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%        |
|                          | SETUP, RISE TIME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1000ms, 50ms/230VAC      2500ms, 50ms/115VAC at full load                                                                             |            |              |              |              |              |              |              |
| HOLD UP TIME (Typ.)      | 16ms/230VAC      16ms/115VAC at full load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                       |            |              |              |              |              |              |              |
| INPUT                    | VOLTAGE RANGE <small>Note.5</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 85 ~ 264VAC      120 ~ 370VDC                                                                                                         |            |              |              |              |              |              |              |
|                          | FREQUENCY RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 47 ~ 63Hz                                                                                                                             |            |              |              |              |              |              |              |
|                          | POWER FACTOR (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | PF>0.94/230VAC      PF>0.99/115VAC at full load                                                                                       |            |              |              |              |              |              |              |
|                          | EFFICIENCY (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 78.5%                                                                                                                                 | 82%        | 86%          | 88%          | 88%          | 88%          | 89%          | 89%          |
|                          | AC CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7.6A/115VAC      3.6A/230VAC                                                                                                          |            |              |              |              |              |              |              |
|                          | INRUSH CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 35A/115VAC      70A/230VAC                                                                                                            |            |              |              |              |              |              |              |
|                          | LEAKAGE CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <1.2mA / 240VAC                                                                                                                       |            |              |              |              |              |              |              |
| PROTECTION               | OVERLOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 105 ~ 135% rated output power<br>Protection type : Constant current limiting, recovers automatically after fault condition is removed |            |              |              |              |              |              |              |
|                          | OVER VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.96 ~ 4.62V                                                                                                                          | 6 ~ 7V     | 9.4 ~ 10.9V  | 14.4 ~ 16.8V | 18.8 ~ 21.8V | 30 ~ 34.8V   | 41.4 ~ 48.6V | 57.6 ~ 67.2V |
|                          | OVER TEMPERATURE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Shut down o/p voltage, recovers automatically after temperature goes down                                                             |            |              |              |              |              |              |              |
| FUNCTION                 | 5V STANDBY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5VSB : 5V@0.3A ; tolerance± 5%, ripple : 50mVp-p(max.)                                                                                |            |              |              |              |              |              |              |
|                          | DC OK SIGNAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PSU turn on : 3.3 ~ 5.6V ; PSU turn off : 0 ~ 1V                                                                                      |            |              |              |              |              |              |              |
|                          | REMOTE CONTROL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RC+ / RC-: 4 ~ 10V or open = power on ; 0 ~ 0.8V or short = power off                                                                 |            |              |              |              |              |              |              |
|                          | FAN CONTROL (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Load 35 ± 15% or RTH2≥50℃ Fan on                                                                                                      |            |              |              |              |              |              |              |
| ENVIRONMENT              | WORKING TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -40 ~ +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, 5G 10min./1cycle, 60min. each along X, Y, Z axes                                                                          |            |              |              |              |              |              |              |
| SAFETY & EMC<br>(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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 147.7K hrs min.      MIL-HDBK-217F (25℃)                                                                                              |            |              |              |              |              |              |              |
|                          | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 218*105*63.5mm (L*W*H)                                                                                                                |            |              |              |              |              |              |              |
|                          | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.58Kg;8pcs/13.6Kg/1.34CUFT                                                                                                           |            |              |              |              |              |              |              |
| NOTE                     | 1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.<br>2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.<br>3. Tolerance : includes set up tolerance, line regulation and load regulation.<br>4. The power supply is considered a component which will be installed into a final equipment. 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.<br>(as available on <a href="http://www.meanwell.com">http://www.meanwell.com</a> )<br>5. Derating may be needed under low input voltages. Please check the derating curve for more details.<br>6. 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.<br>7. No load power consumption<0.75W when RC+ & RC- (CN100 pin3,4) 0 ~ 0.8V or short. |                                                                                                                                       |            |              |              |              |              |              |              |

## Mechanical Specification

Case No. 977A Unit:mm



### AC Input Terminal Pin No. Assignment

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

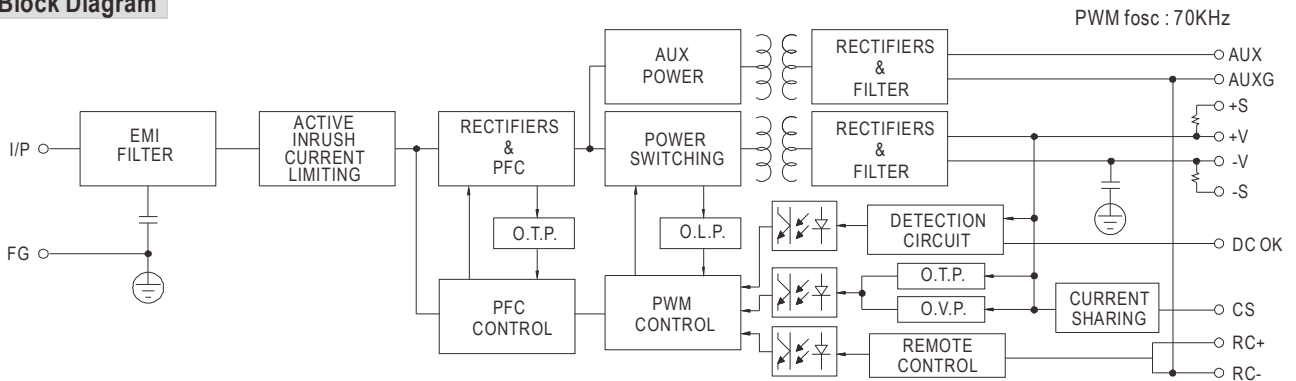
### DC Output Terminal Pin No. Assignment

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

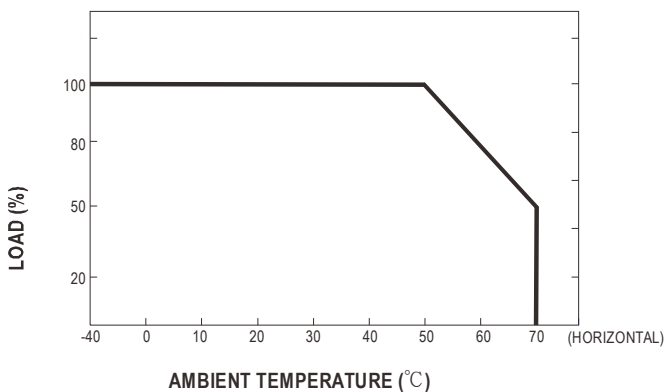
### Connector Pin No. Assignment(CN100) : HRS DF11-10DP-2DS or equivalent

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

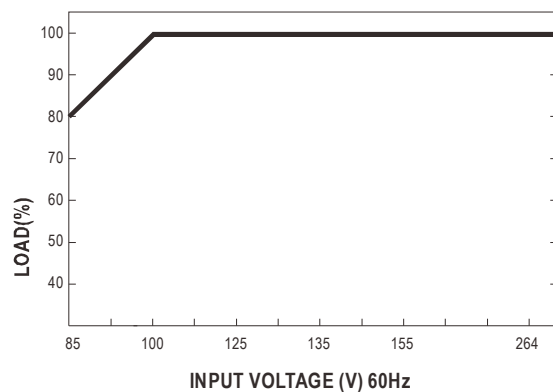
## Block Diagram



## Derating Curve



## Output Derating VS Input Voltage



## Function Description of CN100

| Pin No. | Function | Description                                                                                                                                                                                                           |
|---------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | AUXG     | Auxiliary voltage output ground. The signal return is isolated from the output terminals (+V & -V).                                                                                                                   |
| 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 OFF, Open: Power ON.                                                                                                       |
| 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.

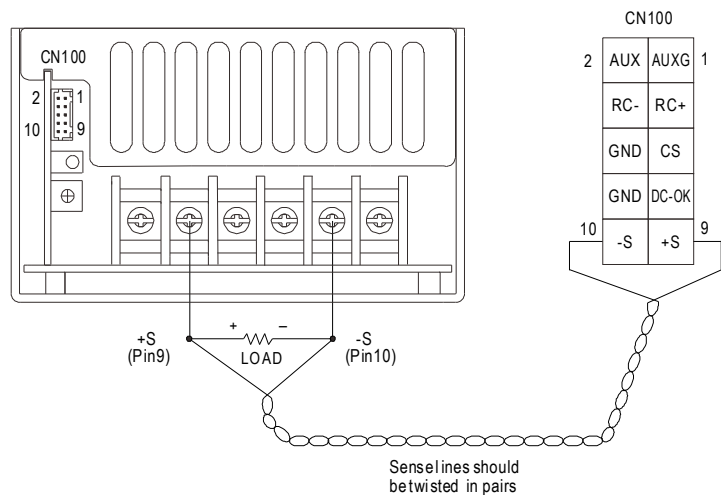


Fig 1.1

### 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           |

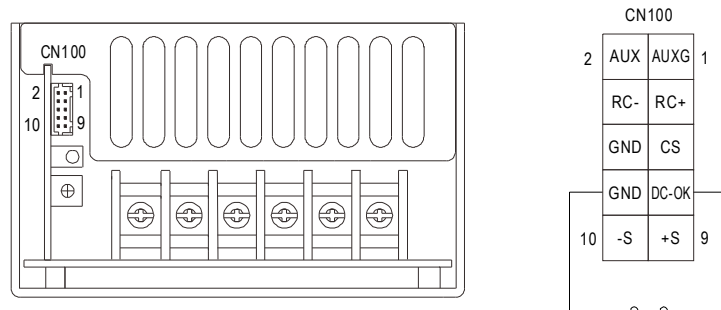


Fig 2.1

### 3.Remote 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)                   | OFF           |
| SW OFF (Open)                   | ON            |

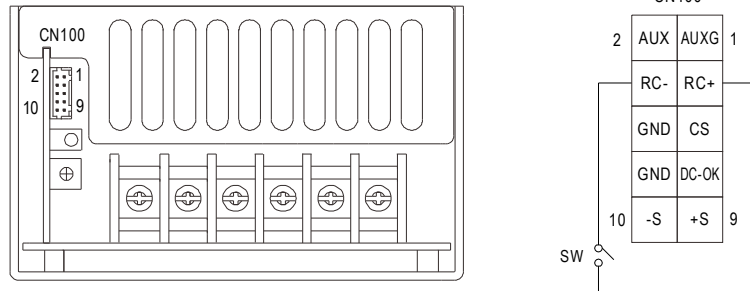


Fig 3. 1

### 4.Current Sharing with Remote Sensing (Only for 24V, 36V and 48V)

HRPG-600 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 4 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.

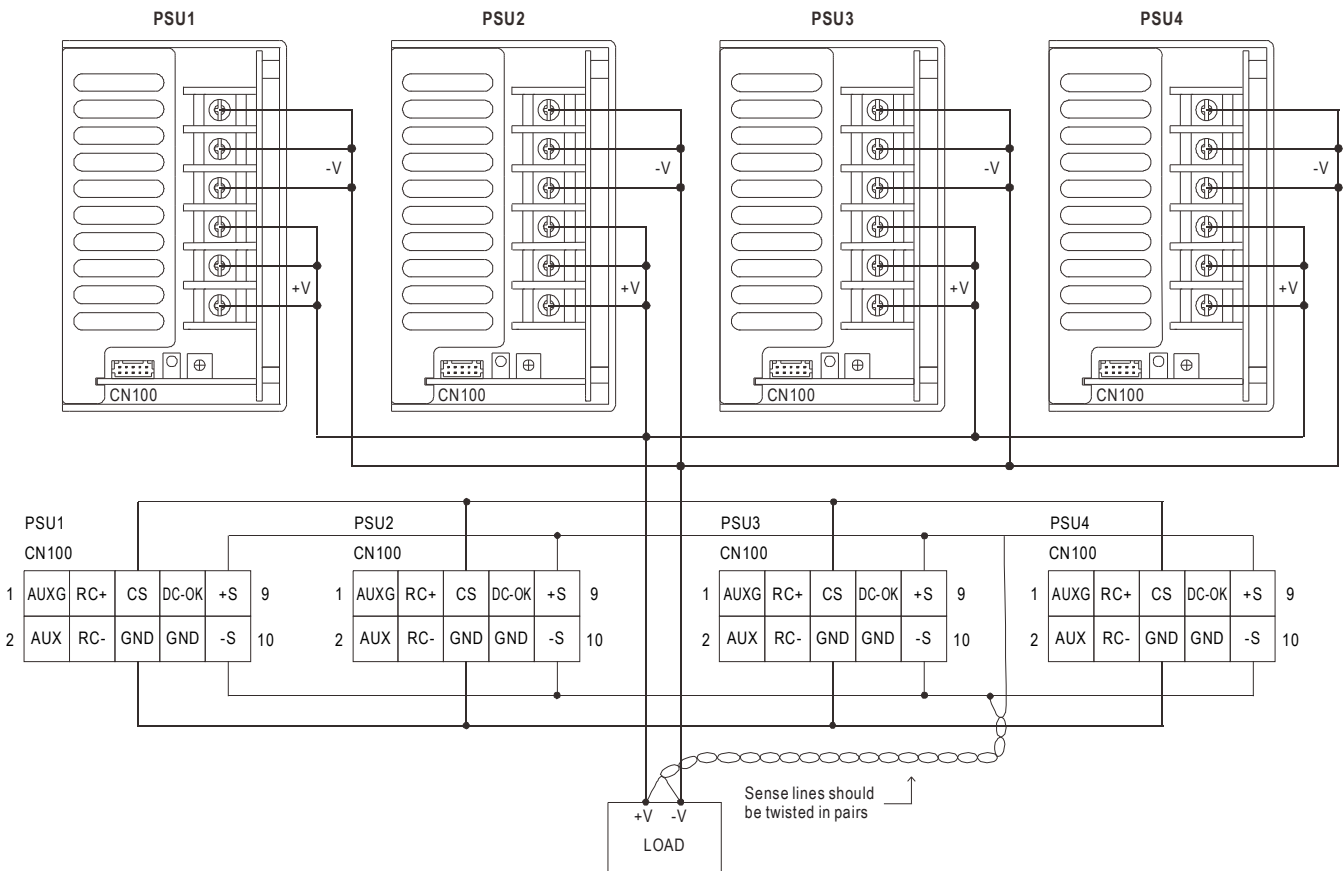


Fig 4. 1

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.