# 1600W Rack Mountable Front End Rectifier RCP-1600 series

Dimension

| L | * | W | * | H | |
|---|---|---|---|---|---|
| 300 | * | 85 | * | 41 (1U) | mm |
| 11.8 | * | 3.35 | * | 1.61 (1U) | inch |

Front

Back

User's Manual

UL62368-1 BS EN/EN62368-1 TPTC004 IEC62368-1

Industrial Automate Telecom Network EV

## Features

- Universal AC input / Full range
  (Withstand 300VAC surge input for 5 seconds)
- Built-in active PFC function
- High efficiency up to 93%
- Forced air cooling by built-in DC fan
- Output voltage and constant current level programmable
- Built-in OR-ing FET, support hot swap (hot plug)
- Active current sharing up to 8000W for one 19" rack shelf
- Built-in $I^2C$ interface, PMBus protocol
  (Optional CANBus protocol)
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Optional conformal coating
- 5 years warranty

## Applications

- Industrial automation
- Distributed power architecture system
- Wireless/telecommunication solution
- Redundant power system
- Electric vehicle charger system
- Constant current source system

## GTIN CODE

MW Search: https://www.meanwell.com/serviceGTIN.aspx

## Description

RCP-1600 is a 1.6KW single output rack mountable front end AC/DC power supply with a 1U low profile and a high power density up to 25W/inch$^3$. This series operates for 90~264VAC input voltage and offers the models with the DC output mostly demanded from the industry. Each model is cooled by the built-in DC fan with fan speed control, working for the temperature up to 70℃. RCP-1600 provides vast design flexibility by equipping various built-in functions such as the PMBus and CANBus communication protocol, output programming, active current sharing (up to 24000W via three 19" rack shelves, RHP-1U), remote control, auxiliary power, alarm signal, etc. Maximum number that can be monitored by master controller in communication shall be 15 power supplies.

## Model Encoding / Order Information

RCP - 1600 - 24 □

- □ — Communication protocol option
- 24 — Output voltage
- 1600 — Output wattage
- RCP — Series name

※ Note 1: 19" rack shelf, RHP-1U, available. Details available on http://www.meanwell.com/

※ Note 2: Control/Monitor unit, RKP-CMU1, available. Details available on http://www.meanwell.com/

| Type | Communication Protocol | Note |
|---|---|---|
| Blank | PMBus protocol | In Stock |
| CAN | CANBus protocol | By request |

## SPECIFICATION

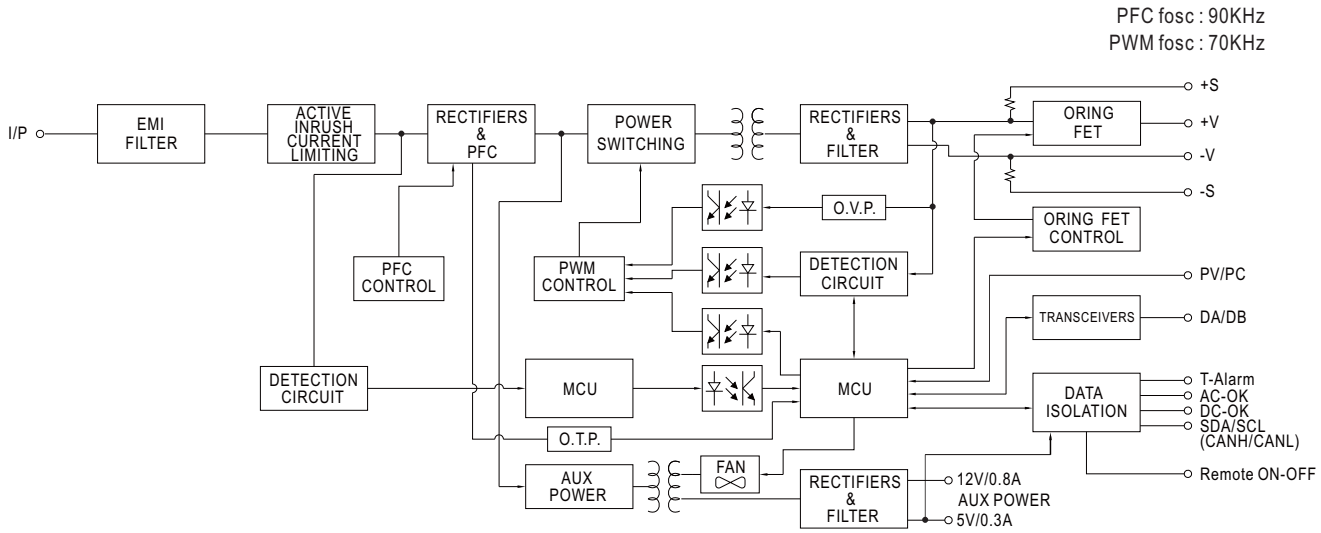
| MODEL | | RCP-1600-12 | RCP-1600-24 | RCP-1600-48 |
|---|---|---|---|---|
| OUTPUT | DC VOLTAGE | 12V | 24V | 48V |
| | RATED CURRENT | 125A | 67A | 33.5A |
| | CURRENT RANGE | 0 ~ 125A | 0 ~ 67A | 0 ~ 33.5A |
| | RATED POWER | 1500W | 1608W | 1608W |
| | RIPPLE & NOISE (max.) Note.2 | 150mVp-p | 200mVp-p | 300mVp-p |
| | VOLTAGE ADJ. RANGE Note.6 | 11.5 ~ 15V | 23.5 ~ 30V | 47.5 ~ 58.8V |
| | VOLTAGE TOLERANCE Note.4 | ±1.0% | ±1.0% | ±1.0% |
| | LINE REGULATION | ±0.5% | ±0.5% | ±0.5% |
| | LOAD REGULATION | ±0.5% | ±0.5% | ±0.5% |
| | SETUP, RISE TIME | 1500ms, 60ms/230VAC at full load | | |
| | HOLD UP TIME (Typ.) | 16ms / 230VAC at 75% load | 10ms / 230VAC at full load | |
| INPUT | VOLTAGE RANGE Note.5 | 90 ~ 264VAC | 250 ~ 370VDC | |
| | FREQUENCY RANGE | 47 ~ 63Hz | | |
| | POWER FACTOR (Typ.) | 0.97/230VAC at full load | | |
| | EFFICIENCY (Typ.) | 88.5% | 91% | 93% |
| | AC CURRENT (Typ.) Note.5 | 14A/115VAC 8A/230VAC | 15A/115VAC 8.5A/230VAC | |
| | INRUSH CURRENT (Typ.) | COLD START 35A/230VAC | | |
| | LEAKAGE CURRENT | <1.5mA / 230VAC | | |
| PROTECTION | OVERLOAD | 105 ~ 115% rated current | | |
| | | Protection type : Constant current limiting, shut down O/P voltage after 5 sec. After O/P voltage falls, re-power on to recover | | |
| | OVER VOLTAGE | 15.75 ~ 18.75V | 31.5 ~ 37.5V | 63 ~ 75V |
| | | 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 | OUTPUT VOLTAGE PROGRAMMABLE(PV) Note 6 | Adjustment of output voltage is allowable to 40 ~ 125% of nominal output voltage(60~125% for 12V).<br>Please refer to the Function Manual in following pages. | | |
| | OUTPUT CURRENT PROGRAMMABLE(PC) Note 6 | Adjustment of constant current level is allowable to 20 ~ 100% of rated current.<br>Please refer to the Function Manual in following pages. | | |
| | REMOTE ON-OFF CONTROL | By electrical signal or dry contact Power ON:short Power OFF:open. Please refer to the Function Manual in following pages. | | |
| | REMOTE SENSE | Compensate voltage drop on the load wiring up to 0.5V. Please refer to the Function Manual in following pages. | | |
| | AUXILIARY POWER | 5V @ 0.3A, 12V @ 0.8A | | |
| | ALARM SIGNAL | Isolated TTL signal output for T-Alarm, AC-OK and DC-OK | | |
| ENVIRONMENT | WORKING TEMP. | -30 ~ +70℃ (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20 ~ 90% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -40 ~ +85℃, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | ±0.03%/℃ (0 ~ 50℃) | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes | | |
| SAFETY & EMC (Note 8) | SAFETY STANDARDS | UL62368-1, CAN/CSA C22.2 No. 62368-1, TUV BS EN/EN62368-1, EAC TP TC 004 approved | | |
| | WITHSTAND VOLTAGE | I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC (0.5KVAC for 12V) | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH | | |
| | EMC EMISSION | **Parameter** | **Standard** | **Test Level / Note** |
| | | Conducted | BS EN/EN55032 (CISPR32) | Class B |
| | | Radiated | BS EN/EN55032 (CISPR32) | Class A |
| | | Harmonic Current | BS EN/EN61000-3-2 | Class A |
| | | Voltage Flicker | BS EN/EN61000-3-3 | ----- |
| | EMC IMMUNITY | BS EN/EN55035, BS EN/EN61000-6-2 | | |
| | | **Parameter** | **Standard** | **Test Level / Note** |
| | | ESD | BS EN/EN61000-4-2 | Level 3, 8KV air ; Level 2, 4KV 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 | >95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods |
| OTHERS | MTBF | 483.3K hrs min. Telcordia SR-332 (Bellcore) ; 39.4K hrs min. MIL-HDBK-217F (25℃) | | |
| | DIMENSION | 300*85*41mm (L*W*H) | | |
| | PACKING | 1.87Kg; 6pcs/12.2Kg/1.16CUFT | | |

**NOTE**

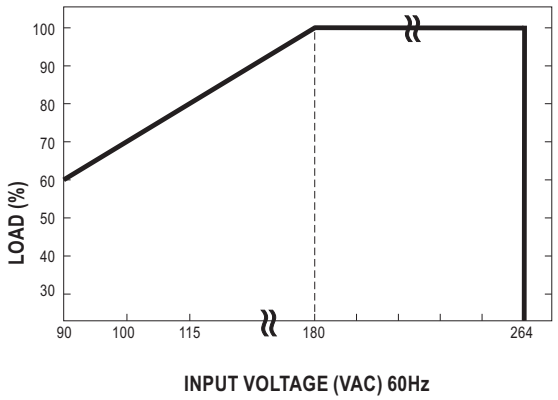
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Under parallel operation ripple of the output voltage may be higher than the SPEC at light load condition. It will go back to normal ripple level once the output load is more than 5%.
4. Tolerance : includes set up tolerance, line regulation and load regulation.
5. Derating may be needed under low input voltages. Please check the derating curve for more details.
6. PV/PC functions when users are not operating on PMBus/CANBus. SVR functions when users are neither operating on PMBus/CANBus nor using PV/PC.
7. Output will shut down after O/P voltage is below < 80% of Vset for 5 sec, re-power on to recover.
8. 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 720mm*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 https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf)
9. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/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



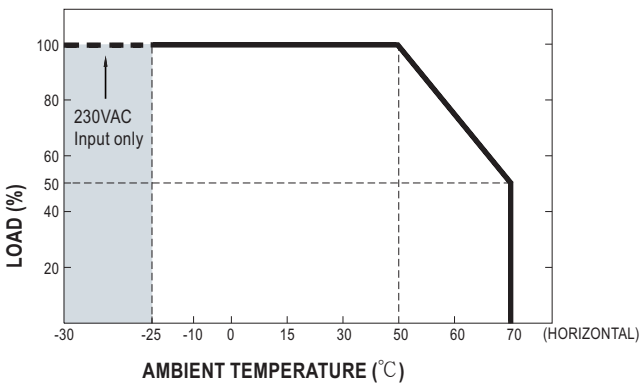

## ■ Static Characteristics



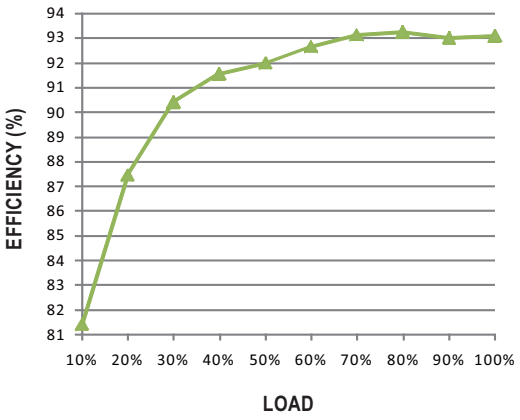

## ■ Derating Loads vs Input Voltage

| INPUT \ MODEL | 12V | 24V | 48V |
|---|---|---|---|
| 180~264VAC | 1500W<br>125A | 1608W<br>67A | 1608W<br>33.5A |
| 115VAC | 1200W<br>100A | 1286.4W<br>53.6A | 1286.4W<br>26.8A |
| 100VAC | 1050W<br>87.5A | 1125.6W<br>46.9A | 1125.6W<br>23.45A |
| 90VAC | 900W<br>75A | 964.8W<br>40.2A | 964.8W<br>20.1A |

## ■ Derating Curve




## ■ Efficiency vs Load (48V Model)



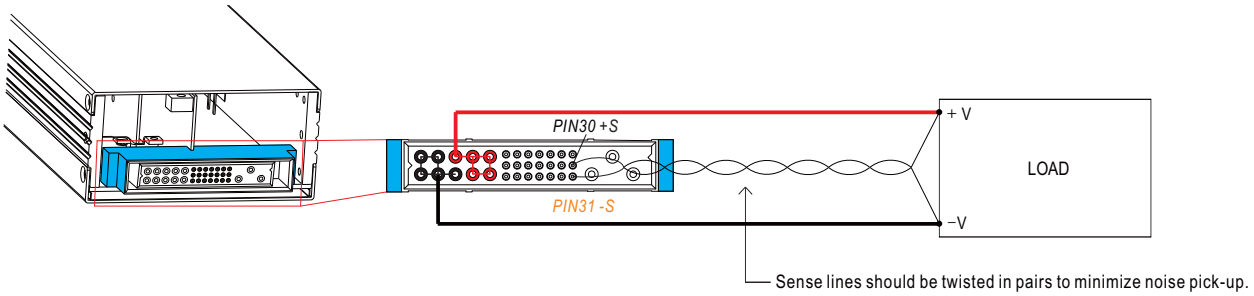

◎ The curve above is measured at 230VAC.

## ■ Function Manual

### 1. Voltage Drop Compensation

1.1 Remote Sense

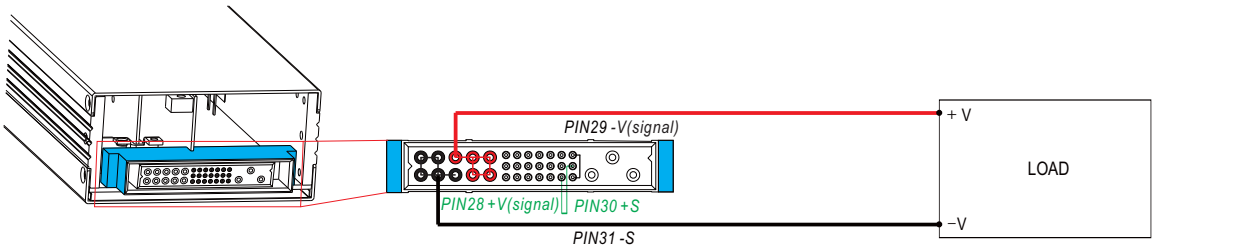
※ The Remote Sense compensates voltage drop on the load wiring up to 0.5V




◎ The +S signal should be connected to the positive terminal of the load whereas -S signal to the negative terminal.

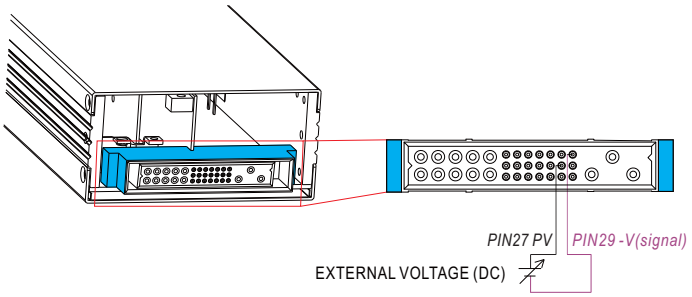
1.2 Local Sense

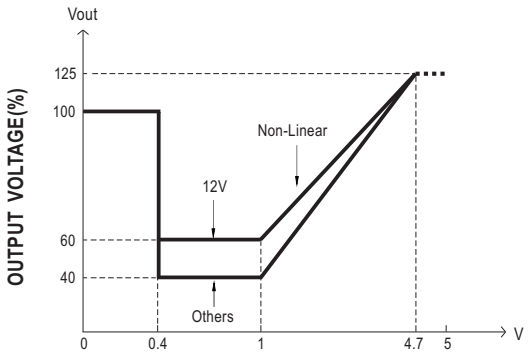
※ The +S,-S have to be connected to the +V(signal),-V(signal), respectively, as the following diagram, in order to get the correct output voltage if Remote Sense is not used.

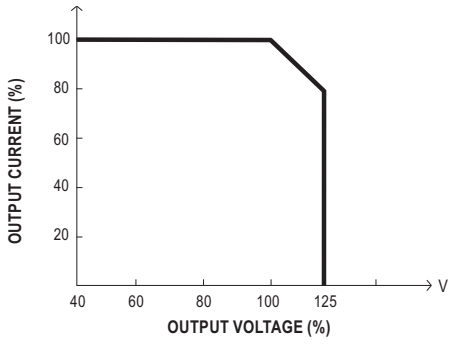



### 2. Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)

※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed to 40~125% of the nominal voltage by applying EXTERNAL VOLTAGE.



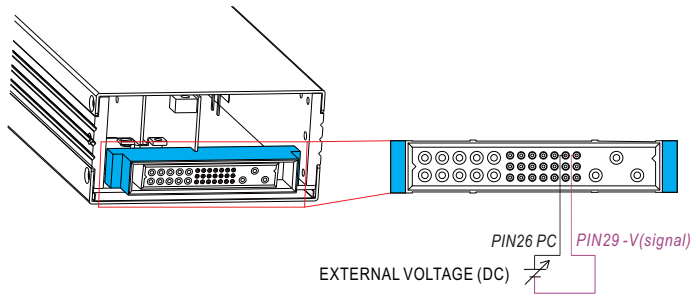




◎ The rated current should change with the Output Voltage Programming accordingly.

◎ For Remote Sense / Local Sense, please refer to “Voltage Drop Compensation” section.

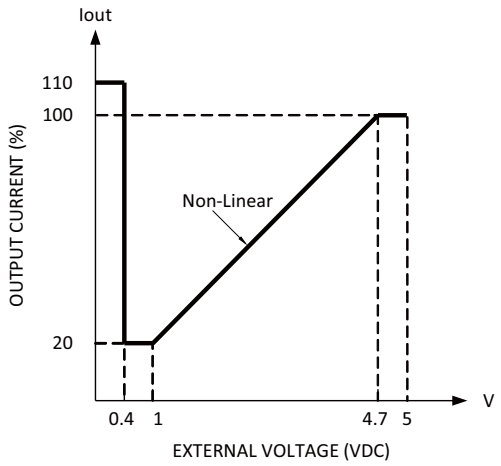
**3. Constant Current Level Programming (or, PC / remote current programming / dynamic current trim)**

※ The constant current level can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.



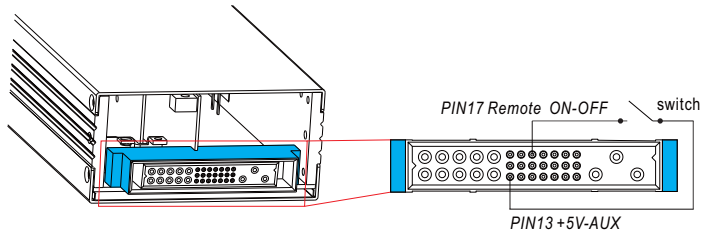

◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

◎ Output will shut down after O/P voltage is below < 80% of Vset for 5 sec, re-power on to recover .




**4. Remote ON-OFF Control**

The power supply can be turned ON/OFF individually or along with other units by using the "Remote ON-OFF" function.




| Between Remote ON-OFF and +5V-AUX | Power Supply Status |
|---|---|
| Switch Short | ON |
| Switch Open | OFF |

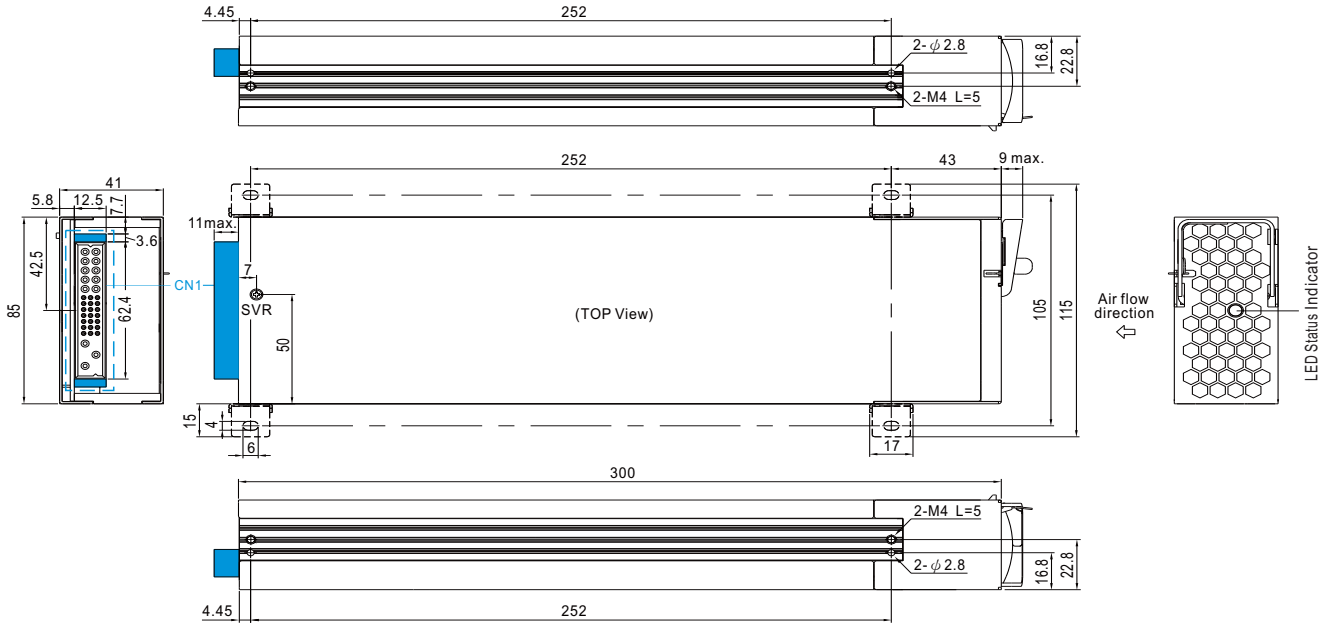
**5.PMBus Communication Interface**

RCP-1600 supports PMBus Rev. 1.1 with maximum 100KHz bus speed, allowing information reading, status monitoring, output trimming, etc. For details, please refer to the Function Manual.

## ■ Mechanical Specification

(Unit: mm , tolerance ±0.5mm)

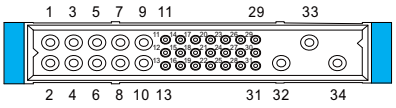
Case No.250




### ※ LED Status Indicators

| LED | Description |
|---|---|
| Green | The power supply functions normally. |
| Red | The LED will present a constant red light when the abnormal status (OTP, OLP, fan fail) arises. |
| Red (Flashing) | The LED will flash with the red light when the internal temperature reaches 60°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.) |

### ※ Input / Output Connector Pin No. Assignment(CN1) : Positronic PCIM34W13M400A1




| Mating Housing | Positronic PCIM34W13F400A1 |
|---|---|

| Pin No. | Function | Description |
|---|---|---|
| 1,2,3,4,6 | -V | Negative output terminal. |
| 5,7,8,9,10 | +V | Positive output terminal. |
| 11 | +12V-AUX | Auxiliary voltage output, 10.8~13.2V, referenced to *GND-AUX (pin 12)*.<br>The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by the *Remote ON/OFF* control. |
| 12 | GND-AUX | Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V). |
| 13 | +5V-AUX | Auxiliary voltage output, 4.5~5.5V, referenced to *GND-AUX (pin 12)*.<br>The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by the *Remote ON/OFF* control. |
| 14 | SCL | For PMBus model: Serial Clock used in the PMBus interface. (Note.2) |
| | CANL | For CANBus model: Data line used in CANBus interface. (Note.2) |
| 15 | SDA | For PMBus model: Serial Data used in the PMBus interface. (Note.2) |
| | CANH | For CANBus model: Data line used in CANBus interface. (Note.2) |
| 16 | T-ALARM | High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when fan fails.<br>Low (-0.5 ~ 0.5V) : When the internal temperature is normal, and when fan normally works.<br>The maximum sourcing current is 10mA and only for output(Note.2) |
| 17 | Remote ON-OFF | The unit can turn the output ON/OFF by electrical signal or dry contact between *Remote ON/OFF* and *+5V-AUX*. (Note.2)<br>Short (4.5 ~ 5.5V) : Power ON ; Open (-0.5 ~ 0.5V) : Power OFF ; The maximum input voltage is 5.5V. |
| 18 | $\overline{\text{DC-OK}}$ | High (3.5 ~ 5.5V) : When the Vout ≦77%±5%.<br>Low (-0.5 ~ 0.5V) : When Vout ≧80%±5%.<br>The maximum sourcing current is 10mA and only for output. (Note.2) |
| 19 | AC-OK | High (3.5 ~ 5.5V) : When the input voltage is ≧87Vrms .<br>Low (-0.5 ~ 0.5V) : When the input voltage is ≦75Vrms.<br>The maximum sourcing current is 10mA and only for output. (Note.2) |
| 20,21,22,23 | A3,A2,A1,A0 | PMBus / CANBus interface address lines. (Note.1) |
| 24,25 | DB,DA | Differential digital signal for parallel control. (Note.1) |
| 26 | PC | Connection for constant current level programming. (Note.1) |
| 27 | PV | Connection for output voltage programming. (Note.1) |
| 28 | +V (Signal) | Positive output voltage signal.<br>It is for local sense; it cannot be connected directly to the load. |
| 29 | -V (Signal) | Negative output voltage signal.<br>It is for local sense; and certain function reference; it cannot be connected directly to the load. |
| 30 | +S | Positive sensing for remote sense. |
| 31 | -S | Negative sensing for remote sense. |
| 32 | FG | AC Ground connection. |
| 33 | AC/L | AC Line connection. |
| 34 | AC/N | AC Neutral connection. |

Note1: Non-isolated signal, referenced to [-V(signal)].
Note2: Isolated signal, referenced to GND-AUX.