# 400W Reliable Green Medical Power Supply

# RPS-400 series

ANSI/AAMI ES60601-1 EN60601-1 IEC60601-1

ECO Medical 2xMOPP BF rated

## Features

- 5"×3" compact size
- Medical safety approved (2 x MOPP) according to ANSI/AAMI ES60601-1 and IEC/EN60601-1
- Suitable for BF application with appropriate system configuration
- 250W convection,400W force air
- EMI Class B for Class I & Class A for Class II configuration
- No load power consumption<0.5W by PS-ON control
- 5Vdc standby output, 12Vdc fan supply, Power Good, Power Fail and remote sense
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Operating altitude up to 4000 meters
- 3 years warranty

## Applications

- Oral irrigator
- Hemodialysis machine
- Medical computer monitors
- Sleep apnea devices
- Pump machine
- Electric bed

## Description

RPS-400 is a 400W highly reliable green PCB type medical power supply with a high power density on the 5" by 3" footprint. It accepts 80~264VAC input and offers various output voltages between 12V and 48V. The working efficiency is up to 94% and the extremely low no load power consumption is down below 0.5W. RPS-400 (blank type only) is able to be used for both Class I (with FG) or Class II (no FG) system design. The extremely low leakage current is less than 160μA. In addition, it conforms to international medical regulations (2*MOPP) and EMC EN55011, perfectly fitting all kinds of BF rated "patient contact" medical system equipment. RPS-400 series also offers the enclosed style models( -C / TF /SF )

## Model Encoding

**RPS - 400 - 12 -C**

- -C: Type
- 12: Output voltage
- 400: Rated wattage
- RPS: Series name

| Type | Description | Note |
|---|---|---|
| Blank | PCB Type | In stock |
| C | Enclosed casing Type | In stock |
| TF | Enclosed Type with fan on the top | In stock |
| SF | Enclosed Type with fan on the side | In stock |

## SPECIFICATION

| MODEL | | | RPS-400-12□ | RPS-400-15□ | RPS-400-18□ | RPS-400-24 | RPS-400-27□ | RPS-400-36□ | RPS-400-48□ |
|---|---|---|---|---|---|---|---|---|---|
| OUTPUT | DC VOLTAGE | | 12V | 15V | 18V | 24V | 27V | 36V | 48V |
| | CURRENT | 25CFM | 33.3A | 26.7A | 22.3A | 16.7A | 14.9A | 11.2A | 8.4A |
| | | Convection | 20.8A | 16.7A | 13.9A | 10.5A | 9.3A | 7A | 5.3A |
| | RATED POWER | 25CFM | 399.6W | 400.5W | 401.4W | 400.8W | 402.3W | 403.2W | 403.2W |
| | | Convection | 249.6W | 250.5W | 250.2W | 252W | 251.1W | 252W | 254.4W |
| | RIPPLE & NOISE (max.) Note.2 | | 120mVp-p | 120mVp-p | 150mVp-p | 150mVp-p | 200mVp-p | 200mVp-p | 200mVp-p |
| | VOLTAGE ADJ. RANGE(main output) | | 11.4~12.6V | 14.3~15.8V | 17.1~18.9V | 22.8~25.2V | 25.6 ~ 28.4V | 34.2 ~37.8V | 45.6 ~50.4V |
| | VOLTAGE TOLERANCE Note.3 | | ±3.0% | ±3.0% | ±3.0% | ±2.0% | ±1.0% | ±1.0% | ±1.0% |
| | LINE REGULATION | | ±0.5% | ±0.5% | ±0.5% | ±0.5% | ±0.5% | ±0.5% | ±0.5% |
| | LOAD REGULATION | | ±1.0% | ±1.0% | ±1.0% | ±1.0% | ±1.0% | ±1.0% | ±1.0% |
| | SETUP, RISE TIME | | 1000ms, 30ms/230VAC 1500ms, 30ms/115VAC at full load | | | | | | |
| | HOLD UP TIME (Typ.) | | 16ms/230VAC 16ms/115VAC at full load | | | | | | |
| INPUT | VOLTAGE RANGE Note.4 | | 80 ~ 264VAC 113 ~ 370VDC | | | | | | |
| | FREQUENCY RANGE | | 47 ~ 63Hz | | | | | | |
| | POWER FACTOR | | PF>0.94/230VAC PF>0.98/115VAC at full load | | | | | | |
| | EFFICIENCY (Typ.) | | 91.5% | 92% | 93% | 93% | 93.5% | 94% | 94% |
| | AC CURRENT (Typ.) | | 4.2A/115VAC 2.1A/230VAC | | | | | | |
| | INRUSH CURRENT (Typ.) | | COLD START 35A/115VAC 70A/230VAC | | | | | | |
| | LEAKAGE CURRENT (max.) Note.5 | | Earth leakage current <200μA/264VAC 50Hz , Touch current < 70μA/264VAC | | | | | | |
| PROTECTION | OVERLOAD | | 105 ~ 135% rated output power | | | | | | |
| | | | Protection type : Hiccup mode, recovers automatically after fault condition is removed | | | | | | |
| | OVER VOLTAGE | | 13.2 ~ 15.6V | 16.5 ~ 19.5V | 19.8 ~23.4V | 26.4 ~ 31.2V | 29.7 ~ 35.1V | 39.6 ~ 46.8V | 52.8 ~ 62.4V |
| | | | Protection type : Shut down o/p voltage, re-power on to recover | | | | | | |
| | OVER TEMPERATURE | | Protection type : Shut down o/p voltage, recovers automatically after temperature goes down | | | | | | |
| FUNCTION | 5V STANDBY | | 5Vsb : 5V@0.6A without fan, 1A with fan 25CFM ;<br>Tolerance ±2%, ripple : 120mVp-p(max.) | | | | | | |
| | FAN SUPPLY | | 12V@0.5A for driving fan ;<br>Tolerance ±10% | | | | | | |
| | PS-ON INPUT SIGNAL | | Power on: PS-ON = "Hi" or " > 2 ~ 5V" ;<br>Power off: PS-ON = "Low" or " < 0 ~ 0.5V" | | | | | | |
| | POWER GOOD / POWER FAIL | | 500ms>PG>10ms ; The TTL signal goes high with 10ms to 500ms delay after power set up ;<br>The TTL signal goes low at least 1ms before Vo below 90% of rated value | | | | | | |
| 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 | | | | | | |
| | OPERATING ALTITUDE Note.6 | | 4000 meters | | | | | | |

## SPECIFICATION

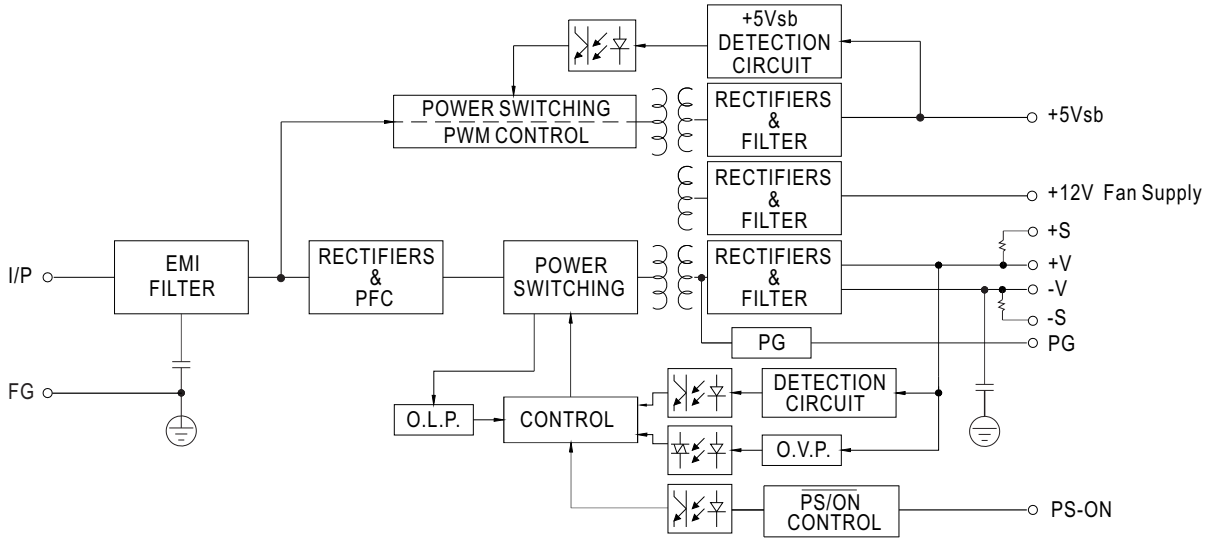
| | | | | | | |
|---|---|---|---|---|---|---|
| SAFETY & EMC (Note 7) | SAFETY STANDARDS | IEC60601-1, TUV EN60601-1,EAC TP TC 004,<br>UL ANSI / AAMI ES60601-1 (3.1 version),<br>CAN/CSA-C22.2 No. 60601-1:14 - Edition 3 approved;<br>Design refer to EN60335-1 | | | | |
| | ISOLATION LEVEL | Primary-Secondary: 2xMOPP, Primary-Earth:1xMOPP, Secondary-Earth:1xMOPP | | | | |
| | WITHSTAND VOLTAGE | I/P-O/P:4KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC | | | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH | | | | |
| | EMC EMISSION | **Parameter** | **Standard** | **Test Level / Note** | | |
| | | Conducted emission | EN55011 (CISPR11) | Class B(Please see last page note1) | | |
| | | Radiated emission | EN55011 (CISPR11) | Class B(Please see last page note1) | | |
| | | Harmonic current | EN61000-3-2 | Class A | | |
| | | Voltage flicker | EN61000-3-3 | ----- | | |
| | EMC IMMUNITY | EN55024 , EN60601-1-2, EN61204-3 | | | | |
| | | **Parameter** | **Standard** | **Test Level / Note** | | |
| | | ESD | EN61000-4-2 | Level 4, 15KV air ; Level 4, 8KV contact | | |
| | | RF field susceptibility | EN61000-4-3 | Level 3, 10V/m( 80MHz~2.7GHz )<br>Table 9, 9~28V/m( 385MHz~5.78GHz ) | | |
| | | EFT bursts | EN61000-4-4 | Level 3, 2KV | | |
| | | Surge susceptibility | EN61000-4-5 | Level 4, 4KV/Line-FG ; 2KV/Line-Line | | |
| | | Conducted susceptibility | EN61000-4-6 | Level 3, 10V | | |
| | | Magnetic field immunity | EN61000-4-8 | Level 4, 30A/m | | |
| | | Voltage dip, interruption | EN61000-4-11 | 100% dip 1 periods, 30% dip 25 periods,<br>100% interruptions 250 periods | | |
| OTHERS | MTBF | 194.1Khrs min. MIL-HDBK-217F (25℃) | | | | |
| | DIMENSION | Type | RPS-400 | RPS-400-C | RPS-400-TF | RPS-400-SF |
| | | L*W*H | 127*76.2*35mm | 130*86*43mm | 130*86*66.5mm | 160*86*43mm |
| | | | 5″*3″*1.37″inch | 5.11″*3.39″*1.69″inch | 5.11″*3.39″*2.62″inch | 6.3″*3.39″*1.69″inch |
| | PACKING | P.W. | 0.39Kg | 0.51Kg | 0.58Kg | 0.64Kg |
| | | Q'TY | 36pcs | 24pcs | 24pcs | 24pcs |
| | | G.W. | 15Kg | 13.2Kg | 14.9Kg | 16.4Kg |
| | | M'MENT | 1.03CUFT | 0.77CUFT | 0.86CUFT | 0.91CUFT |

**NOTE**

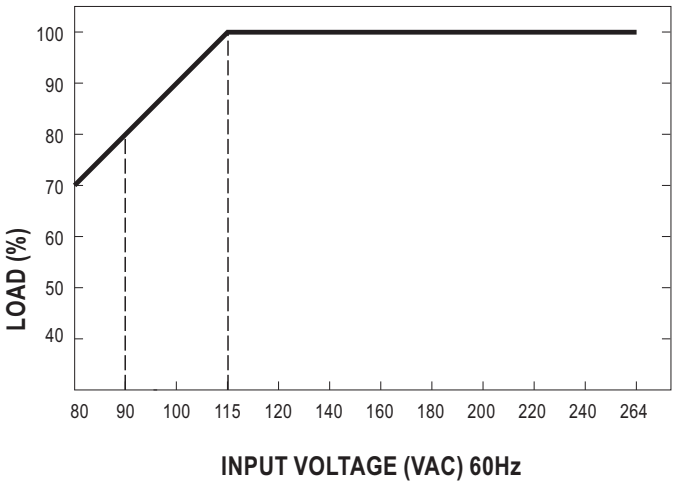
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25 of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1μf & 47μf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. Derating may be needed under low input voltages. Please check the derating curve for more details.
5. Touch current was measured from primary input to DC output.
6. 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).
7. The power supply is considered a component which will be installed into a final equipment. All the Class Ⅰ (with FG) EMC tests are executed by mounting the unit on a 360mm*360mm metal plate with 1mm of thickness. The Class Ⅱ (without FG) EMC tests are executed by mounting the unit on a 130mm*86.6mm 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)

## ■ Block Diagram

PFC fosc : 90KHz
PWM fosc : 100KHz

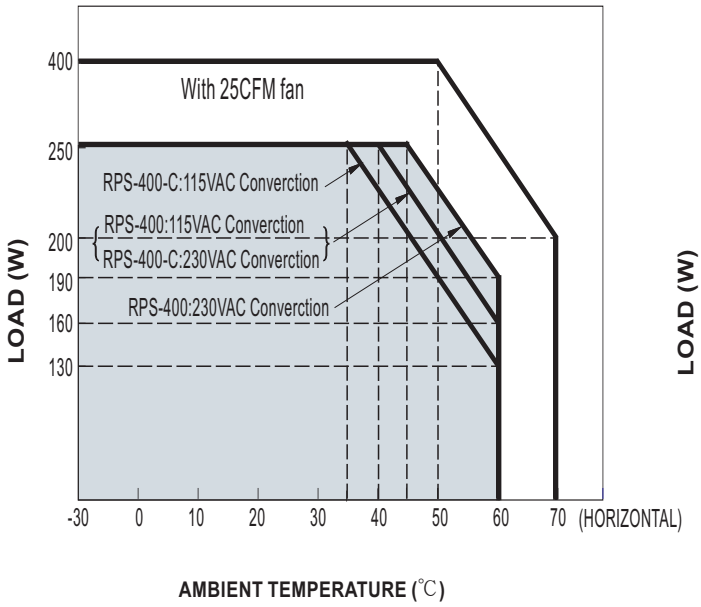



## ■ Output Derating vs Input Voltage

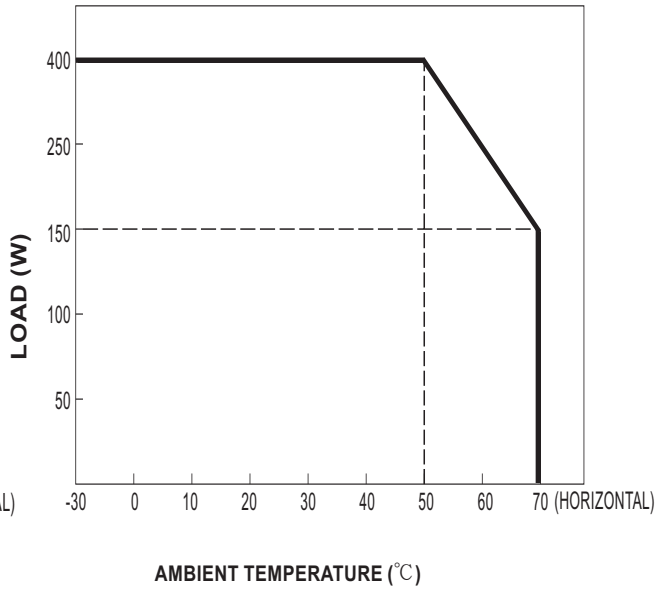


## ■ Derating Curve

◎ **RPS-400 & RPS-400-C**




◎ **RPS-400-TF/SF**

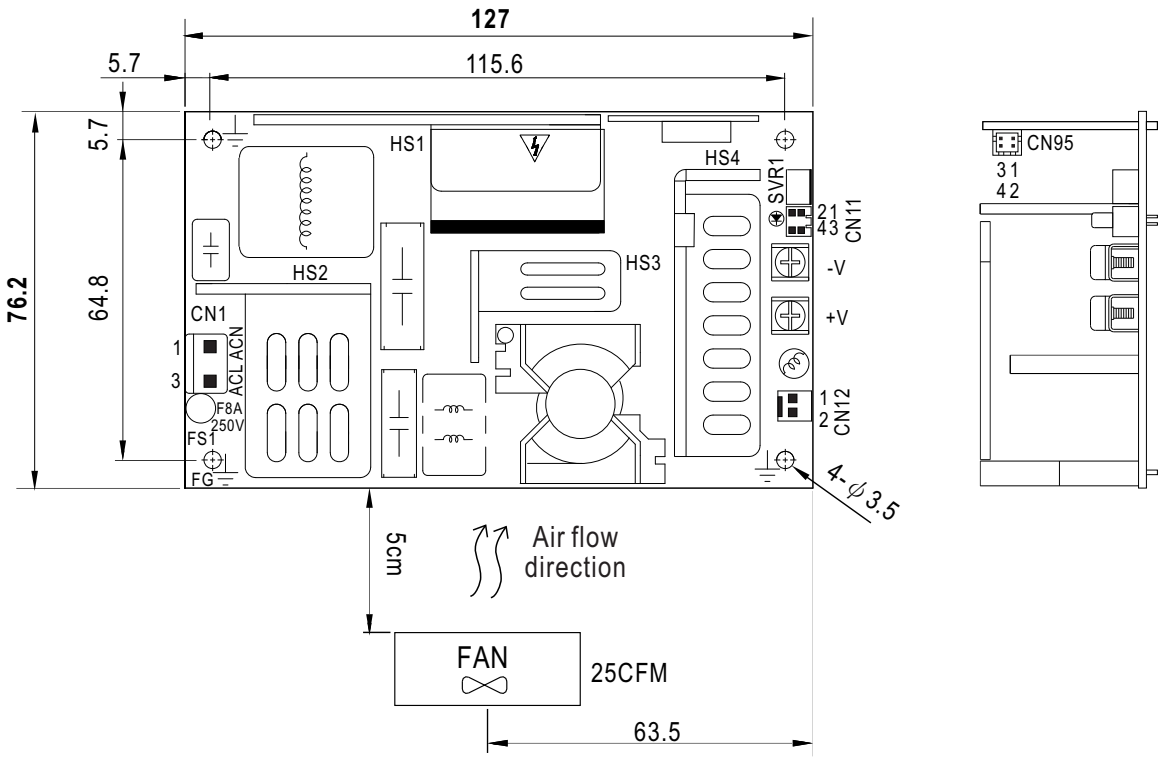


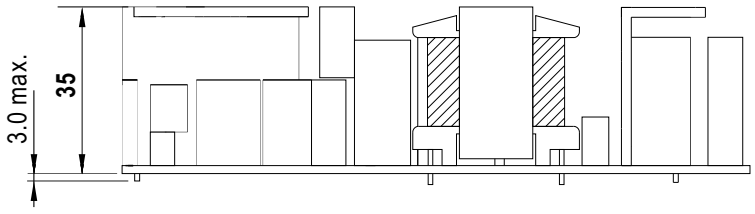

| Order No. | RPS-400 | RPS-400-C | RPS-400-TF | RPS-400-SF |
|---|---|---|---|---|
| Products |  |  |  |  |
| Convection | 250W | 250W | --- | --- |
| Force Air | 400W | 400W | 400W | 400W |

## ■ Mechanical Specification

### ● RPS-400 (PCB Type)

Top View

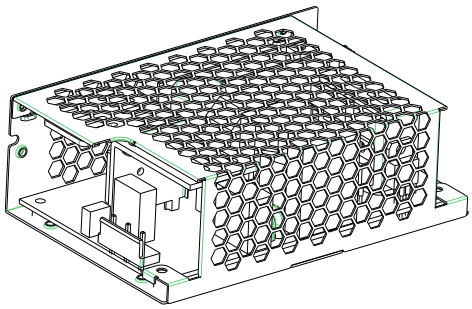


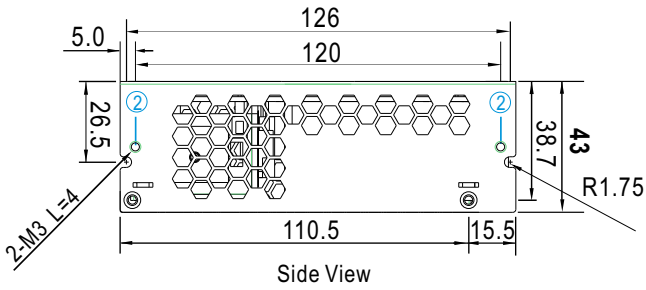




Side View

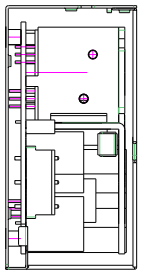
## RPS-400-C (Enclosed type)

Case No. 247A Unit:mm

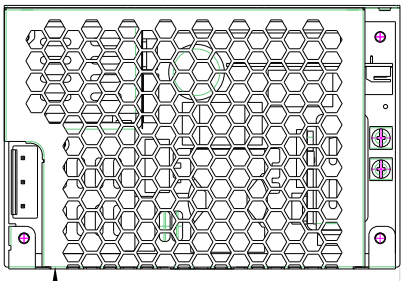




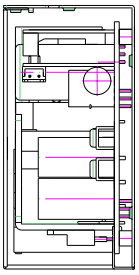

Side View



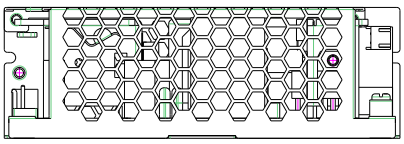
Side View



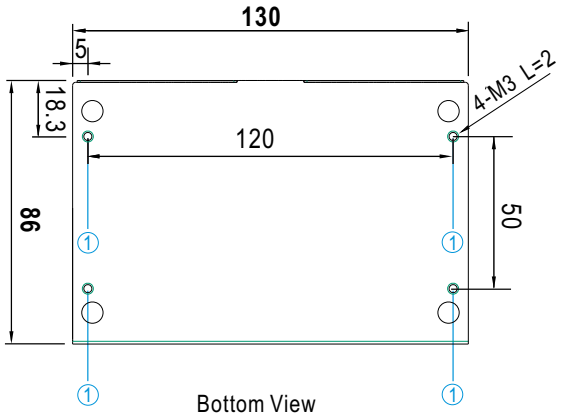

Top View



Side View



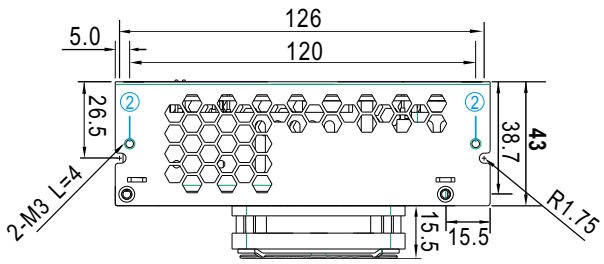
Side View



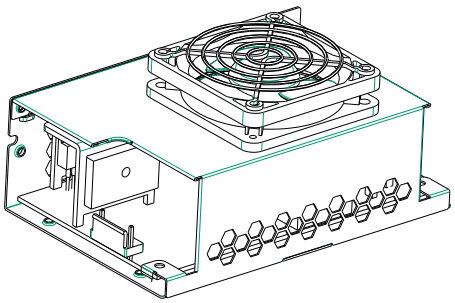

Bottom View

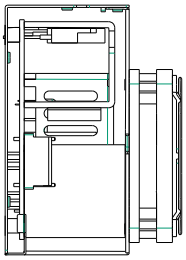
## RPS-400-TF (Enclosed type with fan on the top)

Case No. 247A-D 247B-T Unit:mm

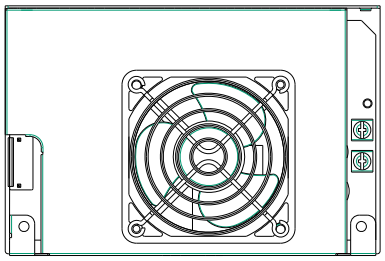



Side View

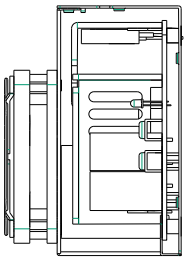




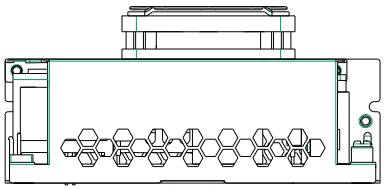
Side View



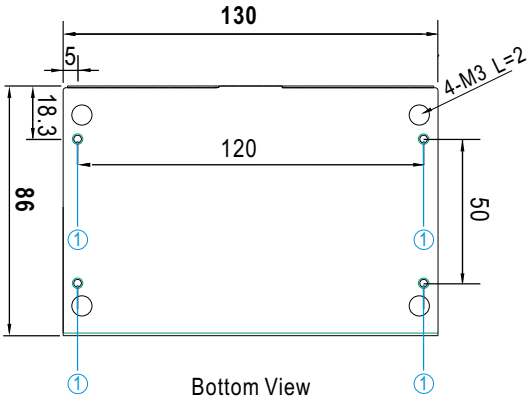
Top View



Side View

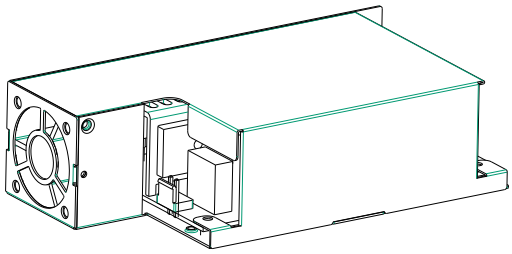
Side View

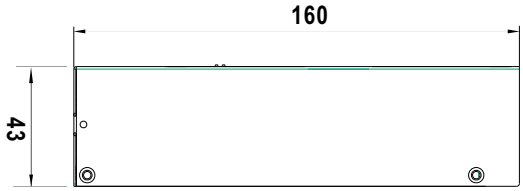



Bottom View

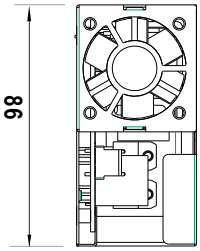
## RPS-400-SF (Enclosed type with fan on the side)

Case No. 248A Unit:mm

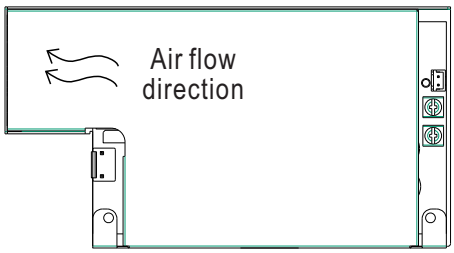




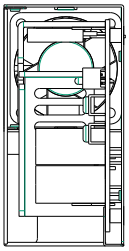

Side View




Side View

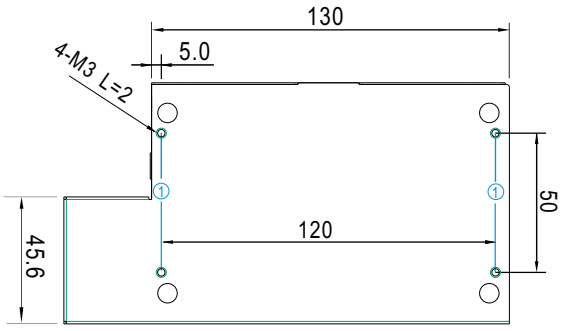



Top View



Side View

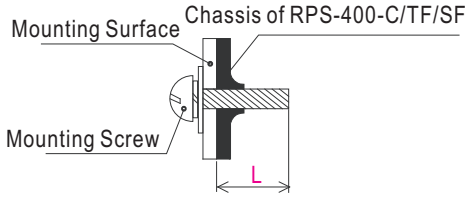
Side View




Bottom View

## ※ Mounting Instruction for -C/-TF/-SF Type

| Hole No. | Recommended Screw Size | MAX. Penetration Depth L | Recommended mounting torque |
|---|---|---|---|
| ① | M3 | 2mm | 4~6Kgf-cm |
| ② | M3 | 4mm | 4~6Kgf-cm |




## ※ CONNECTION

AC Input Connector (CN1) : JST B3P-VH or equivalent

| Pin No. | Assignment | Mating Housing | Terminal |
|---|---|---|---|
| 1 | AC/N | JST VHR or equivalent | JST SVH-21T-P1.1 or equivalent |
| 2 | No Pin | | |
| 3 | AC/L | | |

DC Output Connector (CN2,CN3)

| Pin No. | Assignment | Output Terminals |
|---|---|---|
| CN2 | -V | M3.5 Pan HD screw in 2 positions Torque to 8 lbs-in(90cNm)max. |
| CN3 | +V | |

⚠ HS1,HS2,HS3,HS4 can not be shorted

Function Connector(CN11): TKP DH2I-2X2 or equivalent

| Pin No. | Assignment | Mating Housing | Terminal |
|---|---|---|---|
| 1 | -S | TKP DH2 or equivalent | TKP or equivalent |
| 2 | +S | | |
| 3 | DC COM | | |
| 4 | PG | | |

Function Connector(CN95): TKP DH2L-2X2 or equivalent

| Pin No. | Assignment | Mating Housing | Terminal |
|---|---|---|---|
| 1 | 5Vsb | TKP DH2 or equivalent | TKP or equivalent |
| 2,4 | DC COM | | |
| 3 | PS-ON | | |

FAN Connector(CN12) : TKP 8812-2 or equivalent
(Except for RPS-400-TF/SF)

| Pin No. | Assignment | Mating Housing | Terminal |
|---|---|---|---|
| 1 | DC COM | TKP 2502 or equivalent | TKP 8811 or equivalent |
| 2 | +12V | | |

※ Note: 1. When the input voltage is 230VAC, the PCB type (Blank-Type) model delivers EMI Class B for both conducted emission and radiated emission for the power supply; When the input voltage is 110VAC, the PCB type (Blank Type) model delivers EMI Class B for conducted emission and Class A for radiated emission for the power supply. It delivers Class A for conducted emission and radiated emission, when configured into Class II (no FG) system.

2. The enclosed type (-C/TF/SF type) models are not suitable for configuration within a Class II (without FG) system, but suggested within a Class I (with FG) system.

3. Mounting Instruction for enclosed type.

## ■ Installation Manual

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