



Ordering No.: HS-656
(Water-Cooling Plate)



Features

- High voltage output(115/230/380V DC)
- Slim and Low profile (60mm)
- Fanless design with water or conduction cooling
- Active PFC design and efficiency up to 96%
- Built-in PMBus communication protocol, CANbus optional
- Output voltage and constant current level programmable
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in remote ON/OFF control and DC-OK active signal
- Optional water-cooling plate for quick installation
- OVC III operating altitude up to 2000 meter
- LED indicator for power on
- 5 years warranty

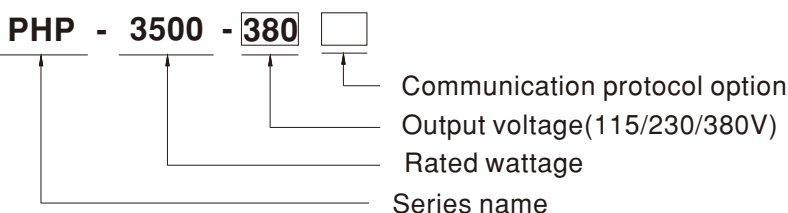
Applications

- Industrial automation machinery
- Industrial control system
- Mechanical and electrical equipments
- Electronic instruments, equipments
- Laser equipments
- Household appliances
- Charging system
- Electrolysis system
- DC centralized bus

Description

PHP-3500-HV series is a 3500W single-output slim type power supply with 60mm of low profile design. Adopting the full range 90~264VAC input, the entire series provides an output voltage line of 115V, 230V and 380VDC. In addition to the high efficiency up to 96%, that the whole series operates from -30°C ~ +70°C under water cooling. PHP-3500-HV has the complete protection functions and 2G anti-vibration capability; it complies with the international safety regulations such as TUV BS EN/EN62368-1, UL62368-1, and design refers to BS EN/EN61558-1 and BS EN/EN60335-1. PHP-3500-HV series serves as a high performance power supply solution for various industrial and DC centralized bus applications.

Model Encoding



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

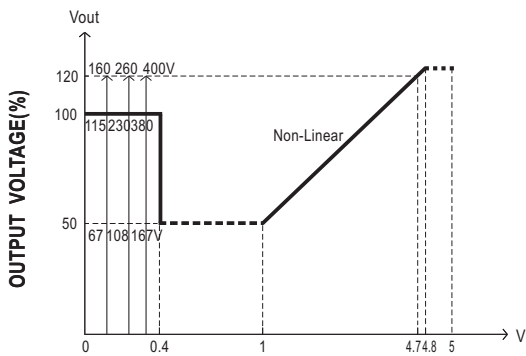
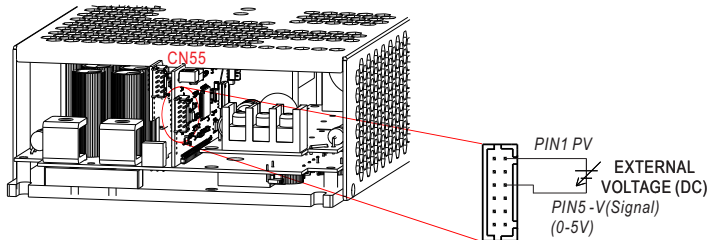
SPECIFICATION

| MODEL | PHP-3500-115 | PHP-3500-230 | PHP-3500-380 | |
|--------------------------------|---|--|--|---|
| OUTPUT | DC VOLTAGE | 115V | 230V | 380V |
| | CURRENT (Factory default) | 25.2A | 15.2A | 9.2A |
| | RATED CURRENT(Max.) | 26.3A | 16.1A | 10.5A |
| | POWER (Factory default) | 2898W | 3500W | 3500W |
| | RATED POWER(Max.) Note.11 | 3500W | 3500W | 3500W |
| | RIPPLE & NOISE (max.) Note.2 | 1.15Vp-p | 2.3Vp-p | 3.8Vp-p |
| | VOLTAGE ADJ. RANGE | By built-in potentiometer, SVR | | |
| | | 110~160V | 170~260V | 260~400V |
| | VOLTAGE TOLERANCE Note.3 | ±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 | 2000ms, 60ms/230VAC at full load 2500ms, 60ms/115VAC at 60% load | | | |
| HOLD UP TIME (Typ.) | 16ms/230VAC at 75% load 10ms/230VAC at full load 10ms/115VAC at 60% load | | | |
| INPUT | VOLTAGE RANGE Note.4 | 90 ~ 264VAC 127 ~ 370VDC | | |
| | FREQUENCY RANGE | 47 ~ 63Hz | | |
| | POWER FACTOR (Typ.) | PF ≥ 0.95/230VAC at full load PF ≥ 0.95/115VAC at 60% load | | |
| | EFFICIENCY (Peak) Note 10 | 95% | 95.5% | 96% |
| | AC CURRENT (Typ.) | 20A/230VAC 21A/115VAC | | |
| | INRUSH CURRENT (Typ.) | Cold start 80A/230VAC 40A/115VAC | | |
| LEAKAGE CURRENT | 2mA / 240VAC | | | |
| PROTECTION | OVERLOAD | 105 ~ 115% rated output power Protection type : Constant current limiting, unit will shut down after 5 sec, re-power on to recover. | | |
| | SHORT CIRCUIT | Protection type : Constant current limiting, unit will shut down after 5 sec, re-power on to recover. | | |
| | OVER VOLTAGE | 168 ~ 200V | 273 ~ 320V | 413 ~ 460V |
| | OVER TEMPERATURE | Protection type : Shut down O/P voltage, re-power on to recover | | |
| FUNCTION | OUTPUT VOLTAGE PROGRAMMABLE(PV) Note 5,6 | Adjustment of output voltage is allowable to 50~120% of nominal output voltage. Please refer to the function manual | | |
| | OUTPUT CURRENT PROGRAMMABLE(PC) Note 6 | Adjustment of constant current level is allowable to 20 ~ 100% of rated current. Please refer to the Function Manual. | | |
| | REMOTE ON/OFF CONTROL | Power ON : Short circuit Power OFF : Open circuit | | |
| | AUXILIARY POWER | 12V@0.5A tolerance±10%, ripple 150mVp-p | | |
| | DC-OK SIGNAL | The TTL signal out, PSU turn on = -0.5 ~ 0.5V ; PSU turn off = 3.5 ~ 5.5V. Please refer to the Function Manual. | | |
| ENVIRONMENT | WORKING TEMP. | -30 ~ +70°C (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20 ~ 90% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -40 ~ +85°C, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | ±0.03%/°C (0 ~ 50°C) | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes | | |
| | OVER VOLTAGE CATEGORY | III ; According to EN61558 ; altitude up to 2000 meters. | | |
| SAFETY & EMC (Note.7,8) | SAFETY STANDARDS | UL62368-1, TUV BS EN/EN62368-1, EAC TP TC 004 approved ; design refers to BS EN/EN61558-1, BS EN/EN60335-1 | | |
| | WITHSTAND VOLTAGE | I/P-O/P:6KVDC I/P-FG:4KVDC O/P-FG:4KVDC | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG,O/P-FG:100M Ohms/500VDC/25°C / 70%RH | | |
| | EMC EMISSION | Parameter | Standard | Test Level / Note |
| | | Conducted | EN55032 (CISPR32) | Class B |
| | | Radiated | EN55032 (CISPR32) | Class A |
| | | Harmonic Current | EN61000-3-12 | ---- |
| | EMC IMMUNITY | Parameter | Standard | Test Level / Note |
| | | ESD | EN61000-4-2 | Level 3, 8KV air ; Level 2, 4KV contact |
| | | Radiated | EN61000-4-3 | Level 3 |
| EFT / Burst | | EN61000-4-4 | Level 3 | |
| Surge | | EN61000-6-2 | 2KV/Line-Line 4KV/Line-Earth | |
| Conducted | | EN61000-4-6 | Level 3 | |
| Magnetic Field | | EN61000-4-8 | Level 4 | |
| Voltage Dips and Interruptions | | EN61000-4-11 | >95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods | |
| OTHERS | MTBF | 192.1K hrs min. 63.9Khrs MIL-HDBK-217F (25°C) | | |
| | DIMENSION | 380*141.4*60mm (L*W*H) | | |
| | PACKING | 4.5Kg;4pcs/19Kg/2.46CUFT | | |
| NOTE | <p>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.</p> <p>2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.</p> <p>3. Tolerance :includes set up tolerance, line regulation and load regulation.</p> <p>4. Derating may be needed under low input voltages. Please check the derating curve for more details.</p> <p>5. Without water or fan cooling to provide adequate heat dissipation, OTP might be triggered if trimming output voltage by PV signal toward upper or lower limits of nominal voltage. Under such condition, enhanced cooling on PSU is highly recommended.</p> <p>6. In the control priority on Vout and Iout trimming, Please refer to the table on page 9.</p> <p>7. Need additional EMI filter to meet regulations of EMC conducted and radiated emission. Characteristics of EMI filter please refer to the table, Minimum Insertion Loss.</p> <p>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 600mm*900mm 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)</p> <p>9. The ambient temperature derating of 3.5°C/1000m with fanless models and of 5°C/1000m with fan models for operating altitude higher than 2000m(6500ft).</p> <p>10. The efficiency level is measured at output voltage: 133V (115V model)/ 217V (230V model)/ 333V (380V model).</p> <p>11. Refer to derating curve.</p> <p>※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx</p> | | | |

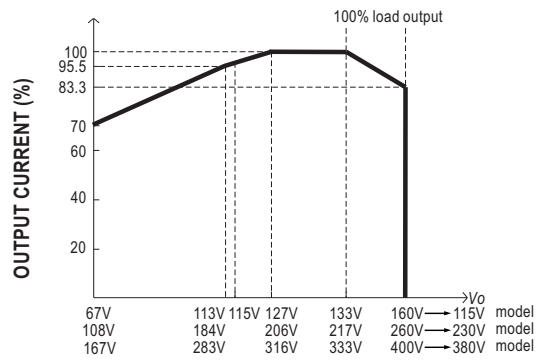
FUNCTION MANUAL

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

115V, 230V, 380V model



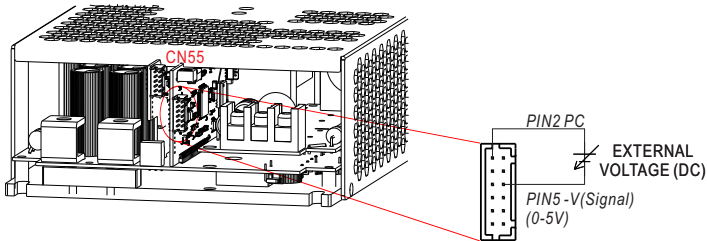
© The 100% output voltage is based on default.



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

2. Output Current Programming (or, PC / remote current programming / dynamic current trim)

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

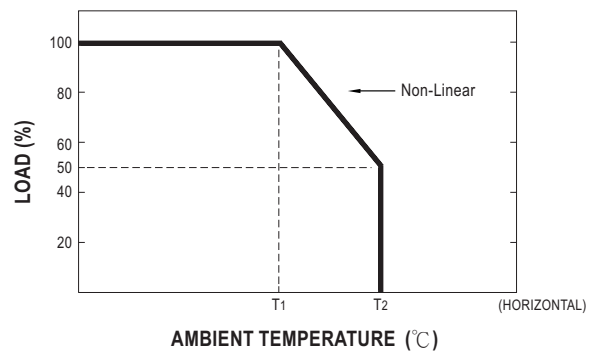
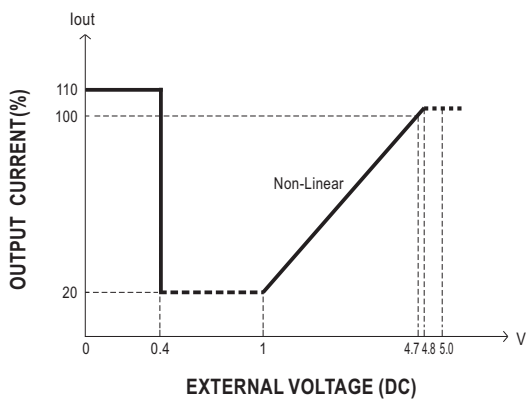


115V, 230V, 380V model

※ Covered by over temperature protection, auto de-rating function works under operation either in PC mode or under control by communication protocol.

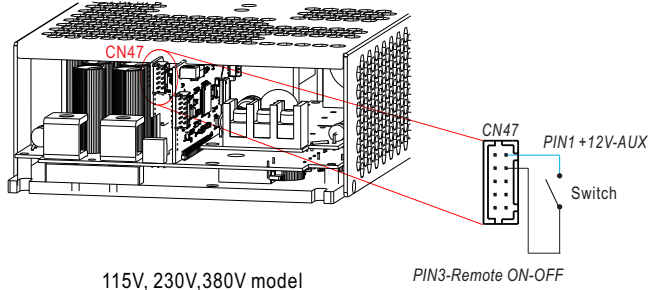
T₁(Typ.): Maximum ambient temperature of full load.

T₂(Typ.): T₁+5°C.



3. Remote ON-OFF Control

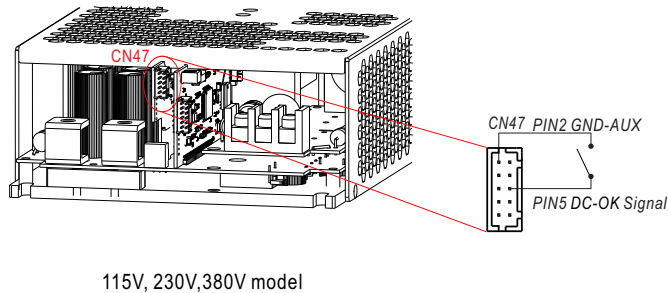
The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.



| Remote ON-OFF | Power Supply Status |
|---------------|---------------------|
| Short circuit | ON |
| Open circuit | OFF |

4. DC-OK Signal

DC-OK signal is a TTL level signal. The maximum sourcing current is 10mA and the maximum external voltage is 5.6V.



| DC-OK signal | Power Supply Status |
|------------------|---------------------|
| "High" >3.5~5.5V | OFF |
| "Low" <-0.5~0.5V | ON |

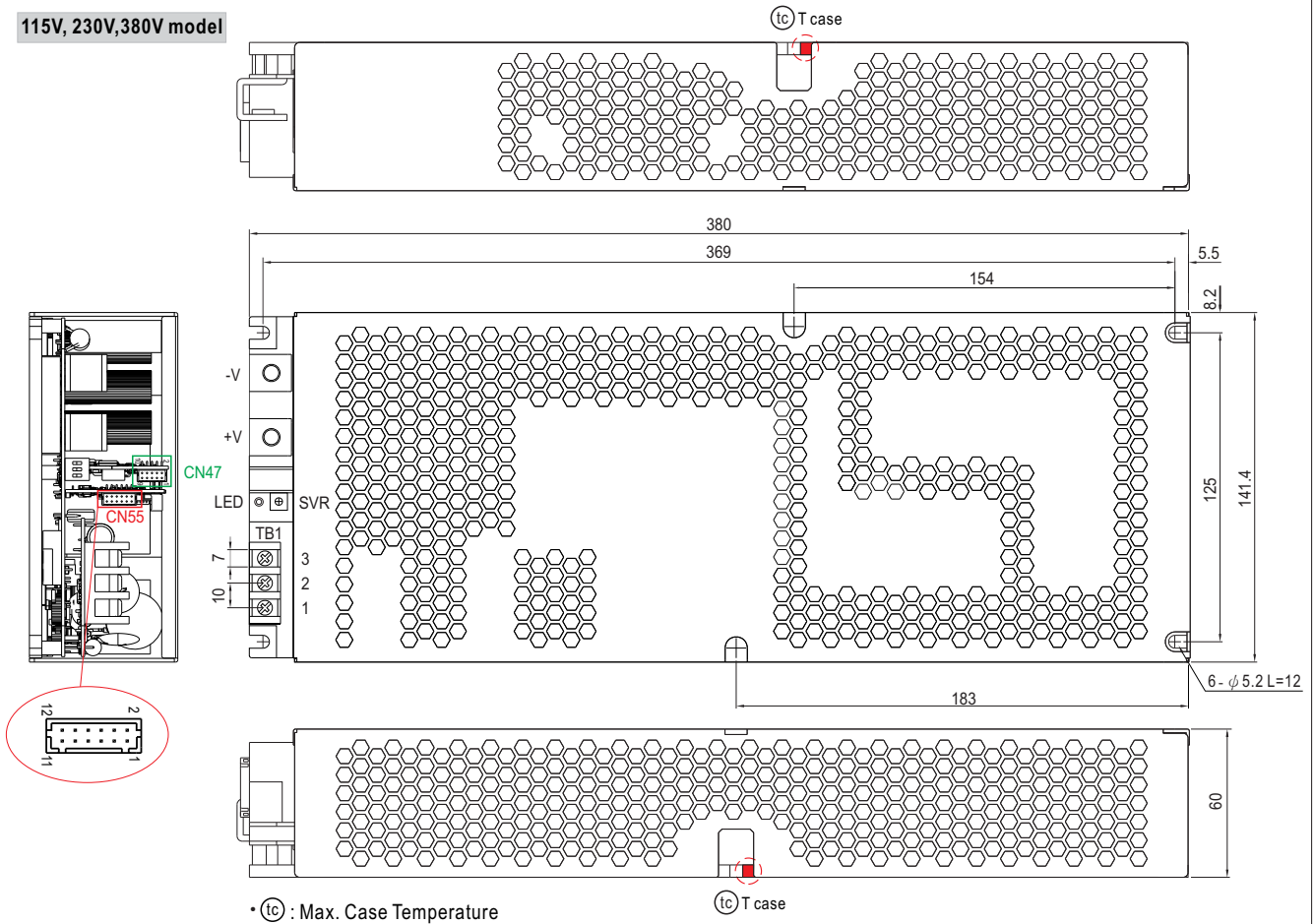
5. PMBus Communication Interface

PHP-3500-HV 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

Case No.278A Unit:mm

115V, 230V,380V model



• (tc) : Max. Case Temperature

(tc) T case

AC Input Terminal(TB1) Pin NO. Assignment

| Pin No. | Assignment | Terminal | Max mounting torque |
|---------|------------|---------------------|---------------------|
| 1 | AC/L | DECA T25-EM10-03 | 18Kgf-cm |
| 2 | AC/N | | |
| 3 | ⊥ | | |

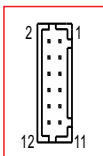
※DC Output Terminal Pin No. Assignment

| Assignment | Diagram | Maximum mounting torque |
|------------|---------|-------------------------|
| +V, -V | | 10Kgf-cm |

※ LED Status Indicators

| LED | Description |
|---------------|--|
| Green | The power supply functions normally. |
| Red(Flashing) | The LED will flash with red light when internal temperature reaches 85°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 / CANBus interface.) |
| Red | Abnormal status (Over temperature protection, Overload protection) |

※Control Pin No. Assignment(CN55) : HRS DF11-12DP-2DS or equivalent



| | |
|----------------|-----------------------------|
| Mating Housing | HRS DF11-12DS or equivalent |
| Terminal | HRS DF11-12SC or equivalent |

| Pin No. | Function | Description |
|----------------|-------------|---|
| 1,3 | PV | Connection for output voltage programming. (Note.1) |
| 2,4 | PC | Connection for constant current level programming. (Note.1) |
| 5,6 | -V (Signal) | Negative output voltage signal. |
| 7,8,9,10,11,12 | NC | |

Note1: Non-isolated signal, referenced to [-V(signal)].

※Control Pin No. Assignment(CN47) : HRS DF11-10DP-2DS or equivalent



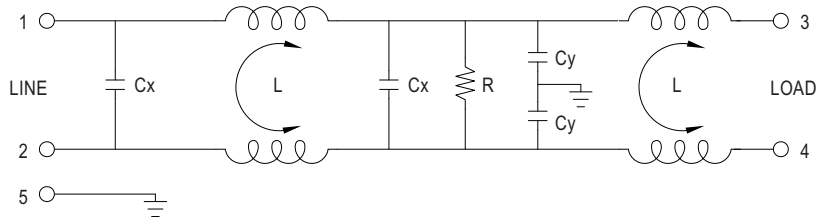
| | |
|----------------|-----------------------------|
| Mating Housing | HRS DF11-10DS or equivalent |
| Terminal | HRS DF11-10SC or equivalent |

| Pin No. | Function | Description |
|---------|---------------|---|
| 1 | +12V-AUX | Auxiliary voltage output, 10.8~13.2V, referenced to <i>GND-AUX</i> (pin 2). The maximum load current is 0.5A. This output has the built-in "Oring diodes" and is not controlled by the <i>Remote ON/OFF</i> control. |
| 2 | GND-AUX | Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V). |
| 3 | Remote ON-OFF | The unit can turn the output ON/OFF by electrical signal or dry contact between <i>Remote ON/OFF</i> and +12V-AUX. (Note.1) Short (10.8 ~ 13.2V) : Power ON ; Open (-0.5 ~ 0.5V) : Power OFF ; The maximum input voltage is 13.2V. |
| 4 | GND-AUX(S) | The signal return is isolated from the output terminals (+V & -V). |
| 5 | DC-OK | High (3.5 ~ 5.5V) : When the $V_{out} \leq 80\% \pm 5\%$. Low (-0.5 ~ 0.5V) : When $V_{out} \geq 80\% \pm 5\%$. The maximum sourcing current is 10mA and only for output. (Note.1) |
| 6 | T-ALARM | High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm. Low (-0.5 ~ 0.5V) : When the internal temperature is normal. The maximum sourcing current is 10mA and only for output(Note.1) |
| 7,8 | SDA | For PMBus model: Serial Data used in the PMBus interface. (Note.1) |
| | CANH | For CANBus model: Data line used in CANBus interface. (Note.1) |
| 9,10 | SCL | For PMBus model: Serial Clock used in the PMBus interface. (Note.1) |
| | CANL | For CANBus model: Data line used in CANBus interface. (Note.1) |

Note1: Isolated signal, referenced to GND-AUX(S).

GUIDANCE OF ADDITIONAL FILTER

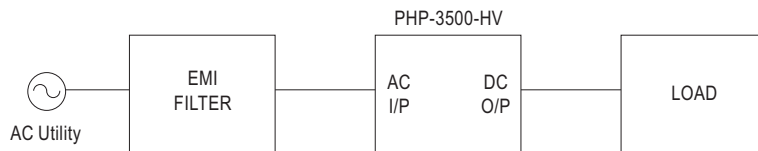
1.Schematic



2.Minimum insertion loss (In dB at 50 Ω system)

| FREQ. MHz | 0.01 | 0.05 | 0.10 | 0.15 | 0.50 | 1.0 | 5.0 | 10 | 30 |
|--------------|------|------|------|------|------|-----|-----|----|----|
| COM. MODE dB | 2 | 5 | 8 | 10 | 30 | 35 | 55 | 45 | 30 |
| DIF. MODE dB | 4 | 15 | 18 | 18 | 45 | 50 | 40 | 40 | 40 |

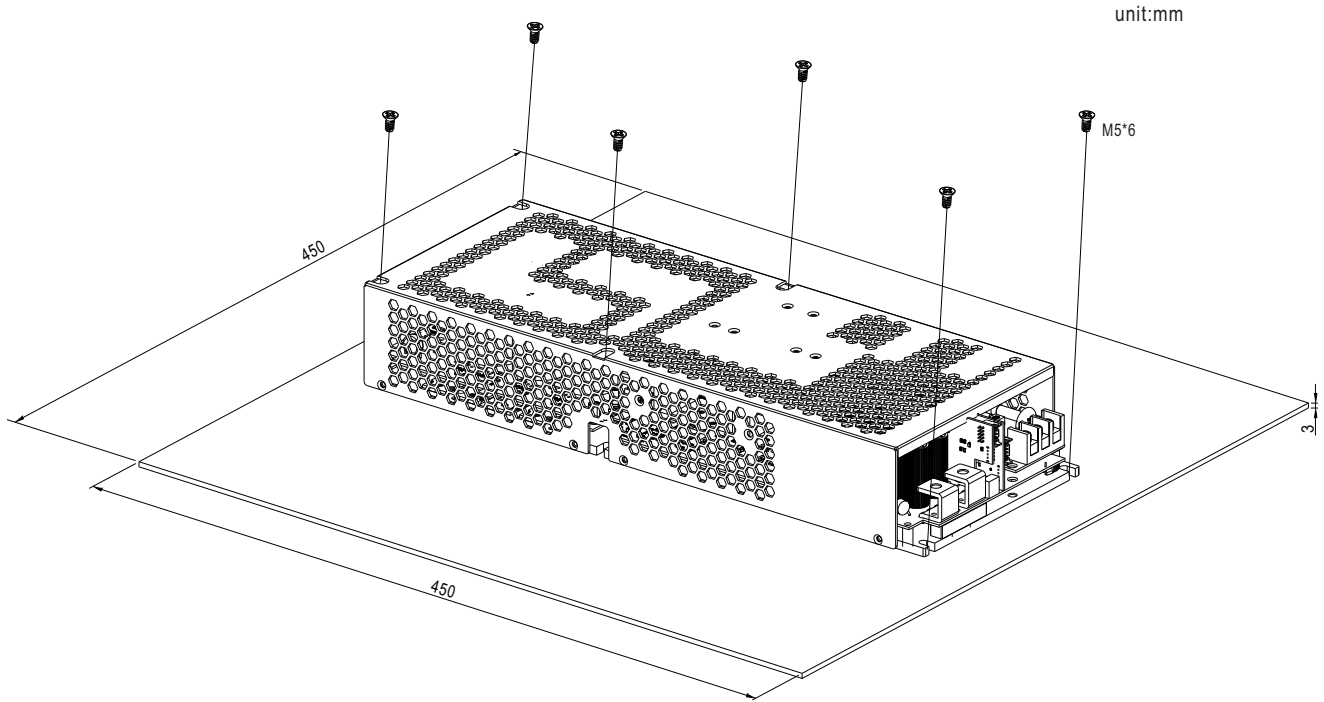
3.Configuration



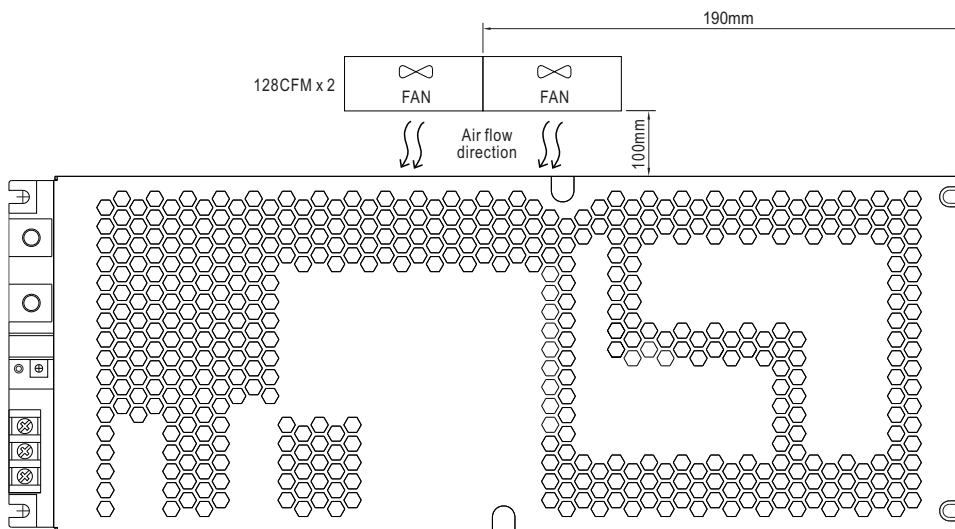
■ INSTALLATION

1. Operate with additional aluminum plate

In order to meet the "Derating Curve" and the "Static Characteristics", PHP-3500-HV series must be installed onto an aluminum plate (or the cabinet of the same size) on the bottom. The size of the suggested aluminum plate is shown as below. And for optimizing thermal performance, the aluminum plate must have an even and smooth surface (or coated with thermal grease), and PHP-3500-HV series must be firmly mounted at the center of the aluminum plate.



2. With 128CFM forced air





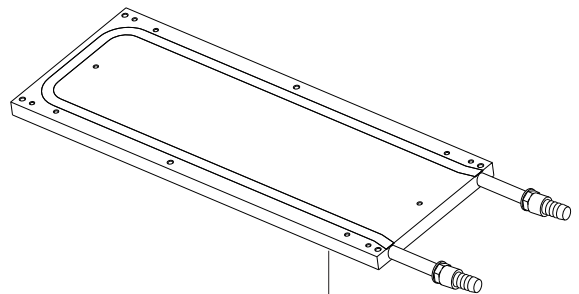
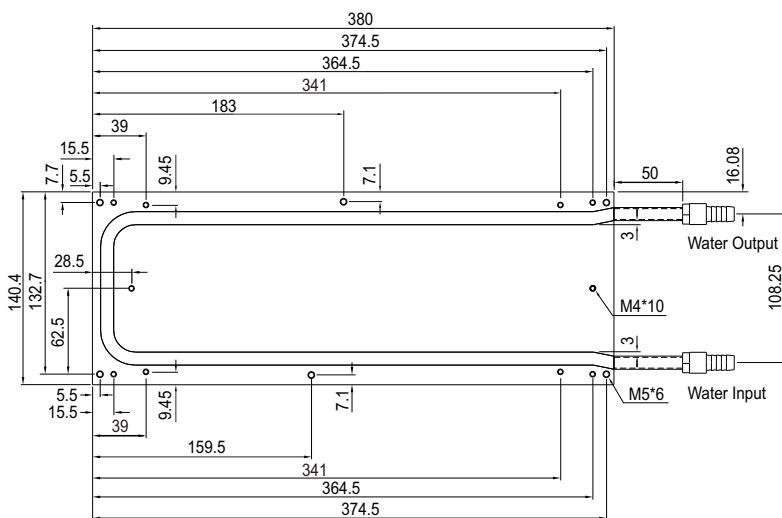
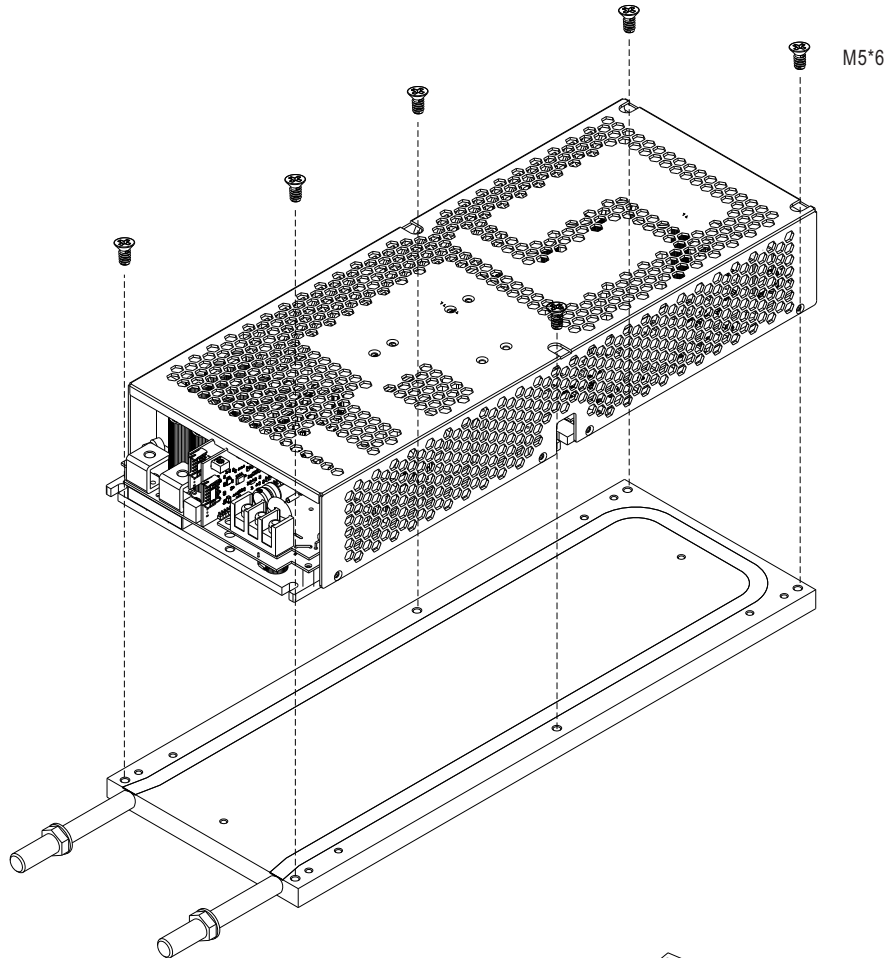
3. For water conduction cooling

Inlet temperature: 25°C

Flow rate (minimum): 1 LPM

If optional cold plate is in need, please contact MEAN WELL for details.

Ordering No.: HS-656



Apply thermal grease (gap filler) between power supply and cold plate connection surface.
 Thermal grease (gap filler):
 * Thermal conductivity is no less than 1W/mK.
 * Thickness is no more than 0.3mm.