产 品 使 用 说 明 及 服 务 承 诺

Instruction Manual & Service Commitment

产品名称	开关电源
Description	Switching Power Supply
适用类型	常规产品 / 通用
Product Type	General Product / Normal
文件编号	HF/QI 90-03 24-10 Ver. 3.5
File No.	

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I. Technical Specifications, Parameters, and Descriptions

Technical Specifications and Parameters:

The technical specifications and electrical performance parameters described in this manual refer to standard, general-purpose switching power supply products.

For customized, special-specification, or non-standard products, please refer to the officially confirmed “Product Specification Approval Form” jointly signed by the customer and our company.

As a component of user equipment, the switching power supply must be selected based on the specific application scenario and applicable standards. For example, if the equipment requires CCC (China Compulsory Certification), a power supply with CCC certification must be used. In other countries or regions, the product should comply with local laws and regulatory certification requirements.

If the user is uncertain about how to select the appropriate power supply, they are encouraged to provide the application scenario and requirements. Our technical team can assist with model selection accordingly.

Descriptions of Parameters:

1. Input Voltage

   In most cases, AC-input power supplies can also operate with DC input.

   For an AC input voltage range of 85–264VAC, the equivalent DC input range is 120–370VDC.

   For an AC input voltage range of 170–264VAC, the DC input range is 240–370VDC.

   Some models support selectable input ranges: 85–132VAC / 170–264VAC (via switch).

2. Inrush Current

   The inrush current refers to the instantaneous peak input current when the power supply is turned on from a cold start.

3. Multiple Outputs

   (1) The rated current values listed for each output in a multi-output power supply represents the maximum for each output. The total combined power of all outputs must not exceed the rated output power of the unit. Typically, the main output (V1) operates independently from the auxiliary outputs. For models that require “common ground,” connect the +/– terminals of V1 to the corresponding terminals of other outputs.

   (2) Load regulation for each channel is tested by varying that output from 20% to 100% of its rated load, while other outputs are maintained at 60% of their rated loads.

4. Output power

   If the output voltage is turned up, the maximum output current will be reduced accordingly to keep the total output power constant;

   If the output voltage is turned down, the maximum output current should not exceed the maximum rated value specified in the standard;

   For a multi-output power supply, the sum of all output powers is less than or equal to the rated output power of the power supply.

5. Operating Temperature

   Refers to the ambient temperature under normal operation.

   If the power supply is installed inside an equipment enclosure, the operating temperature refers to the internal enclosure temperature, not the room or outdoor temperature;

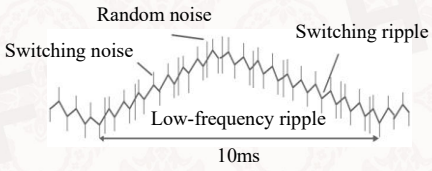
When the operating temperature exceeds the maximum temperature specified for the rated output power of the power supply (refer to the derating curve in the Product Specification), the output power must be determined according to the derating curve of the power supply's operating temperature. As a general rule, the output power should be derated by 2% per degree Celsius (°C) above the rated limit.

Alternatively, forced-air cooling may be employed to ensure that the operating temperature of the power supply remains below the maximum temperature limit for rated output power. If the power supply is not used in accordance with the derating curve, internal over-temperature protection may be triggered, or in severe cases, it may result in damage to the power supply.

When the operating temperature falls below the minimum temperature specified for the rated output power of the power supply (refer to the derating curve in the Product Specification), the output power must also be determined based on the derating curve for the operating temperature.
Failure to follow the derating curve under low-temperature conditions may result in the activation of internal circuit protection mechanisms, or in severe cases, lead to irreversible damage to the power supply.

6. Operating Humidity
   Refers to the acceptable ambient humidity during normal operation.
   Excessive humidity can negatively impact performance or cause failure.
   For high-humidity environments, special design or protection is needed to ensure safe operation.
   The standard operating humidity range is 20%–90%RH(non-condensing).

7. Output Ripple and Noise
   In general, it refers to the peak of the AC component included in the output DC voltage, as shown in the figure below, which consists of four parts:
   (1) Low-frequency ripple: At twice the AC line frequency (not present in DC input models);
   (2) Switching ripple: At the same frequency as the internal pulse modulation (PWM) switching frequency;
   (3) Switching noise: the same frequency as the switching pulse;
   (4) Random noise: independent of AC input voltage and switching frequency



8. Ripple and Noise Measurement for Power Supply Output
   Ripple and noise are measured using an oscilloscope with a bandwidth of 20 MHz. A 30 cm long 20AWG (0.5 mm²) shielded twisted pair cable is connected from the output terminals of the power supply under test. At the end of the twisted pair, a 0.1μF high-frequency ceramic capacitor and a 47μF electrolytic capacitor are connected in parallel.
   The measurement is then taken at this point.

9. Power Supply Efficiency

The efficiency of the switching power supply should be calculated using the following formula:

$$\text{Power efficiency} = \frac{\text{Output Power}}{\text{Input Power}} \times 100\%$$

$$= \frac{\text{Output Voltage} \times \text{Output Current}}{\text{Input Voltage (RMS)} \times \text{Input Current (RMS)} \times \text{Power Factor}} \times 100\%$$

Output Power refers to the power delivered by the power supply to the load under normal operation—essentially, the energy the power supply "outputs."

For multi-output power supplies, the output power is the sum of all channels when each is operating at its rated output.

Input Power refers to the energy absorbed by the power supply from the source (e.g., AC mains or battery)—i.e., the energy it "consumes."

10. Line Regulation

Line regulation (also called input regulation or mains regulation) refers to the percentage change in output voltage as the input voltage varies across its full specified range, under rated load conditions.

$$\text{Line Regulation} = \frac{\text{Maximum Output Voltage Deviation}}{\text{Rated Output Voltage}} \times 100\%$$

For products of this enterprise,the typical value of line regulation is ≤±0.5%.

Example: For model HF50W-LSK-5 (rated output: 5V 10A; input: 100–240VAC), under full load (10A), when the input voltage varies from 85 to 264VAC, the maximum output deviation is ±0.025VDC.

11. Load Regulation

Load regulation refers to the percentage change in output voltage as the load varies from no-load (0%) to full-load (100%) at a fixed input voltage.

$$\text{Load Regulation} = \frac{\text{Maximum Output Voltage Deviation}}{\text{Rated Output Voltage}} \times 100\%$$

For products of this enterprise, the typical load regulation is ≤ ±0.5%.

Example: For model HF50W-LSK-5, under an input voltage of 230VAC, when the load current varies from 0A to 10A, the maximum output deviation is ±0.025VDC.

12. Output Voltage Accuracy

The output voltage accuracy (also known as voltage regulation accuracy) is defined as the percentage deviation of the maximum or minimum actual output voltage from the rated output voltage:

$$\text{Output Voltage Accuracy} = \frac{\text{Max or Min Output Voltage - Rated Output Voltage}}{\text{Rated Output Voltage}} \times 100\%$$

Due to the characteristics of switching power supplies:

The main output channel (V1) typically achieves an accuracy of ±1% of its rated output voltage.

The auxiliary output channels may vary depending on circuit design and configuration, usually within ±1% to ±10% of their respective rated output voltages.

13. Start-up Time

Start-up time refers to the duration from the moment input power is applied to the moment the output voltage reaches 90% of the rated output voltage, under rated load conditions.

As illustrated in the right-side diagram:

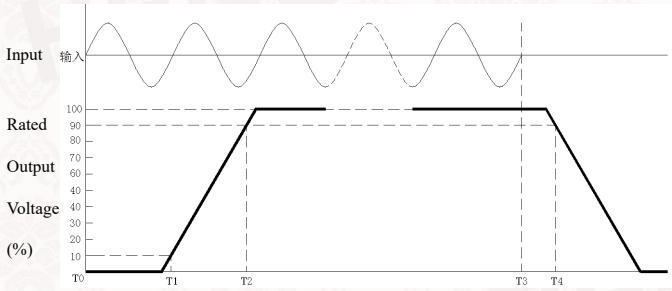
T_0: Time when input power is applied

T_2: Time when output voltage reaches 90% of the rated level

$T_2 - T_0$ = Start-up time

Test condition: Input voltage= 115VAC and 230VAC.

The start-up time is normally set to a reference value as ≤2000Ms.



14. Rise Time

Rise time refers to the time required, under full load conditions and after power-on, for the output voltage to rise from 10% to 90% of its rated output voltage.

As shown in the figure above:

T_1: Time when output voltage reaches 10% of rated output

T_2: Time when output voltage reaches 90% of rated output

$T_2 - T_1$ = Rise Time

Test condition: Input voltage = 230VAC

The rise time is normally set to a reference value at ≤50mS.

15. Hold-up Time

Hold-up time refers to the duration, under full load conditions, from the moment of input power interruption to the moment the output voltage drops to 90% of its rated value.

This parameter is critical to prevent power interruption to the load during a single-cycle AC dropout.

At 50Hz input frequency, one AC cycle = 20 ms

At 60Hz input frequency, one AC cycle = 16 ms

As shown in the figure above:

T_3: Time of AC power failure

T_4: Time when output voltage drops to 90% of rated output

$T_4 - T_3$ = Hold-Up Time

The hold-up time is normally set to a reference value of ≥20ms (at 230VAC input).

16. Input Current

Input current of the switching power supply is using the following formula:

$$\text{Input Current} = \frac{\text{Output Power}}{\text{Input Voltage} \times \text{Power Factor} \times \text{Efficiency}}$$

Special Note: Pay close attention to the influence of “power factor” on input current.

For power supplies without a Power Factor Correction (PFC) circuit, the power factor typically ranges from 0.4 to 0.6; a value of 0.5 is commonly used for approximation.

For power supplies with an active PFC circuit, the power factor is generally ≥0.95; a value of 1.0 can be used for approximation.

Test conditions: Input voltage = 115VAC and 230VAC

17. Power Supply Protection

Input Protection

Switching power supplies include the following three typical input protection mechanisms:

(1) Overvoltage Protection (OVP)

When the input voltage exceeds the rated range (e.g., from grid surges), an overvoltage shut-down circuit is typically integrated into the input stage.

This circuit protects the power supply by cutting off operation in response to abnormal input voltage spikes.

(2) Overcurrent Protection (OCP)

Input overcurrent may result from various complex causes.

In most designs, a fuse is installed in the input circuit to limit excessive input current and protect both the power supply and the mains.

(3) Undervoltage Protection (UVP)

If the input voltage drops below a safe threshold, the power supply shuts off output voltage to protect both the unit and the connected load.

This is achieved via circuit-level undervoltage detection.

Output Protection

The output stage of a switching power supply typically includes the following five protection features:

(1) Overvoltage protection (OVP)

When enabled, this function shuts off the output if the output voltage rises unexpectedly beyond safe levels—protecting both the power supply and the load.

Typical overvoltage protection activation point is set at 115%~150% of the rated output voltage

(2) Overcurrent protection (OCP)

When output current exceeds the rated maximum, the power supply shuts down or reduces output voltage. Depending on the load and circuit design, the following protection modes are used:

Hiccup mode, Constant current limiting, Foldback current limiting

Typical overcurrent protection activation points for products of this enterprise:

Constant current limit type: 110%–130% of rated output current

Hiccup protection type: 105%–150% of rated output current

(3) Overload Protection (OLP) / Overpower Protection (OPP)

If the total output power exceeds the rated capacity, the power supply enters hiccup mode or lowers output voltage to prevent damage.

Typical overload protection activation point: 105%–150% of rated output power

(4) Short Circuit Protection (SCP)

All switching power supplies are equipped with short circuit protection. If a short circuit occurs at the output/load, the unit will either shut down output or enter hiccup mode to prevent further damage.

(5) Overtemperature Protection(OTP)

When equipped with this function, the power supply shuts down output if the ambient or internal temperature exceeds safe limits. This is typically self-recoverable after the temperature returns to normal.

Protection Modes

There are two common protection recovery types for output protection:

(1) Non-Recoverable Protection

Once triggered, the output remains off until the issue is resolved. The power supply must be manually restarted after disconnecting input power for about 30 seconds.

(2) Recoverable Protection

Once the fault condition is removed, the power supply will automatically resume normal operation.

Special Protection Requirements: For power supplies intended for specific environments (e.g., lightning protection, dust-proof, waterproof), additional protective designs and specialized manufacturing processes are required.

18. Mean Time Between Failures(MTBF)

Mean Time Between Failures refers to the average amount of time between two consecutive failures, also described as the product's safe and failure-free operating time. It is a standard metric for product reliability, typically expressed in hours.

It reflects how long a product can maintain its function over time. For AC-DC products, the typical testing conditions are:

Input voltage: 230VAC

Load: rated

Ambient temperature: 25°C

The result is then substituted into the MIL-HDBK-217F formula to calculate MTBF.

19. Leakage Current

Leakage current refers to the current flowing from the product chassis to ground when touched by a human body. For a single unit, leakage current is generally less than 0.75mA.

When using multiple power supplies in the same system, all units are typically grounded at the same point. The total leakage current equals the sum of leakage currents from each unit. To prevent electric shock, always verify that the protective grounding wire is securely connected, and the ground resistance meets required safety standards.

20. Withstand Voltage Test(Hi-Pot Test)

Withstand voltage/Hi-pot (high-potential) testing is a mandatory requirement from international safety agencies such as JSI, CSA, VDE, BSI, UL, IEC, and TUV.

All products must undergo 100% hi-pot testing before leaving the factory as part of quality control and to verify electrical safety.

Test Method: An abnormally high voltage is applied to the product for a specified duration. If no insulation breakdown occurs, the product passes the test.

The international standard does not specify a limit for leakage current during hi-pot testing.

Hengfu's internal standard is: leakage current < 8 Ma

Test voltage values depend on applicable safety standards, working voltage, and insulation rating. Typically, AC voltage is used.If capacitive components bridge insulation points, DC voltage is recommended at 1.414 × the AC test voltage.

Hengfu Standard Withstand Voltage Design (General Power Supplies):

Input to output (I/P-O/P):	3.0 KVAC / 1 min
Input to Ground (I/P-F/G):	1.5 KVAC / 1 min
Output to Ground (O/P-F/G):	0.5 KVAC / 1 min

The design of this withstand voltage index is based on industry standards of information technology equipment.

For special industries, such as medical devices, large-scale industrial equipment, etc., there are particularly high standards for withstand voltage requirements. For industries or products with such requirements, the relevant performance indicators must be specially designed:

Input to output (I/P-O/P):	4.0 KVAC / 1 min
Input to Ground (I/P-F/G):	2.0 KVAC / 1 min
Output to Ground (O/P-F/G):	1.0 KVAC / 1 min

In other industries such as industrial control, the requirements for this indicator are usually low;

Hi-pot testing must be conducted within rated test limits. Over-testing may damage the power supply. Before testing, short-circuit both the input and output terminals.

During high-voltage testing, arcs (sparks) may occur between the test probe and power supply terminals, creating additional voltage surges and potential damage.

Please follow this standard test procedure:

(1) Set the hi-pot tester output voltage to 0V
(2) Securely connect the high-voltage probe to the test point
(3) Gradually increase the voltage to the rated test level
(4) After testing, gradually reduce the voltage back to 0V
(5) Only then, disconnect the test probe

21. Insulation Resistance (Impedance) test

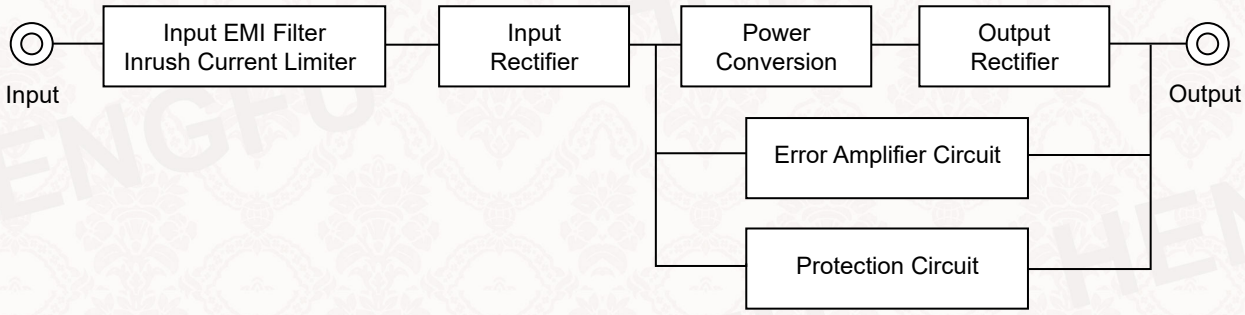
The insulation resistance test verifies the resistance between live parts, output circuits, and the chassis. Typically, a 500VDC test voltage is applied, and the insulation resistance must exceed 100 MΩ.

Test Procedure:

(1) Set the insulation resistance tester to 500VDC, and 1-minute test duration
(2) Short the input and output terminals of the unit; measure I/P–O/P resistance
(3) Short the input terminals; measure I/P–F/G (input to chassis) resistance
(4) Short the output terminals; measure O/P–F/G (output to chassis) resistance
(5) Ensure the test voltage remains 500VDC, and test environment is 25°C / 70% RH

II. Instructions for Use

1. Block Diagram of Switching Power Supply



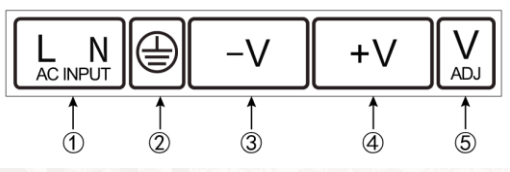
The above diagram applies to standard and general-purpose models. For customized units such as DC-input or special-function versions, the diagram may vary.

2. Input Section

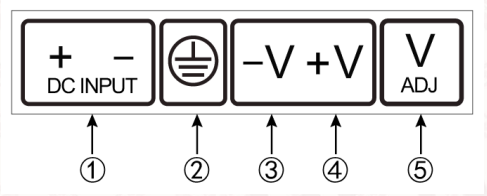
(1) Before use, always confirm the input voltage specification. It must match the electrical input characteristics specified in the Product Specification.

(2) When this product operates normally (i.e., under full load and rated input voltage conditions), its input current is approximately equal to the value specified in the “Electrical Specifications – Input Characteristics” section of the Product Specification, under the item “Input Current.”
Considering factors such as inrush current and power factor, please select the appropriate type and size of wiring for proper connection.

(3) The input wiring method is detailed in the “Installation Drawing – Terminal Layout” section of the Product Specification.
For AC input, the wiring requirements are as follows (refer to the diagram on the right):
At position ①, connect terminal “L” to the Live wire
At position ①, connect terminal “N” to the Neutral wire
At position ②, connect the terminal to the Chassis Ground (Earth wire)



For DC input, the wiring requirements are as follows (refer to the diagram on the right):
At position ①, connect terminal “+” to the Positive Input
At position ①, connect terminal “-” to the Negative Input
At position ②, connect the terminal to the Chassis Ground (Earth wire)



(4) To ensure safe operation and reduced electromagnetic interference, make sure the grounding terminal (i.e., chassis ground at position ②) is properly and reliably connected.It is generally recommended to use a ground wire of AWG18 or above (cross-sectional area ≥ 0.82 mm²).

(5) Before powering on, check that all input connections have been made correctly as specified.
Incorrect wiring may damage the power supply.

3. Output section

(1) Before connecting the load, ensure that the load specifications are compatible with the power supply's output electrical characteristics, as detailed in the "Electrical Specifications – Output Characteristics" section of the Product Specification.

(2) The current measured by an ammeter reflects the average current value.

It is recommended to use an oscilloscope and place a precision resistor in series with the load (select resistor value based on expected current, typically ~0.1Ω per 10A) to measure peak current. The measured peak current should not exceed the rated output current of the power supply.

If the load causes a sudden current surge—such as inrush current during cold start—and this surge exceeds 110%–130% of the rated output current, the power supply may trigger overload protection, which may result in output voltage drop or current limiting. In multi-output models, this may also affect the performance of other output channels.

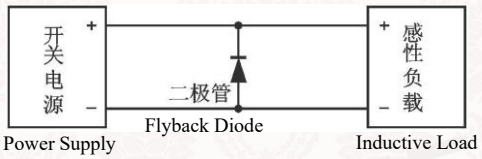
It is recommended to use the same peak current measurement method to assess the load's surge behavior.

(3) For output wiring methods, refer to the "Installation Drawing – Terminal Layout" section in the Product Specification.

(4) Under full-load operation, the output current will reach the rated value indicated in the Product Specification and the product label. Select the output cable (wire gauge) based on this rated current. For longer output cables, voltage drop must be considered and a thicker wire used accordingly.

(5) If the same output voltage is provided through multiple terminals for the same polarity, it is recommended to use parallel wiring to distribute the current evenly.

(6) When powering inductive loads (e.g., relay drivers, motors, coils), install a flyback diode in reverse across the load to safely discharge residual energy upon shutdown and prevent back-EMF damage to the power supply.



4. Other Requirements

(1) Operating requirements: Ensure that the power supply's working conditions comply with the environmental specifications listed in the Product Specification.

(2) For multi-output power supplies, outputs are typically divided into a main output and one or more auxiliary outputs.

The main output (with higher current) generally features better electrical characteristics (e.g., load regulation, dynamic response).

When the main output is active, each auxiliary output should carry at least 10% of its rated load (typically ≥50–100 mA).

If, under certain conditions, only auxiliary outputs are used and the main output is left unloaded, a dummy load should be added to the main output. It is recommended to apply a dummy load of at least 10% on the main output to ensure the auxiliary outputs function properly.

5. Impact of Ambient Temperature on Switching Power Supplies

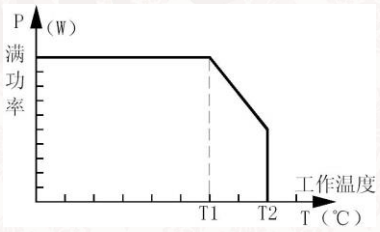
As shown in the diagram on the right:

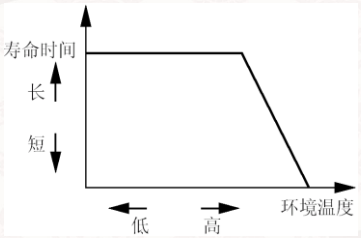
T1 represents the rated operating temperature point

T2 represents the absolute maximum temperature point

This diagram demonstrates that when ambient temperature exceeds the rated value, the maximum allowable output power of the power supply decreases, typically at a rate of 2% per °C.

This graph is also referred to as the derating curve.





As shown in the diagram on the left:

This diagram illustrates that when ambient temperature exceeds the rated operating value, the lifespan (mean operating life) of the power supply drops sharply.

The term ambient temperature is also referred to as operating temperature.

While a brief explanation was provided in Section I – Technical Specifications, Item 5 Operating Temperature, the concept is clarified here again:

The ambient or operating temperature of a switching power supply specifically refers to the temperature at the location where the unit is physically installed and operating continuously.

For example:

If the power supply is installed inside an equipment enclosure, the temperature inside that enclosure at the installation point is considered the power supply's ambient temperature —

even if the enclosure is located in a temperature-controlled room. The room temperature does not represent the power supply's actual ambient temperature.

Since switching power supplies generate internal heat due to power loss, proper ventilation must be maintained to ensure effective heat dissipation.

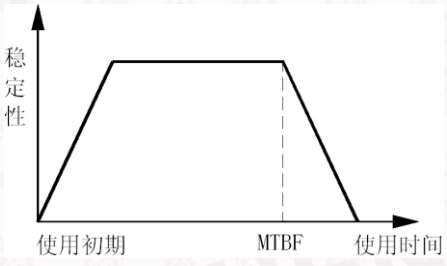
Given the above, ensure that the power supply is installed away from Heat sources, Heatsinks, High-power devices, High-temperature zones.

6. Stability of Switching Power Supplies

The stability of a power supply is influenced by the electrical characteristics and lifespan of the components used, the quality of selected materials, and the manufacturing processes.

Frequent switching on/off of the power supply may negatively impact the service life of the power supply.

The diagram on the right reflects the relationship between the product usage time and stability.



7. Dust Protection

Dust levels in the operating environment have a significant impact on power supply performance. If a power supply operates long-term in dusty environments (e.g., semi-outdoor locations), its internal and external air circulation is increased due to high operating temperatures. Over time, this leads to heavy dust accumulation, which may obstruct airflow, degrade cooling performance, and even cause fan blockage in fan-cooled (forced-air) models.

To avoid such issues, maintain a clean and dust-free environment. Avoid deploying the unit in open or semi-open outdoor areas or locations with heavy airborne dust. In harsh environments where dust cannot be avoided, regular dust-cleaning and maintenance is necessary.

For specific cleaning and maintenance requirements, refer to Section III, Item 4 of this manual.

8. Waterproofing and Corrosion Protection

For switching power supplies not specifically designed for waterproof or corrosion-resistant applications, proper precautions must be taken to prevent moisture or chemical damage.

It is strictly forbidden to place the switching power supply in the following environments:

(1) Outdoor settings, areas exposed to rain, or any location where flooding may occur

(2) High-humidity environments such as indoor swimming pools, saunas, and steam boiler rooms

(3) Locations with large temperature swings that may cause condensation, such as outdoor/semi-outdoor areas with significant day-night temperature differences

(4) Areas with acidic, alkaline, or salty vapors, including chemical plants, surface treatment workshops, chlorine-rich or saltwater vapor zones, and coastal regions with sea breeze exposure or salt spray

If operation in such environments is unavoidable, please notify us in advance. We can evaluate the situation and offer custom protective design solutions as needed.

9. Series and Parallel Operation of Power Supplies

Switching power supplies can typically be configured for series or parallel operation.

Below are four commonly recommended connection methods, as illustrated in the following diagrams:

Diagram 1

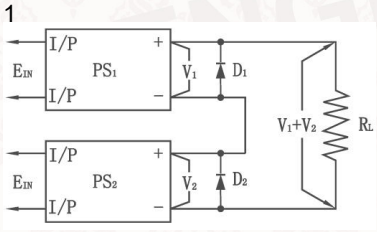


Diagram 2

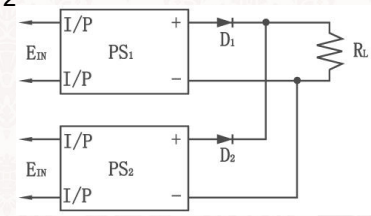


Diagram 3

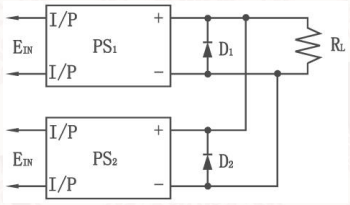
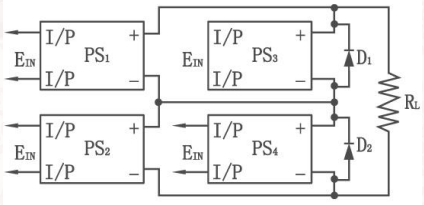


Diagram 4



Note:

Not all switching power supplies support the above connection methods, especially parallel configurations (Diagrams 2, 3, and 4).

The method shown in Diagram 2 is suitable for parallel connection without current sharing.

The method shown in Diagram 3 is suitable for parallel connection with current sharing.

Diodes used in the configurations should preferably be low forward-voltage types, such as Schottky diodes, and proper heat dissipation should be ensured.

Before applying any series or parallel connection method, please consult Hengfu for technical confirmation.

III. Safety Precautions

1. Unboxing

(1) When receiving products in external packaging, follow these steps:

- Inspect the integrity of the outer packaging. Proceed only if the packaging is undamaged.
- Open the box and verify product quantity according to the packing list on the outer label.

(2) If the box contains more than one type of product, confirm the quantity of each type individually.

(3) Once verified, the customer should sign and date the delivery note to confirm receipt.

(4) If any of the following issues occur during inspection:

- Damaged packaging
- Quantity mismatch with packing list
- Incorrect product model types

Then:

- Immediately contact Hengfu or the delivery person on-site for confirmation
- Record the discrepancy and keep the original packing list for further verification
- Keep the packaging and contents in their original condition until confirmed

2. Safety Protection

To ensure personal safety and stable system operation, please observe the following before and during use:

(1) Carefully read this manual. If unclear, contact Hengfu for clarification.

(2) Confirm the product is used within the environmental limits specified.

(3) Due to internal high voltage and energy storage components, wait at least 5 minutes after power-off before any handling (e.g., wiring, cleaning) to allow full discharge.

(4) If the product is moved from a cold to warm environment, condensation may occur, posing a safety hazard. In such cases, let the product sit for at least 4 hours in the new environment to ensure it is condensation-free before use.

During installation, always connect the chassis ground as specified in the product manual or datasheet.

(5) The output voltage adjustment potentiometer must not be adjusted arbitrarily or frequently.

(6) Ensure good ventilation, and avoid installing the unit near heat sources or in high-temperature environments.

(7) Do not operate or store the power supply in open or outdoor environments.

(8) In case of smoke, odor, sparks, or arcing, shut off power immediately.

(9) If a fault occurs, record the fault symptoms and environment, then submit the faulty unit along with the record to Hengfu for diagnosis and repair.

(10) Contact Hengfu promptly if any abnormal conditions arise.

3. Special Instructions

(1) Neutral wire configuration in three-phase systems:

For non-PFC models (power factor 0.4–0.6), when used in a three-phase four-wire setup with multiple units, neutral current cannot cancel due to waveform distortion.

It is recommended that the neutral wire be 1.5 to 2 times thicker than phase wires, or sized based on measured current.

For units with PFC circuits (marked with a PFC label), standard neutral sizing is acceptable.

(2) Output voltage fine-tuning:
Most products allow minor output voltage adjustment (refer to manual section 2.3 and product datasheet).
Use an M2 or M3 Phillips screwdriver, pressure <100g, adjust ≤180° on a single-turn potentiometer.
Adjust gently and within range. Excessive force, frequent adjustments, or over-rotation may damage the product.

(3) Leakage current:
When multiple units share the same ground point, total leakage current = sum of each unit's leakage.
Always verify ground continuity and resistance to avoid electric shock.

(4) Charging usage:
If the datasheet specifies “constant current limiting” for overload protection, the unit can be used directly for float charging (CV+CC mode).

(5) Installation:
Follow the screw length and torque specifications in the datasheet to avoid damaging mounting threads or internal structure.

(6) Wiring:
Input/output wires must comply with datasheet specifications. Terminal screw torque should be applied precisely to avoid damage or safety issues.

4. Maintenance and Servicing

If the power supply operates under ideal conditions and uses natural cooling (no fan), routine maintenance is generally not required.

For fan-cooled units (typically >300W output), especially in dusty or poorly ventilated environments, heat accumulation and airflow may cause dust buildup, fan blockage, or thermal shutdown.

In such cases, regular maintenance every 3–6 months is advised depending on an environment severity and fan noise or airflow reduction.

Recommended maintenance procedure:

(1) Power off the supply and wait 5 minutes to ensure energy is fully discharged

(2) Open the power supply casing

(3) Use a soft-bristle brush to gently clean internal dust, focusing on:
Power components
Heatsinks
Fan inlets/outlets

(4) Use a vacuum cleaner to remove the dislodged dust

(5) Close the casing and power on for testing

IV. Packaging, Transportation, and Storage

1. Packaging

(1) Outer Carton Packaging

The markings on Hengfu's external cartons include the following:

Company logo: Hengfu trademark and name

Product name: Switching Power Supply

Warning symbols:

- Orientation ("This Side Up")
- Rain protection
- Stacking limit warnings

Packing List: Affixed to a designated area, typically on the side of the carton

(2) Product Labeling

The labels directly on the power supply unit include:

Product nameplate: Indicates Hengfu trademark, product model, and key input/output specifications

Factory QR code: A unique serial number assigned to each individual unit

Warning label (if applicable):

- Contains high voltage—do not touch while powered on
- Do not disassemble or repair unless you are a qualified technician
- Internal fan operates based on temperature—ensure sufficient ventilation space near fan and vents to maintain airflow

2. Transportation

(1) Modes of Transport

Hengfu products are suitable for multiple transportation methods:

- Road freight (truck)
- Rail freight
- Air cargo
- Sea freight

(2) Transport Precautions

During transportation, the following precautions must be taken:

- Protect against:

  Rain exposure, Direct sunlight, Salt spray (seawater corrosion), Chemical corrosion, Shock and vibration
- Handle with care (use civil, non-violent loading/unloading practices)

  Products must be stacked strictly according to the stacking limit symbols on the packaging to avoid crushing damage

3. Storage

(1) For Products Not in Immediate Use:

Store the product inside the original carton

Ensure the environment is moisture-protected

(2) For Incomplete Boxes:

If the box is not full, seal it with packing tape and do not stack during storage

(3) Warehouse Environmental Requirements:

Temperature: 0 to +40°C

Relative humidity: 20%–70%RH

Keep away from harmful gases, volatile chemicals, flammable or explosive materials, and corrosive substances

Avoid strong mechanical vibration, impact, or magnetic fields

Ensure protection from rain and direct sunlight

(4) Carton Placement Guidelines:

Store cartons on pallets at least 20 cm above the ground

Keep at least 50 cm away from walls, heat sources, and air vents

(5) Stacking Rules:

Follow the stacking limit warning printed on the carton

(6) Storage Period:

Under proper conditions, recommended storage duration is up to 2 years

For units stored longer than 2 years, retesting is required before use

V. Warranty and Service Commitment

1. Warranty Period
   (1) The standard warranty period for Hengfu products is two (2) years from the date of sale.
   - If the product label's QR code is intact, the warranty is based on the purchase date on the receipt.
   - If no valid receipt is provided or the QR code is damaged/unreadable, the warranty is calculated as three (3) months after the production date of the product batch.

   (2) Customers who follow Hengfu's official WeChat or Douyin accounts are eligible for a one-year extended warranty.
   (3) Warranty covers: Natural faults occurring under normal usage conditions within the warranty period.
   (4) The following situations are not covered by the warranty:
   - Damage caused by abnormal storage or operating environments beyond the specified range
   - Damage due to incorrect operation or misuse
   - Damage resulting from unauthorized repair or disassembly
   - Modification, retrofitting, or replacement of parts without permission
   - Intentional damage or tampering
   - Irreparable damage caused by force majeure or natural disasters

2. Repair Policy
   (1) If the product fails within the warranty period due to material, component, or manufacturing defects, Hengfu will repair or replace it free of charge.
   (2) The following cases are repairable with component cost charged:
   - The product is out of warranty
   - Within the warranty, but damage is caused by abnormal environment or misuse, and the product is still repairable
   - Within the warranty, but damage caused by force majeure or natural disasters, and still repairable

   (3) The following cases are repairable, but Hengfu will charge for both parts and labor:
   - Unauthorized repair or modification causing failure, even within warranty
   - Products with missing components or signs of intentional dismantling
   - Intentional damage by users
   - Out-of-warranty products with non-standard use leading to failure

   (4) Hengfu reserves the right to decline repair under the following conditions:
   - Products that are severely damaged beyond repair, e.g., cracked baseplate, burnt circuit, or extensive corrosion
   - Products that are out of warranty and have no practical value after repair

3. Service Commitment
   (1) Within 30 days from the date of sale (based on intact QR code or purchase receipt), if the customer is dissatisfied with product quality and there is no user-caused damage, Hengfu will offer a free replacement.
   (2) Within the warranty period, for natural faults under normal usage, Hengfu commits to: Free repairs for eligible products
   Customers may send faulty products directly to Hengfu headquarters or through official distributors
   If deemed non-repairable, the product will be replaced for free
   (3) For products repaired out of warranty, Hengfu will provide a 6-month repair warranty for the repaired parts.
   (4) Since all repairs are handled at Hengfu's Shanghai headquarters:

- If a customer delivers or ships the product directly to headquarters, typical repair and return time is 7–20 days from the date of receipt
- If products are sent through distributors, extra transit time may be required
- If urgent turnaround is needed and the model is commonly stocked, and a matching repair replacement unit is available, Hengfu can offer an immediate swap after written customer approval

(5) For replacements after the initial 30-day period, regardless of warranty status, both parties shall bear their own shipping costs.

VI. Product Inspection Standards and Upgrades

1. Design Standards Compliance

   Hengfu's power supply products are designed in accordance with the following sequence of standards:

   (1) International Standards

   (2) National (Chinese) Standards

   (3) Enterprise Standards

   For products that have received international certifications—such as UL, CB, CE (EMC/LVD), CCC, TÜV, etc.—the electrical performance indicators shall also conform to the corresponding certification body standards.

2. Product Inspection Standards

   (1) For all products manufactured by Hengfu, the official Product Datasheet issued by the company defines the benchmark inspection standards, including key electrical performance parameters.

   (2) For certified products, inspection standards include not only the parameters listed in Hengfu's Product Datasheet, but also the relevant standards published by the certification bodies.

3. Product Upgrades and improvements

   Due to ongoing advances in component technology, design methodology, and manufacturing processes, Hengfu reserves the right to make necessary improvements or upgrades to its products without prior notice—as long as such changes do not reduce technical performance.

   For certified products, all improvements and upgrades will comply with the relevant standards of the certifying agencies, and remain within allowed parameters.

   If the customer:

   - Requires fixed-version samples for qualification, or
   - Has specific concerns or restrictions regarding partial or full product changes, these must be clearly stated and agreed upon in the supply contract or agreement.

   In cases where the customer has previously used an older version of the product, and finds that the improved version creates compatibility issues, they should promptly contact Hengfu for technical support.

   If it is confirmed that compatibility cannot be resolved, the customer may request to continue using the original version, which must also be clearly specified in the contract.

   Types of improvements may include:

   (1) Changes in circuit design and PCB layout

   (2) Upgrades to components, including changes in specifications, model numbers, brands (vendors), appearance, and color

   (3) Adjustments to the product enclosure, mounting dimensions, input/output connector types and sizes, etc.

VII. Special Reminders

To inquire about Hengfu's official product offerings, services, technical consultations, pre-sale or post-sale support, or product maintenance and repair, please contact our official customer service hotline: 400-889-1788

Due to the ongoing issue of counterfeit Hengfu products in the market, we strongly advise customers to verify with Hengfu before purchasing from any non-official distributor or unauthorized individual, or before relying on any related information or services.

Failure to verify authenticity may result in unsupported or unsafe product usage, for which Hengfu assumes no responsibility.We appreciate your understanding and cooperation.

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Thank you for choosing Hengfu products !

We warmly invite you to visit Hengfu and explore our company.

You're always welcome to visit our official website.

www.hengfu.com