

## 3000A 12V Rectifier Power Supply for Copper Electroplating

### 1.Specifications:

Input parameters: Three-phase AC400V $\pm$ 10% 60Hz, three-phase $\leq$ 5%

Output parameters: DC 0~12V adjustment

Output current: DC 0~3000A adjustment

Cooling method: Water cooling

Power supply type: IGBT-based high frequency power supply

Application Industry: Surface treatment and plating industries, including copper plating and similar processes.

### 2.Product Description

Rectifier Power Supply for Copper Electroplating plays a critical role in the electroplating process, a surface treatment technique that deposits a thin layer of metal or alloy onto the surface of another material through electrolysis. This technique is essential in the surface treatment industry, enhancing wear resistance, conductivity, reflectivity, corrosion resistance, and aesthetics.

Common applications include copper, nickel, gold, palladium-nickel, tin-lead, silver, zinc, ABS, and chrome plating, all widely utilized in the surface treatment industry.

The process of electroplating relies on key components, including a power supply to provide direct current (DC), which is crucial for efficient surface treatment. The rectifier power supply for copper electroplating ensures stable energy delivery to the cathode (the object to be plated) and anode (the source of the metal or an insoluble precious metal), all immersed in a plating solution containing metal ions.

Rectifiers, as the heart of the rectifier power supply for copper electroplating, are valued for their energy efficiency, output stability, and ability to deliver adjustable waveforms. These features are vital for achieving precision in various applications across the surface treatment industry.

Industries such as automotive benefit greatly from the rectifier power supply for copper electroplating, utilizing this technology for both functional and aesthetic improvements. It is also extensively used in ABS material surface treatment, PCB electroplating, and the plating of metals like copper, nickel, and chromium. The versatility of the rectifier power supply for copper electroplating underscores its importance in modern manufacturing processes.

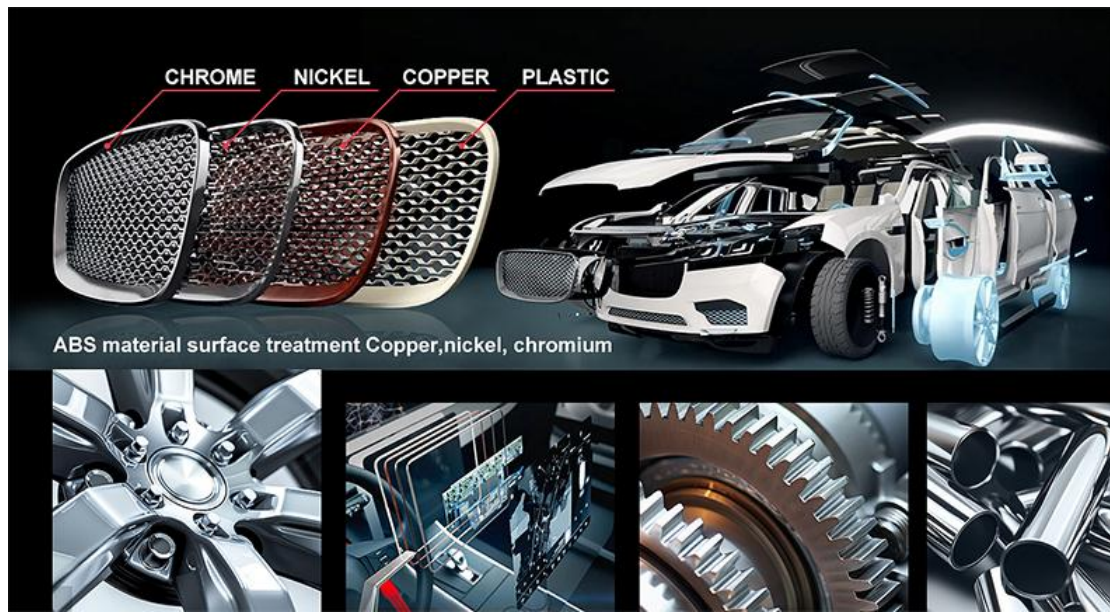
### 3.Product Applications

The Plating Rectifier Equipment series of electroplating rectifiers is extensively utilized for a variety of surface treatments, including PCB electroplating, hard chrome coating, as well as plating with copper, nickel, zinc, gold, and silver, among other hardware surface treatment applications.

1)Field application diagram:



## 2) Industry application examples:



Automobile industry, ABS material surface treatment, Copper, nickel, chromium

## 4. Technology Advantages

Characteristics of an electroplating rectifier:

### Excellent Energy-Saving Effect:

The rectifier is designed to operate efficiently, converting incoming AC power into DC power with minimal energy loss. This leads to significant savings in electricity consumption, which can be particularly beneficial for large-scale electroplating operations that require continuous power supply.

### High Output Stability:

The rectifier is capable of maintaining a constant and stable DC output voltage and current, even under varying load conditions. This ensures consistent and uniform plating thickness, which is crucial for achieving high-quality electroplating results.

### Flexible Output Waveform Modulation:

The output waveform of the rectifier can be easily modulated to suit different electroplating processes and requirements. This includes adjusting the pulse

width, frequency, and duty cycle of the output waveform, which can optimize the plating efficiency and quality for specific applications.

### **Ease of Waveform Modulation:**

In addition to flexibility, the rectifier is also designed for ease of waveform modulation. Operators can quickly and accurately adjust the waveform parameters using intuitive controls or automated systems, allowing for precise control over the electroplating process.

Overall, these characteristics make the electroplating rectifier an essential tool for achieving high-quality, efficient, and energy-saving electroplating processes.

## **5.Role of electroplating**

**Enhance Wear Resistance, Conductivity, and Reflectivity:** By depositing a thin layer of a harder or more conductive material onto the surface of an object, electroplating significantly improves its wear resistance, allowing it to withstand friction and abrasion better. It also enhances conductivity, particularly in electronic and electrical components, by providing a smoother and more uniform surface for the flow of current. Additionally, certain metals, such as silver and chromium, can improve reflectivity, making electroplated surfaces ideal for mirrors, reflectors, and other optical applications.

**Improve Corrosion Resistance and Enhance Aesthetics:** By creating a barrier between the base material and the environment, electroplating protects the object from corrosive elements like moisture, oxygen, and chemicals, thereby extending its lifespan. Furthermore, electroplating can add a decorative finish to an object, enhancing its aesthetic appeal. Whether it's the shiny chrome finish on car bumpers or the gold plating on jewelry, electroplating adds a touch of elegance and sophistication. In summary, electroplating serves a dual purpose: it not only enhances the functional properties of an object but also improves its appearance and extends its durability.

## 6.Types of electroplating

### **Copper Plating:**

Purpose: Primarily used as a primer to enhance adhesion of subsequent plating layers and improve corrosion resistance.

Considerations: Copper is prone to oxidation, which forms copper oxide (copper green) that loses conductivity. Therefore, copper-plated products must undergo copper protection treatments.

### **Nickel Plating:**

Purpose: Used as a primer or for aesthetic purposes to enhance corrosion resistance and wear resistance. Chemical nickel plating is a modern process that offers wear resistance comparable to chrome plating.

Considerations: Note that many electronic products, such as DIN heads and N heads, no longer use nickel as a primer due to its magnetic properties, which can affect the electrical performance and passive intermodulation inside the device.

### **Gold Plating:**

Purpose: Improves conductive contact impedance and enhances signal transmission.

Considerations: Gold is highly stable but also the most expensive option.

### **Palladium-Nickel Plating:**

Purpose: Improves conductive contact impedance and enhances signal transmission. Offers better wear resistance than gold.

Advantages: Combines the benefits of palladium's corrosion resistance and nickel's hardness.

### **Tin-Lead Plating:**

Purpose: Improves soldering ability.

Considerations: Due to concerns about lead content, tin-lead plating is being phased out and replaced by alternatives such as bright tin and mist tin plating.

### **Silver Plating:**

Purpose: Improves conductive contact impedance and enhances signal transmission.

Advantages: Silver offers the best electrical conductivity among these metals and is relatively resistant to oxidation, maintaining conductivity even after oxidation.

Considerations: While silver's performance is excellent, its cost and tendency to tarnish over time should be considered.

the choice of plating type depends on the specific requirements of the application, including corrosion resistance, wear resistance, electrical conductivity, cost, and environmental considerations.

## **7.Elements of Electroplating**

Cathode: The plated object, specifically referring to various connector terminals or other metallic surfaces that are intended to receive the electroplated coating. The cathode serves as the surface where the desired metal ions are reduced and deposited as a solid layer.

Anode: Depending on the type of electroplating process, the anode can be either soluble or insoluble.

Soluble anode: This is the metal that is to be plated onto the cathode. During the electroplating process, metal ions from the anode dissolve into the plating solution and are then plated onto the cathode.

Insoluble anode: In some cases, especially when using precious metals like white gold or iridium oxide, an insoluble anode may be used. This anode does not dissolve during the process but serves as a source of electrons for the reduction reaction that occurs at the cathode.

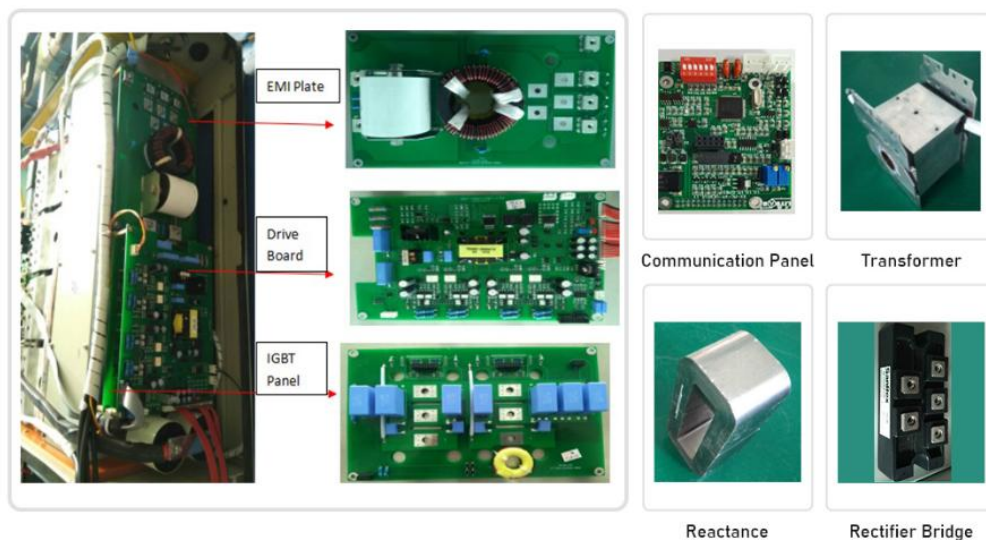
Plating Solution: This is a solution that contains ions of the metal that is to be plated onto the cathode. The composition and concentration of the plating solution are crucial for achieving the desired plating properties, such as thickness, adhesion, and appearance.

**Plating Tank:** The tank that holds and stores the plating solution during the electroplating process. The tank must be able to withstand the corrosive effects of the plating solution and maintain a constant temperature to ensure consistent plating results. Strength, corrosion resistance, temperature resistance, and chemical compatibility are key considerations in selecting the material for the plating tank.

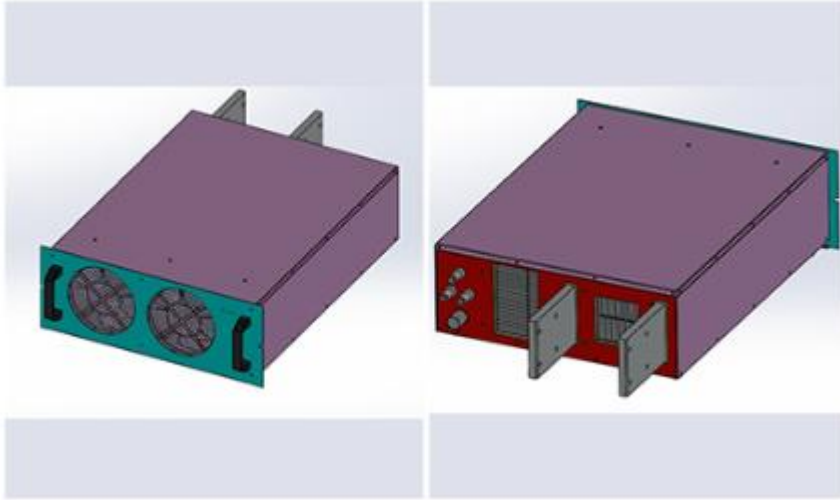
**Rectifier:** The equipment that provides the direct current (DC) power supply for the electroplating process. The rectifier converts alternating current (AC) from the main power supply into DC, which is then used to drive the electroplating reaction. The voltage and current output of the rectifier can be adjusted to control the rate of deposition and the thickness of the plated layer.

Additionally, other elements may also be involved in the electroplating process, such as filters to remove impurities from the plating solution, heaters to maintain the solution at a constant temperature, and stirrers to ensure uniform mixing of the solution.

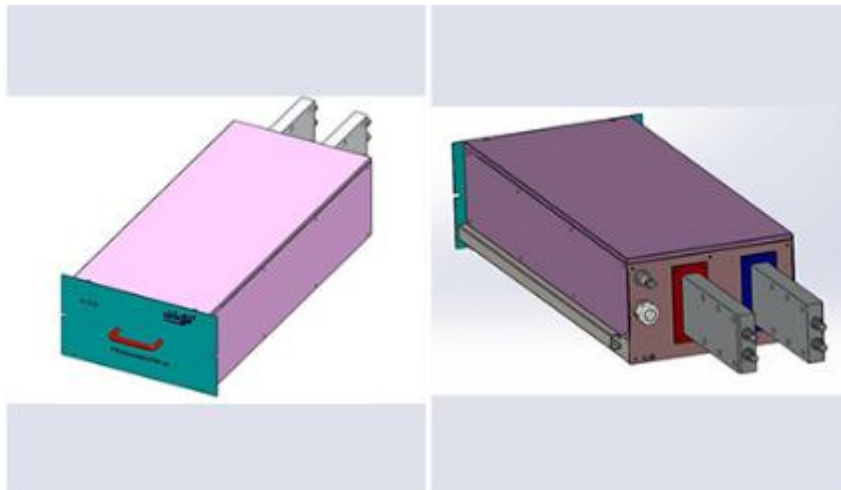
## 8.Component Part for Electroplating



## 9. Cooling Type for Electroplating



Air Cooling: Heat dissipation fan + air duct + comb heat sink



Water Cooling: Built-in water circulation line



## 10. Technical Parameters

Type of	Parameters	Technical Requirements
Input characteristics	Rated input voltage	Three-phase AC400V±10% 60Hz, three-phase ≤5%
	Rated input current	AC 61.3A
	Rated input power	40.3KVA
	Rated input power Ffactor	COSΦ≥0.95
Output characteristics	Output voltage	DC 0~12V adjustment
	Output current	DC 0~3000A adjustment
	Precision of steady current	≤1%
	Precision of stable voltage	≤1%
	Displayed precision	1A, 0.01V
	Current ripple	≤3% (I≥50%Id)
	Rated output power	≥94%
Insulation characteristics	Insulation resistance	Input - Output: ≥5MΩ
		Input - Cabinet: ≥5MΩ
		Output - Cabinet: ≥5MΩ
Protective characteristics	With self-protection function under non-normal cases such as over-voltage, over-current, overload, short circuit and overheating	
Other characteristics	Noise	≤50dB
	Running state	Continuous full load run of product
	Load level	Level II
	Insulation grade of the transformer	Grade B

## 11. Solution

Liyuan will keep up with the world's latest technology closely, and uphold the concept of providing customers with high-quality power supplies and professional integrated services.

With advanced design and rich experience in rectifier manufacturing, we will provide the best power solutions as well as the most stable and efficient power supply for users both at home and abroad.

## **12. Technical Capability**

LIYUAN rectifier is the most competitive brand in China

Company relies on strong technology research and development cooperation basis, created a number of advanced technology, in recent 3 years amounted to more than 30 to apply for a patent, which has nearly 10 patents of invention. Equipped with the national electric power transformation and control engineering technology research center (branch), and has set up a loan enterprise academician workstation.

Strict implementation of ISO quality management system, and through the CE safety certification, has been implementing ERP management for many years, to achieve the network, systematic computer control, the formation of a standard, efficient modern management system.

## **13. Qualification certification**

Liyuan adhere to innovation and the continuous improvement of power conversion efficiency and product quality.

The increasing R&D investment every year, and cooperation with China's well-known universities, we has established the research center of national electric power conversion and control engineering technology.

Especially the related core patents of high-power synchronous rectifier power supply, stay ahead of the whole industry in China.

The ISO 9001 quality management system has been fully implemented in Liyuan, including quality inspection of components in warehouse, production process inspection, and final product inspection.

We adopt advanced scientific quality management system and the most

stringent testing methods in the whole process to ensure the stability and reliability of products.



## 14.Service

### Packing

- 1)Small size rectifier packing in carton box separately.
- 2)Large size rectifier will be packed in wooden case.
- 3)We guarantee that all the packing is intact when it reaches its destination.

### Shipping

- 1)30-45 Days after payment.
- 2)Transport: DHL, FEDEX, UPS, Air shipping, Boat shipping
- 3)You may choose our shipping partner or your own partner.

### Maintenance

We are pleasant to share our theory and experience on equipment maintenance with users.

We are pleasant to interact with users to collect their tips and know-hows on equipment maintenance.

The module “Maintenance” here is intended to help users solve various problems they possibly encounter during equipment maintenance...

If you need other power electroplating rectifiers, we can custom design them according to customer requirements. Please contact us.

Are you looking for 3000A 12V Rectifier Power Supply for Copper Electroplating? Liyuan Haina Group is one of the professional manufacturers and suppliers in this field. With over 27 years of focus on R&D, design, production, sales, and technical services for industrial rectifiers, we have already exported our products to the United States, Canada, Britain, Turkey, Portugal, Italy, Thailand, Spain, South Africa, Russia, the UAE, Japan, South Korea, Malaysia, and other parts of the world. Equipped with a productive factory, we warmly welcome you to purchase our high-quality, Made-in-China products at competitive prices or try our customized service.