

前言



九江历源整流设备有限公司（北区）



九江历源整流设备有限公司（南区）

力源整流器（九江历源整流设备有限公司，九江力与源机电设备有限公司，东莞市力与源电器设备有限公司，深圳市力源海纳能源有限公司，香港历源电器国际有限公司）前身创建于1997年，是一家国家级高新技术企业，同时设有国家电能变换与控制工程技术研究中心和院士工作站，公司在职研发人员50多人。一直致力于直流电源的开发研究，关注国外先进技术的发展，在PCB电源市场占有率超过70%，其中脉冲电源有近1800台（70多条VCP和龙门电镀线）的应用，拥有近20年的技术研发和实际应用经验，多年来一直同高端设备商，品牌药水商和终端用户保持良好的沟通交流，对从电源结合设备方面改善PCB制作的工艺品质和提高效率推出了多项新技术。

力源整流器在PCB电镀电源领域的主推产品有：TB系列同步整流模式的高频开关电源，高速正负脉冲电源（VCP线和龙门线的应用），任意组合的模块化电源双输出和四输出电源；TB系列子母一体机单输出和双输出；TB系列风冷和水冷可选；控制方式为RS485通讯控制并预留可增配的WIFI功能；最新推出的第四代分布式子模块直流/脉冲电源系统带来又一突破；力源PCB电源具备性能稳定（密封性和结构方面）、高效（最高效率可超94%）、控制精度高、体积小、同槽体全新的安装模式降低成本、改善电镀均匀性，优化电镀工艺等综合优势。

公司严格执行质量管理体系，通过CE认证，推行ERP管理，实现网络化，系统化的管理模式，形成规范，高效的现代化生产质量管理体系，确保品质。

公司秉承“专业，品牌，创新，服务”的经营理念，继续同设备商，药水商，终端用户共同努力，挖掘从改善电源性能方面提升PCB制作品质。

PREFACE

Founded in 1997, Liyuan rectifier (Dongguan Liyuyuan Electric Equipment Co., Ltd, Jiujiang Liyuan Rectification Equipment Co., Ltd, Jiujiang Liyuyuan Electromechanical Equipment Co., Ltd, Shenzhen Liyuan Haina Energy Co., Ltd, and Hongkong Liyuan Electric Appliance Co., Ltd.) is a state high-tech company, has the National Electrical Energy Transformation and Engineering Control and Technology Research Sub-Center and a Academician Workstation, and employs over 50 full-time R&D employees. Liyuan is dedicated to development and research of the DC power all the time and pays attention to development of the foreign advanced technology. Now the market share of PCB power is over 70%. Liyuan has technology R&D and practice experiences for about 20 years, has kept good communication with high-end device providers, brand medicinal liquid and end users for multiple years, and has presented multiple new technologies to improve PCB manufacturing process quality and enhance efficiency in power integration device.

The main rectifier products of Liyuan in the PCB electroplating power field includes TB synchronous rectification high-frequency switching power, high-speed negative and positive dual-pulse (VCP line or Gantry line application) power, any combined modular dual-output and quad-output power; TB composite single-output and dual-output power, and TB air cooling and water cooling power; All products are controlled via RS485 communication. The optional WIFI function is reserved. The latest 4G distributed sub-module DC/pulse power system brings a new break-through. Liyuan PCB power features stable performance (sealing and structure), high efficiency (the top efficiency is over 94%), high control precision and small size. Liyuan reduces installation cost via the new one-tank installation mode, improves electroplating uniformity, and optimizes the electroplating process.

LiYuan strictly complies with quality management system, passes CE certification, promotes ERP management, realizes network and system management mode, and forms standardized and efficient modern production quality management system for quality assurance.

LiYuan sticks to the business idea of "professionalism, brand, innovation and service", continues to work hard together with device providers, medicinal liquid providers and end users, and mines and improve power performance to enhance PCB manufacturing quality.

PNPF正负脉冲电源

PNPF positive and negative pulse power

专业 Expertise 品牌 Brand 创新 Innovation 服务 Service

PCB行业 核心优势产品

HPNP 系列高速正负脉冲电源，提升高纵横比深度能力，提高电镀效率
降低综合生产成本，5G产品首选工艺配置

HPNP series high speed positive and negative pulse power supply, improve the ability of high aspect ratio depth, improve electroplating efficiency, reduce the comprehensive production cost

TB系列核心技术为同步整流技术、效率高达94%、节能

The core technology of TB series is synchronous rectification technology, and the efficiency is as high as 94%.energy conservation

TB系列风冷体积小、密封性能优、独立风道设计合理耐用

TB series air cooling volume is small, sealing performance is excellent, independent air duct design is reasonable and durable

TB系列水冷内部无水接头，安全可靠

TB series water-cooled internal anhydrous joint, safe and reliable

TB系列子母一体机单双输出可实现全量程高精度控制

Full range and high precision control can be realized by single and double output of TB series child mother integrated machine.

TB系列双输出或四输出槽两边放置可改善均匀性、降低损耗

TB series double output or four output slot placement on both sides can improve uniformity and reduce loss

第四代分布式（直流/脉冲）电源系统、构建PCB电镀工艺电源配置新理念

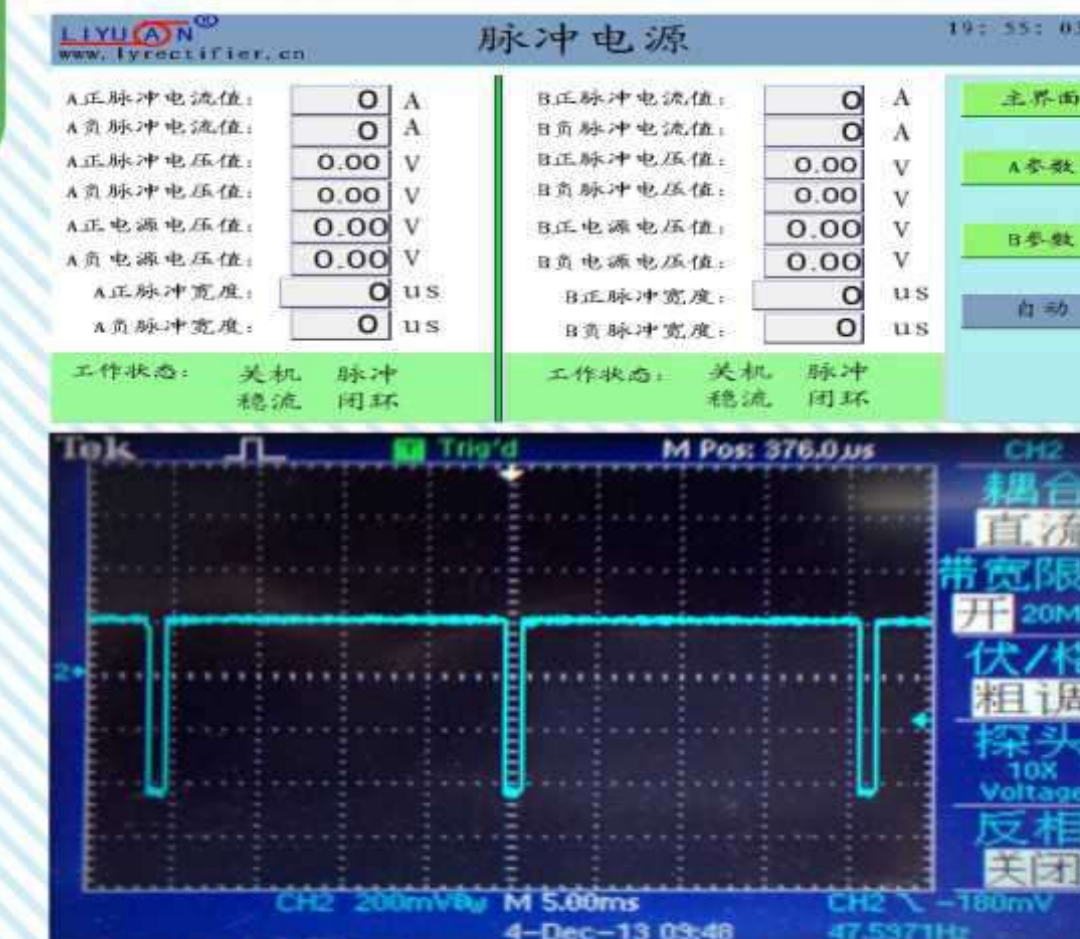
The fourth Generation distributed (DC / Pulsed) Power supply system and the Construction of a New concept of PCB Electroplating process Power supply configuration

力源整流器
LI YUAN RECTIFIER

产品用途

产品应用于高纵横比PCB的深孔，盲孔电镀工艺，为5G PCB板制作工艺首选。

The product is used in deep hole and blind hole electroplating process of high aspect ratio PCB, which is the first choice for 5G PCB board.



正负脉冲实测波形

Actual measurement waveform of positive and negative pulse

产品规格 Product specification

输出电流：正向电流0~2000A；反向电流0~6000A
输出电压：正向电压0~6V；反向电压：0~18V

输入电压 Input voltage	三相AC380V+- 10%，50-60HZ 等 three phase ac380v ± 10%, 50-60hz
正向时间 Forward time	0.5-1000MS 步长100US 0.5-1000ms 100 μ S step
反向时间 Reverse time	0.5-100MS 步长100US (或用户定制) 0.5-100MS 100 μ S step(or custom made)
电压/电流精度 Voltage/Current precision	最大1% ≤ 1%
功率因素 Power factor	0.9
结构模式 Design	独立模组组合模式（第三代） module strcture (3rd generation)
机间同步功能 module synchronization	具备 include
波形相位差 Pulse phase difference	可设置 Can be regulated
复杂波形 multi pulse	20段设置（或用户定义） 20 sections combination
输出类别 Output	双输出或四输出 2 or 4 output
通讯方式 Communication	RS485或其他 RS485 or Others
通讯协议 Protocol	力源定制 LIYUAN
冷却方式 Cooling	风冷/水冷 Air/Water
输出配线 Output cable	双绞线或同轴电缆线 twisted-pair or coaxial cable
配套PCB设备类型 PCB equipment application	龙门线和VCP线（一次铜/二次铜） VCP line or Gantry line

提升深度能力，提高电镀效率30%-50%，优化产能，改善品质，降低电镀流程的综合成本
Reduce PCB electroplating cost, improve deep hole PCB electroplating quality and capability, increase electroplating efficiency by 30%-50%.

可根据客户要求定制
Can be customized according to customer requirements

电镀品质图样

板厚3.2mm 电流密度30ASF

(1) Panel:3.2mm panel,Electroless Copper
Hole Diameter:0.25mm/AR:12.8
孔径: 0.25mm, 面铜厚度: 20.4um,孔铜: 25.5um,TP:125%

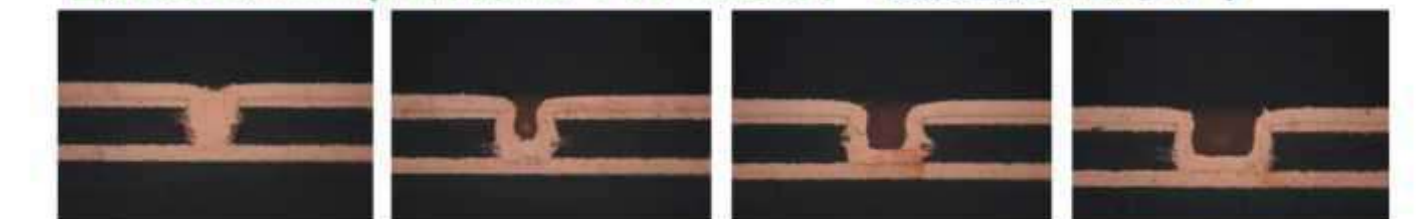
板厚5.5mm 电流密度25ASF

(2) Panel:5.5mm panel(from Customer),flashed copper
Hole Diameter:~0.4mm/AR:13.75
孔径: 0.4mm, 面铜厚度: 22.2um,孔铜: 27.7um,TP:125%

板厚8.0mm 电流密度20ASF

(3) Panel:8.0mm panel,Electroless Copper
Hole Diameter:0.5mm/AR:16
孔径: 0.5mm, 面铜厚度: 24.7um,孔铜: 26.1um,TP:114%

盲孔板1.0mm(同样使用PPR-II镀液, 电流密度25ASF)



孔径3mil Hole TP Filling Kenn TP Filling	孔径4mil Hole TP 153.7% Kenn TP 101.45%	孔径5mil Hole TP 137.89% Kenn TP 101.70%	孔径7mil Hole TP 143.60% Kenn TP 103.99%
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复杂波形



HPNPF 2*Z1000A F3000A 脉冲电源实物图
HPNPF 2*Z1000A F3000A Material object of pulse power

TBFBZ系列风冷式

TBFBZ air cooling type

产品性能优势

Product performance advantage



- 采用同步整流节能优势
Synchronous rectification and energy saving
- 拔插设计方便维护，接线简单
The plug design facilitates maintenance and simplifies wiring.
- 高稳定，高可靠性，多环控制系统
High stability and reliability and multi-loop control system
- 产品体积小，全数字RS485网络通讯制可选增WIFI功能
The product features small size, full digital RS485 network communication and optional WIFI function
- 采用独立风道结构提高整机防腐性能延长电源使用寿命
Independent air duct is used to improve the corrosion resistance of the whole device and extend power life.

可根据客户要求定制

Can be **customized according** to customer requirements

规格型号 specifications and models	W-宽(mm)	L-深(mm)	H-高(mm)
0-400A 06V	100	378	185
400-900A 06V	190	501	262

产品参数列表

List of product parameters

功能 Function	参数 Parameter	功能 Function	参数 Parameter
输入电压 Input voltage	三相380VAC-10%~+15% Three phase 380vac-10%~+15%	使用场所 Use place	室内，不受阳光直射 Indoor, no exposure to direct sunlight
稳压精度 Voltage regulation precision	≤0.5%	输出电压 Output voltage	0-5V线性可调 0-5v linearly adjustable
稳流精度 Current stabilization precision	≤0.5%	海拔高度 Elevation height	低于3000米 Less than 3000m
功率因数 Power factor	PF≥0.9 (满载时) PF≥0.9 (Under full load)	输出电流 Output current	0-2000A线性可调 0-2000A linearly adjustable
调节方式 Regulation mode	RS485通讯、模拟量 RS485 communication and analog	环境温度 Environmental temperature	-25℃~+45℃
保护方式 Protection mode	过温、过流、缺相 Over-temperature, over-current and phase loss	存储温度 Storage temperature	-40℃~+70℃
转换效率 Conversion efficiency	≥90%	电流纹波 Current ripple	≤1%

TBSBZ系列水冷式

TBSBZ water cooling mode

产品性能优势

Product performance advantage



- 独特的防水浇注工艺，有效防止冷凝水的隐患
Distinct waterproof casting process can effectively prevent against condensate water.
- 采用无接头冷却水管，安全不泄漏
The cooling water pipe without a connector is secure and is free of leakage.
- 同步整流节能优势，大幅提高整机效率
The synchronous rectification can save energy and improve whole efficiency much.
- 产品体积小，方便并机扩容；全数字RS485网络通讯控制，可选增WIFI功能
The product is small, is easy to connect in parallel and expand, and provides full digital RS485 network communication control and optional WIFI function.
- 精度高，性能稳定，可靠
High precision, stable performance and reliability

可根据客户要求定制

Can be **customized according** to customer requirements

规格型号 specifications and models	W-宽(mm)	L-深(mm)	H-高(mm)
0-400A 06V	100	378	225
400-1000A 06V	140	416	225

产品参数列表

List of product parameters

功能 Function	参数 Parameter	功能 Function	参数 Parameter
输入电压 Input voltage	三相380VAC-10%~+15% Three phase 380vac-10%~+15%	使用场所 Use place	室内，不受阳光直射 Indoor, no exposure to direct sunlight
稳压精度 Voltage regulation precision	≤0.5%	输出电压 Output voltage	0-5V线性可调 0-5v linearly adjustable
稳流精度 Current stabilization precision	≤0.5%	海拔高度 Elevation height	低于3000米 Less than 3000m
功率因数 Power factor	PF≥0.9 (满载时) PF≥0.9 (Under full load)	输出电流 Output current	0-2000A线性可调 0-2000A linearly adjustable
调节方式 Regulation mode	RS485通讯、模拟量 RS485 communication and analog	环境温度 Environmental temperature	-25℃~+45℃
保护方式 Protection mode	过温、过流、缺相 Over-temperature, over-current and phase loss	存储温度 Storage temperature	-40℃~+70℃
转换效率 Conversion efficiency	≥90%	电流纹波 Current ripple	≤1%

TB系列子母机 (单输出和双输出)

TB composite machine (single output and dual-output)

TB系列双输出电源

TB dual-output power

产品性能优势

Product performance advantage



- 精度高, 性能稳定, 可靠
High precision, stable performance and reliability
- 同步整流节能优势
Synchronous rectification and energy saving
- 体积小, 优化安装空间
Small size and optimized installation space
- 大小电流自动切换控制
Automated switching control of high and low current
- 水冷采用无接头管路, 风冷为独立全密封风道
The pipeline without a connector is used in water cooling and the independent enclosed air duct is used for air cooling.

可根据客户要求定制

Can be customized according to customer requirements

规格型号 specifications and models	W-宽(mm)	L-深(mm)	H-高(mm)
TBFBZ-350A 60A 05V(风冷)	210	418	225
TBSBZ-350A 60A 05V(水冷)	210	418	225
TBFBZ-D(2x500A 50A) 05V(风冷子母机双输出)	520	800	145
TBSBZ-D(2x500A 50A) 05V(水冷子母机双输出)	520	800	145

产品参数列表

List of product parameters

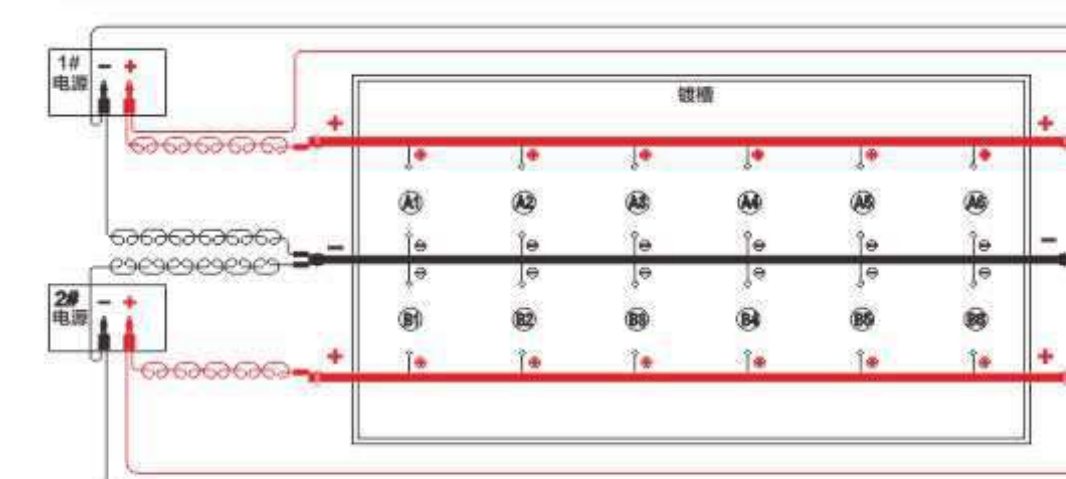
功能 Function	参数 Parameter	功能 Function	参数 Parameter
输入电压 Input voltage	三相380VAC-10%~+15% Three phase 380vac-10%~+15%	使用场所 Use place	室内, 不受阳光直射 Indoor, no exposure to direct sunlight
稳压精度 Voltage regulation precision	≤0.5%	输出电压 Output voltage	0-5V线性可调 0-5v linearly adjustable
稳流精度 Current stabilization precision	≤0.5%	海拔高度 Elevation height	低于3000米 Less than 3000m
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转换效率 Conversion efficiency	≥90%	电流波纹 Current ripple	≤1%



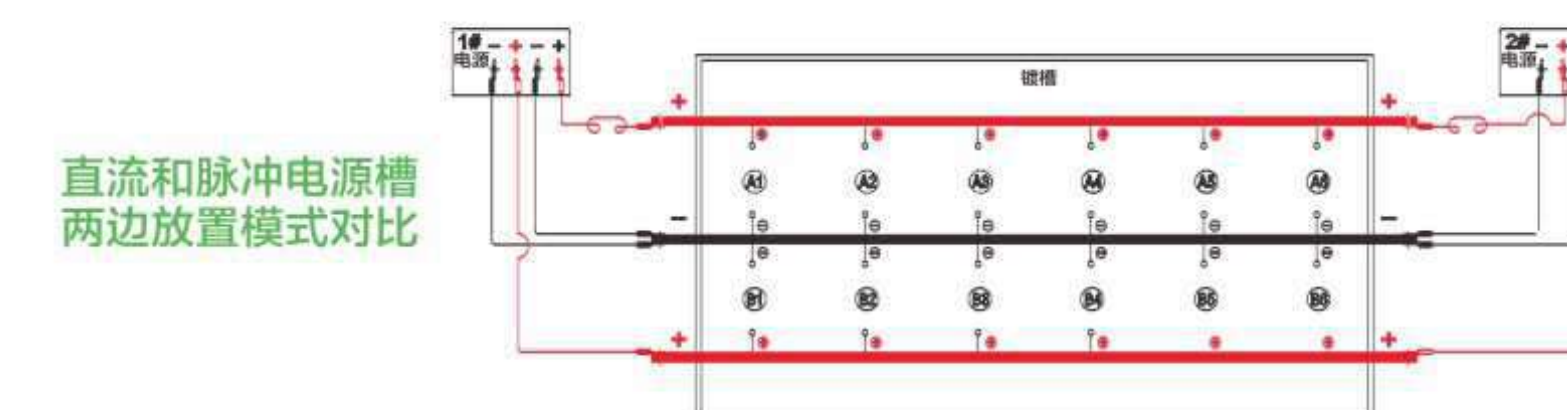
可根据客户要求定制

Can be customized according to customer requirements

规格型号 specifications and models	W-宽(mm)	L-深(mm)	H-高(mm)
0-2*400A	210	482	225
2*500A-2*1000A	260	492	235



传统电镀槽一边放置模式 (DC 或 PULSE)
One-side placement mode of traditional electroplating tank (DC or PULSE)



双输出电镀槽两边放置模式 (DC 或 PULSE)
Both-side placement mode of dual-output electroplating tank (DC or PULSE)

产品参数列表 List of product parameters	传统电镀槽一边放置模式 One-side placement mode for traditional electroplating tank	双输出电镀槽两边放置模式 Both-side placement mode for dual-output electroplating tank
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两种模式差异性对比

Difference comparison of two modes

放置位置 Placement position	两台放置槽体同一侧 Two devices are placed on one side of the tank	就近放在槽体两边或同侧 Place on both sides or one side of tank according to distance
火牛线 Live line	两侧需要等长 Equal length on both sides	保持同一侧等长 Keep equal length on one side
火牛线长度 Length of live line	单根在8米左右 Single line is about 8m	单根可以控制在1-2米间 Single line length is about 1-2m

成本及损耗的差异

Differences of cost and loss

安装成本 Installation cost	火牛线成本高 Live line cost is high	同比降低80% Reduce by 80%
发热量 Heat	发热量多, 损耗高 High heat and loss	火牛线发热量同比减少80% The heat reduces by 80%
一次接线成本 Once wiring cost	相同 Same	相同 Same
水系统或风系统 Water system or air system	相同 Same	相同 Same

电镀工艺的差异

Differences of electroplating process

电流分布均匀性 Current distribution uniformity	比一条飞靶一台有改善 Improved compared to one flying target	两边均流性更好 Better uniformity on both sides
电镀品质改善 Electroplating quality is improved	较好 Better	同比提升2%左右 Increased by about 2%

力源TB系列的节能优势

Energy saving strength of Liyuan TB series

力源同步节能模式TB系列同比其他品牌多节能16%-25%
Liyuan TB series under synchronous energy saving mode can save 16%-25% energy

TB系列四输出电源

TB four-output power

新产品

第四代分布式子模块 直流/脉冲电源系统

4G distributed sub-module DC/pulse power system

产品性能优势

Product performance advantage



- 同步整流，最高效率可超94%；Rs485通讯加数字化偏差校准系统，可选增WIFI功能
Synchronous rectification is used. The maximal efficiency can be over 94%.
The RS485 communication and digital deviation correction system can support optional WIFI function
- 专为槽体电源一体化模式设计可自由组合扩容四输出或者双输出子母机
The special tank and power integration design mode realizes free combination and expansion to dual-output or dual-output composite device
- 机箱密封设计，风道隔离密封，线路板采用独特浸涂工艺，提升防腐性能
The enclosure is enclosed, the air duct is isolated and sealed. The line board is made by using distinct dip-coating process to improve corrosion resistance.
- 内部所有组件单边安装拔插设计方便维护
All internal components are installed on single side and the plug mode is designed for easy maintenance.

可根据客户要求定制

Can be customized according to customer requirements

规格型号 specifications and models	W-宽(mm)	L-深(mm)	H-高(mm)
TBFBZ-D2000A 05V(4x500A)	490	800	155
TBSBZ-D2000A 05V(4x500A)	490	800	125

四输出电源槽体接线示意图
(槽两边放置模式)

Wiring illustration of four-output power tank
(placement mode on both sides of the tank)



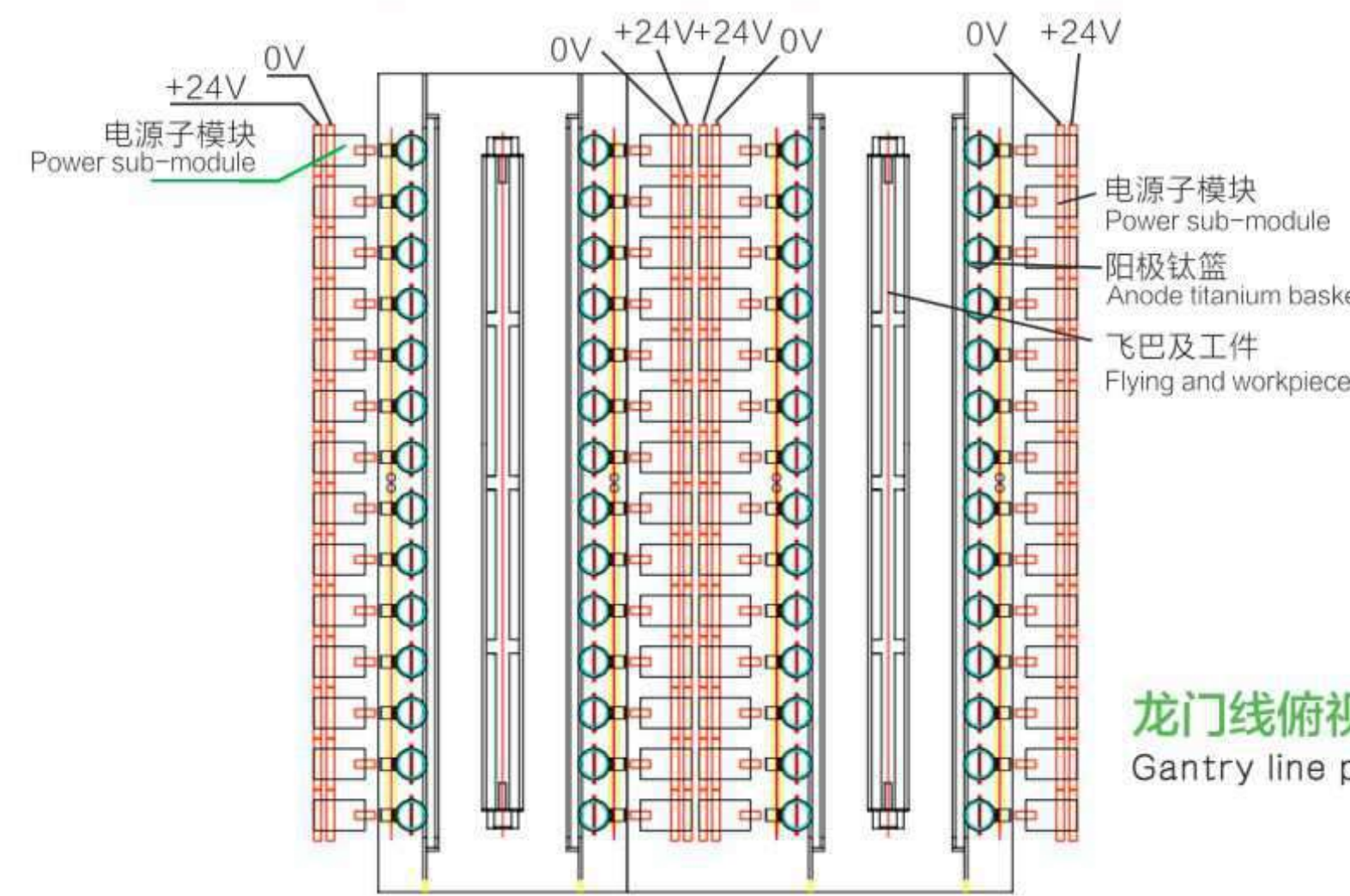
产品参数列表

List of product parameters

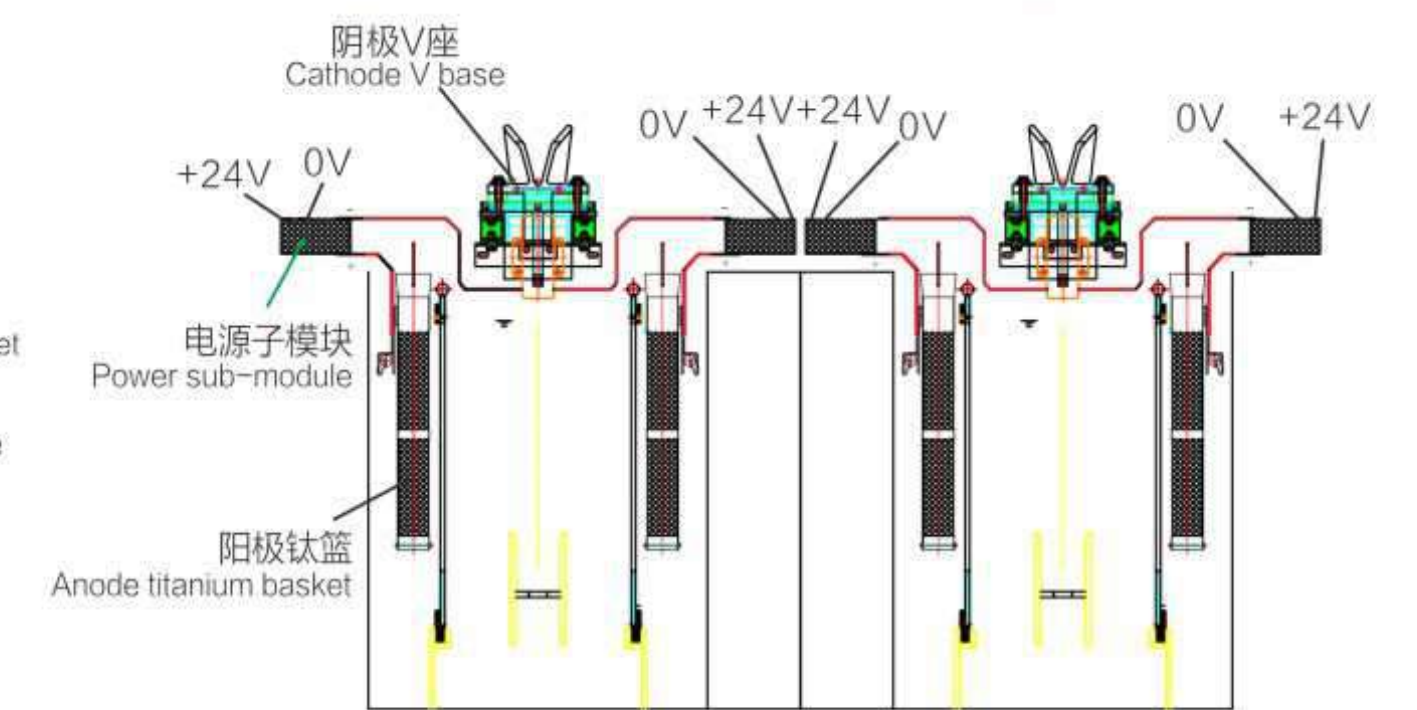
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保护方式 Protection mode	过温、过流、缺相 Over-temperature, over-current and phase loss	存储温度 Storage temperature	-40℃~+70℃
转换效率 Conversion efficiency	≥90%	电流波纹 Current ripple	≤1%

龙门线镀槽

Gantry line plating tank



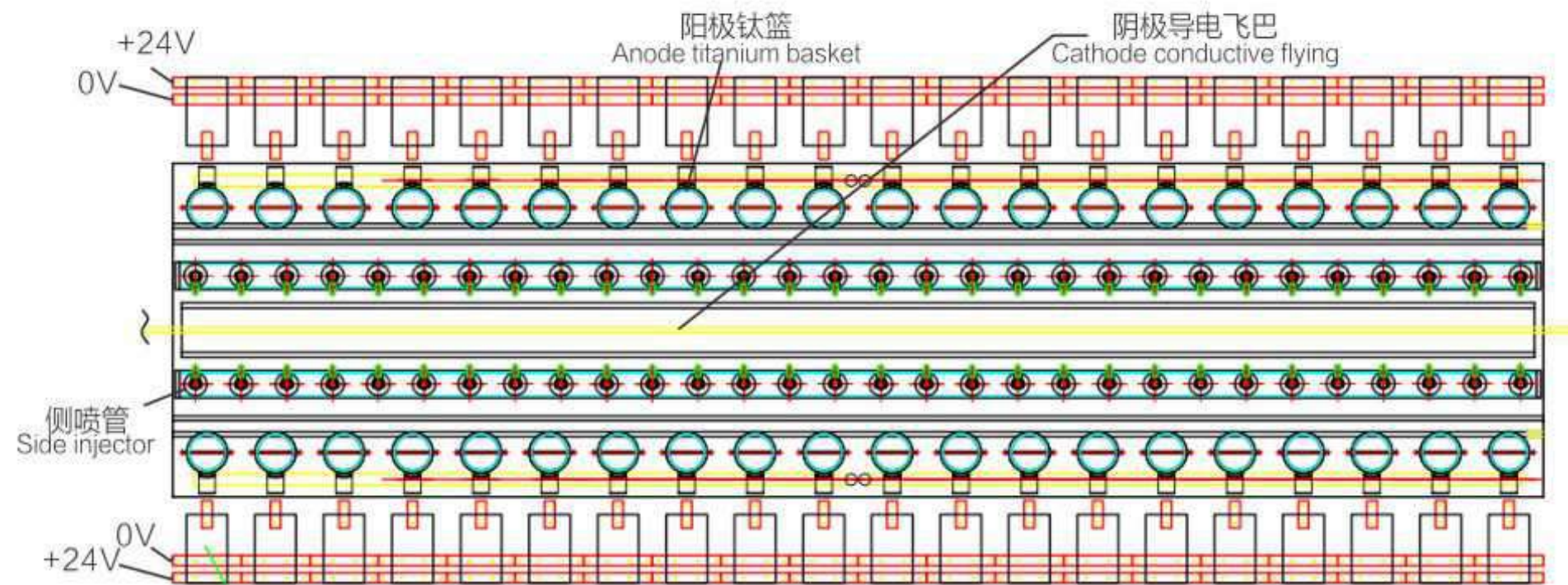
龙门线俯视图
Gantry line platform



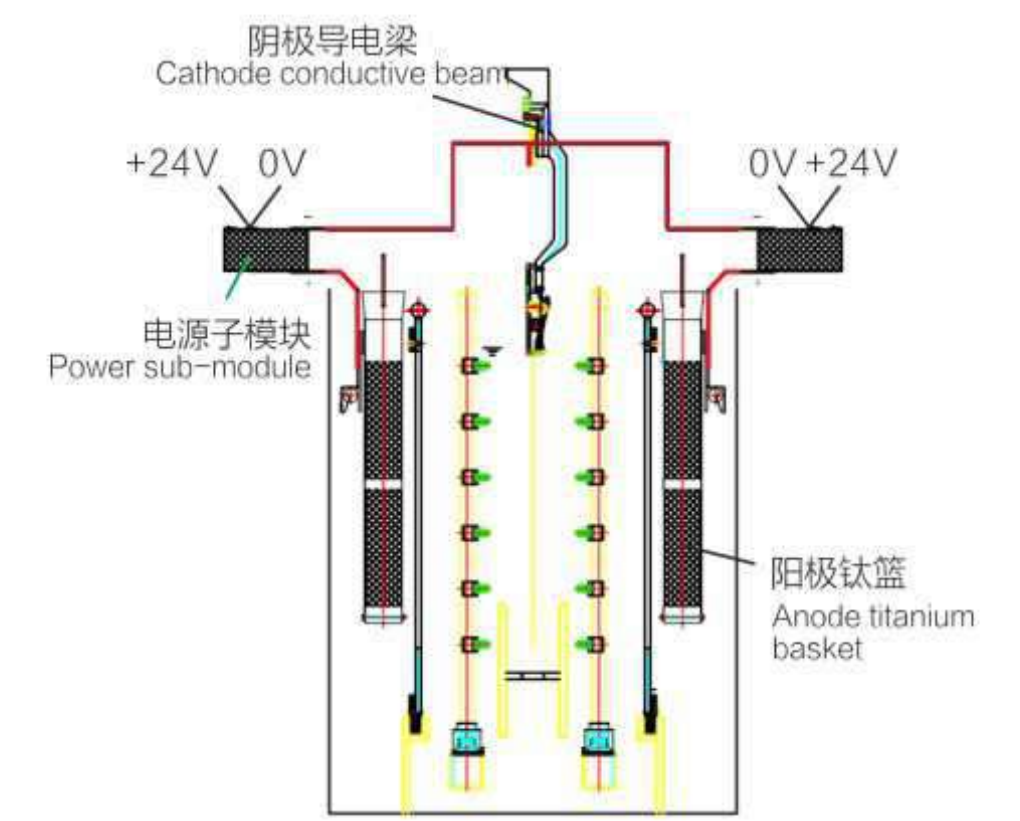
龙门线标准镀槽截面示意图
Gantry line standard plating tank section

VCP线镀槽

VCP line plating tank



VCP线标准镀槽俯视图
VCP line standard plating tank platform



VCP线标准镀槽截面示意图
VCP line standard plating tank section

电源子模块的规格型号 LYDP12020

Specification and model of power sub-module LYDP12020

核心特点 Core features	电源特性 Power characteristics	工艺效果 Process effect
电源安装方式改变 Change of power installation mode	逆变同整流独立分开 The inversion is separated from the rectification.	改变槽体与电源间的结构模式 Change structural mode between the tank and power
每个电源子模块阳极连接一个钛篮 The anode of each power sub-module connects to a titanium basket	电源子模块全密封浇注 The power sub-module is fully sealed and cast	最大限度改善电镀均匀性 Improve the electroplating uniformity to most extent
电源子模块直接同钛篮整合在槽边 The power sub-module is directly integrated into the tank side together with titanium basket	无线数据传输 Wireless data transmission	更有效解决钛篮及铜球接触电阻不一致的问题 More effectively solve inconsistent touch resistance of titanium basket and copper ball
每个钛篮电流单独调节 The current of each titanium basket is separately adjusted.	同时具备直流脉冲输出 The DC pulse output is provided	最大限度改善脉冲电镀效果 Improve the pulse electroplating effect to most extent.
实现每个钛篮电流完全均流 The current of each titanium basket is fully uniform.	每个子电源模块独立控制调节 Each sub-power module is separately controlled and adjusted	
子模块最高效率超过97% The maximal efficiency of sub-module is over 97%	高精度，低纹波 High precision and low ripple	