SPECIFICATION

MODEL NO : GPW24

EDITION : V02

For Single or Two Phase Immersion Cooling

REV	DATE	Description	APPROVED
V00	2024/05/23	Basic functionality	Shadow Bao
V01	2024/08/05	Change output current and current protection for different voltage ranges	Shadow Bao
V02	2024/10/17	Modify ripple, load regulation, and overcurrent protection values	Shadow Bao

Draft	Review	Approve
Jiying Wang 2024/10/17	Xinyun Zeng 2024/10/17	Shadow Bao 2024/10/17

Contents

1. Introduction

GPW24 is born for immersion cooling miners, it is a three-phase voltage input, high efficiency, high power factor power supply. The PSU has output short circuit protection, output over current protection, output over voltage protection, over temperature protection. The whole power supply is designed in strict accordance with safety regulations, in line with information technology equipment safety standards, product design in line with CE, FCC certification requirements.

2. Main specifications

Single Phase immersion：

Max output Power	Input voltage range	Output Voltage	Output Current	Regulation	Ripple & Noise (Max.)
8000W	350V—480Vac	14V-18V	0—570A	±2%	220mVp-p

Two Phase immersion：（electronic fluorinated fluid）

Max output Power	Input voltage range	Output Voltage	Output Current	Regulation	Ripple & Noise (Max.)
9400W	350V—480Vac	14V-18V	0—670A	±2%	220mVp-p

3. Environmental Requirement

No	Items	Technical Index	Unit	Remark
1	Operating Temperature	-20—+60	℃	
2	Store Temperature	-40—+85	℃	
3	Humidity	0—90%		（non-condensing）
4	Altitude	≤2000	m	
5	Cooling Method	immersion cooling		

4. Electrical Specification

1	Input Electrical Characteristics			
No	**Items**	**Technical Index**	**Unit**	**Remark**
1.1	Normal voltage range	380-480	Vac	
1.2	Input Voltage range	350-520	Vac	

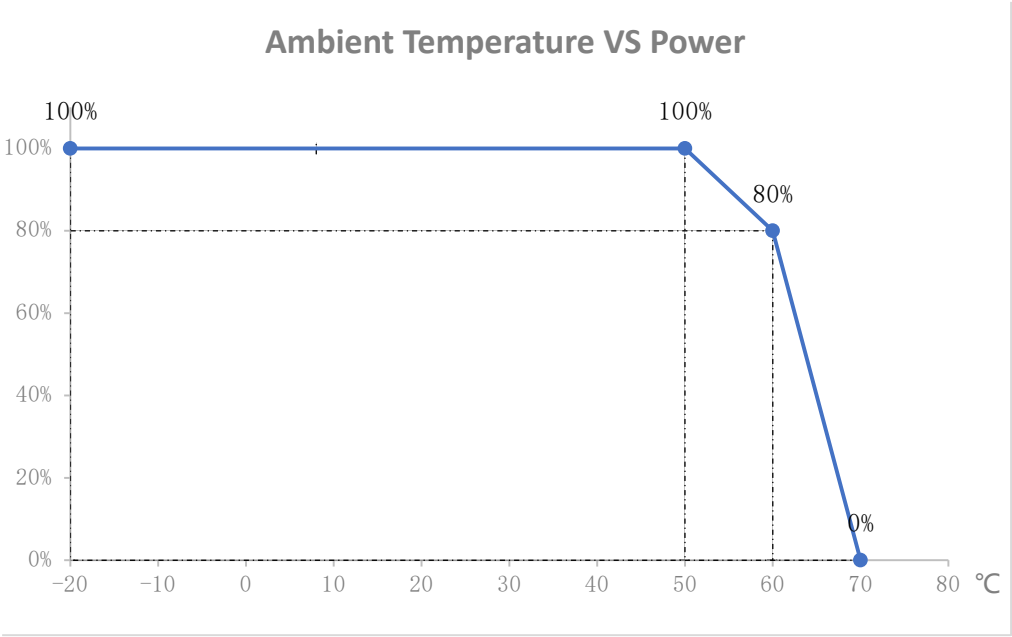
1.3	Inrush current (cold start)	≤65	A	380Vac， 25℃
1.4	Max input ac current	25	A	full load, per phase current
1.5	Power Factor	≥0.98		full load, per phase
1.6	Frequency range	47—63	Hz	

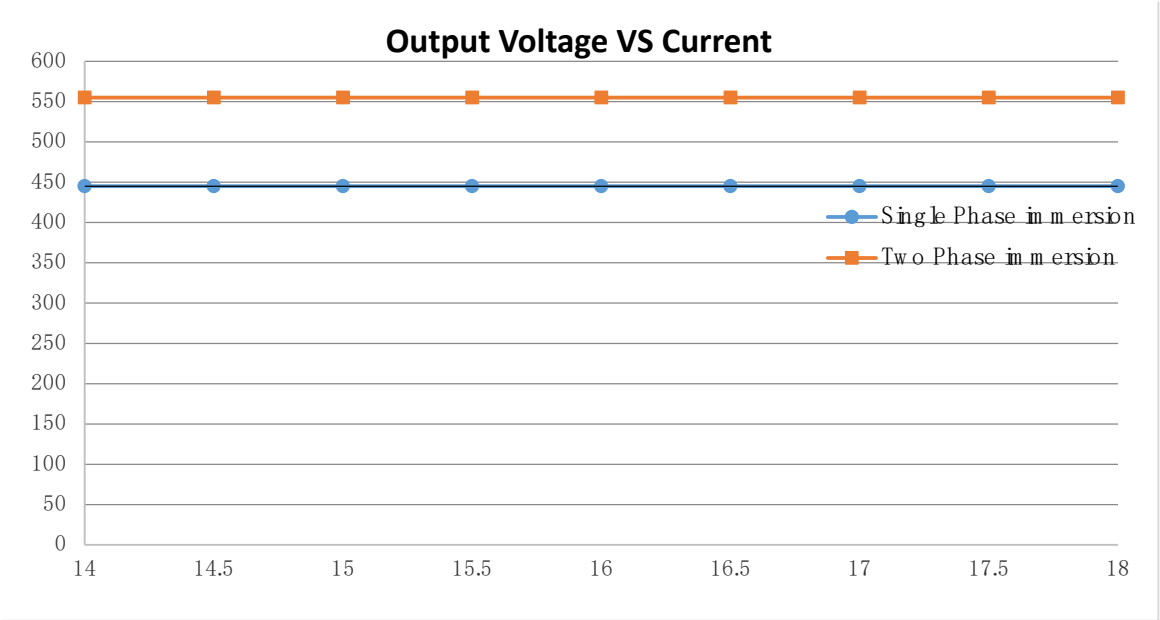
2	**Output Electrical Characteristics**								
No	**Items**	**Technical Index**						**Unit**	**Remark**
		14V	15V	16V	17V	18V	Vo2		
2.1	Output Current	0—570	0-530	0-500	0-470	0-445	0—0.3	A	Single Phase immersion
		0—670	0-625	0-585	0-550	0-520			Two Phase immersion
2.2	Rated current	570	530	500	470	440	0.3	A	Single Phase immersion
		670	625	585	550	520			Two Phaseimmersion
2.3	Output Voltage Range	14-18				11-14.5		V	
2.4	Output Voltage Regulation	±2%				±2%		%	
2.5	Load Regulation	±2%				±2%		%	
2.6	Voltage regulation accuracy	±2%				±2%		%	
2.7	Capacitive load	≤5000				≤1000		μF	
2.8	Efficiency	≥94%							Max efficiency

2.9	Ripple & Noise	≤220	≤220	mVp-p	1) Measurements shall be made with an oscilloscope with 20MHz bandwidth. 2) Outputs shall be bypassed at the connector with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to simulate system loading
2.10	DC output voltage rise time	≤50		ms	The output voltages shall rise from 10% to 90% of their output voltage
2.11	DC Output Overshoot At Turn On & Turn Off	±10%			
2.12	Output Transient Response	Voltage Tolerance Limit	±5%		25% to 50% load and 50% to 75% load
		Recovery time	△t≤500	μS	
		Slew Rate	≥0.5	A/μS	
2.13	Temperature coefficient	±0.02		%/℃	
2.14	Output Power Range	0—8000	0—3	W	Single Phase immersion
		0—9400			Two Phase immersion

3	**Protection**							
No	**Items**	**Technical Index**					**Unit**	**Remark**
		14V	15V	16V	17V	18V	Vo2		
3.1	Output Over Voltage Protection	≥20	≥20	≥20	≥20	≥20	≥15	V	Power supply restart
3.2	Output	627	583	550	520	485	≥0.35	A	Power supply latch into shutdown state

	Over current Protection	750	695	650	610	570	Power supply restart		Power supply latch into shutdown state
3.3	Output Short Circuit Protection	Power supply latch into shutdown state					Power supply restart		
3.4	Over-temperature protection	Power supply restart							


Ambient Temperature VS Power
100%
100%
80%
60%
40%
20%
0%
100%
80%
0%
-20
-10
0
10
20
30
40
50
60
70
80
℃


Output Voltage VS Current
600
550
500
450
400
350
300
250
200
150
100
50
0
14
14.5
15
15.5
16
16.5
17
17.5
18
Single Phase immersion
Two Phase immersion

5. Pmbus Command Table

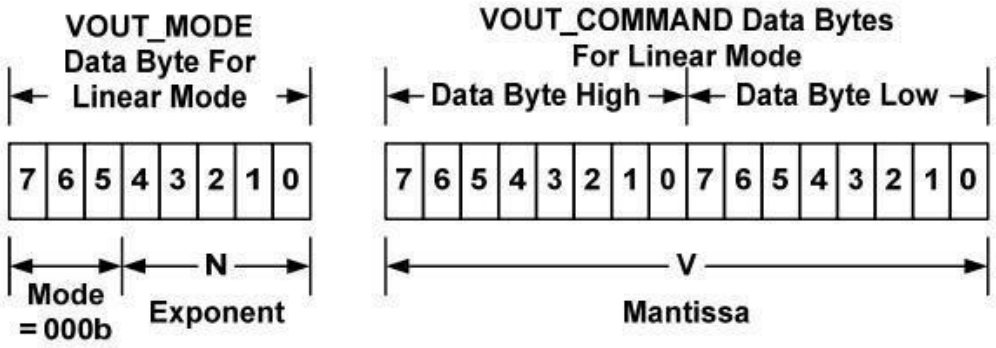
Via the PMBus the computer system can communicate with the power supply to access currents, voltages. The communication follows the Power System Management Protocol Specification. (PMBus 1.2). As soon as AC Power is connected to the PSU the PMBus functionality must be available.

Following Table shows mandatory PMBus commands to be supported by the PSU.

Code(Hex)	Command Name	Read/Write	Bytes	Comments
00h	PSU_VERSION	RO	1	Suppliers PSU Version,should not be zero
01h	ON_OFF_CONFIG	R/W	1	0x80:On 0x00:Off Default:Off
03h	CLEAR_FAULTS	Send Byte	0	
05h	ERRORCODE	RO	2	Error Code 0000h: no err 0001h: Over Temperature 0002h: Input Under Voltage 0004h: Main Road Output Under Voltage 0008h: Main Road Output Over Voltage
06h	PFC_STATE	Block Read	9	PFC state
07h	LLC_STATE	RO	2	LLC state
20h	VOUT_MODE	RO	1	Fixed value: 0x17 (n=-9)
21h	VOUT_COMMAND	R/W	2	Output voltage (set value) Linear-16
8Bh	READ_VOUT	RO	2	Main Output voltage (actual value) Linear-16
8Dh	READ_TEMPERATURE	RO	2	T1 Temperature Linear-11
8Eh	READ_TEMPERATURE	RO	2	T2 Temperature Linear-11
8Fh	READ_TEMPERATURE	RO	2	T3 Temperature Linear-11
90h	READ_TEMPERATURE	RO	2	T4 Temperature Linear-11
95h	READ_VOUT	RO	2	Side Road Output voltage (actual value) Linear-16
96h	READ_POUT	RO	2	Output power (actual value) Linear-11
97h	READ_PIN	RO	2	Input power (actual value) Linear-11
9Ah	MFR_MODEL	Block Read	Variable	Power model,such as "GPW22"
A3h	FW_VER	Block Read	6	Firmware version information, version, date Version(2byte,unsigned short) Date(4byte,unsigned int)
A4h	FW_UPGRADE	Block Write	34	Firmware upgrade: Write upgrade file 34 byte Block write
A5h	FW_UPGRADE_STATE	RO	1	Upgrade state

● Linear-16: Output voltage

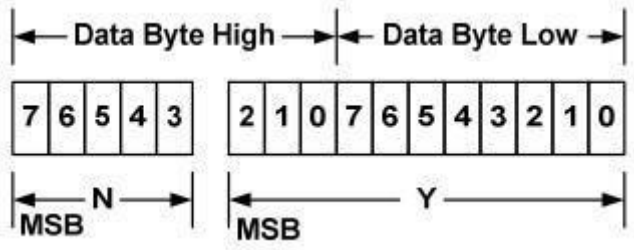
VOUT_MODE The fixed value of the mode of the upper three bits of the register is 0, which specifies the Linear-16 data format. The output voltage is in this data format.



Calculation formula of actual output voltage (unit: V): Voltage=V · 2 ^ N

Where: Voltage is the actual output voltage and V is VOUT_ COMMAND/READ_ VOUT value, N is 5-bit 2-complement integer(two's complement integer).

● Linear-11



X=Y·2^N

Where, X is the actual value, Y is the 11-bit 2-complement integer, and N is the 5-bit 2-complement integer.

6. Isolation

6.1 Table

Input To Output	DC500V 50MΩmin (at 25 degree C)
Input To FG	DC500V 50MΩmin (at 25 degree C)
Output To FG	Non Isolated

6.2 Table

Input To Output	2000Vac 50Hz 1minute ≤10mA
Input To FG	2000Vac 50Hz 1minute ≤10mA
Output To FG	Non Isolated

Note: FG and Output connected internally.

7. Weight

3Kg

8. Package

1,packing

The product name, model number, manufacturer's identification, inspection certificate from the manufacturer's quality department, manufacturing date, etc.Attached list is found in the packing case.

2, transportation,

Suitable for vehicle, ship, aircraft transport, transport should be awning, sunscreen, civilized loading and unloading.

3, storage

Products should be stored in the packing box when not in use. The ambient temperature of the warehouse is -40℃ -- +85℃, and the relative humidity is 0% -- 95%. Harmful gases, inflammable and explosive products and corrosive chemicals are not allowed in the warehouse, and there is no strong mechanical vibration, impact and strong magnetic field effect.It should be at least 50cm away from the wall, heat source, window or air inlet, and the storage period under these conditions is generally 2 years. After 2 years, it should be re-inspected.