Descriptions

480W Uninterruptible Power Supply Unit for Universal Use

RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Universal 22.5 - 30VDC Input voltage
- Operating ambient temperature range: -40℃ to +75℃
- Output over-current, Input over-voltage protection
- Battery temperature abnormal protection
- Selection of battery buffer discharge time
- LED signal and Indicationn
- The base plate with conformal coating
- Safety according to IEC/UL/EN62368, UL508, GB4943

Applications

- Industrial control
- Electricity
- Security
- Mmunications
- Smart home etc

Selection Guide

Certification	Part No.	Output Power (W)	Nominal Output Voltage And Current (Vo/Io)	Battery Pack Rated Voltage (V)	Efficiency % Typ.*
EN/BS EN	DDUPS20-24F-N	480	24V/20A	24	98

Note:

1. Test when the battery is ready.
2. The product picture is for reference only. For details, please refer to the actual product.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage Range	DC input		22.5	--	30	VDC
	Leakage current	30VDC		< 0.5mA			
Output Specifications	Output Voltage Accuracy	Full load range	Main power supply	22.5	--	30	V
			Battery buffered power supply	18	--	28.8	

	Standby Battery Buffer Switching Voltage	Full load range, standby battery charging ready state		--	21	--	
	Output Over-current Protection	Full input voltage		--	28	30	A
	Output Over-voltage Protection	Full load range		≤35VDC			
Battery Management Features	Battery Charging Voltage Range	Full Input Voltage Range (Temperature Compensated)	Serial charging	18	--	28.8	V
			Single charging	9	--	14.4	
		Full Input Voltage Range (No Temperature Compensation)	Serial charging	18	--	26.6	
			Single charging	9	--	13.3	
		Full input voltage range	0.5A load discharging	20	--	28.8	
			20A load discharging	18	--	28.8	
	Battery Temperature Abnormal Protection①	Battery capacity ≤3.9AH	Protection mode: turn off charging or discharging	High temperature protection	--	50	--	℃
				Low temperature protection	--	-10	--	
		Battery capacity ≤10AH		High temperature protection	--	50	--	
				Low temperature protection	--	-10	--	
		10AH < Battery capacity ≤150AH		High temperature protection	--	50	--	
				Low temperature protection	--	-40	--	
	Battery Charging Current	Battery capacity≤3.9AH			--	1	--	A
		Battery capacity≤10AH			--	2	--	
		Battery capacity≤150AH			--	3	--	
	Selection Of Battery Buffer Discharge Time	0.5 / 1 / 2 / 3 / 5 / 10 / 15 / 20 / 30 / ∞						min
	Battery Capacity Selection	≤3.9AH /≤10AH /≤150AH						AH
	Battery Maintenance Mode (Service)	Turn off charging or discharging, replaceable battery						

Signal And Indication	The Light Blinked (*: Light on; -: Light off)	Name And Status Of Indicator Light			
		Error	Diagnosis	Status Batt 1	Status Batt 2
	*-------	Check wiring (Need to check the backup battery connection)	Power in (Input power supply normal)	Ready (Backup battery charged)	Ready (Backup battery charged)
	------	Input warning (Input voltage abnormal)	Buffer time expired (The selected discharge time is not supported by the standby battery)	Charging (Standby battery charging)	Charging (Standby battery charging)
	--*---	High temperature (High temperature abnormal)	Remote (Remote shut-off standby discharge output)	Replace battery (Need to replace the discharge battery)	Replace battery (Need to replace the discharge battery)

	--*-*-	Low temperature (Low temperature abnormal)	Overload (Output overload)	Buffering (Discharge output of standby battery)	Buffering (Discharge output of standby battery)		
	Contact State	State and contact name					
		Alarm		Bat Charge	Bat Mode		
	Contact open②	Check wiring (Need to check the backup battery connection)		Charging (Standby Battery charging)	Buffering (Discharge output of standby battery)		
		Service (Maintenance mode)					
		Replace battery (Need to replace the discharge battery)					
		Buffer time expired (The selected discharge time is not supported by the standby battery)					
General Specifications	Isolation Voltage	I/O - ⏚	Test 1 minute, Leakage Current<5mA	1000	--	--	VAC
	Insulation Resistance	I/O - ⏚	Ambient temperature: 25±5℃ Relative humidity: less than 95%, non-condensing Test Voltage: 500VDC	50	--	--	MΩ
	Operating Temperature	Rated input voltage, rated output voltage, load		-40	--	75	℃
	Storage Temperature			-40	--	85	
	Working Humidity	Non-condensing		20	--	90	%RH
				10	--	95	
	Safety Standard			CLASS II			
	Security Level	MIL-HDBK-217F@25℃		>1000,000h			
	MTBF	Ambient temperature: <50℃		3 years			
Mechanical Specifications	Case Material	Metal (AL5052, SUS)					
	Package Dimensions	124.00 x 46.00 x 124.00 mm (Without installation accessories)					
	Weight	600g (Typ.)					
	Cooling Mode	Free air convection					

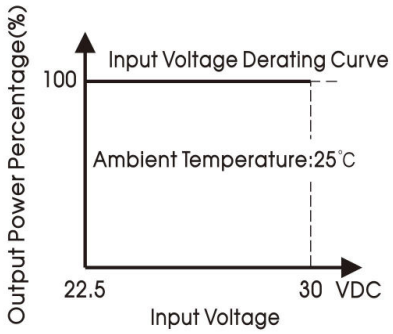
Note:
①This protection function and the protection temperature are not the allowed working temperature and limit of this product, the battery temperature protection is the battery charging and discharging protection function according to the battery application temperature range.
②When the product is working under the corresponding conditions, it is disconnected in normal.

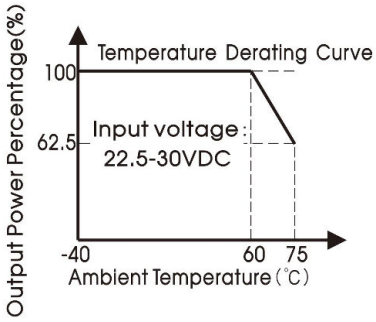
Electromagnetic Compatibility

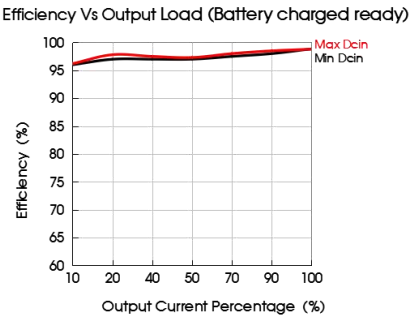
Emissions*	Conducted harassment	CISPR32/EN55032 CLASS B		
	Radiation disturbance	CISPR32/EN55032 CLASS B		
Immunity	Electrostatic discharge	IEC/EN 61000-4-2 Contact ±8KV/Air ±15KV	Housing	perf. Criteria A
	Radiation immunity	IEC/EN 61000-4-3 10V/m	Housing	perf. Criteria A
	Impulse group immunity	IEC/EN 61000-4-4 ±2KV	Input, output	perf. Criteria A
		IEC/EN 61000-4-4 ±2KV	Signal	
	Surge immunity	IEC/EN 61000-4-5 line to line ±1KV/line to ground ±2KV	Input, output, signal	perf. Criteria A
	Conducted disturbance immunity	IEC/EN61000-4-6 10 Vr.m.s	Input, output, signal	perf. Criteria A

Note: *It is tested under the condition of unconnected battery.

Characteristic Curve



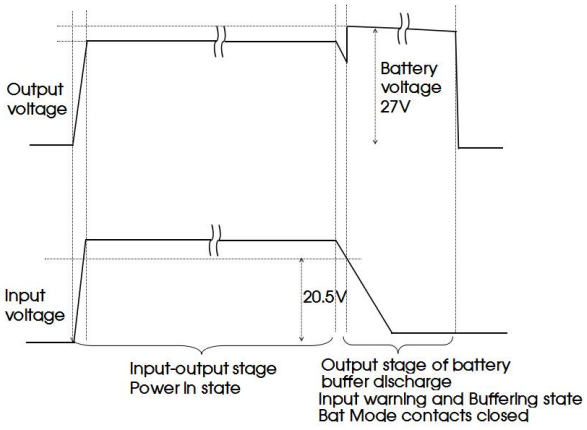




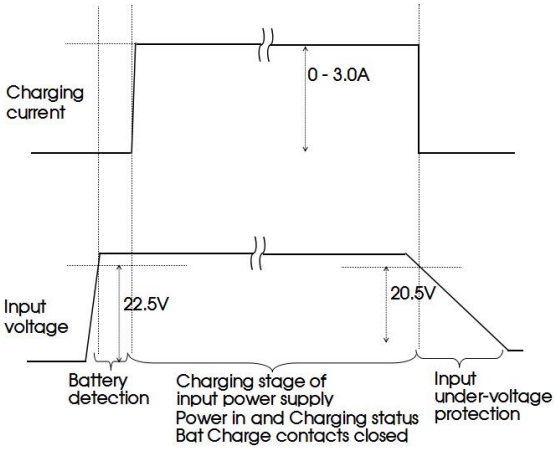
Note: 1.This product is suitable for applications using natural air cooling;

Definition Of Time Series Characteristic And Special State Of Product

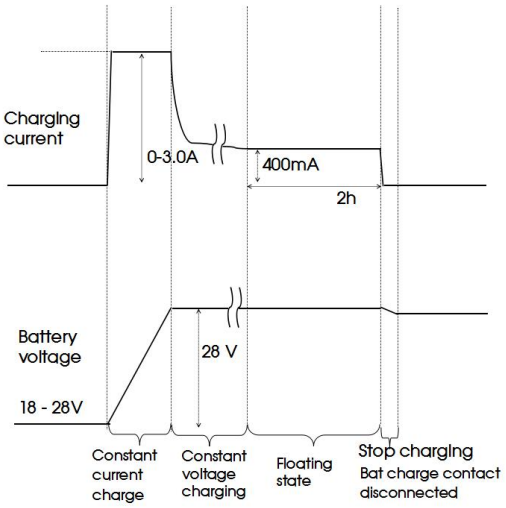
Input power supply and battery buffer discharge



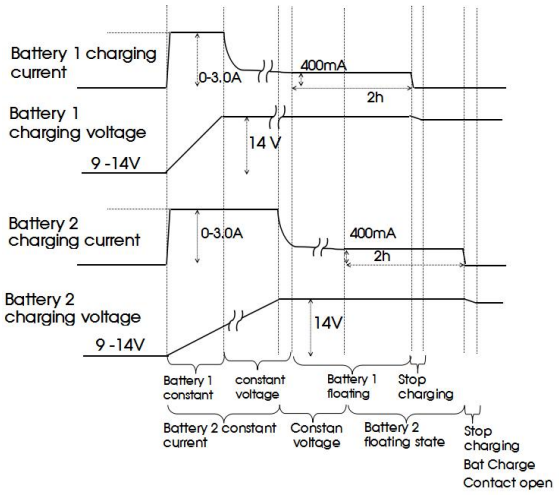
Battery charging mode



Series charging mode with two unconnected batteries

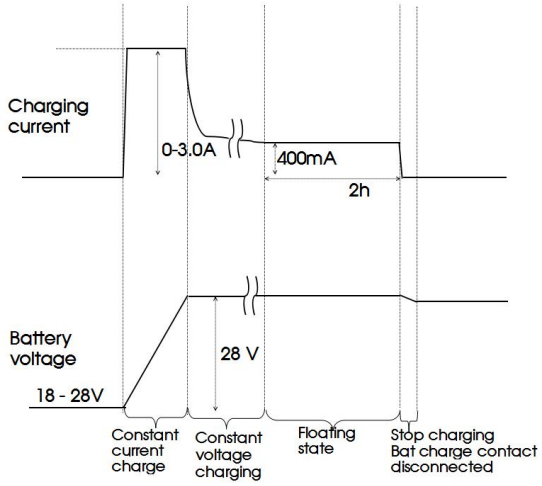


Series charging mode of the Middle Wire of two batteries connection

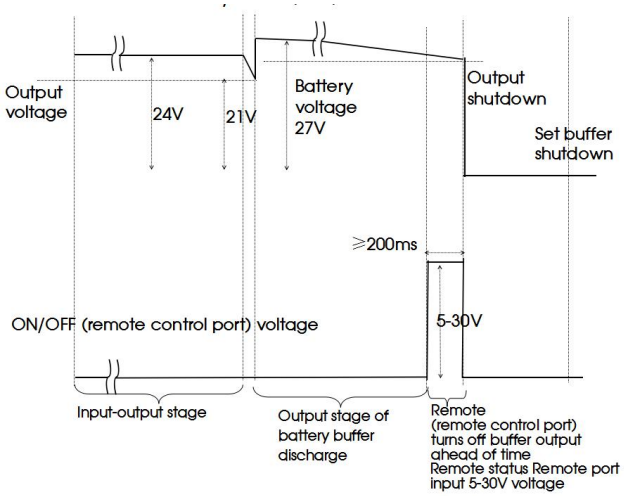


Buffer time expired state definition

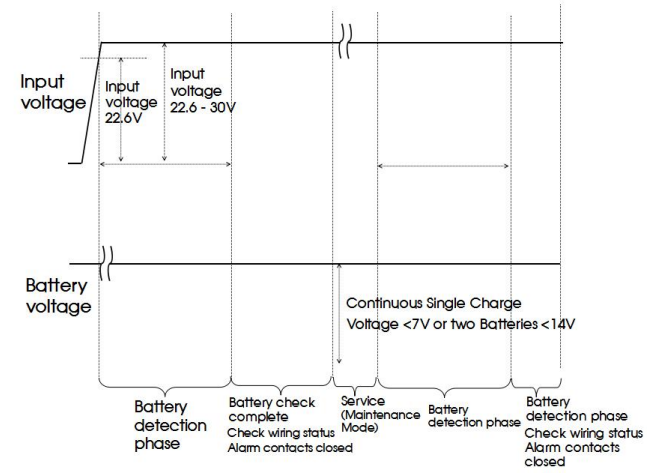
ON/OFF state definition

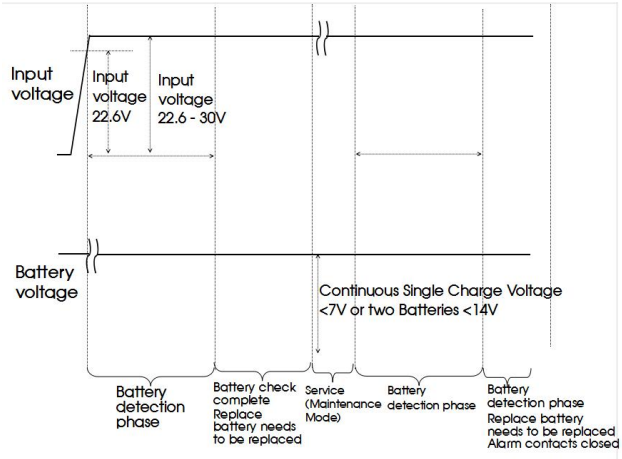


Check wiring state definition

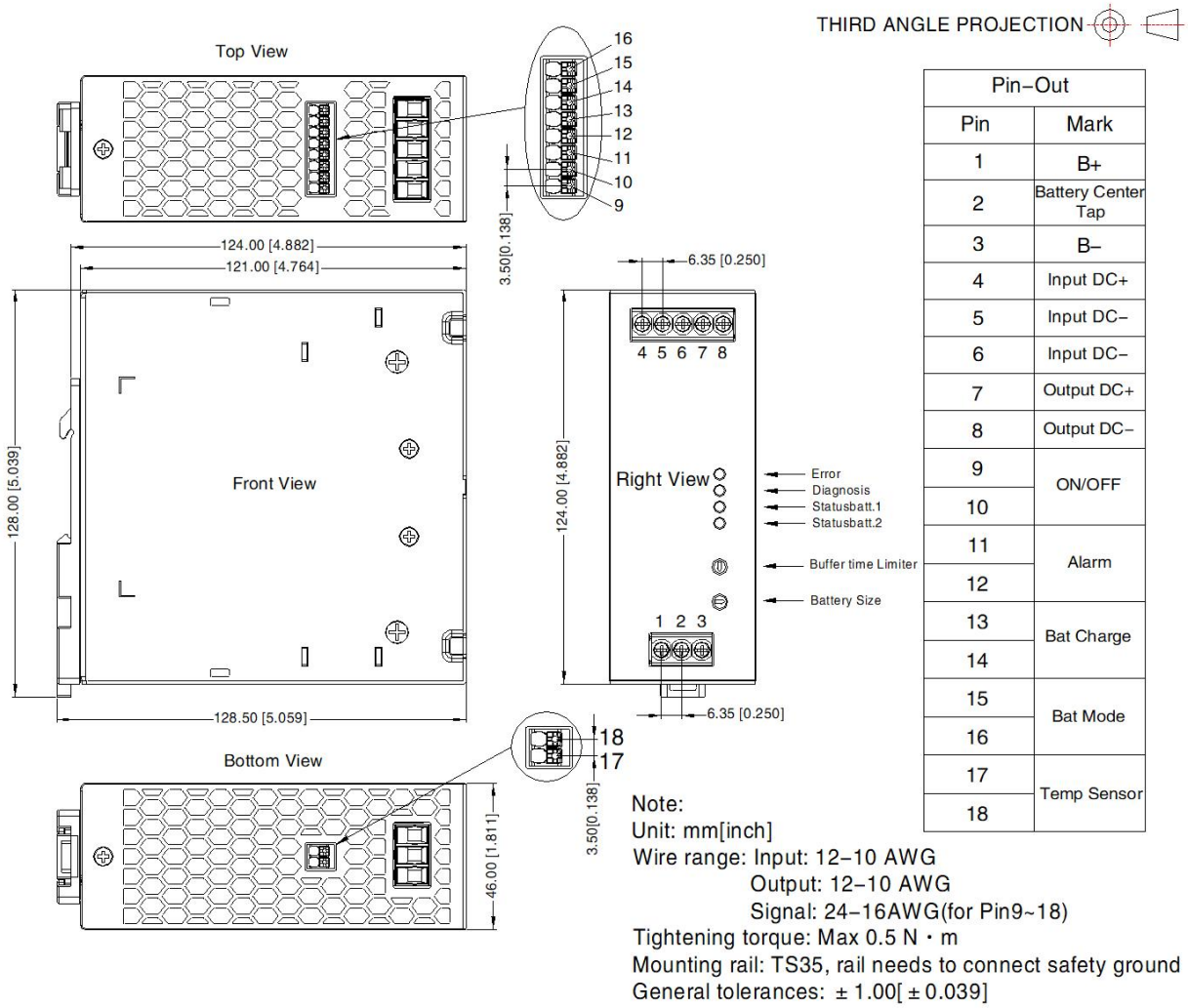


Replace battery state definition





Dimensions and Recommended Layout



Pin–Out	
Pin	Mark
1	B+
2	Battery Center Tap
3	B–
4	Input DC+
5	Input DC–
6	Input DC–
7	Output DC+
8	Output DC–
9	ON/OFF
10	
11	Alarm
12	
13	Bat Charge
14	
15	Bat Mode
16	
17	Temp Sensor
18	

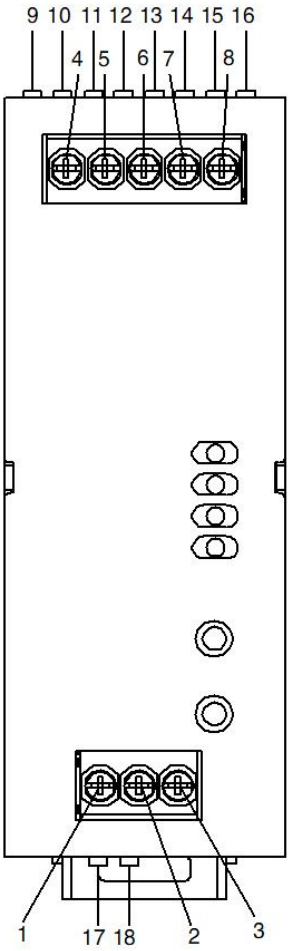
Note:

1. Unless otherwise specified, parameters in this data sheet were measured under the conditions of Ta=25℃, humidity<75%,RH with nominal input voltage and rated output load;
2. The room temperature derating of 5℃/1000m is needed for operating altitude greater than 2000m;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. In order to improve the efficiency at high input voltage, there will be audible noise generated, but it does not affect product performance and reliability;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. The out case needs to be connected to PE (⏚) of system when the terminal equipment in operating;
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
9. The power supply is considered a component which will be installed into final equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

DDUPS20-24F-N Application Notes

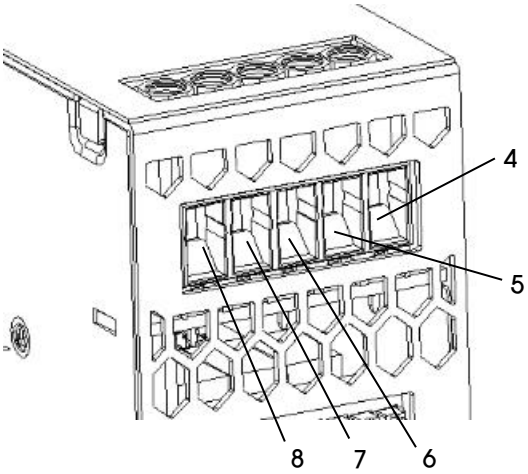
Content

1. Appearance



Pin Way	
Pin	Function
1	B+
2	Battery Center
3	B-
4	Input DC+
5	Input DC-
6	Input DC-
7	Output DC+
8	Output DC-
9	ON/OFF
10	
11	Alarm
12	
13	Bat Charge
14	
15	Bat Mode
16	
17	Temp Sensor
18	

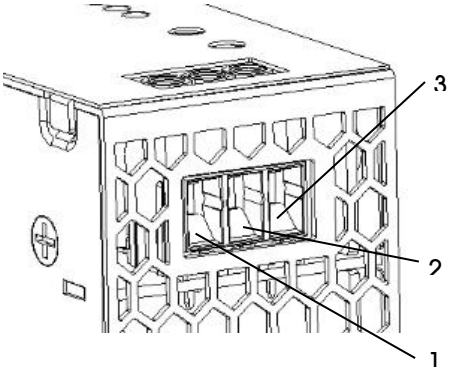
1.1 I/O terminal



Serial number	Pin Name	Pin Definition
4	Input DC+	Input Power supply
5	Input DC-	Input negative
6	Input DC-	Input negative
7	Output DC+	Output positive
8	Output DC-	Output negative

The input and output connection terminals use screw-type PCB terminals, the rated working current of the terminals is 32A, suitable for wire connection of 12 - 10AWG or 3.33 - 5.26 mm^2, the insulation stripping length of the wire connection end is 7 - 8 mm, and the screw tightening torque is: 0.5N/m or 4.43Lb/in.

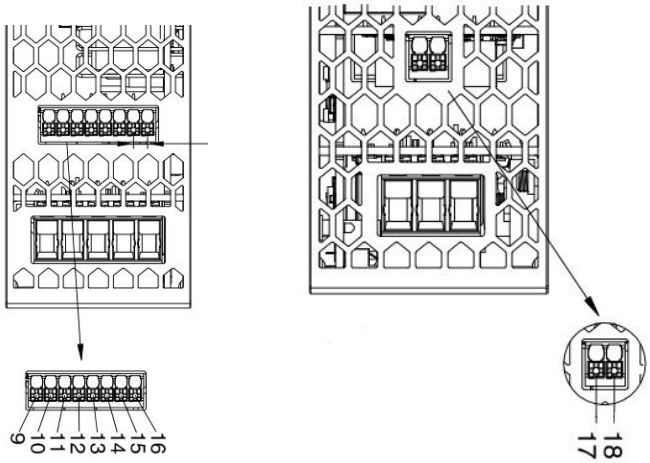
1.2 Battery connector



Serial number	Pin Name	Pin Definition
1	B+	Battery Pack Input Positive
2	Battery Center Tap	Neutral point and wire connector of series battery pack
3	B-	Battery Pack Input Positive

The battery connection terminal use screw-type PCB terminal, the rated working current of the terminal is 32A, suitable for wire connection of 12 - 10AWG or 3.33 - 5.26 mm², the insulation stripping length of the wire connection end is 7 - 8 mm, and the screw tightening torque is: 0.5 N/m or 4.43Lb/in.

1.3 Signal Connection Terminal



Serial number	Pin Name	Pin Definition	Note
9	ON/OFF	Remote Control Terminal, can be turned off remotely battery buffer discharge	Ports are not polarized
10			
11	Alarm	Alarm signal normally open contact output terminal	Ports are not polarized
12			
13	Bat Charge	Battery charge signal normally open contact output terminal	Ports are not polarized
14			
15	Bat Mode	Battery buffer discharge signal normally open contact output end	Ports are not polarized
16			
17	Temp Sensor	Battery temperature sensor connector	Ports are not polarized
18			

The signal connection terminal uses spring terminal, suitable for 24-16AWG or 0.2 - 1.32 mm² wire connection, the insulation stripping length of wire connection is 8-9 mm.

2 Function manual

2.1 Input Terminal

This power supply is not suitable for AC input and allows DC input voltage in the range of 22.5 V-30V. In the normal input voltage range of 22.5V-30V, the power supply and battery connection are normal. When the power supply detects that the input voltage is below 21V, the main power supply is switched to standby power supply to realize the output uninterruptible power supply output.

2.2 Output Terminal

The normal output voltage range of the power supply is 22.5V-30V. When the main power supply is supplied, the output voltage VOUT = VIN - VF, Vin is the input voltage,VF is the internal voltage drop of the circuit, about 0.25-0.35V. When the battery pack buffer discharge output, the output voltage VOUT = VIN - VF, VIN is the battery voltage, VF is the internal voltage drop of the circuit, about 0.1V-0.2V.

With the increase of the output load current of the power supply, the voltage drop at both ends of the lead-wire connected to the battery increases. In order to ensure that the capacity of the battery pack can be fully used and to prevent the battery pack from being damaged by over-discharge, the discharge cut-off voltage of the battery decreases linearly with the increase of load current when the battery is discharged and buffered. When the load current ≤0.5 A, the battery discharge cut-off voltage is 21V, when the load current ≥20A, the battery discharge cut-off voltage is 20V. Therefore, when the load current ≥20A, the minimum output voltage of the power supply is 20V.

When the voltage of the standby battery string is not equal to the input voltage of the main power supply and the output voltage of the standby power supply, and the load current is greater than or equal to 20A, the output voltage is VOUT= VBAT - VF, VBAT is the input voltage, VF is the internal voltage drop of the circuit about 0.1V to 0.2V, and the standby power supply does not provide voltage stability.

2.3 Input Over-votlage protection

Power supply with input over-voltage protection function, when the input voltage is equal to about 32.5V, will trigger the power supply input over-voltage protection function.

2.4 Output Over-current protection

When the output current is > 28A, it will enter the output over-current protection mode. At this time, if it works in the battery buffer discharge mode, the battery buffer discharge is stopped , that is, the output is stopped, and the corresponding abnormal state indication is output.

2.5 Battery temperature protection

When Battery Size is selectd as battery capacity ≤10AH, Battery Temperature > 50℃ or < -10℃, the battery will not be charged and discharged. This protective function and protection temperature are not the permissible operating temperature and limit of the product. When Battery Size is selectd as battery capacity ≤150AH, the allowable working temperature range from -40℃ to +50℃, Battery temperature protection is based on the temperature range of the battery application battery charge, discharge protection functions.

2.6 Over-temperature protection

A thermistor is set inside the product to detect the internal temperature of the casing. When the internal working temperature is > 95℃, it will stop working and turn off the output, to prevent the internal temperature is too high and lead to product damage.

2.7 ON/OFF

The product provides ON/OFF (remote turn OFF the discharge output of the battery pack) function, when the battery pack discharge output, through the ON/OFF terminal input reliable voltage 10-30V DC voltage signal (reliable duration greater than 500ms) , the product will turn off the discharge output of the standby battery pack, and the Remote turn off discharge output of the standby battery pack is indicated by the dials of the Diagnostics. For example, when Buffer time Limiter selects time of 10minutes, the discharge time of the backup battery pack is 10 minutes, but the customer system has finished using electricity when the discharge time of the backup battery pack is 5 minutes, the ON/OFF terminal can be Input 12V signal voltage, in advance turn OFF the standby battery discharge output, to save battery power.

Special Note: On/off function can only turn OFF the discharge output of the standby battery set in advance when the standby battery set is discharged. It is not allowed to turn ON the discharge output of the standby battery set in other states. When the main power supply is normal, if the effective signal voltage is continuously input to the ON/OFF terminal, then the main power supply is cut OFF at the input terminal, the product will not enter the discharge output state of the standby battery.

3 Signal And Status Indication

3.1 The Light Blinked

There are 4 LED indicators for Error, diagnosis, Status Batt 1 and Status Batt 2. Error is the red LED indicator, indicating the Error and warning class information. Diagnosis, Status Batt1, Status Batt2 are the green LED indicator, indicating the special Status class information. According to the flashing of the indicator light, that is, the metronome lights on and off , lights on 1 time, then light off 1 time, weigh and light a beat, divided into 4 indicative states: *-*----- means continuously lighting on 2 time, continuously lighting off 2 time. **-*-*--- Light on 3 beats in a row, light off 1 beat . Diagnosis indicator light: *------- Light on 1 beat, light off 3 beats in a row to indicate Power in state. *-*----- Light on 2 beats in a row, light off 2 beats in a row, to indicate Buffer time expired state. *-*-*--- Light on 3 beats in a row, light off 1 beat to indicate the Remote state. *-*-*-*- Light on 4 beats in a row to indicate the Overload state.

3.2 Special State definition

3.2.1 Error Indicator Indicates Status

Check wiring: When the product does not detect the backup battery access will show this status, need to Check whether the backup battery is properly connected and whether the backup battery has been damaged, single battery Voltage Below 5V, that the backup battery has been damaged.

Input warning: When the main power has no input voltage or the input voltage is lower than the under-voltage protection point and higher than the input voltage range will show this state, that the input voltage is abnormal.

High temperature: The High temperature state is displayed when the battery temperature is above the set charging or discharging temperature range and when the product is in an environment beyond the maximum operating temperature range.

Low temperature: Low temperature is displayed when the battery temperature is below the set charging or discharging temperature range.

3.2.2 Diagnosis Indicator Indicates Status

Power in: When the main power input voltage in the input voltage range will show this state, that the input voltage is normal, and at this time the output of the product output voltage.

Buffer time expired: When the product is in the battery discharge Buffer output state, this state will be displayed before the end of Buffer time Limiter selection time, because the reserve battery under-voltage cut-off discharge, resulting in the reserve battery discharge output early shut-off, indicates that the battery does not support the discharge output time of the backup battery selected by Buffer time Limiter.

Remote: When the battery pack discharge output, by ON/OFF terminal input reliable voltage 10-30V DC voltage signal (reliable duration greater than 500ms) , the product can turn OFF the battery pack discharge output, show Remote status.

Overload: When the output current is more than 28A, it will enter the output Overload protection mode. At this point, if it is working in the battery buffer discharge mode,the battery buffer discharge will be stopped, that is, the output will be stopped, and the corresponding abnormal state indicator will be output to display the Overlosd state.

3.2.3 Status Batt 1、Status Batt 2 Indicator Indicates Status

Ready: Battery charged.

Charging: Battery charging state.

Replace battery: When the battery impedance is higher than the set value, or when the voltage of two batteries is lower than 16V, the status of Replace battery is displayed, indicating the need to Replace the battery.

Buffering: Discharge output state of standby battery.

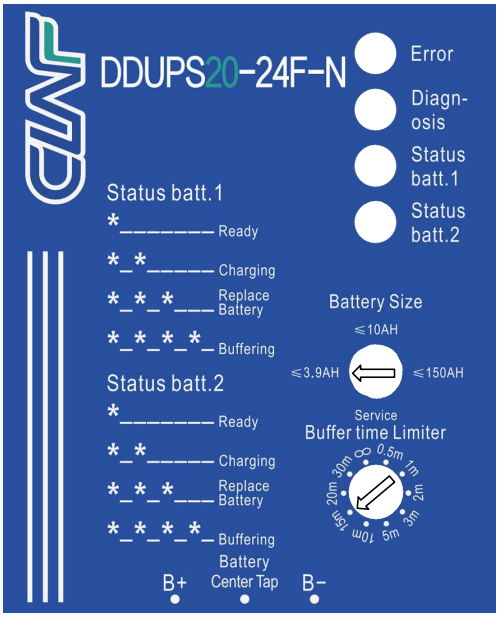
3.2.4 Relay Dry Node Output And Indication Status

<table>
<tr><th colspan="4">Relay node output and indication status</th></tr>
<tr><th rowspan="2">Contact State</th><th colspan="3">State and contact name</th></tr>
<tr><th>Alarm</th><th>Bat Charge</th><th>Bat Mode</th></tr>
<tr><td rowspan="4">Contact closure*</td><td>Check wiring status</td><td rowspan="4">Charging State
(The spare battery is being charged)</td><td rowspan="4">Buffering State
(The spare battery is discharging)</td></tr>
<tr><td>Service State</td></tr>
<tr><td>Replace battery State</td></tr>
<tr><td>Buffer time expired state</td></tr>
<tr><td colspan="4">Note: *contact closure refers to the normal operation of the product contact state</td></tr>
</table>

3.2.5 Buffer Time Limiter Buffer Time Limiter And Battery Size Select Operation

Suitable battery discharge output Buffer time can be selected by Buffer time Limiter KNOB. In order to facilitate accurate selection, the KNOB uses a selection knob with step positioning effect, and the top of the operating handle is marked with a pointing arrow, for Selection, the Buffer time Limiter scale identifies the time unit (M, min) by rotating the handle so that the pointing Arrow points to the time scale to be selected. Battery Size control Knob can select the required Battery capacity, in order to facilitate accurate selection, the KNOB uses a step positioning effect of the selection Knob, and the top of the operation handle marked with a pointing Arrow, select operation, to complete the operation, the operating handle is rotated so that the pointing Arrow points to the battery capacity scale that needs to be selected, which identifies the battery capacity unit as (AH) .

When the handle is rotated so that the Arrow points to the Service scale in the scale mark, the product will be prohibited from charging or discharging the battery buffer output, at which time the battery can be replaced and other maintenance operations can be carried out, when the operation causes the operation handle to point the Arrow back to the selected battery capacity scale, the product first performs a standby battery connection detection and battery status detection.



4. Buffer Time

Buffer time refers to the timing of the discharge output of the backup battery. It provides a choice of 10 gears in the product to save power and prolong the service life of the backup battery while meeting the demand. The two main factors related to Buffer time are the reserve battery capacity and the discharge output load current of the reserve battery, i.e. the larger the reserve battery capacity, the longer the Buffer time and the smaller the load current, the longer the Buffer time, as follows:

Time for discharge output of standby battery (d: h:: m, days: hours:: minutes)							
Load Current (A)	Battery Capacity (AH)						
	3.4	7.2	12	26	38	65	100
0	3d: 12h	8d	13d	30d	43d	77d	115d
0.5	5h: 13m	13h: 20m	2d: 5h: 14m	2d: 5h: 14m	3d: 9h: 1m	6d: 1h: 50m	9d: 3h: 54m
1	2h: 43m	5h: 15m	11h: 20m	1d: 1h: 27m	1d: 11h: 18m	2d: 23h: 45m	4d: 12h: 13m
2	1h: 31m	3h: 10m	5h: 29m	12h: 9m	19h: 5m	1d: 9h: 13m	2d: 5h: 14m
5	21m	56m	2h	4h: 44m	7h: 24m	13h: 53m	20h: 50m
10	8m	22m	47m	2h: 17m	3h: 28m	6h: 49m	10h: 7m
15	3m	7m	27m	1h: 21m	2h: 8m	4h: 23m	6h: 33m
20	/	2m	13m	55m	1h: 31m	3h: 4m	4h: 48m

5. Battery Size

When the main power supply is normal, the charging current will be different, for example: ≤3.9AH/≤10AH/≤150AH different capacity, the corresponding maximum charging current is 1A/2A/3A, and the allowable operating temperature is different for different capacity batteries, for example, the permissible operating temperature of the standby battery is -10℃ -50℃ for 3.9AH/≤10AH/≤150AH, when the working temperature of the battery is -40℃ -50℃ under the condition of ≤150AH, the low temperature environment of lead-acid batteries, the chemical activity of the electrolyte and the electrode plate is greatly reduced, resulting in an increase in the electrode plate is greatly reduced, resulting in an increase in the internal resistance in the battery capacity, When using high power, it will accelerate battery aging.In particular, small capacity batteries, more serious, therefore, when choosing small capacity batteries, according to the battery specification to limit the working temperature. Battery temperature detection using a precision temperature sensor (PT1000), can accurately detect the working temperature of the battery, to protect the normal operation of the battery.

6. Input Power and output power

When the battery is recharged, the output power is POUT= PIN - Plosses - PCharging, so the output power is not equal to the input power.

7 Installation requirements

7.1 Installation mode

The design of product structure and temperature characteristic is based on the vertical-up installation, which is beneficial to the ventilation and heat dissipation of the product and the stability of the structure.