Descriptions

Features

- Universal 18 - 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
- Cold start function
- Safety according to ANSI/ISA 71.04-2013 G3

Applications

- Industrial
- Electricity
- Security
- telecommunications
- Smart home etc

Selection Guide

Part No.	Output Power (W)	Nominal Input Voltage (V)	Nominal Output Voltage (V)	Nominal Output Current (A)	Battery Nominal Voltage (V)	Efficiency (%) Typ.*
DDUPS40-24F-N	960	24	24	40	24	98

Note: *Test when the battery is ready.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage Range	DC input		18	--	30	VDC
	Input Voltage (Max.)			--	--	35	
	No-load Power Consumption	24VDC input, Output no load, no battery/no battery charge		--	0.7	--	W
	Input Reverse Polarity Protection	The indirect negative pressure of Input DC+ to Input DC, or the indirect negative pressure of B+ to B-, the product is not damaged		-30	--	0	VDC
	Input Over-voltage Protection①	Input over-voltage protection trigger voltage (voltage rising from low to high)		30	32	35	
		Input over-voltage protection dropout voltage (voltage from high to low)		30	31	35	
Output Specifications	Output Voltage Accuracy②	Full load range	Input power supply status	18	--	30	V
			Buffer discharge status of the battery	18	--	28.8	
	Output Capacitive Load	Input power supply		--	--	40000	uF
	Output Over-current Protection③	Full input voltage		--	50	60	A
	Short-Circuit Protection	Input power supply status		Hiccup, self-recover			
		Buffer discharge status of the battery		The output is disabled and needs to be restarted			
Battery Management Features	Minimum input voltage that allows battery charging	Input voltage from low to high, full load range		23	--	--	V
	Minimum battery voltage that allows battery charging④			12	--	--	
	Battery charging completion voltage	Battery charging state	Battery temperature sampling is not connected	--	27.6	28.4	
			Connect battery temperature sampling⑤	--	28	28.8	
	Switch to the minimum input voltage of the	Input voltage from high down, full load range		21	22.2	--	
	Battery deep discharge protection voltage	Buffer discharge status of the battery	Load current ≤10A	--	21.6	--	
			10A < Load current ≤20A	--	21	--	
			20A < Load current ≤30A	--	20.4	--	
			Load current > 30A	--	19.6	--	
	Battery temperature abnormal protection⑥	Current specification: 1A/2A	High temperature charging protection temperature	--	40	--	℃
			Low temperature charging protection temperature	--	0	--	
		Current specification: 3A/4A/5A	High temperature charging protection temperature	--	40	--	
			Low temperature charging protection temperature	--	-20	--	

		Current specification: 1A/2A/3A/4A/5A	High temperature charging protection temperature	--	50	--	
			Low temperature charging protection temperature	--	-20	--	
	Battery charging current	Current Size Select "1A"		--	1	--	A
		Current Size Select "2A"		--	2	--	
		Current Size Select "3A"		--	3	--	
		Current Size Select "4A"		--	4	--	
		Current Size Select "5A"		--	5	--	
	Selection of Battery Buffer	0.5 / 1 / 2 / 3 / 5 / 10 / 15 / 20 / 30 / ∞					min
	Battery Maintenance Mode (Service)	Turn off charging or discharging, replaceable battery					
	Battery supply long-term standby current⑦			--	5	--	mA
	Cold start mode	Current Size When Bat-Start is selected and the battery status is normal		Switch directly to the battery buffer discharge state			
General Specifications	Isolation Voltage	I/O - case	Electric strength test for 1 minute, leakage current<5mA	1000	--	--	VAC
	Insulation Resistance	I/O - case	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
	Storage Humidity			10	--	95	
	Safety Standard	IEC/UL/EN62368-1, UL508-1, GB4943.1					
	Security Level	CLASS II, ANSI/ISA71.04-2013					
	MTBF	MIL-HDBK-217F@25℃		>1000,000h			
	Warranty	3 years					
Mechanical Specifications	Case Material	Metal (AL5052, SUS)					
	Package Dimensions	124.00mm x 46.00mm x 127.00mm(Without installation accessories)					
	Weight	600g (Typ.)					
	Cooling Mode	Forced air cooling: 0.5m/s (100LFM)					

Signal And Indication	Name And Status Of Indicator Light				
	Indicator Light name		Error	Diagnosis	Status Bat
	Indicator Light status®	★-------	Check wiring (Need to check the backup battery connection)	Power in (Input power supply normal)	Ready (Backup battery charged)
		★-★-----	Input warning (Input voltage abnormal)	Buffer time expired (The selected discharge	Charging (Standby battery

				time is not supported by the standby battery)	charging)
		★-★-★---	High temperature (High temperature abnormal)	Remote (Remote shut-off standby discharge output)	Replace battery (Need to replace the discharge battery)
		★-★-★-★-	Low temperature (Low temperature abnormal)	Overload (Output overload or Short-circuit protection)	Buffering (Discharge output of standby battery)
	Name And Status Of Contact				
	Contact name		Alarm	Bat Charge	Bat Mode
	Alarm status⑨	Contact disconnection	Check wiring (Need to check the backup battery connection)	/	/
			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)		
		Contact closed	/	Charging (Standby battery charging)	Buffering (Discharging the backup battery)

Note:

①When the input over-voltage protection is triggered, the product will stop

②When the input end is powered, the output voltage changes with the input voltage, which is about the input voltage minus the internal device impedance 0.3V; When the battery is buffered, the output voltage changes with the battery voltage, which is about the battery voltage minus the internal device impedance 0.3V; For details about the output voltage range, see the Application Manual 2.2 Output description.

③ The output overcurrent protection is triggered by the power supply status of the input end, and only generates an alarm signal, not the output of the product; The buffer discharge status of the battery triggers the output overcurrent protection, generates an alarm signal, and shuts off the output.

④ When the battery voltage is lower than 12V, the battery connection is abnormal or damaged, and the battery is not charged, please check the battery connection or replace the battery.

⑤ That is, connect the PT1000 temperature compensation sensor between the signal connection terminal pin15-16 (see the bottom view of the specific connection position).

⑥ The protection function and protection temperature are not the allowable operating temperature and limit of the product. Abnormal battery temperature protection is based on the application temperature range of the corresponding battery pack product to develop the battery charging and discharging protection function, when the battery temperature is too high or too low, the battery will stop charging or discharging.

⑦ When the product is connected to the battery and there is no input voltage, if the product is not in the state of battery buffer discharge or cold start state, and for 5 minutes, the product turns off most of the internal power supply such as the LED indicator until the input voltage recovers or the product enters the cold start mode.

⑧ Indicator status: ★ On for 200ms; - off for 200ms, for example, ★-★----- : on for 200ms, off for 200ms, on for 200ms, and off for 1000ms, and the period is repeated.

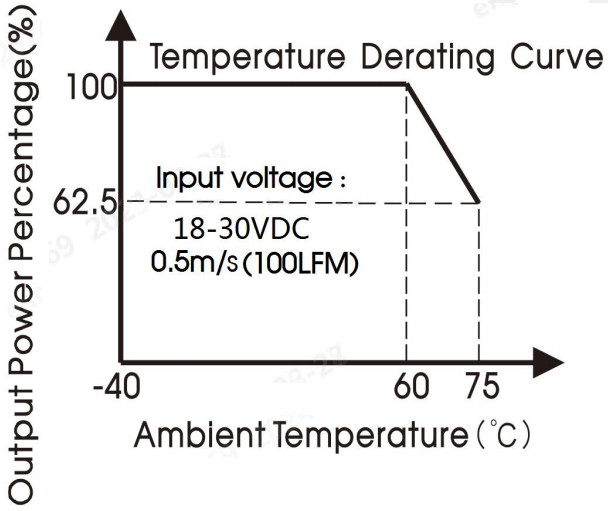
⑨ A contact corresponds to the two pin of the product, the contact disconnection means that the impedance between the two pin is high impedance, and the contact closed means that the impedance between the two pin is low impedance. For example, the Bat Mode corresponds to pin13-14. When the product is in the buffer discharge state of the backup battery, the contact of pin13-14 is closed, and the impedance between pin13-14 is low.

Electromagnetic Compatibility

Emissions*	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN 61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±4KV	perf. Criteria A
	Surge	IEC/EN 61000-4-5 line to line ±2KV/line to ground ±4KV	perf. Criteria B
	CS	IEC/EN61000-4-6 10 Vr.m.s	perf. Criteria A

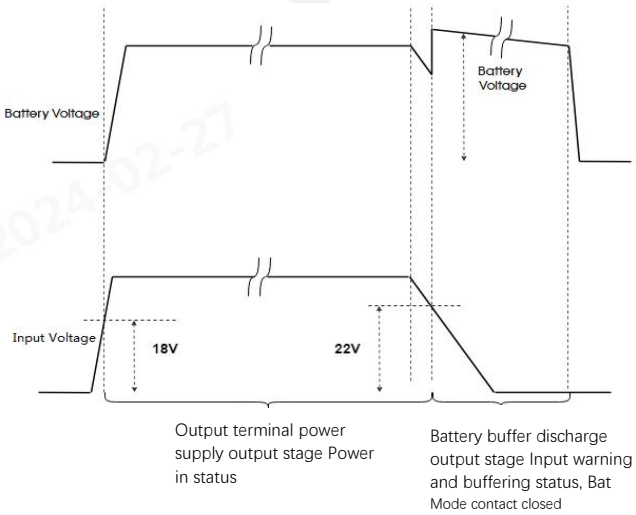
Note: *It is tested under the condition of unconnected battery.

Characteristic Curve



Definition Of Time Series Characteristic And Special State Of Product

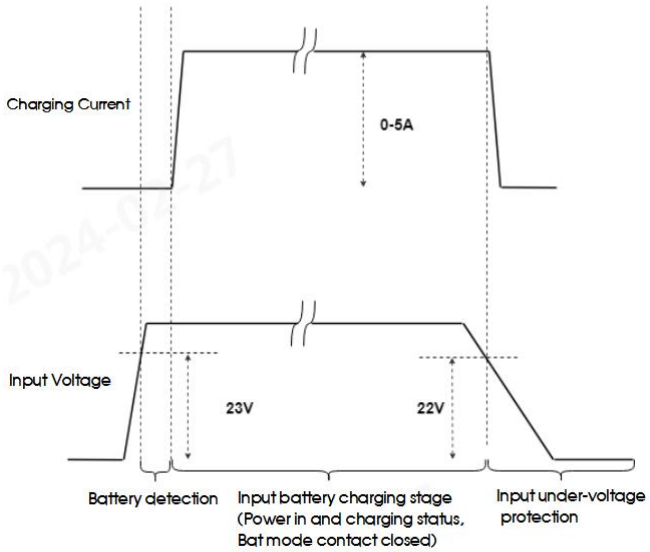
Input power supply and battery buffer discharge



Output terminal power supply output stage Power in status

Battery buffer discharge output stage Input warning and buffering status, Bat Mode contact closed

Battery charging mode

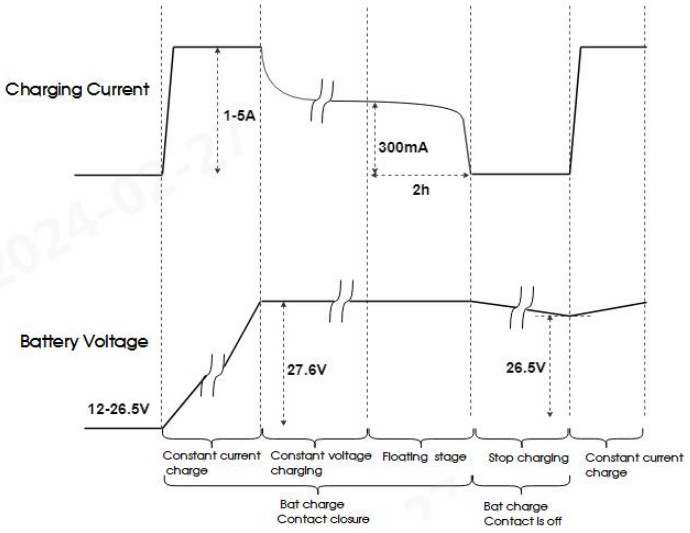


Battery detection

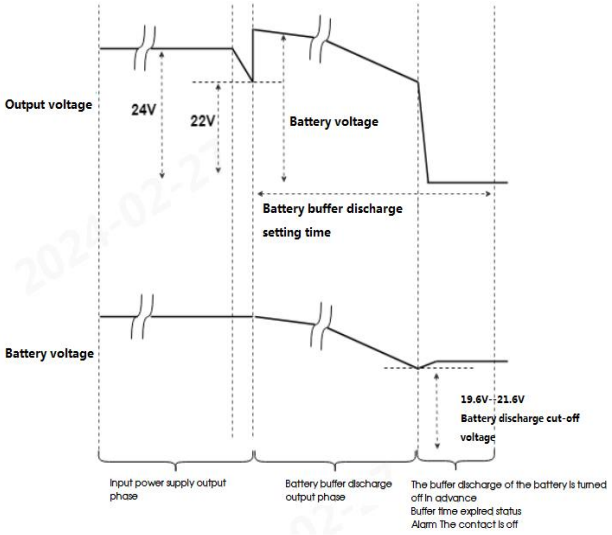
Input battery charging stage (Power in and charging status, Bat mode contact closed)

Input under-voltage protection

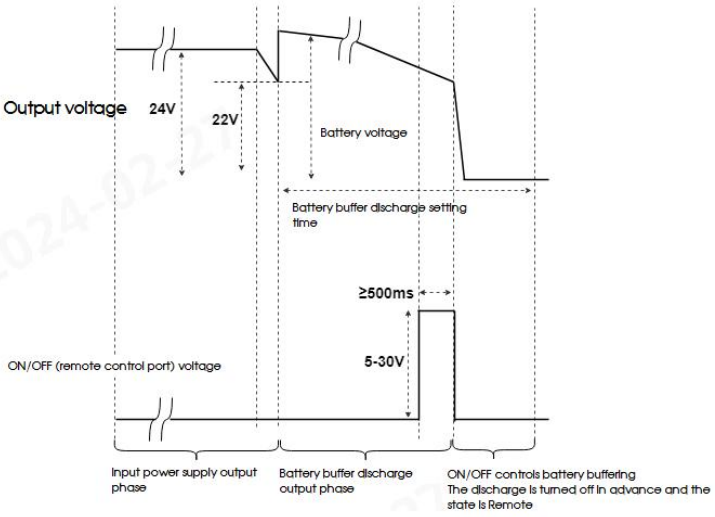
Two batteries are not connected to the neutral line in series charging mode



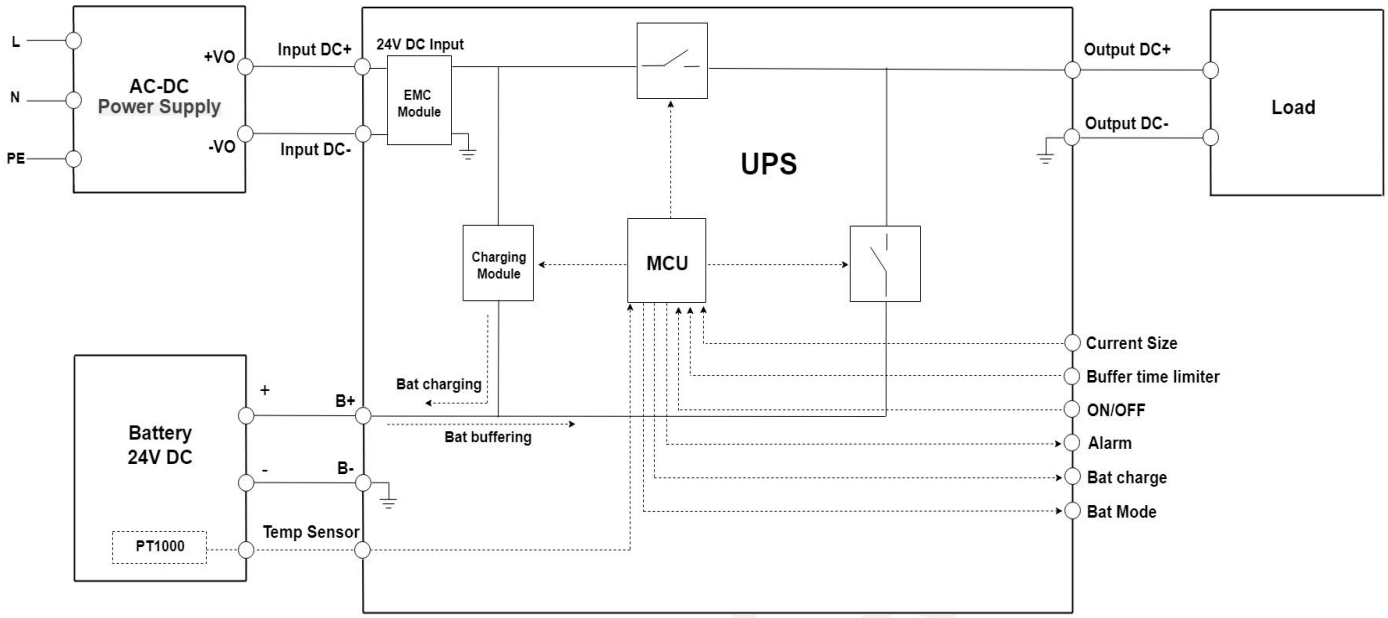
Buffer time expired status definition



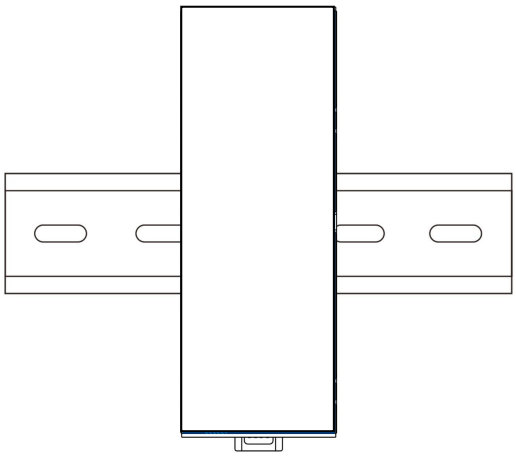
ON/OFF Status definition

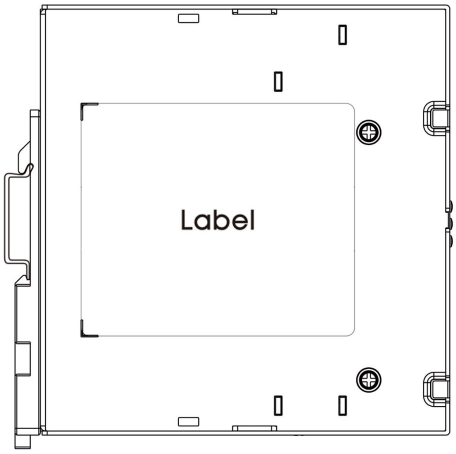


Product application block diagram



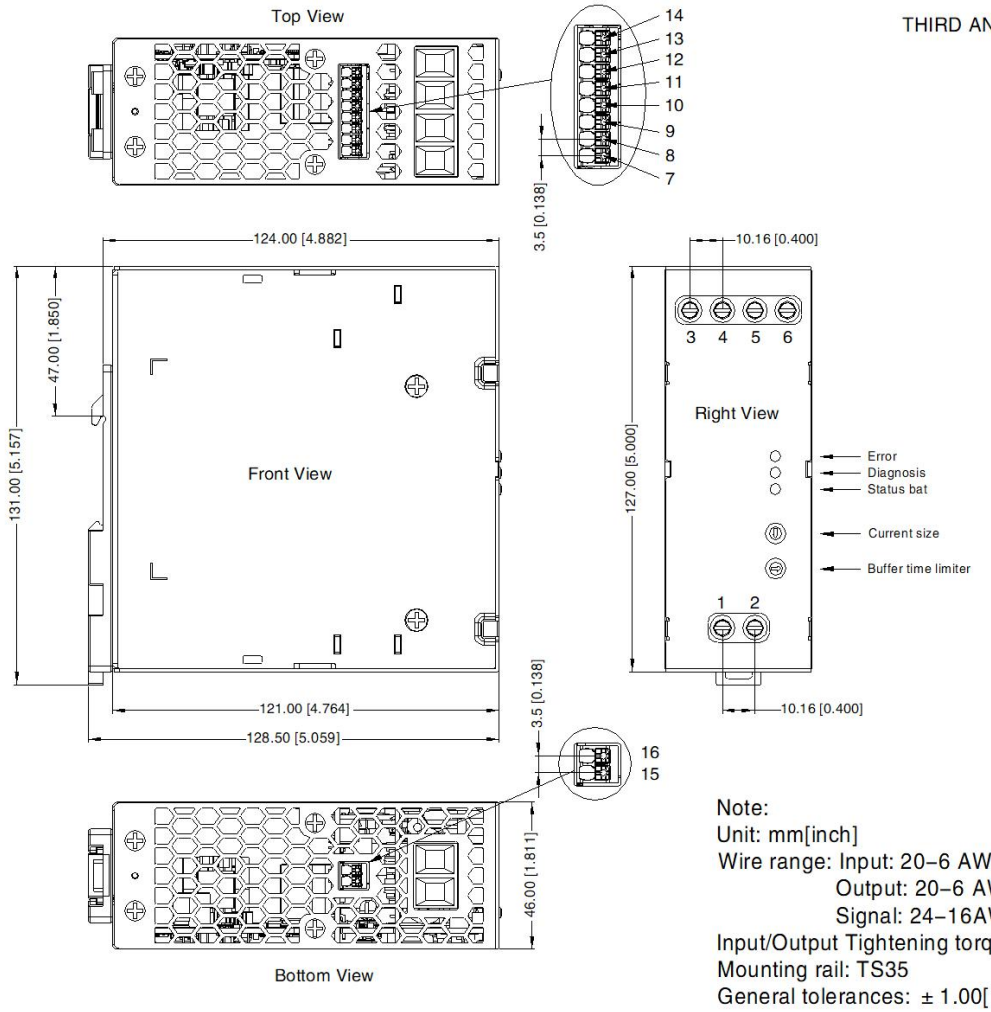
Installation Diagram





Note: When the load of the equipment exceeds 50% of the rated power for a long time, it is recommended to retain the gap of 20mm at the top, 20mm at the bottom, and 5mm at the left and right sides. If the adjacent device is a heat source (e.g., another power source), increase this gap to 15mm.

Dimensions and Recommended Layout



THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: Input: 20–6 AWG
Output: 20–6 AWG
Signal: 24–16AWG(for Pin7~16)
Input/Output Tightening torque: Max 1.2 N・m
Mounting rail: TS35
General tolerances: ± 1.00[± 0.039]

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. Products are related to laws and regulations: see "Features" and "EMC";
6. The out case needs to be connected to PE (⏚) of system when the terminal equipment in operating;
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
8. The power supply is considered a component which will be installed into a terminal equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

DDUPS40-24F-N Application Notes

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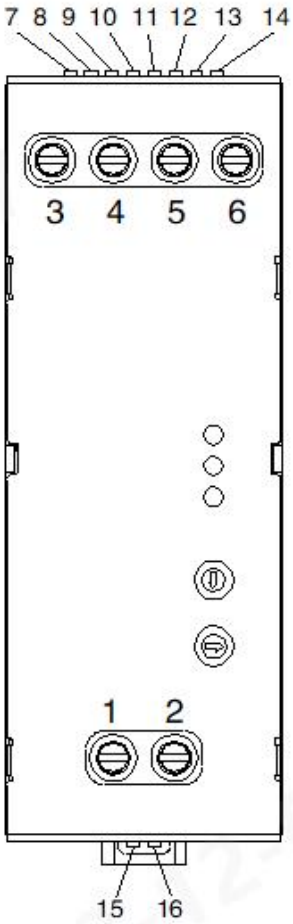
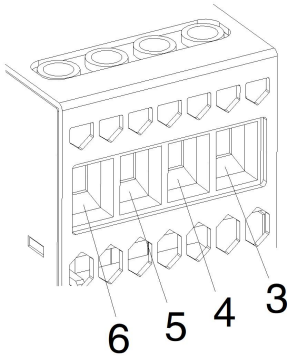
1. Appearance



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

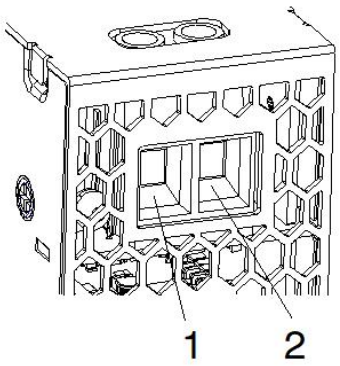
1.1 I/O terminal



Serial number	Pin Name	Pin Definition
3	Input DC+	Output positive
4	Input DC-	Input negative
5	Output DC+	Output positive
6	Output DC-	Input negative

The input and output connection terminals use screw type PCB terminal with rated working current of 60A, suitable for 20-6AWG or 0.5-10 square mm wire connection, the insulation stripping length of the wire connection end is 7-8 mm, and the screw rigid torque is 1.2N.m.

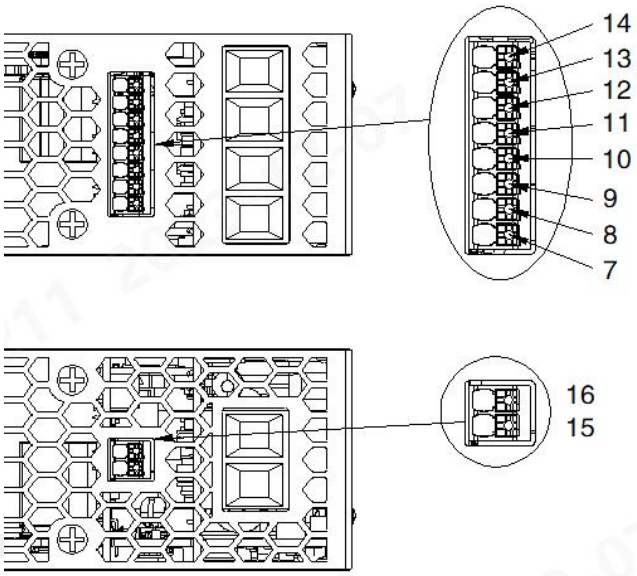
1.2 Battery connector



Serial number	Pin Name	Pin Definition
1	B+	Battery Pack Input Positive
3	B-	Battery Pack Input Negative

The input and output connection terminals use screw type PCB terminal with rated working current of 60A, suitable for 20-6AWG or 0.5-10 square mm wire connection, the insulation stripping length of the wire connection end is 7-8 mm, and the screw rigid torque is 1.2N.m.

1.3 Signal Connection Terminal



Serial number	Pin Name	Pin Definition	Note
7	ON/OFF	Remote Control Terminal, can be turned off remotely battery buffer discharge	Ports are not polarized
8			
9	Alarm	Alarm signal normally-closed contact output terminal	Ports are not polarized
10			
11	Bat Charge	Battery charge signal normally-closed contact output terminal	Ports are not polarized
12			
13	Bat Mode	Battery buffer discharge signal normally-closed contact output end	Ports are not polarized
14			
15	Temp Sensor	Battery temperature sensor connector	Ports are not polarized
16			

The signal connection terminals are spring terminals suitable for 24-16 AWG or 0.2-1.32 mm wire connections with 8-9 mm insulation strip length at the wire connection end.

2. Function manual

2.1 Input Terminal

This power supply is not suitable for AC input, allowing DC input voltage range of 18V-30V.

When the input voltage is 18-23V, the input voltage will supply power to the output load and LED signal indicators, but the UPS will not charge the battery. When the input voltage undervoltage drops to 16.5V, the input stops supplying power to the output load, and the battery is not switched to buffer discharge.

When the input voltage is 23-30V, the input voltage will supply power to the output load and LED signal indicators, while the UPS charges the battery. When the input voltage undervoltage drops to about 22V, it will switch to the battery buffer discharge to achieve uninterruptible output power supply.

2.2 Output Terminal

The power supply does not have the function of regulating the output voltage. The output voltage follows the input voltage or the battery voltage. When the main power supply and the output load is 40A rated current, the output voltage VOUT = VIN-VF, VIN is the input voltage, VF is the internal voltage drop of the circuit, about 0.25V-0.35V. When the buffer discharge output of the battery pack and the output load is 40A rated current, the output voltage VOUT = VBAT-VF, VBAT is the battery pack voltage, and VF is the internal voltage drop of the circuit, about 0.25V-0.35V.

As the output load current of the output power supply increases, the voltage drop at both ends of the battery connection wire also increases. In order to ensure the full use of the capacity of the battery pack and prevent the battery pack from being damaged due to overdischarge, the discharge cutoff voltage of the battery pack decreases linearly with the increase of the load current when the battery pack is discharging buffer output. When the load current is less than 10A, the battery pack discharge cut-off voltage is 21.6V. When 10A < load current ≤20A, the battery pack discharge cutoff voltage is 21V. When 20A < load current ≤30A, the battery pack discharge cutoff voltage is 20.4V. When the load current is greater than 30A, the battery pack discharge cutoff voltage is 19.6V.

2.3 Input Over-votlage protection

The power supply provides input over-voltage protection. When the input voltage is greater than or equal to 32V, the input over-voltage protection function is triggered. In this case, the input stops supplying power to output loads and charging batteries, and does not switch to buffer discharge.

2.4 Output over-current/short-circuit protection

When output current > The output overcurrent protection mode will be entered at 50A. At this time, if working 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. If it works in the input power supply state, it will only output the corresponding abnormal status indication but will not stop the input power supply, and the overcurrent protection depends on the input front-end power supply.

When the output is directly short-circuited, it will enter the output short-circuit protection mode. At this time, if it works in the battery buffer discharge mode, the battery buffer discharge will be stopped and the corresponding abnormal state will be output. If it works in the input power supply state, it will immediately stop the input power supply to the output load, and output the corresponding abnormal state. When the input voltage is detected at 18-30V, it will wait for 10s and try to restart the machine.

2.5 Battery temperature protection

Current Size When 1A/2A is selected, the battery will stop charging when the battery temperature is greater than 40℃ or < 0℃. Current Size When 3A/4A/5A is selected, the battery will stop charging when the battery temperature is > 40℃ or < -20℃, Current Size If 1A/2A/3A/4A/5A is selected, the battery buffer discharge will be stopped when the battery temperature is greater than 50℃ or < -20℃. This protection function and protection temperature are not the allowable working temperature and limit of the product, but the battery

charging and discharge protection function is formulated according to the application temperature range of the corresponding battery pack products.

2.6 Overtemperature protection

A thermistor is installed inside the product to detect the internal temperature of the case. When the internal operating temperature is greater than 115℃, the battery will be stopped to prevent the UPS from continuing to charge the battery at high temperature because the PT1000 is not connected, resulting in temperature damage to the UPS internal power flow.

2.7 ON/OFF

The product provides ON/OFF (remote turn OFF battery buffer discharge output) function. When the battery buffer discharge output is in the battery buffer discharge output, the product will turn off the battery buffer discharge output when the reliable voltage 5-30V DC voltage signal is input to the ON/OFF terminal (reliable duration is greater than 500ms). In addition, the Diagnosis indicator shows the Remote status (remote shutdown of the battery buffer discharge output). For example, when the Buffer time Limiter is set to 10m, the battery buffer discharge output timing time is 10 minutes, but the customer system has finished the power consumption when the battery buffer discharge output timing is 5 minutes, then 12V signal voltage can be input to the ON/OFF terminal. Turn off the battery buffer discharge output in advance to save battery power.

Special note: The ON/OFF function can only be turned off in advance when the battery buffer discharge output, and can not be turned on in other states.

2.8 Temp Sensor

pin15-16 of the product is the Temp Sensor detection pin, which can cooperate with our battery pack products to protect the high and low temperature during battery charging and discharging. Our battery pack products are equipped with PT1000 temperature sensor, that is, a thermistor with an impedance of 1000Ω at 0℃, used to detect the temperature of the battery surface. pin15 and pin16 are connected to the two ends of PT1000 respectively, so there is no need to distinguish the polarity. If pin15-16 is not connected to PT1000, the product will not stop charging and discharging the battery when the ambient temperature is too high/low, and the battery may be damaged.

2.9 Standby mode

When the product is connected to the battery and there is no input voltage, the battery will supply power to the internal circuit of the product, so that the battery has a continuous loss current. In order to avoid the battery power depletion too quickly during this process, the product is designed in standby mode, that is, when the product is connected to the battery and the input voltage is not available, if the product is not in the battery buffer discharge state or cold start state for 5 minutes, the product turns off most of the internal power supply such as the LED indicator until the input voltage recovers or the product enters the cold start mode. In standby mode, the continuous loss current of the battery is reduced to about 5mA.

2.10 Cold start mode

If the Current Size gear is set to Bat-Start, the product enters the cold Start mode. That is, regardless of whether the input voltage is normal, the product will be forcibly switched to the buffer discharge state. The cold start mode can be exit only when the Current Size gear is set to the non-bat-start gear. In cold start mode, the battery buffer discharge will be stopped due to abnormal battery voltage, output overcurrent protection, battery deep discharge protection, battery buffer discharge time selection, and battery temperature abnormal protection. In this case, to restore the battery buffer discharge, If an exception is required, exit the Bat-Start stall and select Bat-Start again.

3. Signal And Status Indication

3.1 Light Flashing

Product total Error, Diagnosis, Status bat, a total of 3 LED indicators. Error is a red LED indicator, indicating error and warning

information. Diagnosis, Status bat, are green LED indicators, indicating special status information. According to the flashing of the indicator light, that is, the rhythm is lit and extinguished, lit once, and then extinguished once, said to light 1 beat, divided into 4 indicator states;

Graphic method:

★-★----- indicates continuous lighting for 2 beats and continuous extinguishing for 2 beats;

★-★-★--- Indicates 3 beats continuously lit and 1 beat turned off;

Take the Diagnosis indicator as an example:

★------- 1 beat on, 3 beats off continuously, indicating Power in status;

★-★----- Continuously lit for 2 beats, and continuously off for 2 beats, indicating Buffer time expired status;

★-★-★--- Continuously light up for 3 beats, and turn off 1 beat, indicating the Remote status;

★-★-★-★- Lights up for 4 beats continuously, indicating the Overload status.

3.2 Special Status Definition

3.2.1 Error Indicator Indicates Status

Check wiring: This state will be displayed when the product detects that the backup battery voltage is below 12V, and it is necessary to check whether the backup battery is correctly connected and whether the backup battery is damaged.

Input warning: This state is displayed when the main power supply has no input voltage or the input voltage is lower than the undervoltage protection point or higher than the input voltage range, indicating that the input voltage is abnormal.

High temperature: The High temperature is displayed when the battery temperature is higher than the set charging or discharging temperature range.

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

3.2.2 Diagnosis Indicator Indicates Status

Power in: This state is displayed when the main power input voltage is within the input voltage range, indicating that the input voltage is normal and the output voltage is available at the output end of the product.

Buffer time expired: When the product is in the battery Buffer discharge output stage, before the end of the timing, the Buffer discharge of the battery is turned off in advance because of the undervoltage cutoff discharge of the backup battery, which indicates that the battery does not support the backup battery discharge output time selected by Buffer time Limiter.

Remote: When the product is in the battery buffer discharge output stage, when the reliable voltage 5-30V DC voltage signal is input to the ON/OFF terminal (reliable duration is greater than 500ms), the product can turn off the battery buffer discharge and display the Remote status.

Overload: The Overload state is displayed when the product output is overloaded or short-circuited.

3.2.3 Status Bat 1, Status Bat 2 Indicator Indicates Status

Ready: The standby battery is charged.

Charging: indicates the backup battery charging status.

Replace battery: If the battery voltage is suddenly lower than 12V during battery charging, the Replace battery status is displayed, indicating that the battery needs to be replaced.

Buffering: indicates the buffer discharge output status of the backup battery.

3.2.4 Relay Dry Contact Output And Indication Status

Alarm: When the product is in the Check wiring, Service, Replace battery, or Buffer time expired state, the impedance between pin 9 and 10 of the corresponding product is high. If it is not in the above state, the impedance between pin 9-10 of the corresponding product is low impedance.

Bat Charge: When the product is in the Charging state, the impedance between pin 11-12 of the corresponding product is low

impedance. If it is not in the above state, the impedance between pin 11-12 of the corresponding product is high impedance.

Bat Mode: When the product is in the Buffering state, the impedance between pin 13 and PIN 14 is low. If it is not in the above state, the impedance between pin 13-14 of the corresponding product is high impedance.

3.2.5 Buffer Time Limiter And Battery Size Select Operation

Through the Current Size knob, you can select the appropriate battery charging current, and let the product enter Service mode or Bat-Start mode, which is divided into ten gears. In order to facilitate accurate selection, the knob uses a selection knob with step positioning effect, and the top of the operation handle is marked with a pointing arrow. During selection operation, rotate the operation handle to make the pointing arrow point to the current or mode to be selected.

When selecting a battery charging current, determine the maximum charging current allowed by the battery according to the battery pack technical manual. The selected battery charging current cannot be greater than the maximum charging current allowed by the battery. For example, the battery pack product is our LUPS-BAT-X7, and the maximum allowable charging Current of the battery used in the battery pack product is 2.1A, then the Current Size knob should be selected as "1A" or "2A" gear.

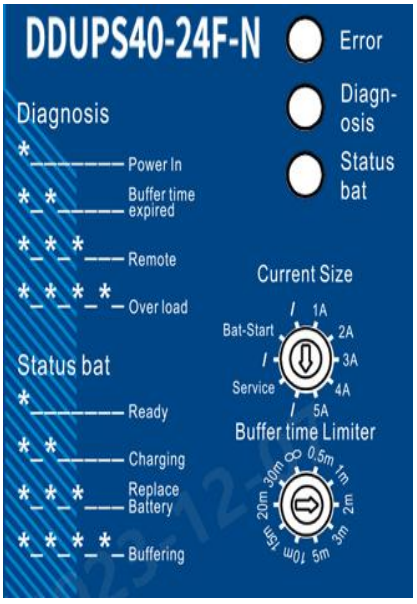
To avoid triggering the Service or Bat-Start mode when selecting the battery charging current, the/gear is set. In the/gear, the charge and discharge function of the product is the same as that in the 1A gear.

When you select the "Service" button, the battery cannot be charged or discharged to buffer output. In this case, the battery can be replaced and other maintenance operations can be performed.

When the "Bat-Start" gear is selected, the product enters the cold start mode, regardless of whether the input voltage is normal, the battery directly switches to the buffer discharge of the output load.

3.2.6 Buffer time Limiter selection operation

The appropriate battery discharge output Buffer timing time can be selected through the Buffer time Limiter knob. In order to facilitate accurate selection, the knob uses the selection knob with step positioning effect, and the pointing arrow is marked on the top of the operating handle. During the selection operation, the operating handle is rotated to make the pointing arrow point to the time scale to be selected. You can choose to complete the operation.

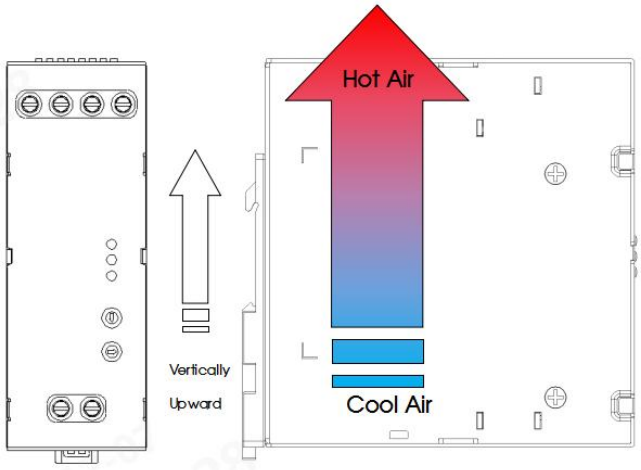


The Limiter scale indicates the unit of time (m, minute), which is divided into 10 levels to save power and extend the service life of the backup battery while meeting the demand. For example, 0.5m indicates that the battery buffer discharge ends after 0.5 minutes. ∞ indicates that the battery buffer discharge is maintained until the input voltage recovers or the battery discharge cutoff voltage is triggered.

How to choose the appropriate discharge duration The backup battery capacity and the backup battery discharge output load current are two factors, that is, the larger the backup battery capacity, the longer the Buffer time, and the smaller the load current.

4. Input power and output power

The product contains the backup battery charge management function. When the backup battery is charged, the output power POUT = PIN - Plosses - PCharging, so the output power is not equal to the input power.

5. Installation mode

The design of product structure and temperature characteristics is based on the vertical upward installation mode, which is conducive to the ventilation and heat dissipation of the product and the structural stability, and improve the reliability of the product.