24V / 10A DRU-24V10ACZ Operating Guideline

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Field Application Engineer / Rev. 00.1

Chrome DC-UPS Module

24V / 10A DRU-24V10ACZ

- Product Overview
- Installation Instruction
- Operating Sequence
- Relay Contact and LED Indicators
- Troubleshooting

Basic Information

Input	24-28Vdc 0.5A ± 0.1A charging mode **The typical charging voltage of a 24V battery type is 27.XX. As such, 28V input to charge the battery should be adequate to fully charge the battery.**
Output (Buffering Mode)	23-28Vdc 10.0A Max 240W Max (24V, 10A)
Battery Voltage	24Vdc, SLA (Sealed lead acid battery) 2x 12Vdc, SLA Sealed lead acid battery
Battery Capacity	3.3AH to 12AH
Charging Time	< 30hr ± 5hr for battery 24V/12AH
Buffering Time	35min for battery 24V/12AH
Operating Temperature	-20° C to +60° C (full power, no power de-rating)
Overload/ Overcurrent Protection	< 18A, Latch Mode
Short Circuit Protection	Latch Mode
Deep Discharge Protection	22V ± 1V **The unit will stop operating when the battery voltage detected is < 22V ± 1V.**

Product Description

1. Input / Output terminal block connector (Rated 300V/25A)
2. Signal terminal block connector (Discharging, Battery Fail, DC OK)
3. LED display status (Red, Green, Orange)
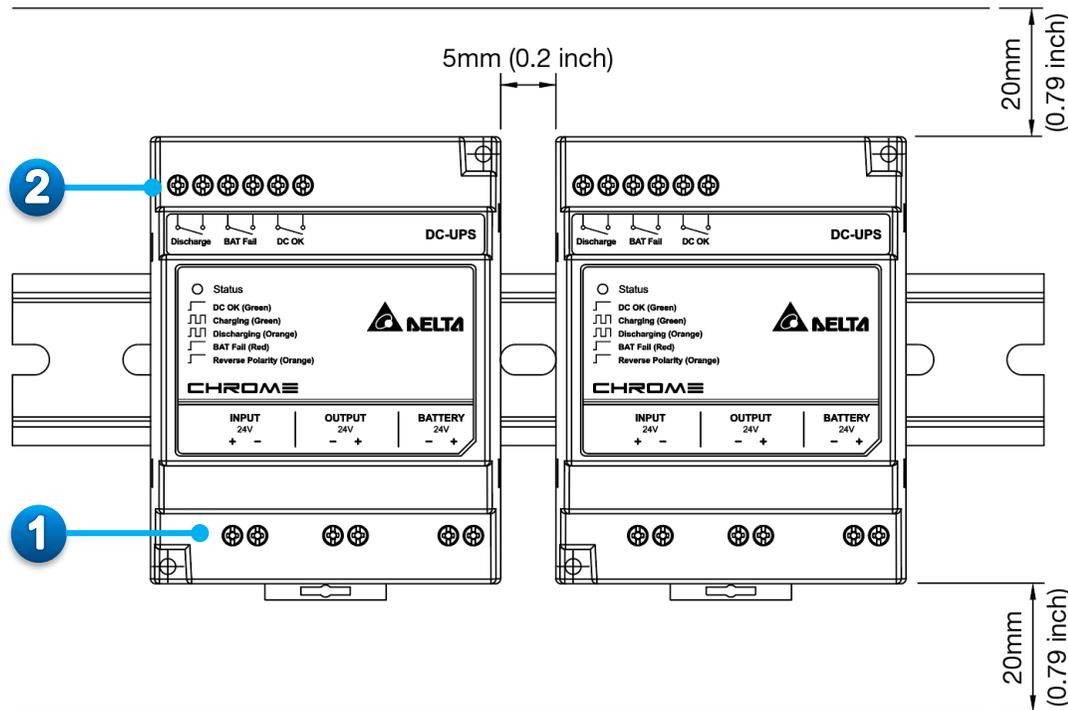4. Universal mounting rail system
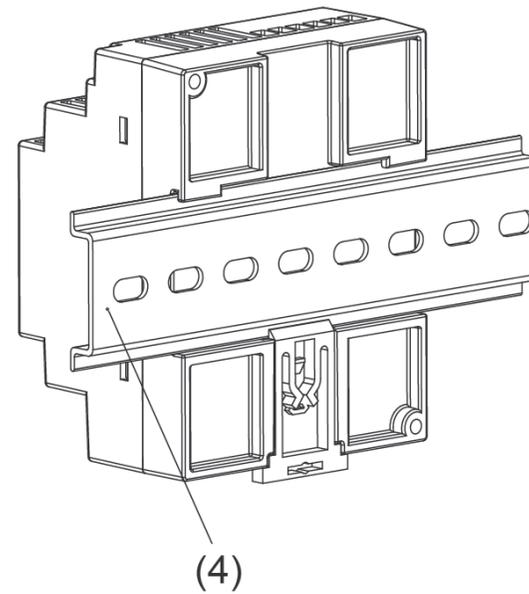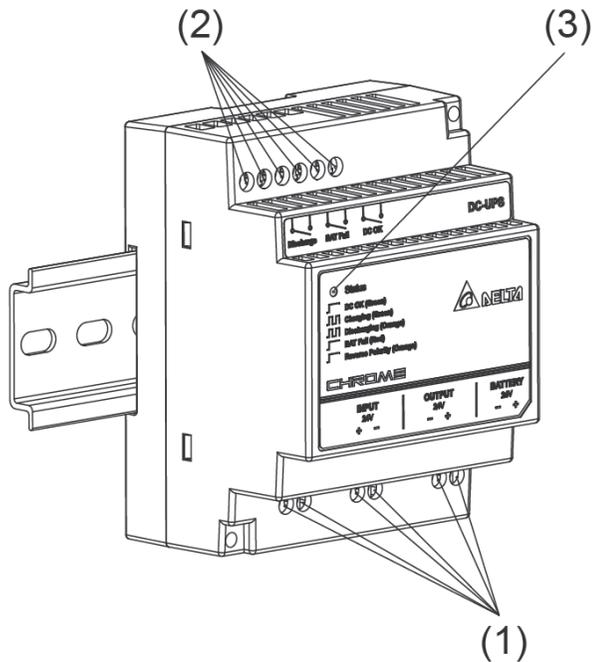
Installation

Vertical Mounting
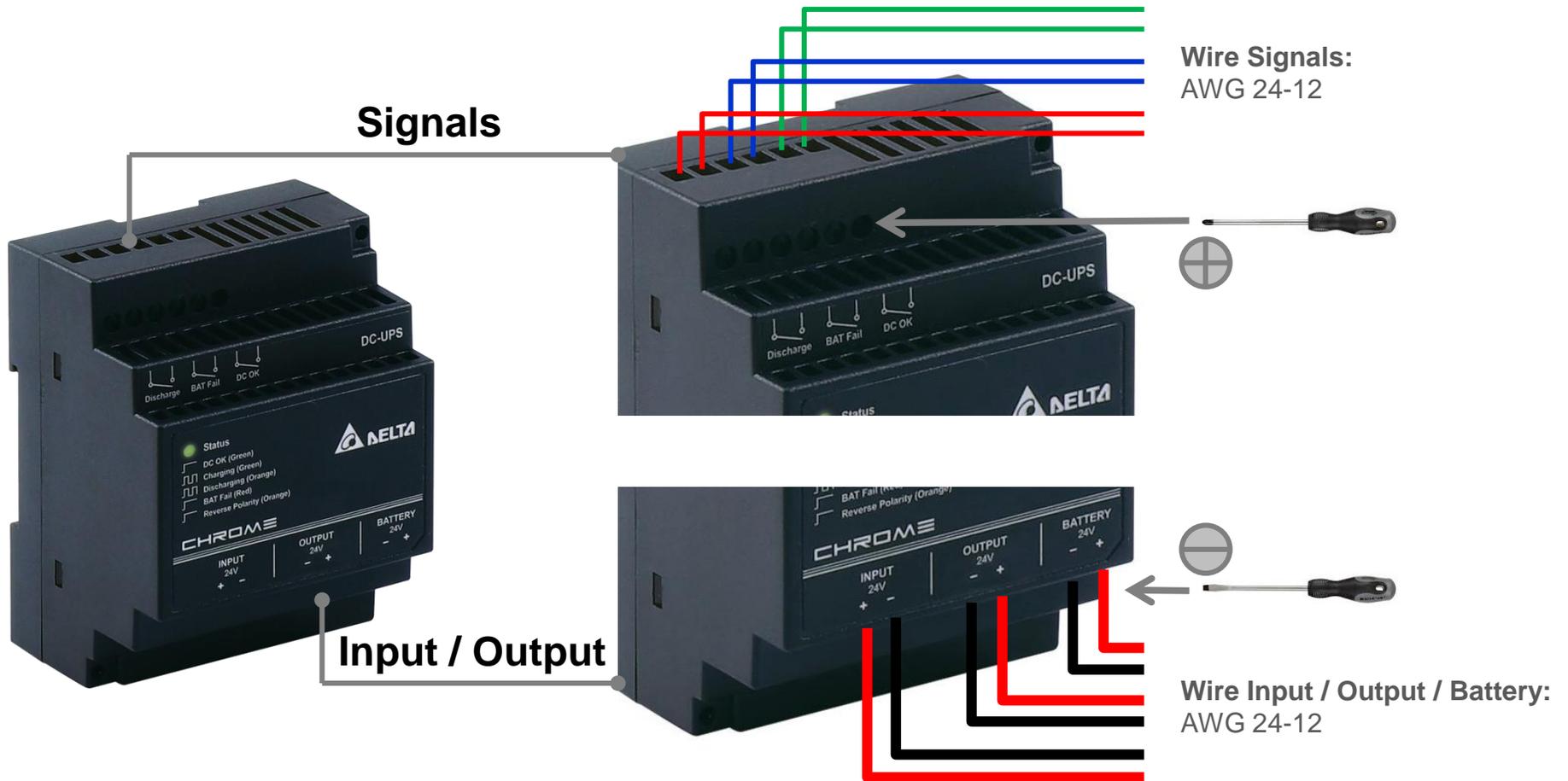
To guarantee sufficient convection cooling

- Keep a distance of 20mm above and below
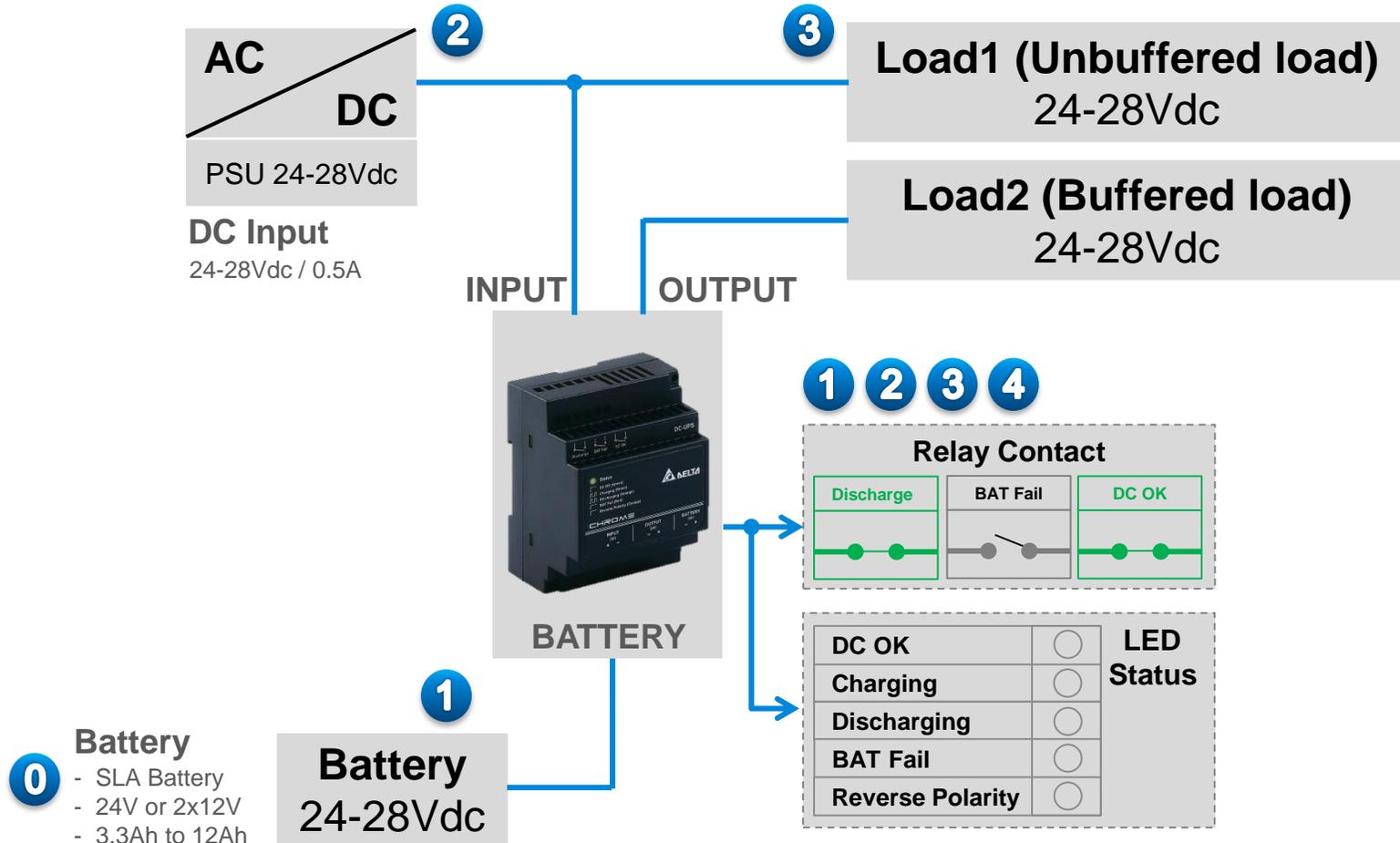- A lateral distance of 5mm

Note:
1. Input / Output / Battery terminal
2. Signals terminal

Wiring Connection

Signals

Input / Output

Wire Signals:
AWG 24-12

Wire Input / Output / Battery:
AWG 24-12

Wiring Instruction

AC ➋
DC

PSU 24-28Vdc

DC Input
24-28Vdc / 0.5A

➌ **Load1 (Unbuffered load)**
24-28Vdc

Load2 (Buffered load)
24-28Vdc

INPUT　　**OUTPUT**

BATTERY

➊ ➋ ➌ ➍

Relay Contact

Discharge	BAT Fail	DC OK

DC OK	◯	**LED**
Charging	◯	**Status**
Discharging	◯	
BAT Fail	◯	
Reverse Polarity	◯	

➊
Battery
24-28Vdc

0 **Battery**
- SLA Battery
- 24V or 2x12V
- 3.3Ah to 12Ah

Note:
Step 0-4, refer page 8-9

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
0	Check the battery voltage	• Battery voltage should be in 23-28Vdc	-	-	• If battery voltage is less than 23Vdc, the DRU module will not operate in buffering mode.
		• Battery voltage 20Vdc min will enable BAT Fail status. **(DRU module will not charge the battery)**	-	-	• Change the battery if the voltage is less than 20Vdc.
1	Connect battery to DRU module	Connect the battery cable to "BATTERY" terminal of DRU module (+ to + and - to -).	OFF (correct connection)	DC OK: Open Discharge: Open BAT Fail: Open	-
			Orange On **(battery wrong polarity)**	DC OK: Open Discharge: Open BAT Fail: Open	Re-check battery polarity and make corrections.

| No.	Operation	Description	LED Status	Signals Status	Troubleshooting
2	Connect PSU to DRU module	• Connect the PSU cable to "INPUT" terminal of DRU module (+ to + and - to -). • 24V battery has typical fully charged voltage at 27.XX. • Suggest to apply input at 28Vdc to charge battery.	Green flashing (battery charging)	DC OK: Closed Discharge: Open BAT Fail: Open	Use current probe to measure at battery cable BATTERY+, the charging current should be around 0.5-0.3A.
			Green On (battery fully charged)	DC OK: Closed Discharge: Open BAT Fail: Open	-
			Orange On (PSU wrong polarity)	DC OK: Open Discharge: Open BAT Fail: Open	Re-check PSU polarity and make corrections.
			Red On (No battery connection or battery spoil)	DC OK: Open Discharge: Open BAT Fail: Closed	Re-check battery voltage and change to good battery (23-28Vdc).
			Orange flashing (DRU input voltage is lower than battery voltage)	DC OK: Closed Discharge: Closed BAT Fail: Open	Re-check DRU input voltage and change to suggested voltage at 28Vdc.

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
3	Connect load2 to DRU module for Buffered load. (Normal mode)	Connect the load cable to "OUTPUT" terminal of DRU module. (+ to + and - to -).	Green flashing (battery charging)	DC OK: Closed Discharge: Open BAT Fail: Open	-
			Green On (battery fully charged)	DC OK: Closed Discharge: Open BAT Fail: Open	-
	Connect load1 to DRU module for Unbuffered load. (if required)	Connect the load cable to "INPUT" terminal of DRU module. (+ to + and - to -).	See above		
4	Buffering mode	Input collapse, DRU module operate in buffering mode. Battery will supply to load.	Orange flashing (battery discharging)	DC OK: Closed Discharge: Closed BAT Fail: Open	-
			OFF (DRU module does not operate in buffering mode)	DC OK: Open Discharge: Open BAT Fail: Open	• Re-check battery wiring and compare with "Typical Application Notes" in DRU module datasheet. Make corrections as needed. • Re-check battery voltage and compare with battery voltage range. Change to good battery (23-28Vdc) as needed.

Relay Characteristics

Max Relay Contact Rating		24Vdc/Vac, 0.5A
DC BUS OK	Relay Contact	"DC OK" contact is closed when the DC input voltage is within 24-28V (±1V) range or the battery voltage is within 23-28V range
	LED Indicator	ON (Green)
Charging	Relay Contact	"DC OK" contact is closed when the unit is in charging mode
	LED Indicator	Flashing (Green)
Battery Discharge[1]	Relay Contact	"Discharging" contact is closed when the unit is in buffering mode
	LED Indicator	Flashing (Orange)
Battery Fail[2]	Relay Contact	"BAT Fail" contact is closed when the battery fails to function or battery voltage is less than 20V ± 1V
	LED Indicator	ON (Red)
Battery Reverse Polarity	Relay Contact	All contact are opened when the battery is in reverse polarity
	LED Indicator	ON (Orange)
Input Reverse Polarity[3]	Relay Contact	All contact are opened when the input is in reverse polarity
	LED Indicator	ON (Orange)

1) Relay contact & LED indicator are functional with output current from 0.1A to 10A range, < 0.1A it is intermittent.
2) While replacing the FAIL battery with system in ON State, user MUST wait for 30secs after removing the FAIL battery and replace with new. In case the user replaces battery within 30secs and accidently connects the battery in reverse polarity, this may cause the **DC-UPS MODULE TO BE DAMAGED!**
3) In this case, power supply is Turned ON with full system configuration (as shown in page 7) the module will indicate if the input connections are reverse.

Signal Wiring Diagram
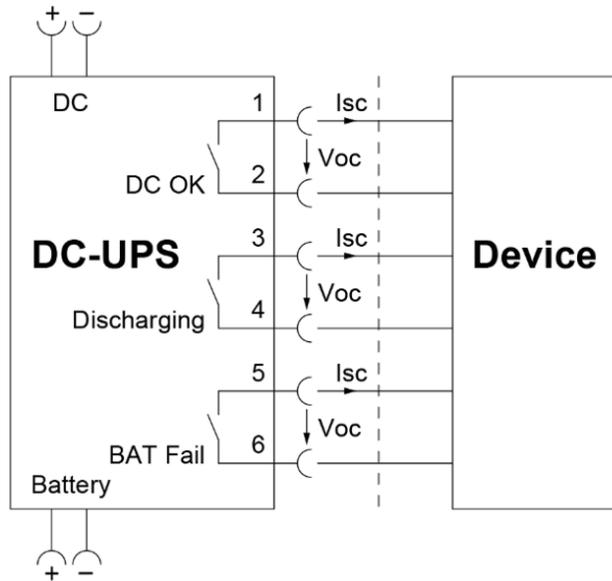
DC-UPS Status	Relay Output Connector			LED Display Status
	Discharging	BAT Fail	DC OK	
Battery Charging	Open	Open	Close	Flashing (Green)
Battery Fully Charged	Open	Open	Close	ON (Green)
Battery Discharging* (Buffering Mode)	Close	Open	Close	Flashing (Orange)
No Battery Connected	Open	Close	Open	ON (Red)
Output Shutdown	Open	Open	Open	OFF

*With output current 0.1A to 10A.

* With output current 0.1A to 10A: While Buffering mode.
The module can operate from output current 0A to 10A. However, please note that the LED display status and relay contact operate properly at output current 0.1A and above. If load is lower than 0.1A, the LED and Relay status will malfunction.

LED Display Status	Problem	Suggestion
DC OK ○ Charging ○ Discharging ○ BAT Fail ○ Reverse Polarity ○	Normal mode (Charging) • LED display status is no light. • DRU module do not operate.	1) Check input voltage at **"INPUT"** terminal whether it is in 24-28Vdc voltage range or not. 2) If the input voltage at **"INPUT"** terminal is not in nominal range, please check wiring and PSU output. 3) Replace DRU module.
DC OK ● (green) Charging ○ Discharging ○ BAT Fail ○ Reverse Polarity ○	Normal mode (Charging) • Green LED display status is light (not flash).	1) Check the input voltage whether it is equal to battery voltage or not. 2) Disconnect battery from DRU module then check battery voltage whether it is > 20Vdc min or not. 3) Replace with another good battery. 4) Replace DRU module.
DC OK ○ Charging ○ Discharging ○ **BAT Fail** ● (red) Reverse Polarity ○	Normal mode (Charging) • Red LED display status is light.	1) Check battery voltage whether it is less than 20Vdc or not. (DRU module will not charge the battery), replace with good battery. 2) If the battery voltage ≥21Vdc, please check battery wiring. 3) Replace DRU module.
DC OK ○ Charging ○ Discharging ○ BAT Fail ○ **Reverse Polarity** ● (orange)	Normal mode (Charging) • Orange LED display status is light.	1) Check battery polarity connection at **"BATTERY"** terminal and make corrections. 2) Check input polarity connection at **"INPUT"** terminal and make corrections.

LED Display Status	Problem	Suggestion
DC OK ○ **Charging** ○ **Discharging** 🟠 **BAT Fail** ○ **Reverse Polarity** ○	Normal mode (Charging) • Discharging during input voltage available • LED display status is Orange flashing.	1) Check battery voltage at **"BATTERY"** terminal whether it is higher than input voltage or not. If the battery voltage at **"BATTERY"** terminal is higher than input voltage, the battery will be discharged until its voltage equal to input voltage then LED display will be Green. Suggest to adjust input voltage to 28Vdc. 2) Replace DRU module.
DC OK ○ **Charging** ○ **Discharging** ○ **BAT Fail** ○ **Reverse Polarity** ○	Buffering mode (Discharging) • LED display status is no light. • DRU module does not take over the load when input collapse.	1) Check battery voltage at **"BATTERY"** terminal whether it is in 24-28V voltage range or not. (the battery voltage < 22V $\pm$ 1V, DRU module will not operate in buffering mode) 2) If the battery voltage at **"BATTERY"** terminal is not available, please check wiring. 3) Replace DRU module.
DC OK 🟢 **Charging** ○ **Discharging** ○ **BAT Fail** ○ **Reverse Polarity** ○	Buffering mode (Discharging) • Green LED display status is light (Orange LED is not flash).	Output load is < 0.1A. (the Orange LED will flash when the output load is > 0.1A)

Thank you.

To learn more about DeltaPSU, please visit www.DeltaPSU.com.

Date	Item	Content Revised	Page Affected	Rev
9 Jun 20	1	Initial release. By Tassanai	All	00
18 Jun 20	1	Update Operating sequence No.2 to add Orange flashing during input available.	9	00.1
	2	Update Troubleshooting to add Orange flashing and re-align its order	13-14	
		By Tassanai		