

CliQ M DC-UPS & Battery Module Operating Guideline

SPSBU | Rev. 06



CliQ M DC-UPS Module

24 V / 10 A, 20 A, 40 A

DRU-24V10AMN, DRU-24V20AMN, DRU-24V40AMN

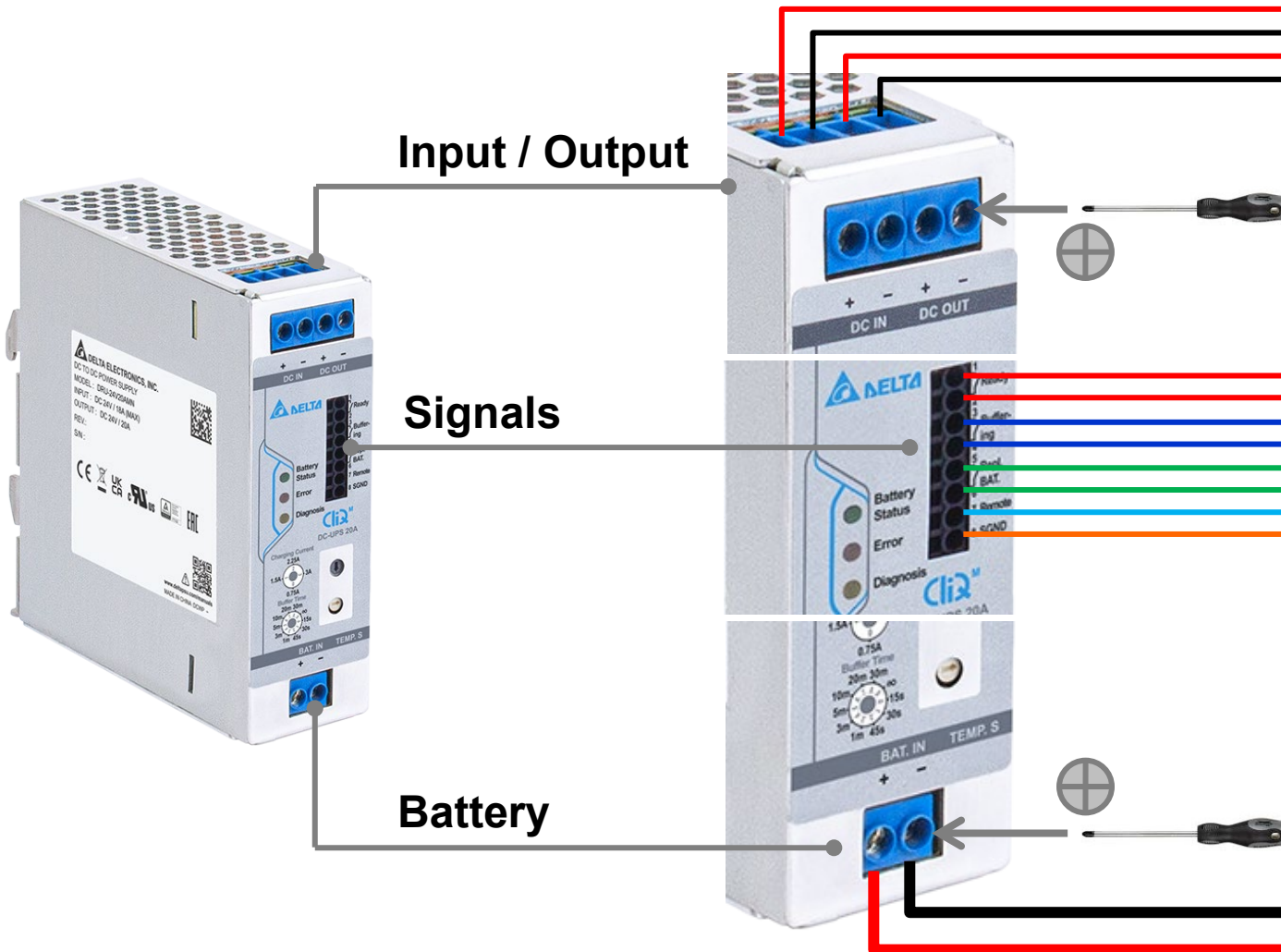


■ Product Overview	3
■ Installation Instruction	5
■ Operating Sequence	7
■ Relay Contacts and LED Indicators	12
■ Troubleshooting	14

Basic Information

Input	<p>18-30 Vdc Four-step rotary selector switch DRU-24V10AMN: 0.5 A, 1 A, 1.5 A, 2 A (typ.) charging mode; Default: 0.5 A DRU-24V20AMN: 0.75 A, 1.5 A, 2.25 A, 3 A (typ.) charging mode; Default: 0.75 A DRU-24V40AMN: 1 A, 2 A, 3 A, 4 A (typ.) charging mode; Default: 1 A</p>
Output (Buffering Mode)	<p>$V_{out} = V_{in} - 0.5 \text{ Vdc}$ DRU-24V10AMN: 10.0 A / 240 W Max; 15.0 A / 360 W Max (7 s) DRU-24V20AMN: 20.0 A / 480 W Max; 30.0 A / 720 W Max (7 s) DRU-24V40AMN: 40.0 A / 960 W Max; 60.0 A / 1440 W Max (7 s)</p>
Battery Voltage	<p>24 Vdc, SLA (Sealed lead acid battery) 2 x 12 Vdc, SLA (Sealed lead acid battery)</p>
Battery Capacity	<p>3.4 AH to 100 AH</p>
Charging Time	<p>DRU-24V10AMN: < 9 hr \pm 1 hr (2 A charging current for 24 V/12 AH battery) DRU-24V20AMN: < 6 hr \pm 1 hr (3 A charging current for 24 V/12 AH battery) DRU-24V40AMN: < 4.5 hr \pm 1 hr (4 A charging current for 24 V/12 AH battery)</p>
Buffering Time Adjustment	<p>Ten-step rotary selector switch 15 s, 30 s, 45 s, 1 min, 3 min, 5 min, 10 min, 20 min, 30 min, ∞</p>
Operating Temperature	<p>-30°C to +70°C (> 60°C de-rate power by 2.5% / °C, when battery is fully charged)</p>
Overload/ Overcurrent/ Short Protection	<p>Normal Operation: Auto Recovery Battery Operation: Latch off</p>
Deep Discharge Protection	<p>21 V \pm 1 V The unit will stop operating when the battery voltage detected is < 21 V \pm 1 V.</p>

Wiring Connection



Wire Input / Output:

DRU-24V10AMN	AWG 18-8 (Load: 0-5 A)	AWG 14-8 (Load: 5-10 A)
DRU-24V20AMN	AWG 14-8 (Load: 0-10 A)	AWG 10-8 (Load: 10-20 A)
DRU-24V40AMN	AWG 10-6 (Load: 0-20 A)	AWG 8-6 (Load: 20-40 A)

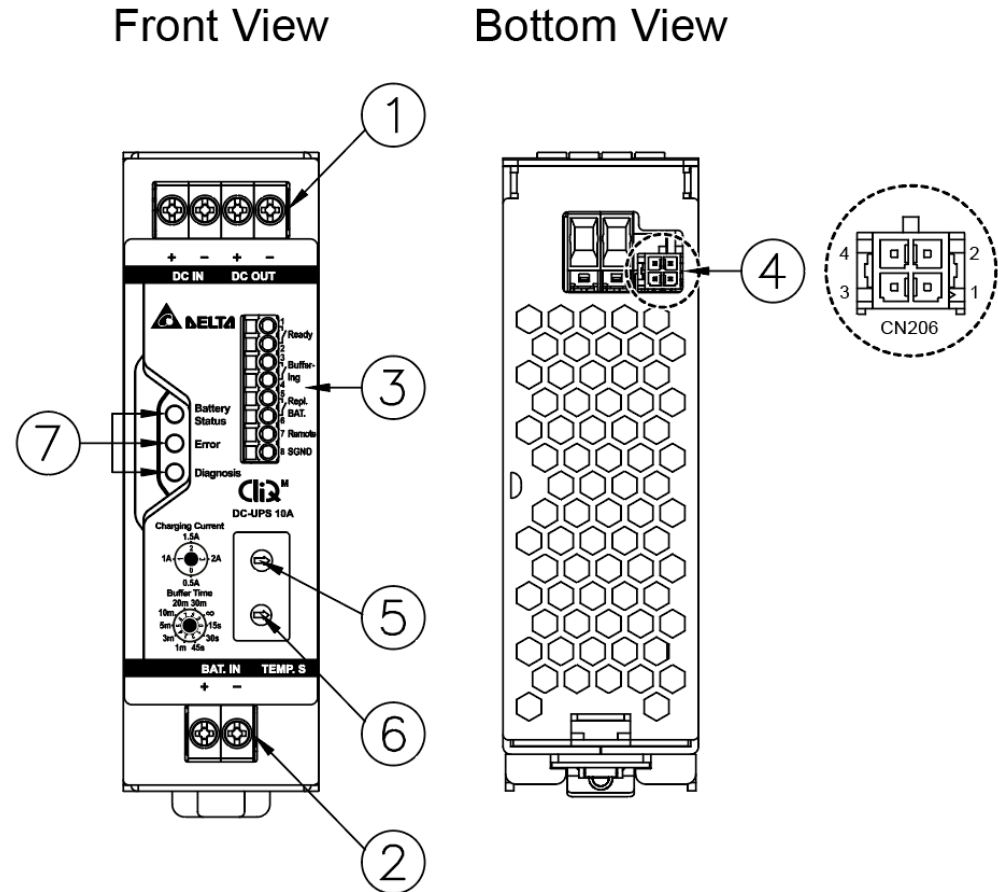
Wire Signals: AWG 24-12

Wire Battery:

DRU-24V10AMN	AWG 18-8 (Load: 0-5 A)	AWG 14-8 (Load: 5-10 A)
DRU-24V20AMN	AWG 14-8 (Load: 0-10 A)	AWG 10-8 (Load: 10-20 A)
DRU-24V40AMN	AWG 10-6 (Load: 0-20 A)	AWG 8-6 (Load: 20-40 A)

Product Description

1. Input / Output terminal block connector (CN202)
2. Battery terminal block connector (CN203)
3. Signal terminal block connector (CN101)
4. Temperature Sensor & Rx/Tx connector (CN206)
 - Pin 1: Temperature Sensor 1
 - Pin 2: Rx/Tx
 - Pin 3: Temperature Sensor 2
 - Pin 4: GND
5. Rotary selector switch for setting the charging current
6. Rotary selector switch for setting the buffer time
7. LED indicators

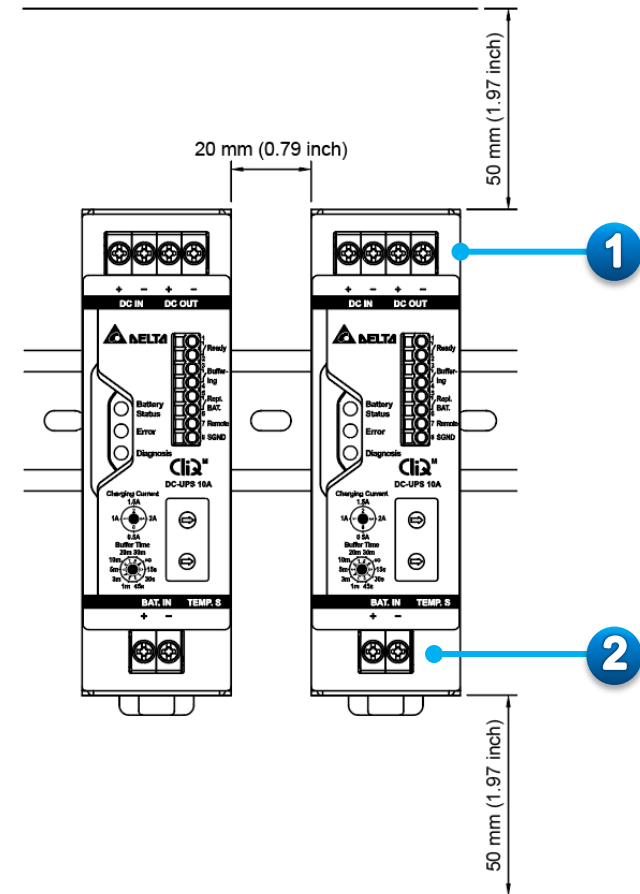


Installation

Vertical Mounting

To guarantee sufficient convection cooling

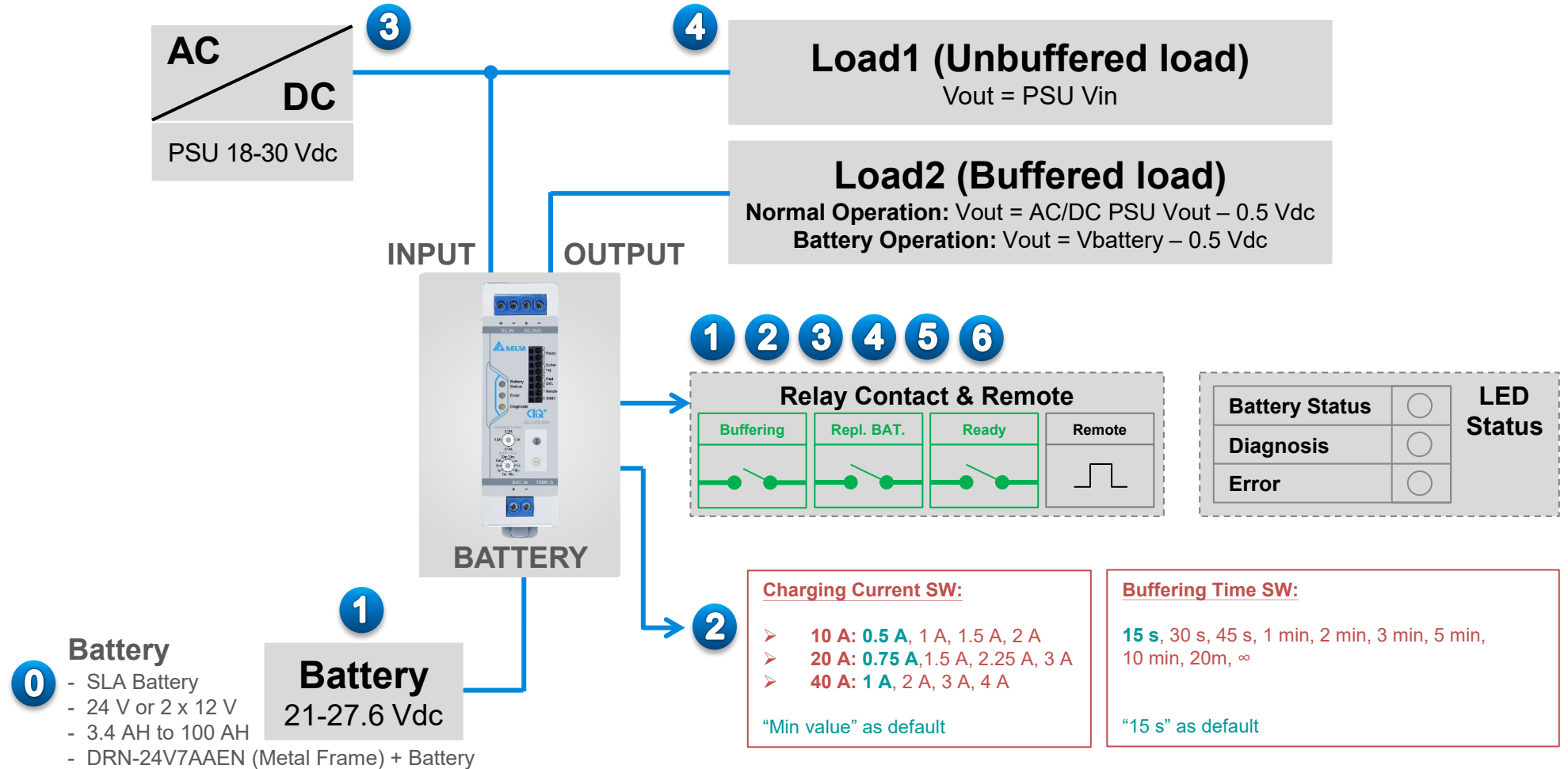
- Keep a distance of 50 mm above and below
- A lateral distance of 20 mm



Note:

1. Input / Output terminal
2. Battery terminal

Wiring Instruction



Note:
Step 0-5, refer page 8-11

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
0	Check the battery voltage	<ul style="list-style-type: none"> Battery voltage should be in 21-27.6 Vdc 	-	-	<ul style="list-style-type: none"> If battery voltage is less than 21 Vdc, the DRU module will not operate in buffering mode.
		<ul style="list-style-type: none"> Battery voltage 19.2 Vdc min will enable "Repl. BAT." relay contact. (DRU module will not charge the battery) 	-	-	<ul style="list-style-type: none"> Change the battery if the voltage is less than 19.2 Vdc.
1	Connect battery to DRU module	Connect the battery cable to "BAT. IN" terminal of DRU module (+ to + and - to -).	All LED OFF (correct connection)	Ready: Open Buffering: Open Replace BAT: Open	-
2	Select Charging Current & Buffering Time	<ul style="list-style-type: none"> Use the rotary selector switch to set a suitable Charging Current for battery (default is minimum value) Use the rotary selector switch to set a suitable Buffering Time for the load demand 	All LED OFF (correct connection)	Ready: Open Buffering: Open Replace BAT: Open	-

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
3	Connect PSU to DRU module then turn on PSU	Connect the PSU cable to "DC IN" terminal of DRU module (+ to + and - to -).	Green flashing slowly (battery charging)	Ready: Open Buffering: Open Replace BAT: Open	Use current probe to measure at battery cable BAT. IN+, the charging current should be around setting value.
			Green On (battery fully charged)	Ready: Close Buffering: Open Replace BAT: Open	
			Red On (buffering time expired)	Ready: Open Buffering: Open Replace BAT: Open	Restart the DC-UPS module to reset the buffering time.
			Orange On (No battery connection or battery reverse polarity or battery spoil)	Ready: Open Buffering: Open Replace BAT: Close	Re-check battery polarity and connection make corrections. Re-check battery voltage and replace with a new battery (21-27.6 Vdc).
			Green flashing slowly & Red On (DRU input voltage is low: 18-21 Vdc)	Ready: Open Buffering: Open Replace BAT: Open	Re-check DRU input voltage and increase to > 21 Vdc.

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
4	Connect load2 to DRU module for Buffered load. (Normal operation mode)	Connect the load cable to “DC OUT” terminal of DRU module (+ to + and - to -).	Green flashing slowly (battery charging)	Ready: Open Buffering: Open Replace BAT: Open	Battery capacity < 85%
			Green On (battery fully charged)	Ready: Close Buffering: Open Replace BAT: Open	Battery capacity ≥ 85%
	Connect load1 to DC UPS module for Unbuffered load. (if required)	Connect the load cable to “DC IN” terminal of DRU module (+ to + and - to -).	See above		
5	Buffering mode (Battery operation)	Input collapse, DRU module operate in buffering mode. Battery will supply to load.	Green flashing quickly (battery discharging)	Ready: Open Buffering: Close Replace BAT: Open	-
			OFF (DRU module does not operate in buffering mode)	Ready: Open Buffering: Open Replace BAT: Open	<ul style="list-style-type: none"> 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. Replace with new battery (21-27.6 Vdc) as needed.

No.	Operation	Description	LED Status	Signals Status	Troubleshooting
6	Remote off	The remote control signal is used to disable the DC-UPS module's output with a high voltage trigger.	Orange On	Ready: Open Buffering: Open BAT Replace: Open	<ul style="list-style-type: none">Re-check the pulse with a minimum length of 250 ms and higher than 10 V with 1 kOhm resistor is required to stop buffering.

Relay Characteristics

Max Relay Contact Rating		30 Vdc/Vac, 1.0 A
Signal (CN101)	“Ready” Relay Contact (2 Pins)	Relay contact is closed when the battery is charged more than typical 85%.
	“Buffering” Relay Contact (2 Pins)	Relay contact is closed when the DC-UPS module is operating in Battery Operation mode.
	“Repl. BAT.” Relay Contact (2 Pins)	Relay contact is closed when the battery fails to function. The battery that has failed is indicated by the green LED which is off. The battery should be replaced as soon as possible.
	“Remote” (1 Pin)	The remote control signal is used to disable the DC-UPS module’s output with a high voltage trigger.
	“SGND” (1 Pin)	The signal ground (SGND) is the reference potential for the remote control signal.
Temperature Sensor & Rx/Tx (CN206)	Temperature Sensor 1 & 2 (2 Pins)	External temperature sensor for battery temperature monitoring. (Sensor 1: Pin 1 / Pin 4, Sensor 2: Pin 3 / Pin 4)
	Rx/Tx & GND (2 Pins)	To monitor the battery temperature, please connect the DC-UPS module to the CliQ M battery module (DRN-24V7AAEN) with 2 x 12 Vdc / 7.2 AH lead acid battery.

- 1) While replacing the FAIL battery with system in ON State, user MUST wait for 30 s after removing the FAIL battery and replace with new. In case the user replaces battery within 30 s and accidentally connects the battery in reverse polarity, this may cause the **DC-UPS MODULE TO BE DAMAGED!**
- 2) 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.

Relay Contacts and LED Indicators Status

DC-UPS Status	Relay Contacts Status			LED Indicators Status		
	Ready	Buffering	Replace BAT	Battery Status	Diagnosis	Error
Battery Charged \geq 85%	Close	Open	Open	ON (Green)	OFF	OFF
Battery Charged < 85%	Open	Open	Open	Flashing Slowly (Green)	OFF	OFF
Battery Charged at low Vin (18-21 Vdc)	Open	Open	Open	Flashing Slowly (Green)	OFF	ON (Red)
Buffering (Battery Operation mode & Vin off)	Open	Close	Open	Flashing Quickly (Green)	OFF	OFF
1) Battery Connection Open 2) Battery Reverse Polarity 3) Battery Replacement Required	Open	Open	Close	OFF	ON (Orange)	OFF
Remote Control Signal Input Active	Open	Open	Open	OFF	ON (Orange)	OFF
Buffering Time Expired	Open	Open	Open	OFF	Flashing Slowly (Orange)	OFF
1) DC-UPS Over Temperature 2) DC-UPS Output Overload 3) Battery Over Temperature	Open	Open	Open	OFF	OFF	ON (Red)
Shutdown	Open	Open	Open	OFF	OFF	OFF

LED Display Status	Problem	Suggestion						
<table border="1"> <tr> <td>Battery Status</td> <td><input type="radio"/></td> </tr> <tr> <td>Diagnosis</td> <td><input type="radio"/></td> </tr> <tr> <td>Error</td> <td><input type="radio"/></td> </tr> </table>	Battery Status	<input type="radio"/>	Diagnosis	<input type="radio"/>	Error	<input type="radio"/>	<p>Normal mode (Charging)</p> <ul style="list-style-type: none"> All LED display status are OFF. DC-UPS module does not operate. 	<ol style="list-style-type: none"> Please check wiring and PSU output. Replace DC-UPS module.
Battery Status	<input type="radio"/>							
Diagnosis	<input type="radio"/>							
Error	<input type="radio"/>							
<table border="1"> <tr> <td>Battery Status</td> <td><input checked="" type="radio"/></td> </tr> <tr> <td>Diagnosis</td> <td><input type="radio"/></td> </tr> <tr> <td>Error</td> <td><input checked="" type="radio"/></td> </tr> </table>	Battery Status	<input checked="" type="radio"/>	Diagnosis	<input type="radio"/>	Error	<input checked="" type="radio"/>	<p>Normal mode (Charging)</p> <ul style="list-style-type: none"> Green LED display status is flashing quickly. Red LED display status is On (not flashing). 	<ol style="list-style-type: none"> The input voltage is low (18-21 Vdc). Re-check input voltage and increase to > 21 Vdc.
Battery Status	<input checked="" type="radio"/>							
Diagnosis	<input type="radio"/>							
Error	<input checked="" type="radio"/>							
<table border="1"> <tr> <td>Battery Status</td> <td><input type="radio"/></td> </tr> <tr> <td>Diagnosis</td> <td><input checked="" type="radio"/></td> </tr> <tr> <td>Error</td> <td><input type="radio"/></td> </tr> </table>	Battery Status	<input type="radio"/>	Diagnosis	<input checked="" type="radio"/>	Error	<input type="radio"/>	<p>Normal mode (Charging)</p> <ul style="list-style-type: none"> Orange LED display status is On (not flashing). 	<ol style="list-style-type: none"> Check the Replace BAT relay contact. If it is "Close", this either means: <ul style="list-style-type: none"> Battery connection is open or there is no battery Battery reverse polarity Battery spoil Check battery polarity connection at "BAT. IN" terminal and make corrections. Check input polarity connection at "DC IN" terminal and make corrections. Re-check battery voltage. If the battery still fails to function and will not charge, replace with a new battery (21-27.6 Vdc).
Battery Status	<input type="radio"/>							
Diagnosis	<input checked="" type="radio"/>							
Error	<input type="radio"/>							

LED Display Status	Problem	Suggestion						
<table border="1"> <tr> <td>Battery Status</td> <td><input type="radio"/></td> </tr> <tr> <td>Diagnosis</td> <td><input checked="" type="radio"/></td> </tr> <tr> <td>Error</td> <td><input type="radio"/></td> </tr> </table>	Battery Status	<input type="radio"/>	Diagnosis	<input checked="" type="radio"/>	Error	<input type="radio"/>	<p>Buffering mode (Buffering)</p> <ul style="list-style-type: none"> Orange LED display status is flashing slowly. 	<ol style="list-style-type: none"> If there is no output voltage, this means the set buffering time has expired. Restart the DC-UPS module to reset the buffering time.
Battery Status	<input type="radio"/>							
Diagnosis	<input checked="" type="radio"/>							
Error	<input type="radio"/>							
<table border="1"> <tr> <td>Battery Status</td> <td><input type="radio"/></td> </tr> <tr> <td>Diagnosis</td> <td><input type="radio"/></td> </tr> <tr> <td>Error</td> <td><input checked="" type="radio"/></td> </tr> </table>	Battery Status	<input type="radio"/>	Diagnosis	<input type="radio"/>	Error	<input checked="" type="radio"/>	<p>Normal mode (Charging)</p> <ul style="list-style-type: none"> RED LED display status is On (not flashing). 	<ol style="list-style-type: none"> Check the Replace BAT relay contact. If it is "Open", this either means: <ul style="list-style-type: none"> DC-UPS module is over temperature Battery module is over temperature (if the Rx/Tx or battery sensor function is used) DC-UPS module's output is overload Check the surrounding air temperature for DC-UPS module or battery module. Check if system is loading over the DC-UPS module's current limit.
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Diagnosis	<input type="radio"/>							
Error	<input checked="" type="radio"/>							

CliQ M Battery Module without Battery

24 V / 7.2 AH

DRN-24V7AAEN



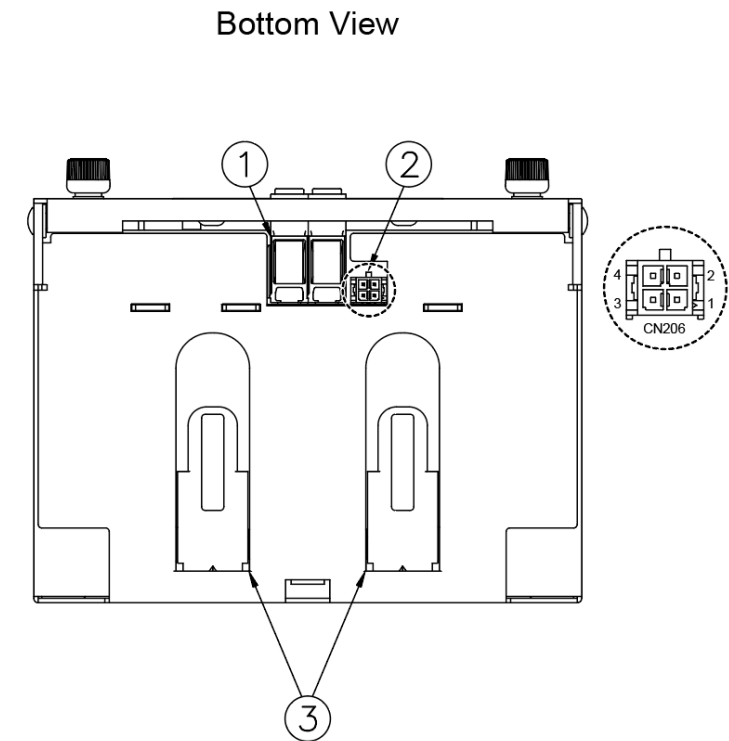
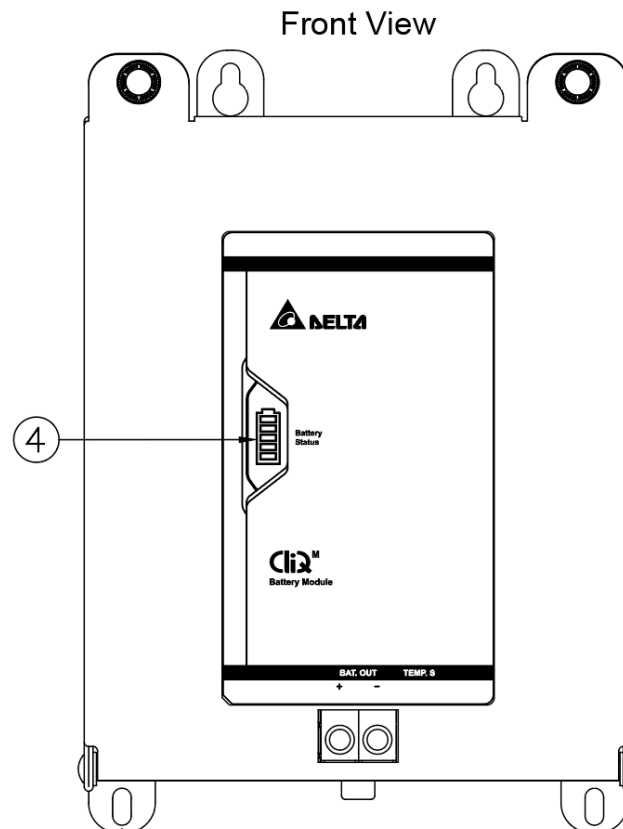
- Product Overview 17
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- LED Indicator 20
- How to Use Battery Temperature Protection 21
- How to Replace the Battery 22

Basic Information

Nominal Battery Voltage	24 Vdc, SLA (Sealed lead acid battery) 2 x 12 Vdc, SLA (Sealed lead acid battery)
Battery Capability	7.2 AH lead-acid battery
Recommended Charging Voltage	27.6 Vdc
Charging Current	2.1 A Max (cannot exceed max charging current limitation of battery specification)
Discharging Current	40 A Max
Battery Fuse	2 pcs in parallel; LITTELFUSE: 0257030. PXAPC, BUSSMANN: ATC-30 or equivalent
Operating Temperature	Charging: 0°C to +40°C Discharging: -10°C to +50°C Storage: -15°C to +40°C

Product Description

1. Battery terminal block connector (CN203)
2. Temperature Sensor & Rx/Tx connector (CN206)
 - Pin 1: Temperature Sensor 1
 - Pin 2: Rx/Tx
 - Pin 3: Temperature Sensor 2
 - Pin 4: GND
3. Hook
4. LED indicator

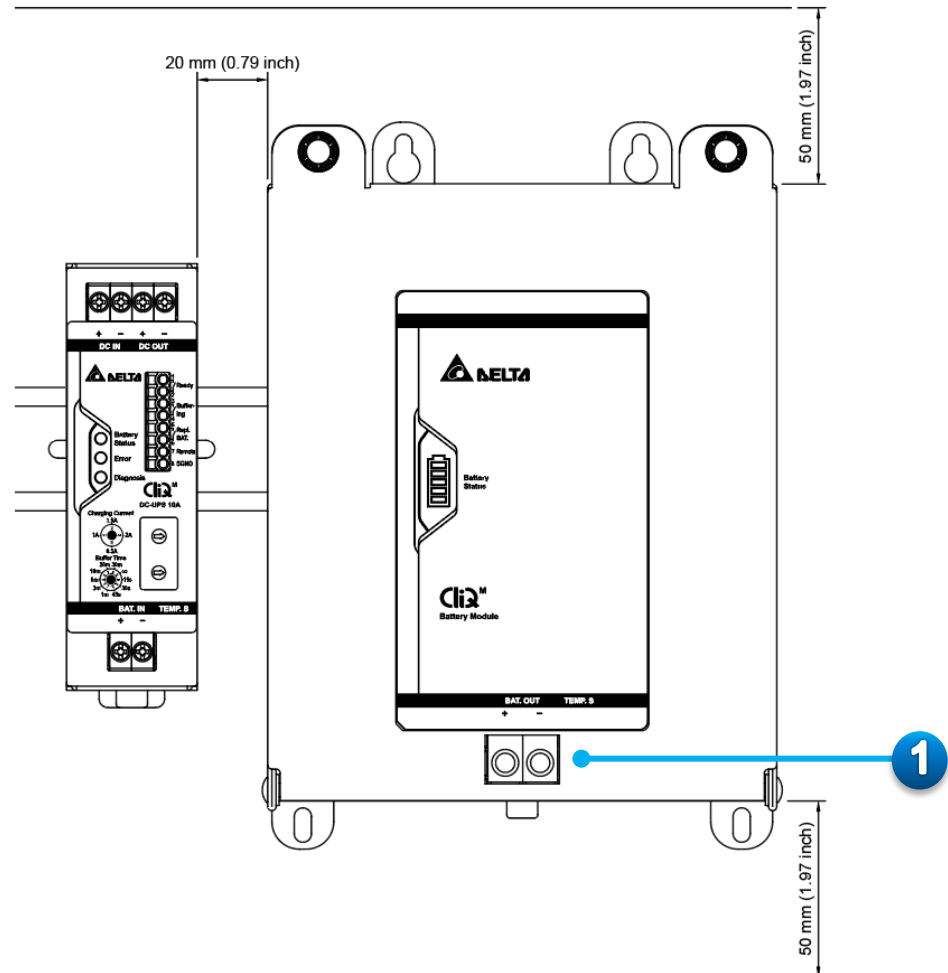


Installation

Vertical Mounting

To guarantee sufficient convection cooling

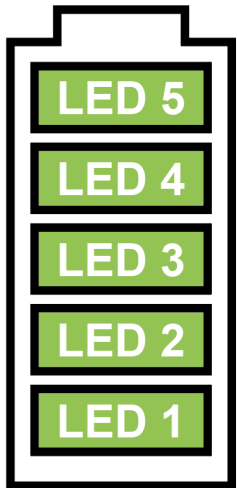
- Keep a distance of 50 mm above and below
- A lateral distance of 20 mm



Note:

1. Battery terminal

LED Indicator

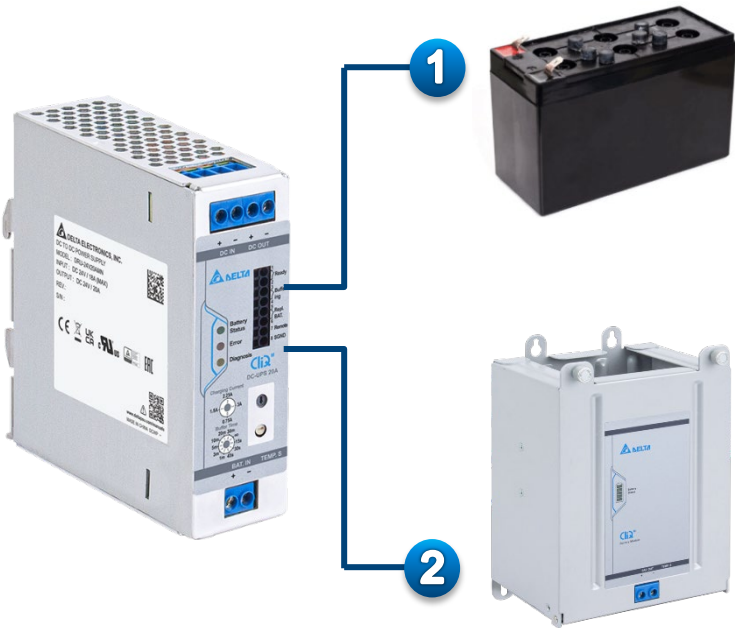


Battery Status

Battery Capacity	LED 1	LED 2	LED 3	LED 4	LED 5
> 85%	ON	ON	ON	ON	ON
70%-85%	ON	ON	ON	ON	OFF
55%-70%	ON	ON	ON	OFF	OFF
40%-55%	ON	ON	OFF	OFF	OFF
20%-40%	ON	OFF	OFF	OFF	OFF
< 20%	OFF	OFF	OFF	OFF	OFF

How to Use Battery Temperature Protection

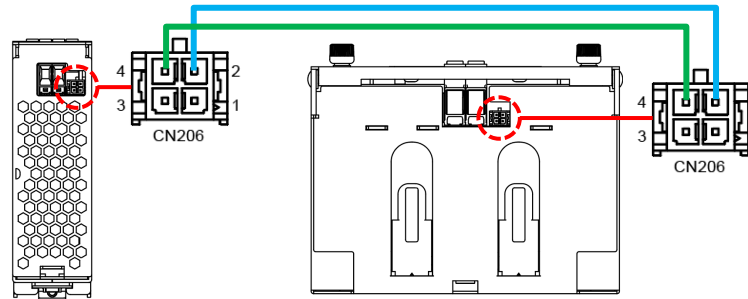
DC-UPS module can offer battery temperature protection function with individual lead acid battery or Delta battery module (DRN-24V7AAEN).



Users can use an external Negative Temperature Coefficient (NTC) thermistor with 10 kOhm F 3435K $\pm 1\%$ as temperature sensor to sense the battery temperature.



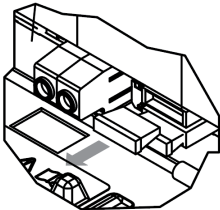
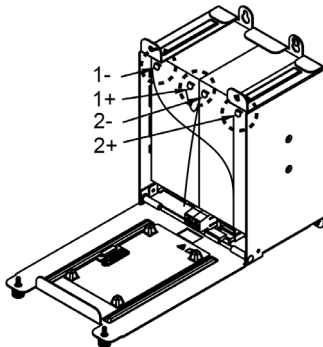
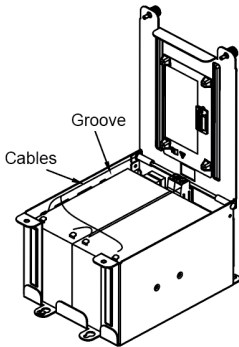
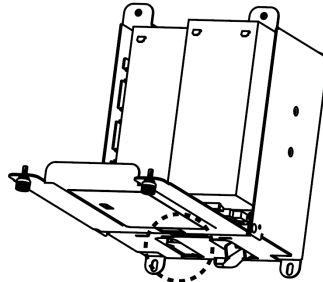
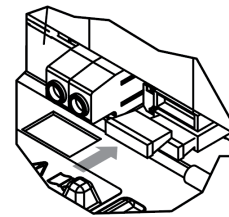
The Rx/Tx function can only be used with the Delta battery module (DRN-24V7AAEN) to detect battery temperature.



Battery Temperature Protection (With Temperature Sensor, CN206 pin1 and pin3) (With Rx/Tx function, CN206 pin2 and pin4)	Normal Operation	Battery surrounding air temperature $< 0^{\circ}\text{C}$ or $> 40^{\circ}\text{C}$, DC-UPS will stop charging to protect battery and extend battery life
	Battery Operation	Battery surrounding air temperature $< -10^{\circ}\text{C}$ or $> 50^{\circ}\text{C}$, DC-UPS will stop buffering to protect battery and extend battery life

WARNING!

For safe installation and operation, please refer the following procedures for battery change. The entire electrical facility should be disconnected from the power supply and take measures to protect against electrical shock.

<p>Step 1. Remove fuses.</p> 	<p>Step 4. Replace new batteries.</p>
<p>Step 2. Remove cables from battery metal tip.</p> 	<p>Step 5. Reconnect cables & check battery polarity. The cables need to be arranged in this groove.</p> 
<p>Step 3. Press hooks to take out the battery.</p> 	<p>Step 6. Insert fuses.</p> 

Recommended DC Fuse: LITTELFUSE: 0257030.PXAPC, BUSSMANN: ATC-30 or equivalent

Recommended Battery: Yuasa: NP7-12, CSB: GP1272F2 or equivalent

Smarter. Greener. Together.



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PSU.deltaww.com



Date	Item	Content Revised	Page Affected	Rev
4 Aug 21 (Harry)	1	New issue.	All	00
11 Aug 21 (Harry)	1	Update Operating Sequence No. 3 for Green flashing slowly & Red On.	9	01
	2	Update DC-UPS status to “Battery Charged at Low Vin (18-21 Vdc)” and re-align its order.	13	
	3	Update Troubleshooting to “Normal Mode (Charging)”.	14	
1 Sep 21 (Harry)	1	Update model name at output and charging time.	3	02
	2	Update recommended charging voltage.	17	
28 Apr 22 (Harry)	1	Revise Battery Capacity from 3.4AH-12AH to 3.4AH-100AH.	3, 7	03
6 Jan 23 (Peeraya)	1	Revise Buffer Time from 2 min to 30 min	2-7, 19, 21	04
13 Nov 24 (Marcus)	1	Revise Remote on/off to Remote off	11	05
8 Jan 26 (Eakkachai)	1	Change product image of DRU-24VxxAMN due to front label change	2,6,7,22	06
	2	Update drawing of DRU-24VxxAMN	4,5,20	
	3	Specify pin number for Temperature Sensor 1 & 2	12	