

CliQ M DC-UPS Module

DRU-24V□AMN



Highlights & Features

- Full corrosion resistant aluminium casing
- Suitable for 24 V system
- Built-in diagnostic monitoring for Battery Ready, Buffering and Replace Battery by relay contacts
- LED indicator for Battery Ready, Battery Fail, DC Input, Battery Reverse Polarity and Battery Buffering
- Selectable Charging Current
- Selectable Buffering Time to prevent battery over discharge
- Battery temperature protection to extend battery life
- Conformal coating on PCBAs to protect against common dust and chemical pollutants

Safety Standards



CB Certified for worldwide use

Model Number:	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
Unit Weight:	0.52 kg (1.15 lb)	0.53 kg (1.17 lb)	0.66 kg (1.46 lb)
Dimensions (H x W x D):	124 x 38 x 117 mm (4.88 x 1.50 x 4.61 inch)	124 x 38 x 117 mm (4.88 x 1.50 x 4.61 inch)	124 x 50 x 117 mm (4.88 x 1.97 x 4.61 inch)

General Description

The CliQ M DC-UPS modules comprise of 24 V 10 A, 20 A and 40 A output models. They offer a 150% power boost function at both main operation mode and battery operation mode. The products offer a wide input voltage from 18-30 V and a wide operating temperature range from -40°C to +70°C. The DC-UPS modules come with potential free contacts for battery management signals and LED indicator for battery status. The battery temperature protection will stop charging/buffering the battery under low and high temperature conditions to extend battery life.

Model Information

CliQ M DC-UPS Module

Model Number	Input Voltage Range	Output Voltage	Output Current
DRU-24V10AMN	18-30 Vdc	24 Vdc typ.	10.0 A Max
DRU-24V20AMN			20.0 A Max
DRU-24V40AMN			40.0 A Max

Model Numbering

DR	U –	24V	□A	M	N
DIN Rail	DC-UPS Module	Output Voltage	Output Current 10 – 10 A 20 – 20 A 40 – 40 A	CliQ M Series	N – Metal Case, without Class I, Div 2

CliQ M DC-UPS Module

DRU-24V□AMN

Specifications

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Input Ratings / Characteristics

Nominal Input Voltage	24 Vdc
Input Voltage Range	18-30 Vdc
Efficiency (Normal Operation)*1	98% typ.

*1 Vin = 24 Vdc, Iout = Max rated output current and battery full charged

Output Ratings / Characteristics (Normal Operation)

Output Voltage Range	Vout = Vin - 0.5 Vdc (17.5 – 29.5 Vdc)			
Rated Output Current	Max.	10.0 A	20.0 A	40.0 A
	Max.	15.0 A (7 s typ.)*2	30.0 A (7 s typ.)*2	60.0 A (7 s typ.)*2
Output Power	Max.	240 W	480 W	960 W
	Max.	360 W (7 s typ.)*2	720 W (7 s typ.)*2	1440 W (7 s typ.)*2
Power Boost Duration	Typ.	7 seconds	Power Boost for 7 seconds at output voltage range	
Power Boost Recovery Time	Typ.	5 seconds	If the Power Boost is over 7 seconds, it will trigger the overload protection and the DC-UPS module will turn off. After 5 seconds, the DC-UPS module will turn on automatically.	

*2 Supports Power Boost for 7 seconds at 24 Vdc, AC DC power supply also need to have Power Boost function.

CliQ M DC-UPS Module

DRU-24V□AMN

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Battery & Buffering Characteristics

Nominal Battery Voltage	24 Vdc, SLA Sealed lead acid battery 2 x 12 Vdc, SLA Sealed lead acid battery in series																															
Battery Discharging Voltage Range	21 Vdc ... 27.6 Vdc 30 Vdc Max (the maximum voltage that will not cause damage to the unit)																															
Output Voltage Range (Battery Operation)	Vout = VBattery - 0.5 Vdc																															
Battery Capacity*3	3.4 AH ~ 100 AH																															
Battery Charging Current*4	0.5 A, 1 A, 1.5 A, 2 A (typ.) (constant current)	0.75 A, 1.5 A, 2.25 A, 3 A (typ.) (constant current)	1 A, 2 A, 3 A, 4 A (typ.) (constant current)																													
	<table border="1"> <thead> <tr> <th>Scale (White Switch)</th> <th>Charging Current</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.5A</td></tr> <tr><td>1</td><td>1A</td></tr> <tr><td>2</td><td>1.5A</td></tr> <tr><td>3</td><td>2A</td></tr> </tbody> </table>	Scale (White Switch)	Charging Current	0	0.5A	1	1A	2	1.5A	3	2A	<table border="1"> <thead> <tr> <th>Scale (White Switch)</th> <th>Charging Current</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.75A</td></tr> <tr><td>1</td><td>1.5A</td></tr> <tr><td>2</td><td>2.25A</td></tr> <tr><td>3</td><td>3A</td></tr> </tbody> </table>	Scale (White Switch)	Charging Current	0	0.75A	1	1.5A	2	2.25A	3	3A	<table border="1"> <thead> <tr> <th>Scale (White Switch)</th> <th>Charging Current</th> </tr> </thead> <tbody> <tr><td>0</td><td>1A</td></tr> <tr><td>1</td><td>2A</td></tr> <tr><td>2</td><td>3A</td></tr> <tr><td>3</td><td>4A</td></tr> </tbody> </table>	Scale (White Switch)	Charging Current	0	1A	1	2A	2	3A	3
Scale (White Switch)	Charging Current																															
0	0.5A																															
1	1A																															
2	1.5A																															
3	2A																															
Scale (White Switch)	Charging Current																															
0	0.75A																															
1	1.5A																															
2	2.25A																															
3	3A																															
Scale (White Switch)	Charging Current																															
0	1A																															
1	2A																															
2	3A																															
3	4A																															
Charging Time	< 9 hr ± 1 hr (2 A charging current for 24 V/12 AH battery)	< 6 hr ± 1 hr (3 A charging current for 24 V/12 AH battery)	< 4.5 hr ± 1 hr (4 A charging current for 24 V/12 AH battery)																													
Buffering Time	15s, 30s, 45s, 1m, 3m, 5m, 10m, 20m, 30m, ∞																															
	<table border="1"> <thead> <tr> <th>Scale (Blue Switch)</th> <th>Buffering Time</th> </tr> </thead> <tbody> <tr><td>0</td><td>15s</td></tr> <tr><td>1</td><td>30s</td></tr> <tr><td>2</td><td>45s</td></tr> <tr><td>3</td><td>1m</td></tr> <tr><td>4</td><td>3m</td></tr> <tr><td>5</td><td>5m</td></tr> <tr><td>6</td><td>10m</td></tr> <tr><td>7</td><td>20m</td></tr> <tr><td>8</td><td>30m</td></tr> <tr><td>9</td><td>∞</td></tr> </tbody> </table>			Scale (Blue Switch)	Buffering Time	0	15s	1	30s	2	45s	3	1m	4	3m	5	5m	6	10m	7	20m	8	30m	9	∞							
Scale (Blue Switch)	Buffering Time																															
0	15s																															
1	30s																															
2	45s																															
3	1m																															
4	3m																															
5	5m																															
6	10m																															
7	20m																															
8	30m																															
9	∞																															
End-of-Charge Voltage	27.6 V																															
Battery Current Consumption*5	< 200 mA																															

*3 Do not short battery + and - together to prevent battery explosion. Please add an external overcurrent protective device between the battery and product (BAT.IN connector) to prevent the battery from short-circuiting. Ensure that a suitable charging current is chosen based on the battery's capability to prevent the battery from overheating. Delta can offer a battery module (DRN-24V7AAEN) for 2 x 12 Vdc / 7.2 AH lead acid battery. The recommended 7.2 AH battery source is Yuasa: NP7-12 & CSB: GP1272F2.

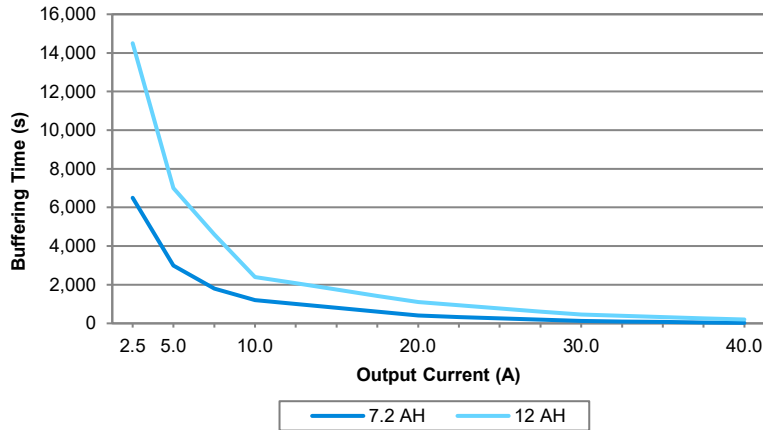
*4 The charging current can be adjusted with a four-step rotary selector switch, which will automatically de-rate when Vin < 24 Vdc.

*5 Iout = 0 A and without battery charge

CliQ M DC-UPS Module

DRU-24V□AMN

Reference Buffering Time



Output Current	Buffering Time	
	7.2 AH	12 AH
2.5 A	6,500 s	14,500 s
5 A	3,000 s	7,000 s
10 A	1,200 s	2,400 s
20 A	400 s	1,100 s
30 A	120 s	450 s
40 A	25 s	200 s

Fig. 1 Buffering Time VS. Output Current

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Mechanical

Case Cover / Chassis		Aluminium		
Dimensions (H x W x D)		124 x 38 x 117 mm (4.88 x 1.50 x 4.61 inch)		124 x 50 x 117 mm (4.88 x 1.97 x 4.61 inch)
Unit Weight		0.52 kg (1.15 lb)	0.53 kg (1.17 lb)	0.66 kg (1.46 lb)
Cooling System		Convection		
Terminal	Input / Output (CN202)	4 Pins		
	Battery (CN203)	2 Pins		
	Signal (CN101)	8 Pins		
	Temperature Sensor & Rx/Tx*6 (CN206)	4 Pins Power Supply Header: CVILUX CP3504P1H00-NH Mating Connector: CVILUX CP3504S0010 Terminal: CVILUX CP35TN21PES		
Wire	Input / Output	AWG 18-8 (Load: 0-5 A)	AWG 14-8 (Load: 0-10 A)	AWG 10-6 (Load: 0-20 A)
	Battery	AWG 14-8 (Load: 5-10 A)	AWG 10-8 (Load: 10-20 A)	AWG 8-6 (Load: 20-40 A)
	Signal	AWG 24-12		
Mounting Rail		Standard TS35 DIN Rail in accordance with EN 60715		
Noise (1 Meter from power supply)		Sound Pressure Level (SPL) < 40 dBA		

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

CliQ M DC-UPS Module

DRU-24V□AMN

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Environment

Surrounding Air Temperature	Operating	-40°C to +70°C
	Storage	-40°C to +85°C
Output Power De-rating*7	Temperature Normal Operation	> 60°C de-rate power by 2.5% / °C (battery is fully charged) If the battery is not fully charged at max load, it is recommended that the surrounding air temperature should not exceed 50°C.
	Temperature Battery Operation	> 60°C de-rate power by 2.5% / °C
Operating Humidity	5 to 95% RH (Non-Condensing)	
Operating Altitude	0 to 6,000 m (Approvals apply only up to 5,000 m)	
Shock Test	Non-Operating	IEC 60068-2-27, 30 G (300 m/s ²) for a duration of 18 ms, 1 time per direction, 2 times in total
Vibration	Non-Operating	IEC 60068-2-6, 10 Hz to 500 Hz @ 30 m/s ² (3 G peak); 60 min per axis for all X, Y, Z direction
	Operating Wind Power Application	EN 60068-2-64
Pollution Degree	2	

*7 Output power de-rating is for the DC-UPS module only. If it is combined with a battery, please check the battery's operating temperature specification.

CliQ M DC-UPS Module

DRU-24V□AMN

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Protections

Overload / Overcurrent / Short (at system)	Normal Operation	Auto Recovery
	Battery Operation	Latch off
Over Temperature	Normal Operation	Auto Recovery
	Battery Operation	Latch off
Overvoltage		Auto Recovery
Insufficient Input Voltage Protection		Yes
Input Polarity Protection		Yes
Battery Polarity Protection		Yes
Wrong Battery Voltage Protection		Yes, 30 Vdc Max (the maximum voltage that will not cause damage to the unit)
Battery Temperature Protection (With Temperature Sensor, CN206 pin1 and pin3)* ⁸ (With Rx/Tx function, CN206 pin2 and pin4)* ⁹	Normal Operation	Battery surrounding air temperature < 0°C or > 40°C, DC-UPS will stop charging to protect battery and extend battery life
	Battery Operation	Battery surrounding air temperature < -10°C or > 50°C, DC-UPS will stop buffering to protect battery and extend battery life
Battery Deep Discharge Protection		Yes (21 V typ.)
Degree of Protection		IP20
Protection Against Shock		Class III

*8 Users can use an external Negative Temperature Coefficient (NTC) thermistor with 10 kOhm F 3435K ±1% to sense the battery temperature.

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

Reliability Data

MTBF	> 500,000 hrs. as per Telcordia SR-332
------	--

CliQ M DC-UPS Module

DRU-24V□AMN

Model Number	DRU-24V10AMN	DRU-24V20AMN	DRU-24V40AMN
--------------	--------------	--------------	--------------

Safety Standards / Directives

Electrical Safety	CB scheme	IEC 62368-1
	TUV Bauart	EN 62368-1
	UL/cUL recognized	UL 62368-1 and CAN/CSA C22.2 No. 62368-1 (File No. E131881)
	EAC	TP TC 002/2011
CE	In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU	
UKCA	In conformance with Electromagnetic Compatibility Regulations 2016 and Electrical Equipment (Safety) Regulations 2016	
Galvanic Isolation	Power Port to Housing	500 Vac
	Signal Port to Housing	500 Vac
	Power Port to Signal Port	500 Vac

EMC

Emissions (CE & RE)	EN/BS EN 61000-6-4, EN 61204-3	
Immunity	EN/BS EN 61000-6-2, EN 61204-3	
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A ¹⁾ Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Level 3 Criteria A ¹⁾ 80 MHz – 1 GHz, 10 V/M, 80% modulation (1 kHz) 1.4 GHz – 2 GHz, 3 V/M, 80% modulation (1 kHz) 2 GHz – 2.7 GHz, 1 V/M, 80% modulation (1 kHz)
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A ¹⁾ 2 kV (Input power ports)
Surge	IEC 61000-4-5	Criteria A ¹⁾ 0.5 kV (DC Input) 0.5 kV (DC Output)
Conducted	IEC 61000-4-6	Level 3 Criteria A ¹⁾ 150 kHz – 80 MHz, 10 Vrms
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A ¹⁾ 30 A/Meter

1) Criteria A: Normal performance within the specification limits

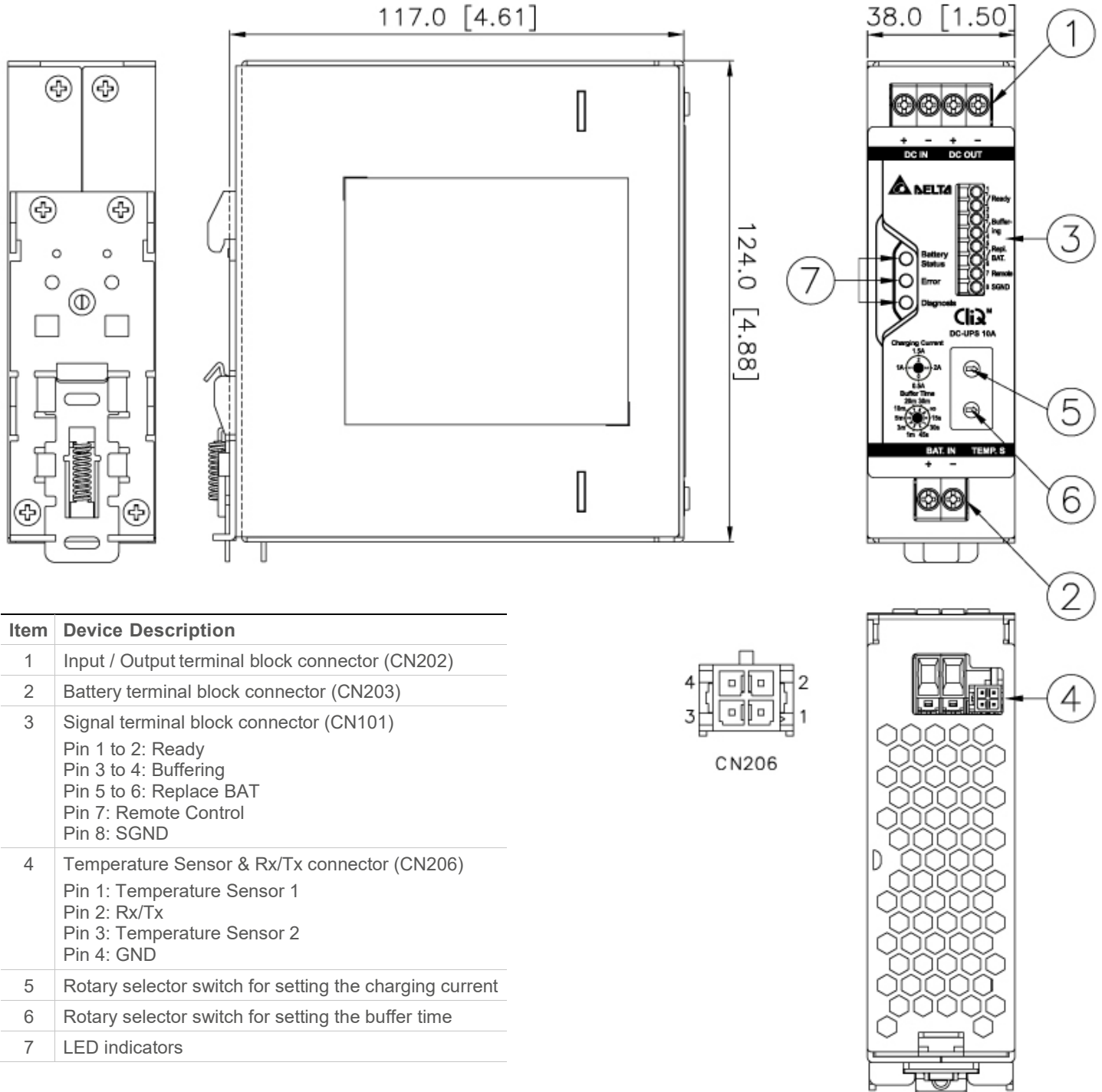
CliQ M DC-UPS Module

DRU-24V□AMN

Dimensions

DRU-24V10AMN & DRU-24V20AMN

H x W x D: 124 x 38 x 117 mm (4.88 x 1.50 x 4.61 inch)



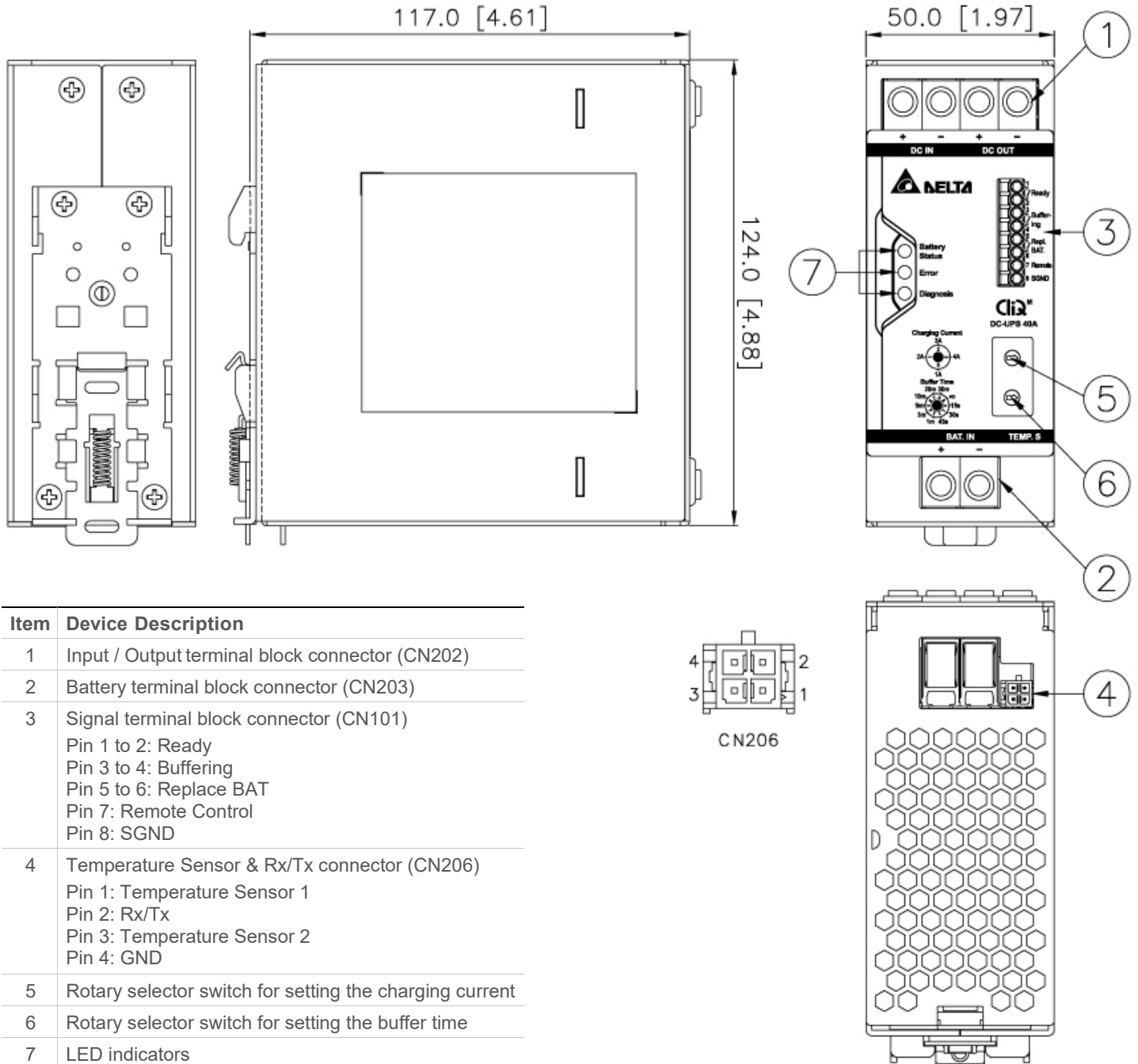
Item	Device Description
1	Input / Output terminal block connector (CN202)
2	Battery terminal block connector (CN203)
3	Signal terminal block connector (CN101) Pin 1 to 2: Ready Pin 3 to 4: Buffering Pin 5 to 6: Replace BAT Pin 7: Remote Control Pin 8: SGND
4	Temperature Sensor & Rx/Tx connector (CN206) 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

CliQ M DC-UPS Module

DRU-24V□AMN

DRU-24V40AMN

H x W x D: 124 x 50 x 117 mm (4.88 x 1.97 x 4.61 inch)



Item	Device Description
1	Input / Output terminal block connector (CN202)
2	Battery terminal block connector (CN203)
3	Signal terminal block connector (CN101) Pin 1 to 2: Ready Pin 3 to 4: Buffering Pin 5 to 6: Replace BAT Pin 7: Remote Control Pin 8: SGND
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

CliQ M DC-UPS Module

DRU-24V□AMN

AWG Wire Table

Current Rating for PVC Wire	
6 AWG	52.5 A
8 AWG	37.5 A
10 AWG	29.0 A
12 AWG	22.5 A
14 AWG	16.5 A
16 AWG	12.0 A
18 AWG	9.0 A
20 AWG	6.5 A
22 AWG	5.0 A
24 AWG	3.5 A
26 AWG	2.5 A
28 AWG	2.0 A
30 AWG	1.5 A

Engineering Data

Output Load De-rating VS Surrounding Air Temperature

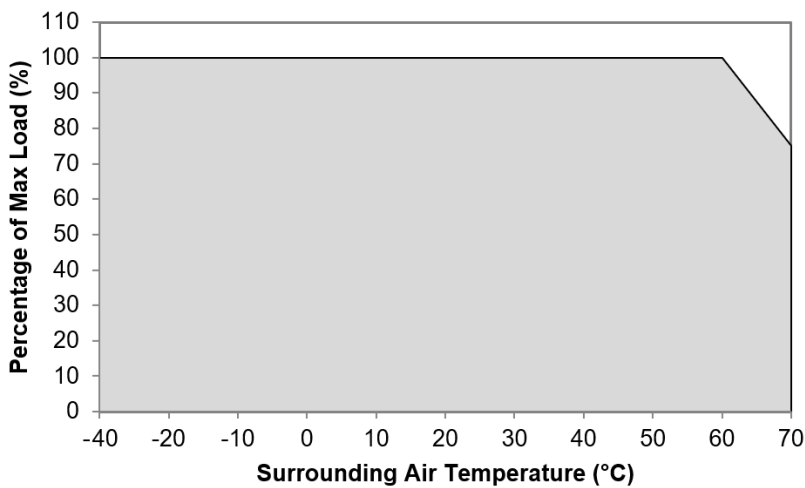


Fig. 2 De-rating for Normal Operation
 > 60°C de-rate power by 2.5% / °C (battery is fully charged)

Note

1. The unit may degrade, or be damaged, when it is continuously used outside the shaded region, refer to the graph shown in Fig. 2.
2. The power supply will bounce when the ambient temperature range is -30°C to -40°C.
3. In order for the device to function in the manner intended, it is also necessary to keep a safety distance of 50 mm above and below the device as well as a lateral distance of 20 mm (for Vertical Mounting) with adjacent units while the device is in operation.
4. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!
5. If the device has to be mounted in any other orientation, please leave a message via the [Contact Us](#) form.

CliQ M DC-UPS Module

DRU-24V□AMN

Assembly & Installation

The unit can be mounted on 35 mm DIN rails in accordance with EN 60715. For Vertical Mounting, the device should be installed with Battery terminal block on the bottom.

Each device is delivered ready to install.

Mounting

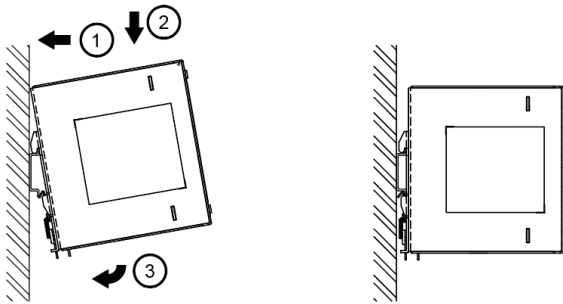


Fig. 3.1 Mounting

Snap on the DIN rail as shown in Fig. 3.1:

1. Tilt the unit upwards and insert it onto the DIN rail.
2. Push downwards until stopped.
3. Press against the bottom front side for locking.
4. Shake the unit slightly to ensure that it is secured.

Dismounting

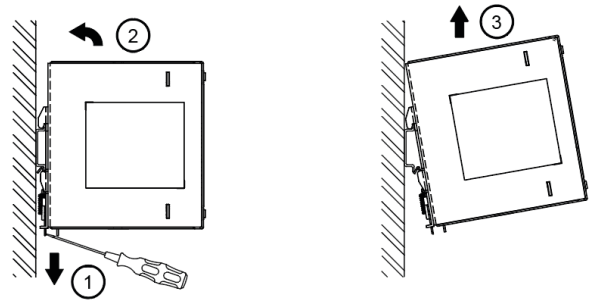
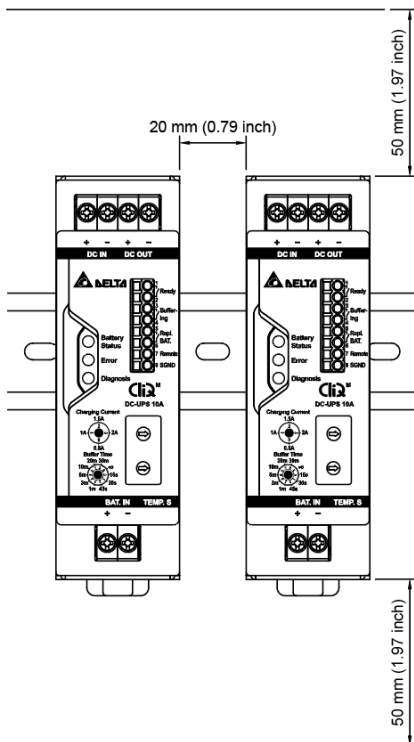


Fig. 3.2 Dismounting

To uninstall, Delta provides an easy way to pull or slide down the latch with screw driver as shown in Fig. 3.2. Then slide the power supply unit (PSU) in the opposite direction, release the latch and pull out the power supply unit (PSU) from the rail.

Safety Instructions

Vertical Mounting



- When replacing batteries, only use the same type of batteries listed under the “Battery & Buffering Characteristics” section on Page 3.
- Proper disposal of batteries is required. Refer to the relevant local codes for disposal requirements.
- ALWAYS switch mains of input power OFF before connecting and disconnecting the input voltage to the unit. If mains are not turned OFF, there is risk of explosion / severe damage.
- If the orange status LED is on, please refer to the details in the Functions section at Relay Contacts & LED Indicators Status on page 11.
- **To guarantee sufficient convection cooling, keep a distance of 50 mm (1.97 inch) above and below the device as well as a lateral distance of 20 mm (0.79 inch) to other units.**
- Note that the enclosure of the device can become very hot depending on the surrounding air temperature and load of the power supply. Risk of burns!
- The main power must be turned off before connecting or disconnecting wires to the terminals!
- DO NOT insert any objects into the unit.
- Hazardous voltages may be present for up to 5 minutes after the input mains voltage is disconnected. Do not touch the unit during this time.
- The unit is a built-in unit and must be installed in a cabinet or room (condensation free environment and indoor location) that is relatively free of conductive contaminants.

CliQ M DC-UPS Module

DRU-24V□AMN

Functions

Relay Contacts & Signal 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.
	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.

Relay Contacts & LED Indicators Status

DC-UPS Status	Relay Contacts Status			LED Indicators Status		
	Ready	Buffering	Replace BAT	Battery Status	Diagnosis	Error
Battery Charged ≥ 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
Input of Remote Control Signal is 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*10	Open	Open	Open	OFF	OFF	ON (Red)
Shutdown	Open	Open	Open	OFF	OFF	OFF

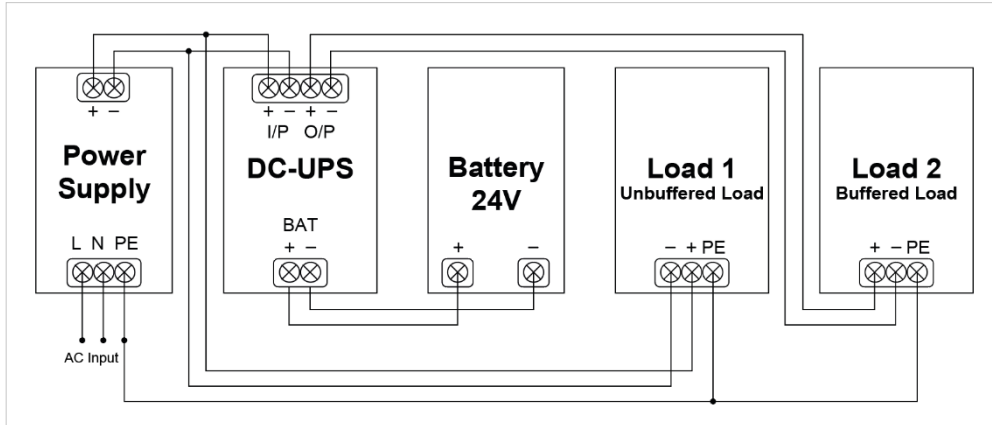
*10 Need to have an external temperature sensor or Rx/Tx function

CliQ M DC-UPS Module

DRU-24V□AMN

Typical Application Notes

Fig. 4 Provide backup power during AC source interruption or failure



Overload & Overcurrent & Short Protections

When the output current exceeds the maximum specified output current. The DC-UPS module will shut down and output current will operate in “Hiccup mode” at normal operation mode and latch off at battery operation mode. Normal operation of the module can be resumed upon removal of fault.

Overvoltage Protection

The DC-UPS module’s overvoltage protection will be activated when DC input to the module exceeds the maximum specified input voltage. The unit shall shutdown then auto recovery and return to normal state when the OVP condition is removed.

Over Temperature Protection

In the event of a higher operating temperature at 100% load, the power supply will run into OTP when the operating temperature is beyond what is recommended in the de-rating graph. When activated, the output voltage will shut down and remain in off state until the temperature drops to its normal operating temperature as recommended in the de-rating graph.

CliQ M DC-UPS Module

DRU-24V□AMN

Others

Attention

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to www.DeltaPSU.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.

Manufacturer and Authorized Representatives Information

Manufacturer

Thailand

Delta Electronics (Thailand) PCL.
909 Pattana 1 Rd., Muang, Samutprakarn, 10280 Thailand

Taiwan

Delta Electronics, Inc.
3 Tungyuan Road, Chungli Industrial Zone, Taoyuan County
32063, Taiwan

Authorized Representatives

The Netherlands

Delta Greentech (Netherlands) B.V.
Zandsteen 15, 2132 MZ Hoofddorp, The Netherlands

United Kingdom

Delta Electronics Europe Limited
1 Redwood Court, Peel Park Campus,
East Kilbride, Glasgow, G74 5PF, United Kingdom