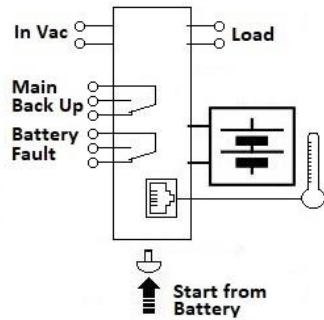


CBI123A ALL In One

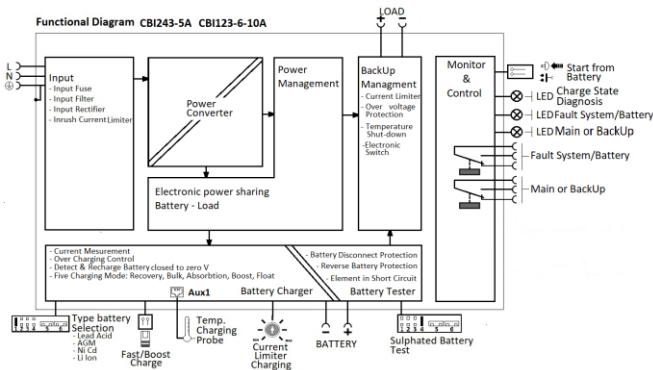


Input: Single-phase 115 – 277 Vac
Output Load: power supply 12 Vdc; 3 A

Output Battery: charging 12 Vdc; 3 A
 Suited for the following battery types: Open Lead Acid, Sealed Lead Acid, Lead Gel, Li-Ion and Ni-Cd
 Automatic diagnostic of battery status. Charging curve IUoU, constant voltage and constant current Battery Life Test function (Battery Care)
 Switching technology, output voltage 10-14.4Vdc Three charging levels: Boost, Float and Recovery
 Protected against short circuit and inverted polarity
 Signal output (contact free) for discharged or damaged battery
 Signal output (contact free) for mains or Back-UP
 Protection degree IP20 - DIN rail; Space saving

Technical features

Thanks to the All In One units (DC-UPS), it will be possible to optimize power management. The available power is automatically allocated between load and battery, supplying power to the load is the first priority of the unit thus it is not necessary to double the power, because also the power going to the battery will go to the load if the load so requires. The maximum available current on the load output is 2 times the value of the device rated current I_n . We call "Battery Care" the concept based on algorithms that implement rapid and automatic charging, battery charge optimization during time, flat batteries recovery and real time diagnostic during installation and operation. The Real Time Auto-diagnostic system, monitoring battery faults such as, battery Sulfated, elements in short circuit, accidental reverse polarity connection, disconnection of the battery, they can easily be detected and removed by help of Blink Code of Diagnosis Led; during the installation and after sell. The continuous monitoring of battery efficiency reduces battery damage risk and allows a safe operation in permanent connection. Each device is suited for all battery types by means of jumpers it is possible setting predefined curves for Open Lead Acid, Sealed Lead Acid, Gel, Ni-Cd (option). They are programmed for two charging levels, boost and charge, but they can be changed to single charging level by the user. A rugged casing with bracket for DIN rail mounting provides IP20 protection degree. They are extremely compact and cost-effective.



Norms and Certifications

In Conformity to: EN 60950 / UL60950-1 and CSA C22.2 No. 60950-1-07 (Information Technology Equipment) – Safety – Part1: General Requirement. Electrical safety; EN54-4 Fire Detection and fire alarm systems; 89/336/EEC EMC Directive; 2014/35/UE (Low Voltage); Safety EN IEC 62368-1: 2014/AC:2015; DIN41773 (Charging cycle); Emission: IEC 61000-6-3; Immunity: IEC 61000-6-2. CE.

Climatic Data

Ambient temperature (operation)	-25 ÷ +70°C
De Rating $T^3 > 50^\circ\text{C}$	- 2.5%(I_n) / °C
Ambient temperature Storage	-40 ÷ +85°C
Humidity at 25 °C no condensation	95% to 25°C
Altitude: 0 to 2 000m - 0 to 6 560ft	No restrictions
Altitude: 2 000 to 6 000m - 6 560 to 20 000ft	De-rating 5°C/1000m
Cooling	Auto convention

General Data

Insulation voltage (IN/OUT)	3000 Vac
Insulation voltage (Input / Earth, PE)	2000 Vac
Insulation voltage (Out Load & Battery / Earth, PE)	500 Vac
Insulation voltage (Out Load & Battery / Fault System & Main or Back Up terminal)	500 Vac
Protection Class (EN/IEC 60529)	IP20
Reliability: MTBF IEC 61709	> 300.000 h
Pollution Degree Environment	2
Connection Terminal Blocks screw Type	2,5mm(24–14AWG)
Protection class (PE Connected)	I, with PE
Dimensions (w-h-d)	65x115x135 mm
Weight	0.6 kg approx.

Input Data

Nominal Input Voltage Vac	115 – 230– 277
Voltage range Vac	90 ÷ 305
Inrush Current ($V_n - \text{in nom. Load}$) I^2t	≤ 11 A ≤ 5 msec.
Frequency	47 ÷ 63 Hz

Input Current (115 – 230 – 277 Vac) Max	1.91- 1.2 – 0.96 A
Internal fuse (not replaceable)	4 A
External Fuse (recommended) MCB curve B	10 A
Output Data (internal power supply)	
Output Voltage (V_n) / Nominal Current (I_n)	12 Vdc / 3A
Output Current $I_n = I_{\text{load}}$	3 A
Efficiency (at 50% of rated current)	≥ 90 %
Residual Ripple	≤ 60 mV _{pp}
Turn-On delay after applying mains voltage	1 sec. (max)
Start up with Strong Load (capacitive load)	Yes, Unlimited
Dissipation power load max (W)	15
Short-circuit protection	Yes
Over Load protection	Yes
Over Voltage Output protection	Yes (typ. 35 Vdc)
Overheating Thermal protection	Yes

Battery Output

Output Voltage Battery	Follow the Out Load
Boost-Fast charge Jumper Configuration 25°C (V/cell). Jumper Configuration battery type	Lead Acid: 2.4 NiCd: 1.51; Li-ion: 3.65
Float Charge Jumper Configuration 25°C (V/cell) Jumper Configuration battery type	Lead Acid: 2.23; 2.25; 2.27; 2.3 NiCd: 1.4; Li-ion: 3.45
Max. Time Boost–Bulk charge (Typ. at IN)	15 h
Min. Time Boost–Bulk charge (Typ. at IN)	1 min.
Recovery Charge	2 – 10 Vdc
Charging current max I_{batt}	6 A ± 5%
Charging current limiting I_{adj}	20 ÷ 100 % / I_{bat}
Reverse battery protection	Yes
Sulfated battery check	Yes by Jumper
Short circuit Element Detection	Yes
Detection of element in short circuit	Yes
Quiescent Current max.	≤ 100 mA
Charging Curve automatic: IUoU	4 stage
Remote Input Control (RTCONN cable)	Boost / Float

Load Output

Output voltage Vdc (at I_n)	10 - 14.4 V (17 Ni-Cd)
Nominal current I_{load}	1.1 x I_n A ± 5%
Continuous current (Without battery) $I_{\text{load}} = I_n$	3 A
Continuous current (With battery) $I_{\text{load}} = I_n + I_{\text{batt}}$	6 A
Max. current Output Load (Main) $I_{\text{load}}(4 \text{ sec.})$	9 A max.
Max. current Output Load (Back Up) $I_{\text{load}}(4 \text{ sec.})$	6 A max.
Start From Battery Without Main (Remote Input Control)	RTCONN (cable) Push Button
Time Buffering; min (switch output off without main input)	∞: standard 5 min.: Require SW
Threshold alarm Battery almost flat	11.5 – 12 Vdc batt
LVD. (Protections against total Battery discharge)	10 – 11 Vdc batt

Signal Output (free switch contacts)

Main or Backup Input Power	Yes
Low Battery	Yes
Fault Battery or system	Yes

Type of Signal Output Contact

Dry Contact. Current can be switched (EN60947.4.1): Max: DC1: 30 Vdc 1 A; AC1: 60 Vac 1A (Resistive load) Min: 1mA at 5 Vdc (Min permissible load)

Fault System / Low Battery	C	NC	NO
Main or Back Up	C	NC	NO

Signal Input / Output (RJ45)

Temp. Comp. Battery (with external probe): Aux Out	RJ Temp (cable)
Remote monitoring LED from Front Device: Aux Out	RJ 45 (cable)

¹Can be adjusted via PC software mode

Operator manual: ADELSYSTEM reserves the right to change the contents of this document without prior notice.

1 “ALL IN ONE” DC-UPS SERIES

Thank you for having chosen one of our products for your work.

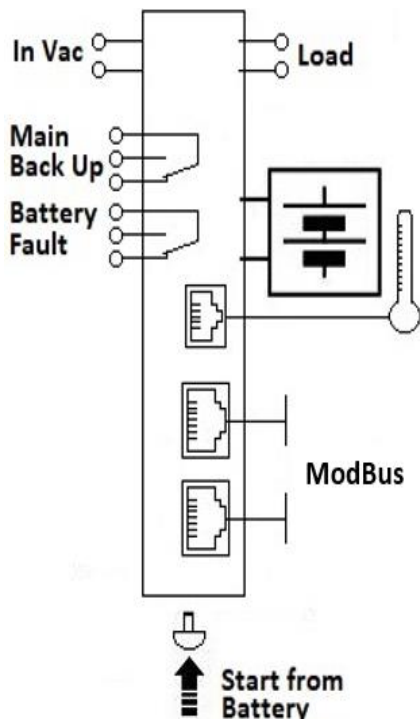
We are certain that it will give the utmost satisfaction and be a notable help on the job.

2 GENERAL DESCRIPTION

Thanks to “All In One” CBI series of DC-UPS, it will be possible to optimize the power management of your system with one single, extremely compact and cost-effective device, connected directly to the mains. The available power is automatically distributed between load and battery giving priority to the load. Battery can supply the load even with mains so the output power to the load can be twice the nominal power if it is required (Power Boost). When mains failure occurs, the load continues to be supplied by the battery in backup mode. It is also possible to switch on the device with no mains directly from battery. The “Battery Care” algorithm performs rapid and automatic charging, battery charge optimization during time, flat batteries recovery and real time diagnosis during installation and operation. Temperature compensation is possible by connecting the temperature sensor probe. The real time auto-diagnostic system monitors battery faults such as sulphated battery, shorted cells, accidental reverse polarity connection or disconnection of the battery. Each fault is signaled by a blink code of Diagnosis Led or via Modbus (only in some models) in order to be easily detected and removed during the installation and after sales. The continuous monitoring of battery efficiency reduces risk of battery damage and allows a safe operation in permanent connection. Predefined curves can be selected by jumpers or DIP switch to optimize the charge of different battery types: Open Lead Acid, AGM and Gel Lead Acid; Ni-Cd are rechargeable using the same device. Charging curves can be customized via Modbus (only in some models). Output dry contacts are used to signal both backup and fault conditions. A rugged casing with bracket for DIN rail mounting provides IP20 protection degree.



3 MAIN CHARACTERISTICS



- Universal input voltage: single-phase 115–230-277 Vac
- Load output: 24 Vdc 3,5,10,20A; 12 Vdc 3,6,10,15,35A 48 Vdc 5,10A
- Battery output: 24 Vdc 3,5,10,20A; 12 Vdc 3,6,10,15,35A; 48 Vdc 5,10A
- “All In One” solution: power supply + battery charger + backup module in one single device connected directly to the mains
- Suited for different battery types: Open Lead Acid, Sealed Lead Acid, AGM and Gel Lead Acid; Ni-Cd and Li-ion are available as options. Four stage charging curve for Lead Acid batteries: 5-stage IUoU (Recovery, Bulk, Absorption, Float, Refresh Battery) plus Recovery stage for deeply discharged batteries
- Automatic diagnosis of battery status and battery Life Test function (Battery Care)
- Switching technology with high efficiency
- Protected against short circuit, overload and inverted polarity
- Output dry contact for signaling Low Battery or Battery Replacement and Fault system
- Output dry contact for signaling Mains or Backup
- IP20 protection degree
- Space saving on DIN rail

4 SAFETY AND WARNING NOTES

- WARNING – Explosion Hazard. Do not disconnect Equipment unless power has been switched off or the area is known to be non-hazardous.



unless power has been switched off or the area is known to be non-hazardous.


- WARNING – Explosion Hazard. Substitution of components may impair suitability for class I, Division 2.
- WARNING – Switch off the system before connecting the module. Never work on the machine when it is live. The device must be installed in accordance with UL508 or UL60950. The device must have a suitable isolating facility outside the power supply unit, via which can be switched to idle. Danger of fatal Injury!

- WARNING - Residual voltage. Wait for 10 seconds before to operate on the device CBI2420A and CBI485A.

5 CONNECTION

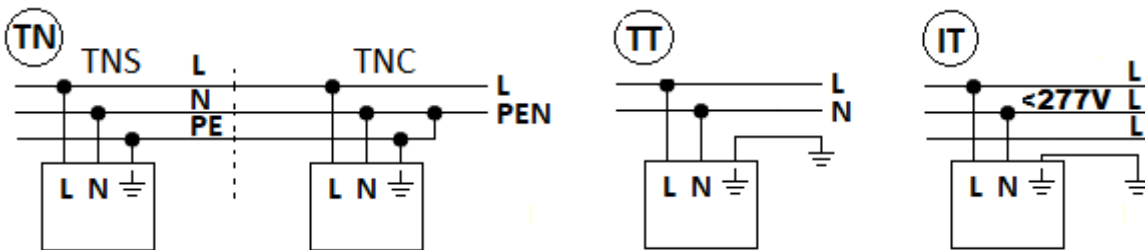
5.1 CONNECTION TERMINAL AND WIRING

The following cable cross-sections may be used:

	Solid (mm ²)	Stranded (mm ²)	AWG	Torque (Nm)	Stripping Length 	All In One (Size)
In:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Size 1 and 2
	4.0	6.0	30 – 10	0.8 – 1.0 Nm	7 mm	Size 3 and 4
Out:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Size 1 and 2
	4.0	6.0	30 – 10	0.8 – 1.0 Nm	7 mm	Size 3 and 4
Signal:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	All types

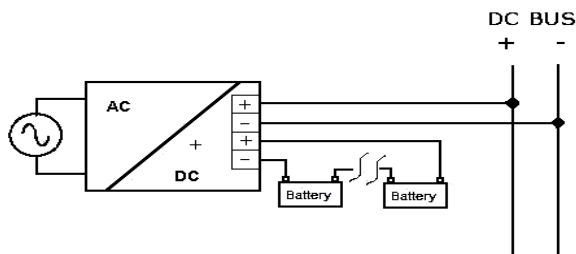
Connection by the screw, type 2.5 mm² or 4.0 mm² terminal blocks. Wiring terminal shall be marked to indicate the proper connection for the power supply. Use copper cables only, for supply connections, use wires suitable for at least 75°C.

5.2 INPUT LINE SYSTEM



5.3 OUTPUT POWER CONNECTIONS: LOAD AND BATTERY

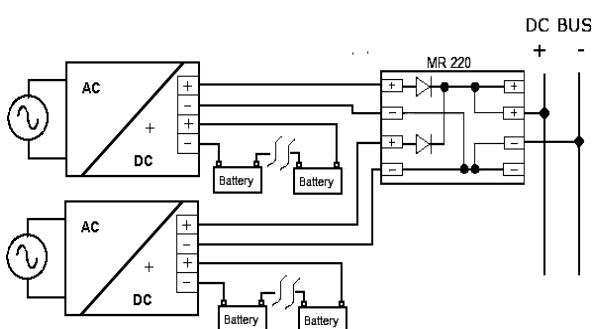
5.3.1 Normal connection



Typical application for All In One device, one output for Load “DC Bus”, one Input / Output for connection to the battery.

- N°1 battery (12 Vdc) for CBI 12xx;
- N°2 battery (12 Vdc) connected in Series for CBI 24xx;
- N°4 battery (12 Vdc) connected in Series for CBI 48xx;

5.3.2 Parallel connection “Redundancy”

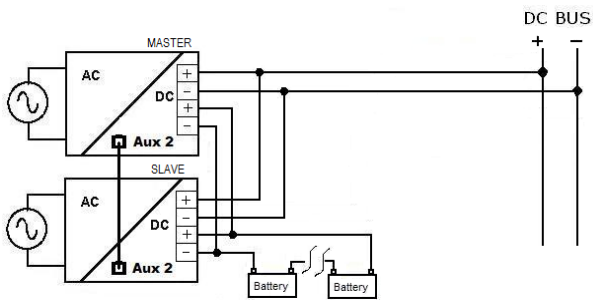


Parallel connection “Redundancy”

Power supplies can be paralleled in case of redundancy concept, to obtain a higher system reliability. Redundant systems may support N+1 redundancy to safeguard against single-point failures, or to enable hot-swapping of a failed supply without system impact. The simplest way is to put two CBI in parallel. In case one power supply unit fails, the other one is automatically able to support the load current without any interruption. To separate completely the hypothetical device fail, it is necessary add the decoupling diodes which are

included in the Redundancy Module MR220. Recommendations for building redundant power systems: a) Use separate input fuses for each CBI. b) Monitor the individual CBI units by three LED. Each unit has two relays: Mains or backup and Low Battery or Battery Replacement (faulty situation). This feature reports a faulty unit; see Relay Contact Rating for any technical detail. c) When possible, connect each power supply to different phases or circuits

5.3.3 Parallel connection “Double Power”

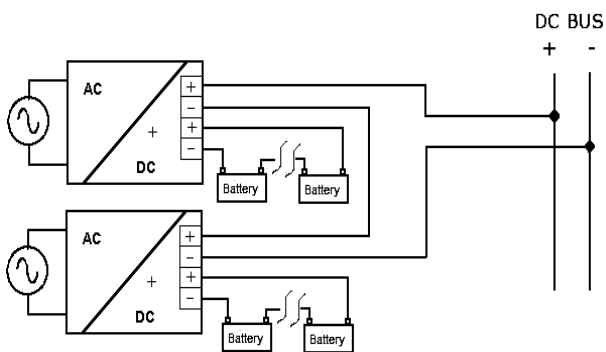


Power supply can be paralleled to increase the output power, devices can be paralleled for 1+1=2 to obtain the double power of a single unit. The possibility to put in parallel connection it is only in SIZE 3 devices in the specific “P” version (i.e.CBI1235AP, CBI2420AP, CBI4810AP), to attain the sum of the current at the same output voltage. It is necessary to use a standard UTP or order Cable code: ERJ.CBI.004 for RJ45, and connect by Aux2 of each device. The communication protocol is based on CAN2.0A standard. In this way the system has only One output for the Load

and One output for the battery.

- Use separate input fuses for each CBI.
- Make sure that the two CBI have the same settings: Battery type, Charging level current, Time buffering, Life test...
- Automatic configuration, Master-Slave. The devices decide themselves their Master and Slave assignment randomly. The assignment is done at every power on, or after the connection of the cable RJ45. Master device provide all the visual signals, the Slave device maintain the diagnosis LED always ON.
- Use the alarm contacts of both the two devices and deliver them at will.
- For Start Battery there are two way, without mains voltage:
 - push start button on both units
 - connect Cable "RTCONN" on position 5, to connect pushbutton on a front panel.

5.3.4 Series connection:



It is possible to connect as many units in series as needed, provided the sum of the output voltage does not exceed 150Vdc. a) Voltages with a potential above 60Vdc are not SELV anymore and can be dangerous. Such voltages must be installed with a protection against touching. b) For serial operation use power supplies of the same type. c) Earthing of the output is required when the sum of the output voltage is above 60Vdc. d) Keep an installation clearance of 10 mm (left/right) between two power supplies and avoid installing the power supplies on top of each other. Note: Avoid return voltage (e.g.

from a decelerating motor or battery) which is applied to the output terminals.

5.4 OUTPUT LOAD (MAINS INPUT ON)

The output Load in normal mode, Mains Input Vac Voltage present, follow the charging battery dc output voltage. The minimum and maximum range stabilized are the following:

CBI 12xx:11 – 14,4 Vdc; 15,5 Vdc for NiCd (Without battery connected out. Voltage fixed at 12Vdc)

CBI 24xx:22 – 28.8 Vdc; 30 Vdc for NiCd (Without battery connected out. Voltage fixed at 24Vdc)

CBI 48xx:44 – 57.6 Vdc; 62 Vdc for NiCd (Without battery connected out. Voltage fixed at 48Vdc)

Thanks to the All In One units, it will be possible to manage the power. The available power, is automatically allocated between load and battery: supplying power to the load is the first priority of the unit; thus it is not necessary to double the power and also the power available for the battery will go to the load if the load requires it.

In “Power Boost Mode” the maximum current on the load output is the 2 times the rated current $2 \times I_n$ ($I_{load} = I_n + I_{batt}$) in continuous operation and 3 times the rated current $3 \times I_n$ ($I_{load} = 2I_n + I_{batt}$) for 4 seconds; after this parameter the devices is electrically protected against overload and short circuit.

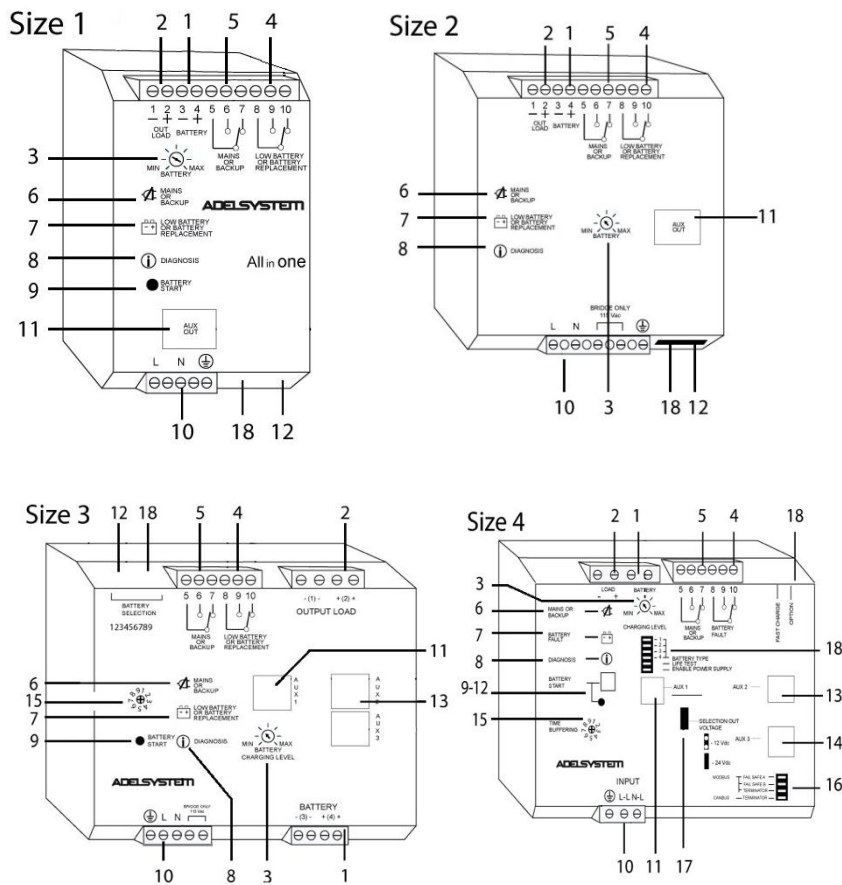
- In “Power Boost Mode”, if the the battery provide current to the load for a time more than 4 minutes, the device give message (8 Blink), this consequently means that the battery is discharging. If the Mains Input Voltage fall below a Threshold level (50% of the Typ. Vac input) the battery is immediately connected to the Output Load, without any interruption.
- Voltage dips: In this situation the voltage in the output load it is the same of the battery.
- To Avoid deep battery discharge**, the battery will supply the load until battery voltage reaches 1.5 V/cell. Below this level the device automatically switches off to prevent Deep discharge and battery damage.

5.5 OUTPUT LOAD: TIME BUFFERING MODE (MAINS INPUT OFF)

Some example of buffering time depending on LOAD Output in function to the Ah of the battery.

Buffering Time	BATT1.2 Ah	BATT 3 Ah	BATT7.2 Ah	BATT12 Ah	BATT100 Ah
Load 1.5 A	20 min	60 min	200 min	400 min	/
Load 3 A	8 min	30 min	120 min	240 min	/
Load 5 A	3 min	15 min	55 min	100 min	/
Load 7.5 A	2 min	10 min	30 min	60 min	/
Load 10 A	No	7 min	20 min	45 min	20 h
Load 12 A	No	3 min	12 min	30 min	600 min
Load 15 A	No	No	9 min	20 min	400 min
Load 20 A	No	No	7 min	13 min	240 min

6 LAY-OUT AND CONNECTIONS



1	Battery
2	Load
3	Charging Current Limiter
4	Fault relay
5	Main-BackUp Relay
6	Main-BackUp LED
7	Fault LED
8	Diagnosis LED
9	Start From Battery (Push Button)
10	Input Vac
11	Aux 1
12	Start From Battery (Connector)
13	Aux 2
14	Aux 3
15	Buffering Time
16	Bus Termination
17	12/24 Output
18	Battery Config.

7 INPUT AND OUTPUT LOAD AND BATTERY CONNECTION

7.1.1 Input AC Port L – N:



No.10

1 Phase Switching Power Supplies L, N, PE ⊕.

Size 2 and Size 3 BRIDGE ONLY for input 115 Vac, and connect L, N, PE ⊕.

7.1.2 Battery Connection Port:

No.1: Connect the battery between: pin. 3 (-) and 4 (+)

One battery (12 Vdc) for CBI12xx;

Two battery (12 Vdc) connected in Series for CBI24xx;

Four battery (12 Vdc) connected in Series for CBI48xx;

7.1.3 Output Load:

No.2: Connect this Output to the load, pin: 1 (-). 2 (+).

7.2 SELECT OUTPUT VOLTAGE (ONLY SIZE4 CBI280)

No.17: Caution: Switch off the system before Setting the Jumper. The Jumper is Read at the device power-up only.

Output Voltage Selection	 - 24 Vdc	Jumper 24 Output Voltage
Output Voltage Selection	 - 12 Vdc	No Jumper 12 Output Voltage

8 DRIVE AND MONITORING

8.1 FAULT - STATUS CONDITIONS (ISOLATED RELAY):

8.1.1 STATUS: Mains or Backup: Input Mains On/Off.

- No.5 Relay Contact: 5, 6, 7
- No.6: Led

8.1.2 FAULT: Low Battery, Battery Replacement, Faulty Battery or Faulty System

- No.4 Relay Contact: 8,9,10
- No.8: Led DIAGNOSIS: Battery charger mode, or, Diagnosis of the system through “blinking code” Light signal

8.1.3 Back Up and Fault: Relay and LED Conditions

Relay:		Port N°5 - Led N°6 Mains/Back-Up		Port N°4 - Led N°7 Fault Battery	
		5-6 Closed	5-7 Closed	8-9 Closed OK	8-10 Closed
Mains Input Vac	ON	■ - led off		■ - led off	
	OFF		■ - led On (1)	■ - led off	
Battery SOC less than 30%	YES		■ - led On		■ - led On (2)
	NO		■ - led On	■ - led off	
Battery or system Fault?	YES	■ - led off			■ - led On
	NO	■ - led off		■ - led off	

Note:

- (1) Contact relay Mains/Back switch at least 5 seconds after disconnection of Power.
- (2) See Diagnosis Led













8.1.4 Relay Contact Rating:

Max.DC1: 30 Vdc 1 A; AC1: 60 Vac 1A: Resistive load (EN 60947-4-1).Min.1mA at 5 Vdc: Min. permissive load

8.1.5 Charging Mode STATUS

	Status (Led)	Diagnosis (No.8)	Fault Battery (No.7)
Charging Type	Float	1 Blink/2 sec	OFF
	Absorption	1 Blink/sec	OFF
	Boost	2 Blink/sec	OFF
	Recovery	5 Blink/sec	OFF

8.1.6 Faulty Battery / Faulty System

System Auto Diagnosis	Reverse polarity or high battery Voltage (over 32.5Vdc for CBI 24xxA)	1 Blink/pause 	ON
	Battery No connected	2 Blink/pause 	ON
	Element in Short Circuit	3 Blink/pause 	ON
	Over Load or short circuit on the load	4 Blink/pause 	ON
	Bad battery; Internal impedance Bad or Bad battery wire connection	5 Blink/pause 	ON
	Life test not possible	6 Blink/pause 	ON
	Boost condition; battery discharge after 4 min. of overload.	8 Blink/pause 	ON
	Internal fault	9 Blink/pause 	ON
	Low battery (under 18.5Vdc for CBI 24xxA) Only if started from battery, no Mains input, from Jumper N°5 or Push Bottom	10 Blink/pause 	ON
	Master-Slave connection lost between the master and slave on parallel configuration, (AP device only 500W)	11 Blink/pause 	ON
	Bad battery wire connection; Parallel mode on Slave Device (AP device only 500W)	13 Blink/pause 	ON
	Boost condition; battery discharge after 4 min. of overload; Parallel mode on Slave Device (AP device only 500W)	15 Blink/pause 	ON

8.2 START FROM BATTERY ONLY, NO INPUT MAINS VAC



No. 9: Push-button, for 3 sec., in the front panel for switch ON the system without the “Mains input Vac” but only the battery connected. (Not present in CBI 2410XX and CBI 485XX)

No.12: (Jumper n.5) It is also available the same function for remote start from the battery, via RTCONN cable connected in the Push-button mounted on front Panel of the external system.

Standard function for all products, Size 2 only with code CBI2410A/S and CBI485A/S. Do not leave jumper in this position, otherwise the system will discharge completely the battery. Only push button.

8.3 BUFFERING TIME SETTING (SIZE 3-4)

No.15: On Size 3 and Size 4 models, is possible to set a buffering time. It can be selected by setting the desired value on the rotary switch 15. Buffering time is initiated when the mains is switched OFF. The LOAD output will be ON for the selected time.

Switch position	0	1	2	3	4	5	6	7	8	9
Buffering Time (min.)		0.5	2	5	10	15	20	30	45	60

If the switch is in position 0, the LOAD output will be in ON state until the battery is completely discharged. Any way to prevent damage risks, the unit disconnects the batteries when a minimum voltage level is reached.

The LOAD output will be in ON state until the battery is completely discharged. It is however possible to request factory customized versions with specific buffering time setting, for units Size 1 or 2, you have two choose the extension CBIxxxxASDx.

9 BATTERY CARE

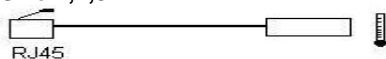
The Battery Care philosophy is based on algorithms that implement rapid and automatic charging, battery charge optimization during time, flat batteries recovery and real time diagnostic during installation and operation. Elements in short circuit, accidental reverse polarity connection, disconnection of the battery, can easily be detected and removed by help of Blink Code of Diagnosis Led; during the installation and after sell. Each device is suited for all battery types, it is possible setting predefined curves for Open Lead Acid, Sealed Lead Acid, Gel, Ni-Cd, Li-Ion. They guarantee battery reliability in time by continuously testing the internal impedance status, avoids any possible risk of damages and grants a permanent, reliable and safe connection of the battery to the power supply. The system, through a battery stimulation circuit with algorithms of evaluation of the detected parameter, is able to recognize sulphated batteries or batteries with a short-circuited element. Battery Test: Automatic. Every 60 sec. check battery connection. Every 220 minute in Float charge, make the test of the battery efficiency is done. The Battery Fault will be monitored by relay and led blinking.

9.1 BATTERY CHARGE IN TEMPERATURE COMPENSATED ENVIRONMENT

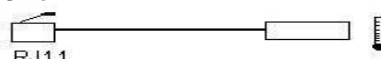
No. 11 Remove the window label to find the connector: Auxiliary Output “AUX 1”

It is possible to connect the Temperature sensor probe and apply it on the battery. The function of the probe is for temperature battery compensation. With this it is possible to active the specifications of the EN54- fire certification.

Size 1,2,3



Size 4



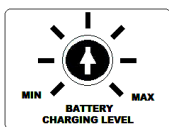
9.1.1 Battery Temperature Compensation Charge (not for NiCd)

Connecting to Auxiliary Output AUX1 the cable RJTEMP (supplied separately), the CBI will vary the voltage of battery charging depending on the temperature:

Fast Charge	Float charge
+/-5mV/°C x n. of Cells from -8°C to +60°C	+/-3mV/°C x n. of Cells from -20°C to +60°C
+140mV/Cell ÷ -200mV/Cell compared to the value at 20°C	+120mV/Cell ÷ -120mV/Cell compared to the value at 20°C

The device stops to charge the battery If the temperature is less than -20°C or greater than +60°C. The sensor placed on cable RJTEMP must be applied on the battery.

9.2 CHARGING CURRENT LIMITER:



No.3 In order to protect the battery from excessive charging currents, the device allows you to limit the maximum charge current by adjusting the trimmer. It allows you to limit from max In up to 20% of current In. To determine the maximum battery charge current, see the battery manufacturer's Data Sheet, If it is not possible, consider that on average the maximum charge current is 10% of Ah's rated battery current; The data is suitable for both Lead Acid and NiCd batteries.

9.3 BATTERY MANAGEMENT CONFIGURATIONS (SIZES 1,2,3,4)

No.18 Preliminary Operations: One device for all battery types.

Completely automatic, all devices are suitable to charge most batteries types thank to User Selectable charging curves. They can charge open lead acid, sealed lead acid, Gel, Ni-Cd and Li-Ion. It is possible to change or add other charging curves connecting the device to a DPY351 or ADELViewSystem.
 Caution: Switch off the system before Setting the jumper. Only jumper in position 6 is Refreshed also with power ON.

Battery Type Selection (Only for CBI485A and CBI485A/S)						
	Jumper Position (Size 1)	Jumper Position (Size 2)	Jumper Position (Size 3)	Dip Switch Position (Size 4)	Float charge (Volt/Cell)	Fast charge (Volt/Cell)
Open Lead					2.23	2.40
AGM Low					2.25	2.40
AGM High					2.27	2.40
Gel Battery					2.30	2.40

Battery Type chemistry Selection						
	Jumper Position (Size 1)	Jumper Position (Size 2)	Jumper Position (Size 3)	Dip Switch Position (Size 4)	Float charge (Volt/Cell)	Fast charge (Volt/Cell)
Open Lead					2.23	2.40
(AGM) Low					2.25	2.40
Gel Battery					2.30	2.40
NiCd					1.4V/cell (12V:10 cells) (24V:20 cells) (48V:40 cells)	1.51V/cell (12V:10 cells) (24V:20 cells) (48V:40 cells)
Li-Ion (4)					3.45 (12V:4 cells) (24V:8 cells)	3.65 (12V:4 cells) (24V:8 cells)
Config Mode (5)					Configure by DPY351 or ADELVIEWSystem.	

Functional Setting				Dip Switch Position (Size 4)	Function
Battery Life test ON					Jumper present or dip switch ON: Life test enabled (not for NiCd)
Boost - Fast Charge Enable (3)					Jumper present: Fast Charge enabled. It is possible remote Fast Charge enabling by RTCONN cable
“Start from Battery” (without Input Mains) (1)					Switch ON the system without the “Mains In Vac”, only the battery is connected. For connection to external Push button use RTCONN cable
UPS Disabling (2)					If jumper removed: UPS function disabled Use RTCONN cable for connection to external Contact.

Note:

- 1 Do not leave the jumper in position 5 (Size 1, 3) or position 6 (Size 2) or Battery Start (Size 4); otherwise, in Backup mode, the battery discharges completely close to Zero. For Size 2: must be require CBI2410A/S or CBI485A/S (/S means start with battery functions, otherwise only start with Input Mains)
- 2 CBI2420A, CBI1235A, CBI4810A, CBI245ASDXX Replaces the fast charge in UPS disabling:
 - Closed contact: back-up (UPS) enabled. System shut down after xx min (depends on time minutes required in SD version).
 - CBI2420A, CBI1235A, CBI4810A: the function it is not enabled if the Time Buffering is in position Zero. In position Zero, the Jumper Fast is enabled.
 - CBI245ASDXX: the Jumper Fast, it is always enabled
 - Contact open: Inhibit backup function. No UPS enabled.
- 3 Jumper present in Fast Charge means also that every 288h, the device goes in “Cycling Refresh Charging”. This mode continues for 85 minutes at the same voltage condition: 2.4V/Cell; for Lead Acid Batteries.
- 4 The littio curve is present from the release: **Size1**:12Vdc Output: S13 R6; 24Vdc Output: S13 R7 **Size2**: 24Vdc Output: S92 R3 **Size3**:12Vdc, 24Vdc, 48Vdc Output: S40 R13 **Size4**: S130 R5
- 5 Whith this selection it is possible to change the parameters of the chemistry selected.
 - a. First, you have to select the battery chemistry
 - b. Select “Config Mode”.
 - c. Change the parameters with DPY351 or ADELVIEWSSystem. After update, it is possible disconnect the programmer and use the device as standalone device.
 - d. If you remove the “Config Mode” all parameter come back to default chemistry selection

9.4 DIAGNOSTIC AND CONTROLS

All CBI devices support the user during installation and operation. A Blink code of Diagnosis Led allows to discriminate among various possible faults.

Error conditions, “LED Battery Fault” ON and “LED Diagnosis” blinking with sequence; see Display Signal section.

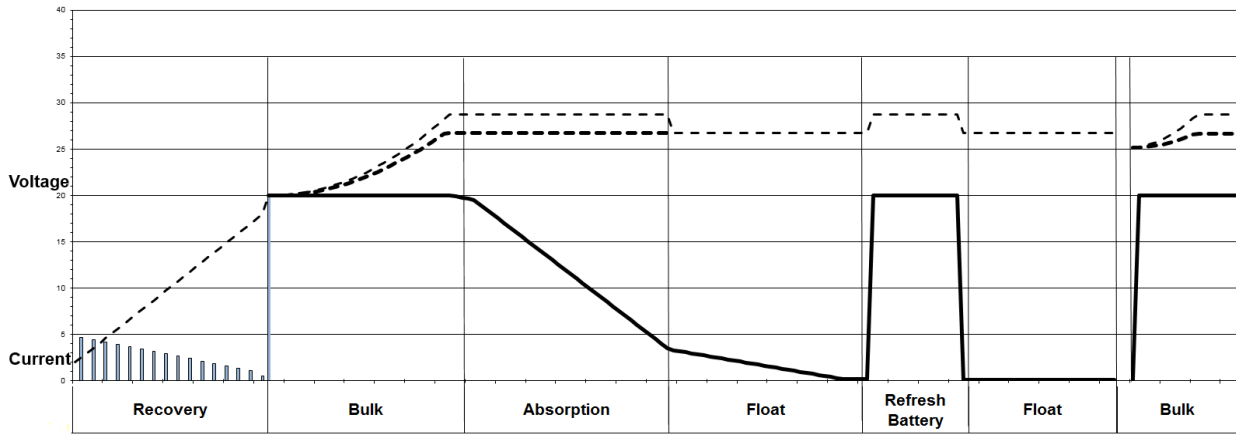
- Check for accidental disconnection of the battery cables and immediately switched off the output power.
- Battery not connected: If the battery is not connected no output on the Load side.
- Test of quality wire connections: During Float charge the quality (resistance) on the battery connection is checked every 60 sec. This to detect if the cable connection has been properly made.
- Battery in Open Circuit or Sulphated: In Float charging mode, the All In One performs internal impedance test every 220 minutes.
- Reverse Polarity check: If the battery it is connected with inverted polarity, the All In One is automatically protected.
- Test of battery voltage connections: Appropriate voltage check, to prevent connection of wrong battery types, more or less than the nominal voltage.
- End of Charge check : When the battery is completely fully charged, the device automatically switch in Float charging mode.
- Check for Battery Cells in short circuit: Thanks to specific algorithms of evaluation, the CBs recognize batteries with cells in internal short circuit. In Float charge every 220 minutes test of element in short circuit.

9.5 PROTECTION FEATURES

- **On the primary side**: the device is equipped whit an internally fuse. If the internal fuse is activated, it is most probable that there is a fault in the device. If happen, the device must be checked in the factory.
- **On the secondary side Battery and load**: The device is electrically protected against short circuits and overload.
- **Polarity Inversion**: the module it is automatically protected against inversion of battery polarity and connection of load inverted.
- **Over current and output short circuit**: the unit limits the output current (see the technical data).
- **Deep discharge**: not possible. The unit disconnects the battery when a minimum voltage level is reached.

9.6 CHARGING CURVE

Automatic multi-stage operation and real time diagnostic allows fast recharge and recovery of deep discharged batteries, adding value and reliability to the system hosting the CBI device. The type of charging is Voltages stabilized and Current stabilized IUoU. Five charging phases are identified by a flashing code on a Diagnosis LED. To maintain the Output Load in lower Voltage state, don't put jumper in position 6, in this case no boost charge but only Float charge. Fast/Bulk Charge means also that every 288h, the device goes in “Cycling Refresh Charging” for 85 minutes at 2.4V/Cell.



9.7 THERMAL BEHAVIOUR

Surrounding air temperature 50°C. For ambient temperature of over 50°C, the output current must be reduced by 2.5% per °C. Max 70°C At the temperature of 70°C the output current will be 50% of I_n . The equipment does not switch off in case of ambient temperature above 70°C or thermal overload. The devices are protected for Over temperature conditions “worst case”; in this situation the device Shut-down the output and automatic restart when temperature inside fall.

10 MODBUS

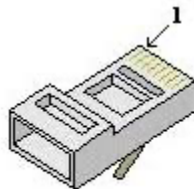
Some devices are provided of Modbus “RTU” communication protocol port; which requires the only one device be the Master, all the others must be slave.

Hardware interface: RS485.

10.1 ELECTRICAL CHARACTERISTICS

The unit is a **SLAVE** in a MODBUS network. The slave units are compliant to the following specifications:

Transmission mode:	MODBUS RTU
Electrical Interface:	RS485 half-duplex serial line
Baud rate:	4800 / 9600 / 19200 / 38400 (default) bps
Data format:	8 data bits
Parity:	even (default) / odd / none
Stop bits:	1 (parity odd or even) / 1 or 2 selectable (parity none)
Slave address:	configurable in the range 1 (default) to 247
Connector type:	RJ45
Cable:	Shielded twisted pair, 8-wire RJ-45 plug



RJ-45 Connector

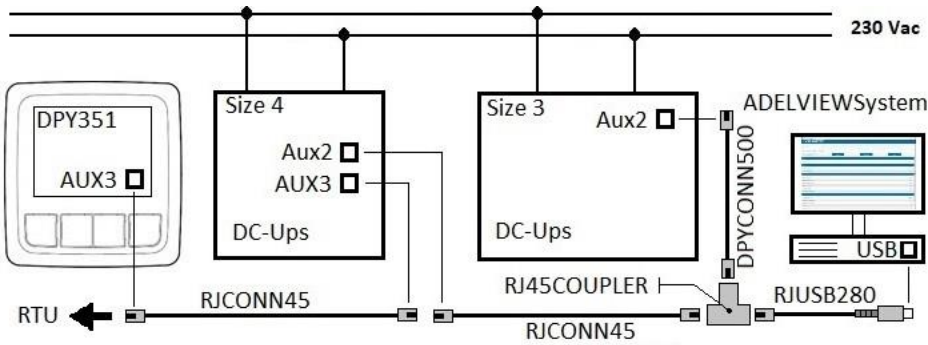
	Size 3	Size4
Connector name	AUX2	AUX3
Pinout (fig. below)	A = pin 2, B = pin 1, Common = pin 3	A = pin 5, B = pin 4, Common = pin 3

10.2 HOW TO CONNECT MODBUS

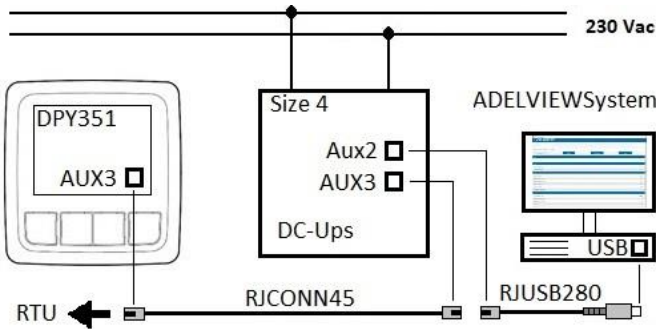
10.2.1 Daisy Chain general connection Diagram

To connect the device in ModBus field, please use AUX2 and AUX3 Port.

- Port: AUX 2 No. 13 is Present only in Sizes 3 and Sizes 4, MODBUS connection via RJ45 connector.
- Port: AUX 3 No. 14 Present only in Sizes 4. The function is the same of Auxiliary Output “AUX 2”

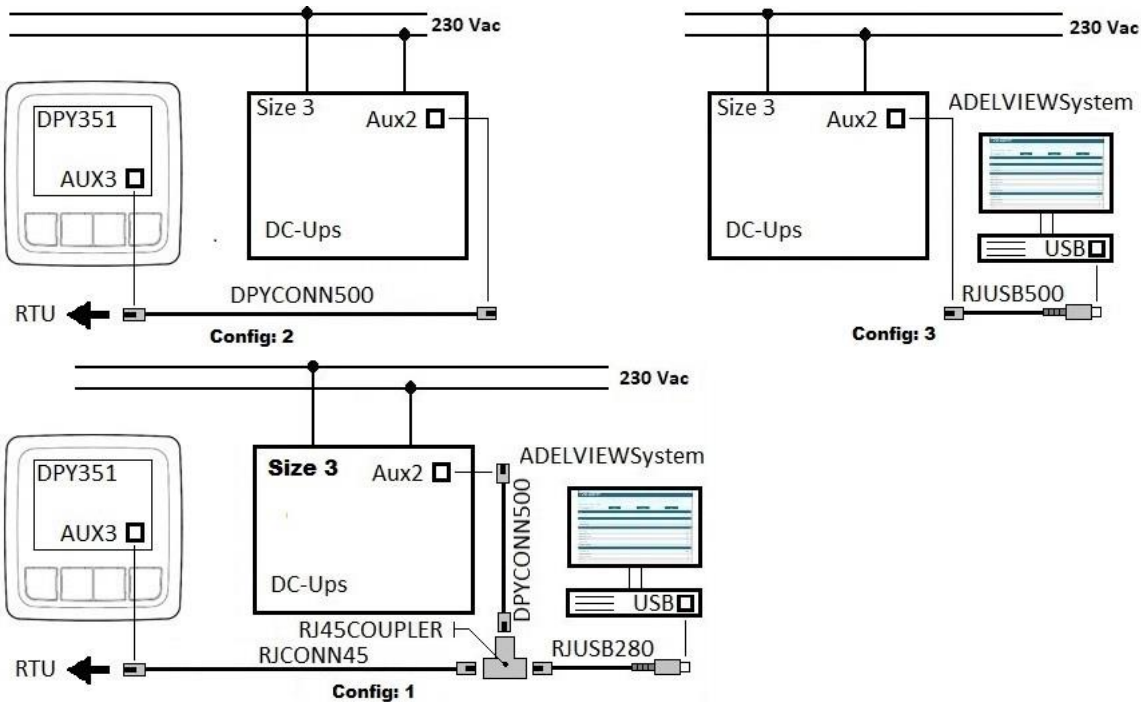


10.2.2 Connection Diagram Size4 CBI280



- RJCONN45: It is a normal RJ45 cable also provided by ADELSystem. It is possible connect in daisy chain up to 32 devices, max distance 1000m, from the Output AUX2 and Aux3.
 - RJUSB280: is cable interface RS485 – USB, max length 2m, for the connection to PC
- Note: If both, DPY351 and ADELViewsystem, are running in the same network at the same time, The DPY351 must be set in the Modbus as "Viewmode".

10.2.3 Connection Diagram Size3 CBI500



- DPYCONN500: is a special cable for the connection of CBI Size3 and the other device; max length 0.5m
- RJ45COUPLER: is a T connection RJ45 for daisy Chain with CBI Size3
- RJCONN45: It is a normal IT cable also provided by ADELSystem. It is possible connect in daisy chain up to 3 devices, max distance 100m, from the Output AUX2.
- RJUSB500: is cable interface RS485 – USB, max length 2m, for the connection to PC

10.2.4 Bus Termination (Size 3)

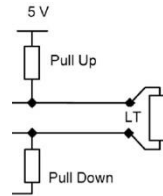
Inside the device are present the following electric diagram for the polarization of the Modbus line:

Fail-safe:

- 560 Ohm (Pull Up) at 5 V
- 560 Ohm (Pull Down) at 0 V

Terminations:

- 120 Ohm (LT) between lines



10.2.5 Bus Termination (Size 4)

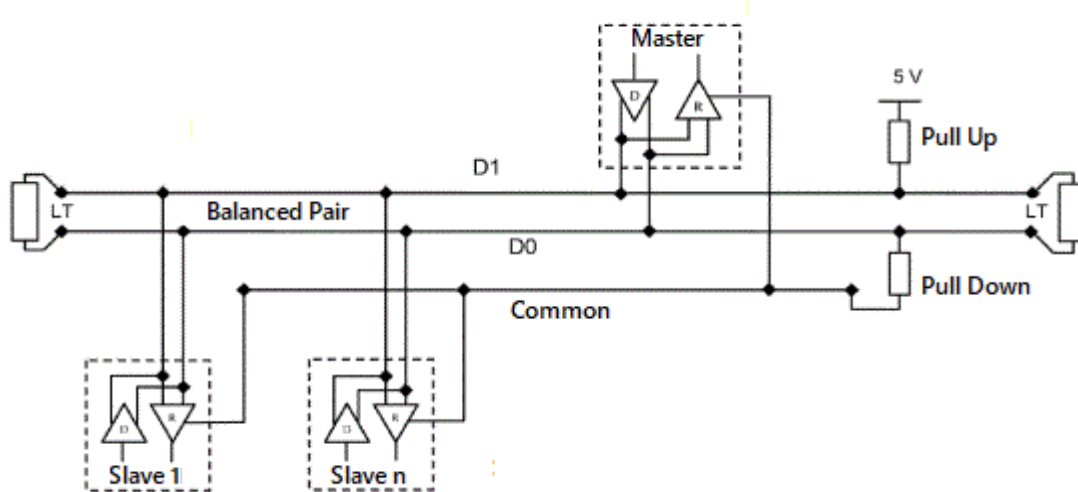
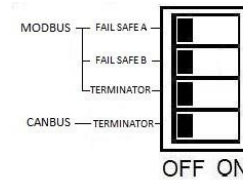
No.16: The Size 4 device, is a full “fail safe” function which assures a complete polarization, for the device in daisy chain. In the CBI2801224A the fail safe function and line terminators can be individually enabled or disabled by means of the dipswitches located on its front panel, as shown in the following figure:

Fail-safe:

- Fail Safe A, 560 Ohm (Pull Up) at 5 V
- Fail Safe B, 560 Ohm (Pull Down) at 0 V

Terminations:

- 120 Ohm (LT) between lines



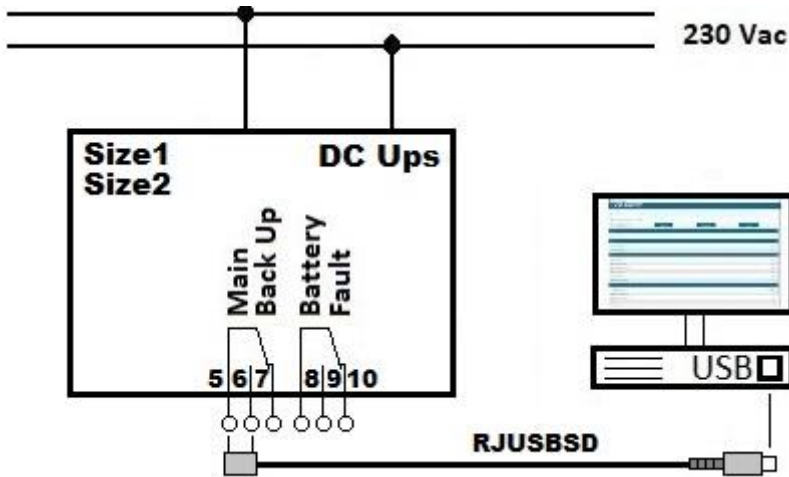
10.3 HOW TO CONFIGURE MODBUS

AUX2 and AUX3 ports, are provided for the connections to the external device like: RTU, PC , DPY351.

- For the connection to RTU, PLC or similar devices, refer to the instruction manuals “Modbus specifications”; Web Site: www.adelsystem.com
- For configuration and monitoring of the parameter inside the devices, Download “ADELViewSystem” from the Web Site: www.adelsystem.com; end Install on the PC.
- Download the Modbus table from Web Site: www.adelsystem.com, section Additional Data, to know all data about the interactive connections Device-Cleaver Interface.
- For Monitoring and Configurations Parameter from the Panel control Device, please use the Plug and Play unit: DPY351.
- For all details of Modbus configuration refer to the instruction manuals “Modbus specifications”; Web Site: www.adelsystem.com, section Additional Data.

11 PC SHUTDOWN

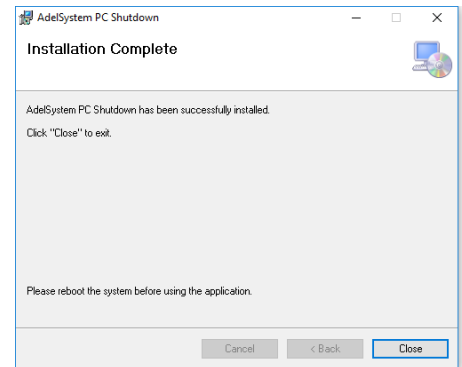
11.1 HARDWARE CONNECTIONS



Connect the cable RJUSBSD to pin 5 and 6 of the DC UPS Size1 and Size2. Connect the other side of the cable to USB on the PC.

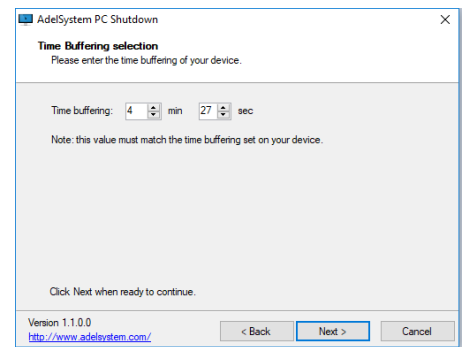
11.2 HOW TO INSTALL “ADELSYSTEM PC SHUTDOWN”

Install the “ADELSystem PC Shutdown” in to the PC, and follow all the information..

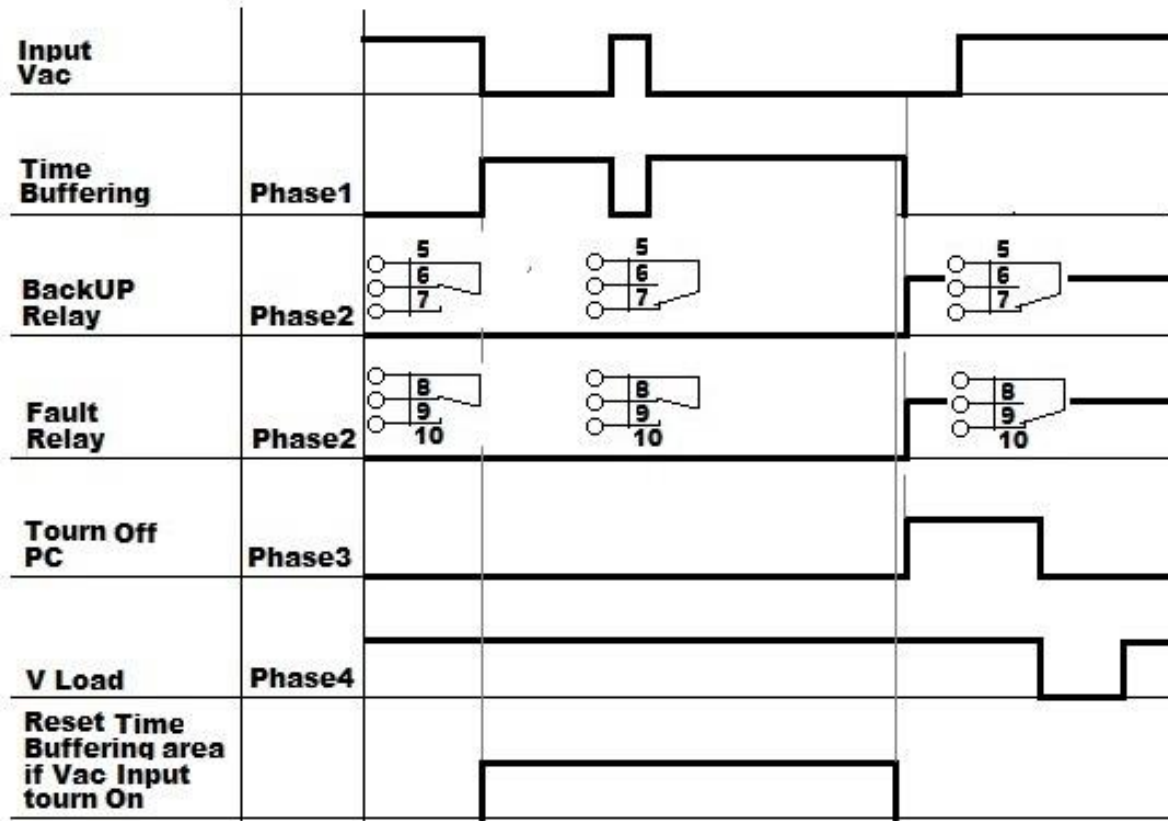


11.3 TIME CONFIGURATIONS FOR SHUTTING DOWN THE PC/IPC

Set the parameter in according to the device Size1 or Size2 CB1xxxxASDx; the parameter “Time Buffering”, you can find in the Side label. Complete the configuration on the Software request.



11.4 SHUTDOWN PC SEQUENCE



12 STANDARD AND CERTIFICATIONS

12.1.1 Electrical Safety for Mounting:

Device assembling: UL508, IEC/EN 60950 (VDE 0805) and EN 50178 (VDE 0160). Installation according: IEC/EN 60950. Input / Output separation: SELV EN 60950-1 and PELV EN 60204-1. Double or reinforced insulation. Safety of Electrical Equipment Machines: EN 60204-1.

CE In According to EMC 2014/30/UE and Low voltage directive 2014/35/UE

12.1.2 Safety Standards:

EN IEC 62368-1: 2014/AC:2015


12.1.3 EMC Standards Immunity:

EN 61000-4-2, EN 61000-4-3, EN 61000-6-2, EN 61000-4-4, EN 61000-4-5.

12.1.4 EMC Standards Emission:

EN 61000-6-4, EN 61000-6-3, EN 61000-3-2 (see data sheet for each device)

12.1.5 Conformity to:

EN60950/UL60950-1 and CSA C22.2 No. 60950-1-07 (Information Technology Equipment) – Safety – Part1: General Requirement. 


Device is intended to be installed in a cabinet protected from external shocks or damages.

Electrical safety EN54-4 Fire Detection and fire alarm systems

DIN41772: Charging curve; DIN41773: Characteristic Curve for charging Lead Acid and Nickel-Cadmium batteries.

12.1.6 Approved:

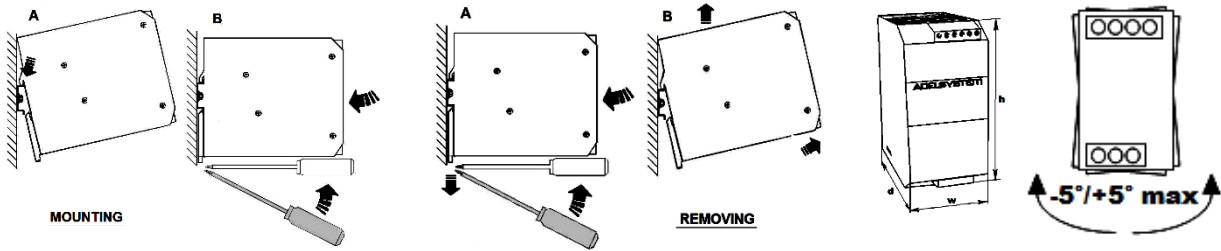
Devices, CBI243A, CBI245A, CBI123A, CBI126A, CBI1210A, CBI2410A and \S, CBI485A and \S, CBI1235A, CBI2420A, CBI4810A

EN60950 / UL60950-1 and CSA C22.2 No. 60950-1-07 (Information Technology Equipment) – Safety – Part1: General Requirement. 

13 DIN RAIL MOUNTING:



All modules must have a minimum vertical and horizontal distance of 10 cm to this power supply in order to guarantee sufficient auto convection. Depending on the ambient temperature and load of the device, the temperature of the housing can become very high.



14 TECHNICAL DATA

For all technical data, please download the data sheet on the Website referred to the specific Product

15

16 BATTERY BANK

16.1 BATTERY BANK 12V

16.2 BATTERY BANK 24V

17 ACCESSORIES

17.1 DIGITAL CABLE

- RJTB500
- RJ45COUPLER
- DPYCONN500
- RJCONN45
- RJUSB500
- RJUSB280
- RJUSBSD

17.2 TEMPERATURE SENSORS

- RJTEMP451
- RJTEMP453
- RJTEMP111
- RJTEMP113

17.3 CABLE CONNECTORS

- RTCONN

17.4 REDONDANCY

- MR220 DECOUPLER

18 MONITOR & CONTROL

18.1.1 DPY351 CONTROL PANEL

18.1.2 DPY353 DISPLAY PANEL

18.1.3 DPY354 "ADELVIEW SYSTEM" SOFTWARE PC