

CB1224xA: Smart Battery Charger
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.

General Description
The CB series is a "Switching technology" and "Battery Care philosophy" since many years parts of the know-how ADEL system, led to the development of this advanced multi-stage battery charging, completely automatic and suited to meet the most advanced requirements of battery manufacturers. The Battery Care concept is based on algorithms that implement rapid and automatic cycle of battery 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, 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. Each device is suited for all battery types, jumper selection sets a predefined curves for: Open Lead Acid, Sealed Lead Acid, Gel, Ni-Cd and Ni-Mh. A rugged casing with bracket for DIN rail mounting provide IP20 protection degree.

Main Characteristic

- Input: Single-phase 115 – 230 – 277 Vac
- Output Battery: charging: 24 Vdc 5 A; 12 Vdc 6 A
- Suited for the following battery types: Open Lead Acid, Sealed Lead Acid, lead Gel and Ni-Cd Ni-Mh.
- Automatic diagnostic of battery status. Charging curve IUoUo, constant voltage and constant current Battery Life Test function (Battery Care)
- Switching technology
- Three charging levels: Boost, Trickle and Recovery
- Protected against short circuit, Over Load and inverted polarity
- Signal output (contact free) for discharged or damaged battery
- Protection degree IP20 - DIN rail; Space saving

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.
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 according with UL508. The device must have a suitable isolating facility outside the power supply unit, via which can be switched to idle. Danger of fatal Injury!

Connection (terminal and wiring):
Cable Connection: The following cable cross-sections may be used:

	Solid (mm²)	Stranded (mm²)	AWG	Torque (Nm)	Stripping Length	1 Phase L N PE Input AC	1 Phase L N PE Input AC
In:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm		
Out:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm		
Signal:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm		

Use only copper cables that are designed for operating temperatures of > 75 °C. Wiring terminal shall be marked to indicate the proper connection for the power supply.

No. 3: Signal Ports (output Isolated):
Connections for Fault Alarm Relay: Low Battery, Fault connections systems, Battery replacement. Contact: 3,4,5
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

Signal Output port true table:		Led N°8 Battery Fault	
		3-4 Closed	3-5 Closed
Battery or system Fault?	YES		■ - led On
	NO	■ - led off	

Please see the NOTE at the bottom of this page.

No. 4: Battery Connection Port:
Connect the battery between pin: 1 (+) and 2 (-).
One battery (12 Vdc) for 12 Vdc Output;
Two battery (12 Vdc) for 24 Vdc Output;
No. 5: Output Voltage Configuration
This setting must be do with mains off. This jumper set the voltage of the batteries connected at the CB, is most important to check the correct voltage value on the batteries. If is connected a wrong Battery the device show the fault indication of 1 blink.
No. 6: Enable Power Supply
This function allow at the Battery Charger to work like a Power Supply. To enable this function the operator must insert a jumper in Pos. 6 Enable Power Supply with the CB unpowered. When the device is turned ON we will have voltage to the output terminals OUTPUT BATTERY even if the battery is not present. After about 10 sec. without detecting a battery the CB signals with 2 blink Battery Not connected and switches the alarm relay. If the battery was already present at power on or if it is connected at a later time, the CB detects the battery and starts to charge, if there is no fault deactivates the alarm relay and the LED DIAGNOSIS indicates the charging status. In Back Up (no Mains) and cell voltage < 2.18V (Pb batteries) or < 1.37V (NiCd batteries) for more than 30 sec. the system turns off completely.

No. 7 and 8 Display Signals
No.8: Led Battery Fault connections systems, Battery Fault.
No.7: Led Diagnosis,
Led Diagnosis: Diagnosis of the system through "blinking code" signal

Monitoring Control Chart:	State	LED Diagnosis (No.7)	LED Battery Fault (No.8)
Charging Type	Trickle	1 Blink/ 2 sec	OFF
	Absorption	1 Blink/sec	OFF
	Boost	2 Blink/sec	OFF
	Recovery (*)	5 Blink/sec	OFF
Auto diagnosis of the system	Reverse polarity or wrong battery voltage (for example: CB set for 24Vdc and battery 12Vdc)	1 Blink/pause	ON
	Battery Not connected	2 Blink/pause	ON
	Element in Short Circuit	3 Blink/pause	ON
	Over Load or Short Circuit on the load (with Enable Power Supply)	4 Blink/pause	ON
	Alarm Low Battery Voltage: 12Vdc, range 8-10 Vdc ONLY on REQUEST 24Vdc, range 18-21 Vdc	9 Blink/pause	ON
	Alarm High Battery Voltage: 12Vdc, over 14 Vdc ONLY on REQUEST 24Vdc, over 28 Vdc	10 Blink/pause	ON

NOTE: (*) In **Recovery** the LED Battery Fault (No.8) is OFF but the Relay is in failure mode (3-5 Closed) to indicate a battery with very low voltage.

Output Power connections:

Normal connection

Typical application:
- One battery (12Vdc) for 12 Vdc Output.
Set No Jumper in Pos. 5
- Two battery (12Vdc) for 24 Vdc Output
Set Jumper in Pos. 5
(See the table below at the point No. 2.)

Operating and Display Element:

No. 1: Input AC Port pin. L – N:
1 Phase Switching Power Supplies L, N, PE @.

No. 2: Battery Management Configurations
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 and Ni-Cd, Ni-Mh batteries. It is possible to change or add other charging curves connecting the device to a portable PC.
Caution: Switch off the system before setting the jumper.

Battery Type Selection	Jumper Position	Trickle/Float charge (Volt/Cell)	Fast/Bulk charge (Volt/Cell)
Open Lead		2.23	2.40
Sealed Lead Low		2.25	2.40
Gel Battery		2.30	2.40
NiCd – NiMh (Note 1)		1.40 – (12V) 10cells 1.40 – (24V) 20cells	1.50 – (12V) 10cells 1.50 – (24V) 20cells
Functional Setting		Function	
Jumper Fast Charge Enable (Note 2)		Jumper present: Fast charge enabled. Not used in Ni-Cd option	
Output Voltage Configuration (Pos. 5)		Jumper Not Present: 12 V Output Jumper present: 24 V Output	
Power Supply Function (Pos. 6)		Jumper Present: Power supply function enabled.	

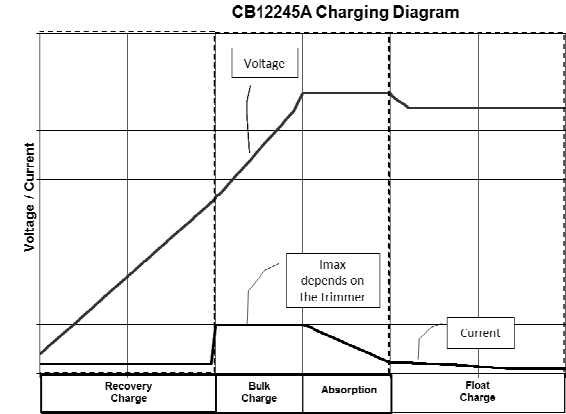
Note:
1 NiCd-NiMh: End-of-charge detected by a "flat" profile. If flat profile is detected, fast charge is terminated after 10 min. General end-of-charge timeout set to 8 hours.
2 This function is a hot swap (is possible to enable or disable with mains on).

No. 9: Charging Level Current:

It is possible set the max recharging current for the batteries by trimmer (Charging Level). The current adjustment goes from 10% + 100% of In. Set the maximum charging current between 10% and 20% of the battery capacity.

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 CB device. The type of charging is Voltages stabilized and Current stabilized IUoUo.
Four charging modes 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 4, in this case no boost charge but only Float charge.

	State	Diagnosis LED	Battery Fault LED
Charging Type	Trickle/Float	1 Blink/ 2 sec	OFF
	Absorption	1 Blink/sec	OFF
	Boost/Bulk	2 Blink/sec	OFF
	Recovery	5 Blink/sec	OFF



Battery Care
The Battery Care philosophy is base 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, 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. 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 guarantees battery reliability in time by continuously testing the internal impedance status, avoids any possible risk of damages and grants also 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 batteries with a short-circuited element. Battery test: Automatic.

Every time a battery will be connected to the Battery Charger, the device will do followings check: reverse battery polarity, wrong battery connected (like batteries 24 – 36Vdc or higher) with Jumper n.5 not present = Battery charger for 12Vdc. After 120 minutes, with jumper in pos. 5 present (24 Vdc output configuration) the device make the test of wrong battery connected like batteries 12Vdc.
Every 240 minutes, make the test element in short circuit.

Diagnostic Type Checks:

Check for accidental disconnection of the battery cables:

The device detects accidental disconnection and immediately switched off the output power.

Battery not connected:

If the battery is not connected no output power.

Reverse Polarity check:

If the battery it is connected with inverted polarity, the device 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 it is completely full, the device automatically switch in trickle 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 trickle charge every 4 hours test of element in short circuit.

Diagnostics of battery and device

All CB 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.

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.

Inversion polarity: 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).

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 In. 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 situations the device Shut-down the output and automatic restart when temperature inside fall.

Standards and Certification

Electrical Safety:

Assembling device: 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.

EMC Standards Immunity :

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

EMC Standards Emission:

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

Standards Conformity:

Safety of Electrical Equipment Machines: EN 60204-1.

CE The CE mark in According to EMC 2004/108/EC and Low voltage directive 2006/95/EEC

UL In According to UL 1236 and CSA C22.2 N° 107.2

Norms and Certifications

In Conformity to: UL1236, IEC/EN 60335-2-29 Battery chargers; EN60950 / UL1950; Electrical safety EN54-4 Fire Detection and fire alarm systems; 2014/30/UE Directive; 2014/35/UE (Low Voltage); DIN41773 (Charging cycle); Emission: IEC 61000-6-4; Immunity: IEC 61000-6-2. CE.

Technical Data:

CB Battery Charger Multi Output voltage 12 – 24Vdc	
	
Input (Volt)	115 – 230 – 277Vac
Output (Vdc – A – W)	12Vdc – 6A – 120W 24Vdc – 5A – 120W
Model	CB12245A
INPUT DATA	
Nominal Input Voltage / Tensione d'ingresso nominale	115 – 230 – 277Vac
Input Voltage Range / Campo di funzionamento	90 – 305Vac
Inrush Current (Vin and In Load) Pi / Corrente di Inserzione	≤ 16 A.s 5mssec
Frequency /Frequenza di Ingresso	47 – 63 Hz ±5%
Input Current (115 – 230Vac) / Assorbimento	2.4 – 1.2A
Internal Fuse / Fusibile Interno (non sostituibile)	4A
External Fuse (recommended) Fusibile Esterno raccomandato	10A (MCB curve B)
OUTPUT DATA	
Output Vdc / Is / Tensione di uscita Vdc / Is	12Vdc – 6A 24Vdc – 5A (230Vac) 24Vdc – 4A (120Vac)
Minimum load / Carico minimo	No
Efficiency (50% of In) / Rendimento tipico	≥ 90%
Short-circuit protection / Protezione contro il corto circuito	Yes
Over Load protection / Protezione sovraccarico	Yes
Over Voltage Output protection / Protezione sovratensione in uscita	Yes
Reverse battery protection / Protezione inversione batteria	Yes
Detection of element in short circuit / Rilevazione elemento in corto circuito	Yes
BATTERY CHARGER OUTPUT / USCITA CARICA BATTERIA	
Boost – Bulk charge (Typ. at Is) / Carica Veloce (1)	14.4Vdc (12Vdc) 28.8Vdc (24Vdc)
Max.Time Boost–Bulk charge (Typ. at Is) / Tempo massimo Carica Veloce	15h
Min.Time Boost–Bulk charge (Typ. at Is) / Tempo minimo Carica Veloce	4 min.
Trickle-Float charge (Typ. at Is) / Carica di mantenimento (1)	13.75Vdc (12Vdc) 27.50Vdc (24Vdc)
Recovery Charge / Carica di recupero	3 – 8 Vdc (12Vdc) 6 – 16 Vdc (24Vdc)
Switching on after applying mains voltage	2 sec
End of charging current Bulk - Absorption to Float - Trickle	1/8 of IsdJ
Start up with capacitive load / Start up con carichi capacitivi	≤ 30.000µF
Residual Ripple / Ripple Residuo	≤ 80 mVpp
Charging max IsdJ / Corrente max. di Carica	6A ± 5% (12Vdc) 5A ± 5% (24Vdc) Ta < 40°C (In) 3.5A ± 5% (24Vdc) Ta > 40°C (In)
Charging current Limiting Is (IsdJ) / Limitazione Corrente di Carica	Yes, 10 + 100 % / In
Quiescent Current / Consumo da batteria max.	≤5mA
JUMPER CONFIGURATION	
Battery Type / Tipo Batteria VRLA Ni-Cd option	2 23,2 25,2 27,2 3; 1,4 – 1,5 (20 elem.)
Battery Voltage 12 or 24 Vdc / Selezione Tensione di Batteria 12 o 24 Vdc	Yes
Power Supply Function / Funzione Alimentatore	Yes
Boost Charge Enable / Abilitazione Carica Rapida	Yes
Characteristic Curve / Caratteristiche di Carica	I/UoIo
SIGNAL OUTPUT (RELAY) / SEGNALE USCITA	
Main or Backup Power	No
Low Battery and Fault Battery	Yes
Main or Backup - Fault Battery	Yes

Rail Mounting:

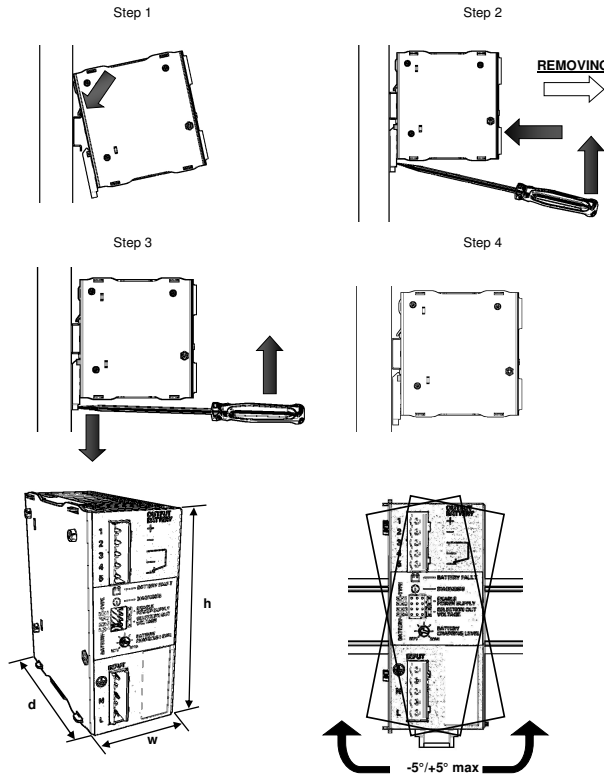


All modules must have a minimum vertical and horizontal distance of 10 cm to this power supply in order to guarantee sufficient auto convection. Depending on the ambient temperature and load of the device, the temperature of the housing can become very high!

Mounting Steps: 1, 2, 3, 4.

Removing Steps: 4, 3, 2, 1.

MOUNTING – REMOVING



AUXILIARY OUTPUT (RJ 45 CONNECTION) FOR:	
Temp. Charging probe / Carica Compensata in Temperatura	No
Voltage drop compensation / Comp. Tensione di ricarica	No
Remote monitoring display / Display Esterno	No
CLIMATIC DATA	
Ambient Temperature operation / Temperatura Ambiente di Lavoro	-25 – +70°C
De rating T1 > (In) / De rating T1 > (In)	> 50° 2.5% °C
Automatic De rating / De rating Automatico	Yes
Ambient Temperature Storage / Temperatura max. Magazzino	-40 – +85°C
Humidity at 25 °C / Umidità	95% to 25°C
Cooling / Raffreddamento	Auto Convection
GENERAL DATA	
Isolation Voltage (IN / OUT) / Tensione di Isolamento (IN / OUT)	3000Vac
Isolation Voltage(IN / PE) / Tensione di Isolamento(IN / TERRA)	1605Vac
Isolation Voltage(OUT / PE) / Tensione di Isolamento(OUT/TERRA)	500Vac
Protection Class (ENIEC 60529) / Protezione Classe	IP 20
Reliability (MTBF IEC 61709) / Affidabilità	> 300 000 h
Pollution Degree Environment / Grado d'inquinamento ambientale	2
Connection Terminal Blocks Screw Type / Dimensione morsetti	2.5mm(24–14AWG)
Protection class (with PE connected) / Grado di protezione (con cavo di terra collegato)	I, with PE connected
Dimension (w-h-d)/Dimensioni (l-h-p) mm	45x105x100 mm
Weight / Peso	0.30 kg approx
Safety Standard Approval / Conformità ed Approvazioni	CE, UL, CSA
CONNECTION DIAGRAM / SCHEMA DI CONNESSIONE	
	

(1) - Depend on jumper selection

All specification are subject to change without notice