



ENG / 11.2009

“Battery Care” the New Battery Charging Philosophy

ADELSYSTEM

Integrated Electronic Solution



Battery Care

Yet another strong proposition from Adelsystem, result of the continuing commitment to provide system designers and users with value added, multi-function devices for battery charging and back-up power supply.

Since many years developer of problem-free solutions addressing the requirements of standard and unforeseen applications, Adelsystem "takes charge of battery charging" and allows designers to safely concentrate on other more strategic issues of their projects.

This is the background that led to the development of the CB Series battery chargers with output voltage 12, 24 and 36 V. They are extremely compact and cost-effective. Thanks to the CB units it will be possible to keep in stock a single multi-purpose product suited to different rated input voltage 120V - 230 Vac, all battery types and able to match most current and voltage output requirement.

Switching technology and the Battery Care concept, since years parts of the core know-how at ADEL system, led to the development of this advanced multi-stage battery charging method, completely automatic and suited to meet the most advanced requirements of battery manufacturers.

The Battery Care concept 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. Battery faults such as battery sulfatation, elements in short circuit, accidental reverse polarity connection can easily be detected, identified and removed.

Safety and long term reliability mean optimized charge and extended battery life. Irreversible damaging conditions are prevented by continuously adapting charging parameters to charge status of the battery and ambient conditions.

The CB Series meet the highest standards of quality and insure high reliability, with MTBF values up to 300.000 hours.

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One device for all battery types

Completely automatic, the battery chargers of the CB series are micro-processor controlled devices suited to charging most batteries types thanks to factory pre-set and 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.

Jumper positions / VpC:

- Open Lead Acid:**

Trickle 2.23V
Boost 2.40V



- Sealed Lead Acid (1):**

Trickle 2.25V
Boost 2.40V



- Sealed Lead Acid (2):**

Trickle 2.27V
Boost 2.40V



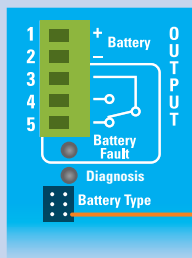
- Gel:**

Trickle 2.30V
Boost 2.40V



- Optional:**

Ni/Cd



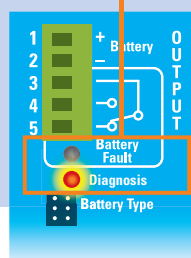
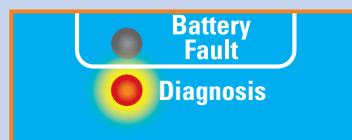
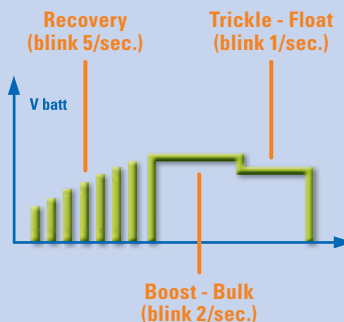
Jumper for Battery Type Selection

Multi-Stage charging - Three charging modes

Automatic multi-stage operation and real time diagnostic allow fast recharge and recovery of deep discharged batteries, adding value and reliability to the system hosting the CB device. The type of charging it is Voltages stabilized and current stabilized IUoUo.

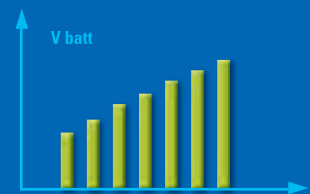
CB battery chargers feature three charging modes, identified by a flashing code on a LED.

- Boost**
(Boost - Bulk) (Blink 2/sec)
- Trickle**
(also known as float or maintenance charging) (Trickle - Float) (Blink 1/Sec.)
- Recovery**
(Recovery) (Blink 5/sec.)



Recovery charging

Automatic multi-stage operation optimizes and adapts to battery status, even when the battery voltage is very low. CB can recharge batteries even when their voltage is close to zero. It allows recharge and complete recovery of flat batteries.



Typical charging curve for recovery of batteries with voltage close to zero.

Setting of battery maximum charging current

The maximum battery charging current can be set from 20% to 100% of the device rated value. Not available on LC models.

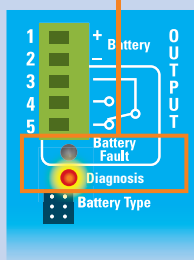
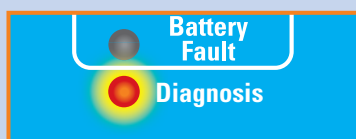


Diagnostic of battery and device

All CB devices support the user during installation and operation. An LED flashing sequence code allows to discriminate among various possible faults.

LED Diagnosis:

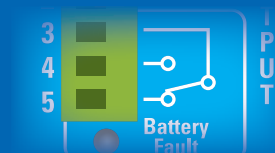
- **1 flash**
Reverse polarity, wrong battery voltage.
- **2 flashes**
Disconnected battery.
- **3 flashes**
Battery element in short circuit.
- **5 flashes**
Battery to be replaced (Internal impedance Bad or Bad battery wire connection).



Monitor signals

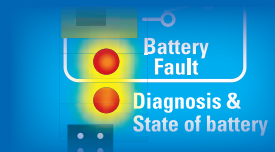
Signal contacts

- CB chargers indicate battery status and faults also via a change-over contact with galvanic isolation.
- Battery common fault.
- Unit disconnected from mains.

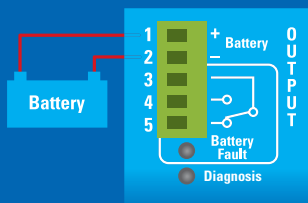


Visual indication

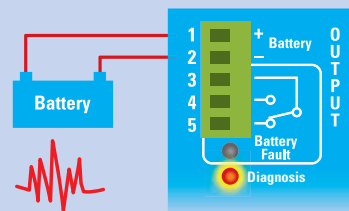
- Battery common fault
- Unit disconnected from mains
- Charging mode
- CB device self-diagnostic



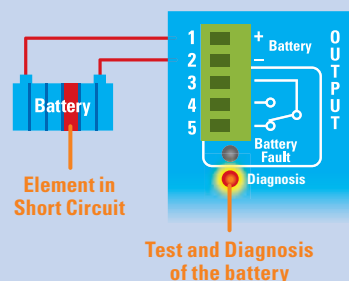
Single output devices



Diagnostic checks



- **Check for accidental disconnection of the battery cables**
If happen the devices switch off immediately the output power.
- **Battery not connected**
If the battery it is not connected no output power.
- **Test of quality wire connections**
During trickle charge the quality (resistance) on the battery connection is checked every 20 sec. This to detect if the cable connection has been properly made.
- **Test of battery voltage connections**
Appropriate voltage check, to prevent connection of wrong battery types.
- **End of charging check**
When the battery it is completely full, the device automatically switch in trickle charging mode.
- **Reverse polarity check**
If the battery it is connected with inverted polarity, the devices are automatically protected.



- **Check for elements in short circuit**
Thanks to specific algorithms of evaluation, the CBs recognize batteries with element in short circuit.

Wide range input voltage

Flexibility is given also by the wide range input voltage. All the devices of the CB range accept input voltage in the range 120 - 230 Vac. Only one device in stock!



Technology

The CB series is a new range of battery chargers based on two strategic know-how elements.

Switching technology

Adel system has a 20 year experience in design of advanced stabilized switching technology power supplies. A battery charger based on this technology is much more efficient and much smaller and lighter than traditional linear technology battery chargers.

Micro-processor and Battery Care

Unlike most other state-of-the-art battery chargers, the CB series is equipped with a micro-processor which controls the charging process and enables several monitoring functions. The firmware implements the extended Adel battery care know-how, result of many years of experience in this field

Maximum safety and protection

The CB series is designed to provide safe operation and long battery life. The following protections are standard features:

- **Output protected against short circuit and overload**
- **Protection against deep battery discharge**
- **Protection against reverse polarity connection**
- **High insulation between primary and secondary**
- **Detection of batteries with wrong rated voltage**
- **Protection against the effect of parallel connection with other power sources, e.g. gensets.**

All protections have automatic reset. No thermal fuse to be replaced.

Norms

The series complies with the most demanding current norms.



Robust construction and easy installation

All the units in the range have aluminium casing, DIN rail fastening clip and are light and compact. IP20 protection degree.



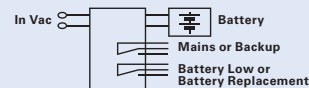
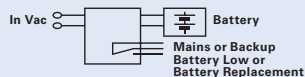
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	Input (Volt) Vac	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230
	Output (Vdc - A - W)	12 - 3 - 36	12 - 3 - 36	12 - 6 - 72	12 - 10 - 120	12 - 35 - 420	24 - 3 - 72
	Model	CB123ALC	CB123A	CB126A	CB1210A	CB1235A	CB243ALC
INPUT DATA 2xVac	Nominal Input Voltage Vac	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230
	Input Voltage Range Vac	90 - 264	90 - 264	90 - 264	90 - 264	90 - 135 / 180 - 264	90 - 264
	Inrush Current (Vn and In Load) I2t (msec)	$\leq 11 A \leq 5$	$\leq 11 A \leq 5$	$\leq 11 A \leq 5$	$\leq 16 A \leq 5$	$\leq 35 A \leq 5$	$\leq 7 A \leq 5$
	Frequency	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%
	Input Current (115 - 230 Vac)	0,5 - 0,3 A	0,5 - 0,3 A	1 - 0,7 A	2,4 - 1,2 A	8 - 4,2 A	1 - 0,7 A
	Internal Fuse	4 A	4 A	4 A	4 A	10 A	4 A
	External Fuse (recommended)	10 A	10 A	10 A	10 A	16 A	10 A
OUTPUTS DATA	Output Vdc / IN	12 Vdc 3 A	12 Vdc 3 A	12 Vdc 6 A	12 Vdc 10 A	12 Vdc 35 A	24 Vdc 3 A
	Minimum load	No	No	No	No	No	No
	Efficiency (50% of IN)	> 81 %	> 81%	> 81%	> 89%	> 91%	> 81%
	Short-circuit protection	✔	✔	✔	✔	✔	✔
	Over Load protection	✔	✔	✔	✔	✔	✔
	Over Voltage Out protection	✔	✔	✔	✔	✔	✔
	Reverse battery protection	✔	✔	✔	✔	✔	✔
BATTERY CHARGER OUTPUT	Boost - Bulk charge (Typ. at IN)	14.4 Vdc	14.4 Vdc	14.4 Vdc	14.4 Vdc	14.4 Vdc	28.8 Vdc
	Max. Time Boost-Bulk charge (Typ. at IN)	15 h	15 h	15 h	15 h	15 h	15 h
	Min. Time Boost-Bulk charge (Typ. at IN)	70 min.	70 min.	70 min.	1 min.	1 min.	70 min.
	Trickle-Float charge (Typ. at IN)	13.75 Vdc	13.75 Vdc	13.75 Vdc	13.75 Vdc	13.75 Vdc	27.5 Vdc
	Recovery Charge	2 - 7 Vdc	2 - 7 Vdc	2 - 7 Vdc	2 - 9 Vdc	2 - 9 Vdc	2 - 16 Vdc
	Charging max Ibatt	3 A \pm 5%	3 A \pm 5%	6 A \pm 5%	10 A \pm 5%	35 A \pm 5%	3 A \pm 5%
	Charging current Limiting IN (Iadj)	✘	✔	✔	✔	✔	✘
	Jumper Config. Type Battery					2.23 V/cell Open Lead, 2.25 V/cell	
	Quiescent Current	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA
	Characteristic Curve						
SIGNAL OUTPUT (RELAY)	Main or Backup Power	✘	✔	✔	✔	✔	✘
	Low Battery and Fault Battery	✔	✔	✔	✔	✔	✔
	Main or Backup - Fault Battery	✔	✔	✔	✔	✔	✔
AUXILIARY RJ45 OUTPUT FOR:	Temp. Charging probe	✘	✔	✔	✔	✔	✔
	Voltage drop compensation	✔	✔	✔	✔	✔	✔
	Remote monitoring display	✔	✔	✔	✔	✔	✔
CLIMATIC DATA	Ambient Temperature (operation)	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C
	De rating T° > . (In)	> 50° 2.5%	> 50° 2.5%	> 40° 2.5%	> 50° 2.5%	> 50° 2.5%	> 50° 2.5%
	Automatic De rating	✘	✔	✔ > 40 °C	✔	✔	✔
	Ambient Temperature Storage	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C
	Humidity at 25 °C, no condensation	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C
	Cooling	Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection
GENERAL DATA	Insulation Voltage (IN/OUT)	3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac
	Insulation Voltage (IN/PE)	1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac
	Insulation Voltage (OUT/PE)	500 Vac	500 Vac	500 Vac	500 Vac	500 Vac	500 Vac
	Protection Class (EN/IEC 60529)	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
	Reliability: MTBF IEC 61709	> 300 000h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h
	Pollution Degree Environment	2	2	2	2	2	2
	Connection Terminal Blocks Screw Type	2,5 mm	2,5 mm	2,5 mm	2,5 mm	4 mm	2,5 mm
	Protection class (with PE connected)	I	I	I	I	I	I
	Dimension (w-h-d)	45x100x100	45x100x100	45x100x100	65x115x135	150x115x135	45x100x100
	Weight	0.30 kg approx	0.30 kg approx	0.30 kg approx	0.65 kg approx	1.5 kg approx	0.30 kg approx

Connection Diagram

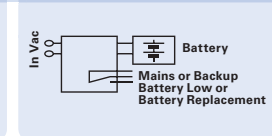
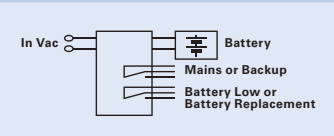
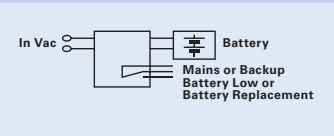
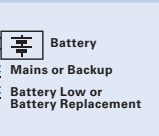


Optional for Auxiliary Output (RJ 45 connection)

Temp. Charging probe: Temperature Sensor for battery 2 m length; Safety Standard Approval: CE.



115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230
12 - 35 - 420	24 - 3 - 72	24 - 3 - 72	24 - 5 - 120	24 - 5 - 120	24 - 10 - 240	24 - 20 - 500	36 - 3 - 110
CB1235A	CB243ALC	CB243A	CB245C	CB245A	CB2410AC	CB2420A	CB363A
115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230	115 - 230
90 - 135 / 180 - 264	90 - 264	90 - 264	90 - 264	90 - 264	90 - 135 / 180 - 264	90 - 135 / 180 - 264	90 - 264
$\leq 35 A \leq 5$	$\leq 7 A \leq 5$	$\leq 7 A \leq 5$	$\leq 16 A \leq 5$	$\leq 16 A \leq 5$	$\leq 16 A \leq 5$	$\leq 35 A \leq 5$	$\leq 16 A \leq 5$
47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%	47 - 63 Hz \pm 6%
8 - 4.2 A	1 - 0.7 A	1 - 0.7 A	2.4 - 1.2 A	2.4 - 1.2 A	3.3 - 2.2 A	8 - 4.2 A	2.4 - 1.2 A
10 A	4 A	4 A	4 A	4 A	6.3 A	10 A	4 A
16 A	10 A	10 A	10 A	10 A	16 A	16 A	10 A
12 Vdc 35 A	24 Vdc 3 A	24 Vdc 3 A	24 Vdc 5 A	24 Vdc 5 A	24 Vdc 10 A	24 Vdc 20 A	36 Vdc 3 A
No	No	No	No	No	No	No	No
> 91%	> 81%	> 81%	> 81%	> 89%	> 88%	> 91%	> 81%
14.4 Vdc	28.8 Vdc	28.8 Vdc	28.8 Vdc	28.8 Vdc	28.8 Vdc	28.8 Vdc	43.2 Vdc
15 h	15 h	15 h	15 h	15 h	15 h	15 h	15 h
1 min.	70 min.	70 min.	70 min.	1 min.	1 min.	1 min.	70 min.
13.75 Vdc	27.5 Vdc	27.5 Vdc	27.5 Vdc	27.5 Vdc	27.5 Vdc	27.5 Vdc	41.25 Vdc
2 - 9 Vdc	2 - 16 Vdc	2 - 16 Vdc	2 - 16 Vdc	2 - 18 Vdc	2 - 18 Vdc	2 - 18 Vdc	2 - 29 Vdc
35 A \pm 5%	3 A \pm 5%	3 A \pm 5%	5 A \pm 5%	5 A \pm 5%	10 A \pm 5%	20 A \pm 5%	3 A \pm 5%
2.23 V/cell Open Lead, 2.25 V/cell Sealed Lead, 2.27 V/cell Sealed Lead, 2.3 V/cell gel							
≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA
IUoUo, Automatic, 3 stage							
-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C	-25 - +70 °C
> 50° 2.5%	> 50° 2.5%	> 50° 2.5%	> 40° 2.5%	> 50° 2.5%	> 50° 2.5%	> 50° 2.5%	> 40° 2.5%
-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C	-40 - +85 °C
95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C	95% to 25 °C
Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection	Auto Convection
3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac	3000 Vac
1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac	1605 Vac
500 Vac	500 Vac	500 Vac	500 Vac	500 Vac	500 Vac	500 Vac	500 Vac
IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h	> 300 000 h
2	2	2	2	2	2	2	2
4 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm	4 mm	2,5 mm
l	l	l	l	l	l	l	l
150x115x135	45x100x100	45x100x100	45x100x100	65x115x135	100x115x135	150x115x135	45x110x105
1.5 kg approx	0.30 kg approx	0.30 kg approx	0.30 kg approx	0.65 kg approx	0.85 kg approx	1.55 kg approx	0.35 kg approx



The range



All In One

For Back Up of Power Continuity. Battery Care concept.



Flex

Din rail Switching power supply are very compact in size, with 150% of power. One product for every input voltage 110 - 230 - 400 - 500 Vac and for every output load.



Battery Charger

New generation of Battery Charger with 3 level of charge, Auto Diagnosis system inside. One product for all batteries types.



Power supply input voltage

Switching power supply for direct connection to secondary transformer 24 Vac; 24, 36, 72, 120, 170, 240, 460 W.



PSM / PST

Completely Range of Switching power supply, input 110 - 230 - 400 - 500 Vac, output voltage 5 - 12 - 24 - 48 Vdc, Power 36 - 960 W.



Dc / Dc converter

Dc / Dc Converter, step Up and Step down. Input - Output isolated, low voltage. With or without DIN Rail.



Interfaces

Wide range of passive interfaces units for Input and Output connections, for PLC and CNC machine.



Battery Module

Battery chest, for connection to All In One products. Battery size: 1.2 - 3 - 7.2 - 12 Ah, 24 Vdc.

Innovation and Functionality

Adelsystem continues to increase its offer of innovative and functional products for DC power back-up and battery charging in DIN mounting configuration. The already wide range of products available is now integrated by the CB Series, the last generation of battery chargers, a real revolution in battery charging technology. Yet another innovative solution developed by Adelsystem' R&D team for the expert designer and the user who need problem free operation. The CB Series implements the "Battery Care" concept. The battery charger is no longer a basic device. It integrates all the other functions to convert it into a reliable elements of the system, capable of monitoring and protecting the battery over time. This in order to give complete and trouble-free tools to designers, for a wide range of application, in conformity with the highest standards and in the most cost-effective way.

ADELSYSTEM

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