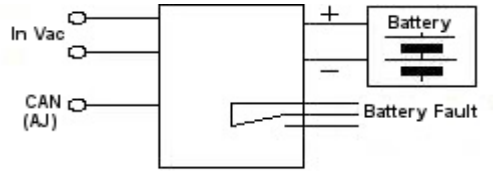
"Smart Battery Charger" CB Series: CB1224xA/CB1224xAJ

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. Only for CB1224xAJ it is available the CAN output, according to the J1939 protocol to connect the device to other electronic units.

Main Characteristics



- Input: Single-phase 115 – 230 – 277 Vac
- Output Battery: 24 Vdc 5 A; 12 Vdc 6 A
- CAN output according to the J1939 (only CB1224xAJ model)
- Suited for the following battery types: Open Lead Acid, Sealed Lead Acid, lead Gel and Ni-Cd.
- Automatic diagnostic of battery status. Charging curve IUoUo, constant voltage and constant current Battery Life Test function (Battery Care)
- Switching technology
- Four charging levels: Boost, Absorption, Float 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

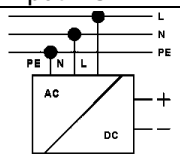
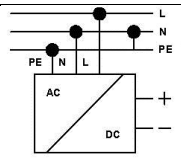
Safety and warning notes

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 to 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):

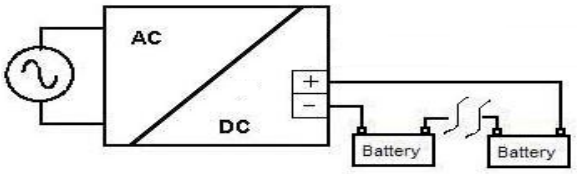
Cable Connection: The following cable cross-sections may be used:

	Solid (mm^2)	Stranded (mm^2)	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		
CANBUS L	0.2 – 1.5	0.2 – 1.5	24 – 16	0.25 Nm	7 mm		
CANBUS H	0.2 – 1.5	0.2 – 1.5	24 – 16	0.25 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.

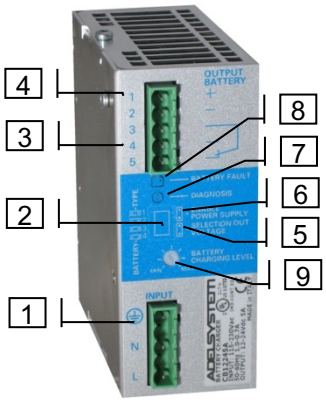
Output Power connections:

Normal connection

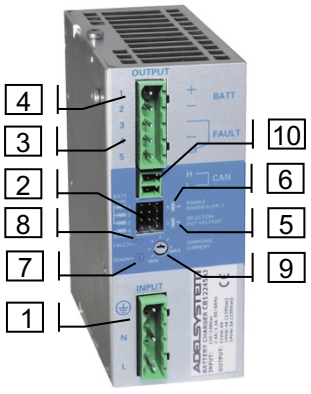


Typical application:
- One battery (12Vdc) for 12 Vdc Output
  Set No Jumper in Pos.5
- Two battery (12Vdc) for 24 Vdc Output
  Set Jumper in Pos. 5 (See the table below at the point No. 2.)

Operating and Display Element:



CB12245A



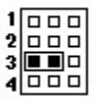
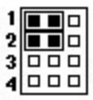
CB12245AJ

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 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	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		1.40 – (12V) 10cells 1.40 – (24V) 20cells	1.50 – (12V) 10cells 1.50 – (24V) 20cells
Li-Ion (Only CB12245AJ)		3.45 (12V:4 cells) (24V:8 cells)	3.65 (12V:4 cells) (24V:8 cells)
CEC (In conformity		2.23	2.40

to Californian Rule)		Improve the Energy Efficiency Compliant to: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609 Alarm Relay it is driven for only 5 sec. when happen an Alarm 3-4 Closed Alarm Relay it is driven only for 5 sec. when happen an Alarm; contact 3-4 closed.

Functional Setting		Function
Jumper Fast Charge Enable		Jumper present: Fast charge enabled. This function is a hot swap (is possible to enable or disable with mains on).
Output Voltage Configuration (Pos. 5)	 5	Jumper Not Present: 12 V Output Jumper present: 24 V Output
Power Supply Function (Pos. 6)	 6	Jumper Present: Power supply function enabled.

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 1A; AC1: 60 Vac 1A: Resistive load (EN 60947-4-1)

Min.1mA at 5Vdc: Min. permissive load

Signal Output port true table:		**Led N°8 Battery Fault**	
Battery or system Fault?	YES		- led On **3-5 Closed**
	NO	- led off **3-4 Closed**	
Battery or system Fault? (In conformity to Californian Rule) jumper 1-3 ON	YES	- led off **3-4 Closed** **(only for 5 sec.)**	

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.

No. 4: Battery Connection Port:

Connect the battery between pin. 1 (+) and 2 (–).

One battery 12 V for 12 Vdc Output;

Two battery 12 V for 24 Vdc Output;

No. 5: Output Voltage Configuration

The device can work at 12Vdc or at 24Vdc setting a jumper. 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 the Battery Charger to function 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 the status of “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 indicate 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 device turns off completely.

No. 7 and 8 Display Signals

No.8: Led Battery Fault connections systems, Battery Fault

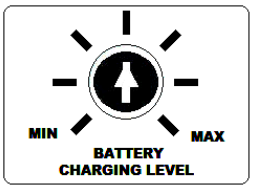
No.7: Led Diagnosis. Diagnosis of the system through “blinking code” signal

Monitoring Control Chart:	**State**	**LED Diagnosis (No.7)**	**LED Battery Fault (No.8)**
Charging Type	Float	1 Blink/ 2 sec	OFF
	Absorption	1 Blink/sec	OFF

	Bulk	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	9 Blink/pause	ON
	Wrong Battery selection	10 Blink/pause	ON

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

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.

No. 10: CAN output:

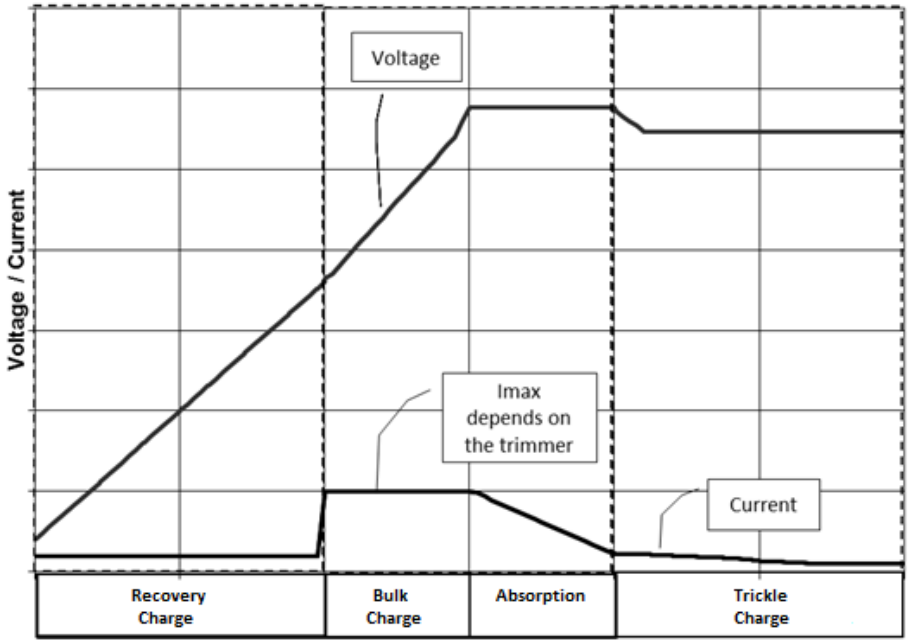
The CAN protocol is defined as the set of rules for transmitting and receiving messages in a network of electronic devices. The CAN bus has a high error identification capability, reducing the probability of receiving a wrong message to almost zero. The CAN bus is based on two lines, called H and L (high and low), that work in differential mode effectively canceling the common mode noise.
The bus line termination network must be added depending on the system design, as the device does not include one.
Of the several protocols based on CAN bus, the CB12245AJ implements SAE J1939 as detailed in the document "ADELSYSTEM_J1939_specification_R2" and the product specific parameter map, that can be downloaded from www.adelsystem.com or requested from the Adelsystem Customer Support service.

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, do not put jumper in position 4, in this case no boost charge but only Float charge.

	State	**Diagnosis LED**	**Battery Fault LED**	**Time for CB1224xA**	**Time for CB1224xAJ**
Charging Type	Float	1 Blink/ 2sec	OFF	-	288h max
	Absorption	1 Blink/sec	OFF	5h max	4h max (8h for NiCd)
	Bulk	2 Blink/sec	OFF	15h max (8 for NiCd)	15h max
	Recovery	5 Blink/sec	OFF	60sec	240h max

CB1224xA - CB1224xAJ Charging Diagram



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 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 4 hours test of element in short circuit.

Diagnosis 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.

CAN Connections

This document describes how to communicate with the Adelsystem devices which are equipped with a CAN interface using the SAE J1939 protocol.

Electrical characteristics

The CAN interfaces onboard the Adelsystem J1939 devices operate at 250kbit/s. Depending on the device type, the bus line termination network can be present inside the device or it has to be provided externally if needed. Refer to the device user manual for further information.

General characteristics

At powerup, the device initiates the address-claiming process as per the J1939-81 network management, which consists of the assignment to the device of a source address that is unique among the devices on the bus. After such assignment, data exchange can take place. Exchanged data is specified in the specific device parameters map, which is a companion to this document.
Each parameter in the map is transmitted by the device to the broadcast address, irrespective of belonging to monitoring, history, configuration or alarm group. The column “Transmission Rate” in the map specifies whether each parameter is broadcast in a timed manner (in this case the period is specified) or only when its value changes (on change). However, immediately after source address negotiations, the device broadcasts all the parameters as a reference for any subsequent change that may occur. Monitoring and alarm parameters are read-only parameters and are transmitted as described. History and configuration parameter values are broadcast by the device through the SPN and PGNs referenced in the map as any other parameter, but are all transmitted only at powerup and on-change.
History parameters can be cleared by writing to **PGN 65490 (0xFFD2)**, which consists of SPN 523000 to 523002.

- SPN 523000: specifies the source address of the device which is the target of the history clearing command.
- SPN 523001: specifies the SPN associated to the history to be cleared. Such SPN is reported in the “SPN” column of the parameters map.
- SPN523002: must contain the history clear command, which is 0x00.

For further clarification, clearing the “Total run time” history is shown:

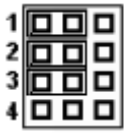
	PGN	byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7
Clear history	65490	Target source address (SPN 523000)	History SPN to clear (SPN 523001)				History value to write (SPN 523002)		
Clear Total Run Time history (SPN 520321)	65490	device source address (0x00 is default)	0x81	0xF0	0x07	0x00	0x00	don't care	don't care
			LSB			MSB			
			same as 520321 decimal						

In addition to being autonomously broadcast using the timed and on-change transmission mechanism, each parameter in the map can be separately requested using **PGN 59904 (Request PGN)** as per J1939-81 network management and specifying in the data field the PGN the requested parameter belongs to; alternatively, the transmission of the whole set of on-change PGN can be requested using **PGN 65492** which consists of SPN 523006 (source address of the device whose map is being requested). The structure of PGN 65492 is shown in the following table.

	PGN	byte 0
Transmit all the on-change PGNs	65492	Target source address (SPN 523006)

Device configuration using the CAN interface

All the parameters in the map are always broadcast autonomously and histories can always be cleared. However, for enhanced control and flexibility, the device has two operation modes: monitoring and configuration mode.
At power-up the device is in monitoring mode unless the jumpers 1-2-3 are present at power-up. Refer to the following figure to locate the jumpers on the device front panel.



Note that other jumpers may be inserted e.g. to enable the power supply function (ENABLE POWER SUPPLY jumper) or to select the 24V output (SELECTION OUT VOLTAGE jumper). These two features can only be enabled at powerup using the jumpers.
When the device is in monitoring mode, the battery charging algorithm is set through the jumpers 1, 2 and 3 at power-up and cannot be changed until the next power-cycling. In monitoring mode the device uses the hardware controls, broadcasts all the parameters in the map as described and allows clearing the histories.
When the device is powered up as shown in the previous figure, i.e. all the three jumpers 1-2-3 inserted, it is in configuration mode. As such, it ignores all the hardware controls (except the ENABLE POWER SUPPLY and SELECTION OUT VOLTAGE jumpers) and uses the parameter values stored in the device non-volatile memory.
When the device is in configuration mode, it is also possible to modify the configuration parameters.
Configuration parameters can be set by writing to **PGN 65491 (0xFFD3)**, which consists of SPN 523003 to 523005.

- SPN 523003: specifies the source address of the device which is the target of the parameter setting command.
- SPN 523004: specifies the SPN associated to the configuration parameter to be set. Such SPN is reported in the "SPN" column of the parameters map.
- SPN 523005: must contain the value to be set

For further clarification, setting the bulk charge (SPN 520335) value to 2410mV/cell is displayed:

	PGN	byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7
Parameter set	65491	Target source address (SPN 523003)	Parameter SPN to write (SPN 523004)				Setting value (SPN 523005)		
Set bulk charge (SPN 520335)	65491	device source address, 0x00 default	0x8F	0xF0	0x07	0x00	0x6A	0x09	don't care
			LSB			MSB	LSB	MSB	
			same as 520335 decimal				same as 2410 decimal		

The following table summarizes the operating modes

	Monitoring mode	Configuration mode
Device control and configuration	-front panel controls	-user configuration from the non-volatile memory -front panel controls ignored except ENABLE POWER SUPPLY and SELECTION OUT VOLTAGE jumpers
CAN operations	-map transmission (autonomously and upon request) -history clearing -networking (address change, PGN requests issued through PGN59904 including NAME and UID)	-map transmission (autonomously and upon request) -history clearing -networking (address change, PGN requests issued through PGN59904 including NAME and UID) -device configuration -factory settings

Networking

Device identification on a J1939 network is done according to the device source address and the J1939 device NAME. Both the source address and the J1939 NAME must be unique on a given J1939 bus.
Prior to exchanging data, a device that goes on bus must claim its source address along with its J1939 NAME. In case two devices claim the same source address, several possibilities exist according to the device capabilities.
All the Adelsystem J1939 devices are arbitrary address capable: if the claimed address is already in use by another device, the devices can automatically reclaim other addresses until an unused one is found. Reclaim address range is 0-220. In addition, the Adelsystem devices can be assigned a given address using the J1939-81 Commanded Address Message (PGN 65240) based on the Broadcast Announce Mode (BAM) of the transport protocol (J1939-21).
The factory-assigned source address is 0 (zero). Any subsequent change in the source address accomplished through the mentioned address claiming process or commanded-address message is immediately applied and stored in the device non-volatile memory thus preserved across power-cycling.
Per the J1939-81 standard, the J1939 NAME is structured according to the following table, where the default values for Adelsystem devices are reported:

Arbitrary address capable	Industry group	Vehicle system instance	Vehicle system	Res.	Function	Function instance	ECU instance	Mfr. code	Identity number
Byte 8 1 bit	*Byte 8 3 bit*	*Byte 8 4 bit*	*Byte 7 7 bit*	*Byte 7 1 bit*	*Byte 6 8 bit*	*Byte 5 5 bit*	*Byte 5 3 bit*	*Byte 4-3 11 bit*	*Byte 3-1 21 bit*
1	Based on product type	Assigned	Based on product type	don't care	Based on product type	Assigned	Assigned	861	Assigned (the 21 LSBs of the device unique identifier UID)

	PGN	byte 0..7	byte 8

Commanded Address Message	65240	J1939 NAME, LSB first (byte 0 = identity number lower part, etc…)	New source address

Discovering the source address and NAME of any/all devices on bus

The NAME field of any device is automatically published by the devices at every source address claiming procedure, but it can also be requested at any time sending the **PGN 59904 (Request PGN)** as per J1939-81 network management to the destination address of the device whose NAME is being requested or to the broadcast address (0xFF) to discover the NAME and source address of all the devices on the bus and specifying in the data field the PGN 60928 (0xEE00).

	PGN	Purpose	Source Address	Destination Address	byte 0	byte 1	byte 2..7
J1939-81 Request for Address Claimed	59904	To know the NAME and source address of all the devices on bus	Requesting device's	0xFF (broadcast address)	0x00	0xEE	0x00
		To know the NAME of the device with a known source address	Requesting device's	The known source address of the target device			

The targeted device or all the devices on bus will reply with the J1939-81 Address Claimed PGN (PGN 60928) specifying as source address its/their own source address and its/their NAME in the data fields:

	PGN	Source Address	Destination Address	byte 0..7
J1939-81 Address Claimed	60928	Device's own source address	0xFF (broadcast address)	NAME

Device unique identifier and restore to factory settings

Each device is assigned an 8-byte unique identifier (UID) at the factory which is used for device identification. The value is reported by the SAE J1939 **PGN 65259 (Component Identification)**, that can be queried using the standard **PGN 59904 (Request PGN).** The structure of PGN 65259 follows.

	PGN	byte 0	byte 1	byte 2…9	byte 10	byte 11
Component identification	65259	0x2A	0x2A	8-byte UID, LSB first	0x2A	0x2A

Restore to factory settings erases all the user configurations and history stored in device memory and replaces them with the default values. This is accomplished using PGN 65491 in order to write the value 1 to the factory setting SPN (SPN 520358). It is possible only when the device is in configuration mode. The restored default values are effective only after power cycling.

	PGN	byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7
Parameter set	65491	Target source address (SPN 523003)	Parameter SPN to write (SPN 523004)				Set value (SPN 523005)		
Factory settings (SPN 520358)	65491	device source address (0x00 is default)	0xA6	0xF0	0x07	0x00	0x01	0x00	don't care
			LSB			MSB			
			same as 520358 decimal						

Standards and Certification

Electrical Safety:
Assembling device: IEC/EN 62368-1
EMC Standards Immunity:
EN 61000-6-2
EMC Standards Emission:
EN 61000-6-3
Standards Conformity:
CE The CE mark in According to EMC 2014/30/UE Directive; 2014/35/UE (Low Voltage)
c UL us In According to UL 1236 and CSA C22.2 N° 107.2
DIN41773 (Charging cycle)

Rail Mounting:

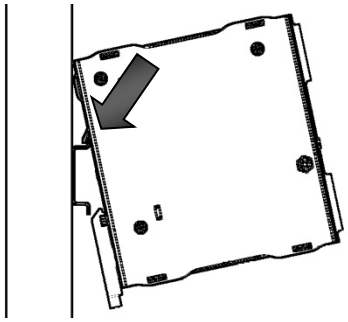
All modules must have a minimum vertical and horizontal distance of 5 mm to this power supply in order to guarantee sufficient auto convection. Depending on the ambient temperature and load of the device, the temperature of the housing can become very high!

Mounting Steps: 1, 2, 3, 4.

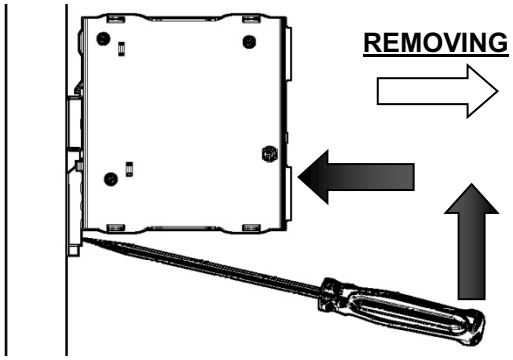
Removing Steps: 4, 3, 2, 1.

MOUNTING – REMOVING

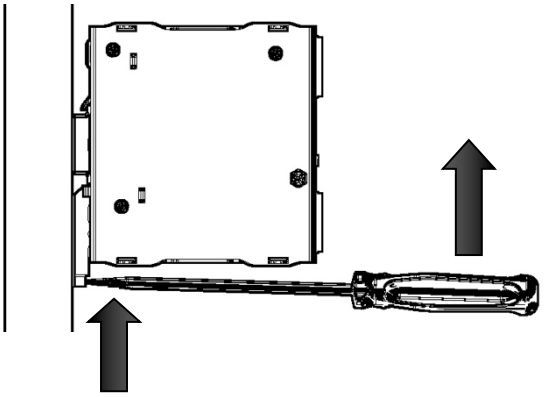
Step 1



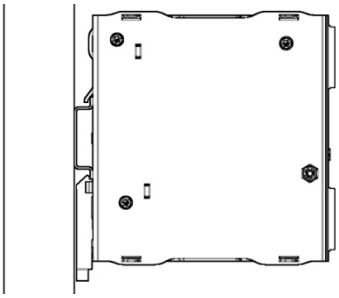
Step 2

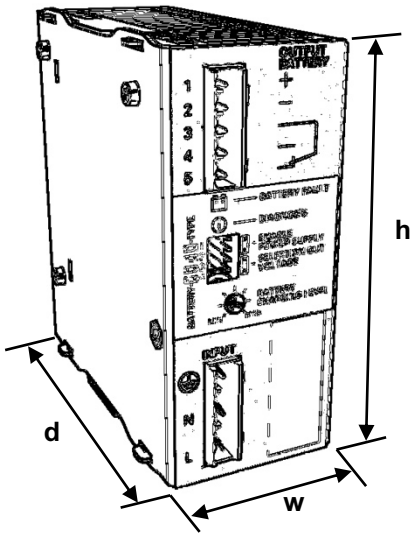


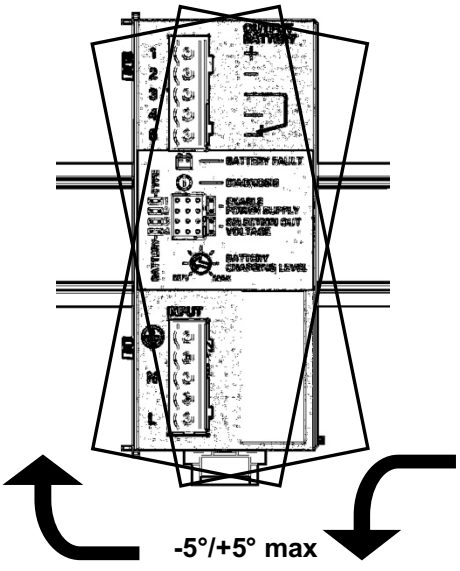
Step 3



Step 4







Technical data

	CB12245A	CB12245AJ
		
Input Data		
Nominal Input Voltage (2 x Vac)	115 – 230 – 277	115 – 230 – 277
Input Voltage range (Vac)	90 – 305	90 – 305
Inrush Current (Vn and In Load) I^2t	≤ 16 A ≤ 5 msec.	≤ 16 A ≤ 5 msec.
Frequency	47 – 63 Hz ±6%	47 – 63 Hz ±6%
Input Current (115 – 270 Vac)	2.4 – 1.2 A	2.4 – 1.2 A
Internal Fuse	4 A	4 A
External Fuse (recommended)	10 A (MCB curve B)	10 A (MCB curve B)
Battery Charger Output 24 Vdc (depend on jumper selection)		
Fast Charge - Boost Charge (Lead Acid)	28.8 Vdc	28.8 Vdc
Fast Charge - Boost Charge (Ni-Cd)	30 Vdc	30 Vdc
Recovery Charge	6 – 18 Vdc	6 – 18 Vdc
Charging Current Max I_{batt} < 40°C(In) Input V. 230Vac	5 A ± 5%	5 A ± 5%
Charging Current Max I_{batt} < 40°C(In) Input V. 120Vac	4 A ± 5%	4 A ± 5%
Charging Current Max I_{batt} > 40°C(In)	3.5 A± 5%	3.5 A± 5%
Battery Charger Output 12 Vdc (depend on jumper selection)		
Fast Charge - Boost Charge	14.4 Vdc	14.4 Vdc
Fast Charge - Boost Charge (Ni-Cd)	15 Vdc	15 Vdc
Recovery Charge	3 – 8 Vdc	3 – 8 Vdc
Charging Current Max I_{batt} < 40°C (In)	6 A ± 5%	6 A ± 5%
Charging Current Max I_{batt} > 40°C (In)	6 A ± 5%	6 A ± 5%
Battery Tester		
Short circuit Element Detection	Yes	Yes
Battery Impendency (Life test)	No	No
Reverse polarity protection	Yes	Yes
Battery Disconnected (Protection No Spark)	Yes	Yes
Battery Voltage Wrong	Yes	Yes
End of charge control	Yes	Yes
Generic Output Data		
Max. time Bust Charge (typ. At In)	15 h	15 h
Min. time Bust Charge (typ. At In)	4 min.	4 min.
Max.Time Bulk charge (Typ. at IN)	15 h	15 h
Min.Time Bulk charge (Typ. at IN)	4 min.	4 min.
Float Charge: Depend on Battery type Float Charge Ni-Cd: V/cell (Jumper Config Battery type)	2.23;2.25;2.27;2.3 1.4 V	2.23;2.25;2.27;2.3 1.4 V
End of charging current (Bulk & Absorption charge)	6% charging current	6% charging current
Charging current limiting I_{adj}	20 ÷ 100 % / I_n	20 ÷ 100 % / I_n
Quiescent Current	≤5mA	≤5mA
Remote Charge Input Control	Bulk / Float	Bulk / Float
Power Supply function	By Jumper Enabling	By Jumper Enabling
Output Voltage 12 or 24 Vdc Selection	By Jumper Enabling	By Jumper Enabling
Boost charge Enabling	By Jumper Enabling	By Jumper Enabling
Efficiency (50% of In)	90%	90%
Dissipation Power load max (W)	9	9
Residual Ripple	≤ 60 mVpp	≤ 60 mVpp
Quiescent Current	≤ 5 mA	≤ 5 mA
Charging Curve automatic: IuoUo	4 stage	4 stage
Detection of element in short circuit	Yes	Yes
Short-circuit protection)	Yes	Yes
Over Load protection	Yes	Yes
Overheating Thermal Protection	Yes	Yes
Over Voltage Output protection	(Typ. 35Vdc)	(Typ. 35Vdc)
Connection and Monitoring		
Signal Output (free switch contact)		
Main or Backup Input Power	Yes	Yes
Low Battery	Yes	Yes
Fault Battery	Yes	Yes

Type of Signal Output Contact (free switch contact)		
Max. current can be switched (EN60947.4.1): Max. DC1: 30 Vdc 1 A; AC1: 60 Vac 1A Min.1mA at 5 Vdc	 Resistive load Min. load	 Resistive load Min. load
Can (connection)		
CanBus J1939	No	Yes
General Data		
Insulation voltage (In /Out)	3000 Vac	3000 Vac
Insulation voltage (In / PE)	1605 Vac	1605 Vac
Insulation voltage (Out / PE)	500 Vac	500 Vac
Protection Class (EN/IEC 60529)	IP20	IP20
Protection class	I, with PE connected	I, with PE connected
Reliability: MTBF IEC 61709	> 300.000 h	> 300.000 h
Pollution Degree Environment	2	2
Connection Terminal Blocks screw Type	2,5mm(24–14AWG)	2,5mm(24–14AWG)
Dimensions (w-h-d)	45x110x105 mm	45x110x105 mm
Weight	0.30 Kg approx.	0.30 Kg approx.
Safety Standard Approval	CE – UL1236	CE
Climatic Data		
Ambient temperature (operation)	-25 ÷ +70°C	-25 ÷ +70°C
De Rating T^a > 50°C	- 2.5%(In) / °C	- 2.5%(In) / °C
Ambient temperature Storage	-40 ÷ +85°C	-40 ÷ +85°C
Humidity at 25 °C no condensation	95% to 25°C	95% to 25°C
Cooling	Auto Convention	Auto Convention
Auto Derating	Yes Up to 50 °C	Yes Up to 50 °C
Accessory		
ADELView Graphic		
ADELView System		