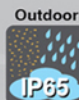


BENTON
CAR ACCESSORIES

7 STEP

- A Unique Battery Charger
- Fully Automatic
- Electronically safe against user errors!
- Smart Option for computerized battery charging and management!

SWITCH MODE BATTERY CHARGER



Charges 12V & 24V Batteries



MCU controlled, fully INTERACTIVE



Returns to last selected Mode when restarted



Fully automatic from Charge to Maintenance!!



Charges WET/Flooded, GEL, AGM type Lead-Acid Rechargeable Batteries



Automatically Diagnoses, Recovers, Charges & Maintains batteries for months...

Q080003



Six Options – 28.8V, 29.4V, 14.4V, 14.7V, 13.6V/SUPPLY and 16V BOOST



SUPPLY

BOOST

BX-2

Product Features



Rescues drained batteries over 4.5V (for 12V batteries) and 16V (for 24V batteries)



Standby feature- Monitors current drawn by battery



No risk of over-charging



Electronically safe against user errors



Spark-proof



Overheat protection



Fully protected against short circuit & wrong connections



Works as power Generator (13.6V/5A)



Boosts deep discharged batteries (4.5V)



10 Stage charging strategy - Pulse charge, 7.0A, 5.0A, 3.5A, 3.0A, 1.5A, 200mA, Boost charge, Maintenance & Power Supply

All major starter battery manufacturers recommend to keep your battery fully charged during idle period.

BENTON® BX-2 is a unique 7-Step fully automatic switch mode battery charger and maintainer, designed for charging a variety of 12V and 24V lead acid rechargeable batteries, widely used in boats, cars, trucks and several other vehicles. The batteries may be of various types i.e. WET/Flooded (Liquid Electrolyte), GEL (Gelatin type Electrolyte, absorbed into the plates), AGM (Absorbed Glass Mat), MF, VRLA (Valve Regulated Lead Acid) batteries. Their capacity range from 12V/14Ah to 12V/230Ah and 24V/14Ah to 24V/120Ah. The **BENTON® BX-2** battery charger also charges batteries in cold conditions. Using state-of-the-art technology, the charger enables the recharging of the batteries to almost 100% of their original capacity. It recovers slightly sulphated batteries. It diagnoses and rescues drained battery. It provides trickle charge and maintenance charging which increases battery life and gives superb performance. The **BENTON® BX-2** battery charger provides six output options to meet numerous requirements i.e. 14.4V, 14.7V, 28.8V, 29.4V, 13.6V/SUPPLY and 16V/BOOST. It also features low back current drain and low ripple.

Memory Function: It has memory function. The charger returns to last selected mode automatically when power is switched on (this feature is unavailable for 13.6V/SUPPLY and 16V/BOOST mode). For repetitive charging process, this is a very useful feature. However different charging mode could be selected by pressing the "MODE" button.

Battery Type & Settings

The following recommendations should only be referred to as guidelines. For precise details, you must refer to battery manufacturer for instructions.

SYMBOL	MODE	SETTINGS	DETAILS
	1	28.8V/3.5A	This mode is normally suitable for 24V WET, MF and GEL batteries.
	2	29.4V/3.5A	This mode is recommended for several 24V AGM batteries. It is also suitable for charging batteries in sub-zero temperatures.
	3	14.4V/7A	This mode is normally suitable for 12V WET, MF and GEL batteries.
	4	14.7V/7A	This mode is recommended for several 12V AGM batteries. It is also suitable for charging batteries in sub-zero temperatures.
	5	13.6V/5A SUPPLY	<p>a) Maintenance of 12V SLA batteries: This mode is suitable for maintenance of 12V batteries with capacity range from 14-230Ah. The charger delivers a constant voltage of 13.6V. This is maintenance mode for applications where maximum capacity from the battery is required such as Golf Carts, Floor Sweepers etc.</p> <p>b) Power source: BENTON® BX-2 battery charger is also used as a power supply, without attaching a battery in this mode. The charger delivers 13.6V/5A. Spark free function is inactivated. However reverse polarity protection function still works.</p>
	6	16V/1.5A BOOST	This mode is mainly applied for recovering 12V batteries with capacity range from 14-230Ah in normal condition. To recover severely discharged batteries due to stratified acid, this mode is useful. High voltage (17V max) at 1.5A is applied for a maximum period of 3 hours. A fully charged battery gives faster result. High voltage may cause some water loss, hence this mode should be handled carefully. For optimal efficiency, battery must be disconnected

Product Safety Feature

- Electronically safe against user errors. The charger will not damage vehicle electronics. It is totally safe for months-long connections and maintenance of irregularly or seasonally used batteries even while the charger is still connected to the vehicle. It provides optimal condition without damage. **No risk of over-charging!**
- Full protection against wrong connection and against short circuit ensures safe charging operation.
- Provided with Spark protection mechanism. This feature does not activate when the charger is in Supply mode. The charger will not begin operation upon connection to the battery unless charging mode has been selected. This embedded feature eliminates the possibility of a spark that often appears during connections.
- Fully controlled by internal MCU (Micro-Computer-Unit), which makes it faster, powerful, reliable and smarter. It detects the state of charge of the battery plugged into it and initiates charging.
- Dust and splash proof (IP65) approval. Outdoor use.
- Double insulated

Rescuing Drained Battery

When charger is connected to a battery, before the start of charging process, the charger automatically detects the voltage of the battery. It can recover deeply discharged & drained batteries with pulse charging if the voltage is in the range of 4.5-10.5V for 12V battery or 16V-21V for 24V battery.

Abnormality Protection

In case of short-circuit, open circuit, reversed polarity connection or battery voltage below 4.5V (for 12V battery) or 16V (for 24V battery), the charger will turn-off the electronic system and will immediately reset the system back to basic position to avoid damage to battery and charger.

Overheating Protection

BENTON® BX-2 charger is protected by NTC control. During the charging process, if the charger becomes too hot, the power output is automatically reduced to protect itself from damage. The charger continues to work trickle charge. Charger increases power automatically when the ambient temperature drops.

Identification of Overlap Voltage

To treat a 14.6-21V battery if it may be a fully charged 12V battery or deep-discharged 24V battery. **BENTON® BX-2** charger smartly identifies correct nature of battery and provides appropriate course of action. Once the selection button is pressed, within 1-2 minutes the embedded MCU would detect change in battery voltage. If battery voltage remains at original value or rises to a higher level, system would treat it as a 24V battery, if voltage falls, it is treated as a 12V battery.

Technical Data

MODEL	BX-2
Input Voltage AC	220-240VAC, 50/60Hz
Output Voltage	12V & 24V (Auto-select)
Input Current	1.5A RMS max
Efficiency	>75%
Charging Voltage	28.8V or 29.4V or 14.4V or 14.7V or 13.6V or 16.5V
Charging Current	7.0A or 5.0A or 3.0A or 1.5A
Back Current Drain*	<5mA
Ripple**	Max 150mV, 0.3A
Ambient Temperature	-20°C to +50°C/-4°F to +122°F, Reduced output power at higher temperature
Type of Charger	Seven step, fully automatic, switch mode with maintenance charging
Type of Batteries	12V & 24V Lead-acid batteries (WET, MF, AGM and GEL)
Battery Capacity	14-230Ah (for 12V), 14-120Ah (for 24V)
Dimensions (LxWxH)	201x91x51mm
Housing Protection	IP65 (Dust and Splash proof) Outdoor use
Weight	0.912kg
Noise Level	<50 dB (Tested from a distance of 50cm)

* = Back current drain is the amount of current drawn by the charger from battery, when the charger is connected to the battery, without power cord connected. **BENTON® BX-2** has extremely low back current drain which corresponds to 0.7 Ah per month (1mA/hr)

** = Ripple refers to interference of current and voltage. A high current ripple heats up battery and reduces life of battery. Against a linear charger, which has a current ripple of upto 400%, **BENTON® BX-2** charger's current ripple is below 2% (0.15/12V or 0.3/24V battery voltage), which is much lower than the max 5% for a sealed acid battery. Equipments connected to the battery could be damaged by high voltage ripple.

Bulk Charging Time

Battery Size (Ah)	For about 80% Charge (hours)	12V	24V
14	2.5	4.9	
60	7.5	15	
100	12	24	
120	15	30	
230	29		

Note: Above table for reference only. Actual data may differ due to battery condition.

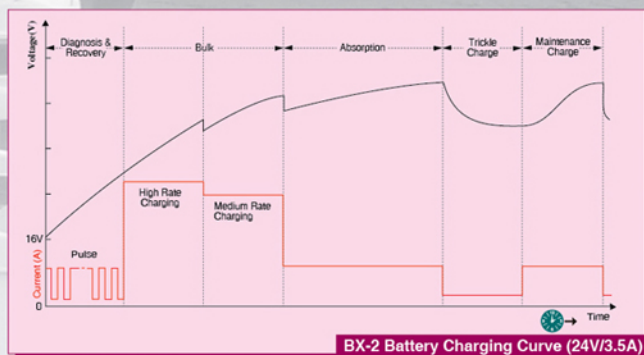


Charging Phases

BENTON® BX-2 charger performs 7-step fully automatic charging cycle.

MODE	SETTINGS	SYMBOL
1	28.8V/3.5A	
2	29.4V/3.5A	
3	14.4V/7A	
4	14.7V/7A	
5	13.6V/5A SUPPLY	
6	16V/1.5A BOOST	

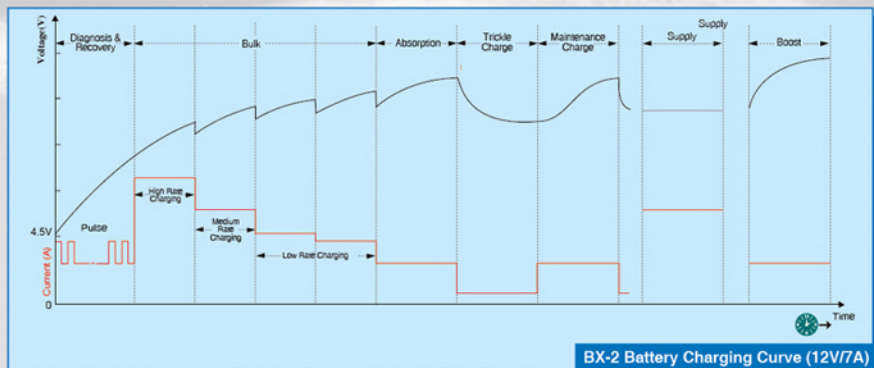
Control Panel



* In case of cold weather charging, *1 voltage refers to 29.4V, instead of 28.8V



Packing Illustration



* In case of cold weather charging, *2 voltage refers to 14.7V, instead of 14.4V

1) Diagnosis & Bulk Charge:

Initializes the recovery process for drained batteries by pulse charging with small current in order to restoring the battery capacity.

2) Bulk

80% of energy is returned in this phase of charging. Here charger performs in two states: High Rate Charging and Medium Rate Charging.

For 24V battery

- High Rate Charging:** Charger delivers constant current of 3.5A until the voltage reaches to 25.6V
- Medium Rate Charging:** Charger delivers constant current of 3.0A until the voltage reaches to 28.2V at which point the charger switches to Absorption phase.

For 12V battery

- High Rate Charging:** Charger delivers constant current of 7.0A until the voltage reaches to 12.8V
- Medium Rate Charging:** Charger delivers constant current of 5.0A until the voltage reaches to 13.9V, at this level constant current is 3.5A until voltage reaches to 14.0V. Finally charger delivers 3.0A current until voltage reaches to 14.1V at which point the charger switches to Absorption phase. Since current is not delivered at highest constant level, **BENTON® BX-2** charger will minimize the heating up of the battery, and hence will eliminate the build up of gases. This ensures more efficient and safer performance.

3) Absorption

In this phase complete charging up to almost 100% is achieved. Charger switches to trickle charge phase after sensing that the battery is truly fully charged.

4) Trickle Charge

Battery is fully charged and ready to use. If the battery needs more current, the charger will switch to Maintenance Charge phase.

5) Maintenance Charge

As charger continuously monitors the terminal voltage in order to determine if a maintenance charging should be initiated. If the battery is loaded and/or terminal voltage falls below 12.8V (for 12V battery) or 25.6V (for 24V battery), the charger starts a maintenance cycle until voltage reaches to 14.4V (for 12V battery) or 28.8V (for 24V battery). The maintenance charging is discontinued.

6) Supply 13.6V:

BENTON® BX-2 charger provides a constant voltage at 13.6V and current upto 5A. This is suitable for maintenance of 12V battery using Float charge approach at 100% of charge. **BENTON® BX-2** battery charger is also used as a power supply with maximum capacity of 13.6V/5A. In this mode spark free function is inactivated. However reverse polarity protection function still works. It has electronic overload protection, which activates if output voltage from battery charger falls below 4.5V and current to around 6A (max).

7) Boost 16V:

To recover severely discharged 12V batteries this mode is useful. High voltage (17V max) at 1.5A is applied for a maximum period of 3 hours. At finish of this stage it would switch to normal charging setting (14.4V).

Standby feature

When battery remains connected with vehicle's wiring system, during the trickle mode, circuits continuously monitor the current drawn by the battery.

BENTON® BX-2 is fully interactive

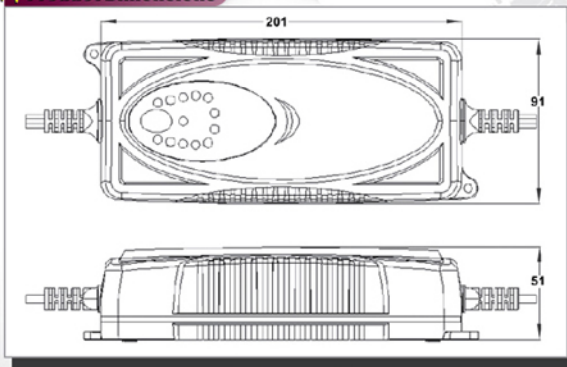
Charger which adjusts itself to changing current and voltage requirement to charge and maintain the battery

Mounting & Product dimensions

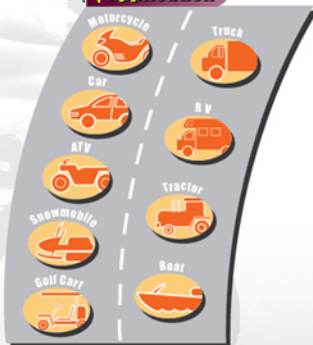
The charger is easy to fix using two screws.

(Please refer to product drawing.)

Product Dimensions

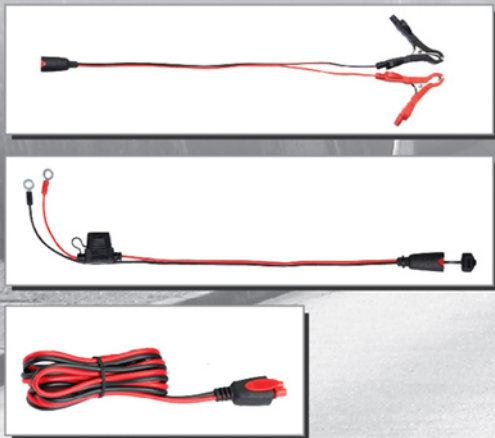


Application



Equipment


BENTON® BX-2 charger is supplied with two detachable and interchangeable colour coded lead sets- one with clamps for bench charging and other with eyelet terminals (Ø6.3mm) with in-line battery protection plug-in fuse (10A) for permanent attachment to the battery posts to allow quick connection/disconnection through snap-connector.



Connectors



Declaration of Compliance

Tested and approved by  and SGS, and conforms to EN 60335-2-29, EN 60335-1, EN 62233, EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, AS/NZS CISPR 14.1:2003, AS/NZS 60335.2.29:2004

BENTON
CAR ACCESSORIES

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