

Instruction Manual

PowerBox Systems®

World Leaders in RC
Power Supply Systems

PowerBox Battery System

PowerBox Battery 1500

PowerBox Battery 2800

PowerBox Battery 3200

PowerBox Battery 4000



**Modern battery system with integral
charge system, balancer,
low-voltage monitor and rugged case**



PowerBox Systems[®]

Dear customer,

We are delighted that you have decided to purchase a **PowerBox Battery**, our modern, world-leading battery design, which has proved to be extremely successful since its introduction in 2003, and has been used in thousands of models.

You are now the owner of a battery system which is unique in the RC world, in which safety and user-friendliness take absolute priority. It is a system which we have developed specifically for use as power supply for the receivers and servos employed in radio-controlled models.

We can offer the optimum battery size for any application: you can choose between four different battery types according to the number and type (power) of servos.

We are confident that your **PowerBox Battery** will give you great pleasure and success over a long period.

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1. Product description

All **PowerBox Battery** systems feature an electronic charge circuit specifically de-signed to suit the cells used in the pack. This approach makes it possible to charge the batteries more accurately and more individually than with any other battery charger. The electronic charge / monitor circuit integrated into the battery pack also ensures that the cells' useful life is as long as possible. The electronic charge circuit detects the battery's state of charge when it is plugged into the mains PSU or the 12 V adapter, and automatically initiates the charge process - without requiring any further intervention. The battery's **integral balancers** monitor the voltage curve of both cells, and reduce the charge current when required in order to avoid the vol-tage of one or both cells rising to an excessive level. Each pack also includes a temperature sensor installed between the two battery cells. During the charge pro-cess this sensor constantly monitors the temperature of both cells. If the tem-perature falls below 0°C, or rises above +40°C, the circuit cuts off the charge pro-cess to avoid damage to the cells caused by the charging process.

An external LED can be connected to the battery, enabling the user to monitor its voltage even when the receiving system is switched off.

These features make the charging process just as simple and reliable as it is with all those other battery-powered devices which we use in everyday life, such as mobile telephones, cameras and laptop computers.

The battery cells we use in our **PowerBox Battery** products have been developed specially for us, and for their application as receiver power supplies (i.e. not as power cells for electric motors). Their outstanding features are extended effective life, low internal resistance, high vibration rejection and high energy density.

We carry out a sophisticated selection procedure which guarantees 100% selection of defective cells, and therefore maximum useful life and optimum performance.

The security and user-friendliness aspects of our battery design are greatly en-hanced by the mounting frames which we developed specifically for these batteries.

Since 2008 we have shipped all **PowerBox Battery** products with encapsulated MPX connectors. We were the first company to use the “**Hot Melt**” process to produce injection-moulded cable supports which have a virtually indefinite life compared with cable connections supported by heat-shrink sleeves. They also represent a substantial security enhancement for your power supply.



Registered Design protection: DE 40 2010 000 949.5

2. Installation, connections

We strongly advise the use of the mounting frame supplied in the set, as it represents an easy method of retaining your battery pack securely in the model. The attachment points are arranged at the points of a triangle; this ensures that the frame can always be screwed to the model securely, without placing it under stress, and with full vibration absorption, even when the sub-surface is not flat.

The snap-in retainers ensure that the battery can be shifted from one model to another easily and quickly at any time, i.e. it is practical as well as possible to use the battery as the power supply for several models. The mounting system is designed to hold the battery securely even at loads of 25 G and more.

Mounting frames are included in the set contents of all **PowerBox Battery 1500, 2800, 3200 and 4000**; they are also available separately for fitting in additional models.

The frame should be fixed to a secure sub-surface using the rubber grommets, metal tubular spacers and screws supplied in the set (spacer flange at the bottom!).

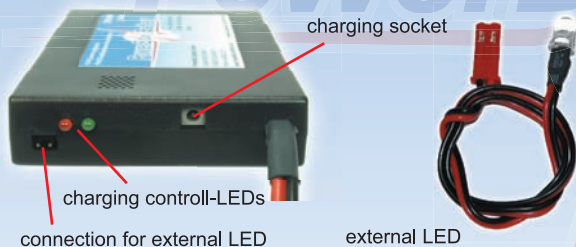
The ultra-bright LED included in the set acts as a supplementary battery monitor, and functions autonomously - i.e. even when the receiving system is switched off.

When used with a Battery 1500, 3200 or 4000, the LED lights up when the voltage falls below 6.9 V. This means that it is possible to keep a watchful eye on the battery voltage during the Winter period when you

are not flying, and thereby avoid deep-discharging the cells. To prevent the LED itself causing further deep-discharging, it is switched off if the battery voltage falls below 5.6 V. Within this range - i.e. between 6.9 V and 5.6 V - the LED glows for several hours.

Since late 2010 the **tri-colour** LED fitted to the **PowerBox Battery 2800** has offered a supplementary function: as well as acting as voltage monitor, this three-colour LED also serves as status indicator for the charger. This means that you can monitor the battery charging process even if the pack is installed in an inaccessible part of the model.

Caution: we strongly advise that the external LED should always be connected, as the LiPo cells will suffer permanent damage if the pack voltage falls below 5.0 V. The low voltage causes gradual gassing of the electrolyte inside the cells, and this causes the cells to inflate when they are subsequently charged and discharged. When this happens, there is a very marked decline in the battery's potential performance and capacity. At the first sign of inflated cells please send the battery pack to us in order to avoid any further safety risk. Please refer to Point 6., which contains more information on our reasonably-priced cell exchange programme.



3. Charge process

To ensure that your batteries enjoy a long life, and that the charging process is safe and properly controlled, we strongly recommend that you use the charging facilities we have developed for this purpose. Both charge methods (110 / 220 V mains PSU or 12 V car adapter) feature two charge leads for the **simultaneous** charging of two batteries, which can also be of different capacity.

The integral red LED glows to indicate that the charge process is active. When the process is concluded, the red LED goes out, and the green LED lights up. It is safe to leave the charger connected to the battery even after the charge process is over. Battery backers or other consumer units can be left plugged in during charging or even left switched on; there is no danger of excess voltage or current at the battery output, i.e. at the connecting lead.

If a problem occurs during a charge process the red LED starts flashing, or goes out: this means that the charge process has been switched off for safety reasons. There are several reasons why the charge process may be terminated in this way:

- Cell temperature too high or too low
- Charge process time exceeded
- Faulty or damaged cells

Please wait a while, then connect the charge plug again in an attempt to re-start the charge process.

If you cannot persuade the electronic circuit to charge the battery despite several attempts, please send it to our Service address for checking, complete with the mains PSU or car adapter.

If you need to charge the battery, but the mains PSU or car adapter is not available for any reason, it is also possible to charge the pack directly using a battery charger designed for **LiPo** / **LiFe** packs using the battery connecting lead.

Please note: if you charge the pack using the battery lead, the two balancers continue to work, but **none** of the integral **electronic safety measures** are active.

Caution: if you are using a separate charger, take care to set the correct cell count and charge current. Note that charge currents greater than 1C can have an adverse effect on the cells' useful life. Charging the pack incorrectly using an external bat-tery charger invalidates the guarantee on the pack.

4. Checking the capacity

Many modellers occasionally like to measure the charged-in capacity of a battery in mAh. This can be accomplished using a charger suitable for **LiPo** / **LiFe** batteries: charge the pack using the mains PSU until the green LED lights up, then connect your LiPo / LiFe battery charger to the connecting lead, and set up a discharge program to discharge the cells. Take care to select the correct discharge voltage limit: for LiPo packs it should be no lower than 6.0 V; for LiFe packs the bottom limit is 5.0 V.

5. Applications

The **PowerBox Battery** range has been developed specifically for use as receiver power supplies, and the battery size should be selected to suit your particular ap-plication. For example, a 1500 mAh pack could well be overloaded by a model fitted with fifteen digital servos; far better to select the next size up. We are always pleased to help you choose the right size of battery for your model.

Our **PowerBox Battery 4000** has also proved to be an excellent choice as an ECU power supply for turbines. We do not recommend the **PowerBox Battery 2800** for this application, as the current load during a kerosene start process is around 35 - 40 A, and this would soon shorten the useful life of this battery type.

The **PowerBox Battery 3200** LiFePo is also unsuitable for this task, because the typical ECU requires a voltage of more than 7.0 Volt, which these packs cannot supply: the nominal voltage of a LiFePo pack is only 6.6 Volt.

6. Service

After a working life of around three or four years - depending on the application and the stress involved - the electrolyte in the cells will be exhausted to the point where a loss of performance and capacity is evident.

Please do not just throw away exhausted batteries !

It is only the two battery cells which are exhausted. Send the batteries to our Ser-vice address (see below), and we will open the case, unsolder the exhausted cells, check all the electronics, and install new, selected cells. The battery case and also the connecting lead (if damaged) are also replaced. This work returns the batteries to 'as-new' condition, and they are ready for a further three or four years' work.

This service is available at the following prices (correct as of 2011), plus carriage:

Service replacement of both 1500 cells: 30.00 Euro

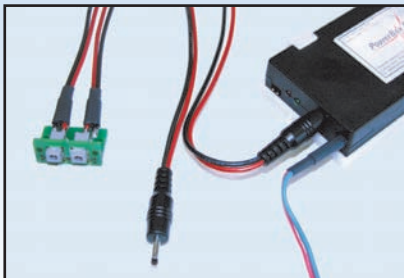
Service replacement of both 2800 cells: 40.00 Euro

Service replacement of both 3200 cells: 40.00 Euro

Service replacement of both 4000 cells: 50.00 Euro

7. Accessories

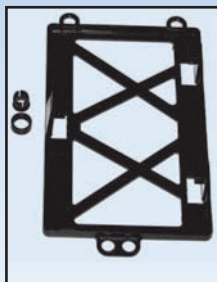
If it is necessary to install the batteries in the model in an inaccessible location, you will need to use a charge extension lead, available in 30 cm and 50 cm lengths. These leads enable you to install the charge sockets in an accessible position, e.g. in the cockpit, or even in the fuselage side.



- 110 / 220 V mains PSU and car charging lead



- Mounting frame for all four **PowerBox Battery** types



- Monitor LED and mounting
- MPX extension lead, 20 cm, 30 cm or 40 cm length

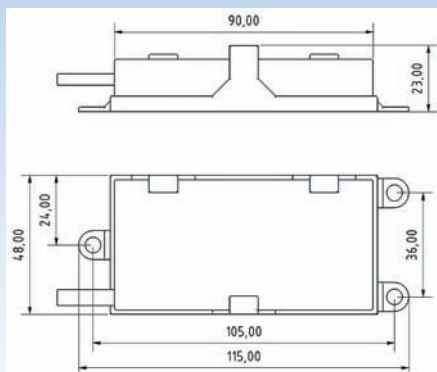
8. Safety / hazard notes and warnings

- Do not connect the positive terminal to the negative terminal (short-circuit)
 - Do not incinerate the battery (open fire)
 - Do keep the battery well away from any heat source (engine, silencer)
 - Do not allow the battery to contact water or fuel
 - Do not use a battery which is obviously damaged or distorted
 - Do not use the battery for any purpose other than the intended application
 - If the battery should leak (after a crash, or other mechanical stress), do not allow the electrolyte to touch your skin. Place the battery on a non-inflammable surface and observe it
 - Do not place the battery in a microwave oven or any pressurised container
 - If you charge the battery using an external charger, connected via the connecting lead, we wish to point out expressly that such a method **disables** all the electronic safety measures which we have provided to ensure a safe charge!
 - If the **PowerBox Battery** becomes hot, place it on a non-inflammable surface and observe it
 - Store the battery in a location which is inaccessible to children
 - Never store the **PowerBox Battery** in the discharged state
 - Stop using the battery if you notice that it is emitting an unusual smell
 - If the electrolyte makes contact with your skin, wash the area with plenty of clean water. In the case of eye contact consult a doctor
 - Never connect the battery directly to a receiver or servos, unless they are approved specifically for use on 8.4 Volts
 - The basic rule is that the battery pack should only be connected to a **PowerBox** system approved by us, such as the **PowerBox** “Digi-Switch”, “Sensor”, “Gemini”, “Evolution”, “Competition”, “Cockpit”, “Champion”, “Royal” or “VoltageRegulator”
- **Don't open the battery pack! Opening the case will wreck it, and the action could easily damage the Lithium-Polymer battery inside it. Extreme fire risk!**

9. Specification

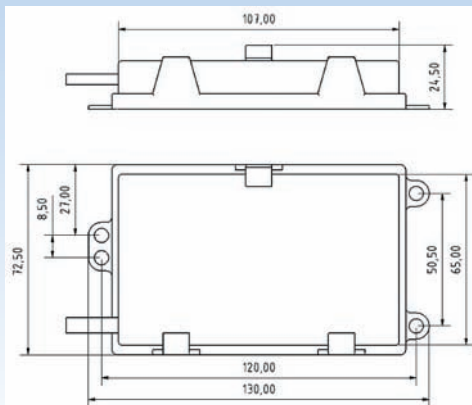
PowerBox Battery 1500 LiPo

Cells in pack:	2S LiPo
Nominal capacity:	1500 mAh
Nominal voltage:	7.4 Volt
Final charge voltage:	8.4 Volt
Final discharge voltage:	6.0 Volt
Voltage range for internal charger:	10.5 – 17.0 Volt
Temperature range for charging / discharging:	0°C to + 40°C
Weight including connecting lead:	95 grammes (JR / Futaba connector) 99 grammes (MPX connector)
Weight of mounting frame:	15 grammes
Dimensions:	88 x 46 x 17 mm (L, W, H)
Connecting lead:	1.0 mm ² (MPX)
Length of connecting lead:	200 mm
CE Declaration of Conformity:	EN 55014-1: 2006 EN 55014-2: 1997+A1:2001
EMC Directive:	2004/108/EG



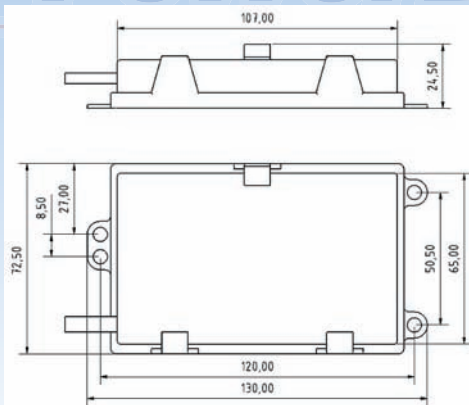
PowerBox Battery 2800 LiPo

Cells in pack:	2S LiPo
Nominal capacity:	2800 mAh
Nominal voltage:	7.4 Volt
Final charge voltage:	8.4 Volt
Final discharge voltage:	6.0 Volt
Voltage range for internal charger:	10.5 – 17.0 Volt
Temperature range for charging/discharging:	0°C to + 40°C
Weight including connecting lead:	152 grammes (JR / Futaba connector) 156 grammes (MPX connector)
Weight of mounting frame:	18 grammes
Dimensions:	106 x 65 x 16 mm (L, W, H)
Connecting lead:	1.0 mm ² (MPX)
Length of connecting lead:	270 mm
CE Declaration of Conformity:	EN 55014-1: 2006 EN 55014-2:1997+A1:2001
EMC Directive:	2004/108/EG



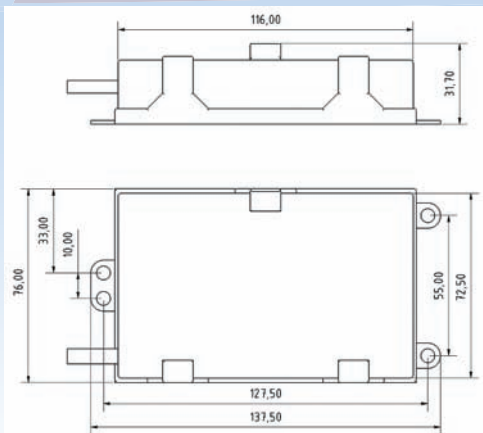
PowerBox Battery 3200 LiFePo

Cells in pack:	2S LiFePo4
Nominal capacity:	3200 mAh
Nominal voltage:	6.6 Volt
Final charge voltage:	7.2 Volt
Final discharge voltage:	5.0 Volt
Voltage range for internal charger:	9.0 – 17.0 Volt
Temperature range for charging / discharging:	0°C to + 40°C
Weight including connecting lead:	227 grammes (JR / Futaba connector) 232 grammes (MPX connector)
Weight of mounting frame:	24 grammes
Dimensions:	115 x 72 x 23 mm (L, W, H)
Connecting lead:	1.0 mm ² (MPX)
Length of connecting lead:	270 mm
CE Declaration of Conformity:	EN 55014-1: 2006 EN 55014-2: 1997+A1:2001
EMC Directive:	2004/108/EG



PowerBox Battery 4000 LiPo

Cells in pack:	2S LiPo
Nominal capacity:	4000 mAh
Nominal voltage:	7.4 Volt
Final charge voltage:	8.4 Volt
Final discharge voltage:	6.0 Volt
Voltage range for internal charger:	10.5 – 17.0 Volt
Temperature range for charging / discharging:	0°C to + 40°C
Weight including connecting lead:	244 grammes (JR / Futaba connector) 249 grammes (MPX connector)
Weight of mounting frame:	24 grammes
Dimensions:	115 x 72 x 23 mm (L, W, H)
Connecting lead:	1.0 mm ² (MPX)
Length of connecting lead:	270 mm
CE Declaration of Conformity:	EN 55014-1: 2006 EN 55014-2: 1997+A1:2001
EMC Directive:	2004/108/EG



10. Set contents

- **PowerBox Battery 1500, 2800, 3200, 4000**
- Mounting frame
- External LED
- Four rubber grommets with brass tubular spacers
- Four retaining screws
- Operating instructions

The following disposal and return agreements are valid for all battery packs produced by us, with the following disposal agents:

WEEE used equipment register, Register number: DE 639 766 11

Dual System, Green Spot, Register number: DE 556 166 5

GRS battery disposal, Register number: DE 109 021 248

11. Guarantee conditions

During the manufacturing process we subject each **PowerBox Battery** to a series of test procedures: this begins with the selection of the electronic components, via the selection of the individual battery cells, the calibration of the balancers, and includes checks on correct charge and discharge behaviour.

At the development and production stages we at PowerBox Systems take the maintenance of the highest quality standards very seriously (DIN ISO 9001: 2008); guaranteed “Made in Germany”!

That is why we are the only manufacturer in the model industry able to grant a **12 month** guarantee on all **PowerBox Battery** products, from the date of purchase.

The guarantee covers proven material faults - including those involving the battery cells - occurring during the guarantee period, which will be corrected by us at no charge to you. Please note that we reserve the right to replace the battery pack if a repair is no longer economically possible.

Any repairs which we carry out in our Service department do not extend the original guarantee period.

The guarantee does not cover damage caused by incorrect use of the unit, **reversed polarity**, very severe vibration, excessive charge voltage, damp, fuel or short-circuit. The same applies to faults caused by particularly heavy use or severe stress.

We accept no liability for transit damage or the loss of your shipment. If you wish to make a claim under guarantee, send the device to us at the following address, to-gether with proof of purchase.

Service Address:

**PowerBox-Systems GmbH
Ludwig-Auer-Str. 5
D-86609 Donauwörth
Germany**

12. Liability exclusion

We are not in a position to ensure that you install and operate the **PowerBox Battery** correctly, nor that the entire radio control system has been maintained properly.

For this reason we are unable to accept liability for loss, damages or costs which result from the use of the **PowerBox Battery**, or are connected with its use in any way. Unless otherwise prescribed by law, our obligation to pay compensation, re-gardless of the legal argument employed, is limited to the invoice value of those of our products which were involved in the event in which the damage occurred.

We wish you every success using your new **PowerBox Battery**, and hope you have loads of fun with it.

Donauwörth, February 2011





PowerBox Systems®

*World Leaders in RC
Power Supply Systems*

PowerBox-Systems GmbH

Certificated according to DIN EN ISO 9001:2008

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