Instruction Manual

PowerBox Systems

World Leaders in RC
Power Supply Systems

PowerBox Cockpit

PowerBox Competition

Dear customer,

We are delighted that you have decided to purchase the **PowerBox Competition / Cockpit** from our range.

We hope you have many hours of pleasure and great success with your **PowerBox Competition / Cockpit.**

1. Product description

The **PowerBox Competition** and **Cockpit** are the latest innovations from the **PowerBox Systems** stable**.** These **PowerBoxes** are modern power supply systems which contain all the electronic components required for modern receivers, servos and models**.** Every component needed for a totally secure airborne power supply, including ICs, micro-controllers and electronic circuits, is **duplicated**! The outstanding features of this High-End power supply system include a raft of important innovations such as an integrated high-resolution graphic OLED screen, multi-tasking door sequencer, fine-tuning facilities for four channels (match-channels) and the ability to exploit downlink channels provided by various RC system manufacturers**.**

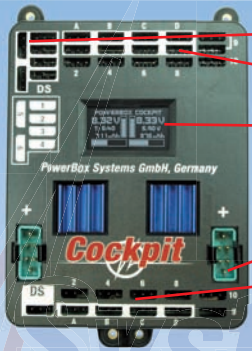
Features:

- Integral high-resolution graphic OLED screen with a resolution of 128 x 64 pixels
- Extremely user-friendly menu-controlled programming using the **SensorSwitch**
- **PB Cockpit**: eleven channels + one channel for door sequencer
  Signal amplification for a total of eleven channels and 21 servos
- **PB Competition**:twelve channels
  Signal amplification for a total of twelve channels and 18 servos
- **Synchronised** servo output: all servos operate totally synchronously
- 16-bit processor for fast, high-resolution signal processing
- Multi-tasking **door sequencer** in the **PB Cockpit**
- Four match-channels, each for two servos; all servos individually variable
- **Double** regulated output voltage
- Sockets for **Spektrum** and Multiplex **MSB** downlink bus systems
- Direct transmission of battery voltage and residual capacity to the transmitter
- Separate voltage display for each battery
- Residual capacity display for both batteries
- Software-selectable servo voltage: 5.9 V or 7.4 V
- Minimum value memory alerts the pilot to any collapses in battery voltage
- Large-area heat-sink for high regulator performance
- Regulator monitor and regulator error indicator
- Support for three battery types: **LiPo**, **NiMH/NiCd**, **LiFe**
- Suppression of any servo feedback currents which may occur.

These functions make the **PowerBox Competition / Cockpit** ideal for model aircraft with wingspans up to 3.0 m, including jets and scale types.

2. Connections, controls

The following illustrations show the essential sockets and controls:



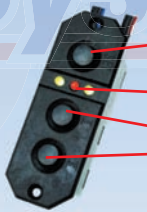
Door sequencer outputs

Servo sockets

OLED screen

Battery input, battery 2

Receiver inputs



Button for activating system and setting battery type

Power-on status LEDs

Switching buttons for batteries I and II

Left: Socket for **Spektrum** telemetry
Right: **SensorSwitch** button

Socket for Multiplex **MSB** telemetry

3. First steps, the unit in use:

In the following instructions we do not differentiate between the **PowerBox Cockpit** and **Competition**, since the method of programming the two units is absolutely identical. The only difference is that the **PB Cockpit** includes the door sequencer function, whereas the **PB Competition** does not.

3.1. Connections

- Use the patch-leads supplied in the set to connect all the PB inputs to the receiver channels you wish to use. The channel assignment is left up to you, bearing in mind that input No. 3 also corresponds to output No. 3. The only specific requirement applies to the **PB Cockpit**; in this case the channel for the retracts and wheel doors must be connected to the socket marked **DS** (door sequencer).
  CAUTION: at this point you can connect all the servos to the PB, but for safety's sake please disconnect the mechanical linkages to the unmatched servos:
  Please read the set-up notes **f)** !
- Connect the receiver to the unit using the eleven or twelve patch-leads supplied; fewer leads may be sufficient if the channel count is lower. Power is fed to the receiver via these leads.
- Connect the **SensorSwitch** to the appropriate socket on the unit, ensuring that the ribbon cable faces up as shown. In models subject to severe vibration we recommend that you secure the ribbon cable by at least one additional point to avoid the connector working loose. If the connector were to fall out, it would have no effect on the switched state of the backer, but it would prevent you switching the system off.
- Connect the batteries to the backer's integral MPX connectors, taking great care to maintain **correct polarity.** We recommend the use of **PowerBox Batteries** of **1500 mAh**, **2800 mAh** or **4000 mAh** capacity. If you prefer to use other makes of battery, or wish to make up your own packs, it is absolutely essential to maintain correct polarity - check twice rather than make a mistake! If you connect a battery with reversed polarity, the immediate result will be to ruin the corresponding regulator in the backer. Please note that the backer does not feature reverse polarity protection in order to minimise power leads. The + (positive) indicator can be seen on the case cover.

3.2. The procedure for switching on and off

The method of switching the unit on and off is very simple, and the process effectively eliminates the possibility of changing the backer's status accidentally. This is the procedure:

Locate the SET button on the **SensorSwitch** and hold it pressed in until the central LED glows red. Now press buttons I and II in turn to switch the backer on.
Repeat the procedure to switch off: hold the SET button pressed in, wait until the central LED glows red, then confirm by pressing buttons I and II in turn.
Your **PowerBox** stores the last switched state (on or off). That means: if the backer is switched off using the **SensorSwitch**, it stays switched off.
Once switched on, the backer can only be turned off again using the switch unit. Intermittent contacts or interruptions in the power supply cannot cause the backer to be switched off.

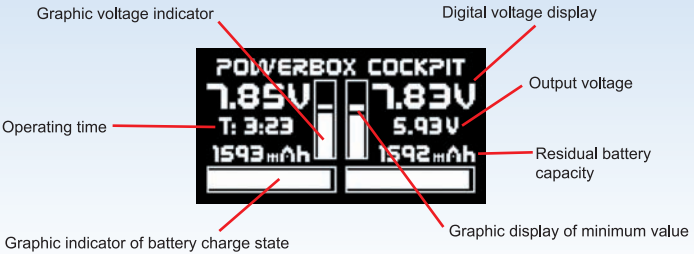
3.3. After the charge process

The **PowerBox** must be reset after each charge process, otherwise it is impossible for the unit to display reliable values for energy consumption and operating times. This is the reset procedure:
With the **system switched on**, locate both buttons I and II on the **SensorSwitch** and press them simultaneously; hold them pressed in until the following screen display appears

Release both buttons: the capacity is now reset to the value you previously entered for the batteries in use, and the operating time starts recording again from 0.

3.4. Main screen display

When switched on, the unit's integral screen shows this display:



Key to the individual display points:

- Digital voltage display:
This extremely accurate display allows you to read off the voltage of the battery directly, i.e. the voltage which is present at the **input** of the **PowerBox.**

- Graphic voltage display:
A brief glance into the model provides you with information about the batteries' state of charge. This display is always correct for the type of battery you have selected. This means that the bar will extend right to the top of the box if the connected battery is fully charged - assuming that you have set the correct battery type. If the bar only fills the bottom third of the box, then the corresponding battery is almost flat. This indicator is supplemented by the residual capacity display.

- Residual battery capacity:
This display shows the momentary capacity value of the battery - again, assuming that you have previously set the battery type correctly. This display is capable of providing very accurate information about the remaining battery capacity, although ageing effects or defective batteries may falsify the value. In practice this means that you should always take both values into account: if the remaining capacity appears to be high, but the voltage has already fallen to a low level, you should consider it an urgent necessity to check the battery more closely.

- Graphic indicator of battery charge state:
This display is set to match the capacity you previously entered for the batteries connected to the backer. Assuming that the battery is of good quality, this means: if the bar only reaches the half-way point, then the battery is still half-full.

- Operating time:
This figure shows the elapsed time since the last RESET. It is important always to carry out a RESET after each battery charge process.

- Output voltage:
This value displays the backer's exact output voltage. The voltage fed to the servos and receiver is the exact value displayed here.

Note:
The residual capacity of the two batteries as displayed on the screen is likely to drift apart as the packs are discharged; this is due to minor differences in the rate of discharge of the batteries through the **PowerBox.** This by no means indicates a fault in the **PowerBox**; in fact it proves that the **system** features **genuine redundancy.** Here at **PowerBox Systems** we take great trouble to

compensate for manufacturing tolerances between the two regulators, but it is never possible to produce a system which is completely devoid of tolerances. The only method of discharging two batteries at 100% identical rates is to use a system fitted with only one regulator. However, such systems cannot be claimed to offer redundancy!

3.5. Basic settings

The **PowerBox Competition** and **Cockpit** feature a new kind of graphic OLED screen, intended to do away with old-fashioned programming methods based on flashing LED codes, morse code beeps or obsolete mechanical jumpers. The screen provides the basis for an extremely user-friendly control system, and eliminates the need for a supplementary set-up unit or programming device. The **SensorSwitch** is employed as a convenient means of entering settings within the menu system, and since the **SensorSwitch** is always used as the main ON / OFF switch, it is always installed in the model, so you cannot forget it. Wherever possible the screen provides full information in English; few abbreviations are used. The overall result is an intuitive method of programming which is a great advantage at the flying field, as you will rarely need to consult the operating instructions

This is the basic rule in programming: buttons **I** and **II** are used to move the cursor or **change** values, while the **SET** button is used to select or confirm your inputs.

The basic settings cover the battery type in use, the battery capacity, the output voltage, the servo frame rate, the initialisation of the match-channels and the switching points for the door sequencer.

3.5.a Battery settings

These settings should always be entered first, so that you have an accurate view of the state of the battery while you carry out further adjustments. In the screen-shot below you will see the default settings of the **PowerBox Competition / Cockpit.** If you wish to change them, this is the procedure:

- Switch both batteries on.
- Press the SET button and **hold it pressed** in until the following display appears:

- Press button **II** until the **cursor** (**hollow** circular ring) lines up with **"Power Manager"**, then press the SET button. The following display now appears:

factory setting

- If you wish to change one of the settings, use buttons **I** and **II** to move the cursor to the appropriate menu point, then press the SET button to select it (cursor changes to a solid disc). You can now alter the value using buttons **I** and **II**. Once you have selected the desired value, press the SET button to confirm it; this saves (stores) the new value. Select the menu point **OK** to return to the main menu.

NOTE: the presence of a solid disc (instead of a ring) indicates that you are in a menu point.
It is possible to alter a value more quickly by holding one of the two buttons **I** or **II** pressed in; the value then starts to change slowly in the corresponding direction, and the rate of change accelerates with time.

Key to the individual menu points:

- Chemistry: this is where you set the battery type. Three different types of battery are available:
• Two-cell LiPo
• Five-cell NiMH
• Two-cell LiFe

- Capacity: you can enter the nominal capacity of your batteries at this point.

- Frame rate:
What does **'frame rate'** mean?
This value indicates the time interval at which the servo signal is refreshed. Modern digital servos are unlikely to encounter problems with the 12 ms setting, but older analogue servos may require a longer setting of 21 ms. For more information on servo compatibility please contact the manufacturer of your servos. A faster refresh rate causes the servos to respond more swiftly, and they will offer greater effective torque because they are capable of counteracting the forces acting upon them more quickly.

Caution:
The **frame rate** setting should only be changed if you know for certain that your servos are suitable for the **frame rate** you wish to use.

Variable frame rate is not available on all channels of the **PowerBox Competition / Cockpit.**

PB Cockpit: the **frame rate** adjustment facility is available for the four match-channels and all the door sequencer outputs.

PB Competition: the **frame rate** adjustment facility is available for the four match-channels as well as outputs 1 and 2.

All the other channels operate at the same **frame rate** as the receiver.

- Output voltage:
  CAUTION: if you intend to select the 7.4 V output voltage, please ensure **before** you make the change that **all** the consumer units connected to the unit, i.e. all servos, receivers and gyros, are compatible with a 7.4 V supply. Information on this subject can be found in the instructions for these components supplied by the manufacturers.
  Compared with a direct, unregulated voltage of 8.4 V, the advantage of a stabilised 7.4 V supply is that the voltage is always constant. This means that the servos in your model always run at the same speed and with the same torque, regardless of the manoeuvres you fly. For example, if you were to operate the servos on the unregulated voltage of LiPo batteries, their running characteristics would alter as the freshly charged batteries steadily discharged during the flight. Another major advantage of a regulated 7.4 V voltage is that it completely eliminates damaging voltage peaks (spikes); this extends the useful life of the servos substantially.

3.5. b Initialising the transmitter

If the servo-matching function and / or the door sequencer are to operate effectively, it is essential to 'teach' the backer the centre point of your transmitter's sticks and the switching points of the switched channel. This only has to be carried out **once.**
Move to the main menu and call up the point **"TX SETTINGS".** This action takes you to the following menu:

• Setting the door sequencer switch positions

The **switch positions** are the positions of your model's retractable undercarriage; the following points must be observed in this regard:

A stands for the 'undercarriage extended' state
B stands for the 'undercarriage retracted' state

It is important to define these points before setting up the sequencer: when the system is switched on, the door sequencer "waits" for switch position **"A"** before it allows switching processes to be carried out. If the transmitter switch is at the **"B"** position - retracted - when the system is switched on, the undercarriage remains extended.

The cursor should be positioned at **"POS A".** Now press the SET button on the **SensorSwitch**, move the retract switch on your transmitter to the position corresponding to 'undercarriage extended', then press the SET button again.
Now use button II to move the cursor to **"POS B"** before pressing the SET button again. Move the transmitter retract switch to the position corresponding to 'undercarriage retracted', and press the SET button.
The values which now appear on the screen at **"POS A"** and **"POS B"** are of no importance, but they must be different; it is essential to check this. If the two values are identical or almost identical, please check the settings on the transmitter to establish whether you have activated the correct switch.

• Setting the centre point for servo matching

Precise servo matching is only possible if your transmitter is first initialised. Contrary to previous **PowerBox** servo matching systems, you now only need to 'teach' the backer your transmitter's centre point settings.
This is accomplished to moving the curser to **"CHANNEL"** and selecting the appropriate channel.
Select **"POS"** using the cursor, and check that the stick and trim for this channel are exactly at centre. Press the SET button to confirm the value.
Repeat the procedure for all the match-channels you wish to use.
The servos can now be calibrated, using these stick positions as a reference point. Subsequent trim adjustments have no effect on servo matching.

Select **"OK"** to return to the main menu.

4. Setting up the door sequencer

Select the point **“SEQUENCER”** in the main menu. The following display will now appear:

Right at the outset we must point out that the **PowerBox** door sequencer which we have developed provides totally new solutions and unprecedented facilities for programming the movement of undercarriage wheel doors.
For example, many door sequencers only offer the pilot fixed, pre-set vectors for retracting and extending the undercarriage, but our system does **not.** Most of today’s door sequencers only provide two modes, which can be used - for example - to open the wheel doors, extend the wheels, then close the doors again. When the undercarriage is retracted, the procedure and the timing of the actions are the same.
The **PowerBox** door sequencer offers virtually unlimited flexibility, because the operator is able to define each element of travel himself, **together** with the time over which each part of the process occurs. For example, it is possible for all the wheel doors to open or close at entirely different rates, and even multiple extension / retraction processes are possible. If your scale prototype features a ‘jerk’ in the motion when the locking mechanism engages, this can also be simulated. The opening and closing processes can be set up individually, as they are completely independent of each other.
In spite of the wide-ranging facilities, operating the door sequencer is simple and user-friendly thanks to the integral screen and the menu-based control system. Additional programming aids are included in the software. Once you have understood the basic principle, you will find it very straightforward to program the system, even **without recourse to the manual.**

This is the principle:

The basis of all the settings is what we term the **“TASK”**: each **task** represents a **single** action. **Twelve** tasks are available for the retraction process, and a further **twelve** tasks for the extension process, i.e. it is possible to program a sequence consisting of **24** different movement processes.

One task contains the following information:

Value	Range
Task number	1 - 12
Extend or retract undercarriage	ACTION A or B
Servo number	1 - 6
Servo position START	700 µs - 2300 µs
Servo position STOP	700 µs - 2300 µs
Start time	0 - 9.9s
Stop time	0 - 9.9s

A brief reminder of the method of setting the values: as in the other menus, buttons **I** and **II** on the **SensorSwitch** are always used to move the cursor and adjust the selected value. The **"Set"** button is used to select the menu point or confirm the entered value.
Holding buttons **I** or **II** pressed in causes the selected value to change automatically in the appropriate direction; the rate of change is initially slow, and then accelerates steadily.
The servo position alters in real time, which makes it very much easier for you to adjust the wheel doors accurately to suit the "OPEN" or "CLOSED" positions.

Intelligent programming aid:

If you wish to set up multiple tasks in order to move the wheel doors to several positions, you will soon discover that the initial position value and start time for the new task are always assumed to be the same as the last set position of the selected servo. This speeds up programming, as you do not need to note down the servo's last position and stop time.
The system is analogous when you are setting up the retract process (A » B). When you subsequently set up the extend process (B » A), you will find that the position values for Start and Stop for that servo are already entered at Stop and Start.

You will also find the **TEST** function helpful when programming particular **tasks**, as it carries out the specific task which is displayed on the screen at that time. This is always useful if you wish to check whether the servo reaches the same end-point from its rotational movement as it did in the previous stage of programming. It is also helpful for testing the switching points of an electronic valve.

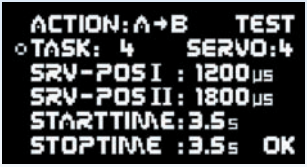
The following sequential example covers a complete retraction / extension process. Naturally the values for the various positions will vary according to your linkages, and you must set them up individually to suit your model. **It is vital that the wheel door positions should not mechanically stall (obstruct) the servos.** You will also need to adjust the timing shown in the example to suit the requirements of your model. The processes do not need to be timed exactly as shown in tasks 3 and 4. Our example shows a typical set-up for opening one wheel door, extending the wheel, and closing the wheel door again.

Sequence for retracting the undercarriage

TASK 1 is used to open the main wheel door immediately when the transmitter switch is moved **from position A to position B.** The selected stop time of three seconds causes the door to open slowly.

TASK 2 controls the secondary wheel door. In our example the servo for this function is installed in the reverse orientation, as can be seen from the position values. Reversing the servo is very easy with the sequencer.

TASK 3 is responsible for operating the nosewheel door, which is open when the wheel is extended. After a period of 3.5 seconds (set in Task 4) the undercarriage is extended, and after a brief pause this wheel door closes again.



TASK 4 controls an electronic pneumatic valve for the retractable undercarriage in our example. The valve will open after a delay of half a second once the wheel doors have reached their position; at this moment it feeds compressed air into the air cylinders. The switching points are programmed on the valve itself after the door sequencer has been programmed.

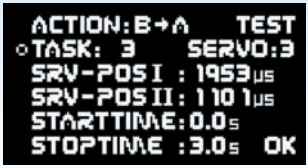
TASK 5 - the wheel door which opened in Task 1 closes again 1.5 seconds after the undercarriage is extended. In our example it closes even more slowly than when opened.

TASK 6 - the secondary wheel door of the main undercarriage closes again.

Sequence for extending the undercarriage

TASK 1 - the same times have been selected as for retracting the undercarriage. The only change that needs to be made is the direction: B » A must be selected at the **ACTION** point. The software automatically copies the values for positions I and II as soon as you select servo 1.

TASK 2 - the main undercarriage door opens immediately when the retract switch is moved from position “B” to “A”.



TASK 3 immediately starts to open the nosewheel door when the transmitter switch is operated, but opens it slowly.

TASK 4 operates the electronic valve again, and the undercarriage is extended.

TASK 5 - the main wheel doors close again slowly.

TASK 6 closes the secondary main wheel door after the undercarriage is extended, with a delay of 1.5 seconds.

Our example clearly shows how a complex function is put together. It is also possible to insert additional movements or intermediate stops at any time when opening or closing the wheel doors: you can simply use the remaining tasks 7 to 12 for this. Using the facilities of the sequencer system there is no reason why the model's undercarriage should not retract and extend exactly as the original. The only limit to what can be achieved is your own imagination.

5. Setting up the match-channels

Select the point **“Servo matching”** from the main menu, and you will see the following screen display:

It is important to start by initialising the match-channels which you wish to use, as described in point 3.5b. We recommend that you carry out a mechanical adjustment of servo 1 for the channel in question, so that the control surface is exactly at neutral when the servo is at centre. We also advise that you set up the maximum travel and Expo functions correctly before matching the servos. The method of programming is once again extremely simple; a step-by-step account follows:

- **Disconnect** the control surface linkages from the servos to avoid high forces acting upon the as yet unmatched servos.
- Select the channel you wish to match in the menu point CHANNEL.
- Now select the servo you wish to adjust; both servos can be adjusted or reversed independently of each other.
- Move the cursor to “START”, but **do not** press the SET button at this stage.
- If you now move the corresponding transmitter stick, the arrow at the bottom of the screen indicates which OFFSET you are adjusting. This is not relevant to the adjustment process, but does inform you whether you are altering the end-point or the centre position.
- Move the stick in the direction you wish to adjust, then press the SET button.
- You can now release the stick, as the **PowerBox** retains the position. This means that you have both hands free, so that you can use one hand to adjust the position accurately using buttons **I** and **II**, and the other to check that the disconnected ball-link lines up correctly with the linkage point.
- Press the SET button again to conclude the set-up process.
- Do not re-connect the linkage until you have adjusted the centre position and both end-points perfectly.

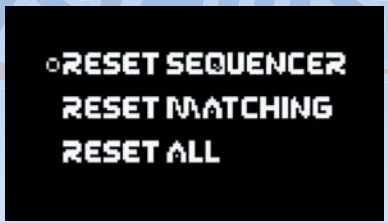
- To carry out further adjustments at the opposite end-point or the centre position, move the transmitter stick in the desired direction once more, and press the **SET** button again to start the process.
- If you wish to reverse the direction of rotation of a servo, move the control surface to one end-point and select the menu point **START.** Now press button **I** or **II** constantly until the control surface moves in the opposite direction. Repeat the procedure for the other end-point of travel.

TIP:

In the case of large ailerons in particular, it can be advantageous **not to** match the servos with 100% accuracy. If the servos are precisely matched, gearbox play may allow aileron flutter to develop. You can eliminate this danger as follows: first match the servos exactly to each other, and then offset them against each other slightly by pressing the **I** or **II** button two or three times.

6. Resetting the door sequencer and the match-channels

Select the point **"RESET"** in the main menu to move to the following screen display:



This menu point is used to reset the values for the door sequencer and / or the match-channels to the factory default settings.

Caution: once you have confirmed your choice by answering **"YES"** to the security query, the values are reset, and the previous settings are permanently lost.

7. Connections for radio control systems with downlink facilities

The **PowerBox Competition / Cockpit** both include one entirely new feature: you can connect various radio control systems to them in order to transmit all battery data directly to the screen of your radio control transmitter. The system supports the Multiplex **"MSB"** system and **Spektrum** telemetry.
All that is required is to connect the receiver or the downlink transmitter to the appropriate port of the **PB Competition / Cockpit** battery backer before switching the system on. There is nothing to configure, and the system automatically adopts the correct settings and calibration values. However, if you are using an **MSB** connection it is essential to check that other sensors connected to the "bus" do not share the addresses used by the **PowerBox.** The table below contains a summary of the addresses used. The voltage and residual capacity of **both** batteries is passed out, and alarms are triggered at the transmitter if the values fall below a specific threshold, regardless of battery type. An alarm is also triggered at the transmitter if the residual capacity falls below 20%.

Addresses of the **PowerBox Competition / Cockpit** for the MSB system (Multiplex):

Address	Function
3	Battery voltage 1
4	Battery voltage 2
6	Capacity 1
7	Capacity 2

8. Regulator error message

The **PowerBox Cockpit** or **Competition** constantly checks both voltage regulators independently of each other. If a fault should occur in one of these regulators, this warning will appear on the screen:

There are two possible causes for this warning:

a) One or both regulators is generating insufficient output voltage or none at all. This could mean that you are flying with only one regulator functioning, and for reasons of safety this is not permissible.
b) One or both regulators is not functioning, and is passing through the full battery voltage. This means that the servos and receiver are being operated on an excessive voltage, which could lead to failures in the longer term. This malfunction usually occurs after a reversed polarity connection.

If you see the warning message, it is essential to send the backer to us at the Service address printed below, together with the completed repair form which can be downloaded from our website.

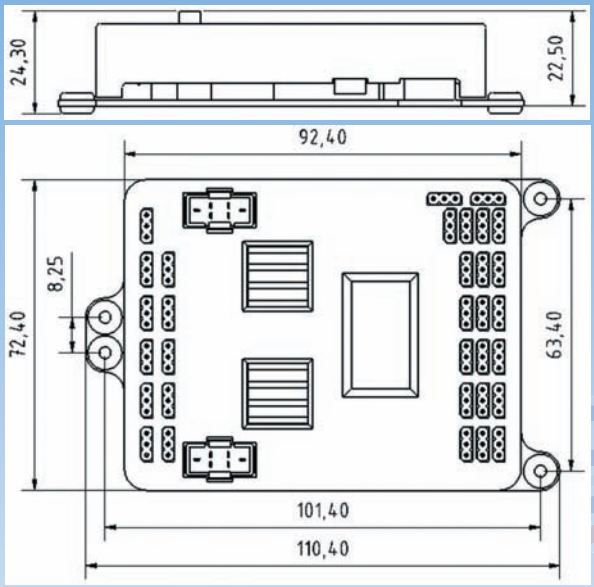
9. Specification

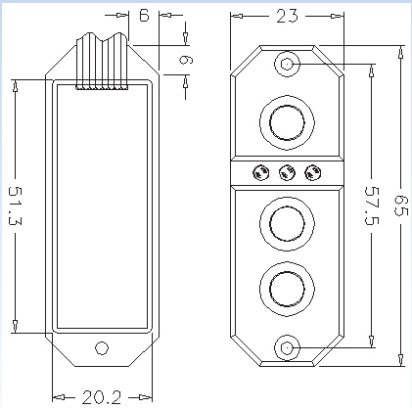
Operating voltage:	4.0 Volts to 9.0 Volts
Energy source:	2 x two-cell LiPo batteries, 7.4 Volts 2 x five-cell NiCd / NiMH batteries, 2 x two-cell LiFe batteries (A123)
Current drain:	Power-on state, approx. 130 mA Power-off state, approx. 15 µA
Dropout voltage:	approx. 0.25 V
Max. receiver and servo current:	2 x 10 A (stabilised), according to cooling efficiency - Peak 2 x 20 A
Servo signal resolution:	0.5 µs
Signal repeat rate (frame rate):	9 ms, 12 ms, 15 ms, 18 ms, 21 ms
Integral screen:	OLED, 128 x 64 pixels, graphic
Servo sockets:	**Cockpit:** 21 sockets, 11 channels **Competition:** 18 sockets,12 channels
Temperature range:	-30° C to +75° C
Weight:	115 g
SensorSwitch:	15 g
EMV approval:	EN 55014-1:2006
CE approval:	2004/108/EG

This battery backer fulfils the EMV protective requirements, EN 55014-1:2006 with certificate dated 10 February 2009. EMC approval 2004/108/EG.

The unit must not be connected to a mains PSU!

Dimensions:





10. Set contents

- **PowerBox Competition / Cockpit**
- 12 / 11 UNI patch-leads
- **SensorSwitch**
- Four rubber grommets and brass spacer sleeves, factory-fitted
- Four retaining screws
- Operating instructions

6. Guarantee conditions

We take the maintenance of the highest quality standards very seriously, and that is why **PowerBox Systems GmbH** is currently the only RC electronics manufacturer which has been awarded certification to the **DIN ISO 9001:2000** industrial norm**.**
Our stringent quality management, which applies both to development and production, is the reason why we are able to grant a **36 month guarantee** on our products, valid from the initial date of purchase**.** The guarantee covers proven material faults, which will be corrected by us at no charge to you**.**

We expressly deny liability for damages which are caused by the device, or arise through the use of the device!

Liability exclusion:

We are not in a position to ensure that you install and operate this battery backer 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 device, or are connected with its use in any way!

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

Donauwörth, February 2010

PowerBox-Systems GmbH
certificated according to DIN EN ISO 9001:2008
Ludwig-Auer-Strasse 5
D-86609 Donauwörth
Germany

Tel: +49-906-22 55 9
Fax: +49-906-22 45 9
info@PowerBox-Systems.com

www.PowerBox-Systems.com