PowerBox Systems®

World Leaders in RC
Power Supply Systems

Instruction Manual

EVOLUTION

SPEKTRUM


PowerBox Systems

Dear customer,

We are delighted that you have decided to purchase the **PowerBox Evolution Spektrum** from our range.

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

1. Product description

The **PowerBox Evolution Spektrum** has been developed specifically for Spektrum pilots, and represents a combination of the proven **PowerBox Evolution** with a Spektrum nine-channel receiver in one compact device. All you need is three **Spektrum DSMX** satellites in order to obtain a completely redundant receiver / battery system.

As with all **PowerBox systems** the power supply system is duplicated throughout, i.e. there are two controllers, two switches and two regulators.

All commonly used types of battery can be employed: LiPo, LiFePo or NiMH. The LED indicator allows you to monitor the packs' state of charge at a glance.

The integral regulators stabilise the voltage at 5.9 V or (optionally) 7.4 V. This makes it possible to exploit the performance potential of HV servos to the full.

The **SensorSwitch** included in the set is used to activate and disable the integral electronic switches. It is also used to set the battery type and the output voltage.

Features:

- Integral 9 Channel Spektrum™ DSMX® Empfänger
- 2048 bit resolution
- Double regulated output voltage
- Two integral electronic switches, controlled by the **SensorSwitch**
- Signal amplification for a total of 9 channels and 12 servos
- Connector for Flight Log to check RF-quality
- Selectable servo voltage of 5.9V or 7.4V
- Independent voltage monitors in 4 steps
- Regulator monitoring
- Minimum voltage memory for both batteries
- For LiPo, 5-cell NiCd/NiMH or LiFePo batteries
- Two external ultra-bright warning LEDs
- Large heatsink for extreme loads
- Elemination of reverse voltages from servos

This range of functions makes the **PowerBox Spektrum Evolution** the ideal dual power supply for large model aircraft with wingspans in the range 2.0 m to 2.6 m, as well as helicopters and gliders.

2. Connections, controls:

The following illustrations show the essential sockets and controls:

Input binding plug or FlightLog

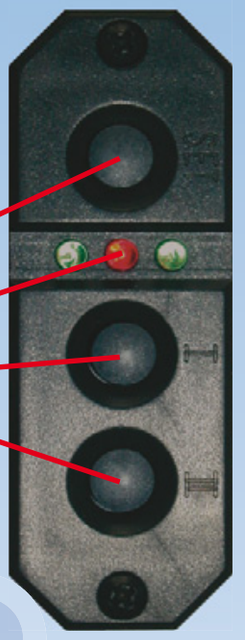
Servo sockets

Sockets for external LEDs

Voltage and minimum value indicator LEDs

Input for battery II

Satellite inputs



Button for activation and battery type selection

LEDs for power-on status

Switch buttons for battery I and II

SensorSwitch socket - connect as shown.

3. First steps, the unit in use

a) Connections

- First connect the three satellite receivers. All three receivers must be connected, otherwise the system will not start. The purpose of this requirement is safety, as it reveals sources of errors such as faulty connecting leads in good time. Any faults which develop in flight have no effect, as reception is always adequate with at least one satellite receiver.
- Connect the servos to the appropriate sockets; the function assignment is printed on the **PowerBox** itself.
- Now 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 lead 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 **PowerBox**, but would prevent you switching the system off.
- The optional ultra-bright external LEDs can now be connected to the unit. We urge you to connect them and mount them in the fuselage side, as they enable you to detect battery problems when the model is flying.
- The final step is to connect the batteries to the **PowerBox**'s integral MPX connectors. We recommend the use of batteries or **1500mAh** or **2800mAh** capacity from **PowerBox Systems**. 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! Connecting a battery with reversed polarity will instantly ruin the voltage regulators. In order to minimise power losses, the **Evolution Spektrum** does not feature reverse polarity protection. The **+** (positive) indicator can be seen on the case cover.

b) The procedure for switching on and off

Switching the unit on and off is very simple, and the process effectively prevents accidentally changing the **PowerBox**'s status. 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; the PowerBox is now switched 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.

Once switched on, the **PowerBox** can only be turned off again using the switch unit. Intermittent contacts or interruptions in the power supply cannot cause the **PowerBox** to be switched off permanently.

c) Setting the battery type

The default battery type setting is Lithium Polymer. If you wish to use two-cell LiPo packs, you therefore need to make no changes at this point. For all other battery types adopt this procedure:

- Switch both batteries on.
- Hold the SET button pressed in, and watch the central LED on the **SensorSwitch**.
- The LED will light up, and then go out again after a brief period.
- After a few seconds the LED emits one brief red flash. If you now release the button, you have selected the battery type LiPo.
- If you allow the LED to flash twice before releasing the button, you have selected five-cell NiCd / NiMH as the battery type.
- If you hold the button pressed in until the LED has flashed three times, the voltage indicator is prepared for LiFe (A123) packs.

This process only takes a few seconds, and is designed to eliminate the danger of accidental changes to the setting. In any case it only has to be carried out once, as your selected battery type is permanently stored in the **PowerBox**'s EEPROM.

d) Reading out the minimum value memory

The minimum value memory shows you the extent to which the battery voltage collapsed during the last flight. Control surfaces with a tendency to jam, stiff linkages, or simply batteries which fade under load may be the cause of any problem in this respect. Please make it part of your routine to read out this minimum value memory after every flight, as this enables you to detect any weakness in the system before the next flight.

The method of calling up the memory is simple:

After the flight, press both switch buttons I and II simultaneously, and hold them pressed in as long as you like. The LED which now lights up indicates the lowest voltage value which occurred during the flight. The memory does not record voltage collapses which were of very short duration; only those lasting longer than one second.

e) Binding the receiver to the transmitter

The receiver must be programmed to the transmitter's GUID to ensure that it only processes the signals from its own transmitter. This procedure causes the receiver to store a code which is unique in the world. During the binding process the servos' fail-safe positions are also stored. The **PowerBox Evolution Spektrum** offers two types of "fail-safe". The methods are the same for all Spektrum receivers:

a. Binding using the SmartSafe system

In this case all control surfaces remain in Hold mode in a fail-safe event, while the throttle channel runs to Idle or the Off position:

- Check that the **PowerBox** is off, then insert the Bind plug into it.
- Switch the **PowerBox Evolution Spektrum** on: all three satellites should now flash at a high rate.
- Hold the transmitter's Bind button pressed in while you switch the transmitter on.
- Continue to hold the button pressed in until the LEDs on all the satellites glow constantly.
- Disconnect the Bind plug.

b. Binding using the PreSet Fail-Safe system

In this variant the positions set during the binding procedure are passed to the receiver and subsequently passed on to the servos if a fail-safe event should occur:

- Check that the **PowerBox Evolution Spektrum** is switched off, then insert the Bind plug into it.
- Switch the **PowerBox Evolution Spektrum** on: all three satellites should now flash at a high rate.
- **Disconnect the Bind plug.**
- Move all the transmitter sticks and switches to your preferred fail-safe positions.
- Hold the transmitter's Bind button pressed in while you switch the transmitter on.
- Continue to hold the button pressed in until the LEDs on all the satellites glow constantly.

Check all the fail-safe servo positions by switching the transmitter off: all the servos should now run to the previously programmed positions.

f) Range-checking

We recommend carrying out a range-check before every day's flying session, and before flying any new model. When 35 MHz systems were in use it was easy to detect a broken aerial or similar damage, but this is not always obvious with 2.4 GHz equipment. The range-check is carried out by holding the Bind button of your Spektrum transmitter pressed in while you walk away from the model holding the transmitter. All the control surfaces must operate correctly at a range of at least 25m.

NOTE: if you find after a flight that the LEDs on one or more satellites are flashing, this indicates either low voltage or the brief failure of a cable connection. If this should happen, read out the FlightLog data and check the lead to the satellite concerned

g) Changing the output voltage 5.9 V / 7.4 V

You can set your **PowerBox Evolution Spektrum** to either of two different output voltages. The default stabilized voltage is 5.9 Volts. If you wish to raise the voltage to 7.4 Volts, please check carefully that all the components in your model are designed and approved for the higher voltage.
In 7.4 Volt mode the dissipated power is lower, and this means that the power of your **PowerBox Evolution Spektrum** is about 30% higher.

By default both voltage regulators are set to 5.9 V. If you wish to use high-voltage servos (HV servos, designed for up to 8.4 V), the **PowerBox Evolution Spektrum** allows you to operate the servos on a regulated voltage of 7.4 V instead of 5.9 V. The advantage of a regulated 7.4 V voltage compared with an 'open' 8.4 V battery is that the regulated voltage causes all servos to work constantly at the same speed and generate the same torque. This is an important advantage which is particularly appreciated by all our competition pilots, as it makes all maneuvers more predictable and easier to fly.
A further advantage of a regulated 7.4 V servo voltage is a longer effective life for your servos, as it eliminates the voltage peaks which occur when the batteries are freshly charged.

The procedure for switching the unit to 7.4 Volts is quick and simple, and only needs to be carried out once. The setting is stored permanently, but can also be changed again at any time. The change must be carried out for each of the two voltage regulators, as the **PowerBox Evolution Spektrum** features two regulators which work independently of each other.

To change the output voltage:

- Connect both batteries and switch the **PowerBox Evolution Spektrum** on
- Now disconnect both batteries from the **PowerBox Evolution Spektrum**
- Press the SET button and hold it pressed in
- With the SET button pressed in, reconnect Battery 1 and Battery 2
- The selected setting is indicated by the LED monitor on the **PowerBox**: all the LEDs on the appropriate side light up:

1 x flash means that the regulator is now operating at 5.9 V
3 x flashes means that the regulator is now operating at 7.4 V

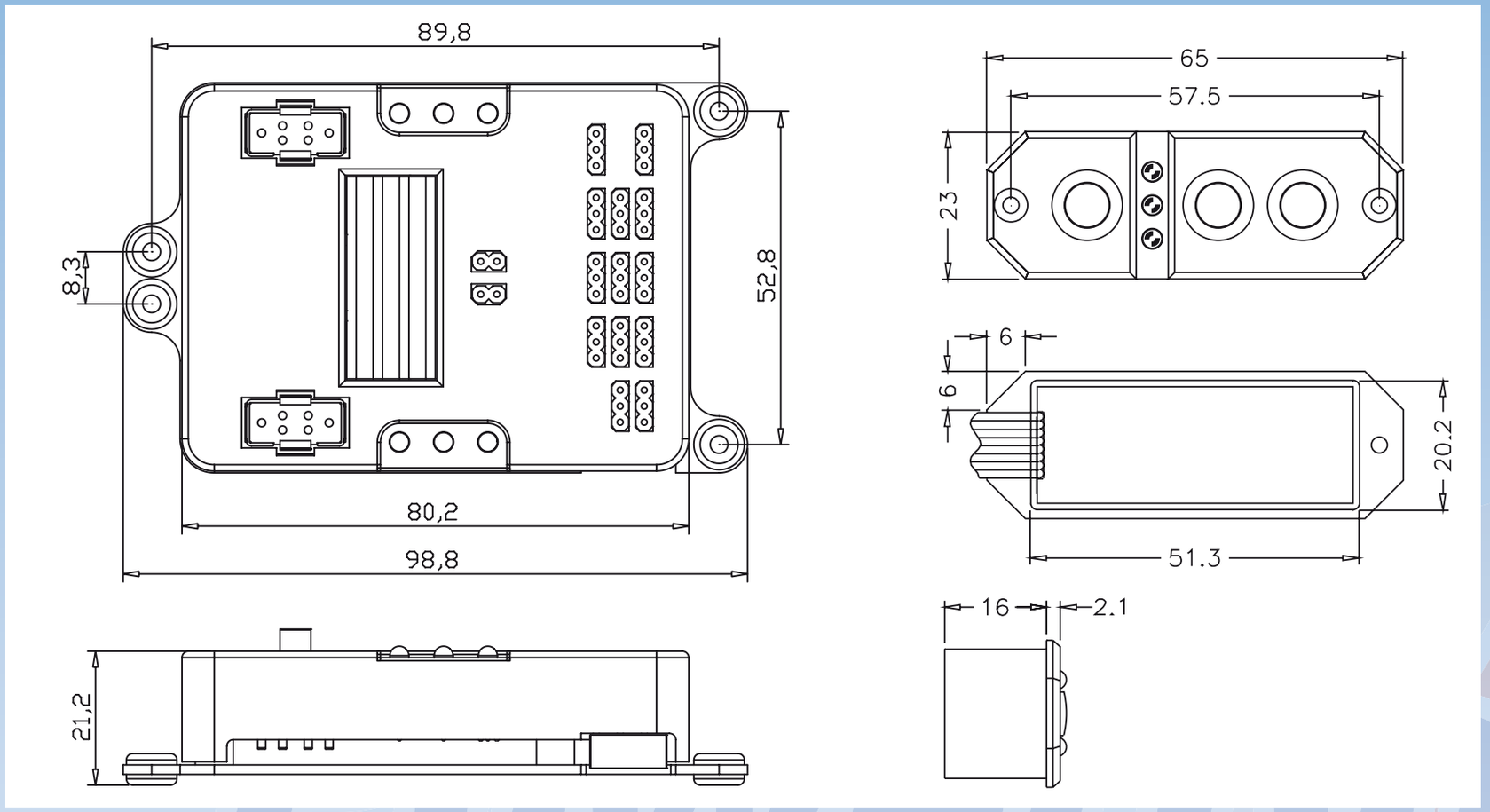
The output voltage is switched by a toggle process. Example: the set voltage is 5.9V; if you connect the batteries with the SET button pressed in, the output voltage changes to 7.4 V, and the LEDs flash three times. If you wish to revert to 5.9 V, you must disconnect the batteries and repeat the procedure.

Caution: it is essential that both regulators are set to the same voltage. If you set only one regulator to 7.4 V, the voltage at the output is 7.4 V.

4. Specification

Operating voltage:	4.0V - 9.0V
Power supply:	2S LiPo, 2S LiFePo, 5S NiCd/NiMH
Current drain:	Power-on state 85mA
Current drain:	Standby 4µA
Maximum load current:	Peak 2x20A
Drop-out voltage:	0.3V
Output voltage:	5.9V and/or 7.4V regulated
Signal input:	seriell, DSMX
Channels:	9
Servo sockets:	12
Dimensions:	93 x 67 x 19 mm
Weight:	90g
Weight Sensor Switch:	15g
Temperature range:	-30°C to +75°C
EMV test:	EN 55014-1:2006
CE test:	2004/108/EG
Registered design:	DE 203 13 420.6

The unit must not be connected to a mains PSU!



5. Set contents

- **PowerBox Evolution Spektrum**
- **SensorSwitch**
- 2 external LEDs
- 4 rubber grommets and brass spacers
- 4 retaining screws
- Operating instructions

6. Service note

We are anxious to offer good service to our customers, and to this end we have set up a Support Forum which deals with all queries concerning our products. This relieves us of a great deal of work, as it eliminates the need to answer frequently asked questions time and again. At the same it gives you the opportunity to obtain help quickly all round the clock - even at weekends. All the answers are provided by the **PowerBox Team**, guaranteeing that the information is correct.

Please use the Support Forum before you telephone us.

You can find the forum at the following address:

www.forum.powerbox-systems.com

7. Guarantee conditions

At **PowerBox System**s we insist on the highest possible quality standards in the development and manufacture of our products. They are guaranteed **“Made in Germany”!**

That is why we are able to grant a **36 month guarantee** on our **PowerBox Evolution Spektrum** from the initial date of purchase. The guarantee covers proven material faults, which will be corrected by us at no charge to you. As a precautionary measure, we are obliged to point out that we reserve the right to replace the unit if we deem the repair to be economically unviable.

Repairs which our Service department carries out for you do not extend the original guarantee period.

The guarantee does not cover damage caused by incorrect usage, e.g. reverse polarity, excessive vibration, excessive voltage, damp, fuel, and short-circuits. The same applies to defects due to severe wear.

We accept no liability for transit damage or loss of your shipment. If you wish to make a claim under guarantee, please send the device to the following address, together with proof of purchase and a description of the defect:

Service Address:

PowerBox-Systems GmbH
Ludwig-Auer-Straße 5
D-86609 Donauwörth
Germany

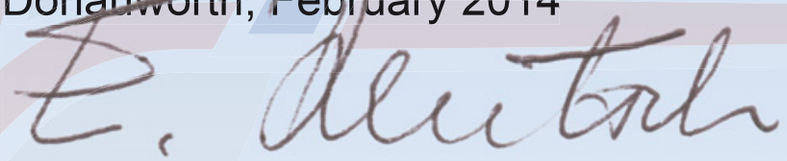
8. Liability exclusion

We are not in a position to ensure that you observe our instructions regarding installation of the **PowerBox Evolution Spektrum**, fulfil the recommended conditions when using the unit, or maintain the entire radio control system competently.

For this reason we deny liability for loss, damage or costs which arise due to the use or operation of the PowerBox Evolution Spektrum, or which are connected with such use in any way. Regardless of the legal arguments employed, our obligation to pay compensation is limited to the invoice total of our products which were involved in the event, insofar as this is deemed legally permissible.

We wish you every success with your new **PowerBox Evolution Spektrum**.

Donauwörth, February 2014



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