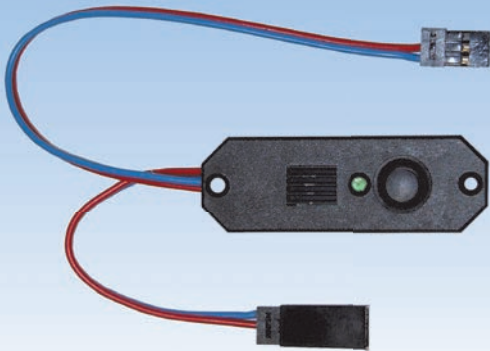


PowerBox Systems®

World Leaders in RC
Power Supply Systems

Instruction Manual

DigiSwitch





PowerBox Systems

Dear customer,

We are delighted that you have decided to purchase the **PowerBox DigiSwitch** power supply from our range. We hope you have many hours of pleasure and success with your **DigiSwitch**.

1. Product description:

This innovative product is the world's first multi-function switch system to include an integral linear voltage regulator, four-stage voltage monitoring and an electronic switch.

The unit is developed and produced by **PowerBox Systems GmbH**, and is primarily intended for use with modern, lightweight Lithium-Polymer cells.

The switching process is controlled by a micro-processor. It is particularly secure and reliable, as none of the mechanical switch components has any effect on the actual switching process.

The unit's integral voltage stabilisation circuit offers very high performance, and ensures that the running characteristics of the servos are absolutely constant. The servos' output torque and transit speed are always exactly the same through all flight manoeuvres: flight after flight, charge after charge.

This is an important advantage, especially for successful aerobatic flying, as shown by the countless international successes achieved with the unit!

Inside the elegant, extremely robust plastic case are extra-wide solder pads to which the two 0.34 mm² connecting leads - running to the battery and the receiver - are soldered in a straight line, i.e. in the direction of tension. At the transitional point between the solder pad and the cable the assembly is secured with a special adhesive which provides additional protection from vibration-induced cable fractures. As an option, the **DigiSwitch** can also be ordered with an **MPX** battery connector.



The **DigiSwitch** is primarily intended for the following **applications**:

- Small to medium model aircraft with up to five standard-size servos
- F3A competition models, for which it is extremely popular
- Model gliders with up to eight servos or more, depending on servo size, model size and type of flying
- Electric or glow-powered model helicopters with up to 1.30 m rotor diameter and a maximum of five servos
- RC model cars - electric or glow power
- Model boats
- Petrol engine ignition systems which are normally operated using a 4S NiMH battery (DA and many others)

2. First use, operating the switch

2.1. Connections

Caution: connect the battery with **correct polarity**. Both linear regulators in the switch will immediately be ruined if you connect the battery with reverse polarity.

Connect your choice of battery to the battery lead, taking care to maintain **correct polarity**. This can be a 5S NiCd or NiMH battery, a 2S (7.4 V) LiPo or Li-Ion pack, or a 2S (6.6 V) LiFePo battery.

By default the voltage monitor is set up to work with a LiPo battery.

We recommend that you use the LiPo or LiFePo battery packs which we manufacture. All **PowerBox batteries** are equipped with appropriate electronic monitor and security circuits, balancer and integral charger. All our batteries are supplied complete with a practical mounting frame of the correct size.

2.2. Switching on and off

The **DigiSwitch** features a single button, and is therefore particularly user-friendly; this button is even employed to set the battery type to be used. The button transmits the switching signal to the electronic switch, but has nothing to do with the actual process of switching the current.

The unit is **switched on** by pressing the sensor button (0.5 sec.), and holding it pressed in until the LED glows orange. Release the button briefly, then press it a second time. The LED now glows green, and the unit is switched on.

The procedure for **switching off** is identical: press the sensor button (0.5 sec.) and hold it pressed in until the LED glows orange. Release the button briefly before pressing it a second time: the LED now goes out, and the unit is switched off.

This two-stage switching procedure eliminates the danger of switching the system on or off accidentally.

If the LED glows orange or red instead of green when you switch the unit on, then:

- the battery connected to the unit is flat or only partially charged,
- or the unit is set up for the wrong type of battery.

2.3. Setting the battery type

If you wish to use a 5S NiCd or NiMH battery, or a 2S LiFePo pack, it is essential to set the voltage monitor to match your choice, otherwise the LED will flash red constantly. Please note, however, that the setting has absolutely no effect on the actual switching process or the voltage regulation system.

This is the procedure for setting up the unit to suit the different battery types:

- **Connect the battery, and switch on the DigiSwitch**
- Now **hold the button pressed in**, and watch the LED
- The LED will glow red, then go out again after a while
- Pause, hold the button pressed in again
- The LED flashes green once. If you release the button now, you have selected the 2S LiPo battery type
- Pause, hold the button pressed in again
- The LED flashes green twice. If you release the button now, you have selected the 5S NiCd / NiMH battery type
- Pause, hold the button pressed in again
- The LED flashes green three times. If you release the button now, you have selected the 2S LiFePo battery type

This procedure does take a few seconds, but is designed to prevent the user setting the wrong battery type accidentally. In any case it only has to be carried out once when you switch battery types; the setting is stored permanently in the micro-controller.

2.3. Voltage monitor

The **DigiSwitch** not only regulates the operating voltage of your RC system, it also monitors the battery connected to it.

The tri-colour LED, which you have already used to confirm the unit's power-on status, also informs you of the voltage of your battery by changing colour. The four stages are reflected by the colours green, orange, red and flashing red. Before you launch your model, you should always switch the RC system on and move the sticks around briefly: this gives you the chance to check whether the system is "in the green" while the battery is actually under load. The coloured LED also acts as a warning if the battery is too small to cope with the servos in your model, or if the battery cables are of inadequate cross-sectional area.

2.4. Installation



Please don't throw away the internal packaging, as it includes a cutting template for marking out the switch opening in or on the model. Cut or saw **outside the marked line** (see photo).

Although the **DigiSwitch** is well protected against the effects of vibration, you should still install it in a part of the fuselage where vibration levels are low.

The GRP fuselage sides of a powered model aircraft are not suitable for mounting a switch - regardless of type - because they always tend to oscillate and vibrate. You can eliminate this problem by fitting a doubler made of 2.5 or 3 mm plywood: cut a plate 2 to 3 cm larger all round than the switch cut-out, and glue it to the inside of the fuselage at the appropriate point before sawing out the switch opening.

Once glued in place, the plywood plate damps down the vibration, and also provides ample “meat” into which the retaining screws can bite.



Successful pilots place their trust in the **DigiSwitch**: 1st, 2nd and 3rd places at the 2006 European Championships in Switzerland - all using the **DigiSwitch**.

From left to right:
Roland Matt
Christophe Paysant Le Roux
Sebastiano Silvestri

3. Detailed description of function

3.1. Maximum current load

The capacity of the **PowerBox DigiSwitch** (1 - 3 A) is limited by the performance of the regulator when cooled efficiently, rather than by the switching capacity of the **DigiSwitch**. To obtain good cooling and ensure high performance, one of the heat-sinks of the **DigiSwitch** is attached to the outside of the unit. This part is normally installed on the model's fuselage side, where it receives a constant flow of cooling air when the model is flying. The internal silver-coloured heat-sink is soldered to the regulator circuit board due to its greater ability to withstand high temperatures. The recess in the case ensures that this heat-sink cannot be completely covered even if the unit is installed imperfectly. The maximum current-handling capacity of the electronic components is 12 A; this means that

the unit can cope with brief peak loads up to this level without problem. If the **DigiSwitch** is operated on a 5S NiCd or a 2S LiFePo battery, the maximum regulator capacity is higher because of the lower voltage level of these cells. If you find that the **DigiSwitch** heats up to an uncomfortable level (above 60°C) in use, then it is a safe assumption that the load connected to it is too great. You can usually improve the situation by installing the **DigiSwitch** in a position where the cooling airflow is better, and also by reducing any stiffness in the control surfaces or mechanical linkages. If none of these measures eliminates the problem, you should replace the unit with a **PowerBox Sensor**, as this product is designed for higher currents. We will be glad to advise you on such matters.

3.2. Minimum voltage

The **DigiSwitch** continues to work until the voltage falls to 2.5 V. If the voltage of the battery falls below the regulator voltage, the **DigiSwitch** passes on the full available voltage to the system rather than switching itself off.

3.3. Idle current

If the battery is left connected to the **DigiSwitch** when it is switched off, the micro-processor goes into **stand-by** mode; in this state it draws a minimal idle current of around 5.0 μA , which is far lower than the self-discharge rate of any rechargeable battery. Nevertheless, it is good practice to disconnect the battery from the unit if you know you will not be flying the model for a protracted period.



Christophe and Benoit Paysant Le Roux with their models at the 2009 F3A World Championships in Portugal, where they won the titles of **World Champion and Vice World Champion**. All the models are fitted with the **DigiSwitch**.

Benoit Le Roux: "Thank you very much; it was a great moment for me and my brother!

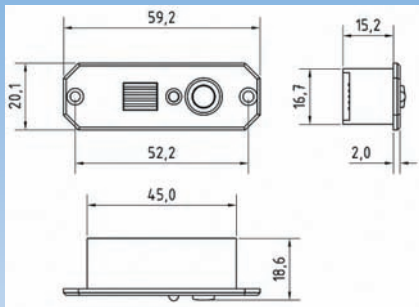
Of course we both used the **DigiSwitch** in all our models and it works really well in these very hot conditions ... 42°C on the last day!"

Christophe Le Roux: "Benoit and I were using your **DigiSwitch** and we are very happy with it. Thank you very much for your help and your support"

4. Specification

Voltage range:	2S LiPo 5S NiCd / NiMH, 2S LiFePo
Output voltage:	5.90 Volt, stabilised
Voltage monitor:	Tri-colour LED Four-stage: green, orange, red, flashing red
Regulator capacity:	1 - 3 Ampere, according to efficiency of cooling measures and the type of battery in use
Connections:	Uni plug and socket, or MPX battery connector
Cable cross-section:	Both connecting leads 0.34 mm ² , silicone-insulated flex cable
Weight:	15 grammes incl. leads
Temperature range:	-40°C to +85°C
EMV test:	EN 55014-1:2006
CE test:	2004/108/EG
WEEE Reg. No.:	DE 639 766 11

5. Installed dimensions



6. Set contents:

- Retaining screws
- Installation template
- Operating instructions in German and English

If serious vibration causes the loss of the push-button, we can supply a replacement:

Order No.: 6410 JR battery connector
6420 MPX battery connector

7. Guarantee conditions:

During the manufacturing process we subject each **DigiSwitch** to a series of test procedures. We take the maintenance of the highest quality standards very seriously (**DIN ISO 9001:2008**), and that includes all bought-in components. That is why we are able to grant a **36 month guarantee** on all our battery backers and switching systems. The guarantee covers proven material faults occurring during the guarantee period, which will be corrected by us at no charge to you.

The guarantee does not cover damage caused by using the unit incorrectly, using it for an unsuitable application, reversed polarity, excessive voltage, damp, serious external mechanical influences or shock (crash damage) or inadequate mounting (excessive vibration).

We deny any further liability, e.g. for consequent damage. We also deny liability for damage caused by the device or the use of the device, since we are not in a position to ensure that you install and operate the unit correctly.

The DigiSwitch fulfils the EMV protective requirements, EN 55014-1:2006, with certificate dated 28 February 2008. EMC test 2004/108/EG.

We hope you have loads of fun and success with your new **DigiSwitch** !



Donauwörth, July 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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