PowerBox Systems

World Leaders in RC
Power Supply Systems

Smart-Switch

Operating Instructions

Dear customer,

Congratulations on your decision to purchase the Smart-Switch from our range!

This innovative product is the world's first electronic multi-function switch system, developed and produced by **PowerBox Systems GmbH**. The unit is designed to switch the receiving system on and off safely and reliably, and to monitor the airborne power supply.

The switch housing accommodates a modern, failure-proof electronic switch and a four-stage voltage monitor designed for use with all the usual power sources employed in modeling: four-cell and five-cell NC or NiMH batteries, and two-cell LiPo packs.

The dual connecting leads have a conductor cross-section of 0.34 mm², and inside the elegant, extremely robust plastic housing they are both soldered directly (i.e. in a straight line) to extra-wide solder pads, where they are encased in a special support adhesive for additional protection from possible vibration damage.

We recommend the Smart-Switch primarily for the following applications and types of model:
- all models which were previously equipped with mechanical switches,
- small to medium-sized model aircraft,
- model gliders,
- model helicopters
- model cars,
- model boats, and
- all kinds of petrol engine ignition

Operation:
The only control on the **Smart-Switch** is the push-button, which makes it extremely easy to use. All this button does is pass the switch signal to the electronic switch; it has nothing to do with the actual switching of the current.

Connect a battery of your choice to the battery lead, which is fitted with a Universal connector (JR, Futaba). The pack may be a four-cell or five-cell NC or NiMH type, or a two-cell (7.4 V) LiPo or Li-Ion battery. Take care to connect the pack **with correct polarity**.

Caution: the Smart-Switch does not feature a voltage stabilization circuit.

If you wish to use a **two-cell LiPo battery**, you must not use the **Smart-Switch** in conjunction with a **receiving system designed only for 6.0 Volts**, i.e. the entire system - receiver and servos - must be designed to cope with this voltage. If the receiving system is only designed for max. 6.0 Volts, we recommend the **Digi-Switch** (also in our range), as this features a supplementary voltage stabilization circuit which generates 5.5 Volts; the switch housing is the same size.

If the **Smart-Switch** is to be used with a two-cell LiPo pack, one application which we particularly recommend is as a switch for ignition systems which are designed as standard for more than 6.0 Volts.

Caution: connecting the battery with reversed polarity will destroy the switching IC inside the unit!

When you connect the **correct** battery, the LED immediately glows green.

By default the voltage monitor is set up for use with LiPo cells.

If you wish to use an NC or NiMH battery, you must first re-set the voltage monitor circuit, otherwise the unit will detect the wrong battery type, and the LED will constantly flash red.

The voltage monitor setting is changed using the sensor button. You simply hold the button pressed in until the LED indicates the correct setting in setup mode:
- LED flashes green once = LiPo
- LED flashes green twice = five-cell battery
- LED flashes green three times = four-cell battery

Now we come to the procedure for setting the voltage monitor circuit:
- Hold the sensor button pressed in
- After about one second the color of the LED changes to orange
- After a further three seconds the color of the LED changes to red
- After a further five seconds the LED goes out briefly - now watch carefully!
- The LED emits one brief green flash: release the button now, and the switch is set to voltage monitoring for LiPo batteries.
- If you continue to hold the button pressed in, the LED emits two brief green flashes: release the button now, and the switch is set to voltage monitoring for a five-cell NC or NiMH battery.
- If you still continue to hold the button pressed in, the LED emits three brief green flashes: release the button now, and the switch is set to voltage monitoring for a four-cell NC or NiMH battery.

To switch off: hold the sensor button pressed in for about 0.5 seconds until the LED glows orange, then press the button briefly a second time. The LED goes out, and the **Smart-Switch** is switched off.

To switch on: hold the sensor button pressed in for about 0.5 seconds until the LED glows orange, then press the button briefly a second time. The LED glows green, and the switch is on.

The process of pressing the button twice, with a precisely defined interval, eliminates the possibility of the switch being turned off accidentally, e.g. by vibration.

If the LED glows orange or red instead of green when you switch the circuit on, this indicates that the battery connected to it is not fully charged or is already discharged; alternatively the incorrect battery type might have been set. If this should occur, we recommend that you recharge the pack using a suitable battery charger before using it again; alternatively set the switch to the correct battery type.

The current handling capacity of the **Smart-Switch** stated in the Specification does not relate to the switching capacity of the electronic **switch**, but to the limitations of the two connecting leads (conductor cross-section 0.34 mm²) and the gold-plated Uni connector contacts (JR, Futaba). Cooling is not required with the **Smart-Switch**. In electronic terms the switching capacity of the **Smart-Switch** is more than 20 A, and if the current should approach anywhere near this value, the leads and the Uni-connector would burn out long before the switch is affected.

If the **Smart-Switch** is left connected to a battery when it is switched off, the unit goes into "**stand-by**" mode. The idle current in this state is around 5.0 µA, which is lower than any battery's natural rate of self-discharge. Even so, we recommend that you disconnect the battery from the switch if you know the model will not be used for a long period.

Please don't just throw away the inner packaging, as it is designed to be used as a template for marking the switch aperture on the model. Cut the opening using a knife or saw, working **slightly outside the marked line** (see photo).

Even though our product is very well protected >from the effects of vibration, the **Smart-Switch** should always be mounted in a part of the model where vibration levels are relatively low.

Please note the following point:
The GRP fuselage sides of a large power model are not suitable for mounting the **Smart-Switch** - nor any other type of switch - as they are always subject to considerable vibration.

You can remedy the situation by cutting a ply plate (2.5 - 3 mm thick) about 2 - 3 cm larger than the switch aperture, and gluing it over the inside of the opening.

The plate damps the vibration, and at the same time provides plenty of "meat" for the switch retaining screws to bite into.

The difference between the Digi-Switch and the Smart-Switch
The **Digi-Switch** features a linear IC-controlled regulator which maintains the voltage for the consumer units - receiver and servos - at a constant 5.5 Volts, regardless of the battery to which you connect it. Externally the Digi-Switch is distinguished by the black heat-sink on the front face, and the silver heat-sink on the rear of the housing.

The **Smart-Switch** does **not** feature an integral regulator, i.e. the input voltage from the connected battery simply passes through it just like any other switch; the voltage is not regulated or reduced in any way. For this reason, if the **Smart-Switch** is connected to **LiPo cells**, it must not be used in conjunction with a receiving system which is designed for max. 6.0 Volts, as this would subject the receiver and servos to an input voltage which could be as high as 8.4 Volts. Externally you can distinguish the **Smart-Switch** by the blue heat-sink on its front face; there is also no heat-sink on the rear of the housing.

For your receiver power supplies we particularly recommend our own make of batteries: the **PowerBox Battery 2800** or **PowerBox Battery 1500**. These packs feature an integral electronic monitor / security circuit to ensure reliable charging, and each battery is supplied complete with a practical mounting frame.

We are also delighted to make up NC or NiMH batteries to your own specification.

If a separate charge lead is fitted to the battery, you can safely leave the **Smart-Switch** connected to the pack while it is on charge, but it must be in the **switched-off state**. **Important: switch the Smart-Switch off!**

During the in-house production process each **Smart-Switch** undergoes a series of tests. We take the maintenance of high quality standards very seriously, and this includes bought-in items. That is why we are able to grant a **24 month guarantee** on all our battery backer and switch systems.

The guarantee covers proven material faults, which will be corrected by us at no charge to you.
Misuse and maltreatment, such as reversed polarity connections, excessive voltage, damp, external mechanical influences or damage (crash damage) or inappropriate mounting (serious vibration) invalidate the guarantee.

The guarantee does not cover any additional claims, such as consequent damage. We do not accept liability for damage which is caused by the unit or its use, because we are unable to ensure that it is installed and operated in accordance with our instructions.

Specification :

Voltage range :	Four-cell or five-cell NC or NiMH battery
	Two-cell LiPo or Li-Ion battery
Output voltage:	According to battery type in use
Switching capacity:	More than 20 Amps. In practice the limiting factor is the connecting cable and connector contacts
Weight:	15 grammes, including cables
Temperature range :	- 10°C to + 75°C

Accessories:
- Retaining screws
- Installation template

Order No.: 6510

We wish you every success using your new **Smart-Switch** from the **PowerBox Systems** range, and hope you have loads of fun with it.

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