

**PowerBox Systems**

World Leaders in RC  
Power Supply Systems

# PowerBox Smokepump

Operating instructions



connects directly to any PowerBox system  
programmable flow rate  
for use in power models and model jets



Dear customer,

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

Now you can fit one of the most powerful smoke pumps to your valuable model aircraft - regardless of type.

The electric motor and electronics are normally powered by one of our **PowerBox systems**. If you adopt this option, no additional battery for the smoke pump is required.

At the customer's request we can also supply this high-quality smoke pump in a version for use with a separate battery. This may well be necessary if you are using a different type of power supply system which cannot supply the current required to drive the pump motor.

The electronic circuit of the Smoke Pump provides proportional flow control from 0% to 100%, enabling you to adjust the system to suit the requirements of all types of model in any situation.

Although the **Smokepump** is simple to operate, you do need to understand certain points if you are to exploit its advantages to the full. The instructions are designed to ensure that you quickly feel "at home" with your new auxiliary system, so please read right through the operating instructions before you use the unit for the first time.

We hope you have many years of pleasure and success with your **PowerBox Smokepump!**

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### 1. General information to the PowerBox smokepump

Development work on the smoke pump began in 2003 in response to many requests from customers. Countless model pilots have harboured the desire to fly a realistic flight schedule as carried out by full-size machines, and in particular to be able to emulate the special "show effects" in their display flights, especially in what are known as freestyle schedules.

### 2. Patch lead connections:

Please read the notes printed on the smoke pump before you connect the two patch leads to the unit.

**Important:** If you look at the smoke pump with the monitor LED on the left, the patch lead on the left is for the power supply (blue / red), and the patch lead on the right is for the control connection (yellow / red / brown).



### 3. Setting up the electronic control unit

The electronic control unit is set up using the following procedure:

Basically you simply need to observe the monitor LED on the pump, and listen for the buzzing sound which is emitted every time the LED flashes.

You can trigger your selected smoke pump setting using either a two-position switch - which only has an On / Off function - or using a stick or slider on your transmitter.

Connect the blue / red lead to any vacant socket on your PowerBox. In nearly all cases our PowerBox units will have plenty of free sockets in order to accommodate this connector in addition to the servos. However, if you are using a PowerBox Sensor or a PowerBox 12, connect the two plugs attached to the Smoke Pump to the receiver.

Connect the brown / red / orange lead to the receiver socket corresponding to the channel output which you wish to use to control the pump. Please note that the electronic control circuit provides **fully proportional** control of the flow rate, i.e. from 0 to 100%, just like the travel of a servo. For this reason you must use a full proportional channel. Please note that **at least** the last two channels of Futaba and JR systems are present only in the form of switched functions, i.e. they are not full proportional channels. If you have no other vacant channels available, we recommend that you set up a mixer involving the throttle servo channel, and set up the "On" trigger point at a particular throttle setting - half-throttle, for example - with proportional control after that point.

Decide the end-point of the switch or stick where the pump is **not** to be switched on, then move the corresponding switch or stick to the "pump off" position.

Switch the power supply on.

If the pump is programmed to the correct direction of running, the LED will glow green, and you will hear a brief audible melody.

The pump is now ready for use without further ado, i.e. you can switch it on using the appropriate switch / stick.

You can set the desired rate of flow by altering the servo travel setting in the transmitter menu. We recommend that you start with 100%; if the rate of flow is too great, you will notice that the available smoke time is relatively brief, and the tail panels will be heavily soiled after the flight. If this should occur, simply reduce the travel in 10% increments until you notice a clear decline in the smoke effect. At this point you should increase the setting again by 10%; the rate of flow should now be correct for your combination of model, engine and smoke fluid.

Model jets fly fast, and therefore require a heavy rate of flow. For such models you will not usually be able to set a flow rate of less than 100%.

If the transmitter switch / stick is set to the "On" position when you turn the power supply on, i.e. it is at the position where the pump is normally running, then the pump electronics will **not** switch the pump on. This is a safety feature, designed to prevent smoke oil being injected into the exhaust when the engine is at a stand-still.

If this situation should occur, use this procedure to correct it: first move the switch or stick to the appropriate "Off" position, then **switch the power supply off before switching it on again.**

However, if you still do not move the switch / stick to the correct "Off" position, the electronic control unit will warn you in the following way:

The LED will flash red, and you will hear a buzz at every flash.

This is designed to warn you that the transmitter control is in the wrong position. You have about fifteen seconds to react and correct the situation by moving the switch / stick to the correct "Off" position.

After this warning period the circuit automatically switches to "Reverse switch position" mode.

The advantage of this feature is that you can still generate smoke even if you have forgotten to correct the switch position, e.g. during a freestyle display; the only difference is that you have to move the switch in the opposite direction to generate smoke.

At the correct "Off" position the LED glows a constant green, and the pump is ready for use.

### 4. Reversing the switch setting

If you wish to program the pump electronics to a different end-point of the switch / stick, this is the procedure:

- Switch the power supply off completely.
- Connect the pump using the integral leads.
- Switch the transmitter on, and set the travel of the appropriate channel (i.e. the channel which is used to control the smoke pump) to 100% in the transmitter menu. Note that percentage values lower than 100% may result in the circuit failing to reverse the switch.
- Move the switch / stick to the position at which you wish the pump to be **switched off** in future.
- Now switch on the power supply in your model.
- The monitor LED flashes red twenty times with accompanying buzzes (lasts about fifteen seconds).
- There follows a three-second interval, and the LED goes out.
- The LED then flashes red once (with buzz) to indicate that the circuit has switched to set-up mode.
- There follows a three-second interval, and the LED goes out.
- The LED flashes green once (with buzz) to indicate that the circuit has detected this end-point of the switch / stick ("On" state).
- Now move the stick / switch back to the other end-point ("Off" state).
- The LED flashes green once (with buzz) to indicate that the circuit has also detected the second end-point.
- Move the switch / stick to the other end-point to check the set-up: the pump should now start running.
- Move the switch / stick to the "Off" position.
- The LED glows green, and the melody sounds.
- All done
- The pump is now ready for use with this new switch / stick position.

### 5. Additional features

The electronic pump circuit features a low-voltage cut-off.

If the pump should cease running even though there is still smoke oil in the tank, or if it does not start running at all, this may indicate that the low-voltage cut-off circuit has tripped.

If this occurs, you will notice that the **monitor LED** glows **orange** to indicate the problem.

For this reason please be sure to use the supplied blue / red **patch lead** only; this is intended for the pump's power supply. If you need to use a substantially longer cable (more than 40 cm) you must ensure that the conductor cross-section is adequate, otherwise the pump will cause an excessive voltage drop when running, and the pump electronics will detect this as a low-voltage situation.

The low-voltage cut-off is intended to protect the **servos** and receiver by maintaining the airborne system voltage at a safe level. The cut-off is triggered at around 5.5 Volts; if the voltage falls to this level, the circuit prevents the **smoke pump** running in order to prevent a further collapse in the airborne power supply caused by the **smoke pump**.

As described above, the cut-off may also be triggered if the effective voltage at the pump falls to 5.5 Volts due to an excessively long power supply cable of inadequate conductor cross-section - even if the power supply is still delivering 5.9 Volts.

### 6. Operating notes

Use pure smoke oil only! **We recommend our own smoke oil, which has been specially developed for the purpose, or the equivalent sold by 3W-Modellmotoren.**

Old, used oil or other aggressive mixtures can easily gum up the pump gears, attack the gaskets or cause serious oxidation of the aluminium parts. Running water through the pump will immediately ruin it; do not use water even for a brief period, as the pump mechanism is not designed for this!

If you know you will not be using the pump for a long period (Winter break), we recommend that you inject a little anti-corrosion oil in the pump's inlet nipple, then run it briefly to distribute the oil round the inside of the pump.

The smoke pump should never be stored "dry" for a long period, as this could cause the brass gears to seize inside the housing. If the pump refuses to run after a long period of storage, switch it off immediately to avoid damaging the electronic control unit. Undo the four screws to open the pump, free up the gears by moving them manually, then try again.

### 7. Specification

Operating voltage:	5.5 to 7.0 Volts
Power supply:	Via PowerBox power supply system; at customer's request can be converted to use with separate battery
Pumped medium:	PowerBox smoke oil or 3W smoke oil
Maximum continuous use:	4 minutes
Current drain:	approx. 1.5 A
Temperature range:	-10°C to +75°C
Weight:	125 g
Materials employed:	<b>Pump housing</b> and cover: Al Zn Mg Cu 1.5, Brinell hardness rating 140, as used for severely stressed aviation components <b>Gears:</b> brass 58 / CuZn 40 lead 2, floating bearing in the pump; not pressed. Brinell hardness rating 95 <b>Gaskets:</b> Du Pont Viton, up to +200°C, resistant to all hydrocarbons

## **8. Installation note**

The smoke pump is self-priming.

This means that **the smoke tank must always be installed in the model at a lower level than the smoke pump.**

Cut-off valves or electrical one-way valves are not required for the smoke pump. The gears inside the smoke pump are accurately run-in in pairs; smoke oil cannot by-pass the gears when the smoke pump is not running.

The smoke pump is highly resistant to vibration, but it should still be installed in an area of the model aircraft where vibration is low; this also applies to all the other electronic and mechanical components of the receiving system.

**The smoke pump fulfils the requirements of the EMV protection regulations,** and for this reason is entitled to bear the **CE symbol**. However, it is approved exclusively for use in modeling applications, and may only be employed in radio-controlled models.

The unit is approved only for use with a D.C. power source corresponding to an NC or NiMH battery containing up to five cells, or the voltage of one of our voltage-stabilized PowerBox systems.

**The system must not be powered by a mains PSU!**

## **9. Guarantee conditions**

During the production process each **smoke pump** undergoes a series of tests. We take the maintenance of the highest quality standards very seriously, and that is why we are able to grant a **24 month guarantee** on our smoke pumps, 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 wish to emphasize expressly that we reserve the right to replace the unit if a repair is impossible for economic reasons.

Proof of the commencement and progress of this guarantee period is the purchase receipt which you received when you bought the smoke pump. Repairs carried out under guarantee do not extend the guarantee period. Misuse and maltreatment, such as reversed polarity, excessive voltage, damp or the effects of aggressive materials used as smoke oil, invalidate the guarantee. The same applies to faults due to severe wear or excessive vibration. The guarantee does not cover any additional claims, such as consequent damage.

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

### **Liability exclusion:**

We are unable to ensure that you install and operate the smoke pump 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 smoke pump, or are connected with its use in any way.**

Unless otherwise prescribed by binding law, our obligation to pay compensation, regardless of the legal argument employed, is limited to the invoice value of that quantity of our products which was immediately and directly involved in the event which caused the damage.

### **Accessories:**

- Patch lead, blue / red, 40 cm
- Patch lead, brown / red / orange, 40 cm
- Y-distributor
- 50 cm rubber hose
- Operating instructions, English / German



We wish you every success using your new smoke pump, and hope you have loads of fun with it!

Donauwörth, January 2007

A handwritten signature in black ink, appearing to read "Peter E." with a stylized flourish at the end.

**PowerBox-Systems GmbH**  
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](http://www.PowerBox-Systems.com)**