

PowerBox Systems

World Leaders in RC
Power Supply Systems

Instruction Manual

PowerBox Smokepump



The logo features a stylized lightning bolt graphic composed of two overlapping, jagged shapes in red and white, set against a light gray circular background. A horizontal line, colored red with a white outline, passes through the center of the lightning bolt and the text.

PowerBox Systems

Dear customer,

Congratulations on your choice of the smoke pump from **PowerBox Systems**.

This pump has been developed specifically for use in model aircraft smoke systems, and this differentiates it very clearly from other pumps, most of which were originally designed for other purposes.

This means that you, as the owner of a **PowerBox SmokePump**, can enjoy the services of one of the highest-performing and most durable smoke pumps available on the market today, as proved by our continuous test in which a pump operated for an uninterrupted 76 days.

The outstanding feature of the new smoke pump electronics is that the unit can be powered either directly from a **PowerBox** or from a separate battery.

The smoke pump circuit provides linear control from 0% to 100% (1024 steps), and can therefore be set up to match any exhaust system, engine system or turbine. Switching thresholds are necessary when, for instance, you want the pump to be switched on at a particular position of the throttle stick, and these are also freely programmable.

If the power supply takes the form of a separate battery, all you have to do is plug the pack into the smoke pump's input socket; there is no need for a switch in the lead. The electronic circuit detects whether a valid control signal from the receiver is present, and switches itself on in that case; when the receiver is switched off, the circuit automatically reverts to "stand-by" mode.

Although the **PowerBox SmokePump** is simple to handle, you need to have some understanding of it before you can set it up and operate it efficiently. Please take the time to read through these instructions, as this will ensure that you quickly become familiar with your new accessory.

We are confident that you will have many hours of pleasure and success with your **PowerBox SmokePump**.

Specification:

- Input voltage: 4.8 – 8.5 V
- Temperature range: -5°C to +75°C
- Control range: 0 – 100%
- Control range resolution: 10-bit
- Current drain at 30%: approx. 0.75 A; at 100%: approx. 1.6A
- Current drain in “stand-by” mode with separate battery: 2 μ A
- Freely programmable power-on and power-off points
- Fail-safe mode
- Weight: 110g
- EMV approval: EN55014-1:2006
- CE approval: 204/108/EG

This smoke pump fulfils the EMV protective requirements EN 55014-1:2006 with certificate dated 10 June 2010. EMC approval 2004/108/EG.

2. External features

The pictures below show the essential external features:



Control signal connection

Power supply connection



Tri-colour LED

3. Initial steps: before using the smoke pump:

3.1. Connecting the smoke pump

The nipple marked "IN" on the smoke pump must be connected to the smoke oil tank using Tygon fuel tubing (do not use silicone tubing). Please be particularly careful to keep the tank, the clunk pick-up and all tubing clean. Since the gears of the smoke pump mesh very closely, even very small foreign bodies can easily jam the mechanism.

One result of the two precisely fitted gears is that the pump is extremely well sealed, and this eliminates the need for a separate reverse-flow valve. The black, fabric-clad, heat-resistant rubber tubing supplied in the set should only be used for connecting the silencer or exhaust manifold to the output of the smoke pump (or the T-piece). Tygon fuel tubing must not be connected directly to the silencer, because it cannot withstand the temperatures at the silencer or exhaust manifold. Connect the pump output nipple (marked "OUT") to the silencer using the black tubing. We recommend that you apply a small drop of oil to the end of the tubing before pushing it onto the nipples. When the tubing is pushed into place, the oil prevents minute slivers being scraped from the tubing, which could then get inside the pump.

3.2. Electrical connections

Use the red / blue lead to connect the smoke pump to the power supply: it can simply be plugged into any vacant output of a **PowerBox** battery backer. The current drain varies greatly according to the viscosity of the smoke oil. If you prefer to use a power supply other than a genuine **PowerBox** product, we recommend the use of a separate battery (4S - 5S NiMH, 2S LiPo, 2S LiFe), which can be connected directly to the pump's power input socket.

Connect the three-core control lead (orange / red / brown) to the appropriate receiver output, i.e. the channel which is to be used to switch the smoke pump on and off.

3.3. Setting the switching points

By default the **PowerBox SmokePump** is set up with the power-off point located at - 100% of servo travel, with the full flow rate present at +100% servo travel. Please note that this varies according to the RC system in use, and works the opposite way round with Futaba.

However, it is also possible to program the on and off thresholds of the **PowerBox SmokePump** to any values you wish. This will be necessary, for example, if you want to assign the power-on point to a particular position of a transmitter stick.

- This is accomplished by connecting only the power supply to the pump; the signal lead should **not yet** be connected.
- Switch the transmitter and receiver on: the LED will now flash green / red, indicating that no signal is present.
- Move the switch on your transmitter to the "ON" position, and connect the control lead. The pump electronics flash red for several seconds (50 x), and at the same time you will hear a low-frequency sound. After a short period the LED goes out and the sound ceases.
- After a further five seconds the LED flashes green, and at the same time the unit emits a high-frequency beep. Now move the switch to the "OFF" position.
- After five seconds the LED will flash twice briefly, and you will hear a double beep.

- This is followed immediately by a brief melody, and the LED glows a con-stant green.

This completes the programming procedure.

If you wish, you can now reduce the pump's flow rate by reducing servo travel at the transmitter. When the system is used with a petrol engine, a value of 20% to 30% of servo travel is generally sufficient.

4. Notes on “stand-by” mode and fail-safe

There is no need to consider fitting a separate On / Off switch, since the pump features an integral “stand-by” mode; in this state the current drain is very much lower than the self-discharge rate of any battery.

As soon as the control signal is switched off (i.e. receiver off), the LED starts to flash red / green, and after two seconds the unit switches automatically to “stand-by” mode. The pump switches itself on again automatically as soon as a valid signal is present (i.e. receiver on).

Fail-safe function: if there is a loss of signal while the pump is switched on and pumping, the unit instantly switches itself off. If the signal remains ab-sent for longer than two seconds, the pump reverts to “stand-by” mode, as described above.

5. General hints and tips

- The best smoke oil to use is the proven **PowerBox Blue Max**. This oil pro-duces the best results in terms of smoke generation, and is consumed at a very low rate. The oil is non-resinous and is completely devoid of oxidation problems. Its use also guarantees that all the pump's moving parts have an almost indefinite lifespan.

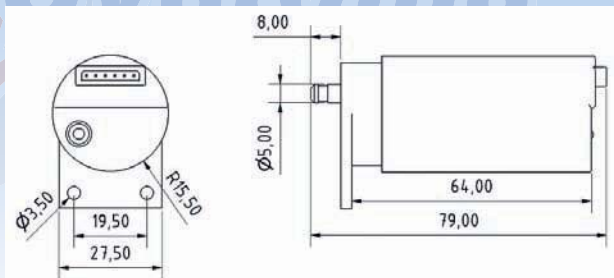
- The black heat-resistant tubing supplied in the set should only be used to connect the pump's output to the silencer. For the input we recommend Tygon fuel tubing.
- Please be scrupulous about cleanliness: keep the smoke oil tank clean, and maintain the highest standards when filling the smoke oil tank. Don't use old fuel tanks and tubing for your smoke system.
- We do not recommend the use of a felt pick-up or other form of filter on the intake side of the pump. The viscosity of smoke oils is relatively high, and this can cause cavitation inside the pump. Cavitation generates gas bubbles, which can result in irregular smoke production. Filters can also shed fabric strands or metal particles; if these are drawn into the pump mechanism, they could jam it.
- Install the smoke pump in the mount designed for it; it must not be supported by the plastic case.
- For piston-engined models a flow rate in the range 20% to 30% is generally sufficient. Avoid excessive settings: if the flow rate is too high, the oil cannot be converted into smoke efficiently, and the model will be severely soiled. If smoke continues to be generated after the pump is switched off, this usually indicates that the flow rate setting is too high; the excess smoke oil remains unvaporised and collects in the exhaust; it is then consumed after the pump is switched off. Excessive smoking after power-off can also indicate that the tube to the silencer is too long. You can avoid this by always installing the pump close to the silencer.
- Model jets require the full flow rate due to their high airspeeds.
- It is difficult to state the ideal injection point in the exhaust system. The hotter the injection point, the better the results in terms of smoke generation. This means that the exhaust manifold is the ideal location, but the injection point must not be too close to the engine's exhaust port.
- It is not necessary to use a supplementary magnetic valve with the **PowerBox SmokePump**. The gears are extremely accurately made, and run in floating bearings; the close fits eliminate the risk of oil flowing when the pump is at rest. If the model continues to smoke after the pump is switched off, you should reduce the system's flow rate, or reduce the distance between the pump and the exhaust, as described above.

- If the pump motor fails to start when the unit is switched on, this generally indicates that there is a foreign body jamming the gears. If this should happen, switch the pump off immediately to avoid burning out the motor.

6. Set contents

- 1 **PowerBox SmokePump** for connection to a **PowerBox** or external battery
- 1 3-core patch lead, 40 cm, 0.24 mm²: signal lead
- 1 2-core patch lead, 40 cm, 0.34 mm²: power supply lead
- 1 heat-resistant, fabric-clad pressure hose, 60 cm
- 1 T-piece: distributor for two silencers
- Operating instructions in German and English

7. Dimensions



8. 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 9001:2008** industrial norm.

Our stringent quality management, which applies both to development and production, is the reason why we are able to grant a **24 month** guarantee on our products, valid from the initial date of purchase. The guarantee covers verified material defects or production faults, which will be corrected by us at no charge to you. The guarantee does not cover jammed pumps caused by ingested foreign bodies.

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 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 device, or are connected with its use in any way.

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



Donauwörth, June 2010

The logo features a stylized lightning bolt graphic in the center, composed of two overlapping red and white shapes that create a sense of motion and energy. The bolt is set against a light gray circular background. A horizontal line, consisting of a thin white line and a thicker red line, passes through the middle of the lightning bolt and the text.

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PowerBox-Systems GmbH

Certificated according to ISO 9001:2008

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