

INSTRUCTION MANUAL

PowerBox Systems®

*World Leaders in RC
Power Supply Systems*



SMOKEPUMP



Dear Customer,

We are delighted, that you have selected the **PowerBox Smokepump** from our range of products.

1. PRODUCT DESCRIPTION

The **PowerBox Smokepump** has been developed by **PowerBox-Systems** specifically for pumping smoke oil in model aircraft. The mechanical system and electronics are manufactured on our own premises, and the unit's high standard of quality is evident from its long effective life: the **PowerBox Smokepump** is the world's most durable smoke oil pump, as has been demonstrated in several long-term tests.

The mechanical pump system is assembled entirely from high-quality aluminium and brass parts. All our pumps are subjected to a running-in procedure during manufacture, ensuring that the gears mesh perfectly, and that the pump is 100% leak-free. Tight manufacturing tolerances eliminate the need for a separate cut-off valve with the **PowerBox Smokepump**.

The electronic circuit is infinitely variable within the range 0% - 100%, allowing the pilot to fine-tune the flow rate to match the exact requirements of the model. The **PowerBox Smokepump** can be powered either by a **PowerBox** or a separate battery.

If a separate battery is used, the electronic circuit switches to a „stand-by“ mode if the receiver fails to pick up a signal. This means that it is not necessary to provide a separate switch to isolate the **PowerBox Smokepump** from the battery when you switch the model off.

The **PowerBox Smokepump** is available in a Standard version and a Jet version,

the later with higher throughput and twin outlets.

The maximum flow rate of the **PowerBox Smokepump** (Order No. 8010) is around 750 ml/min, while the **PowerBox Smokepump Jet** (Order No. 8015) is capable of around 950 ml/min. The set includes all the necessary connecting leads and a length of heat-resistant hose. The standard set also contains a Y-piece which can be used to connect both silencers of an opposed-twin (boxer) engine.

Features

- durable metal-gear pump
- infinitely variable flow rate from 0 - 100%
- no external cut-off valve required
- high maximum flow rate
- can be operated directly from the receiver power supply
- Stand-by cut-off when used with separate battery
- compact design
- low current drain
- Mounting facility

2. EXTERNAL FEATURES



Tri-colour LED

Power supply connection

Control signal connection



Interpretation of the LED signal

- Green: Pump ready
- Red blinking: Pump waits for switch "off" position
- Red/Green blinking: no Signal

3. INITIAL STEPS BEFORE USING THE POWERBOX SMOKEPUMP:

3.1. Connecting the tubes

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/LiIon, 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 up the transmitter

There are different versions of the software for the **PowerBox Smokepump**. In the course of time we have added features to meet the requests of customers, and in response to frequently asked questions on setting up the pump.

The initial versions of the pump, when the switching points were user-variable (up to 2010), are no longer listed here.

PowerBox Smokepump without version number

This version of the software was supplied between 2010 and 10/2014. The pump controller behaves like a conventional speed controller:

Transmitter -100% » pump off

Transmitter +100% » full pump power

Examples:

a) You wish to set 30% pump power; this is the usual requirement for petrol engines. For this the transmitter travel has to be set up as follows:

- **100%** pump off

- **60%** pump on

With most transmitters this is only possible by setting up a mixer, since the upper limit of travel cannot be set to a value below 0%. Our Expert Forum includes suggested solutions for various radio control systems.

b) You wish to set 100% pump power, as is usual with model jets:

- **100%** pump off

+ **100%** pump on

These are the default values in every transmitter, i.e. they are present when a channel is assigned for the first time.

PowerBox Smokepump with version number V4

This version of the software has been supplied since 10/2014. The pump controller has been fine-tuned to make it easier to set up the radio control system:

Transmitter - 100% to 0% » pump off

Transmitter + 100% » full pump power

Examples:

a) You wish to set 30% pump power; this is the usual requirement for petrol engines. For this the transmitter travel has to be set up as follows:

- **100% to 0%** pump off

+ **30%** pump on

b) You wish to set 100% pump power, as is usual with model jets:

- **100% to 0%** pump off

+ **100%** pump on

If you assign a new channel at the transmitter, it will have the standard travel of -100% to +100%. Since all travel values less than 0% mean "pump off", you can simply leave these standard values as they are, i.e. no further changes are required at the transmitter.

PowerBox Smoke Pump, version number V05 (Jet version only)

This version of the software has been supplied from 7/2016. In addition to the functions described for V04 the pump controller offers one additional feature:

Transmitter 0% to + 100% » pump output infinitely variable

Transmitter - 100% to 0% » pump switches to interval operation

The On / Off times for interval operation can be varied by adjusting the travel at the transmitter.

-100% short intervals

-30% long intervals

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).

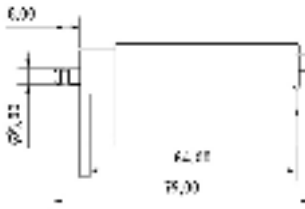
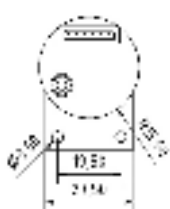
Fail-safe function: if there is a loss of signal while the pump is switched on and pumping, the unit instantly switches itself off. If the signal remains absent for longer than two seconds, the pump reverts to “stand-by” mode, as described above.

5. GENERAL HINTS AND TIPS

- The best smoke oil to use is the proven **PowerBox BlueMax**. This oil produces 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 use of diesel fuel or formwork oil invalidates any claim under guarantee. These liquids contain no lubricants and / or are severely corrosive!
- **Diesel fuel and other mineral oils are harmful to the environment! The oil simply vaporises, then returns to its original form as a deposit in the environment, thereby finding its way into the water system. A single litre of diesel is sufficient to contaminate thousands of litres of water!**
- 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. DIMENSION



7. TECHNICAL DATA

Operating voltage:	4.0V - 9.0V
Current drain Power-on state:	approx. 1.5 Ampere at 100%
Current drain Standby:	10µA
Max. flow rate:	max. 750ml/min
Smoke medium:	Smokeoil „BlueMax“ or 3W Smokeoil
Dimensions:	79 x 31 mm
Weight:	125g
Temperature range:	-30°C to +75°C

8. SET CONTENTS

- | | |
|---|---|
| - PowerBox SmokePump | - heat-resistant, fabric-clad pressure hose |
| - 1x 3-core patch lead: signal lead | - T-piece: distributor for two silencers |
| - 1x 2-core patch lead: power supply lead | - Operating instructions |

9. 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



10. GUARANTEE CONDITIONS

At **PowerBox-Systems** 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 **24 month guarantee** on our **PowerBox Smoke-pump** 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
86609 Donauwoerth
Germany

11. LIABILITY EXCLUSION

We are not in a position to ensure that you observe our instructions regarding installation of the **PowerBox Smokepump**, 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 Smokepump**, 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 Smokepump**!



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