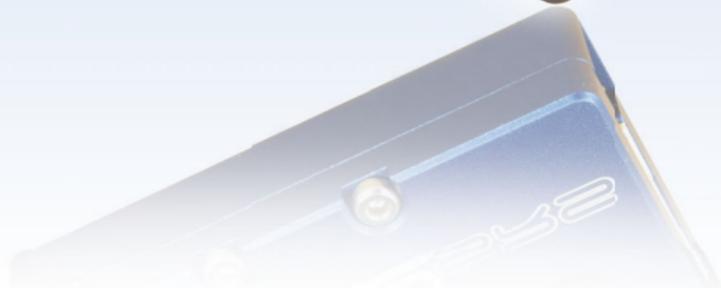# Instruction Manual

**PowerBox Systems** ®

*World Leaders in RC
Power Supply Systems*

# iGYRO
## 3 AXIS GPS CONTROLLED
## SRS

**Dear customer,**

We are delighted that you have decided to purchase the **PowerBox iGyro SRS** from our range.
We hope you have many hours of pleasure and success with this new type of gyro system.
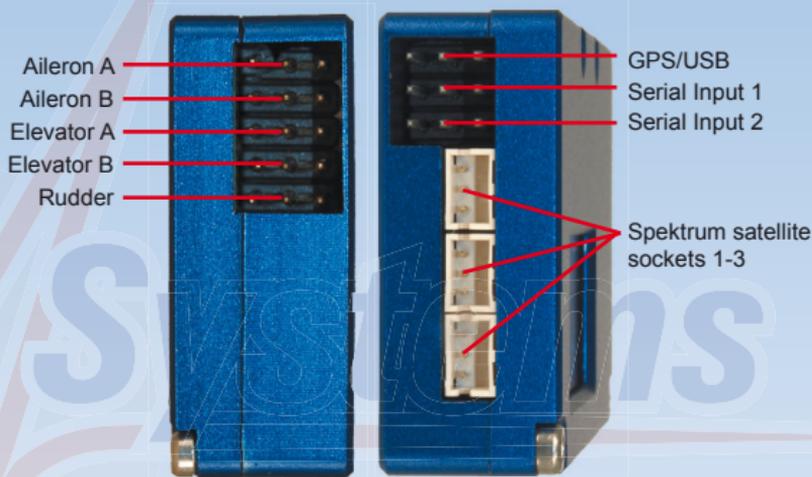
## 1. Product description

The **PowerBox iGyro SRS** is a special gyro system intended for fixed-wing model aircraft. At the development stage our constant aim was to combine maximum versatility with simplicity of operation. The system incorporates a regulatory algorithm specifically developed for fixed-wing models, which causes hardly any alteration in the model's familiar flying characteristics; at the same time the aeroplane flies much more smoothly and accurately, and is less sensitive to unwanted weather-induced or aerodynamic influences. The need for mixers, such as elevator to rudder or flaps, is eliminated entirely. The **iGyro** exploits the latest servo bus technology to minimise the extremely complex wiring arrangements necessitated by previous gyro systems. The ability to assign any channel to the gain adjusters makes it possible to set up the desired gyro effect accurately in just one short flight. Independent adjustment of each of the five outputs is possible, enabling the modeller to set up gyro gain and direction of effect precisely. The separate **GPS II sensor** provides a means of obtaining a constant gyro effect over the model's full speed range, effectively eliminating the problem of over-compensation leading to oscillation in high-speed flight. A menu-based setup assistant makes it possible to complete all the settings in just a few minutes.

**Features:**

- Extremely accurate triple-axis MEMS sensor
- Special regulatory algorithm designed for fixed-wing model aircraft
- Menu-based setup assistant
- Three-stage flight phase switching
- Three axes distributed to five servos, each adjustable independently
- GPS-regulated gyro gain
- Integral delta mixer
- Can be installed in any attitude
- Graphic OLED screen with 128x64 pixels
- Ultra-simple menu-controlled programming method using the **Sensor-Switch**

- SRS technology for use with various bus systems:
  Futaba S-Bus, Spektrum SRXL, Spektrum DSM2 / DSMX, JR DMSS,
  HoTT, M-Link and Jeti
- Unrestricted channel assignment
- Digital output can be passed on to an **SRS PowerBox system**
- 16-bit processor for fast, high-resolution signal processing
- Settings can be stored on a PC and reloaded at any time
- Can be updated using the **PowerBox USB Interface Adapter**
- Robust aluminium case

## 2. Layout and connections



Aileron A
Aileron B
Elevator A
Elevator B
Rudder

GPS/USB
Serial Input 1
Serial Input 2

Spektrum satellite
sockets 1-3

## 3. Fundamental factors for the understanding of the iGyro

### 3.1. Special characteristics of the regulatory algorithm:

The **PowerBox iGyro SRS** operates on all three axes, i.e. aileron, elevator and rudder. The gyro has two different working modes:

- **Heading mode:** this mode is active when the transmitter stick is at the centre position of the corresponding control surface. In this centre range the **iGyro** maintains the last attitude defined by the operator at the transmitter. A concrete example would be elevator control in knife-edge flight: the **iGyro** eliminates the need to apply down-elevator to correct the influence of the model's Centre of Gravity, i.e. no elevator control commands are required.

- **Normal or damping mode:** this mode is active when the transmitter stick is moved away from the centre position of the corresponding control surface. In this mode the **iGyro** simply has the effect of damping external

influences. An example of this would be a gust of wind, which would normally cause the model to deviate from its course, but the gyro counteracts the unwanted movement either entirely or to a great extent, depending on the gain setting selected by the user.
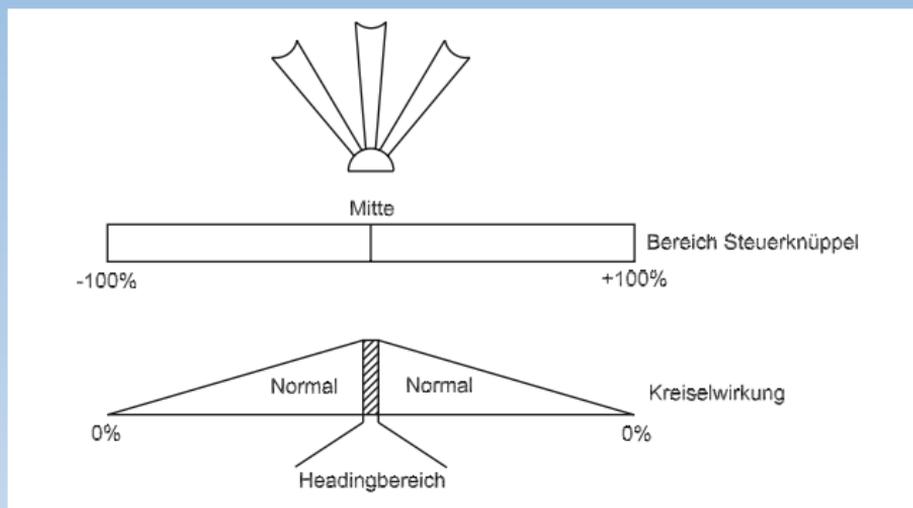


As can be seen from the diagrams above, gyro gain is suppressed progressively as control travel is increased. This reduces the effect of the **iGyro** in terms of counteracting deliberate control commands.

### 3.2. Speed-dependent gyro gain control

The **PowerBox iGyro** can be connected to an optional **GPS II sensor** with the purpose of passing speed data to the gyro.

This **GPS II sensor** supplies data regarding the model's speed to the **iGyro** at a rate of twice per second. This allows the gyro to adjust its gain constantly to suit the actual flying speed; an effect which is particularly important when you are flying a model with a very broad speed range.

Gyro systems which are not speed-compensated in this way can only be set to a low gain value, because the model would otherwise tend to oscillate at high-speed. Reducing the gain to overcome this problem reduces the gyro's stabilising effect at low speed, e.g. on the landing approach. However, fixed-wing model aircraft are particularly susceptible to gusts of wind and propeller torque effects at low speed, and high gyro gain is desirable for precisely this reason.

The effect of the **GPS II sensor** can be adjusted to any of six levels for each axis, so that maximum gyro effect can be obtained in fast and slow flight alike.

**Important:**
The **GPS II** used for the **iGyro** is also capable of determining speed in vertical flight, which prevents oscillations even in a dive. Only tailwinds and headwinds cannot be taken into account when the system is calculating the model's actual speed. However, this has a negligible effect on the stability of the model, even when the wind is strong.

## 3.3. Use of flight modes

The Flight Mode function can be assigned to any channel, and gives the pilot the facility to activate three different gyro settings for particular flight maneuvers. If you set up the gyro using the Setup Assistant, **the gyro is always completely disabled** in **Flight Mode 1**: control signals are passed on 1 : 1 to the servo outputs. Of course, if the Delta function is switched on, the Delta mixer remains active.

**Flight Modes 2** and **3** are freely configurable by the pilot. In most cases the Flight Mode switch is only required in order to switch the Heading value for rudder on and off. The Heading value for rudder is only required for particular flight maneuvers, such as slow rolls or knife-edge flight, and should be switched off again by changing the Flight Mode when the maneuver is complete. In normal flight the Heading value is a hindrance for the rudder, because the tail then tends to "drag" when the model is turning.

In a flight situations models can be flown with Heading on aileron and elevator. The **GPS II sensor** also makes flight phases unnecessary for "normal" fixed-wing model aircraft.

## 3.4. The iGyro's installed position

The **PowerBox iGyro** can be installed in any position and attitude, with the proviso that it must be at right-angles to the direction of flight (fuselage centreline). All you need to do is inform the **iGyro** of its orientation in the model. There is no need for the pilot to set up the gyro using axis designations such as X, Y, Z; instead the system always uses the standard terminology: **Aileron**, **Elevator** and **Rudder**.

## 4. Step-by-step procedure for setting up the iGyro

**4.1.**      **Installing the iGyro**
**4.2.**      **Installing the GPS II sensor**
**4.3.**      **Operating the unit, the menu control system**
**4.4.**      **Selecting the radio control system**
**4.5.**      **Setup Assistant**

**Note:**
Text passages in *bold italics* are printed exactly as found in the **iGyro** menu, or on the label attached to the case.

### 4.1. Installing the PowerBox iGyro

In mechanical terms the **iGyro** should be installed in the model using the double-sided self-adhesive pad supplied in the set. Please ensure that the **iGyro** is always mounted at right-angles to the model's centreline. The **iGyro** does **not** need to be positioned at the Centre of Gravity. Thanks to modern servo bus technology, the electrical installation of the **iGyro** is very straightforward.

**Note:**
the earth (ground) wire of the connectors - usually black or brown - must always face up, i.e. towards the face bearing the screen.

There are various options for connecting the **iGyro** electrically - regardless of the radio control system you wish to use. The following shows just a few of the possible methods. If your own radio control system is not shown here, please refer to our Support Forum, where you will find additional wiring diagrams.

**Futaba, Spektrum SRXL, M-Link, HoTT** and **Jeti system, _without_ PowerBox** power supply system**:**

Up to two receivers can be connected to the **iGyro**. The servos for 2 x aileron, 2 x elevator and 1 x rudder are plugged directly into the **iGyro**. Additional channels, such as throttle or retracts, can be connected to the remaining receiver outputs. The power supply for the system as a whole should be connected to the receiver or receivers.

**Futaba, Spektrum SRXL, M-Link, HOTT, JR DMSS and Jeti wiring diagram:**
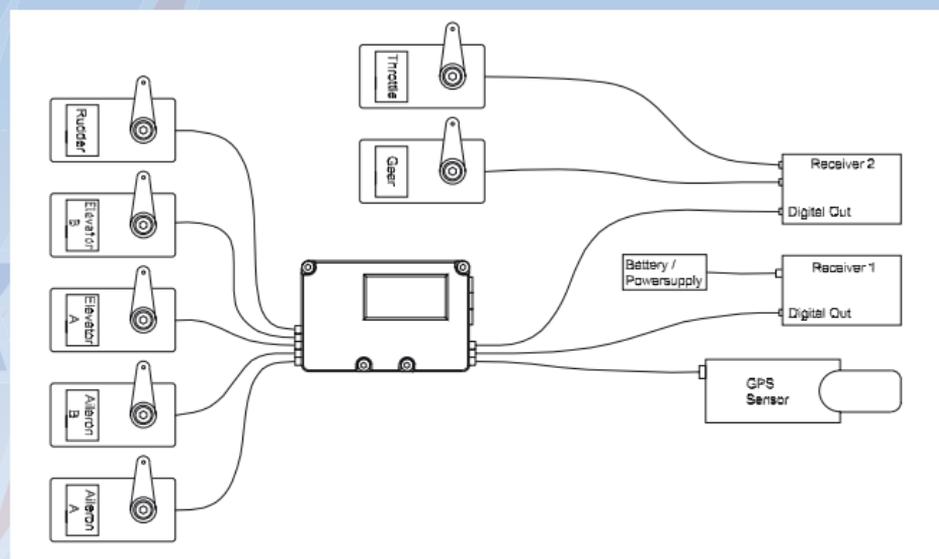
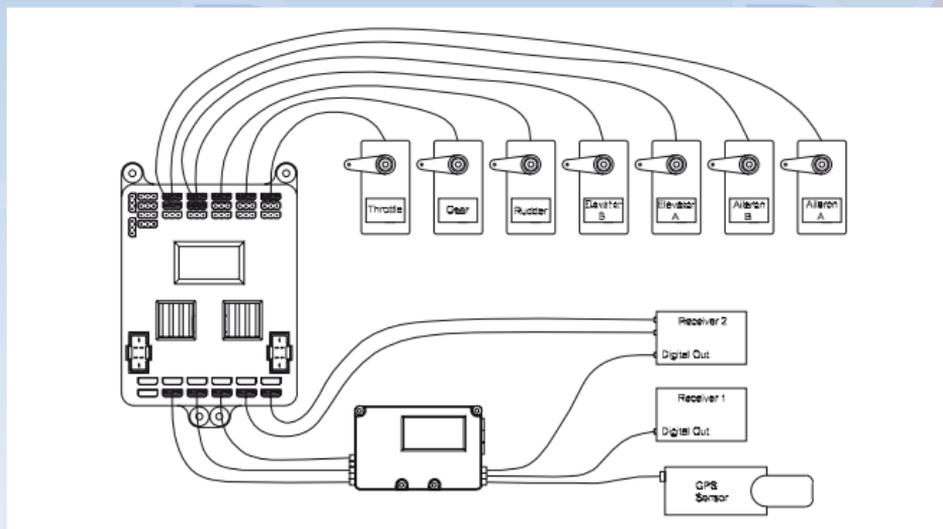**Any radio control system with PowerBox power supply system:**

Connect both receivers (or just one) to the serial output of the **iGyro**. The channels which are to be gyro-stabilised should be connected from the **iGyro** to the input of the **PowerBox**. All the other channels can be connected directly from the receiver to the **PowerBox**.

**Note:**
if you use two receivers, only those channels which come from the **iGyro** are protected by redundancy.

The servo assignment at the **PowerBox** is left up to you; the diagram only shows a typical example of servo connections.

**Wiring diagram with a PowerBox:**

Any radio control system in conjunction with the **SRS PowerBox**:

Spektrum satellites should be connected to the white inputs labelled SAT; all other receivers to the two serial BUS inputs. Select the *DIG-OUT* point in the TX Settings menu at the **iGyro**, and set it to *ON*. Set S-BUS as radio control system at the **SRS PowerBox**. Point 4.4. describes the settings which have to be selected at the receivers.

The servo assignment at the **PowerBox** is left up to you; the diagram only shows a typical example of servo connections.

**Note:**
if you use two receivers, all channels are protected by redundancy.

**Wiring diagram with a PowerBox SRS:**
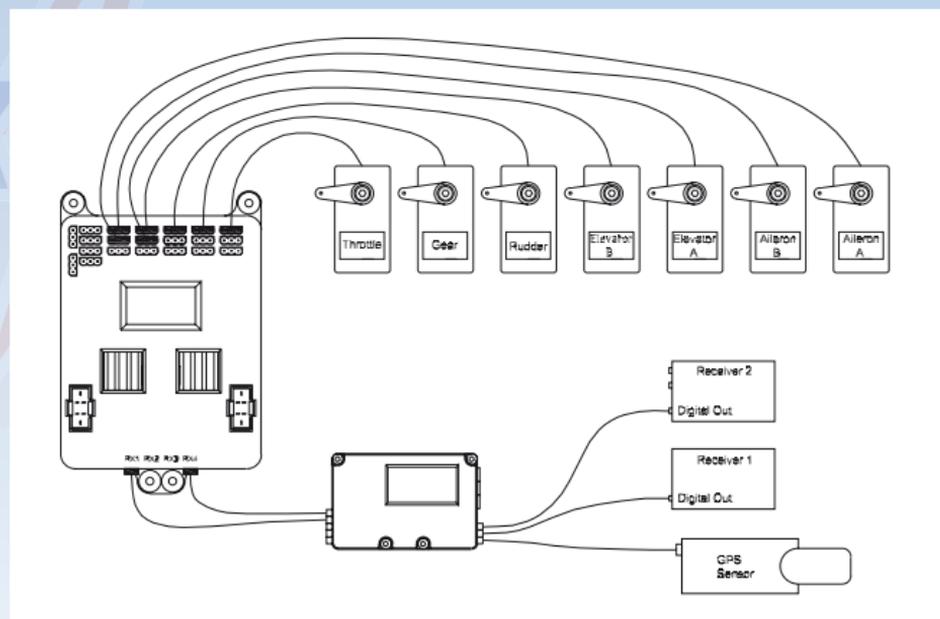
### 4.2. Installing the GPS sensor

The **GPS II sensor** does not need to be installed in a particular position or attitude; it can simply be mounted at any point in the model using the double-sided self-adhesive tape supplied in the set. To ensure best possible reception, the sensor should be located in an area of the model low in vibration, and spaced well away in all directions from parts containing carbon fibre or metal. If the **GPS II sensor** should suffer a brief period of poor reception - or none at all - during a flight, gyro gain is reduced to the minimum set value; this prevents the model oscillating, regardless of its momentary airspeed. The **iGyro** is able to compensate for outside influences on the model even when gyro gain is reduced. Interference to GPS reception is usually of very short duration, and its effects are not noticed by the pilot when the model is flying.

### 4.3. Operating the unit, the menu control system

All the necessary set-up work is carried out in conjunction with the **SensorSwitch**, which is included in the set. The **SensorSwitch** is plugged into the unit for programming, and can then be disconnected again. When connected to the **iGyro**, the **SensorSwitch** has no switching function for the power supply; it is only used for the adjustment procedure.

The menu control system could hardly be simpler:

- Buttons I and II move the cursor up and down, or alter values.
- The SET-button selects a menu point, and confirms selected values.

A brief press on the SET-button takes you to the menu; you will then initially see the left-hand screen shot. If you move the cursor right to the bottom, the right-hand screen display will appear:

```
∘ZERO GYRO              ∘SETUP ASSISTANT
 GYRO SETTINGS           TEST FLY ASSISTANT
 AIRSPEED SETTINGS       FACTORY RESET
 INPUT MAPPING
 GENERAL SETTINGS
 RECEIVER SETTINGS  →                    OK
```

The circular cursor to the left of the menu points turns into a solid disc when you select a menu point and adjust values.
The main menu can be left again by selecting *OK*.

### 4.4. Selecting the radio control system

The **PowerBox iGyro** must be informed which radio control system you wish to use, as the bus systems of the various manufacturers differ very widely. You only need to enter this information once.
The unit's integral **SRS system** selects one receiver when switched on, and automatically switches over to the second receiver if the signal is lost. Regardless of the type of radio control system employed, the change-over process takes just a few milliseconds, and is not noticeable to the pilot.

Select the *RECEIVER SETTINGS* point at the main menu, then press the SET-button; the following screen display appears:

```
TX-SYSTEM: DSMX
BIND

DIGITAL OUT: OFF
                        OK
```
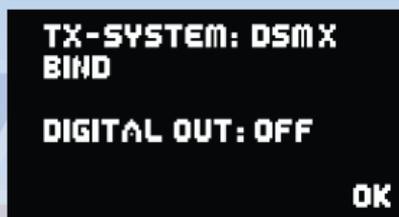
At this point please select the radio control system you wish to use. With most receivers it is necessary to activate the Bus output, and / or set the correct operating mode. Bear in mind the following points:

**a) Futaba FASST and FASSTEST:**

The **iGyro SRS** works with the S-BUS signal. Many receivers require one output to be re-assigned to S-BUS:

- R7003SB: no adjustment necessary; signal present at "PORT 1".
- R7008SB: output 8 must be set to S-BUS, Mode B or Mode D.
- R6303SB:  no adjustment necessary; direct S-BUS output fitted
- R6308SB(T): output 8 must be set to S-BUS, Mode B or Mode D.

The S-Bus socket fitted to many Futaba receivers is a potential hazard. The two pictures below illustrate the correct connector position:



**correct**    **incorrect**

Other receivers with an S-BUS output can also be used; please refer to the set-up notes included in the instructions supplied with the receiver.

### b) Spektrum DSM2 and DSMX

If you are using a Spektrum *AR 9020*, the *SRXL* output can be used: all eighteen channels are then available <u>without</u> requiring an *X-Plus module*. No adjustments are required: all you have to do is connect the *SRXL* output to the *iGyro*. Once again it is also possible to connect two receivers.
An alternative option is to connect three Spektrum satellites. This wiring arrangement is described in greater detail on our Support Forum.

### c) Graupner HoTT

When a HoTT system is used, the receivers should first be bound; adjustments can then be carried out in the Telemetry menu. All receivers require the *CH-OUT-TYPE* to be set to *SUMD-OF-16*.
- GR16 and GR24: *SUMD-OF-16* is present at **Output 8**.
- GR32: *SUMD-OF-16* is present at **Output S**.

### d) Jeti

With a Jeti system it is only necessary to set one *SAT* or *EXT* output (depending on the particular receiver) to *UDI 16*. The remaining adjustments are carried out using the transmitter's device manager:

• Serial output: UDI
**- Primary settings:**
• Signal speed: 10 ms
• PPM settings: Direct
• Failsafe: Inactive (if two receivers are in use; otherwise any setting)

## e) Multiplex M-LINK

If you are using a Multiplex system, the *B/D* output at the receiver must be set to *Serial Servo Data SRXL*. This can be accomplished using the USB lead and the MPX Launcher PC program. If you connect two receivers, the following settings must also be entered: *max. hold duration: 0.2 s* and *max. Failsafe duration: 0.0 s*.

## f) JR DMSS

For a JR DMSS system you need receivers with an *X-BUS* output, e.g. **RG731BX**. The receiver or receivers are first bound, then set to *MODE A* at the transmitter. The *X-BUS* output now generates sixteen channels, which are accessible from the **iGyro SRS**.

## Digital output:

The Digital output can be used in order to connect the **iGyro** to an **SRS PowerBox** or directly to an S-Bus system. If *DIG.OUT* is set to *ON*, then conventional servos cannot be connected directly to the **iGyro**.

The outputs *ELEV-B* and *RUDDER* generate a serial **S-Bus signal** output. The output is present at two output sockets, to allow two cables to be used for additional security.

## Important:

you must select the S-Bus option in the *TX SYSTEM* menu of an **SRS PowerBox**, even if, for example, Spektrum satellites are connected to the **iGyro**. Power is now fed from the **PowerBox** to the **iGyro** and the receivers connected to it via the two leads.

## 4.5. Setup Assistant

Here at **PowerBox-Systems** we are committed to making high-tech electronics accessible to all pilots without requiring them to tackle complicated programming procedures. Our top priority is to make it as simple as possible to operate the equipment without restricting its performance.

With the help of the *Setup Assistant* you should be in a position to set up the **iGyro** in ten minutes at most. Once you have completed the basic settings, only <u>a single</u> flight is required for fine adjustment.

The Assistant covers 99% of all model types. Within certain limits it is also suitable for thrust vector control systems. For such models the Assistant can be used to set up the primary functions. The thrust vector control system itself must then be set up manually. For additional information on setting up thrust vector control systems please refer to our Support Forum

Before carrying out the set-up flight we recommend that you run the *Test Fly Assistant* on the ground **<u>several times</u>**, to familiarise yourself with the sequence of operations and the way it works. It is also extremely helpful to have a fellow-modeller by your side during the set-up flight, as he will be able to follow the **Add-On manual**, and keep abreast of the set-up sequence.

The system also incorporates a safety function, should anything unexpected occur:

**Moving the flight mode switch to the FM1 position disables all the gyro functions!**

The set-up procedure is divided into two sections:

- *SETUP ASSISTANT*
  In this section you select all the model-specific settings, e.g. the gyro's orientation in the model, channel assignment, direction of gyro effect.

- *TEST FLY ASSISTANT*
  In this section you adjust the gyro's gain (sensitivity) while the model is flying. It is advisable to run this section of the Assistant several times before flying the model to ensure that you are familiar with the set-up procedure. Carrying out a 'dry run' in this way does not affect the settings of the *SETUP ASSISTANT*. However, if you are not confident of doing this, the alternative is to land the model after setting each value, and view the gyro's current status on the integral screen.

The only preparations you have to make are these:

- Enter the radio control system you wish to use in the *RX SETTINGS* menu (Point 4.4)
- Assign a three-position switch and a rotary knob or linear slider at the transmitter

The next stage is simply to select the *Setup Assistant* at the **iGyro**, and follow the on-screen instructions. The *Add-On Manual* supplied in the set shows the sequence of the *Setup Assistant*, and explains the following steps.



*Add-On Manual*

When the *Setup Assistant* is complete, you have correctly set the channel assignments, the gyro's installed orientation, wing type and direction of gyro effect. At this point the model should be test-flown **without** gyro support, and properly trimmed out.

If your model features a rudder - elevator mixer, or a rudder - aileron mixer, then it is **essential to disable** it. If you neglect this, the **iGyro** will not operate in Heading mode, since the control surfaces will, of course, be offset from centre.

You **can disable** any elevator - landing flap mixer. If you later find that your optimum gyro gain (established in the air) does not provide sufficient elevator compensation when landing flaps are deployed, you will need to activate the mixer again.

Exponential functions can be set up in the usual way, but you may need to reduce the values slightly when the gyro is active, since the gyro effect counteracts the control surface function slightly when control commands are small. This behaviour diminishes as stick deflection increases, and falls to zero at full stick travel.

Once the model is properly trimmed, you should activate the *Test Fly Assistant* in order to find the ideal gyro gain in flight. Once again, additional information can be found in the *Add-On Manual*.

*Add-On Manual*

When the *Test Fly Assistant* is complete, the set-up procedure for the gyro is finished!

## 5. Experts and manual adjustments

All parameters established using the *Setup Assistant* can also be adjusted manually. The system offers a whole series of additional adjustment options to cater for particular set-ups, such as thrust vector control systems. It is also possible to adjust the gyro characteristics and flight modes individually. The following section explains the menu points and functions available.

## 5.1. The installed orientation of the iGyro

This setting can be found in the *GENERAL SETTINGS* menu. To simplify the process of installing and operating the system, the **iGyro** must be informed once of the unit's orientation in the model after it has been installed. This procedure makes it possible to use the terms *AILERON*, *ELEVATOR* and *RUDDER* subsequently in the *GYRO SETTINGS* menu.



*SCREEN* refers to the position of the OLED screen in the model; SWITCH refers to the **SensorSwitch** socket.

Once you have installed the system in the model, you must enter the position of the screen and the position of the switch. There are six possible options for the screen and switch locations.

Here are two examples which should avoid the need for protracted explanations:

a) The **iGyro** is installed with the screen on top, and the switch socket facing the fuselage nose. The correct setting is therefore:

*SCREEN: UP/DOWN*
*SWITCH: BACK/FRONT*

b) The **iGyro** is installed with the screen on top, and the switch socket facing the wing. The correct setting is now:

*SCREEN: UP/DOWN*
*SWITCH: LEFT/RIGHT*

### 5.2. Selecting the wing type (Mixer)

The **iGyro** features an integral delta and V-tail mixer. This makes it possible to exploit the advantages of heading-lock gyro stabilization even with deltas and V-tail models! This mixer can be activated in the *GENERAL SETTINGS* menu point: select *DELTA-WING* or *V-TAIL* at the *MIXER* point.

**Caution:** if your model is a delta or features a V-tail, you must not set up a delta or V-tail mixer at the transmitter. The **iGyro** carries out the mixing.
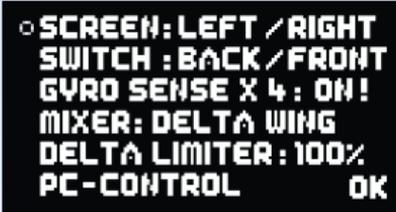
```
○SCREEN:LEFT∕RIGHT
 SWITCH :BACK∕FRONT
 GYRO SENSE X 4: ON !
 MIXER: DELTA WING
 DELTA LIMITER:100%
 PC-CONTROL      OK
```

The **iGyro** analyses the aileron and elevator signals from the transmitter, calculates the deviation according to the sensors, and generates the signal for both delta control surfaces (elevons).
The mixed delta signals are available at the *AILERON-A* and *ELEVATOR-A* outputs.

In this case *ELEVATOR-B* is available for functions such as vector control or a canard system, and can be set up independently.

The *Delta x2 function* is intended specifically for models with a delta wing and a twin thrust vector control system, and allows the thrust vector system to be operated in combination with a delta mixer. The second delta mixer is available at outputs *AILERON-B* and *ELEVATOR-B*.

## 5.3. Delta limiter

The default value here is 0%, which means that the elevons (control surfaces) never run beyond the end-point set at the transmitter, even if the pilot gives a combined aileron and elevator command equating to full travel simultaneously. If you set the limiter to a higher value, the calibrated values can be exceeded accordingly.

This value should be adjusted with the aileron and elevator sticks moved to full travel: ensure that the servos do not strike their mechanical stops at any extreme of travel.

## 5.4. Gyro Sense x4

This option quadruples the gyro effect; this is often necessary with large, sluggish models in order to obtain the optimum stabilising effect.

**Caution:** Select this option only if 100% gyro effect is inadequate! Selecting this option resets **all** gain settings to 0%!
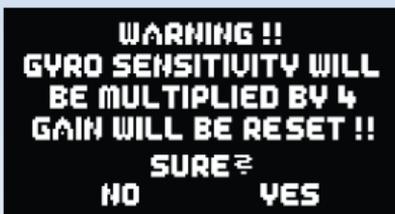


```
        WARNING !!
  GYRO SENSITIVITY WILL
    BE MULTIPLIED BY 4
  GAIN WILL BE RESET !!
        SURE ?
    NO        YES
```

## 5.5. Channel assignment

Modern **SRS** bus technology makes it possible to assign channels to particular functions without restriction. The menu point *INPUT MAPPING* is used to assign a channel to any function. There are various functions which can be mapped in this way. In the examples below we show the method of assigning the ailerons and the flight mode switch:

| CH | FUNCTION |
|----|----------|
| ○ 2 | AILERON A |
| 11 | GAIN NORM AILE-A |
| 12 | GAIN HEAD AILE-A |
| | > |

| CH | FUNCTION |
|----|----------|
| ○ 6 | AILERON B |
| 11 | GAIN NORM AILE-B |
| 12 | GAIN HEAD AILE-B |
| | > |

| CH | FUNCTION |
|----|----------|
| ● 14 – FLIGHT MODE | |
| | OK |

For example, if you wish to adjust the ailerons again after completing the settings using the *Setup Assistant*, you can very simply assign a slider or rotary knob at the transmitter to the *GAIN NORM AILE-A* function. With this arrangement the slider only adjusts the Normal mode of the ailerons. At the same time you could adjust the Heading value using the same slider by assigning the same channel to the function *GAIN HEAD AILE-A*. Alternatively - if you prefer to adjust the Heading value separately - you could assign a second slider to Heading gain.
If your model is fitted with two ailerons (or elevators), you should always assign the same slider to the left and right control surfaces, so that the Normal or Heading values are adjusted simultaneously.

Example above:

- Channel *2* controls the right-hand aileron output
- Channel *11* adjusts the Normal value for the right-hand aileron
- Channel *12* adjusts the Heading value for the right-hand aileron

- Channel *6* controls the left-hand aileron output
- Channel *11* adjusts the Normal value for the left-hand aileron
- Channel *12* adjusts the Heading value for the left-hand aileron

**Note:** with many radio control systems it is advisable to select the slider or rotary knob at the transmitter, and set that channel's travel to -105% to +105%, in order actually to be able to set 0 - 100% gain.

If you wish to assign a channel, use the SET-button to select the appropriate function, then move the stick, rotary knob or switch which you wish to assign. Make sure beforehand that the transmitter control in question is already assigned to a channel at the transmitter.

**Note:** automatic detection only works reliably if only <u>one channel per transmitter</u> control is assigned at the transmitter. For example, if separate channels are assigned to each aileron at the **iGyro**, use buttons I and II for the assignment procedure.

The settings can be checked in the *GYRO SETTINGS* menu: select the corresponding axis and move your gain slider or rotary knob: the Gain display should now vary between 0% and 100%. The flight mode switch must shift the number following *FM* between 1 - 2 - 3.
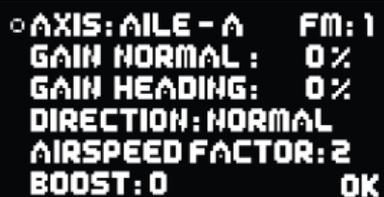
```
○AXIS: AILE - A    FM: 1
 GAIN NORMAL :      0%
 GAIN HEADING:      0%
 DIRECTION: NORMAL
 AIRSPEED FACTOR: 2
 BOOST: 0            OK
```

**5.6. Settings in the Gyro Settings menu**

**- AXIS:**
   At this point you select the axis you wish to adjust. There are 2 x ailerons (AILE), 2 x elevators (ELEV) and 2 x rudder (RUDD). However, the second rudder can only be used if the Bus output is active. For example: in conjunction with an **SRS PowerBox**, a PowerBus or a Futaba Bus system.

**- FM:**
   The position of the flight mode switch is displayed at this point.

**- Gain Normal:**
   Here you see the Normal gain setting for the axis you have set up. At this point it is possible at any time to alter the gain manually using the **SensorSwitch**. Changing this value manually automatically erases the gain channel assignment in the *Input Mapping* menu.

**Note:** any change you make to the gain setting always applies to the selected flight mode only! Different gain values can be set for each flight mode!

**- Gain Heading:**
Here you see the Heading gain setting for the axis you have set up. At this point it is possible at any time to alter the gain manually using the **SensorSwitch**. Changing this value manually automatically erases the gain channel assignment in the *Input Mapping* menu.

**Note:** any change you make to the gain setting always applies to the selected flight mode only! Different gain values can be set for each flight mode!

**- Direction:**
At this point it is possible to set the gyro's direction of effect manually for each axis. **Caution:** setting the incorrect direction at this point will usually result in the loss of the model!
Here is an example of checking using the ailerons as an example: move the right-hand wing up, and the right-hand aileron must also deflect up, the left-hand aileron down.
If the control surfaces respond in the other direction, you must invert the direction of effect with *REVERSE*.

**Note:** naturally any such change has no effect on the direction of response to transmitter commands!

**- Airspeed Factor:**
In many tests the ideal value for the *AIRSPEED FACTOR* has proved to be 3. This setting only has a function if the **GPS II sensor** is connected to the system. If during or after test-flying (with or without the Assistant) it is evident that the model only shows a tendency to oscillate at full-throttle, then this value can be increased.

*Airpeedfactor 0*: no speed compensation
*Airpeedfactor 5*: high speed compensation (no gyro effect at max. airspeed)

The *Airspeed Factor* can be set to different values for the various flight modes. For example, in *FM3* you might wish to select an airspeed factor of 5 for a vector control system. Gyro gain is then at a maximum when the model is hovering. When you resume normal flight, you have more time to switch over to *FM2* before the model starts to oscillate due to

increasing speed and high gyro gain.

**- Boost:**
*Boost* is one of the **iGyro**'s "expert functions", and its basic purpose is to provide better stabilisation for models which are very unresponsive. In extremely windy conditions this function may also provide a better corrective effect. The fundamental effect of the **iGyro**'s *Boost* function is to produce a brief but very pronounced compensatory action right at the onset of any external influence.
*Boost* can also be set differently for the various flight modes.

**Caution:**

- This function must be used with care, and the setting should only be increased gradually, since too high a setting will immediately result in the model oscillating violently.
- As a general rule we only recommend using this function if the "Normal" and "Heading" modes do not provide the desired level of stabilisation; a situation which may occur in models with slow control response and small control surfaces.

## 5.7. Zero Gyro

You will find the *ZERO GYRO* function in the first line of the main menu. This function has two purposes:

a) Calibrating the stick centre position
b) Resetting the control surface travel end-points

This function must be used if you subsequently alter the trims or the servo travel.
Never select the *ZERO GYRO* function unless the transmitter sticks are at centre, and the model is standing motionless, with the engine or motor stopped.

After selecting the function, move all the sticks once to each end-point; this action causes the **iGyro** to detect and save the end-points automatically once more.

### 5.8. Airspeed Settings

During a flight the **iGyro** automatically accepts the new maximum speed values which are passed to it, and adjusts its stabilising behaviour to suit. If you ever need to reset this value - perhaps when you switch to a different model - this can be accomplished in the *AIRSPEED SETTINGS* menu.

In this menu you can read off the maximum speed achieved by the model; this is the value which follows the point *MAX AIRSP*.

To reset the maximum speed, select the *RESET MAX. SPEED* menu point. The speed is then reset to a value of 10 km/hr.

**Note:** it is also possible to test the **GPS sensor**: the *ACT. SPEED* point shows the momentary speed.

**Note:** speeds below 10 km/hr are not very precise!

### 6. Important points for handling the iGyro in normal operations

### 6.1. Switching the system on

When the **iGyro** is switched on, it accepts the current stick positions as centre, and calculates the sensor offset. For this reason it is important to avoid touching the sticks and the model when you switch the system on. Once switched on, the **iGyro** waits a moment until everything is motionless before calculating the sensor offset.

### 6.2. Trimming one or more axes

If you alter the trims in Flight Mode 1, due perhaps to a change in the model's Centre of Gravity or other modification to the airframe, the gyro must be switched on and off again; alternatively select the *ZERO GYRO* menu point briefly.

When the **iGyro** is switched on, it accepts the new centre settings again.

## 6.3. Status monitor

You will see this display when you switch the system on:

```
        iGYRO
    SYSTEM STATUS
TEMP: +22°
FLIGHTMODE: 1
GPS   : LOGGED IN
SENSORS: IDLE
```

- **TEMP:** The value following **TEMP** shows the current temperature of the MEMS sensor. The value is purely for information purposes, as MEMS sensors are largely insensitive to temperature fluctuations.

- **FLIGHTMODE** shows the currently selected flight mode. The number changes when you operate the Flight Mode switch on the transmitter.

- **GPS** indicates the current status of the GPS receiver. There are four different status displays:

- **NO SENSOR** - no GPS sensor is connected. The **iGyro** operates at 100% of the set gyro gain.

- **SEARCHING** - the GPS sensor is searching for available satellites. This procedure may take up to forty seconds when the system is switched on. These values apply when reception conditions are good.

- **LOGGED IN** - the GPS sensor has located an adequate number of satellites, and is supplying speed data to the gyro.

- **LOST** - the GPS sensor was registered when the system was switched on, but was removed during current operations. If this should happen, the **iGyro** sets the minimum gain.

- **SENSORS** makes the movement of the sensors visible. **IDLE** is indicated when the model is stationary; **IN MOTION**, when the **iGyro** is moved. You may find that the display occasionally switches between **IDLE** and **IN MOTION** when the model is not moving.

## 6.4. Reading out the flight recorder

The *RF-Flight Recorder* display is accessed by briefly and simultaneously pressing *buttons I and II* on the **SensorSwitch**:

```
RF-FLIGHTRECORDER
ANT.FADES    LOST
RX 1:   13  FRAMES:
RX2:    -      1
RX3:    52
            HOLDS:  0
```

*Antenna Fades:*
This item displays the lost data packets for the individual receivers.

*Lost Frames:*
This value shows how many occasions a valid data packet was not supplied by any of the connected receivers.

*Holds:*
This value is incremented when none of the connected receivers is able to supply a valid signal for a period longer than 250 ms. When this occurs, the servos stay in the Hold positions or move to the Fail-Safe positions stored in the PowerBox.

## 6.5. PC Control

The *PC-CONTROL* menu point in the *GENERAL SETTINGS* menu can be used to update the software, and to save and restore the gyro settings. Full instructions regarding these functions are supplied with the **PowerBox Terminal** PC program. The method of operating the **Terminal** program is very simple, and no special PC expertise is required.

## 7. Specification

| | |
|---|---|
| Operating voltage: | 4.0 V - 9.0 V |
| Current drain, **iGyro**: | 51 mA |
| Current drain, **GPS**: | approx. 60 mA |
| Maximum current: | min. 10 A |
| Receiver: | Two, using serial inputs |
| RC systems supported: | Spektrum SRXL, DSM2 / DSMX, Futaba, HOTT, M-Link, Jeti |
| Gyro sensor type: | MEMS |
| Number of sensor axes: | 3 |
| Gyro regulation modes: | Heading mode, Normal mode |
| Channels: | 18 |
| Servo outputs: | 5 |
| Servo signal resolution: | 0.5 µs |
| Servo frame rate: | 18 ms |
| Screen: | Graphic OLED, 128 x 64 pixels |
| Dimensions: | 52 x 35 x 14 mm |
| Weight incl. **GPS sensor**: | 50 g |
| Temperature range: | -30°C to +75°C |
| EMV approval: | EN 55014-1:2006 |
| CE approval: | 2004/108/EG |

## 8. Dimensions
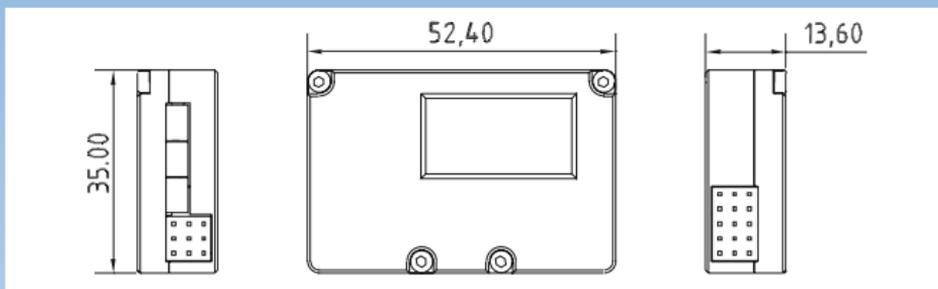


## 9. Set contents, depending on package

- **PowerBox iGyro**
- **GPS II sensor**
- **SensorSwitch**
- **USB Interface Adapter**
- 2 Uni patch-leads, 2-core
- 2 Uni patch-leads, 3-core
- 2 self-adhesive pads, large
- 2 self-adhesive pads, small
- Operating instructions in German and English
- Add-on manual for "Setup Assistant"

## 10. Service Note

We make every effort to provide a good service to our customers, and have established a Support Forum which covers all queries relating to our products. This helps us considerably, as we no longer have to answer frequently asked questions again and again. At the same time it gives you the opportunity to obtain assistance all round the clock, and even at weekends. The answers come from the **PowerBox team**, which guarantees that the information is correct.

Please use the Support Forum **before** you contact us by telephone.

You will find the forum at the following address:
**www.forum.powerbox-systems.com**

## 11. 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 **36 month guarantee** on our **PowerBox iGyro** 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 wish to point out that we reserve the right to replace the unit if we deem the repair to be economically non-viable.

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 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.

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**
**D-86609 Donauwörth**
**Germany**

## 12. Liability exclusion:

We are not in a position to ensure that you observe our instructions regarding installation of the **PowerBox iGyro**, 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 iGyro**, or which are connected with such use in any way. Regardless of the legal arguments employed, our obligation to pay damages 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 using your new **PowerBox iGyro**.

Donauwörth, July 2015

World Leaders in RC
Power Supply Systems

**PowerBox-Systems GmbH**
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