Instruction Manual

PowerBox Systems®

World Leaders in RC Power Supply Systems

PowerBox

iGYRO SRS

3 AXIS GPS CONTROLLED

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

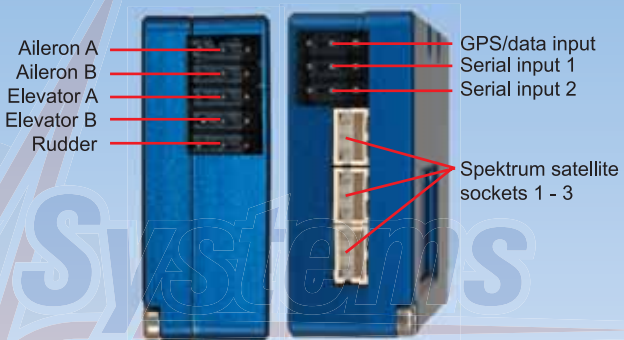
The **PowerBox iGyro SRS** is a completely new type of gyro system intended for fixed-wing model aircraft. At the development stage our constant aim was to combine maximum versatility with simplicity of operation. The system incorporates a regulatory algorithm specifically developed for fixed-wing models, 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 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. The control system is based on menus displayed on the graphic OLED screen, which makes short work of all set-up tasks.

Features:

- Extremely accurate triple-axis MEMS sensor
- Special regulatory algorithm designed for fixed-wing model aircraft
- 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 128 x 64 pixels
- Ultra-simple menu-controlled programming method using the **SensorSwitch**

- SRS technology for use with various bus systems:
  Futaba S-Bus, Spektrum DSM2 / DSMX, HoTT, M-Link and Jeti
- Unrestricted channel assignment (channel mapping)
- 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



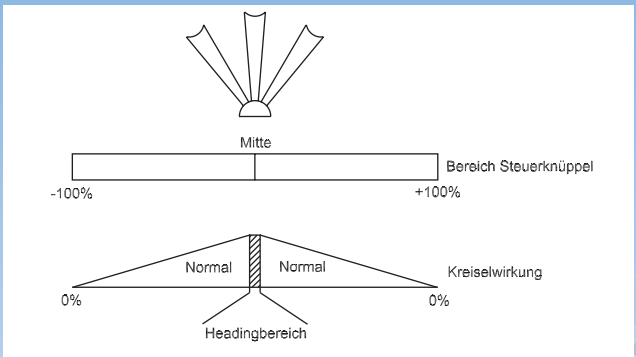
3. Fundamental factors for the understanding of the iGyro

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 control surface. In this centre position 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 gyro 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 the deliberate control command.

3.2. Speed-dependent gyro gain control:

The **PowerBox iGyro** can be connected to an optional **GPS Sensor** with the pur-pose of passing speed data to the gyro.
The **GPS 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 setting, 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 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.

3.3. Use of the 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 manoeuvres. For example, in **Flight Mode 1** the gyro is **completely disabled**: 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. Generally 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 manoeuvres, such as slow rolls or knife-edge flight, and should be switched off again by changing the Flight Mode when the manoeuvre is complete. In normal flight the Heading value is a hindrance, because the tail then tends to "drag" when the model is turning.
Aileron and elevator can be set up the same for all flight situations - the **GPS Sensor** 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

1. **Installing the iGyro**
2. **Installing the GPS Sensor**
3. **Operating the unit, the menu control system**
4. **Selecting the radio control system**
5. **Selecting the installed orientation of the iGyro**
6. **Selecting the wing type**
7. **Channel assignment (mapping)**
8. **Setting up the individual axes**
9. **"Zero Gyro"**

Note:
Text passages printed 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

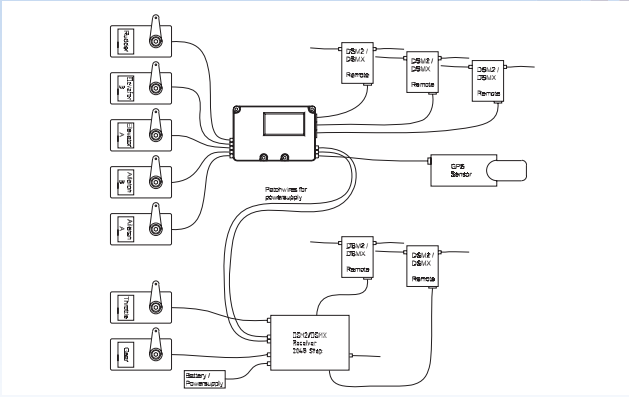
In mechanical terms the **iGyro** should be installed in the model using the double-sided self-adhesive pad supplied in the set. Please ensure that the **iGyro** is always mounted at right-angles to the model's centreline. The **iGyro** does **not** need to be positioned at the Centre of Gravity. Thanks 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 four possible methods of installing the **iGyro**:

Spektrum system, without **PowerBox** power supply system:

Up to three satellite 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.** An additional receiver is required for extra channels, such as throttle or choke. Only DSM2 or DSMX satellites may be used, i.e. those specified with **2048**-step resolution. If you are not sure, the operating instructions supplied with your receiver will state this value. Power is fed to the **iGyro** through two patch-leads connected between two vacant receiver channels and the **iGyro.** The power supply for the system as a whole should be connected to the receiver.

Spektrum wiring diagram:

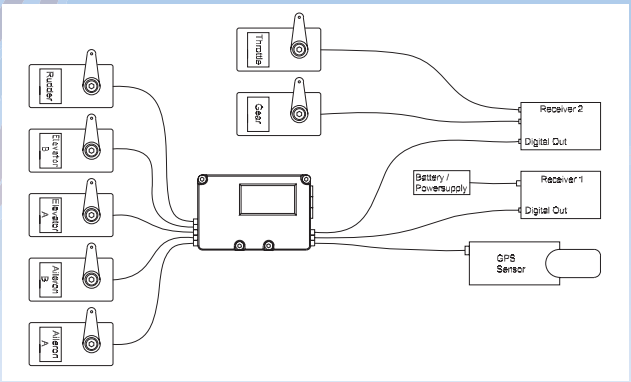


Note: if you wish to use a **PowerBox** (not **SRS**) as power supply with a Spektrum system, the unit is simply installed between the servos and the **iGyro**, or servos and receiver**.**

Futaba, 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, M-Link, HoTT and **Jeti** wiring diagram:

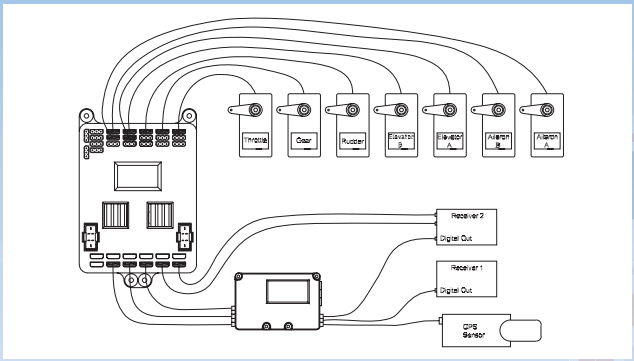


Any radio control system with **PowerBox** power supply system:

Connect both receivers (or just one) with the serial output to 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**:



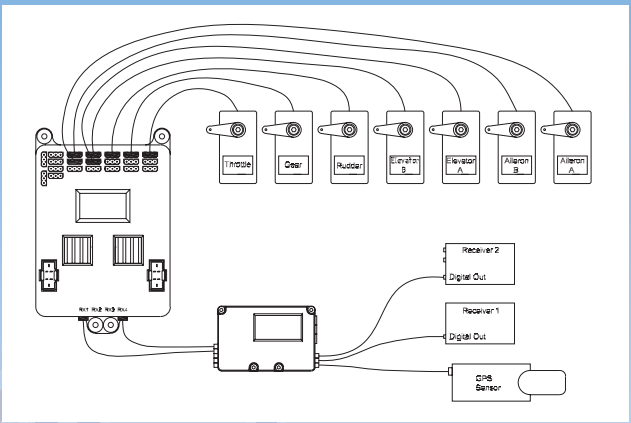
Any radio control system in conjunction with the PowerBox <u>SRS</u> battery backer:

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*****.** The procedure is described in full under point **4.3.**

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, **<u>all</u>** channels are protected by redundancy**.**

Wiring diagram with a **PowerBox SRS**:



4.2. Installing the GPS sensor

The **GPS Sensor** does not need to be installed in a particular position or attitude; it can 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 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.

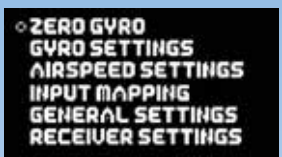
4.3. Operating the unit, the menu control system

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.

Press the **SET** button briefly to move to the menu. You will see this screen display:



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 using button II to move the cursor to the ***RECEIVER SETTINGS*** menu point.

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 auto-matically switches over to the second receiver if the signal is lost. If you are using a Spektrum system, up to three satellites can be connected to the unit. 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:

At this point please select the radio control system you wish to use, bearing in mind the following points:

Spektrum: the option you should select depends on the transmitter type you wish to use - not on the satellites connected to the system. For example, if your transmitter is a DSM2 type, but the satellites are DSMX types, select DSM2 here (for example, this applies to all Spektrum modules fitted to MC 24 transmitters).

If you do not intend to use the **iGyro** in conjunction with an **SRS PowerBox**, then one additional Spektrum receiver is required. The satellites connected to the **iGyro** and the receiver must be bound to the transmitter. This is the correct procedure:

- Insert the binding plug in the receiver
- Select the ***BINDING*** menu point at the **iGyro**
- Disconnect the power supply for the receiver and **iGyro**
- Re-connect the power supply to the receiver and **iGyro**
- The satellites at the receiver and **iGyro** should now be flashing
- Switch the transmitter on with the binding button pressed in

M-Link: The MPX receiver or receivers to be used must be set to "digital output". This can be accomplished using the Pro - Mate device or a PC with the help of a USB adapter (Multiplex or **PowerBox USB Interface**). At the same time please set the fail-safe time to 0s. This is important if you intend to use two receivers, as it ensures a rapid switch between receivers in the case of signal loss.

S-BUS: Set the receiver(s) to "normal mode" - **not** "high-speed mode". If you are using an R7008SB receiver, you must observe a special point: output 8 must be set to S-Bus, and this output must be used. Do not make any connections to the S-Bus2 output.

Jeti: Connect two R-Sat2 satellites to the system: one satellite operates as "clone", the other as "normal". We have found the following settings to work well:

- Output Mode: Computed
- Signal Fault: off
- Signal Fault Delay: 0.5s
- Output period: 20ms
- PPM 8, 9, 12, 16 depending on your transmitter / transmitter module

HoTT D: If you select this option, it is essential to activate the SUMD signal at the receiver. This is a digital bus system which provides a higher frame rate and better resolution than the previous SUMO.
Set “SUMD OF 16” under “CH OUT TYPE” at the SmartBox
OF means that the receiver switches off the SUMD signal if the signal should be lost. The **SRS** system detects this within a few milliseconds, and switches over to the second receiver.

Digital output:

The **digital output** can be used in order to connect the **iGyro** to a **PowerBox SRS.**
If ***DIG.OUT*** is set to ***ON***, no servos can 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.

Caution: PowerBox SRS systems with software versions earlier than V12 reset the ***Output Mapping*** if a change is made in the ***TX-SYSTEM*** menu. Please check these settings once you have completed the system set-up procedure.

4.5. Selecting the installed orientation of the iGyro

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.
This setting can be found in the ***GENERAL 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 three possible options for the screen and switch locations:

- ***LEFT/RIGHT***
- ***UP/DOWN***
- ***BACK/FRONT***

It is not possible to set two settings to the same value; this is intended to avoid errors when entering the gyro's orientation. 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

4.6. Selecting the wing type

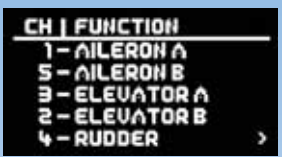
The **iGyro** features an integral delta mixer. This makes it possible to exploit the advantages of heading-lock gyro stabilisation on aileron and elevator even with a model delta! This mixer can be activated in the ***GENERAL SETTINGS*** menu point. If your model is a delta, simply select ***YES*** at the ***DELTA-WING*** point.

Caution: if your model is a delta, you **must not** set up a delta mixer at the transmitter. The **iGyro** carries out the mixing.

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. ***AILERON-A*** should be assigned as aileron, and ***ELEVATOR-A*** as ele-vator, as described under point 4.6.
In this case ***ELEVATOR-B*** is available for vector control or a canard system, and can be set up independently.

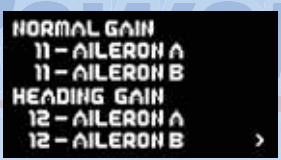
4.7. Channel assignment (mapping)

Modern **SRS** bus technology makes it possible to assign channels freely to particular functions**.** 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:



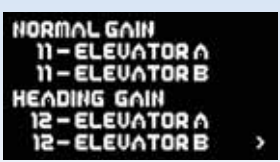
Mapping the control surface functions:

- 2 x ailerons
- 2 x elevators
- 1 x rudder

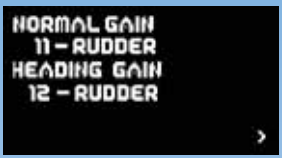


Assigning **iGyro** gain for the two ailerons**.**

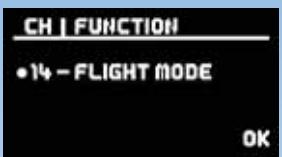
Ideally two sliders or rotary controls should be assigned for adjusting the system: one for the Heading value, and one for the Normal value.
In this case only three short flights are required in order to set up all three axes**.**



Assigning **iGyro** gain for the two elevators**.**



Assigning **iGyro** gain for the rudder.



Assigning the Flight Mode switch.

A three-position switch must be assigned for this function, set up at the transmitter to **-100% | 0% | +100%**

To assign a channel, use the "**SET** button" to select the appropriate function, then move the stick, rotary knob or switch which is to be assigned. Ensure that the transmitter control is assigned to a channel before you do this.

Note: automatic detection only works reliably if just one channel is assigned per transmitter control at the transmitter. For example, if you are assigning a separate channel for each aileron in the **iGyro**, use buttons I and II for the mapping procedure.

4.8. Setting up the individual axes

When you have installed the **iGyro**, the next step is to set up the gain and the direction of the stabilising effect.

Caution: the direction of effect is extremely important!

If you set the direction of effect incorrectly, the usual result will be the loss of the model.

If set incorrectly, the gyro system would respond to any unwanted external influence - such as a gust of wind - with a control surface deflection in the wrong direction, which would amplify the unwanted

movement. The gyro would then assume this movement to be a further outside influence, and increase the “corrective” movement once more. The net result is that the gyro would run to maximum control surface travel within just a few seconds.
Applying an opposite control command in this situation would not cause the aeroplane to recover.

The model must first be trimmed accurately to fly straight and level without the **iGyro**, or with the **iGyro** switched off.

If you subsequently alter the trim settings, this necessitates a re-calibration of the **iGyro**, **or** zeroing the unit. Zeroing the **iGyro** forces it to accept a new centre, so that Heading mode can work properly. More on this later.

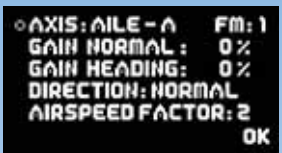
At least one channel is required in order to adjust gyro gain in flight. If you use just one channel, six flights are necessary in order to set up the Heading and Normal values for all three axes.
The set-up process is faster and more convenient if you assign two channels to one axis, controlled by two rotary knobs or sliders: in this case only one flight is required per axis in order to set the Heading and Normal values.
The following instructions assume the use of **two** assigned rotary knobs or sliders for carrying out adjustments. If your radio system does not have two spare channels available, you will need to carry out one flight to set up the Normal value, and a second flight to set up the Heading value.

Note: the channels you assign for this purpose will be available for other functions once the **iGyro** set-up procedure is complete.

The test-flight procedure:

a) Fly the model with the **iGyro** switched off
b) Assign channels to one or two rotary controls or sliders
c) Set the correct direction of effect
d) Fly the model in Flight Mode 1
e) Set the Normal gain value
f) Set the Heading gain value
g) Check the Airspeed Factor
h) Disable the rotary controls or sliders

a) We assume that the **iGyro** is installed in the model, and the control surface channels and Flight Mode switch are assigned. Set gyro gain - referred to simply as “gain” from now on - to 0% on all axes and in all flight modes. Check this by calling up the ***GYRO SETTINGS*** menu, where you will see the following display:



The first step should immediately be to test the Flight Mode switch: when you operate the switch, the value at ***FM***: should change to ***2*** and then ***3***.
In this way you can check that gyro gain in all flight modes is set to 0% on the ***AILE-A*** axis.
Repeat this check procedure for all axes: ***AILE-A, AILE-B, ELEV-A, ELEV-B, RUDD***.

Do not use any mixers!
It is essential to disable any mixers which automatically apply elevator trim compen-sation to rudder or landing flaps, and also any rudder - aileron mixer (coupled aileron / rudder).
Exponential functions can be set up in the usual way. You may find it necessary to reduce these settings slightly at a later point, once the gyro is active, since the gyro effect has a slight counteracting effect on the control surface function when control commands are small. This characteristic diminishes with increasing stick travel, and is reduced to zero at full travel.

Note: if your model features other superimposed functions, such as camber-changing flaps and ailerons, please note that the **iGyro** does not work in Heading mode when the flaps are deployed; in this case the gyro system only operates in Normal mode, since the transmitter control is no longer at the centre point to which the gyro is calibrated when the system is initially switched on.

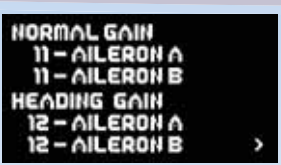
While the gyro is switched off, its direction of effect is irrelevant. The first step is always to test-fly the model in Flight Mode 1, with the gyro effect switched off.

Once the model has landed, the **iGyro** must learn the new trim values and travel end-points. With the motor stopped, select the first point

ZERO GYRO in the **iGyro** menu, and refrain from touching the model. The **iGyro** waits for a few seconds, then carries out a ***RESET***; the delay gives you sufficient time to release the switch, so that the result is not falsified by any external movements. The ***RESET*** is complete when the solid disc cursor reverts to a hollow circle. During this "Zeroing" process the gyro accepts the new stick centre points, and resets the end-points of travel. At the same time any Offset values are calculated for the MEMS sensors. When you move all the control functions to their endpoints in both directions, the gyro automatically detects and saves the new values.

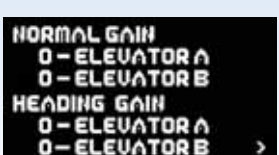
Note: if at some later time you alter the end-points or centre point at the transmitter, it is important to reset the **iGyro** again by selecting the ***ZERO GYRO*** menu point once more. When you have done this, you must move all the sticks to both endpoints once only; the **iGyro** then automatically saves the end-point values.

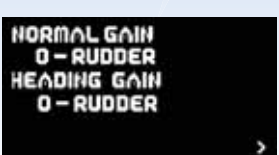
b) The first test-flight is used to set up gyro gain on the aileron axis. You should therefore assign a rotary control or slider to the ***NORMAL GAIN - AILERON-A*** points in the **Input Mapping** menu; you will use this control to adjust and save the gyro gain for Normal mode. If the model has two aileron channels, assign the same channel to ***NORMAL GAIN - AILERON-B***:



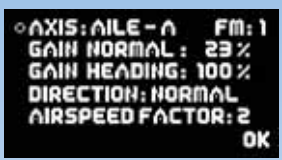
If you have two channels available for adjusting gain, assign a further channel for ***AILERON-A*** and ***AILERON-B*** under ***HEADING GAIN***.

The assignments for Gain at ***ELEVATOR*** and ***RUDDER*** must be left at 0:





These settings can be checked in the ***GYRO SETTINGS*** menu point. Operating the rotary knob or slider should now alter the values at ***GAIN NORMAL*** and ***GAIN HEADING*** over the range 0% to 100%. You can also check the other axes at the ***AXIS*** menu point. If you are using two ailerons, the gain values at ***AILE-B*** must also be variable. The Gain values for ***ELEV-A***, ***ELEV-B*** and ***RUDD*** remain at 0% even when the gain adjusters are moved from stop to stop.
In the course of many tests we have found that the ideal value for the ***AIRSPEED FACTOR*** is **2**; this setting only applies if the **GPS Sensor** is connected. A full description of the method of setting the ***AIRSPEED FACTOR*** is included later.



c) Setting the direction of effect: rotate or slide the Heading Gain adjuster at the transmitter to 100%; this setting is more convenient for setting the direction of gyro effect. Now leave the transmitter stick at centre, and move the model: you should notice a distinct aileron deflection.
Check: move the **right-hand wing up**, and the **right aileron** should now deflect **up**, the left aileron **down.** If the ailerons move in the opposite direction, then the direction of effect must be altered to ***REVERSE*** at the ***DIRECTION*** menu point. Ensure that both ailerons operate in the correct direction; if you are using two aileron channels, check that ***AILE-B*** is also set up correctly.

Note: naturally this action has no effect on the direction of operation of the actual aileron control system in the model!

d) Before you fly your model, set both gain adjusters on the transmitter to 0%, and move the Flight Mode switch to ***FM:1.*** Before flying, satisfy yourself once more that you are familiar with the transmitter controls you have selected.
At the set-up phase the Flight Mode switch is very important, because it en-ables you to disable the **iGyro** immediately if you find you have made a mistake in setting up the system: all you have to do is switch back to Flight Mode 1.

It is also important to select rotary control(s) or slider(s) at the transmitter which you can reach easily when the model is flying.
If you are using the **GPS Sensor**, you should check before flying the model that the **GPS Sensor** indicates ***LOGGED IN*** in the **iGyro System Status** display.

e) After take-off, set the model on a course parallel to the runway, ideally at a safe height - but not so high that you cannot see the model clearly. During the fly-past, move the Flight Mode switch to 2. Don't fly too fast, otherwise the **GPS Sensor** will already be applying severe damping to the gyro. A good starting point is to aim at a straight pass along the strip at ¼-throttle. Slowly advance the knob (or slider) for the Normal value until the model starts to oscillate slightly. At this point reduce the adjuster setting slightly once more.

Note: it is essential to leave the Heading value adjuster at 0% at this stage, as this ensures that the Normal value alone is active at all speed ranges, and can then be adjusted accurately.

If the Heading value is set to 0%, the **iGyro** operates permanently in Normal mode.

g) The model's flightpath should already be significantly smoother. Carry out a further pass along the runway at maximum speed, to establish whether the damping of the **GPS Sensor** is sufficient. If the model starts to oscillate at maximum speed, it is advisable to land the model, and set the value for ***AIRSPEED FACTOR*** to 3 for ***AILE-A*** and ***AILE-B***.

f) When you are confident that the model is also stable at maximum speed, you can advance the Heading value during a further pass: set the model on the desired heading, and take your fingers off the aileron stick. Now turn up the assigned Heading value adjuster until the model just starts to oscillate. As described previously, reduce the adjuster's setting slightly at this point, and the job is done. To accept these settings in Flight Mode 3, move the Flight Mode switch briefly to ***FM:3***.

Note: a useful final test of the stability of the gyro settings is to let the sticks "snap back" to centre: as soon as the sticks stop moving, the model should resume normal flight without oscillating.

It is now already safe to land the model with the **iGyro** switched on: you should be rewarded with a smooth, stable landing approach, which is an impressive indication of the effectiveness of the **iGyro**.

h) After the flight you should disable the gyro gain adjusters. There are two possible methods of accomplishing this:

1) Move to the ***GYRO SETTINGS*** menu, and use the SET button briefly to select the two menu points ***GAIN NORMAL*** and ***GAIN HEADING***, and then leave them again. If your model has two aileron servos, carry this out separately for ***AILE-A*** and ***AILE-B***.

2) In the ***INPUT MAPPING*** menu use the SensorSwitch to set the assignment for ***NORMAL GAIN*** and ***HEADING GAIN*** to ***0***.

The next step is to set up the **iGyro** for the elevators: simply repeat the procedure described for the ailerons. Here is a brief summary of the steps involved:

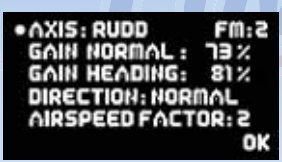
- Assign one or two adjusters for gyro gain.
- Check the adjuster assignment in the ***GYRO SETTINGS*** menu for both elevators, if present.
- Set the Heading value to 100%, and check the direction of effect of the gyro: When you raise the tail end of the model, both elevators must deflect up. If the elevators deflect down, select the ***DIRECTION*** menu point, and set the direction of effect to ***REVERSE***.
- Set both gain adjusters to 0%, and the Flight Mode switch to 1.
- Check the GPS status.
- Steer the model on a straight flightpath parallel with the runway at the ¼-throttle setting, and slowly increase the Normal value until the model starts to oscillate. At this point reduce the gain slightly until the oscillation ceases.
- Carry out another pass along the runway at maximum speed, and observe whether the model tends to oscillate. If oscillation occurs, land the model and increase the ***AIRSPEED FACTOR***.
- When you have achieved stable flight at maximum speed, carry out another pass along the strip in order to adjust the Heading value: fly along the runway at ¼-throttle, and take your fingers off the elevator stick; advance the Heading value adjuster until the model starts to oscillate, and then reduce it again slightly.
- A further pass at maximum speed will show whether the ***AIRSPEED FACTOR*** is adequate.
- Briefly move the Flight Mode switch to 3 to accept the same settings in ***FM:3***.
- The model can now be landed with the **iGyro** active.
- Disable the assignment of the gyro gain adjusters.

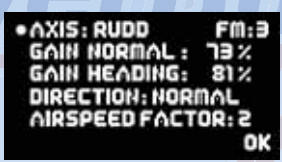
The model is now gyro-stabilised in Flight Modes 2 and 3 on the aileron and elevator axes.

The rudder requires special handling: if a Heading value is active on the rudder, the model will always “hang its tail” when flown through turns. For this reason we recommend that you set the Heading value for the rudder to 0% in Flight Mode 2, and only activate it in Flight Mode 3.
The method of adjusting the gain value for the rudder only differs slightly from that of the other control axes. Use exactly the same procedure for setting up the rudder as for the other two axes - until you reach the “Setting the Heading value” point.

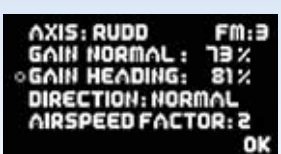
The difference compared with the other two axes is this: once you have set the Heading value, switch to Flight Mode 1 to disable the **iGyro**, then land the model with the gyro switched off; do not alter the position of the rotary knob or slider.

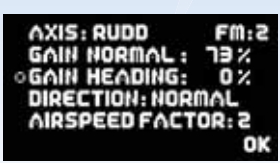
After the landing, select the ***GYRO SETTINGS*** menu and process the values manually. After the flight the menu will look something like this - except (of course) that the gain values will be those you have established in flight-testing:





Disable the Normal value gain adjuster by placing the cursor at ***GAIN NORMAL*** and pressing the SET button twice.
The ***GAIN HEADING*** value should be set to 0% in Flight Mode 2 using the **SensorSwitch.** Your menu should now look like this:





Select the ***INPUT MAPPING*** menu, and check once more that the gyro gain assignment has been disabled. The two channels you used are now immediately available again for other functions.

Set up in this way, the model can be flown in Flight Mode 2 in all situations, including take-off and landing. Flight Mode 1 is generally no longer required. Flight Mode 3 is available in a "supporting role" for knife-edge flight, slow rolls and 3D aerobatic manoeuvres.

4.9. Zero Gyro

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

a) Calculating the sensor offset
b) Calibrating the stick centre position
c) Resetting the control surface travel endpoints

This function **must** be used if you subsequently alter the trims or the servo travel.

The function **can** be used if the control surfaces slowly deflect in one direction when the model is left to stand for a long period. In flight, however, this movement is not noticeable.

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 endpoint; this action causes the **iGyro** to detect and save the endpoints automatically once more.

5. Important points for handling the iGyro in normal operations

5.1. Switching the system on

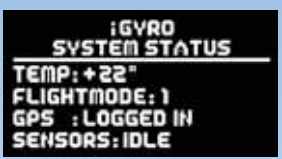
When the **iGyro** is switched on, it accepts the current stick positions as centre, and calculates the sensor offset. For this reason it is important **to avoid touching** the sticks **and** the model when you switch the system on. The **iGyro** waits for a few seconds after it is switched on, to give you time to take your hands off the model.

5.2. 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.

5.3. Status monitor

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



- 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 three different operating modes:
  - ***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 one minute the first time the system is switched on, but a small buffer battery stores the setting for several hours thereafter, thereby abbreviating further start-up processes to about ten seconds.
    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.

- ***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; this has no adverse effect when the model is in the air. The value should show ***IDLE*** after a "***ZERO GYRO***" process.

5.4. Handling the GPS Sensor

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.
For your information: speeds below 10 km/hr are not very precise!

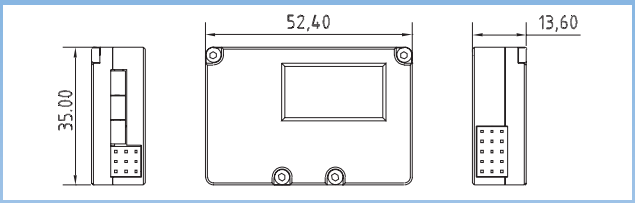
5.5. PC Control

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.

6. 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:	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

7. Dimensions



8. Set contents, depending on package

- **PowerBox iGyro**
- **GPS Sensor**
- **SensorSwitch**
- **USB Interface Adapter**
- 2 Uni patch-leads
- 2 self-adhesive pads, large
- 2 self-adhesive pads, small
- Operating instructions in German and English

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 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 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

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, April 2012

PowerBox-Systems GmbH
certificated according to DIN EN ISO 9001:2008

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