WAVE

Spirit W1 is stabilisation system for R/C aircrafts such as helicopters and planes featuring control unit and receiver in one extraordinary package!

It combines the best available technologies from both worlds to offer cutting edge experience.

In other words, Spirit W1 consists from Spirit GT hardware and Spirit Wave receiver.

Control part

- Top-notch 20-bit IMU Sensor
- Performance-line ARM F7 processor
- Precise pressure sensor for Altitude measurement
- Dedicated Memory Chip for detailed logging

Receiver part

- Spirit Wave 2.4Ghz full-range telemetry receiver
- Full featured 30+ channels available
- Blazing fast 300 Hz transmission
- High interference immunity
- BEC Voltage measurement

Spirit W1 can be easily bound with all Spirit Wave radios. It can be used also with all third party external receivers known to work with Spirit units.

This will allow easy transition from previous systems, while Wave radio can be linked anytime later.

Following pages are covering setup of your Spirit Wave radio and W1 unit to prepare everything for the first flight.

When W1 unit is used with a non-Wave radio you can proceed according standard Spirit manual (https://manual.spirit-system.com/index.php?title=Manual).

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1 Safety

R/C models such as helicopters are not toys! It is necessary to check all the manufacturer instructions of the model, comply with local laws and to perform pre-flight inspections of the model to address all possible mechanical concerns, electrical concerns and failures immediately.

Rotor blades and propellers rotate at high speed and can lead to serious injury to persons and property if not respected.

If you encounter any problems, contact your dealer or other experienced modelers.

Pay particular attention to your own safety and the safety of others. Never fly amongst or over people, animals, or on private property without prior authorization from the property owner. Fly only in safe places where no additional damage is possible to other objects, because the model can suddenly become unmanageable for various reasons, such as failure of electronics, mechanical failure, pilot error or radio interference.

Do not try to fly damaged models or perform repairs using damaged parts; always replace damaged parts with new ones. Never fly a model which exhibits abnormal behavior or excess vibrations, this may cause unwanted flight characteristics or in-flight failures. Find the source of the vibrations and fix the problem.

> ⚠️ **Spirit W1** unit is not an autopilot, it is necessary to have knowledge of flying R/C models. The system is only designed to improve flight experience. We recommend using R/C simulators designed for training before the first flight.
> **The user takes full responsibility for any damage or injury caused while flying an R/C model equipped with one of our devices. The manufacturer can neither guarantee nor control the conditions in which the unit is being used.**
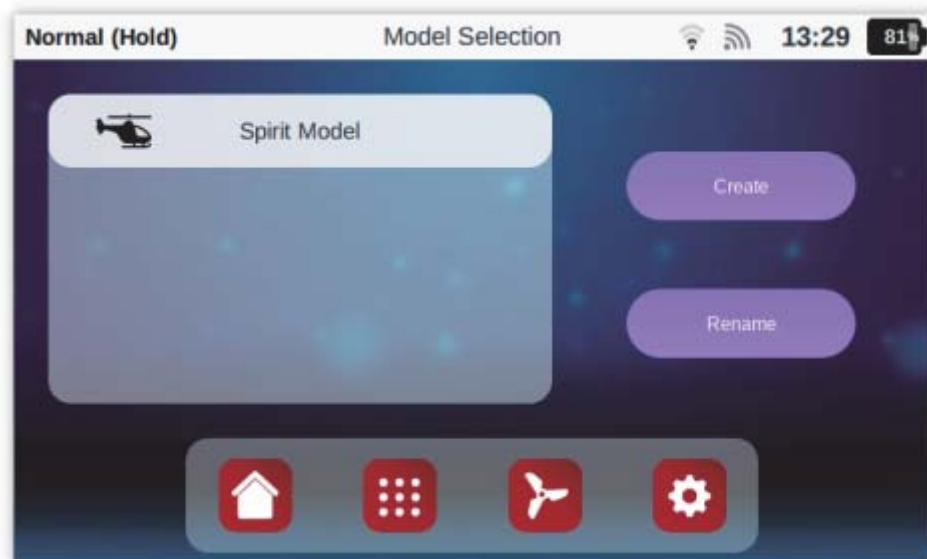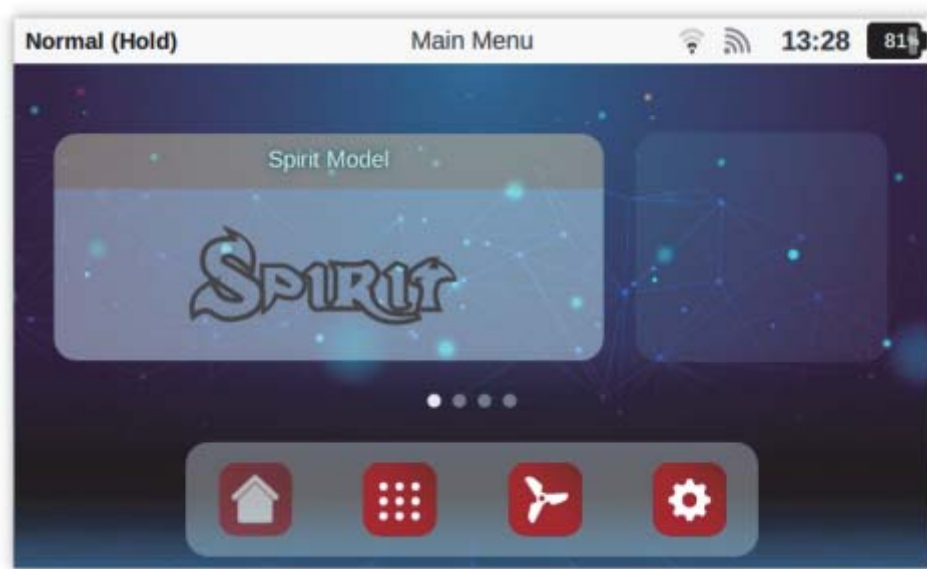
Preparation

To use Spirit W1 with Spirit Wave radio it is enough to create fresh Model in the Model list.
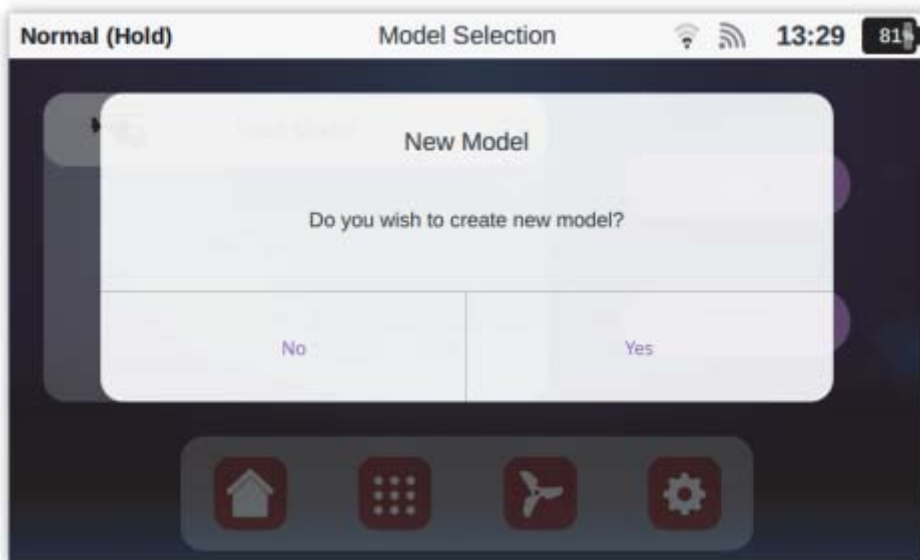
Spirit W1 unit can be used for Helicopters and Airplanes. Depending on this create according model.
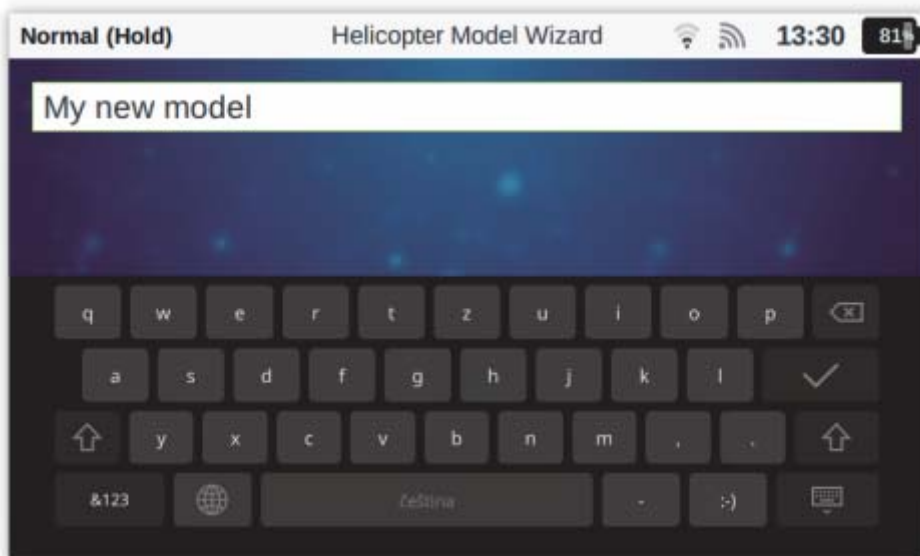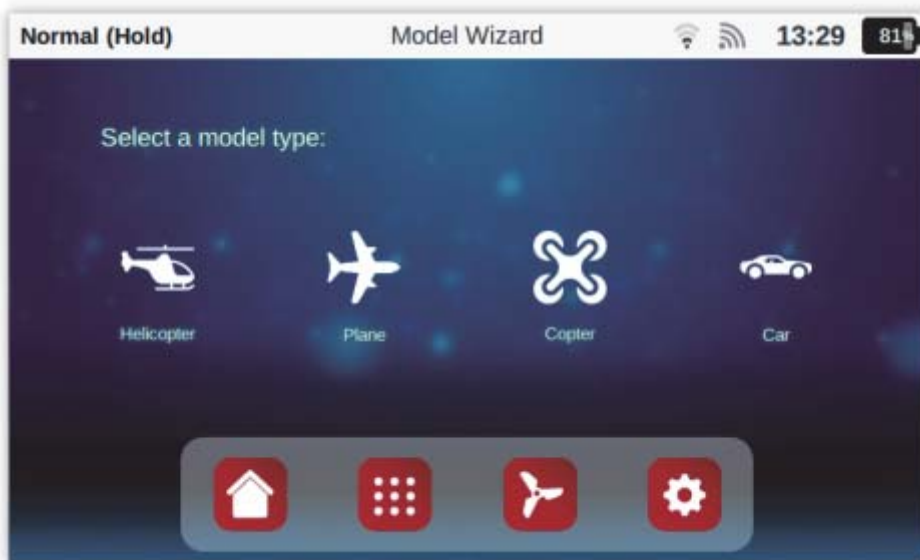
Model Creation

1. Go to **Main Screen** by tapping at the Home icon from where you can enter **Model Selection** menu.

2. Tap at the **Create button** and choose **Yes**.

3. Then select **Helicopter** or **Plane** and enter Model Name if using Spirit W1.

ⓘ By default Spirit W1 units are preloaded with Helicopter firmware. You can flash Spirit Aero firmware for free at any moment if you plan to use a plane.

Model Configuration

All Model-related settings are at the **Model menu** (Third icon at the bottom panel).

Depending on Model type you selected during model creation this menu has differences. For helicopters you will find there different menus than for a planes.

Model menu pages

After binding with Spirit W1 you can find three menu pages in the Model Menu. If Spirit unit is not detected only two menu pages are visible.

- **Spirit** - Full integration and configuration of the Spirit Flybarless unit.
- **General** - Receiver binding, Flight Modes, Throttle and Pitch Curves, Gyro gain and similar.
- **Miscellaneous** - Theme for particular model, Alarms, Logging and rest.

> ℹ You can do the General settings at any moment even without Spirit unit disconnected.

2 Mounting

Correct mounting of the Spirit W1 unit plays an important role for the operation of your model.

Find a suitable location where vibrations are as low as possible - this is usually the same location shown by the manufacturer for mounting a gyro.

It is VERY important that the unit will be mounted so that the unit is **exactly** perpendicular to each rotational axis. Depending on your preference and available space it can be mounted in eight different positions:

- Horizontal (0°)
- Horizontal (180°)
- Horizontal (0° + inverted)
- Horizontal (180° + inverted)
- Vertical (0° - left side)
- Vertical (180° - left side)
- Vertical (0° - right side)
- Vertical (180° - right side)

In case the unit is positioned so that connectors are facing forwards, select *180°*, please. If the unit is mounted upside down, select *inverted* option.
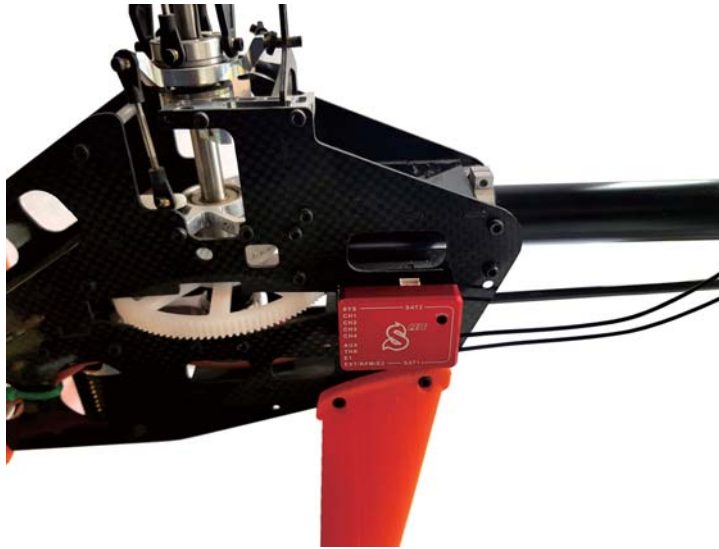
Mounting examples

In the following photo the unit is mounted by double-sided adhesive tape to the frame of model.
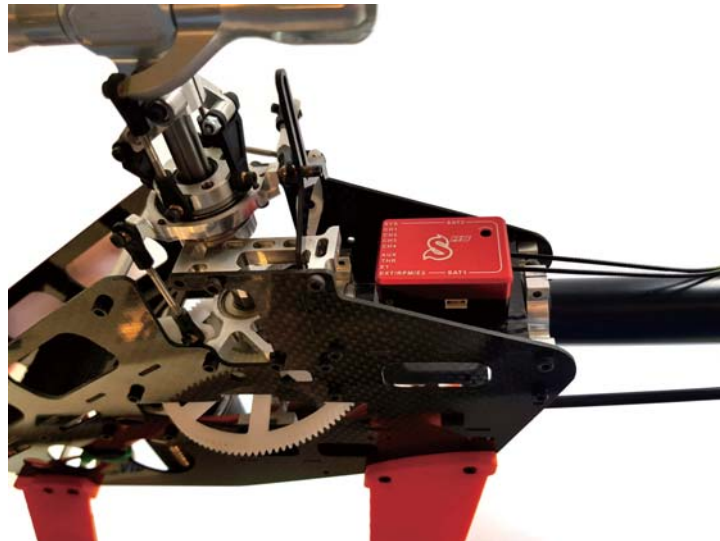
Example 1: Position is **Horizontal (180°)**

Example 2: Position is **Vertical (180° - left side)**

In order to better insulate against any vibrations from the model, it is necessary to choose the right double-sided mounting tape. The tape should limit any transmission of vibrations from the model to the Spirit which may produce undesirable flight characteristics. Vibrations may also be caused by incorrectly balanced blades, damaged bearings, bent shafts and other mechanical issues.

We recommend to use supplied double sided tape.

Antenna

Spirit W1 is equipped with 2 full-range antennas. For the best signal reception it is necessary to mount them properly at the model.

Ends of the antennas should be perpendicular to each other in all directions for optimal signal radiation.

⚠ **Do not bend antennas more than 45° in a sharp angle. Bending radius should be more than 2 cm.**

⚠ **Do not cover antennas with any additional objects. Preferably direct visibility at any angle should be achieved.**

⚠ **Never pull the antennas. Antennas are replaceable and could be accidently disconnected making them ineffective.**

3 Wiring

Spirit W1 has support for 4x swashplate, 1x tail and 1x throttle servos.

It has also 2x independent telemetry ports which mean you can attach directly two Spirit Wave sensors. Moreover you can optionally connect a backup receiver.

Additionally you can utilize ESC Telemetry and GeoLink GPS/GNSS module.

Servo Wiring

According following diagrams you can connect servos to the Spirit W1. If some of your servos are not 1520µs center pulse, please connect the servo later during Setup Wizard process.

- **CH1** and **CH3** - Aileron/Pitch servo
- **CH2** - Elevator Servo
- **CH4** - Tail Servo

- **CH0** - Optional 2nd Elevator Servo

Depending on your model and selected Swashplate Type servos are wired differently. Wiring is described in the following sections and also in the Setup Wizard.
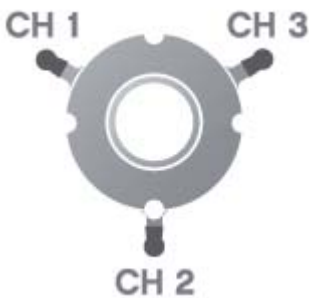
Elevator at the front

Elevator has servo control push rod at the front part of the model - swashplate push rod at the front.
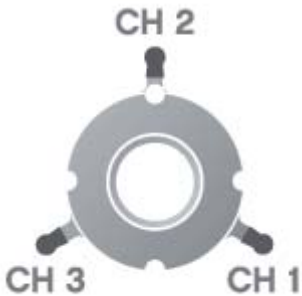
- **CH1** - connected to the right servo (Pitch)
- **CH3** - connected to the left servo (Aileron)

Elevator at the rear

Elevator has servo control push rod at the rear - swashplate push rod at the rear.

- **CH1** - connected to the left servo (Aileron)
- **CH3** - connected to the right servo (Pitch)

Power Supply

Power Supply is critical part of the model. For this reason it is highly recommended to use suitable BEC or battery that can handle used servos. Once wiring and setup is completed it is highly advised to perform the **BEC test**. If the test will not pass it is clear the power supply is inadequate and failure will occur.

BEC, Battery or Backup power supply should be connected always at **THR**, **E1** and **AUX** ports.

- **THR** - used for Throttle output and primary ESC/BEC cable for electric helicopters. For a combustion helicopters THR port is used for Throttle Servo.
- **T1** - used for Secondary BEC cable for electric helicopters (recommended for class 500+). For a combustion helicopters T1 port is used for a Battery lead.
- **AUX** - used for Optional Power Guard system or an additional battery lead. Can output also channel data for controlling a landing gear, lights, etc.

> ⚠️ **Do not connect any wire to X pin. This pin is shared with internal Spirit RX receiver. Only if using external receiver this pin can be used!**

Telemetry

Spirit W1 is equipped with 2 separate inputs for Spirit Telemetry sensors. These sensors are compatible also with external Spirit RX receivers.

Available telemetry ports:

- **T1**
- **T2**

Please note these ports are not used for ESC telemetry or GeoLink module.

> ⚠️ Spirit W1 is equipped also with X pin at T2/RPM/X port. This pin is used internally for communication with built-in receiver. **When using Spirit RX receiver nothing should be connected to X pin.**
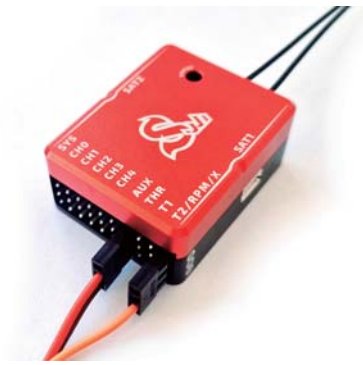
Telemetry Sensor Wiring

T1 port

Connect Sensor or Expander cable directly without any change.
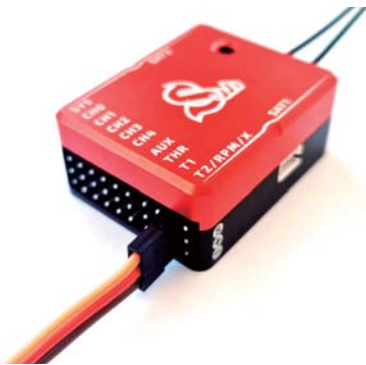

T2 port

Connect Spirit Sensor cable in so that RED/BROWN wires are at the AUX port (or any other free powering port) and ORANGE wire at the bottom T2 pin. In case of lack of free ports, please use an Y-cable.

> ℹ️ Original connector must be modified so that two servo connectors are used.

Telemetry Sensor Data

You can set display Sensor Data at the Main screen by opening adding **Widgets**.
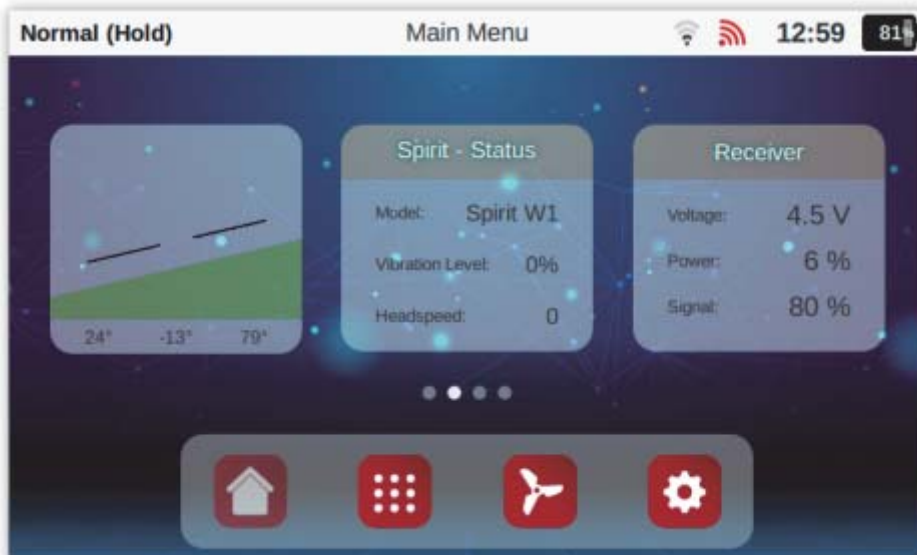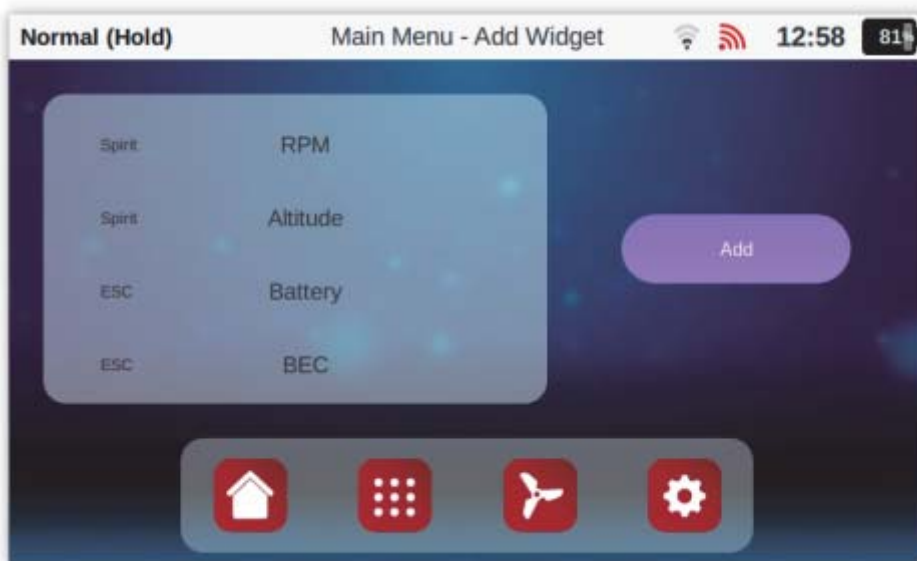
Spirit Telemetry

Besides Spirit Telemetry sensors you can also utilize the ESC Telemetry, GeoLink module and Spirit telemetry variables.

This mean you can interface your ESC and display telemetry data such as Battery Voltage, Current, Consumed Capacity, Temperature, RPM.

For more details about ESC telemetry please visit linked guide.

Similarly you can install GeoLink for measuring GPS position, Speed and other variables.

4 Binding Procedure

In order to Bind Spirit W1 with your Wave radio use supplied Bind plug.

1. Insert **Bind plug** at the **SYS port** and connect Power supply to the Spirit W1 unit. You can connect BEC or 1-3S Battery at the **THR, AUX, T1** ports.
2. Spirit W1 unit will start to blink with the Status LED periodically.
3. Then power up your Wave radio.
4. Radio will automatically bind to the receiver when using new Model profile. You can also Bind anytime manually as described in the section above.
5. After successfull binding Spirit unit will stop blinking and will initialize. Then you can remove the Bind plug.
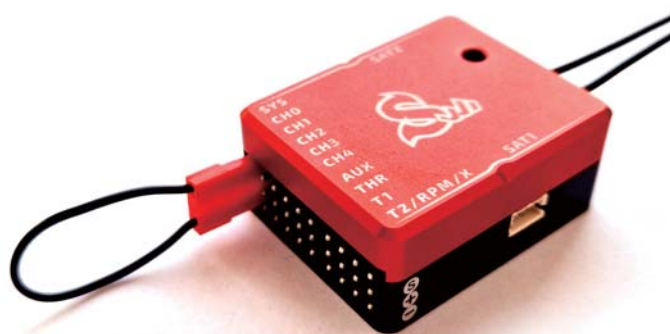
Manual Binding

You can Bind manually by going to the **Model/Receiver** menu. Press the **Bind button** after powering up Spirit W1 with a Bind plug.

5 Setup

All Spirit units can be configured through radio in the full extent without usage of computer. You can perform full setup of the Spirit W1 and tune all flight parameters easily from the **Model** menu in the Spirit Wave radio.

Spirit Integration

All Spirit features are tightly integrated to the configuration interface. All changes related to the Spirit W1 unit can be done from there which mean you do not need computer for full model configuration. You can enter and close it anytime you wish.

> ℹ It is highly advised to not enter the setup while flying!.

Opening Spirit menu

To open Spirit setup you can proceed in the following way.

Tap at the **Model menu** and the very first page is all related only to Spirit parameters.
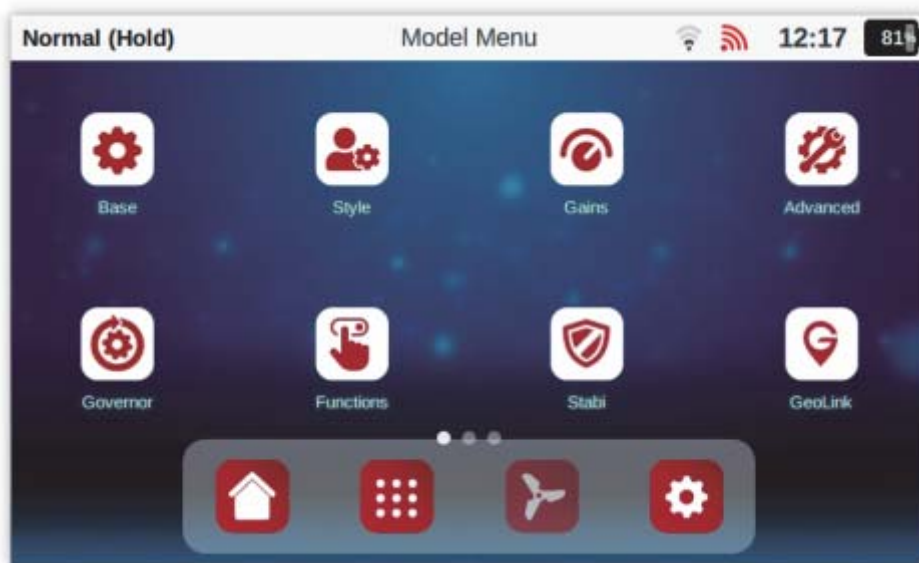
Spirit Settings interface

Spirit menu is almost identical to computer software called Spirit Settings that can be also optionally used.

You can easily change any parameter and changes are applied immediately. But to store any changes do not forget to Save the settings.

> ℹ Click at the **Save Settings** in the Spirit menu to save all changes you have made in the Spirit W1 settings. Otherwise after re-power changes are returned to the previous values.

Spirit setup

To prepare Spirit unit for flight it is necessary to go through **Setup Wizard** first. This process is required only once, always for a new model.

You can find the Setup Wizard in the **Model/Base/Setup Wizard**.
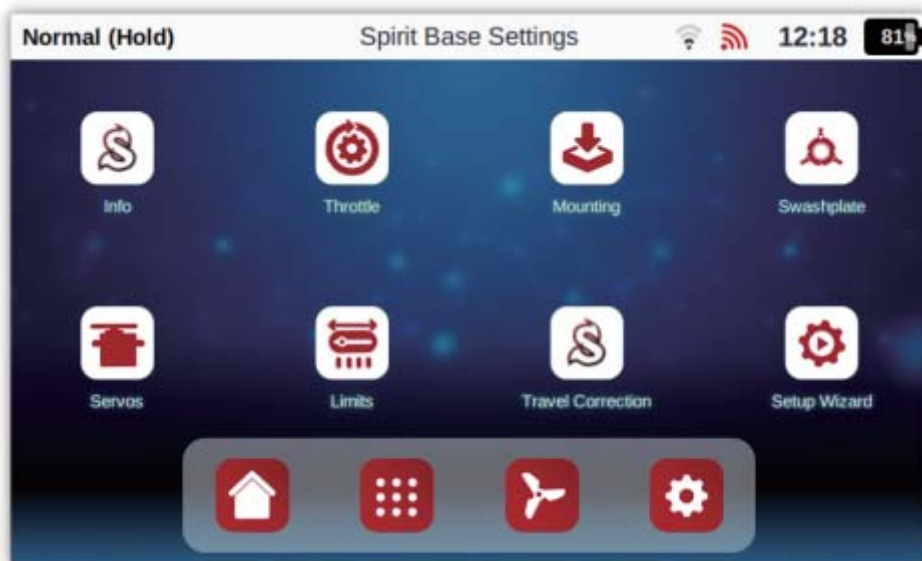
PC Configuration

Spirit W1 units can be configured through any modern computer. This will allow the best comfort and guidance through the entire setup process.

Spirit W1 is compatible with Spirit USB interface and can be connected and configured at any given moment.

Please proceed according our Configuration page that is common for all Spirit units.
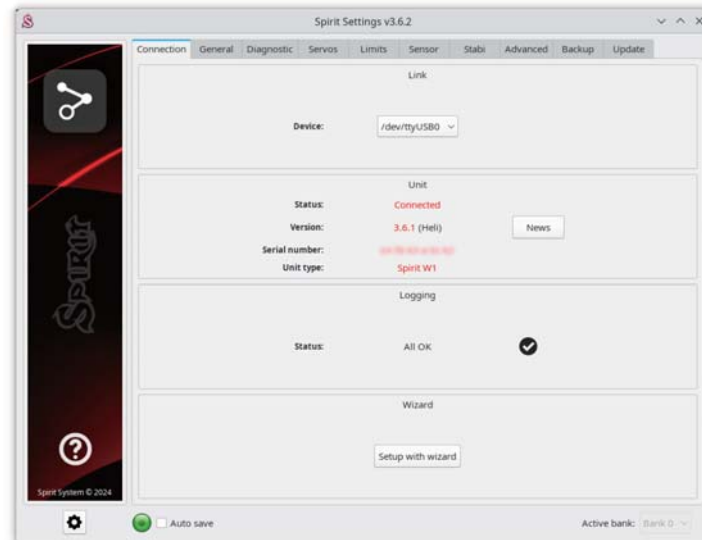
6 FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. To maintain compliance with FCC's RF exposure guidelines, the distance must be at least 20 cm between the radiator and your body, and fully supported by the operating and installation.