Spirit Wave Manual

Spirit Wave is next generation Radio Control System utilizing the cutting edge technology. We aim to provide the best experience for R/C model enhusiast through seamless integration of all Spirit products.

It is designed for all R/C models and it's capabilities can be extended without a limitation. Easily by Updating to a new version, for free.

RF module

- Designed entirely by Spirit System for allowing the unprecedented integration.
- Spirit Wave 2.4Ghz full-range telemetry.
- Dual Path independent antennas for improved safety and Signal coverage.
- Full featured 30+ channels available.
- Blazing fast 300 Hz transmission.
- High interference immunity.

Spirit Wave can be easily bound with Spirit W1 controllers or with Spirit RX receivers. Spirit W1 is our greatest unit for R/C helicopters and R/C airplanes with integrated Wave receiver.

Any third party controller can be connected through Spirit RX receiver by a standard PWM, S-BUS or SRXL protocols.

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Specifications

Base Data

Specification

- **Weight**: **Wave** @ 865 grams +/- 10g, **Wave Pro** @ 1110g +/- 40g
- **Main Body dimension**: 180 x 170 x 65 mm (excluding Radio Holder, Switches and Neck Strap Lock)
- **Operating Temperature**: 0 - 40°C / 32°F -104°F
- **Battery**: 6900mAh 3.8V Premium Grade LiPo
- **Current Consumption**: 850 mA max., 45 nA Standby

Supported Models

- Helicopter
- Plane
- Copter
- Car
- Boat
- Other

Model Support will be extended with upcoming updates (Free Of Charge).

Package Content

- Spirit Wave transmitter
- Carry Bag
- Neck Strap
- 2m USB-C Cable
- Alan Key
- Torx T6 Key

USB Charger is not included, you can buy it optionally from us. Any USB (USB-A) charger will work, including USB port from a computer.

Safety

R/C models such as helicopters, planes or drones 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.

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.

Introduction

Each Spirit Wave R/C transmitter comes fully calibrated and tested in a real condition to allow immediate operation. Our aim is to provide product with a high quality standards and long operating time with extended support. All inputs such as Touchscreen Display, Switches, Potentiometers, Sliders, Motion and Light Sensors together with Sound System check are passing through extensive tests prior the shipping. Each RF module is strictly tested to meet desired parameters.

Our products are completely services by us or by authorized Spirit Wave dealers. Each Wave radio has 2-Year Warranty.

First Steps

We highly recommend to **Charge Radio Battery** first. Spirit Wave comes with LiPo battery at Storage Voltage to make sure it can be left for long time before use. Charging can be done in the same way as todays Smartphones through USB-C connector with no special requirements. USB Charger is not part of the Package Content to allow easy Worldwide distribution and minimize environmental impact.

Charging will Stop automatically to prevent overcharging.

Charging

Charging can be performed at any moment. Radio will start with the process immediately if Battery Capacity is under 100%.

1. Insert Charger to the Grid or a Charging cable to a source (Computer, Power Bank).
2. Insert USB-C connector at the rear side of the Wave radio.

Charging Status

- When radio is Powered Off you can find whether it is charged or not by short press at the "S" Button. When battery is being charged the "S" Button is pulsating.
- When radio was connected to the Charger while Powered On you will see Charging notification immediately at the Display. Display will show you Battery Capacity all the time.

> If radio is Powered On Charging speed is several times slower depending on user activity.

Powering On

1. Press and Hold "S" button for at least 3 seconds.

2. You will feel short vibrations, button can be released.
3. Radio will Bootup within following 5 seconds from Cold Start.

Powering Off

1. Short press at the "S" button,
2. Confirm the intention by pressing YES at the Display.

You have to confirm Powering Off within 5 seconds.

If a model is connected Radio will Display Warning and will not allow Powering Off without further interaction.

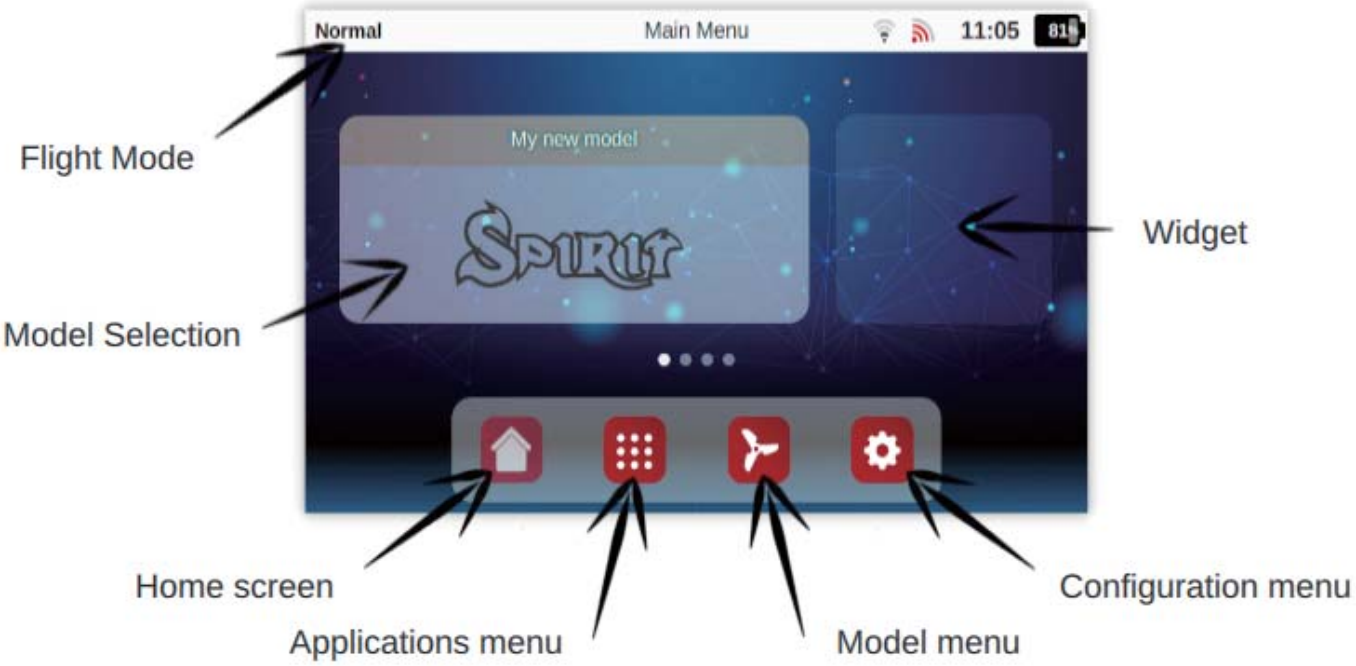
Force Shutdown

In Emergency, unexpected situation it is possible to completely Power Off Wave Radio by Long Press and Hold at the "S" button for 10 seconds. After 10 seconds "S" button light will turn off and you can release the button.

User Interface

Spirit Wave radios are running **Spirit OS**. This Operating System is developed from scratch by Spirit System to meet all the requirements from pilots. Core of the OS is highly optimized Linux kernel tailored for the fastest response and booting.

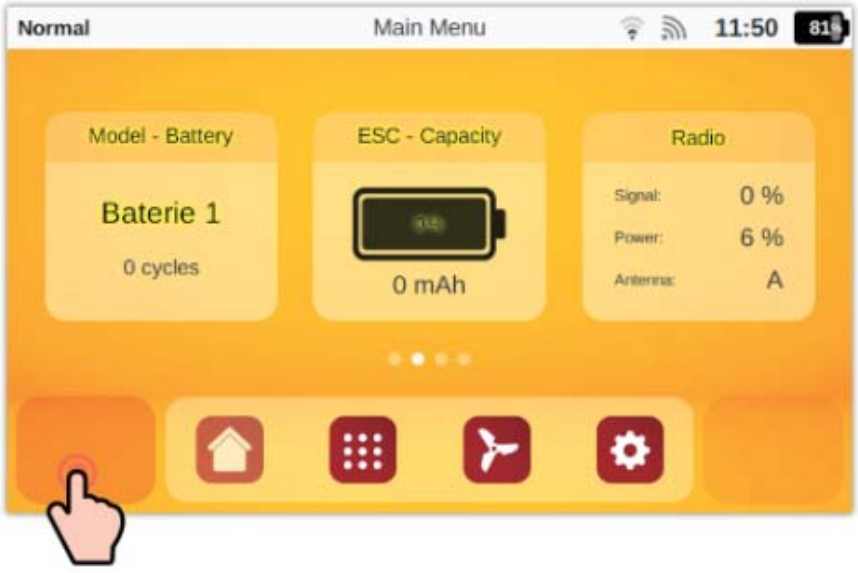
User Interface is fully controlled by Touch Screen interaction, similarly to a common Smart devices.



Navigation

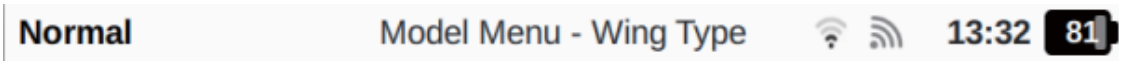
The User Interface consists from the following parts:

- Navigation Bar (Top)
- Main Panel (Bottom)
- Menu Content (Center area)



Navigation Bar

Navigation Bar is displaying current status and condition of the Spirit Wave radio.



Information that is included follows (listed from the left side):

- Flight Mode
- Bank ID (if Bank Switching is used)
- Menu or submenu Title
- WiFi Signal
- Radio Link Signal
- Time
- Battery (Available capacity percentage)

Main Panel

Bottom Panel has 4 different Icons (listed from the left side):

- Home
- Applications
- Model
- Configuration

Home

Home Icon will return you always at the Home Screen, not matter at which Submenu or Menu the system was. Home Screen is further explained at the following section [Menu Content]. If you need to quickly return, it is enough to press at the Icon.

> At the left side of the Main Panel there is area that can be used for the same purpose as Home Icon.

Applications

Applications Menu contain variety of different tools that are meant as an Addon. For Pilot they are not critical but can greatly extend functionality of the Wave radio. Optionally, you can install a new ones through the Spirit App Store.

Following Application set is preinstalled:

- App Store
- Media Player
- Simulator
- Files
- Updater
- Log Viewer
- Help

Model

Model is Menu where you can find all Model related settings, ranging from Receiver Binding to Alarm configuration.

Menu consists from Submenus dependent on Model Type that is active at the moment. This mean it has different set of available menus when your model is a Helicopter or when it is a Plane for example. When your physical R/C model is equipped with a Spirit unit then this Model menu is extended to allow tight integration and quick access for all Spirit parameters.

Certain Submenus are common for all Models:

- Receiver
- Flight Mode
- Throttle
- Alarm
- Mix
- Logging
- Stats
- Battery
- Theme
- Image
- Trainer
- Check

The most important for all pilots are **Receiver**, **Flight Mode** and **Throttle** Submenus.

Configuration

This is System-related menu where you can find all System Settings, independent from Model selection.

Following Submenus are available:

- Language
- Controls
- Connection
- System
- Display
- Vibration
- Sound
- Time

Return Back

At the right side of the Main Panel there is area that acts as **Return Back** button. Whatever Menu is present, you can always go **One Step Back** to a previous Menu. This allows seamless navigation through User Interface without need to open each Menu from the beginning.

Menu Content

Each Menu is available for touch interaction allowing entering Submenus. Submenus are accessible by pressing at the Icons. Area available between Navigation Bar and Main Panel is for displaying content of each menu.

Main Screen

When Main Screen is visible (Press HOME Icon), you can see Widget based Menu.

Widgets

Widgets are Containers that are displaying all kind of different data, but can also be used for Model related configuration or operations.

Model Selection is the base widget for changing Model profile in the Wave radio. By simply tapping at the rectangular area Model List will be visible.

Available Widgets are rendered as a transparent rectangles. By Long Pressing at them you can add a new Widget there. **Removing Widgets** can be done by Long Pressing at them.

The most common usage for the Widgets are to display Telemetry data in a RealTime. For example you can see Battery Voltage, Current, Used Capacity, Rotor RPM, Vibration Level and more. Some Widgets such as Timers can be further configured by pressing at them.

Pages

Some menus have several Pages available. This can be distinguished by a small dots at the Main Panel. You can move between the pages by using so called **Swipe** Gesture (touching the Screen and moving your finger to left or right side).

Long Press

Wherever there are Items that can be added you can delete them by Long Press. This Gesture is common within entire Spirit OS.

Opening and Closing

Spirit Wave can be opened and maintained with supplied Screwdrivers. All screws are Torx type, except for Gimbals.

Before opening the chasis Power Off the transmitter completely.

Opening the Chasis, changing Stick or Switch configuration will not lead to a Warranty Loss if done correctly.

Opening Procedure

Back Cover

Use supplied Torx T6 Key to open the Wave radio. Unscrew 5 screws in Total.

Plastic Body of the Wave radio has center screw longer! When assembling the chasis make sure to insert it only at this center opening.

Two Chasis parts

When all 5 screws were disassembled continue in the following way. Gently move top and bottom parts apart.

Opened

As the last step, put front sides carefully near each other. Both parts are interconnected. To maintain connection of all the cables, proceed with the following photo.

Closing Procedure

1. Arrange both parts of the radio as described at the *Opened* section above.
2. Make sure all the flat cables are inserted properly at their connectors.
3. Make sure Battery and Speaker cables are connected and their connectors are fully inserted.
4. Move the Top part of the Wave radio above Bottom part.
5. Gently place the Top part to be exactly above Bottom part, so that edges of both parts are parallel.
6. Check from each side that there is no cable coming out of the chasis. (From Battery, Speaker or Switches), if so move them inside the body.
7. Flip the Radio upside down carefully and insert all 5 screws. For plastic Spirit Wave central screw is longer (8 mm).
8. Tighten all 5 screws. Do not overtight them.

Verify that Gimbals are moving freely in the full extent with no audiable sound. If there is a noise during movement it mean a flat cables are incorrectly placed and interfering with a gimbal mechanics inside. This will require opening, correcting the problem and closing procedure.

Battery

Spirit Wave Radio is equipped with LiPo battery - **GensAce 6900 mAh 3.8V**.

⚠ It is prohibited to use battery with a different nominal voltage than 3.8 Volts.

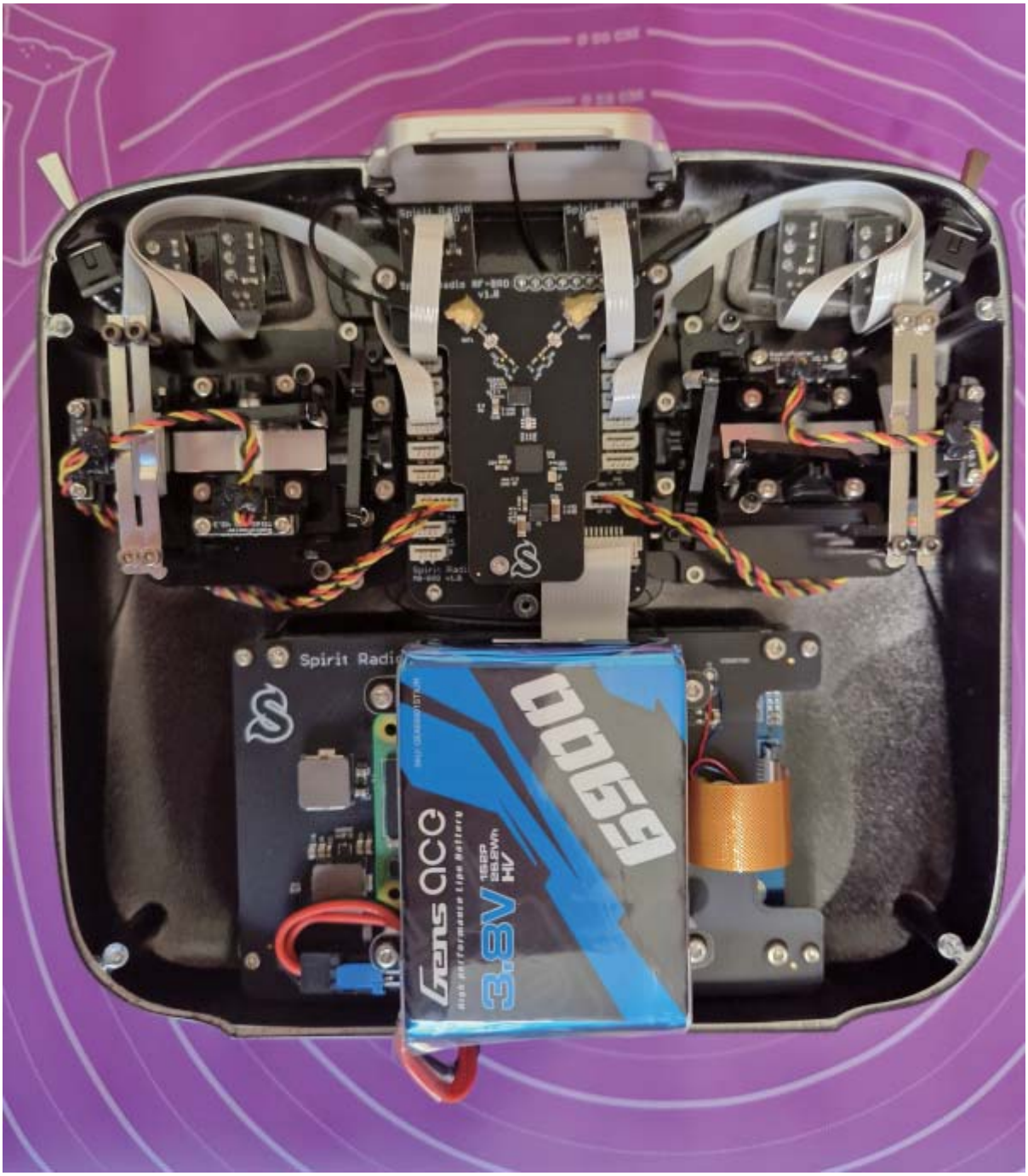
⚠ Always disconnect battery before changing any radio wiring or changing a components.

⚠ Do not expose electronics to a high moisture or high temperature.

Battery is installed at the tray with a velcro tape. It must be precisely positioned to avoid a contact with a nearby parts, wrong positioning will not allow mounting of the back cover.

Special care must be taken at the battery cables during Radio Chasis closing. Pay extra attention to not touch any electronics part with a conductive tools.

Operator is responsible for careful placement of the cables to avoid damage.



Battery Connection

Battery has two leads that must be connected to the Radio with a correct polarity.

> ⚠️ Shorting a leads or routes at the PCB could cause fire!

Spirit Ra
BATTERY
Gens ace
High performance Lipo Battery
3.8V
1S2P
26.2Wh
HV
SKU: GEA69001STXJR

Updating Radio

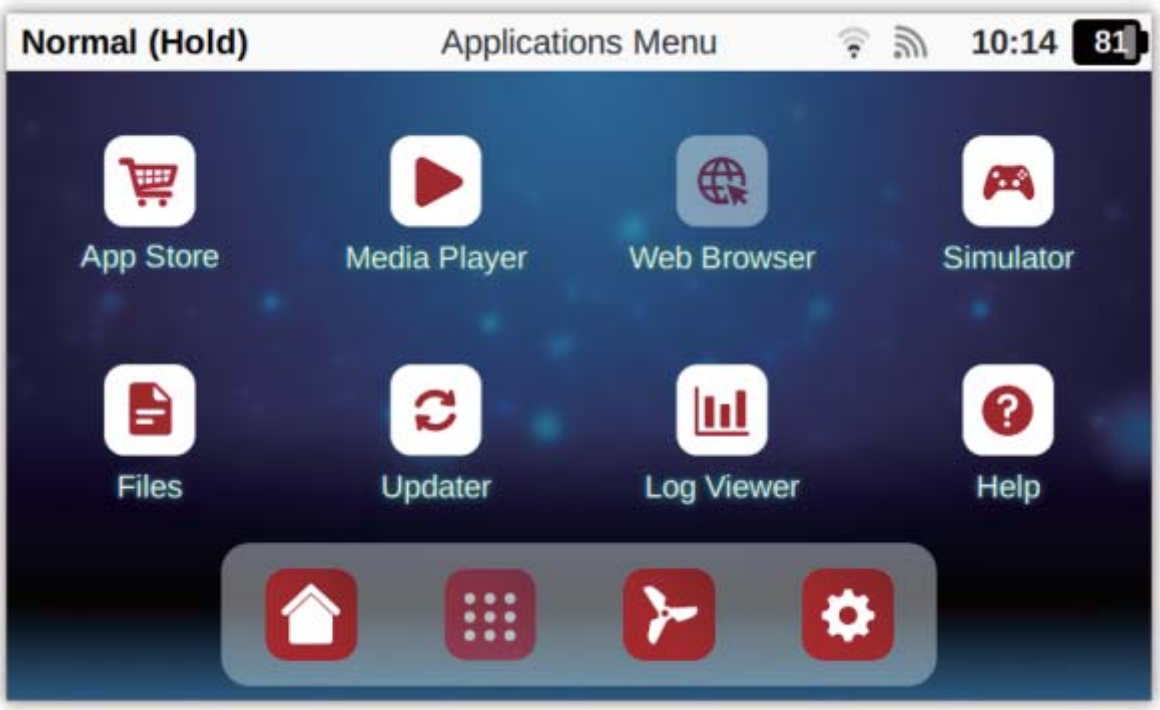
Spirit Wave can be updated Online directly from the User Interface. This allows very easy method for gaining new features of the Radio and variety of imprevements.

It is always recommended to use the latest firmware, preferably to update all Spirit products to the latest version.

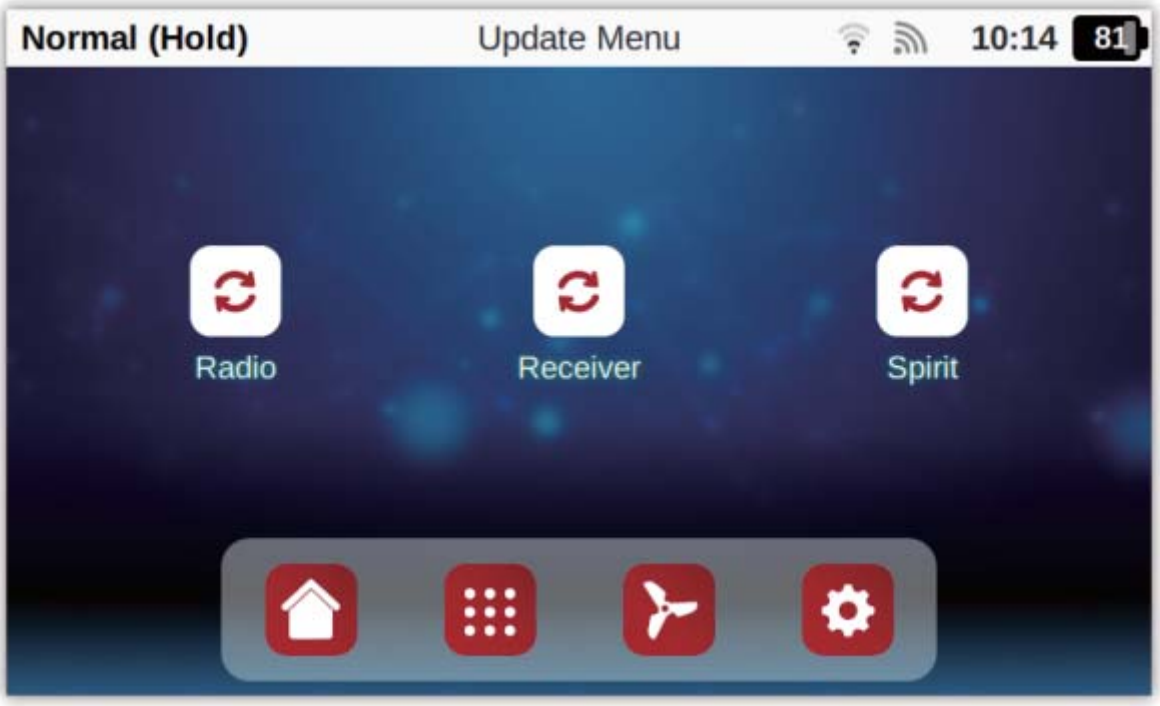
Updater

Updater tool is embedded software for doing Firmware Updates easily. No other tool is required for full System update. The only requirement is working Internet connection.

The Updater tool can be found at the **Applications** menu (second Icon from left at the bottom panel).



Select **Radio** and then choose the firmware.



Firmware list is automatically displayed as soon as Internet Connection is working. Usually there are more firmwares available, one with the most recent date is the latest one.

Immediately after pressing the Update button whole Radio will be updated.

Before updating Spirit Wave it is required to turn off all receivers that are bound to it.

Updating Process

1. Firmware is downloaded (approximately 50MB).
2. Firmware is verified and checked for Integrity.
3. Firmware is saved to the memory.
4. Radio is restarted automatically after successful updating.

Updating Receiver

Spirit RX receivers can be updated in a two different ways:

- From Spirit Wave radio
- From Spirit Settings PC software

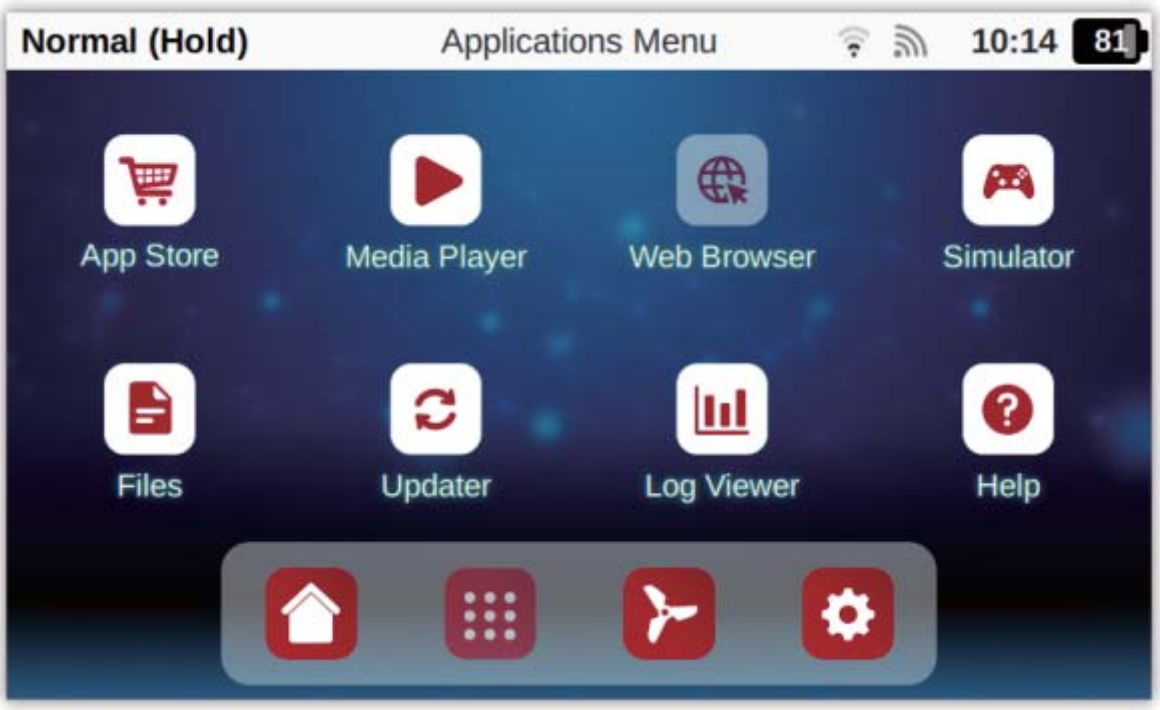
Updating through Spirit Wave is very easy and convinient way because no other device is required. Updating through Spirit Settings require a Spirit unit. Update process can be done at the same time as updating Spirit firmware by checking Spirit RX option during the Update.

It is always recommended to use the latest firmware, preferably to update all Spirit products to the latest version.

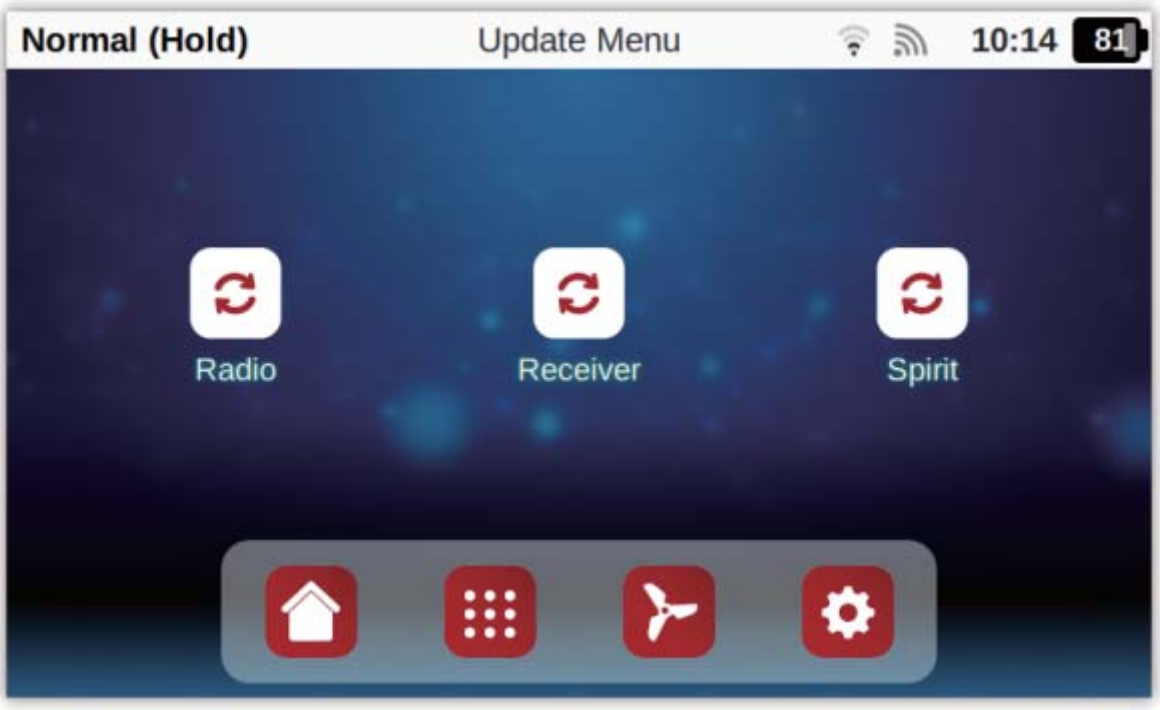
Updating with Spirit Wave

Updater tool is embedded software for doing Firmware Updates easily. No other tool is required for full System update. The only requirement is working Internet connection.

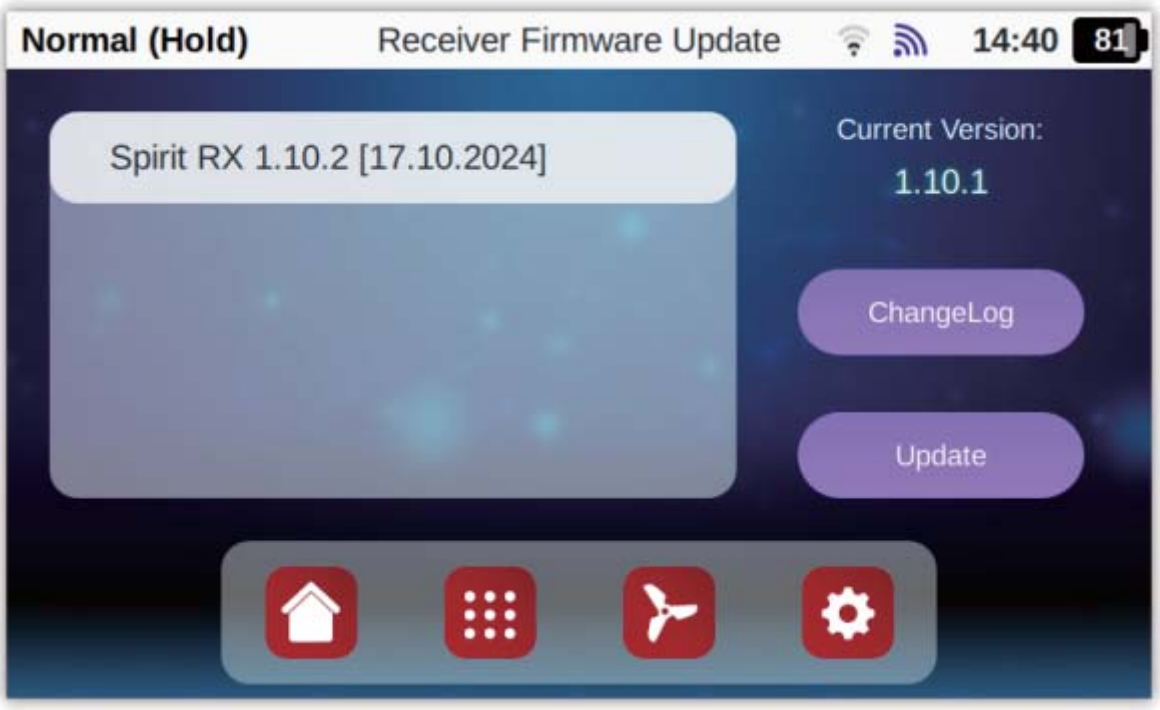
The Updater tool can be found at the **Applications** menu (second Icon from left at the bottom panel).



Select **Receiver** and then choose the firmware.



Firmware list is automatically displayed as soon as Internet Connection is working. Usually there are more firmwares available, one with the most recent date is the latest one.



Immediately after pressing the Update button Receiver will be updated. It takes approximately one minute.

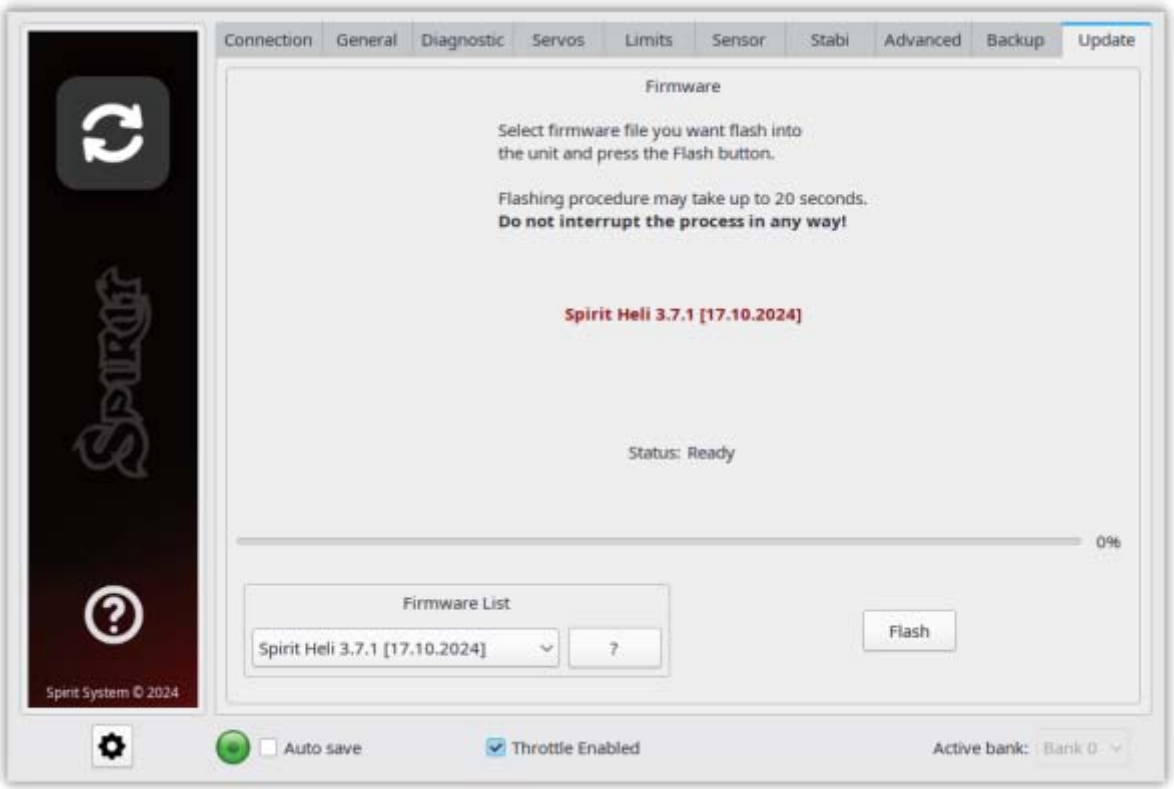
Before updating Spirit RX you have to bind the receiver with Wave.

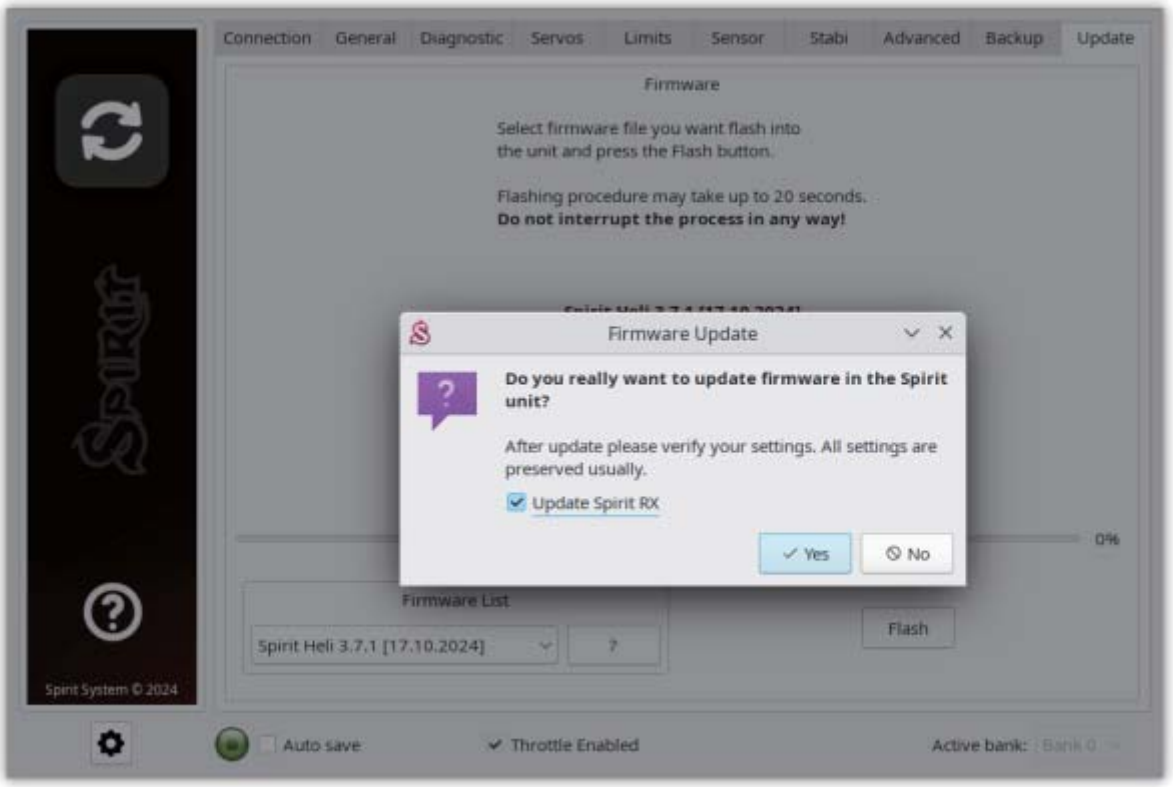
Updating with PC

1. Connect Spirit RX with a Spirit unit. (any Spirit unit, except Spirit 1 can be used) - see Wiring section.
2. Start the Spirit Settings software, make sure that **Spirit RX** Receiver Type is selected at the General tab.
3. If using Spirit W1 unit, press **CTRL+D** shortcut to switch to the external receiver.

4. Go to the Update tab.
5. Select the latest Spirit firmware and check **Spirit RX** option after pressing the Flash button.

Before updating Spirit RX you have to bind the receiver with Wave (at least one time).





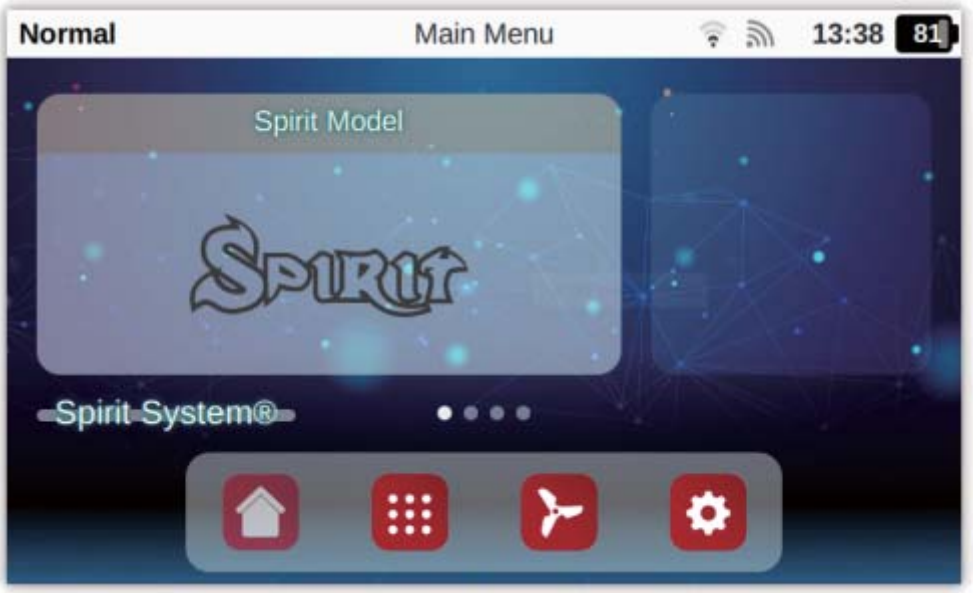
New Model

In order to start with the Wave Radio it is required to create so called **Model**. Each model inside the Radio can be bound to specific Receiver. For this reason it is common to have multiple Models stored inside the Wave Radio for each of your physical R/C model. In other words, one Model per each R/C model.

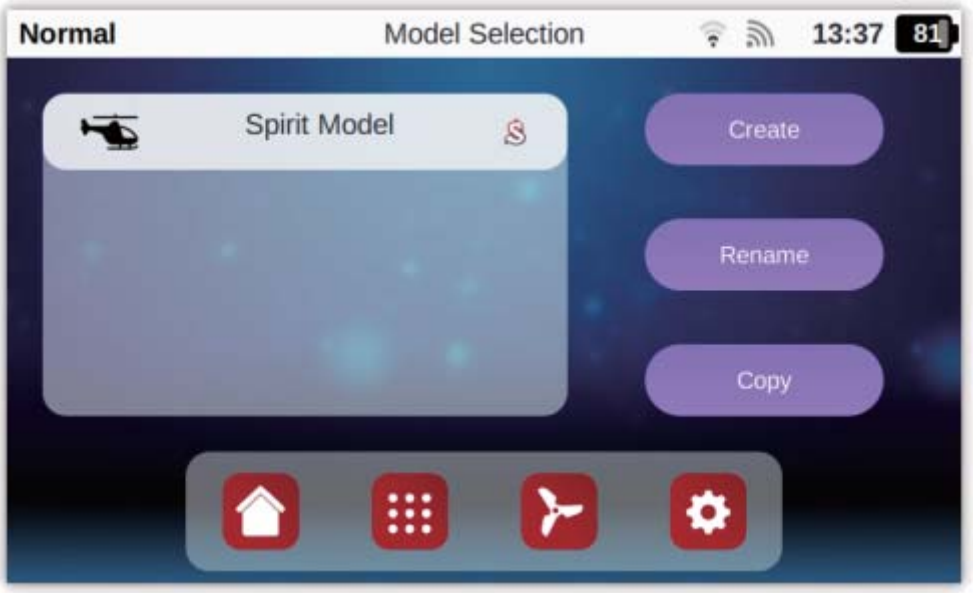
Spirit Wave radio has default Model precreated (for Helicopter) when it is launched for the first time or after Factory Defaults.

Model Creation

Press at the Home icon at the bottom panel.

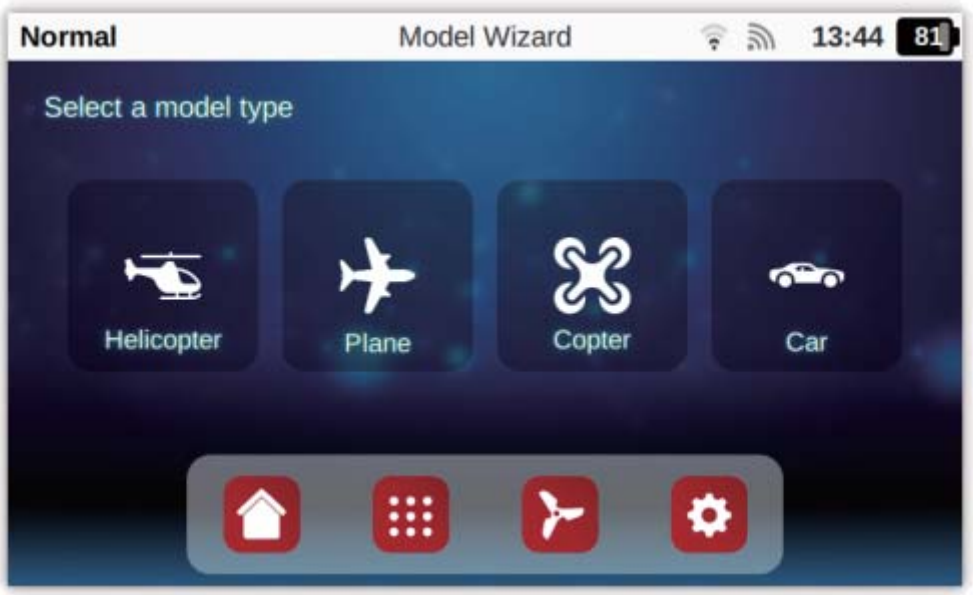


Continue with the CREATE button and confirm Dialog with YES.



From then choose appropriate Model Type that correspond to your R/C model.

If it is unlisted type such as a Boat you can use other type - for example Car.

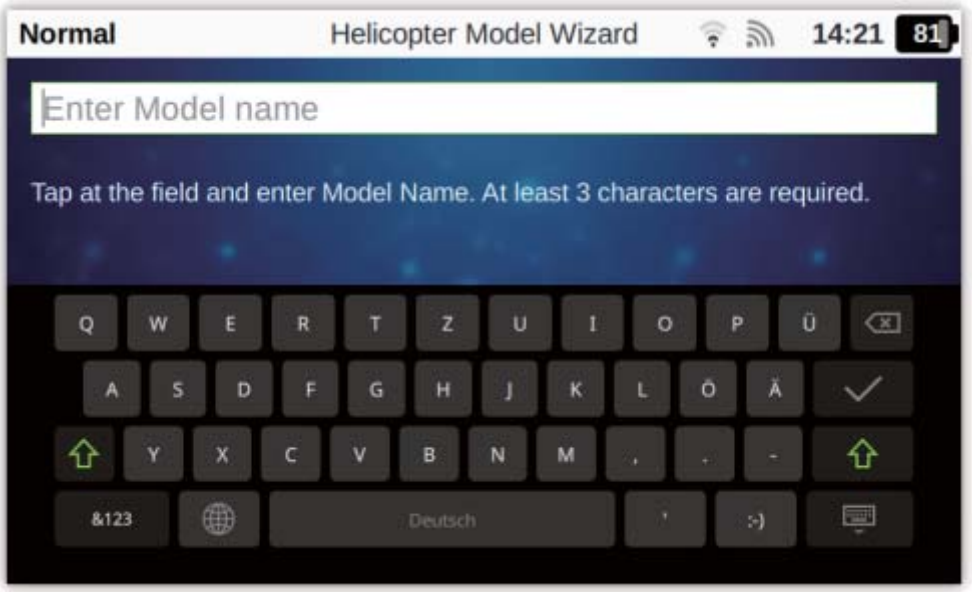


Each Model Type has different Setup Wizard that reflects physical properties of the R/C model, for this reason it is important to select it correctly.

Helicopter

Spirit Wave radio can be connected with any Flybarless controller.

- If you are using **Spirit FBL** unit, choose **Spirit unit (Heli firmware)** option.
- For models with no controller (Receiver Only) or for controllers such as MSH Brain, Mikado VBar, BeastX Microbeast, Bavarian Demon Axon or other, select **Spirit Receiver Only**.

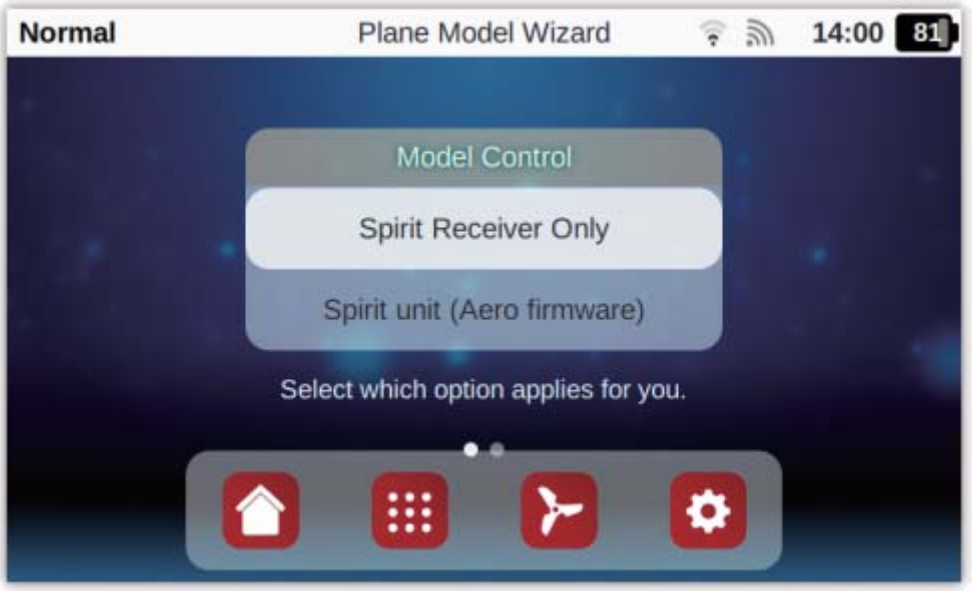


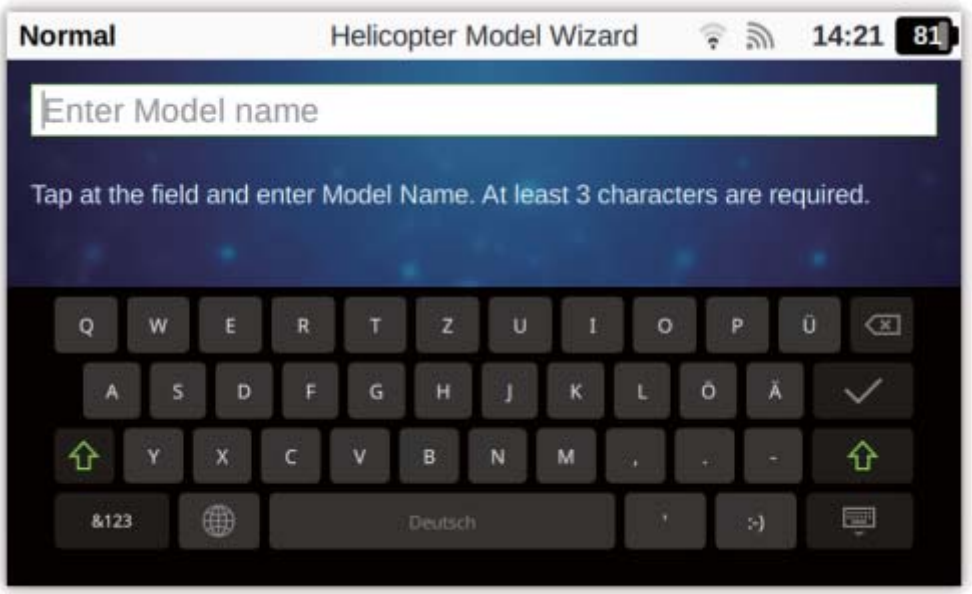
Continue by using a Swipe gesture to enter Model Name.

Plane

Spirit Wave radio can be connected with any stabilisation controller.

- If you are using **Spirit** unit, choose **Spirit unit (Aero firmware)** option.
- For models with no controller (Receiver Only) or for controllers such as Bavarian Demon Cortex select **Spirit Receiver Only**.





Continue by using a Swipe gesture to enter Model Name.

Model Setup

Once model is created you can bind it with a receiver according Binding section. Then depending on Model Type you can adjust it's parameters.

Binding Procedure

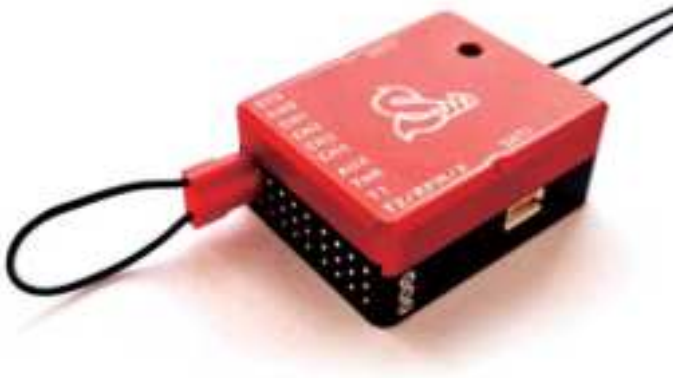
Binding is two side operation, in which Radio and Receiver is put into the Binding mode at the same time. Both will learn how to talk to each other and from this time they will transmit both channel data, telemetry and allow remote configuration. Bind Date are stored at both sides. Model that is created in your Radio is matched with one specific receiver.

Spirit W1

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

If Spirit W1 is new (no Bind Data available) a Bind Plug is not required and you can continue with the following section **Binding with Wave**.

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. Perform binding according following **Binding with Wave** section.



If Spirit W1 is Powered On for 30 seconds or more in the Bind mode, it will remove previously saved bind data.

Spirit RX7

In order to Bind Spirit RX7 with your Wave radio use supplied **Bind plug**.

If Spirit RX7 is new (no Bind Data available) a Bind Plug is not required and you can continue with the following section **Binding with Wave**.

1. Insert **Bind plug** at the **BIND port** and connect Power supply to the Spirit RX7 unit. You can connect BEC or 1-3S Battery at any port.

2. Perform binding according following **Binding with Wave** section.

If Spirit RX7 is Powered On for 30 seconds or more in the Bind mode, it will remove previously saved bind data.

Binding with Wave

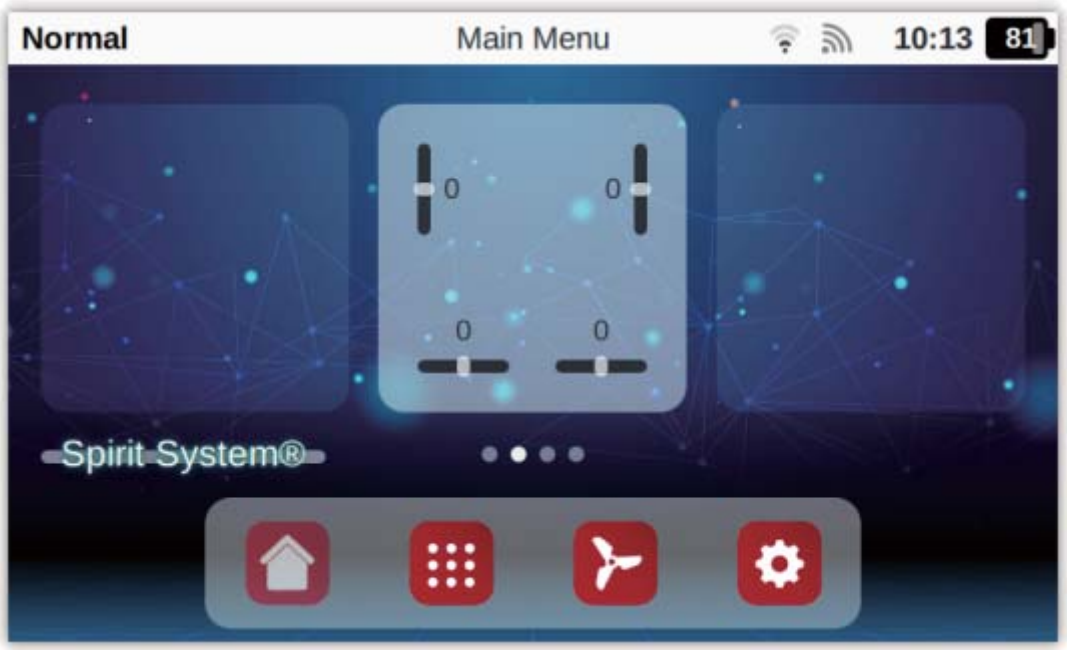
1. You can always Bind any Wave receiver by going to the **Model/Receiver** menu.
2. Press the **Bind button** after powering up a receiver with a Bind plug. (Spirit RX7 or Spirit W1)
3. After successfull binding you will be notified at the Display. Binding will take no more than 500 ms.
4. Bind plug can be removed.

Channel Trims

Spirit Wave brings brand new way for Trimming your Model. This method is easy, safe and can be used In-Flight.

Since Wave is designed for all kind of models whereas only some require to Trim. You can access the Trimming feature from the **Trim Widget**.

- This allows Trimming **only at a time you really want**, making it safer comparing to a Physical Trims.
- Morever there is **no need to take your fingers off** the sticks, allowing full control without interruption.
- Lastly, this trim method allow a **Variable Trim Rate** unlike a Physical Trims. The bigger trow is used, the bigger trim rate is picked.



Trim

General Trimming Process can be described in the following steps:

1. Engaging the Trim Mode
2. Moving with a Sticks in a direction you wish to trim.
3. Disengaging the Trim Mode

Engaging

You can engage the Trim Mode in a several different ways, however two different methods are available:

- Engaging with a Touch
- Engaging with assigned Input

Touch

This method require entering Trim Widget and touching designated Area for as long as needed. When a finger is released Trim Mode is disengaged.

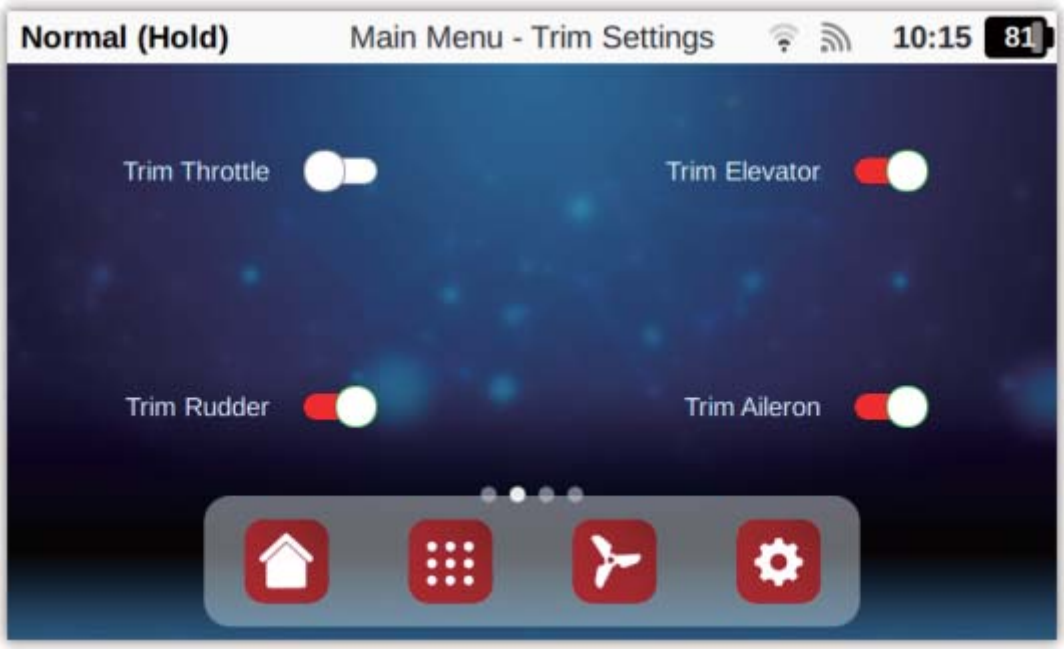
Input

Alternative method is using assigned Input such as Switch, Potentiometer, Slider or Tilting to engage the Trim Mode. This method allows to Trim at any moment when Radio is powered on as soon as the Input is set to an Active position.

As recommended input for engaging the Trim Mode a Momentary Switch can be used.

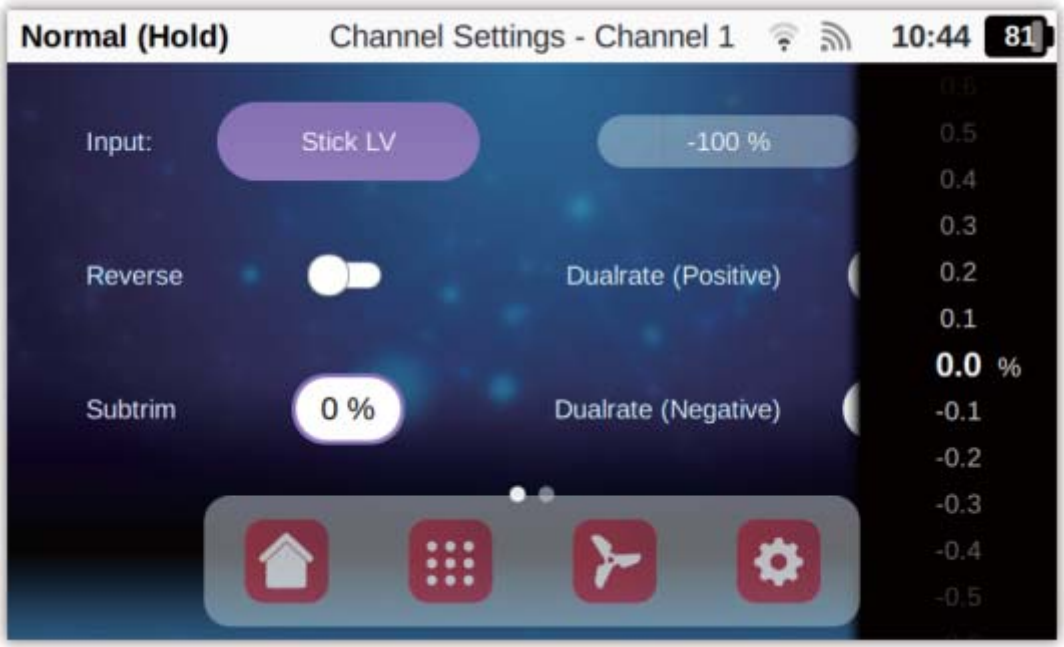
Options

To minimize unwanted Trimming you can further select which functions can be used. For example if you know only Rudder and Aileron trims are required you can safely control Elevator and Throttle even when the Trim Mode is active.



Reset

You can reset configured Trims for each channel individually in the **Model - Channels - Subtrim**.



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. The SAR limit of USA(FCC) is 1.6 W/kg averaged over one gram of tissue. Device types Spirit WAVE with Spirit WAVE **(FCC ID: 2AW4Z-SRADIO)** has also been tested against this SAR limit. The highest reported SAR values for body-worn is 0.460W/kg. The Max simultaneous SAR is 0.460W/kg. This device was tested for typical body-worn operations with the back of the handset kept 0mm from the body. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.