Introduction

The RB-35/RB-35S builds on the success of the previous trusted Redundancy Bus series by adding many new features, such as configurable dual power input, dual BEC outputs, overload / current detection, the new ADV stabilizer (RB-35S), etc. The RB-35/RB-35S system has been designed to meet the needs of users who want the ultimate flight-safe performance and safety for their RC Models.

Triple Receiver Redundancy & Dual Power Input
RB-35/RB-35S has been designed to offer both dual-power and triple-receiver redundancy. This provides the user triple receiver signal and telemetry redundancy by adding multiplex ports (RX1-3 IN / S.Port). Dual-power provides a safe and efficient way to power the system with your power sources connected via a pair of standard XT30 connections.
The dual-power consumption system can operate either in Balance or Backup mode. In Balance Mode (default), it consumes the power line from either power source depending on which has the higher voltage. When switching to the Backup Mode, the system consumes the power line with the priority that the user selected under the set voltage range.

Dual BEC Outputs & Overload Protection & Current Detection
The RB-35/RB-35S includes a built-in Dual BEC, each XT30 output port can be independently configured to provide between 5V to 8.4V output. The unit's BEC also can change channel output voltage for ports uses BEC1- VOut1 and Channels 1-9, and BEC2 - VOut2 and all other Channels and ports. All Channel ports are provided with overload protection, and in addition, Channels 1-9 support the current detection function.

Advanced Stabilizer (RB-35S)
The RB-35S offers an ADV Stabilizer function which is an upgrade over the original classical gyroscope stabilization modes. The ADV Stabilizer offers an advanced mode that provides more programmable stabilized channels and flexibility.
The classic stabilization mode has been enhanced with 5 additional stabilization channels, providing pin mapping to each channel in the multiple flight modes like Stabilization, Auto-Level, Hover, and Knife-Edge with an airplane model. In the advanced stabilization mode, all the RB-35S output pins are configurable for stabilization and additional advanced features such as File Sharing, Programmable Parameters, Developer Access, etc.
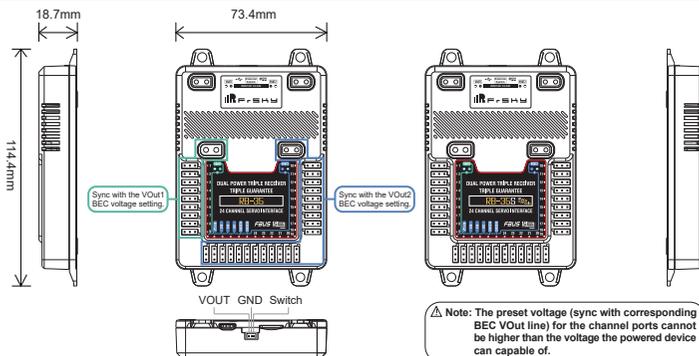
Diversified Sensor Telemetry
The RB-35/RB-35S also works as an extensive sensor module. It has various built-in sensors including diversified telemetry. The RB-35S includes high-precision telemetry sensors for monitoring altitude, vertical speed, etc. It can be used as an alternative to using a GR or S series receiver.

Power Switch Function
The built-in power switch function draws the support of using multiple types of external switches (e.g. NFC switch, Pin Plug, etc.) that enable flexible options on how the power can be switched on/off without the need to plug/unplug the battery connections.

Overview

18.7mm   73.4mm   114.4mm

Sync with the VOut1 BEC voltage setting.
Sync with the VOut2 BEC voltage setting.

VOUT   GND   Switch

⚠ Note: The preset voltage (sync with corresponding BEC VOut line) for the channel ports cannot be higher than the voltage the powered device can capable of.
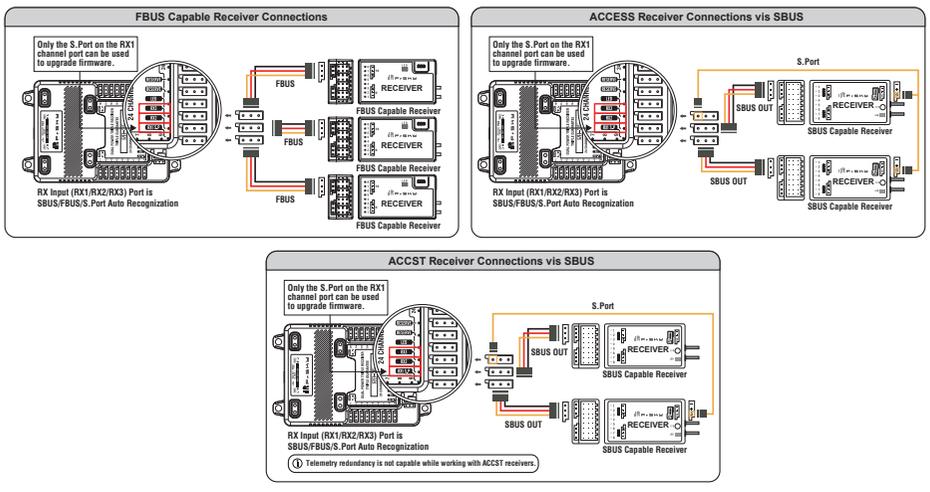
Specifications

- Dimension: 114.4*73.4*18.7mm (L*W*H)
- Weight: 98g (RB-35) / 99g (RB-35S)
- Number of Configurable Channel Ports: 24 (PWM/FBUS/S.Port/SBUS Out)
- 3 RX Input Ports & 1 LED Indicator Port
- Battery Input Voltage Range: DC7.4-26V (It is recommended to use 3S-6S Li batteries)
  (Note: 2S Li Batteries will not have sufficient input supply voltage to reach the 8.4V BEC output configuration.)
- Operating Current: 200mA@12V
- Continuous Current: 2*15A@5-8.4V (BEC Outputs)
- Operating Temperature: -20°C~75°C
- Battery Input & BEC Output Connector: XT30

Features

- Dual Power Input & Triple Receiver Redundant Guarantee
- RX In | FBUS/SBUS/S.Port Auto Recognization
  (Note: Only the S.Port on the RX1 channel port can be used to upgrade firmware.)
- Built-in Advanced Stabilization Functions (RB-35S)
- Built-in High-Precision Telemetry Sensor (Altitude, Vertical Speed, etc.) (RB-35S)
- Built-in Power Switch Function | Match with Different External Switches (Optional)
- Dual Power Input (Balance / Backup mode)
- Independently Configurable Dual BEC Outputs
  (BEC 1: VOut1 & CH1-9 | BEC 2: VOut2 & CH10-24 & all other Ports)
- Overload Protection on Each Channel
- Channel1-9 with Current Detection
- Full Black Box Data Record Function
- Supports External LED Indication (RB-35S)

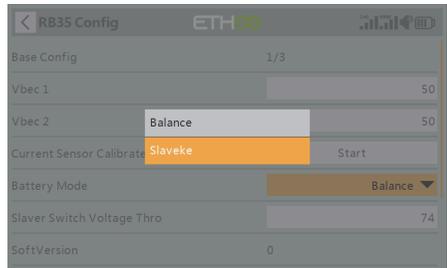## Setup Guide - Redundant Signal Control with Telemetry

FBUS Capable Receiver Connections

ACCESS Receiver Connections vis SBUS

ACCST Receiver Connections vis SBUS

Setup Guide - Dual Power Redundancy

RB35/35S Config ETHOS		
Base Config	1/3	
Vbec 1		50
Vbec 2		50
Current Sensor Calibrate		Start
Battery Mode		Balance ▼
Slaver Switch Voltage Thro		74
SoftVersion	0	

[RB35/RB35S Config] → [Battery Mode]

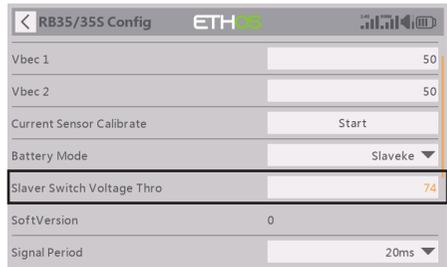| RB35 Config ETHOS		
Base Config	1/3	
Vbec 1		50
Vbec 2	Balance	50
Current Sensor Calibrate	Slaveke	Start
Battery Mode		Balance ▼
Slaver Switch Voltage Thro		74
SoftVersion	0	

Select the battery consumption mode.

Balance Mode
When the dual batteries are plugged into the RB flight-safe system the Power Redundancy function is automatically activated. The system is designed to use the battery line from the higher voltage allowing the balancing of power consumption across both batteries.

Backup Mode
When the primary battery is consumed to the limitation of the preset voltage, the system will allow the backup battery to join and enter into the balancing of power consumption across both batteries. In this mode, the consumption limit of voltage can be set for the primary battery.
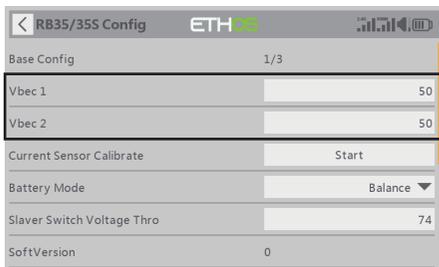
RB35/35S Config ETHOS		
Vbec 1		50
Vbec 2		50
Current Sensor Calibrate		Start
Battery Mode		Slaveke ▼
Slaver Switch Voltage Thro		74
SoftVersion	0	
Signal Period		20ms ▼

[RB35/RB35S Config] → [Slaver Switch Voltage Thro]

Note: 1. Please ensure the battery is plugged into VBAT1 while using the single battery.
2. Please ensure that both battery's output power is not lower than the power needed for the connected devices, otherwise there will be insufficient power supply for the devices.

Setup Guide - Dual BEC Voltage Outputs

RB35/35S Config ETHOS		
Base Config	1/3	
Vbec 1		50
Vbec 2		50
Current Sensor Calibrate		Start
Battery Mode		Balance ▼
Slaver Switch Voltage Thro		74
SoftVersion	0	

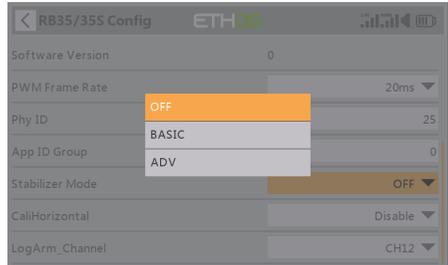Dual BEC voltage outputs can be configured from 5-8.4V and supports device working with DC 2*15A in this range.
● Sync with the VOut1 BEC voltage setting.
● Sync with the VOut2 BEC voltage setting.

⚠ **Note: The preset voltage (sync with corresponding BEC VOut line) for the channel ports cannot be higher than the voltage the powered device can capable of.**
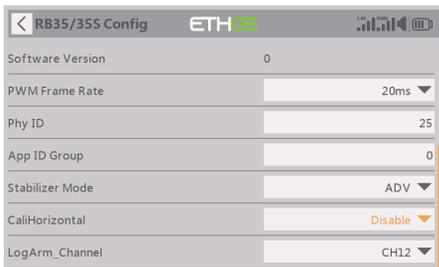
Stabilizer MODE (RB-35S)

RB-35S supports enabling or disabling the stabilization function module.

RB35/35S Config	ETH DB	
Software Version	0	
PWM Frame Rate	20ms ▼	
Phy ID	25	
App ID Group	0	
Stabilizer Mode	OFF ▼	
CaliHorizontal	Disable ▼	
LogArm_Channel	CH12 ▼	

RB35/35S Config	ETH DB	
Software Version	0	
PWM Frame Rate	20ms ▼	
Phy ID	OFF / BASIC / ADV	25
App ID Group		0
Stabilizer Mode	OFF ▼	
CaliHorizontal	Disable ▼	
LogArm_Channel	CH12 ▼	

- OFF: The stabilization mode cannot be used.
- BASIC: Enable default self-stabilization channels.
- ADV: Editing with RBmixer software is required before use.

Note: Normal usage only requires selecting the BASIC mode. If you need to use the ADV stabilization mode, please edit and enable it using the RBmixer software.

RB35/35S Config	ETH DB	
Software Version	0	
PWM Frame Rate	20ms ▼	
Phy ID	25	
App ID Group	0	
Stabilizer Mode	ADV ▼	
CaliHorizontal	Disable ▼	
LogArm_Channel	CH12 ▼	

RB35/35S Config	ETH DB	
Software Version	0	
PWM Frame Rate	20ms ▼	
Phy ID	Disable / Enable	25
App ID Group		0
Stabilizer Mode	ADV ▼	
CaliHorizontal	Disable ▼	
LogArm_Channel	CH12 ▼	

Changing the CaliHorizontal option from Disable to Enable can trigger horizontal plane calibration.

Note: This "calihorizontal" option is only used for ADV mode horizontal calibration. You don't need to worry about this option when using basic mode.

Option 1 under 'Stab Index' in the Stabilizing allows turning on or off the first group of stabilization channels (CH1-6), while Option 2 allows turning on or off the second group of stabilization channels (CH7-11).

RB35S Stab	ETH DB	
Stable System 1	1/2	
Stabilizing	ON ▼	
Self Check	Disable ▼	
Quick Mode	Enable ▼	
WingType	Delta ▼	
Mounting Type	Horizontal ▼	
CH5 Mode	AIL2 ▼	

RB35S Stab	ETH DB	
Stable System 2	2/2	
Stabilizing	ON ▼	
Self Check	Disable ▼	
Quick Mode	Enable ▼	
WingType	Delta ▼	
Mounting Type	Horizontal ▼	
CH10 Mode	AIL4 ▼	

Note: The settings for Stable System 1 and 2 are independent, and both need to be calibrated when Self Check calibration is required.

Basic Step Guides-Stabilization Function (RB-35S)

a. Model Creation & Make sure the connected receiver is bound to the radio;
b. Ensure stabilization is enabled & Calibrate the gyroscope sensor of the device;
c. Servo connection & Build the stabilization device to the model;
d. Set up the mixer channel and radio switches;
e. Determine the [Wing Type] & [Mounting Type];
f. Check the stabilized channel outputs of the receiver in the Auto-Level mode;
g. Check the stick control of the transmitter in the manual mode;
h. Self-Check of the receiver;
I. Failsafe setting.

> **Note: Please move to the [DOWNLOAD] section from the product page to download the functional Lua scripts (Please copy the scripts folder to the root folder of the storage card to use.).**

Gyroscope Sensor Calibration (RB-35S)

Ensure the RB35S stabilization function is enabled.

[System] → [RB35S Stab]

[RB35S Stab] → [Stabilizing] → [On]

**Move to [RB35S Calibration] tool and calibrate the gyroscope sensor**

1. The gyroscope of device (6 surfaces) must be calibrated before mounting into the model. Please place the device on a flat ground or a table, and follow the instruction steps below to calibrate the gyrosope sensor;

2. Make sure the stabilization device with the Logo label side facing upwards laying on the desktop, move to the radio and enter the [RB35S Calibration] tool, and select "click to confirm". At this moment, the yellow LED light will flash until it lits off, then follow the prompts to calibrate the sensor;

3. Complete the calibration of all the device surfaces. Ensure the values of each axis (X, Y, Z, Mod) is about 1.000 while placing the device in the corresponding direction, and the deviation could be within ±0.1;

4. The calibration is completed if all the steps above are done.

RB35S Calibration — ETHOS

Calibration of SxR Gyros and Accelerometers

Place your receiver vertical, pins up.
Press ENTER to start
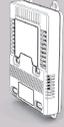
RB35S Calibration — ETHOS
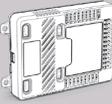
Calibration of SxR Gyros and Accelerometers

Place your receiver vertical, pins down.
Press ENTER to start

RB35S Calibration — ETHOS

Calibration of SxR Gyros and Accelerometers

Place your receiver legible lettering, pins right.
Press ENTER to start

RB35S Calibration — ETHOS

Calibration of SxR Gyros and Accelerometers

Place your receiver not legible lettering, pins left.
Press ENTER to start


RB35S Calibration — ETHOS

Calibration of SxR Gyros and Accelerometers

Calibration finished

Servo connection & Build the device to the model (RB-35S)

Connect the servos to the ports of the stabilization device according to the Channel List.

Forward

Backward

> **Note: Please make sure the side with the External Switch Port forwards the nose direction of airplane model.**
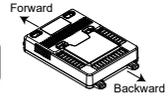
Number of Channel	Corresponding parts on the model	Full name
CH1	AIL 1	Aileron
CH2	ELE 1	Elevator
CH3	THR	Throttle
CH4	RUD	Rudder
CH5	AIL 2	Aileron
CH6	ELE 2	Elevator
CH7	AIL 3	Aileron
CH8	ELE 3	Elevator
CH9	RUD 2	Rudder
CH10	AIL 4	Aileron
CH11	ELE 4	Elevator
CH12	User-defined	
CH13	User-defined	Gyro gain adjustment
CH14&CH15	User-defined	Flight modes
CH16	User-defined	Emergency mode

Gyro gain adjustment of CH13: When the the value of CH13 is in the center, the gain is zero. The gain increases as the value get bigger. Until the value is ±100%, the gain reaches maximum.

> **Note: RX1/S.Port is used to do the firmware upgrade and parameter settings by the S.Port tool or ETHOS radio.**

Attentions
CH1~CH12 should be connected to the corresponding servos.

Set up the mixer channel and radio switches

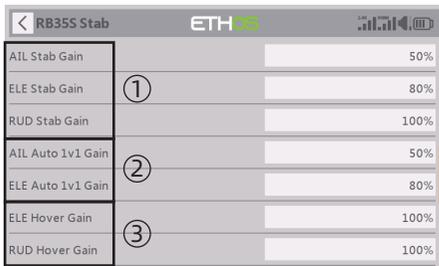| Mixer	ETHOS			
Name	Source	Channels	+	Type
				Active condition
Ailerons	Aileron	1, 5, 7, 10		
Elevators	Elevator	2, 6, 8, 11		
Throttle	Throttle	3		
Rudders	Rudder	4, 9		
Gain	Pot1	13		
Flight Mode	SC	14		
Flight Mode	SD	15		
Emergency Mode	SG	16		

Refer to the Channel List to set the channel and switches. The switch setting of CH13-16 on the picture is for reference.

Move to the [RB35S Stab] tool, determine the [WingType] & [Mounting Type];

RB35S Stab	ETHOS	
Stable System 1	1/2	
Stabilizing	ON ▼	
Self Check	Disable ▼	
Quick Mode	Enable ▼	
WingType ①	Delta ▼	
Mounting Type ②	Horizontal ▼	
CH5 Mode	AIL2 ▼	

① Wing Type
② Mounting Type

[Gain] and [Offset] configurations of flight modes

RB35S Stab	ETHOS	
AIL Stab Gain	50%	
ELE Stab Gain ①	80%	
RUD Stab Gain	100%	
AIL Auto 1v1 Gain ②	50%	
ELE Auto 1v1 Gain	80%	
ELE Hover Gain ③	100%	
RUD Hover Gain	100%	

① Gain - Stab Mode
② Gain - Auto-Level Mode
③ Gain - Hover Mode

RB35S Stab	ETHOS	
AIL Knife Gain ①	50%	
RUD Knife Gain	100%	
AIL Auto 1v1 Offset ②	-109%	
ELE Auto 1v1 offset	-123%	
ELE Hover Offset ③	0%	
RUD Hover Offset	5%	
AIL Knife Offset ④	19%	

① Gain - Knife Mode
② Angle Offset - Auto-Level Mode
③ Angle Offset - Hover Mode
④ Angle Offset - Knife Mode

Check whether the reaction of the wing servo is in line with the flight attitude caption below in the [Auto-Level] mode. If not, please try to invert the corresponding channel output in the [RB35S Stab] tool.

| RB35S Stab	ETHOS	
CH5 Mode	AIL2 ▼	
CH6 Mode	AIL2 ▼	
AIL Direction	Invers ▼	
ELE Direction	Invers ▼	
RUD Direction	Invers ▼	
AIL2 Direction	Invers ▼	
ELE2 Direction	Invers ▼	

Inspection of flight attitude

To ensure flight safety, checking the compensation direction of the model is strongly recommended.
Activating auto level mode will produce a strong deflection on AIL and ELE, which is used to check the response of aileron and elevator. Also, activating Knife-edge and Hover mode will have the same reaction on the rudder.
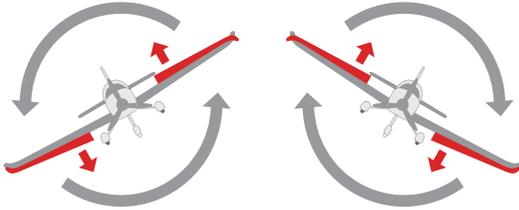
When the plane is rotated left or right (Roll), ailerons should have the correcting actions as illustrated.
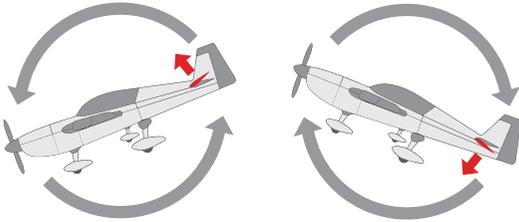
When the plane is rotated up or down (Pitch), elevators should have the correcting actions as illustrated.
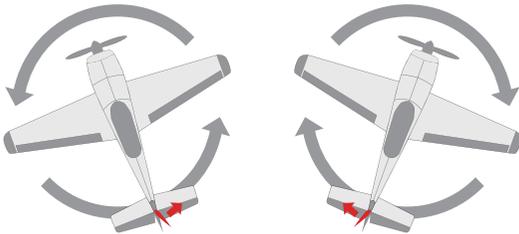
When the plane is rotated to left or right (Yaw), rudders should have the correcting actions as illustrated.

⚠ **After changing the compensation direction, make sure to check it again on the actual model.**

Note: If the compensation direction is incorrect, please reverse the corresponding channel as illustrated above through the RB35S Stab tool.

Check whether the reaction of the wing servo is in line with the radio stick operation in the [Manual] mode. If not, please try to invert the corresponding channel output by pressing the channel bar in the [Output] tool.

Self Check (RB-35S)

LED Working State

The external LED indicator can be connected to the LED port while the gyroscope sensor is enabled.

External Blue LED	State (Self-check)
ON	In process
OFF	Self-check is completed
Flash	Max & Min of channels in detecting

1. Make sure the model is in a horizontal position on the ground, then put the throttle to 0, and keep the other channels in the center position.
2. Move to [System] and enter the [RB35S Stab] tool to turn on [Self Check], then the blue LED light turns on. Once the blue LED starts flashing, we can calibrate the maximum travel of stick channels (excluding the throttle channel).
3. If the calibration is completed, the LED turns off and the servos react left and right to indicate that the calibration process is completed.

Do the Self-Check in the [RB35S Stab] tool.

[System] → [RB35S Stab] → [Self-Check]

Note: To do the Self-Check of the stabilization device, please ensure the stabilization function is enabled. Enter the [RB35S Stab] tool and turn On the [Stabilizing], then quit the [RB35S Stab] tool and back into this tool again, now the [Self-Check] function is capable to enable.

How to set the flight modes (RB-35S)

Quick Mode

It supports stabilization mode, auto-level mode, and manual (Gyroscope is off) mode and configured through CH14. What's more, an emergency mode is added to configure automatic level mode default through CH16. The precise configuration is written below.

Enable the Quick Mode in the [RB35S] tool.

Note: The default mode of RB-35S is Quick Mode.
  - If Quick Mode is applied, there is no Knife Edge or (3D) Hover Mode.
  - CH15 is not used when using Quick Mode.

| Channel	Position		Flight Mode
CH14 (3 pos SW)	SW Down	⊙	Off
	SW Mid	⊙	Stabilization Mode
	SW Up	⊙	Automatical Level Mode
CH16 (3 pos SW)	SW Down	⊛	Emergency Mode (Automatic Level Mode)

Conventional Mode

It supports stabilization mode and manual (Gyroscope is off) mode and configured through CH14&15. The precise configuration is Written below.

Flight mode	Stabilization	Automatic level	Hover	Knife-Edge	Off
CH14 (3 pos SW)	CH14 SW Down &	CH14 SW Down &	CH14 SW Down &	CH14 SW Up &	CH14 SW-Mid
CH15 (3 pos SW)	CH15 SW Mid	CH15 SW Down	CH15 SW Up	CH15 SW Mid	

Model Configuration Reference (RB-35S)

Conventional Model

Layout
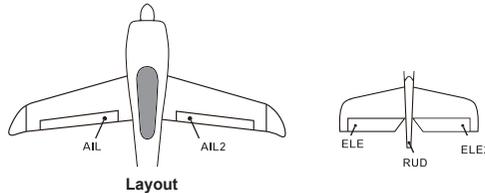
Flight mode	Stabilization	Automatic level	Hover	Knife-Edge	Off
CH14 (3 pos SW)	CH14>M+H (CH14 SW Down)	CH14>M+H (CH14 SW Down)	CH14>M+H (CH14 SW Down)	CH14<M-H (CH14 SW Up)	CH14 SW-Mid
CH15 (3 pos SW)	M-H<CH15<M+H (CH15 SW Mid)	CH15>M+H (CH15 SW Down)	CH15<M-H (CH15 SW Up)	M-H<CH15<M+H (CH15 SW Mid)	

Note: M: represents a neutral signal period (1500μs)
H: represents the time of required signal change to activate the mode (50μs). When the factory settings are selected, the switch position shown above represents the required modes.

Delta wing & Flying wing & V-tail

Layout of Delta wing / Flying wing

Layout of V-tail
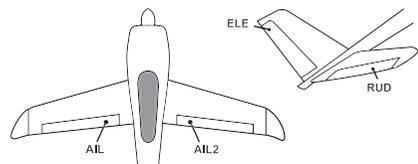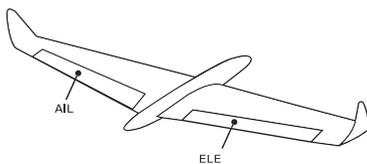
The available flight modes can be assigned to CH14 with a three-position switch.

Flight mode	Stabilization	Auto Level	Off
CH14	CH14>M+H (CH14 SW Down)	CH14<M-H (CH14 SW Up)	CH14 SW-Mid

1. When Delta wing/Flying wing is selected, the signal produced by the transmitter should be without active mixes on the channels related to AIL and ELE. RB-35S will mix the AIL (CH1) and ELE (CH2) input signal with a fixed mix percentage automatically.

2. When V-tail type is selected, the signal produced by the transmitter should be without active mixes on the channels related to ELE and RUD. RB-35S will mix the ELE (CH2) and RUD (CH4) input signal with a fixed mix percentage automatically.

Stabilization: When the model is activated, RB-35S will compensate with external forces (wind) as soon as receiving commands from the transmitter. This function is used to enhance the stability of the model on three axis (Pitch, Roll, YAW). CH13 could be used to adjust gyro gain by assigning a knob or a slider, changing the sensitivity of the counteracting signal produced by the internal three-axis gyroscope.

Automatic level: When the mode is activated, RB-35S will make the model return to level orientation with internal three-axis accelerometer and three-axis gyroscope on AIL and ELE channels after the sticks being released to neutral. RUD channel works in stabilization mode only.

Hover: When the mode is activated, RB-35S will make the nose of the model straight up with internal three-axis accelerometer and three-axis gyroscope on RUD and ELE channels (ELE and RUD inputs are not required). Under this mode, AIL is used to control the rotation of the model and THR adjust the altitude. AIL channel works in stabilization mode only.

Knife-egde mode: When the mode is activated, RB-35S will roll the plane on a certain side (wing points up) with internal three-axis accelerometer and three-axis gyroscope on RUD and AIL channels.Thus, AIL inputs are not required. While the mode steering is done with ELE, altitude will be maintained with THR/RUD. ELE channel operates in stabilization mode only.

Off: When the mode is activated, RB-35S will transmit the received commands produced by the transmitter to the model without compensating.

How to switch the S.Port/SBUS/FBUS
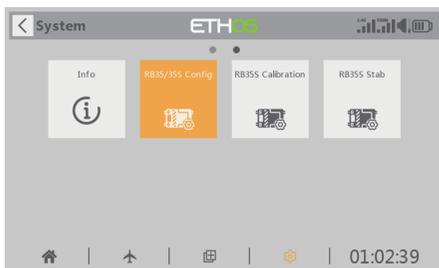
Enter [RB35 | RB35S Config] and turn to Channel Config 2/3 page

Select the FBUS/S.Port/SBUS for the channel ports.

How to set Failsafe

System	ETHOS	
Info	RB35/35S Config	RB35S Calibration	RB35S Stab

01:02:39

Enter [RB35 | RB35S Config] and turn to Failsafe Config 3/3 page.

RB35/35S Config	ETHOS
Failsafe Config	3/3
Failsafe CH1	1500us
Failsafe CH2	1500us
Failsafe CH3	890us
Failsafe CH4	890us
Failsafe CH5	890us
Failsafe CH6	890us

The programmed channel will output the setted Failsafe value before losing the control link.