Overview

Green LED | Red LED | Status
---|---|---
ON | Flashing | Binding
Flashing | OFF | Normal
OFF | Flashing | Signal lost

Yellow LED | Status
---|---
ON | Accelerometer outside of Calibration limits [0.9 G, 1.1 G]
OFF | Accelerometer within Calibration limits [0.9 G, 1.1 G]
Flashing | Completed accelerometer calibration

Blue LED | Status
---|---
ON | Self-check in progress
OFF | Completed self-check

Specifications

Model name: S6R (6CH receiver with built-in 3-axis gyro and 3-axis acceleration)
Dimension: 47.42x23.84x14.7mm (L x W x H)
Weight: 12.1g
Number of Channels: 6CH (1~6CH from conventional channel outputs)
With RSSI output on board: PWM voltage output (0~3.3V), 100Hz, 1500±500uS
Operating Voltage Range: 4.0~10V
Operating Current: 100mA@9V
Operating Range: Full range
Gyroscope Measurement Range: ±2000dps
Accelerometer Measurement Range: ±1g
Firmware Upgradable
Compatibility: FrSky Taranis X9D Plus/X9E/Horus X12S /XJT in D16 mode
S6R-EU only works with FrSky Horus X12S and Taranis X9D Plus/X9E-EU/XJT-EU in D16-EU mode.

Features

- Built-in three-axis gyroscope and three-axis accelerometer sensor module
- Built-in RSSI PWM output (0~3.3V)
- Built-in battery voltage sensor
- Smart Port enabled

Receiver Channels

Receiver channel order:
AIL1 (CH1), ELE1 (CH2), THR (CH3), RUD (CH4), AIL2 (CH5), ELE2 (CH6), gyro gain adjustment (CH9), flight modes (CH10 and CH11), self-check activation switch (CH12).

Function:
AIL1 (Aileron nr.1), ELE (Elevator (nr.1)), THR (Throttle), RUD (Rudder), AIL2 (Aileron nr.2) and ELE2 (Elevator nr.2) should be connected to the corresponding servos. S.PORT can be used to update, edit parameter settings via the FrSky STK PC tool and to connect telemetry sensors.

S6R functions

The S6R supports stabilization, automatic level, hover and Knife-edge flight modes for conventional models, stabilization and automatic level for Delta wing (flying wing) and V-tail. These model types can be enabled via the S6R, Config or S6R.lua PC software. If required the S6R can be used as a standard 6 channel X series receiver.

Conventional model layout

S6R supports stabilization, automatic level, hover, Knife-edge and an off function when selecting a conventional model layout. The available flight modes can be set assigned to channels CH10 and CH11, in combination with three position switches as shown below:

<table>
<thead>
<tr>
<th>Flight mode</th>
<th>Stabilization</th>
<th>Automatic level</th>
<th>Hover</th>
<th>Knife-Edge</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH10 (3 pos SW)</td>
<td>CH10&gt;M+H (CH10 SW Down)</td>
<td>CH10&gt;M+H (CH10 SW Down)</td>
<td>CH10&gt;M+H (CH10 SW Down)</td>
<td>CH10&gt;M+H (CH10 SW Up)</td>
<td>CH10 SW-mid</td>
</tr>
<tr>
<td>CH11 (3 pos SW)</td>
<td>M-H (CH11 SW Mid)</td>
<td>M-H (CH11 SW Mid)</td>
<td>M-H (CH11 SW Mid)</td>
<td>M-H (CH11 SW Mid)</td>
<td>CH10 SW-mid</td>
</tr>
</tbody>
</table>

M±1500us represents a neutral signal, H=50us represents the required signal change to activate the mode. > and < represents the required signal direction. When using the factory settings the switch position shown above represents the mode selection.

Off mode: When active the S6R processes the received commands from the transmitter and acts on the plane without compensating.

Stabilization mode: When active the S6R compensates outside forces instantly and compensates during orders from the transmitter using the data from the three-axis gyroscope. This is the main advantage of the three-axis gyroscope. This can be used to adjust gyro gain by assigning a knob or slider (gain = abs (CH9-M)), this will change the sensitivity of the counteracting signal produced by the internal three-axis gyroscope.
Automatic level mode: S6R uses the internal three-axis accelerometer and the three-axis gyro scope on the AIL and ELE channels, to return the model to level orientation when the sticks are released to neutral. The RUD channel will operate in stabilization mode only.

Hover mode: When active the S6R uses the internal three-axis accelerometer and the three-axis gyro scope on the ELE and RUD channels, to point the nose straight up. While in this mode the user can control the rotation of the model with AIL, THR is used to adjust the altitude. ELE and RUD inputs (by user) are not required in this mode as the S6R will hold the nose pointing up. The AIL channel will operate in stabilization mode only.

Knife-edge mode: When active the S6R uses the internal three-axis accelerometer and the three-axis gyro scope on the AIL and RUD channels, to roll the plane on its side (wing points up). While this mode steering is done with ELE, and attitude can be maintained with THR and/or RUD. AIL inputs (by user) are not required in this mode as the S6R will hold the wing pointing up. The ELE channel will operate in stabilization mode only.

Delta wing (flying wing)

When using the Delta wing (flying wing) type option, the signal produced by the transmitter should be without active mixes on the AIL and ELE channels. The S6R will mix the AIL (CH1) and ELE (CH2) input signal with a fixed mix percentage automatically. The RUD(CH4), AIL2 (CH5), ELE2 (CH6) signals can behave as required by the user. The S6R supports stabilization, auto level and off modes when using Delta wing (flying wing). CH9 can be used to adjust gyro gain by assigning a knob or slider, this will change the sensitivity of the counteracting signal produced by the internal three-axis gyro scope. Three different flight modes can be selected by using channel CH10 in combination with a three position switch as shown below:

<table>
<thead>
<tr>
<th>Flight mode</th>
<th>Stabilization</th>
<th>Auto Level</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH10</td>
<td>CH10=M+H</td>
<td>CH10=M-H</td>
<td>CH10 SW center</td>
</tr>
<tr>
<td></td>
<td>(CH10 SW Down)</td>
<td>(CH10 SW Up)</td>
<td></td>
</tr>
</tbody>
</table>

V-tail

When using the V-tail type option, the signal produced by the transmitter should be without active mixes on the ELE and RUD channels (rates/expo are allowed). The S6R will mix the RUD (CH4) and ELE (CH2) input signal with a fixed mix percentage automatically. AIL1 (CH1), AIL2 (CH5) and ELE2 (CH6) signals can behave as required by the user. The S6R supports stabilization, auto level and off modes when using V-tail. CH9 can be used to adjust gyro gain by assigning a knob or slider, this will change the sensitivity of the counteracting signal produced by the internal three-axis gyro scope.

Three different flight modes can be selected by using channel CH10 in combination with a three position switch as shown below:

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<td>CH10=M-H</td>
<td>CH10 SW center</td>
</tr>
<tr>
<td></td>
<td>(CH10 SW Down)</td>
<td>(CH10 SW Up)</td>
<td></td>
</tr>
</tbody>
</table>

Configuration

Use either a FrSky radio (wireless) or the PC configuration software (FrSky STK (usb adapter)) to configure the S6R settings. These are: wing type, mounting type, gain setting, offset angle setting and accelerometer calibration. When using a FrSky transmitter running OpenTX, make sure the transmitter has firmware version 2.2 or above installed. Copy the S6R.lua file on the SD card of the transmitter, bind the S6R to the transmitter and run the file.

Using the PC configuration software

Connect the S6R as shown below to the FrSky STK usb adapter, and plug it in to a PC.

Run the S6RConfig software, to access the page illustrated below (next page). Press “open” to connect with the S6R. On the bottom of the menu screens the following options are displayed:

Serial: Displays the usb port that has the S6R is connected.

S6R enabled: When S6R square in not marked, the S6R functions as a regular six channel receiver.

Open: Gives the PC software access to the S6R configuration data.

Read: Retrieves the stored S6R data to be edited in the PC software.

Write: Stores the created data on the S6R.

Default: Returns the PC software settings to the factory defaults.
Wing type: Conventional model, Delta wing (flying wing) and V-tail options are available.

Mounting type: Level, Bottom, Right up and Left up options are available.

Gain setting:
- Compensation direction: The S6R AIL, AIL2, ELE, ELE2, RUD travel direction can be reversed by selecting the positive or negative option for each channel.
- Gyro gain stabilization mode: The gain setting of the S6R stabilize mode can be set on the aileron, elevator and rudder channels.
- Angle gain Auto level mode: The gain setting of the S6R Auto level mode can be set on the aileron and elevator channels.
- Angle gain Hover mode: The gain setting of the S6R Hover mode can be set on the elevator and rudder channels.
- Angle gain Knife Edge mode: The gain setting of the S6R Knife Edge mode can be set on the aileron and rudder channels.
Due to possibility of minor installation and calibration errors, this software menu has the option to adjust the attitude of the model to achieve the best orientation when Auto Level, Hover or Knife edge mode is activated.  

**Offset angle of auto level:** The roll and Pitch attitude can be adjusted on the aileron and elevator channels to achieve true straight and level flight.

**Offset angle of Hover:** The nose up attitude can be adjusted on the elevator and rudder channels to achieve a stationary Hover in zero wind condition.

**Offset angle of Knife Edge:** The ideal orientation can be achieved by adjusting the aileron and rudder channels to achieve true straight and level Knife edge flight.

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**Accelarometer calibration**

S6R accelerometer requires to be calibrated in six steps. The positive and negative values combined with the 3-axis of the gyro/accelerometer make a total of six values that need to be acquired. Follow the on screen instructions produced by the PC software describing how to position the S6R, click the “Calibration” button, wait until the YELLOW LED starts flashing, this indicates that calibration on this orientation has been completed. Repeat the above on the five remaining steps, when completed check the values at the top of the menu to ensure a value of 1 (+/-0.1) is displayed on all three axes by placing the S6R in the required orientation. As this is the final step of the PC software, make sure to press “Write” to save the data on the S6R when done.

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**Inspection of direction**

We recommend to check the compensation direction of S6R signal before each flight to insure flight safety. Auto level mode produces an large deflection on the AIL and ELE channel and makes it ideal for checking the aileron and elevator surfaces, selecting Knife edge or Hover gives the user clear view of the rudder surface.

When the plane is rotated left or right (Roll), ailerons should have the correcting actions as illustrated above.

When the plane is rotated up or down (Pitch), elevators should have the correcting actions as illustrated above.

When the plane is rotated to left or right (Yaw), rudders should have the correcting actions as illustrated above.
If the compensation direction is incorrect, reverse the affected channel via the PC software as illustrated below.

Self-check

Before starting the self-check, place the model on the ground (level surface).

When flying models, aerodynamic balance is more important than a level model attitude. This results in that at slow speeds the model fly’s at a constant altitude with the nose pointing slightly up. To avoid the plane nosediving at high air speeds the user must insure that the model is placed at a level or slightly nose up attitude during the self-check. Always install the S6R straight and level in the model. If required the PC software can be used to adjust the angle of attack to produce the required setting. If large values are required, we advise the user to recheck the installation orientation of the S6R.

Power the transmitter and insure that the Alleron (CH1), Elevator (CH2), Rudder (CH4), Alleron2 (CH5) and Elevator2 (CH6) are in the neutral position. Power the model to start the S6R self-check, this is required to attain the gyro auto level angle and gimbal neutral position. Do not touch and/or move the model until the self-check is finished, as this will corrupt the calibration settings created during the procedure.

By press and releasing the bind button of the S6R or by change (if set up in the transmitter) the switch position of CH12 from middle to up or down to trigger the self-check procedure, the blue LED will turn ON to indicate self-check procedure is initiated, the surfaces will move and thereafter the blue LED turn off to indicate the self-check has been completed. NEVER operate the CH12 switch during flight! During the self-check procedure, transmitter inputs will not be reproduced by the S6R. We recommend to only use CH12 during ground testing, and use the bind button to select the desired boot procedure.

After completion, move the sticks from CH1 to CH6 (except Thr) to transmit the channel limits to insure the output of S6R will not damage the models hardware. The S6R will save the zero points of the gyro, auto level angle, gimbal neutral position and servo channel limits. Remove the S6R power supply and retry if self-check fails.

S6R setup steps

Use the pc software to calibrate the S6R before installing it in to the model. Insure the wing type and mounting orientation settings are identical to the intended model installation.

Install the S6R and insure that each servo is installed correctly.

Power the transmitter and reduce the servo endpoint setting to insure self-check mode cannot damage the models hardware.
Assign a knob or slider to operate CH6, this will activate the real-time gain adjustment capabilities of the S6R.
Assign three-position switches to operate CH10 and CH11, this to switch between the available flight modes.

Power the model and check the deflection direction of each control surface to insure this is correct Switch between the flight modes and insure that the compensation direction of the gyro is as intended on RUD, AIL and ELE.
If necessary, you can make a self-checking for S6R. Disconnect the power from the S6R will not lose the setting parameters.

Enjoy flying.