RX12

Manual

Version 1.2

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Table of Contents

1. Overview
2. Connections and LED codes
3. Binding
4. Output formats and channel order
5. Client software
6. Data logging

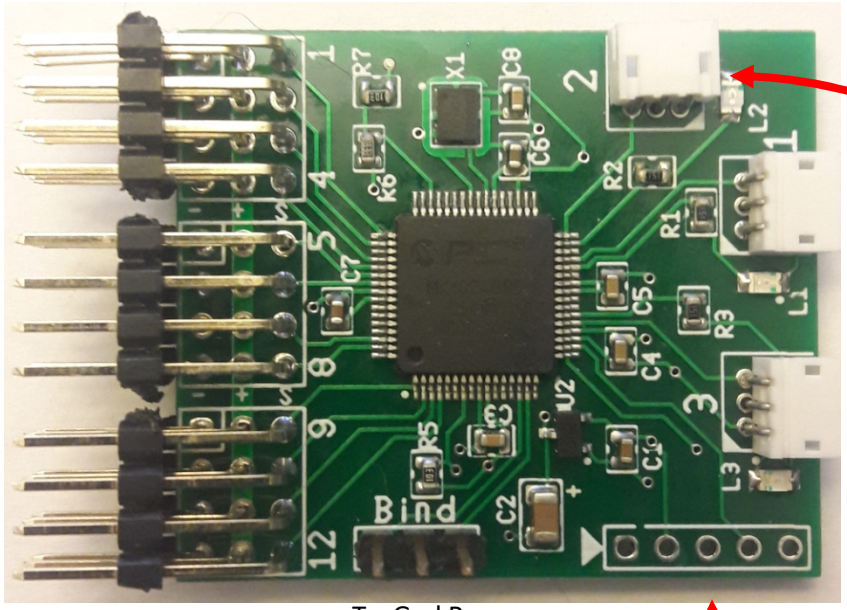
Overview

The RX12 receiver turns one or more DSMX/DSM2 satellite receivers into a full capability receiver with up to 12 channels. It supports the following features:

- Supports DSMX-11ms, DSMX-22ms, DSM2-2048 and DSM2-1024 transmitter modes. Note that you must use DSMX-22ms to receive 12 channels. The maximum channels in DSMX-11ms mode is 10. This is appears to be a Spektrum limitation and not an issue with the receiver.
- 22ms or 11ms output frame rate or PPM or S.Bus on a single output.
- Configurable hold (no throttle signal) or user preset failsafe
- Can support up to three satellite receivers for full diversity.
- Limited data logging.
- Updatable firmware.

Note: This is not a Spektrum DSMX or DSM2 product, nor is it a copy of a Spektrum DSM2 or DSMX product. The Spektrum, DSMX and DSM2 brand is a trademark of Horizon Hobby, Inc.

Connections and LED codes



Connection descriptions

Satellite ports: Connect one or more DSMX/DSM2 satellites to these ports. Any port may be used, they do not need to be connected in any order. You can connect satellites to any combination of ports. The only requirement is that all satellites must be of the same type, either all DSMX or all DSM2. Each port has an associated LED for status indication.

Bind/Serial port: Used to bind the receiver to the transmitter and for serial communication to a PC. See the Binding section of the manual for information on binding. See the Client Software section for information on serial communication.

ICSP port: Used to update the firmware. Not normally used.

Servo outputs: Connections to the servos. The channels are labeled on the board. Channels 1 – 4 are grouped together then 5 – 8 and 9 – 12. Channels 11 and 12 can also be used during the binding process. See the Binding section for details. The signal pin is the upper pin (or rightmost on top pin versions). The ground pin is the bottom (or leftmost) pin. The center pin is power.

Led codes

LED1	On solid = satellite connected and receiving data Four flashes at startup = Logging enabled
LED2	On solid = satellite connected and receiving data Two flashes at startup = Preset failsafe mode
LED3	On solid = satellite connected and receiving data or serial connection established One flash at startup = 11ms frame mode Two flashes at startup = PPM mode Three flashes at startup = S.Bus mode 10 flashes at startup = bind mode

Binding

To bind the receiver to a transmitter follow the steps below.

1. Connect one or more satellite receivers to the satellite ports.
2. Place a bind plug on the bind connector.
3. If you are using DSM2 satellites place a bind plug on Channel 11.
4. If you want to enable 11ms output frame rate place a bind plug on Channel 12. This can also be enabled at a later time either with a bind process or with the PC software.
5. Connect the receiver to an ESC or battery. LED3 should blink rapidly 10 times and the satellites should blink to indicate bind mode.
6. Place the transmitter into bind mode and complete the bind. DO NOT unplug the bind plug at this time unless you want to enable preset failsafe (see next step.)
7. To enable the preset failsafe do the following. Go to step 8 for normal failsafe.
    a. Use the transmitter to set the servos in the desired positions.
    b. With the servos in the correct positions remove the bind plug.
    c. You can now power off the receiver.
8. For normal failsafe (no signal to throttle, all other channels hold) remove the power from the receiver BEFORE removing the bind plug. Don't forget to remove the bind plug!

Note: Some servos may be detected as a bind plug. When binding it is best not to have a servo plugged into channels 11 or 12 as it may be detected as a bind plug . If you must have a servo plugged into these channels plug it in after LED3 stops flashing.

To enable/disable 11ms output frame rate **after** the receiver has been bound:

1. Plug a bind plug into the bind port.
2. Plug a bind plug into Channel 12 to enable 11 ms mode. Leave Channel 12 open to disable 11ms mode.
3. Power the receiver. LED3 will blink 10 times and the satellites will be in bind mode.
4. DO NOT rebind the transmitter. After the receiver quits blinking remove the power THEN remove the bind plugs. The next time the receiver is powered up it will blink LED3 twice to indicate it is in 11ms mode.

Note that 11ms output frame rate is independent from the transmitter frame rate. You may use 11ms output with DSMX-22ms mode or use 22ms output with DSMX-11ms mode. Any combination is allowed. However, you should only use the 11ms output with digital servos.

Output formats and channel order

The receiver can output to the servos or a flight controller in the following formats:

- Standard PWM outputs on the numbered servo output pins.
- PPM output of up to 8 channels on the Channel 12 pins
- S.Bus output of up to 12 channels on Channel 12 pins

To switch to PPM or S.Bus output you must use the client software to switch modes. See the next section for details on the client software.

Channel ordering

For PWM output the channels follow the standard Spektrum order:

1. Throttle
2. Aileron
3. Elevator
4. Rudder
5. Gear
6. Flaps
7. Aux1
8. Aux2
9. Aux3
10. Aux4
11. Aux5
12. Aux6

PPM output uses the same ordering as above but only channels 1 – 8.

S.Bus output uses the Futaba AETR ordering:

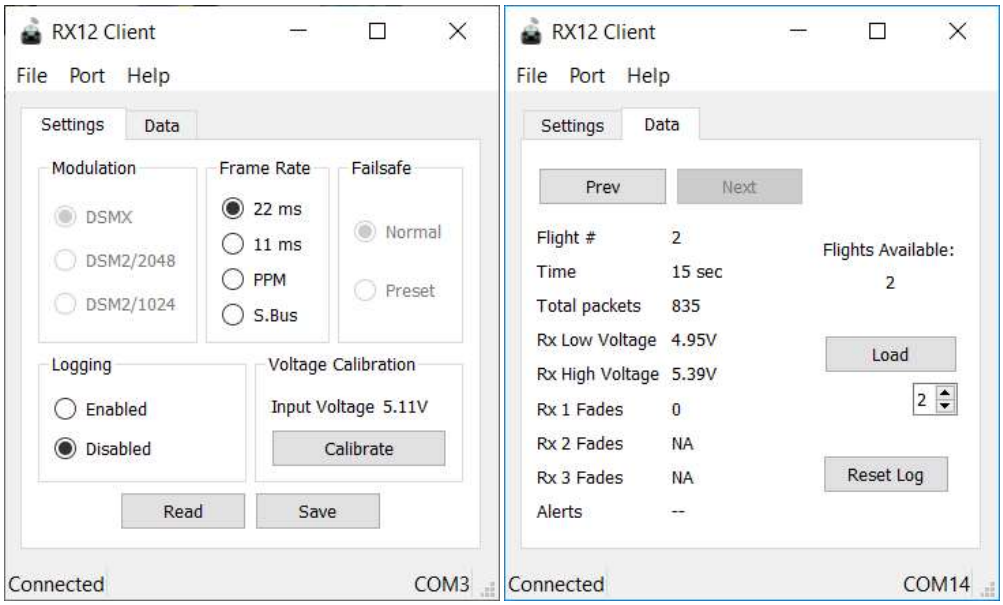
1. Aileron
2. Elevator
3. Throttle
4. Rudder
5. Gear
6. Flaps
7. Aux1
8. Aux2
9. Aux3
10. Aux4
11. Aux5
12. Aux6

Client Software

The receiver can be connected to a PC through the bind/serial port. The client software can be used to read or set some of the configuration settings. It can also be used to retrieve data logged during previous flights. To connect the receiver to a PC you will need a USB to Serial bridge that supports 3.3V levels.

To connect:

1. Make sure the USB to Serial adapter is set for 3.3V. A 5V adapter will damage or destroy the receiver.
2. Connect the ground of the adapter to the middle pin of the bind port.
3. Connect the TX of the adapter to the RX pin of the bind port (see picture in Connections section.)
4. Connect the RX of the adapter to the TX pin of the bind port.
5. Plug the USB to Serial adapter into your computer.
6. Connect an ESC or battery to the receiver. LED3 should light up and remain on.
7. Start the client software.
8. Select the Port menu then select the port that corresponds to your USB to Serial adapter. The status bar at the bottom of the window should show that you are connected.
9. Click the Read button to read the settings.
10. Make any changes you want and then click the Save button to save them to the receiver.
11. To download flight logs change to the Data tab. Select the number of logs to download (starting with the most recent) and click the Load button.
12. Clicking the Reset Log button will clear all current logs and restart the numbering at 1.



Voltage Calibration

The voltage input must be calibrated before it will give meaningful results. You can do a one point or two point calibration. A two point calibration is more accurate but requires two different voltages with at least 1.0V difference. A 2.0V or more difference is recommended. This will require a variable power supply that can be connected to the receiver

To perform a one point calibration:

1. With the receiver connected to the serial adapter and powered on, accurately measure the input voltage to the receiver.
2. Click the calibrate button.
3. Enter the measured input voltage in the dialog.
4. Click Next
5. Click Single Value to complete the calibration.

To perform a two point calibration

1. While connected to the serial adapter and powered on set the input voltage to the receiver to a known value between 4.0V and 12.0V.
2. Click the calibrate button.
3. Enter the input voltage in the dialog.
4. Click Next
5. Set the input voltage to a new value. It can be higher or lower than the first voltage but should be at least a one volt difference. It is best to use voltages that cover the expected operating range of the receiver.
6. Enter the new input voltage in the dialog.
7. Click Next to complete the calibration.

Data Logging

If enabled the receiver will log the following data for each time it is powered on:

- Power on duration
- Total packets received by all satellites
- Input high and low voltage.
- Fades for each satellite.
- Any error conditions detected including activation of the failsafe feature.

Notes:

- Data is sampled continuously but is only saved to flash memory every second.
- In the event of a power failure or brownout the last second of data may be lost.
- Voltages are checked every millisecond.
- Fades are recorded with each satellite packet.
- It is not recommended to use data logging for every flight. Continuous use will eventually wear out the flash memory used to save the logs. This will not affect the operation of the receiver but will prevent any more logging. Just turn on logging when you want to see how the receiver is functioning in a new setup or with a different satellite configuration etc.

Alert Codes - The following codes may show up in the Alerts display:

- FS = Failsafe
  The failsafe engaged at some time during the flight. This means none of the satellites had a signal at that time.
- WD = Watchdog
  A watchdog reset occurred. This is bad. It means the code locked up at some point. Report this to the designer.
- CF = Clock Failure
  The on board oscillator has failed and the backup internal oscillator had to take over. The receiver will still function but may not be fully reliable. This should almost never happen but if you see this error it is recommended to replace the receiver.