

SwitchDoc Labs

Raspberry Pi WeatherRack2 Kit

November 2020

Version 1.1



WeatherSense

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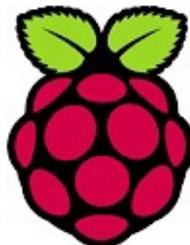
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Introduction

Thank you for your purchase of the SwitchDoc Labs Raspberry Pi Kit for the WeatherSense WeatherRack2. The following user guide provides step by step instructions for installation, operation and troubleshooting.

Raspberry Pi WeatherSense Wireless Kit

Software Defined Radio



SwitchDoc Labs



First Step

Assemble your WeatherRack2 and Indoor T/H Sensor and put batteries in the units. Follow the instructions in the [WeatherRack2 Technical Specification and Assembly](#) manual.

Parts List

NOTE: A Raspberry Pi Board is NOT included in this Kit

Part A - USB Software Defined Radio (SDR)

Part B – Antenna for SDR



Step-By-Step Assembly

Step 1 – Unplug your Raspberry Pi if you have it powered.

Step 2 – Plug the Antenna (Part B) into the socket on the SDR (Part A)

Step 3 – Plug the USB on the SDR (Part A) into any USB slot on your Raspberry Pi.



Installing Software and Testing Your Kit

Set up your Raspberry Pi using your SD Card or the SDL SDCard and either use a monitor, ssh into the Raspberry Pi or use VNC. Use one of the many Raspberry Pi Tutorials to get to this point.

Before you follow these steps, you must have the WeatherRack2 and the Indoor Temperature/Humidity Sensor assembled and powered up with batteries.

Step 1 - If you are using the SDL SD Card, skip to Step 5.

Step 2 - If you have your own SD Card, continue on to Step 3.

Step 3 – Download the SDL Version of rtl_433. Open a terminal window and type into the command line:

```
cd ~
git clone https://github.com/switchdoclabs/rtl\_433.git
cd rtl_433
mkdir build
cd build
cmake ..
make
sudo make install
```

These steps will take a while to complete. Make sure that the compile succeeded!

Step 4 – Download the SDL WeatherRack2 Raspberry Pi drivers

```
cd ~
git clone https://github.com/switchdoclabs/SDL\_Pi\_WeatherRack2.git
```

Step 5 – Test the software

```
cd ~
cd SDL_Pi_WeatherRack2
sudo python3 readWeatherSensors.py
```

Assuming you have completed all the steps above, you will start to see information similar to the below within a minute or so. And you will see duplicate messages because the WeatherRack2 is sending the data twice per sample and our SDR software is good enough to pick up both messages.

```
pi@SwitchDocLabs:~/SDL_Pi_WeatherRack2 $ sudo python3 readWeatherSensors.py
Starting Wireless Read
rtl_433 version -128-NOTFOUND branch master at 202010011416 inputs file rtl_tcp RTL-SDR

Use -h for usage help and see https://triq.org/ for documentation.

Trying conf file at "rtl_433.conf"...

Trying conf file at "/root/.config/rtl_433/rtl_433.conf"...

Trying conf file at "/usr/local/etc/rtl_433/rtl_433.conf"...

Trying conf file at "/etc/rtl_433/rtl_433.conf"...

quiet option (-q) is default and deprecated. See -v to increase verbosity
```

Consider using "-M newmodel" to transition to new model keys. This will become the default someday.

A table of changes and discussion is at https://github.com/merbanan/rtl_433/pull/986.

```
Registered 2 out of 147 device decoding protocols [ 146-147 ]
Found Rafael Micro R820T tuner
Exact sample rate is: 250000.000414 Hz
[R82XX] PLL not locked!
Sample rate set to 250000 S/s.
Tuner gain set to Auto.
Tuned to 433.920MHz.
Allocating 15 zero-copy buffers
{"time" : "2020-11-08 15:31:10", "model" : "SwitchDoc Labs F016TH Thermo-Hygrometer", "device" :
56, "modelnumber" : 5, "channel" : 2, "battery" : "OK", "temperature_F" : 73.300, "humidity" : 27,
"mic" : "CRC"}
WeatherSense Indoor T/H F016TH Found
This is the raw data: {"time" : "2020-11-08 15:31:10", "model" : "SwitchDoc Labs F016TH Thermo-
Hygrometer", "device" : 56, "modelnumber" : 5, "channel" : 2, "battery" : "OK", "temperature_F" :
73.300, "humidity" : 27, "mic" : "CRC"}
{"time" : "2020-11-08 15:31:14", "model" : "SwitchDoc Labs F016TH Thermo-Hygrometer", "device" :
147, "modelnumber" : 5, "channel" : 1, "battery" : "OK", "temperature_F" : 72.700, "humidity" : 28,
"mic" : "CRC"}
WeatherSense Indoor T/H F016TH Found
```

```
This is the raw data: {"time" : "2020-11-08 15:31:14", "model" : "SwitchDoc Labs F016TH Thermo-  
Hygrometer", "device" : 147, "modelnumber" : 5, "channel" : 1, "battery" : "OK", "temperature_F" :  
72.700, "humidity" : 28, "mic" : "CRC"}
```

```
{"time" : "2020-11-08 15:31:15", "model" : "SwitchDoc Labs FT020T AIO", "device" : 12, "id" : 0,  
"batterylow" : 0, "avewindspeed" : 21, "gustwindspeed" : 26, "winddirection" : 216,  
"cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" : 1048, "uv" : 1, "mic" :  
"CRC"}
```

WeatherSense WeatherRack2 FT020T found

```
This is the raw data: {"time" : "2020-11-08 15:31:15", "model" : "SwitchDoc Labs FT020T AIO",  
"device" : 12, "id" : 0, "batterylow" : 0, "avewindspeed" : 21, "gustwindspeed" : 26,  
"winddirection" : 216, "cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" :  
1048, "uv" : 1, "mic" : "CRC"}
```

```
{"time" : "2020-11-08 15:31:31", "model" : "SwitchDoc Labs FT020T AIO", "device" : 12, "id" : 0,  
"batterylow" : 0, "avewindspeed" : 20, "gustwindspeed" : 23, "winddirection" : 148,  
"cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" : 1048, "uv" : 1, "mic" :  
"CRC"}
```

WeatherSense WeatherRack2 FT020T found

```
This is the raw data: {"time" : "2020-11-08 15:31:31", "model" : "SwitchDoc Labs FT020T AIO",  
"device" : 12, "id" : 0, "batterylow" : 0, "avewindspeed" : 20, "gustwindspeed" : 23,  
"winddirection" : 148, "cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" :  
1048, "uv" : 1, "mic" : "CRC"}
```

```
{"time" : "2020-11-08 15:31:31", "model" : "SwitchDoc Labs FT020T AIO", "device" : 12, "id" : 0,  
"batterylow" : 0, "avewindspeed" : 20, "gustwindspeed" : 23, "winddirection" : 148,  
"cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" : 1048, "uv" : 1, "mic" :  
"CRC"}
```

WeatherSense WeatherRack2 FT020T found

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"device" : 12, "id" : 0, "batterylow" : 0, "avewindspeed" : 20, "gustwindspeed" : 23,  
"winddirection" : 148, "cumulativerain" : 1920, "temperature" : 697, "humidity" : 90, "light" :  
1048, "uv" : 1, "mic" : "CRC"}
```

```
{"time" : "2020-11-08 15:31:35", "model" : "SwitchDoc Labs F016TH Thermo-Hygrometer", "device" :  
132, "modelnumber" : 5, "channel" : 4, "battery" : "OK", "temperature_F" : 70.700, "humidity" : 31,  
"mic" : "CRC"}
```

WeatherSense Indoor T/H F016TH Found

```
This is the raw data: {"time" : "2020-11-08 15:31:35", "model" : "SwitchDoc Labs F016TH Thermo-  
Hygrometer", "device" : 132, "modelnumber" : 5, "channel" : 4, "battery" : "OK", "temperature_F" :  
70.700, "humidity" : 31, "mic" : "CRC"}
```

Now you are connected to your wireless weather instruments. Look at the Python 3 readWeatherSensors.py code to see how you can connect this into your own software creations.

Notes on Radio Reception

Your computer, monitors, cell phone can generate interference for your Raspberry Pi Kit. If you don't receive messages check to see your sensors have batteries and try moving the antenna away from sources of interference.

Wireless communication is susceptible to interference, distance, walls and metal barriers. We recommend the following best practices for trouble free wireless communication.

1. **Electro-Magnetic Interference (EMI).** Keep the sensors several feet away from computer monitors and TVs.

2. **Radio Frequency Interference (RFI).** If you have other 433 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid intermittent communication.
3. **Line of Sight Rating.** This device is rated at 100 m line of sight (no interference, barriers or walls) but typically you will get 30 m maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and receiver through a window to get a clear line of sight.

The following is a table of reception loss vs. the transmission medium. Each “wall” or obstruction decreases the transmission range by the factor shown below.

Medium	RF Signal Strength Reduction
Glass (untreated)	5-15%
Plastics	10-15%
Wood	10-40%
Brick	10-40%
Concrete	40-80%
Metal	90-100%

Disclaimer

SwitchDoc Labs, LLC takes no responsibility for any physical injuries and possession loss caused by those reasons which are not related to product quality, such as operating without following the operating manual and cautions, natural disasters, or force majeure.

SwitchDoc Labs, LLC has compiled and published this manual which covers the latest product description and specification. The contents of this manual are subject to change without notice.