

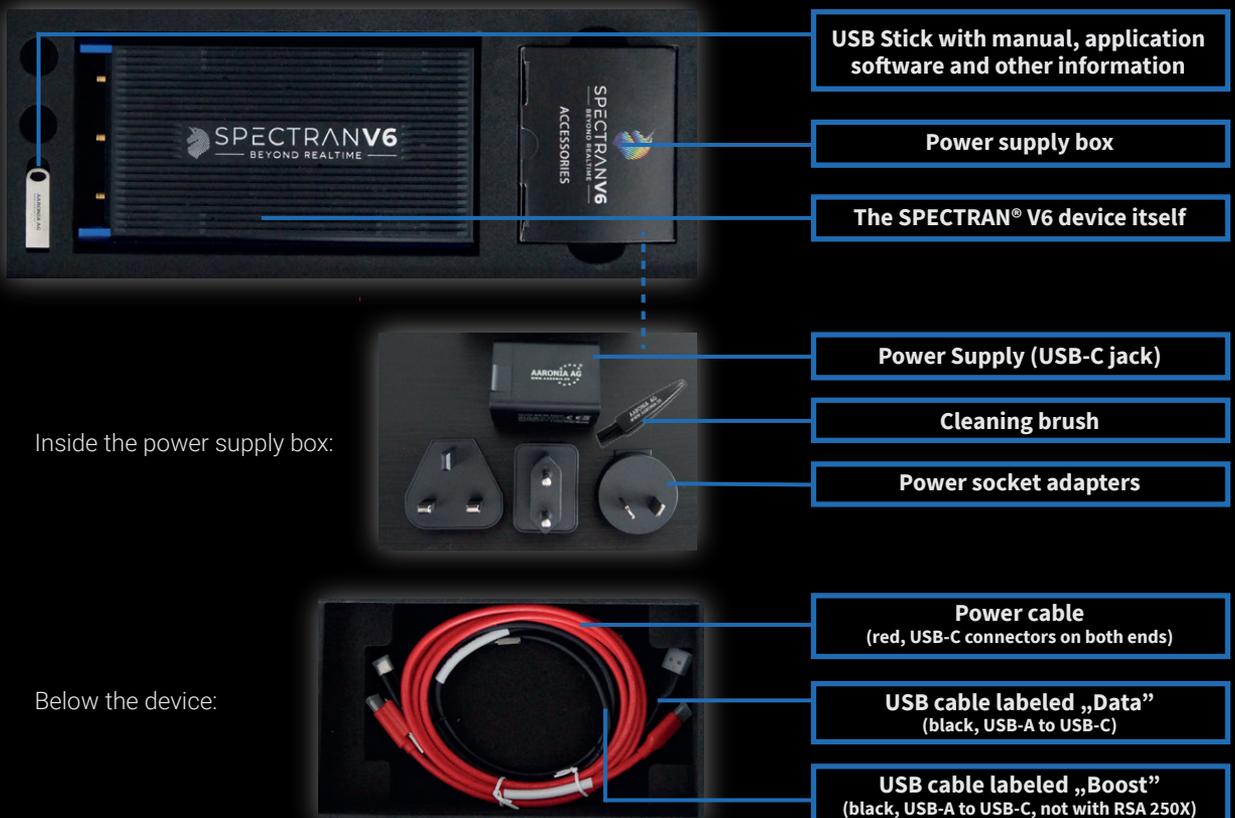
QUICK START GUIDE



Congratulations on getting your new Aaronia SPECTRAN® V6 Realtime Spectrum Analyzer. This quick start guide will provide you with some important initial instructions for connecting it to your PC and measurement equipment. It also shows how to install and configure the RTSA-Suite PRO PC software for performing measurements.

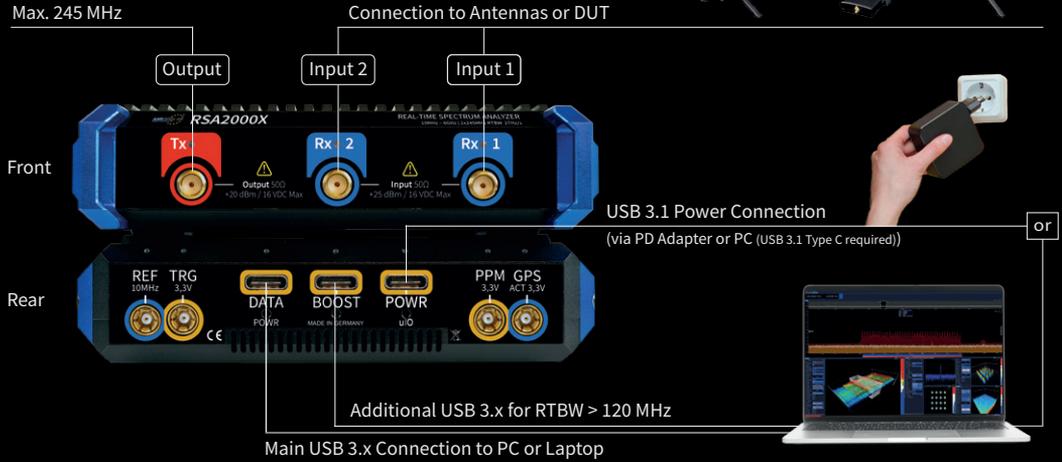
Check package contents

Before your new SPECTRAN® V6 can be used please verify that all necessary components are available and all requirements are met:



Connectors

Please see the image below for a general overview of the available connectors. Each of them will be described in more detail in the following sections.



Connecting the SPECTRAN® V6 with the PC



Power

Option A) Attach the proper adapter to the power supply and plug it into a power socket. Then use the red power cable to connect the power supply with the "POWR" port on the device.

Option B) Use the red power cable and connect it to the "POWR" jack of the device with a USB port that supports the "Power Delivery" feature. Such ports are marked by one of the symbols shown on the right.



Data

Use the black cable labeled "Data" to connect the "DATA" port of the device to any USB 3.x port of your PC. USB 3.x ports are usually blue or red and are marked with a "SuperSpeed" logo:



Boost (not for RSA 250X)

Note

In some cases, the "Data" connection can also supply power, and no dedicated "Power"-connection is needed. However, this depends on the USB port, cable and device configuration in the mission used, so it is recommended to always supply power using the "Power" connector.

LED status lights (Boost /Data)

- Disconnected
- Connected
- Datatransfer

The SPECTRAN® V6 may need a second USB connection when operating at full capacity. In such scenarios connect the black cable labeled "Boost" to the "BOOST" port of the device and a second USB 3.x port on your PC.

Do not use a USB hub for connecting the SPECTRAN® V6. Avoid using USB 2.0 ports for connecting the SPECTRAN® V6. (While it is possible, a USB 2.0 port limits the data rate extremely and may cause data errors and trigger error messages.)



Attention

Third-party USB cables may cause problems if they do not meet the proper specifications. In case of USB problems always make sure you are using the cables supplied by Aaronia before contacting support.

Connecting the SPECTRAN® V6 with antennas or RF devices

The SPECTRAN® V6 provides the following connectors for antennas and/or other RF devices:

RX



Two SMA inputs labeled Rx1 and Rx2 to connect antennas, generators or other measurement equipment supporting signal strengths of up to +25 dBm (Rx2 only supported on RSA 2000X).

TX



One SMA output labeled Tx to connect receiving equipment providing signal strengths of up to +20 dBm (not supported on RSA 250X).

REF



One SMB input labeled REF to connect an external 10 MHz clock signal.

TRG



One SMB in/output labeled TRG for synchronizing device.

PPM



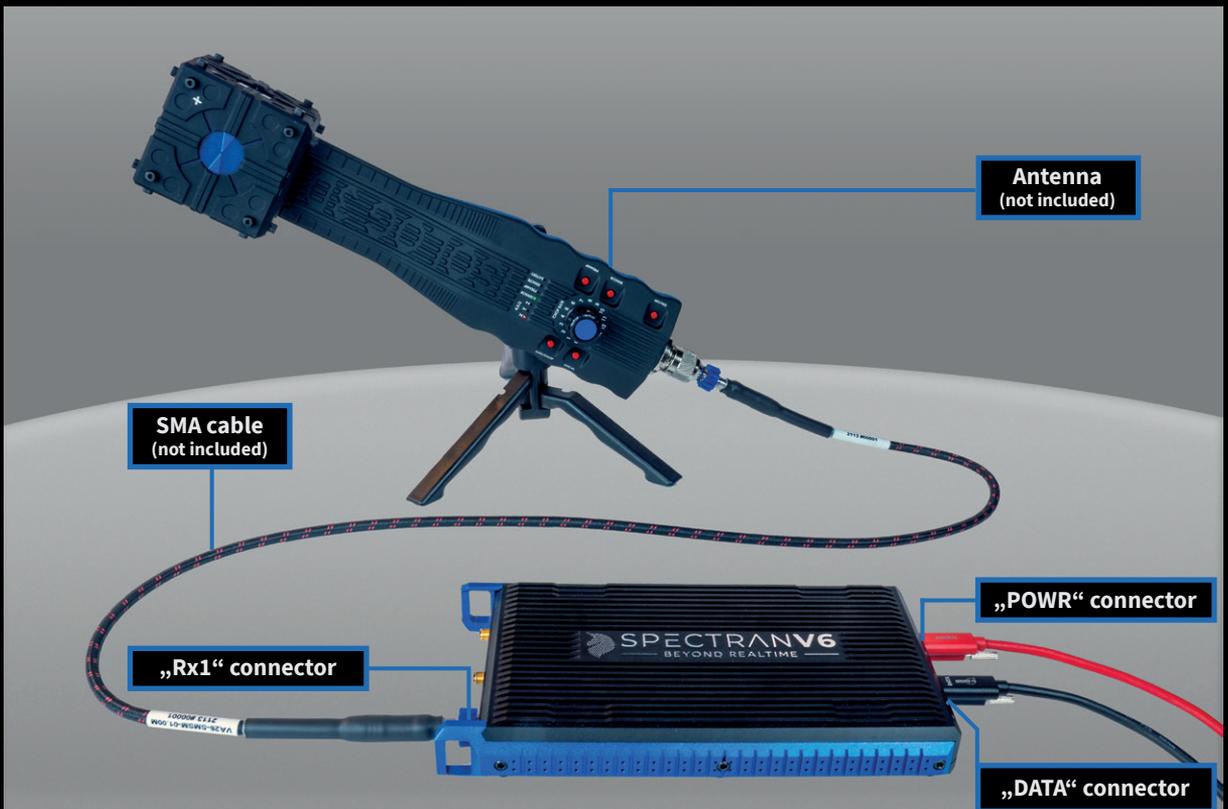
One SMB in/output labeled PPM.

GPS



One SMB input labeled GPS to connect an antenna to the integrated GPS receiver (requires software license).

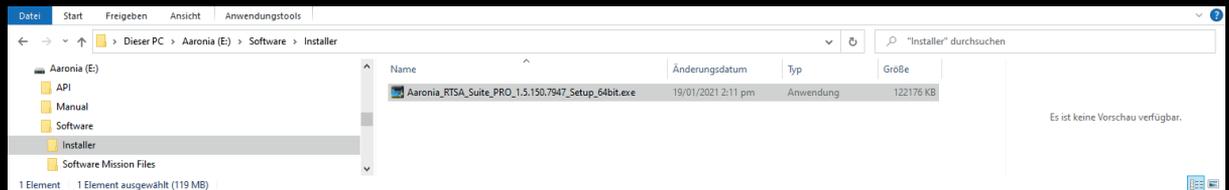
In most scenarios, you will only connect the Rx1 input to an antenna (or other device), so your setup will look similar to this:



Installing the software

To use the SPECTRAN® V6 RSA the Aaronia RTSA-Suite PRO analyzer software is required. A version of that is available on the USB stick included in the package under the “\Software\Installer” folder, alternatively you can download the most recent version at <https://aaronia.com/downloads/>

Installing the RTSA-Suite PRO on Windows 10 is pretty straightforward. Just double-click on the installer file on the USB stick or in your download folder:



The installation is similar to most other Windows applications. Read each screen carefully before clicking “Next”. In particular make sure that the “Install SPECTRAN V6 Driver” option is enabled (should be the default) on the last page of the installation process.

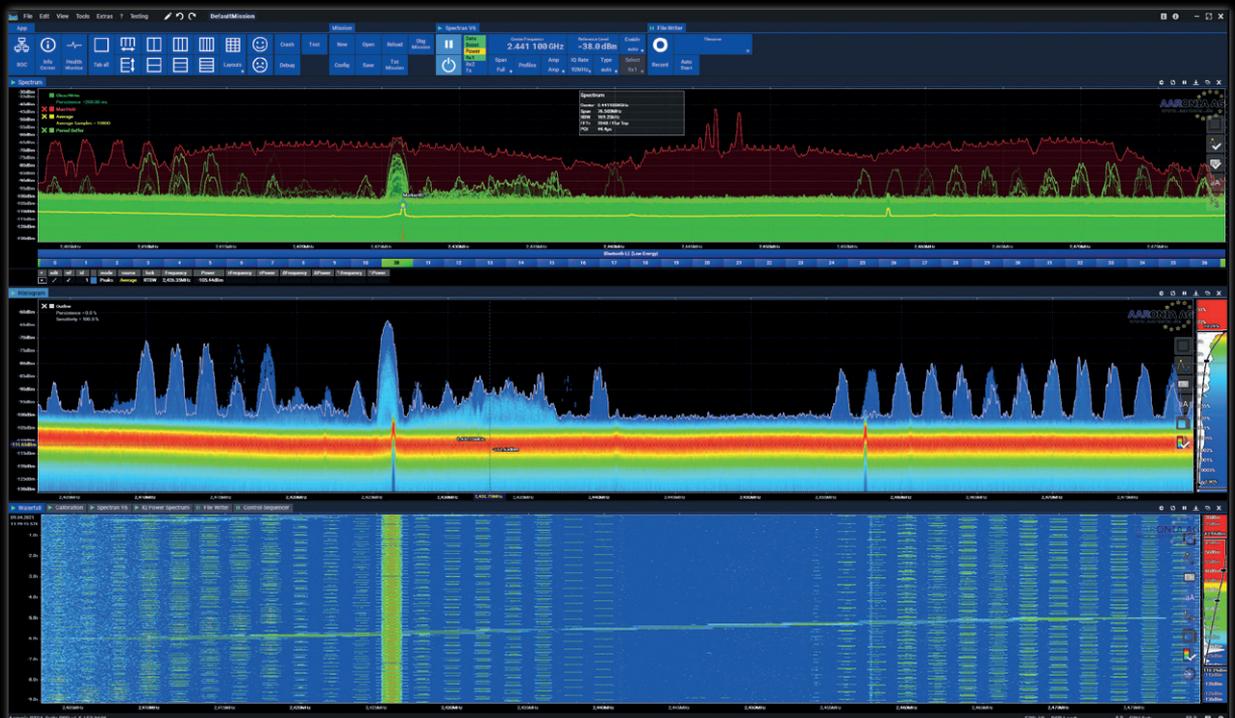
Attention

Linux users: The RTSA also works on Linux, but the installer is not included on the USB stick and needs to be downloaded from our website. For obvious reasons the installer will have some differences to the Windows version, in particular it will not contain a “Install SPECTRAN V6 driver” option.

Starting the software

After the RTSA-Suite PRO is installed, start it like any other application using the start menu or desktop shortcut. The start of the RTSA-Suite PRO may take some time during which you may not see any interface elements, please be patient in that case, the application windows should appear within a few seconds.

By default, the RTSA-Suite PRO will load a mission file that will connect to a connected SPECTRAN® V6 RSA, start a measurement and display the data as spectrum, waterfall and histogram view. Of course, this only works if the device is properly connected to the PC before starting the RTSA-Suite PRO. If all works properly, your RTSA-Suite PRO window will look similar to this after a few seconds:

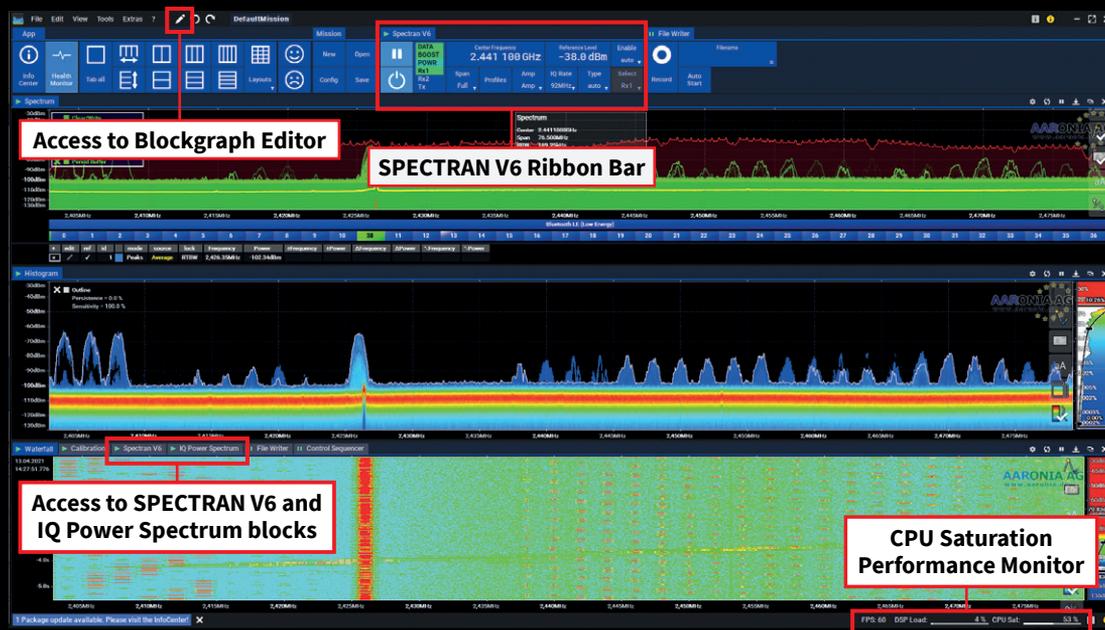


If your SPECTRAN® V6 RSA is connected as instructed, but the RTSA-Suite PRO does not display a screen similar to the above please check for error messages in the bottom left corner of the screen and check the SPECTRAN® V6 forum at <https://aaronia.com/v6-forum/> for solutions. There you will also find a lot of additional information for using your new SPECTRAN® V6 RSA.

For more information about the RTSA-Suite PRO please visit our website at <https://aaronia.com/rtsa/> and its manual at <https://aaronia.com/rtsa-manual/>

RTSA interface overview

The RTSA-Suite PRO is a very complex software. Please refer to the full manual for a detailed usage guide. This quick start guide only references a few parts of the interface that are briefly described below:



Accessing the SPECTRAN® V6 settings

The mission which is loaded by default in the RTSA-Suite PRO uses all available screen space for displaying data. To access the settings of the SPECTRAN® V6 it is necessary to open the Spectran V6 block by clicking on the “Spectran V6” tab above the Waterfall display in the lower part of the RTSA-Suite PRO application window. That action will switch the lower window section from the Histogram block to the Spectran V6 block where the device parameters can be adjusted:



The image only shows some of the available settings, it could be necessary to scroll down and possibly open the available submenus (by clicking on the arrow on the left side of the setting) to see them all.

In the same way the FFT parameters in the “IQ Power Spectrum” block can be accessed, or the processing or display parameters of any other block.

Configuring the SPECTRAN® V6 RSA

The “Spectran V6” block provides many configuration options for tuning the device to your specific measurement scenario. This quick start guide describes the most important settings briefly. If a setting is not mentioned below it is recommended to leave it at its default value.

Group „Main“:

Device Select	Allows to select a specific SPECTRAN® V6 device in case multiple devices are connected to the PC. If only one device is connected the “Any available” setting is recommended.
Center Frequency	Adjust this to match the frequency range to be measured.
Span	Adjusts the span of the frequency range to be measured, based on the selected RTBW. “Full” yields the maximum frequency range, the other settings will reduce it by the selected factor.
Frequency Profile	Allows to select one of several predefined profiles to automatically adjust the measurement parameters to match the profile.
Full Spectrum	Makes the full RTBW spectrum available for use. By default, the outer areas are discarded to avoid possible artifacts.
Reference Level	This variable controls the sensitivity of the device. Strong signals may require tuning this up to increase the level, weak signals to reduce it. The available value range depends on the current amplifier configuration and can be changed with the “RX Amplifier” setting described below.
Connect / Disconnect	Allows to manually connect / disconnect the software connection to the selected device. The default mission should establish the connection automatically, but in some cases, it might be necessary to perform this connection manually.
Start / Stop	Start / stop the actual measurement. The default mission should automatically start it.

Group „Board Config“:

Output Format	Defines if the block should output IQ data, Spectra data or both. The default “auto” selection will determine the correct output format based on the blocks connected to the block output connectors.
Spectra 1 / Spectra 2	Adjust the FFT parameters when using the “Spectra” output connectors. Spectra 2 only available on RSA 2000X.
Receiver Clock	Select the bandwidth to be used. Values above 100 MHz only available on RSA 2000X or with separate bandwidth option.
GPS Mode	Specifies which data of the integrated GPS receiver should be included in outgoing data streams. Only available with separate GPS option.

Group „Calibration“:

RX Filter	Allows manually selecting a bandpass filter option instead of the default automatic selection. The numbers specify the frequency range of the filter, with the optional number in parentheses specifying the maximum bandwidth that this filter is usable with.
RF Amplifier	Selects the amplifier stage(s) to use. Every SPECTRAN® V6 has an internal amplifier labeled “amp” that can be enabled or disabled. There is also an optional second amplifier labeled “preamp” right after the RF connector that needs to be unlocked by license key. It is also possible to use the “both” setting to activate both, or “auto” to enable/disable amplifiers based on the specified “Reference Level” (as described above).

When using the IQ Power Spectrum block (as done in the default mission) there are some relevant settings related to the conversion of IQ into Spectra data:

Group „Main“:

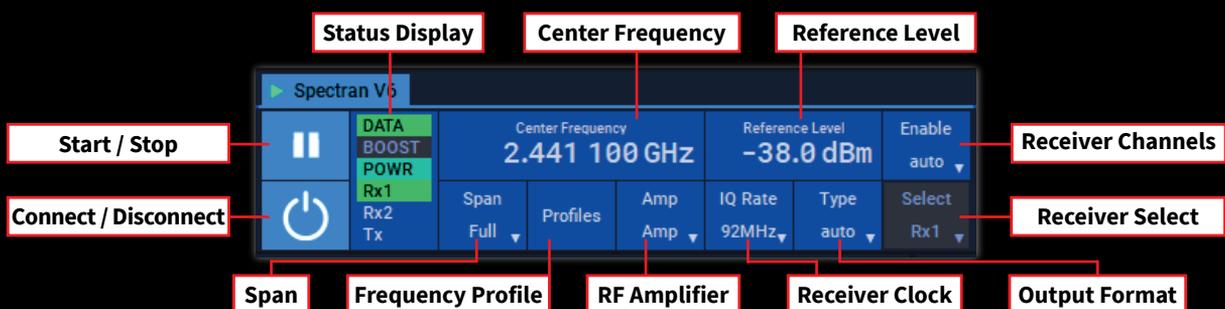
FFT Size Mode	Allows to select between different options to specify FFT parameters.
FFT Size	Adjusts the conversion from IQ to Spectra data. Higher values will result in a smaller RBW value of the Spectra data.
FFT RBW Frequency	When setting “FFT Size Mode” to “RBW” you can directly enter the desired RBW value of Spectra data here, which will automatically adjust the FFT parameters accordingly.

Attention

Changing these parameters can result in a significant increase of CPU and memory consumption. Please monitor the “CPU Saturation” level in the bottom-right corner of the RTSA window. When the bar turns red the current configuration might be too much for your hardware to handle.

Ribbon bar

Above the main display area of the RTSA-Suite PRO is the ribbon bar that allows quick access to some commonly used parameters (same as described above). It includes a section labeled “Spectran V6”:



The controls for “Start / Stop”, “Connect / Disconnect”, “Center Frequency”, “Reference Level”, “Span”, “Frequency Profile”, “RF Amplifier”, “Receiver Clock” and “Output Format” correspond to the settings of the same name in the previous section, they are only duplicated here for easy access.

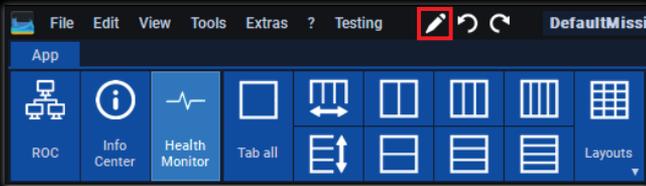
“Receiver Channels” is only available on RSA 2000X models and allows to select which Rx input(s) should be used for measurement. Changing this setting will trigger a restart of the measurement which can take a few seconds as the device has to be reinitialized.

“Receiver Select” is only available after selecting the value “Rx1/Rx2” in “Receiver Channels” and allows then to switch between the inputs without restarting the measurement.

The “Status Display” part shows which connection is currently used and if there are any problems with it. A green background indicates no problems, red background implies a critical error and a yellow exclamation mark is shown when there is a non-critical issue. You can hover the mouse cursor over the element to get a tooltip with more information on the issue.

Customizing the mission

When the default mission does not meet your requirements, you can of course change it to fit your needs. To do so open the blockgraph editor by clicking on the pen button at the top of the application window:



That will open the blockgraph editor in a new window section:



Note
The window will likely be opened on the left side of the application window and therefore be too small to display all contents shown above. F5 rearranges the elements automatically.

In the blockgraph editor you can add, remove or rearrange blocks to measure and analyze data. This is done using a drag & drop interface and connecting the in- and outputs of different blocks. Different blocks support different datatypes indicated by the colors and labels of the connectors. Connections can only be established between blocks supporting compatible data types (e.g. it is not possible to connect an IQ output to a Spectra input). Removing blocks is achieved by selecting the block and pressing the "Delete" key on the keyboard.

Note It is not possible to manually reposition elements in the blockgraph.

Please refer to the RTSA-Suite PRO manual at <https://aaronia.com/rtsa-manual/> for details.

Mission examples

Some examples for alternative mission configurations:



One of the simplest missions possible:

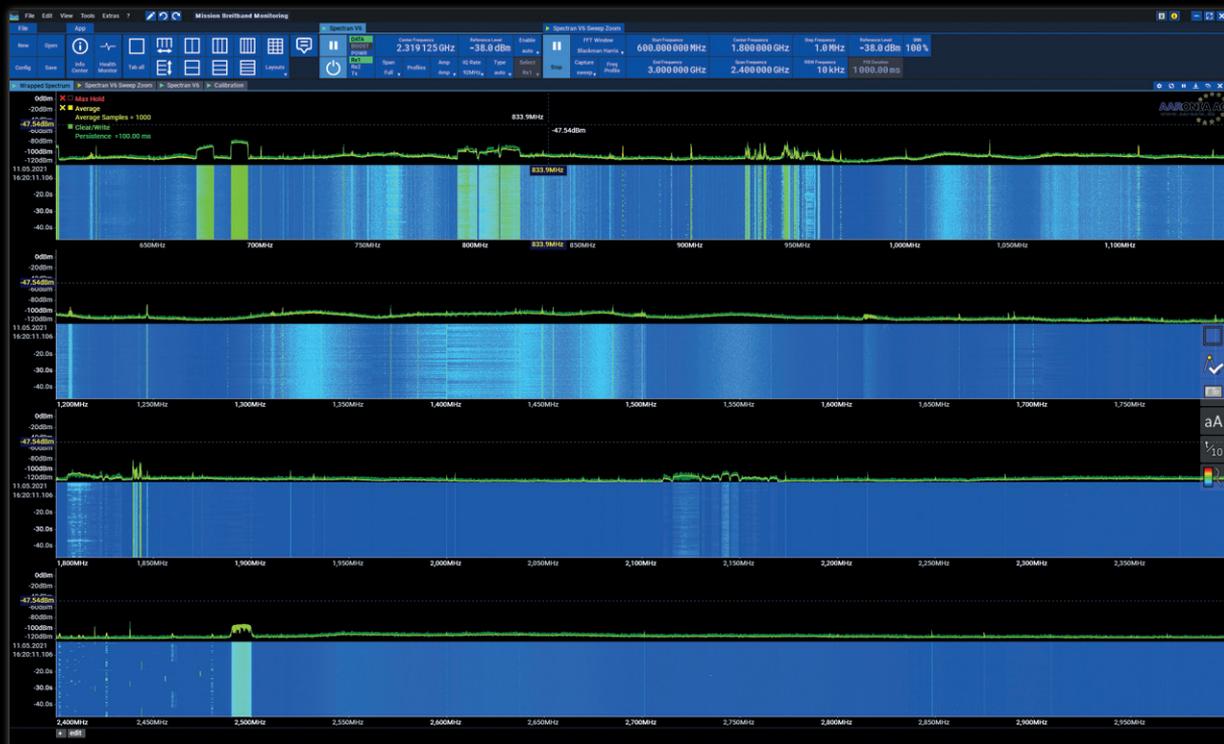
The mission begins with a calibration block on the left in the blockgraph editor (see picture above). To specify which cable, antenna and/or other RF equipment is connected to the SPECTRAN® V6, so the RTSA-Suite PRO can adjust the data for the generated gain or loss. The Calibration block output is connected to the RF input of a SPECTRAN V6 block to control the device. And finally, the Spectra 1 output of the SPECTRAN V6 block sends the measured data to a ComboView block to provide a combined display of spectrum, histogram and waterfall.

This example uses the Spectra output of the SPECTRAN V6 block instead of passing the IQ data through the IQ Power Spectrum block. It simplifies the mission configuration at the cost of less influence on the FFT parameters used.

A more complex mission to monitor a large frequency spectrum with a single SPECTRAN® V6 device, using the Spectran V6 Sweep Zoom and Wrapped Spectrum blocks.



Download this base mission with all settings at <https://v6-forum.aaronia.de/demo-mission-1/>



Problems and solutions

<i>If starting the RTSA suite PRO does not start the measurement automatically.</i>	This may be caused by power management settings, timing problems or software issues. Starting the measurement manually by clicking on the Start/Stop button in the ribbon bar should work without problem.
<i>Pressing the “Connect” button has no effect.</i>	Check that all cables are connected correctly, and that the power supply is properly plugged into the power socket.
<i>The status display in the ribbon bar shows a “USB underflow” error.</i>	The USB connection does not provide enough bandwidth to transfer all data from the device to the PC. There are two types of causes for this: ▷ The “DATA” connection does not support USB 3 SuperSpeed. Please make sure the port is connected to a USB 3.x port on the PC or the cable does support the USB 3 “SuperSpeed” standard. ▷ The current measurement parameters are set too high. Some parameter combinations require more bandwidth than a single USB 3 connection can handle. This can be caused by using both Rx1 and Rx2 in parallel, or using more than 122 MHz RTBW on a RSA 2000X model. When using such set-ups please also connect the “BOOST” cable in addition to the “DATA” cable.
<i>The Status display in the ribbon bar shows a “DSP buffer overflow” error.</i>	The RTSA-Suite Pro is receiving more data than it can process with the current mission configuration. Either reduce the amount of data generated (lower Receiver Clock setting or use Spectra instead of IQ as Output Format) or adjust the mission configuration to perform less processing (for example by reducing the FFT size in the IQ Power Spectrum block settings).
<i>The Status appears to be working (fan is on), but no data is displayed.</i>	This can be caused if the connections of the Spectran V6 block does not match the configuration settings. In particular using the “Spectra” connectors while using IQ “Output Format”, or using “IQ 2” or “Spectra 2” outputs without changing the “Receiver Channels” setting.