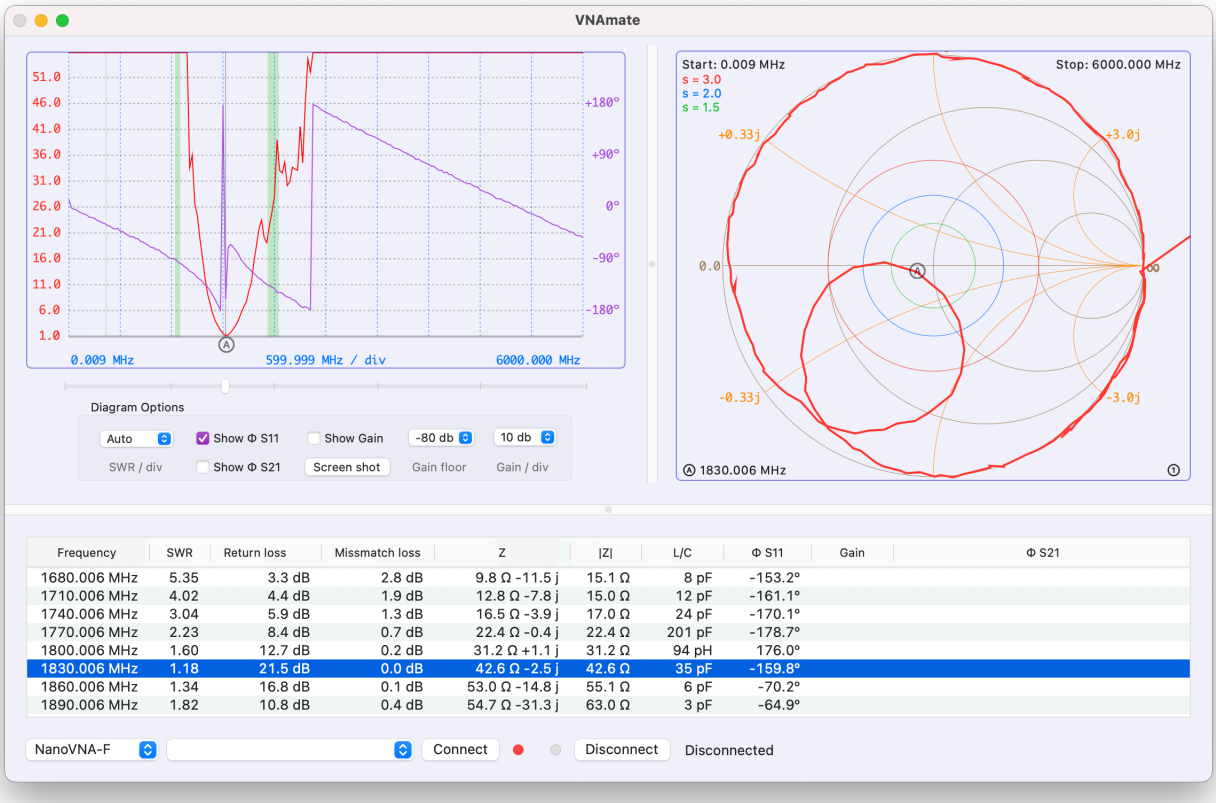
VNAmate



For macOS

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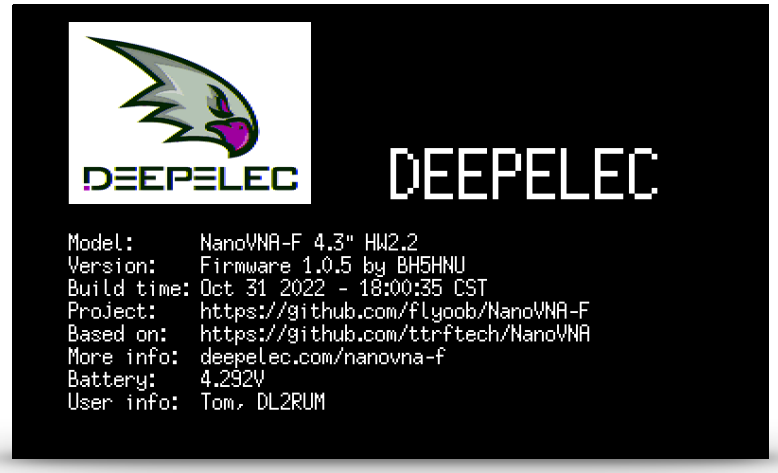
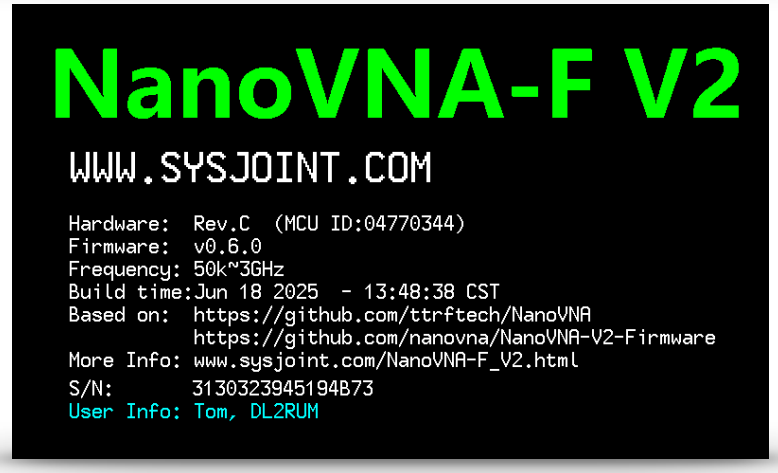
Supported Devices

NanoVNA-F, NanoVNA-F V2, FA-VA 5

The program has been successfully tested on the following devices.

Other versions of the NanoVNA may also work, but full function cannot be guaranteed. Small deviations in the firmware have a greater impact on the cooperation with external software.





Program Start

The lower part of the program window is used for the first settings.

The available functions differ depending on the device, so a model must first be selected. If the corresponding interface has been selected, the connection to the VNA can be established or disconnected. The left 'LED' shows the status of the connection, the right lights up briefly when data is received. Only when the status information on the right shows the connected device can the VNA be used.
If the previously used serial interface is found again at later program starts, an automatic connection to the VNA is made.

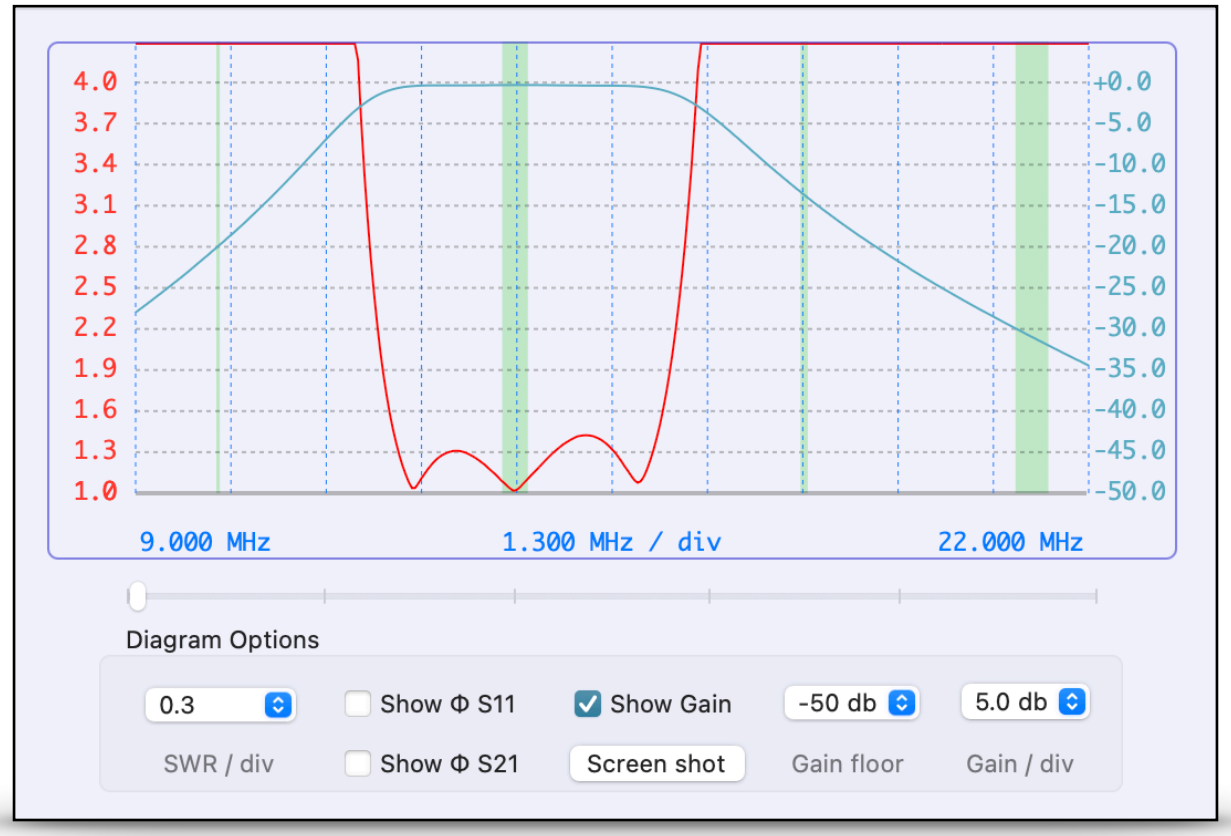
The Program Window

The window is divided into three parts. The size ratios can be adjusted in each case.

Table

All calculated values are listed in the table in the lower half. All calculations are based on a system impedance of 50.0 Ω! The individual columns can be moved, re-sorted, adjusted in width or hide and re-displayed. If a row is selected, the corresponding marker is set in the diagrams. A right-click on a row opens a context menu, with which the markers can be set. See section *Markers*.

Diagram



20 m band pass filter: SWR and attenuation 9 - 22 MHz

This chart is not used for single frequency measurements!

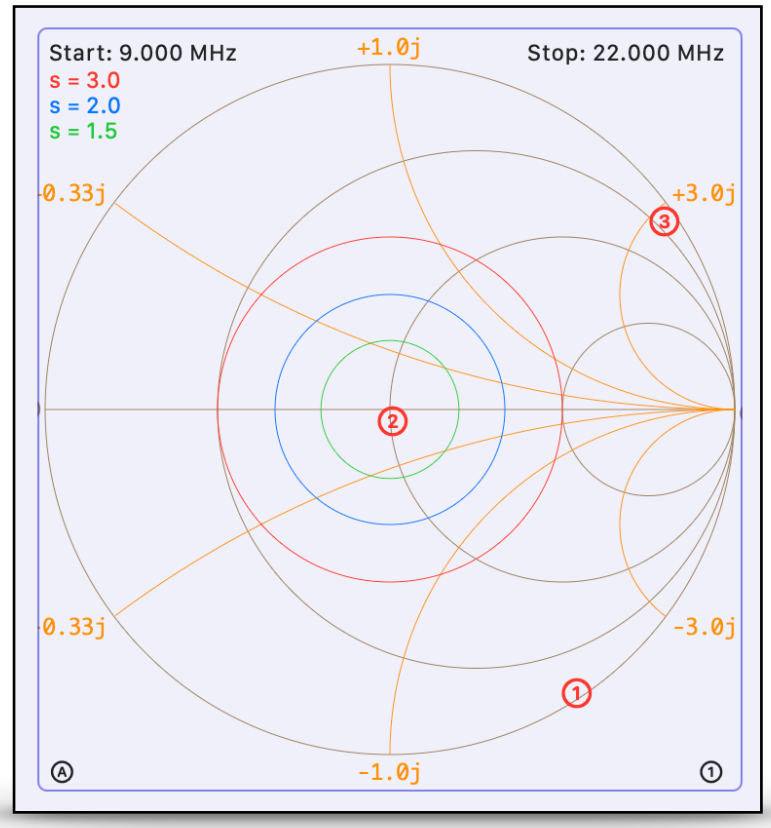
The diagram can represent the following values:

- SWR S11
- Phase S11
- Phase S21
- Gain S21

The SWR curve is constantly shown, the others are optional. With the slider directly below the diagram, you can quickly move the marker. The corresponding entry is marked in the table. The areas of the amateur radio bands are highlighted in green. The frequencies shown on the left and right correspond to the start and stop frequency.

The button *Screen shot* creates a copy of the **NanoNVA** display.

Smith Diagram



20 m band pass filter at 10.1, 14.0 und 18.1 MHz.

The (undesignated) resistance circles are at 0.33, 1.0 and 3.0. This corresponds to 16.66, 50.0 and 150.0 Ω. In single frequency measurements, no curve is drawn, but the first nine measurements are shown as markers ① - ⑨.

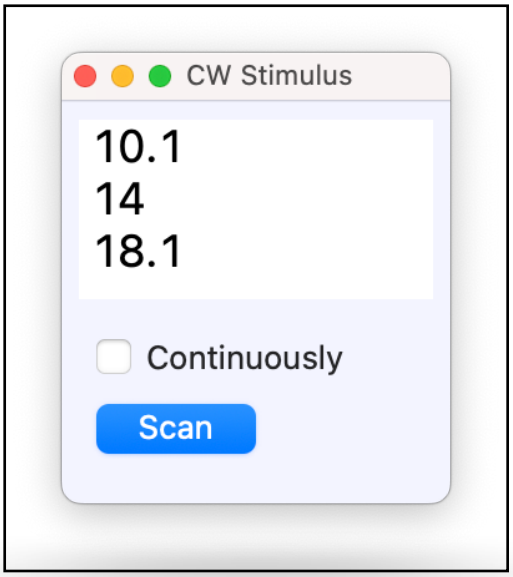
Measurements

To obtain correct values from the **NanoVNA**, any trace for S11 and/or S21 must be active on the device itself.

The **FA-VA 5** provides only non-calibrated values, therefore a SOL calibration must be carried out in the program before starting the measurements, see section *Calibration*.

In principle, two types of measurements can be distinguished: single frequency and frequency band measurements.

Single frequency measurements



A single measurement is made at 10.1, 14.0 and 18.1 MHz

The *CW Stimulus Panel* is used for this purpose. The frequency indication must be given in MHz, the dot is to be used as a decimal separator.

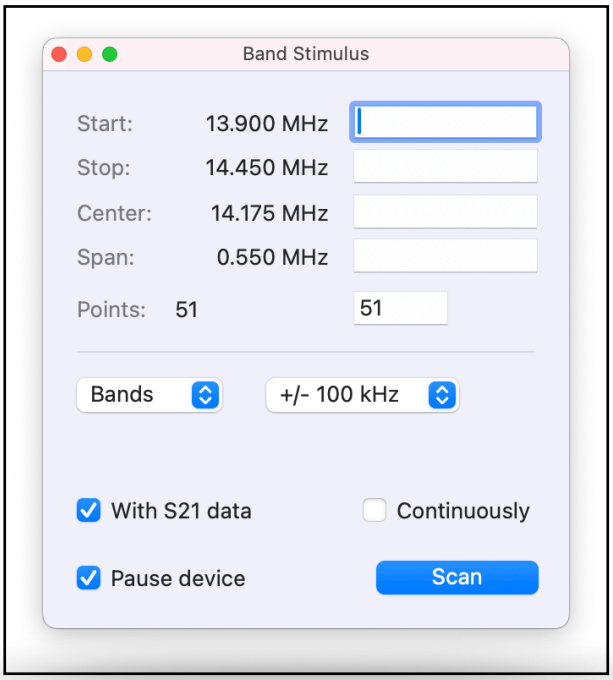
Each desired frequency must be on a separate line. The button *Scan* starts a measurement per frequency. If the *Continuously* checkbox is activated, the scan is constantly repeated. To exit, the checkbox must be deactivated again.

Frequency	SWR	Return loss	Missmatch loss	Z	|Z|	L/C	Φ S11	Gain	Φ S21
10.100 MHz	> 99	0.1 dB	15.7 dB	1.4 Ω -89.0 j	89.0 Ω	177 pF	-58.7°	-20.14 db	-151.5°
14.000 MHz	1.09	27.6 dB	0.0 dB	50.2 Ω -4.2 j	50.3 Ω	3 nF	-85.3°	-0.33 db	-1.7°
18.100 MHz	44.26	0.4 dB	10.6 dB	13.0 Ω +161.5 j	162.0 Ω	1 µH	34.2°	-13.57 db	137.1°

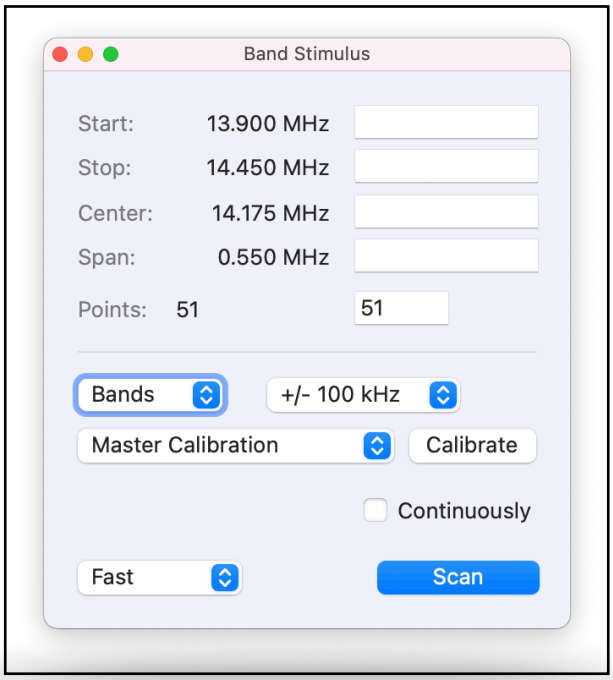
The result of the above measurement in tabular form

Frequency Band Measurements

The Panel Band Stimulus is used for this purpose. Depending on the VNA model used, the control elements differ slightly.



NanoVNA



FA-VA 5

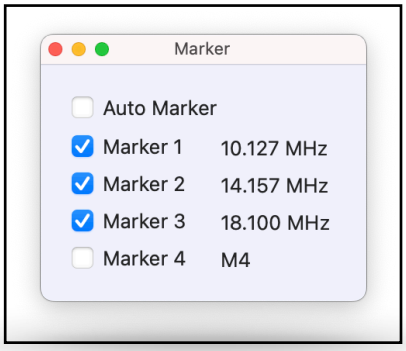
With the **NanoVNA** there is the option to query S21 data in addition to S11, as well as to pause the scan on the device itself. These two options also affect the single frequency measurements.

With the **FA-VA**, the measuring accuracy (Fast, Standard, Precise) can also be selected and here you will find the controls for calibration, see section *Calibration*.
Here, too, the frequency is indicated in MHz, and the period is to be used as a decimal separator. On the left are the values that were used in the last scan. Entered values that are outside the allowed limits may not be accepted. If frequencies have been determined, the one-time measurement is started with the button *Scan*. If the checkbox *Continuously* is activated, the

scan is constantly repeated. To exit, the checkbox must be deactivated again.

With the pop-up button *Bands* you can quickly select amateur radio bands. The scan starts immediately. In addition, the span can be extended with the adjacent pop-up button. This would then have to be selected beforehand.

Marker



Marker Panel

A separate marker Ⓐ is available within the program. This can be set automatically or manually. The **NanoVNA** has four internal markers that can be synchronised with this program. The **FA-VA** does not have this option.

Marker Ⓐ

When reading new data (from the device or from a file), this marker is set to the frequency with the lowest SWR. The data table displays the corresponding entry. By selecting another row in the table, or by moving the slider, the marker can be moved. The marker Ⓐ can be temporarily deactivated with the corresponding checkbox. However, it is activated again when new data is read in.

Marker ① - ④ NanoVNA

By activating a checkbox, the corresponding marker is set in the program with data from the NanoVNA. The marker is also activated in the NanoVNA. Deactivating the checkbox will deactivate the markers in the program and in

the device. For a change of the marker frequency, a marker can be selected in the contextual menu of the data table.

Marker ① - ④ FA-VA 5

To set a marker, the contextual menu in the data table must be used. A marker can also be switched off by deselecting the corresponding checkbox in the *Marker Panel*.

Data exchange

Import

The program can read and display *.s1p and *.s2p Touchstone files: *Menu —> File —> Open*

Export

A screen shot of the LCD display can be taken from the **NanoVNA**. To do this, the button *Screen Shot* in the *Diagram Options* box is used. The image can be saved: *Menu —> File —> Save screen shot as image*.

Data from the table can be exported as *.csv, *.s1p or *.s2p. See *Menu —> File Export data as ...*

The graphic of the Smith or SWR diagram can be saved as a *.pdf file. Use *Menu —> File —> Export ...*

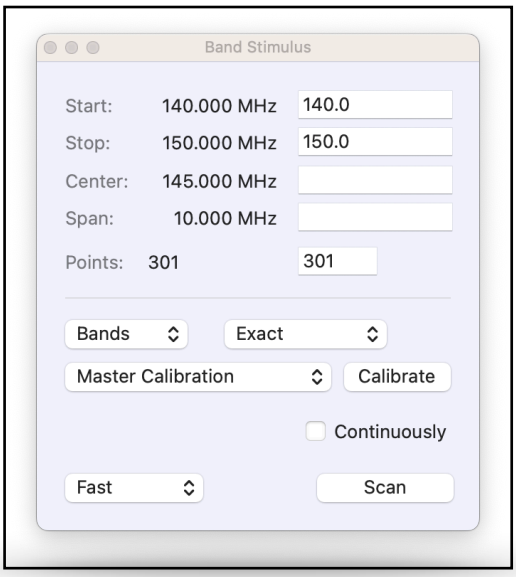
FA-VA 5 Calibration

Before the first use of the **FA-VA**, SOL calibration data must be calculated. The calibration from the device cannot be used in the program. A master calibration, which captures the entire range of 0.1 - 600 MHz, can then be used continuously. In addition, further individual calibrations are possible.

Master Calibration

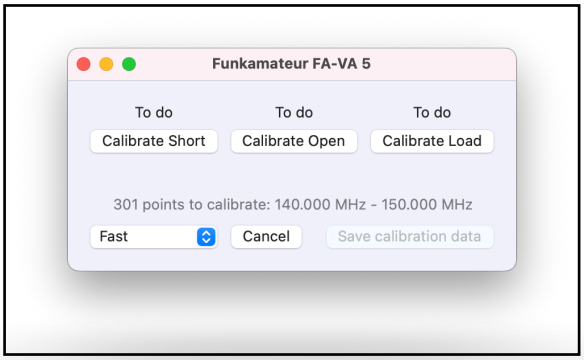
This can be reached via *Menu —> Window —> Master Calibration FA-VA 5* .

Individual Calibration



This can be done for the highest accuracy. To do this, select a frequency range and any number of measurement points in the *Band Stimulus Panel* and press the *Calibrate* button. These numbers are then transferred to the calibration window.

Calibration



The accuracy (and thus the duration of the calibration) can be selected. With the *Fast* option, the process takes about 3 x 45 seconds. Before the correction data can be saved, all three passes (Short, Open, Load) must be

completed. The passages can be cancelled at any time and can be repeated as often as desired. The master data is saved directly when you press the *Save calibration data* button. For an individual calibration, a name must be selected for saving. This calibration can then be called up again later in the *Band Stimulus Panel*.