# ((•)) *Antenna Analyzer* plus

User manual

/ version 2.0 /

Budapest, 2017

"**Antenna Analyzer plus**" is a multifunctional measuring instrument, most useful for amateur radio activity. Its size allows you to easily take it for relocation as well. The


panel size is 115 x 75 mm fitting into a small box of size eg. 125 x 80 x 25 mm. Its main function is put into effect by the two RF impedance meters - called together the antenna analyzer - which can **measure phase true complex impedance** between the main antenna poles, ranging from 100kHz to 200MHz and 425MHz to 445MHz. Numeric

results are also displayed graphically. In addition to the detailed measurement of antenna parameters, it **can be used as an inductance and capacitance meter** as
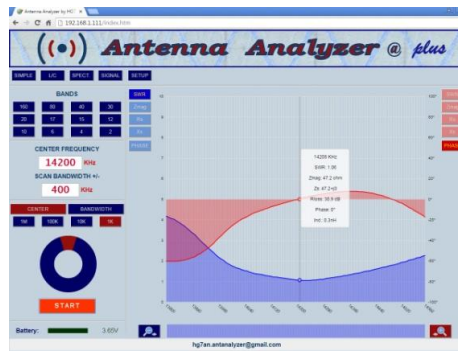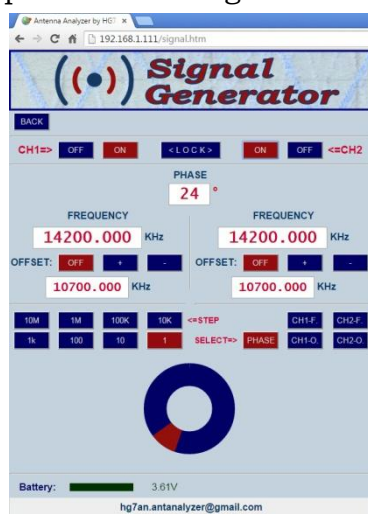

well, with which you can measure parts from 10nH or 1pF. Another interesting feature available is **spectrum display function**, with which you can visualize the full output spectrum of the transmitter within
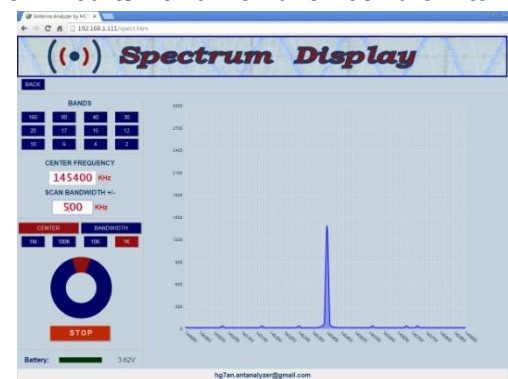

the whole **100kHz to 200MHz and 425MHz to 445MHz frequency interval**. The function, which enables the measurement of filters was built in the new version.
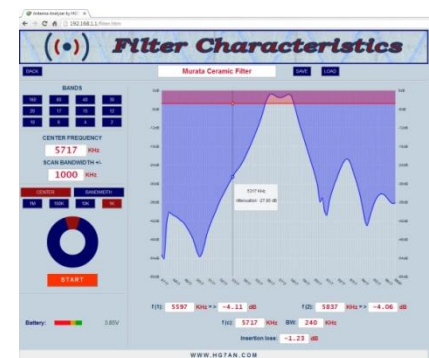
Furthermore, the device includes a **dual-channel signal generator**, which can produce sine signal from 100Hz to 200MHz and 425MHz to 445MHz, freely set for the

two independent channels with a **frequency resolution of 1 Hz**. Moreover, the **relative phase shift** between signals of the two channels **can be controlled by 1 degree increments from 0 to 360 degrees**. Perhaps the most interesting part of the instrument is the control and display of measurement results. On the instrument itself, there is no display and no controls, so it **can be placed directly on the antenna base**

point while remote controlled from a distance up to 50m, including evaluation of the results. Control of the instrument is possible **using any WiFi enabled device with installed web browser**. This could be notebook, tablet or even a smartphone, and the solution adopted is **"platform" independent**, so it should not matter if the controlling device is running Windows, Linux, Android or iOS operating system.

TECHNICAL DATA:

Version 1.

Synthesizer:	DDS with 1Hz resolution	Power:	3.7V/1500mA Li-Ion Battery
Frequency range:	100KHz - 200MHz	Operation time: ~4.5 hours	
Phase:	0° – 360°	Charge:	5V/400mA
Measured result range:		Charge time: ~4 hours	
Complex impedance:	1Ω – 1000Ω	Interface: transceiver	802.11g Wi-Fi certified
Phase:	-90° - 90°	AD converter:	12bit
Capacitance:	1pF – 10nF	Size:	125x80x25 mm
Inductance:	10nH – 100uH	Weight:	170g with battery

Version 2.

Synthesizer:	DDS with 1Hz resolution	Power:	3.7V/1800mA Li-Ion Battery
Frequency range:	100KHz - 200MHz 425MHz - 445MHz	Operation time: ~5 hours	
Phase:	0° – 360°	Charge:	5V/400mA
Measured result range:		Charge time: ~4.5 hours	
Complex impedance:	1Ω – 1000Ω	Interface: transceiver	802.11g Wi-Fi certified
Phase:	-90° - 90°	AD converter:	16bit
Capacitance:	1pF – 10nF	Size:	125x80x25 mm
Inductance:	10nH – 100uH	Weight:	175g with battery

Front layout:

A: Power on/off switch

B: Charging connector. Charge the antenna analyzer in switched off state!

C: Charge display LED

D: Power on display LED

E: Operation display LED

F: Antenna connector and signal generator channel 1 output

G: Signal generator channel 2 output

Warnings:

- Be sure that your antenna has no stored electrostatic charge before trying to connect to the antenna analyzer.
- Do not connect the antenna analyzer to antenna in a stormy weather.
- Do not left the antenna analyzer connected to antenna. Electrostatic discharge can damage analyzer even if it powered off.
- Do not connect analyzer to transmitter RF-Output. RF signal from transmitter immediately damage the antenna analyzer.
- Please observe a correct polarity when you charge the antenna analyzer from external DC source.

Requirements for the control device:

- WIFI 802.11g compatible
- Operating sytem with internet browser

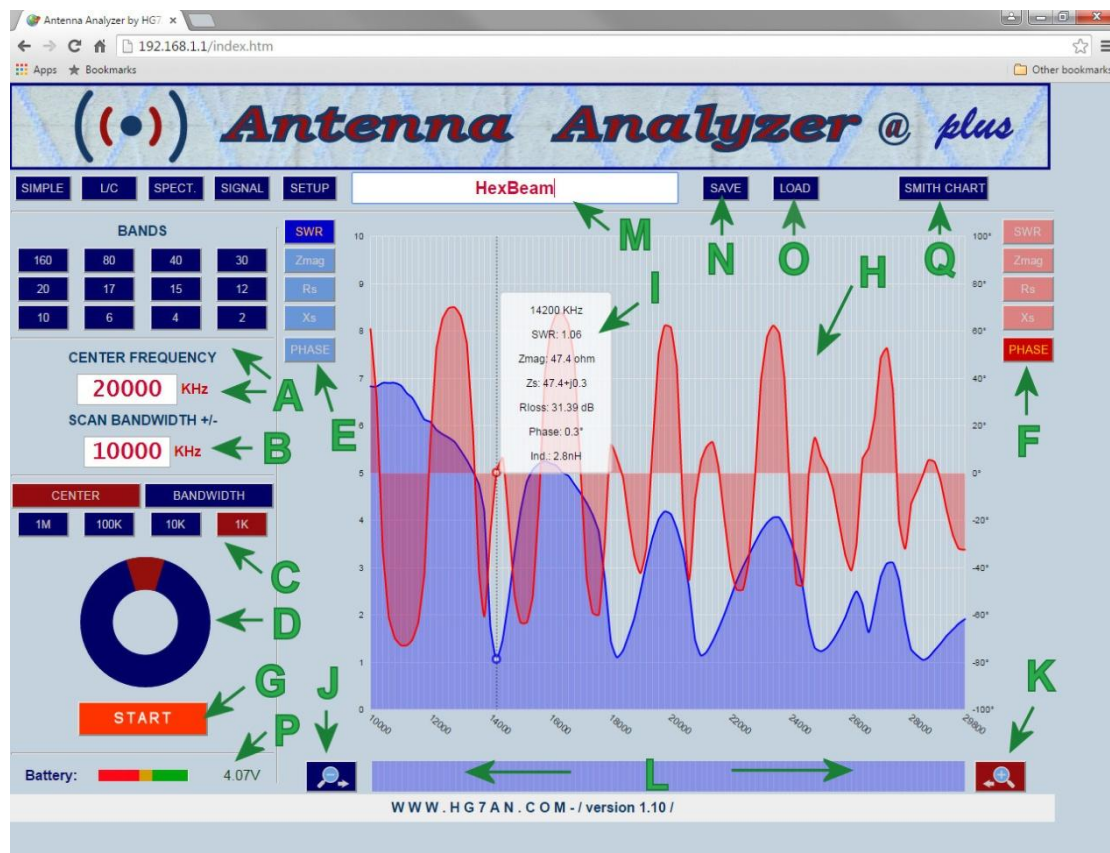 /Windows 7 or newer, or Android 4 or newer, or iOS7 or newer, linux (not tested)/

Connection:

- WIFI SSID: Analyzer http://192.168.1.1
- Password (WEP-13 characters): antenna123456
- Web address: http://192.168.1.1

FUNCTIONS

Antenna analyzer:

A: Choose a band or type the center frequency in the input field

B: Set the scan bandwidth

C: Choose the function of the frequency-tuning knob and the step value

D: Frequency-tuning knob. You can use the frequency-tuning knob to set the center frequency or scan bandwidth

E: Select the measured value that the „blue" graph will show

F: Select the measured value that the „red" graph will show

G: Press the Start button and wait for the result of the measurement

H: Read the result from the the graph

I: Click on the graph to show the measured values in that point

J: Zoom-out selection button

K: Zoom-in selection button

L: Click on this stripe to zoom-in or zoom-out the graph

M: Type the name of the measurement in the input field. If you press the Save button your measurement will be saved with the given name

N: Press the Save button if you want to save the result

O: Press the Load button if you want to load a saved result

P: Display of the battery value

Q: Press the Smith Chart button if you want to see the impedance curve of the measurement

Smith Chart:
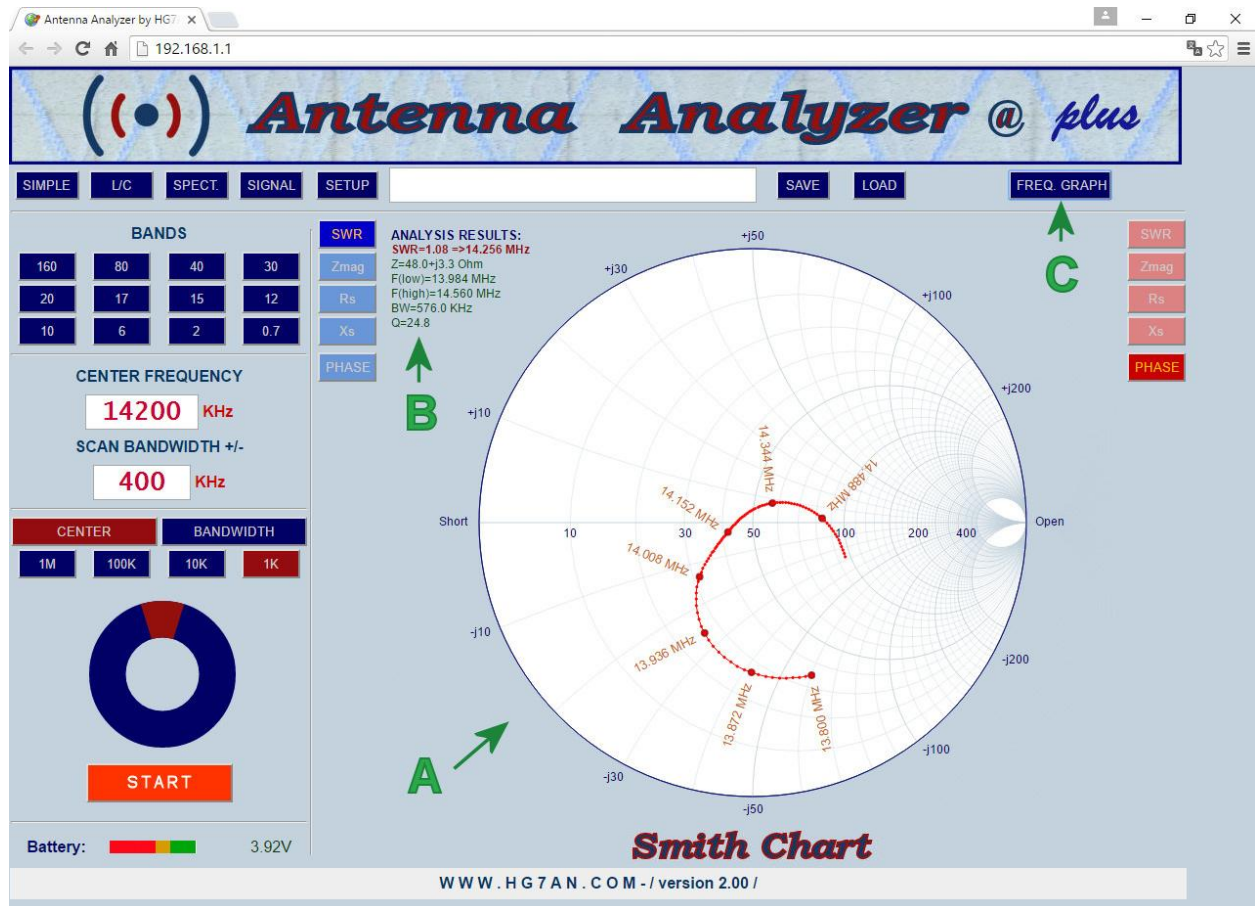
A: Read the result from the the graph

B: Analysis results:

- minimum SWR value in the measured frequency range
- complex impedance value at the minimum SWR value
- start frequency of the bandwidth
- end frequency of the bandwidth
- bandwidth of the measured antenna
- quality of the measured antenna

C: Press the Freq Graph button to return to the frequency graph

SIMPLE (measurement on a single frequency):
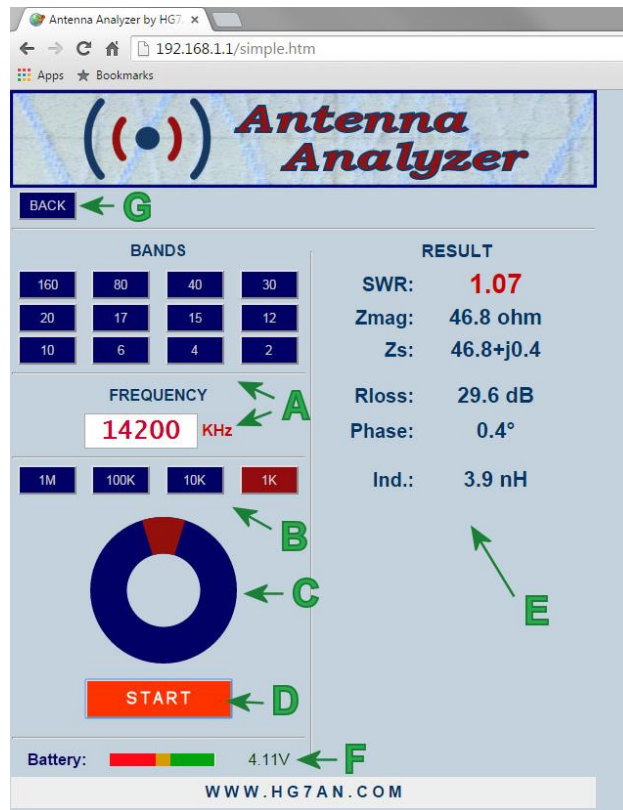
A: Choose a band or type the frequency in the input field

B: Choose the step value of the frequency-tuning knob

C: Frequency-tuning knob. You can use the frequency-tuning knob to set the frequency

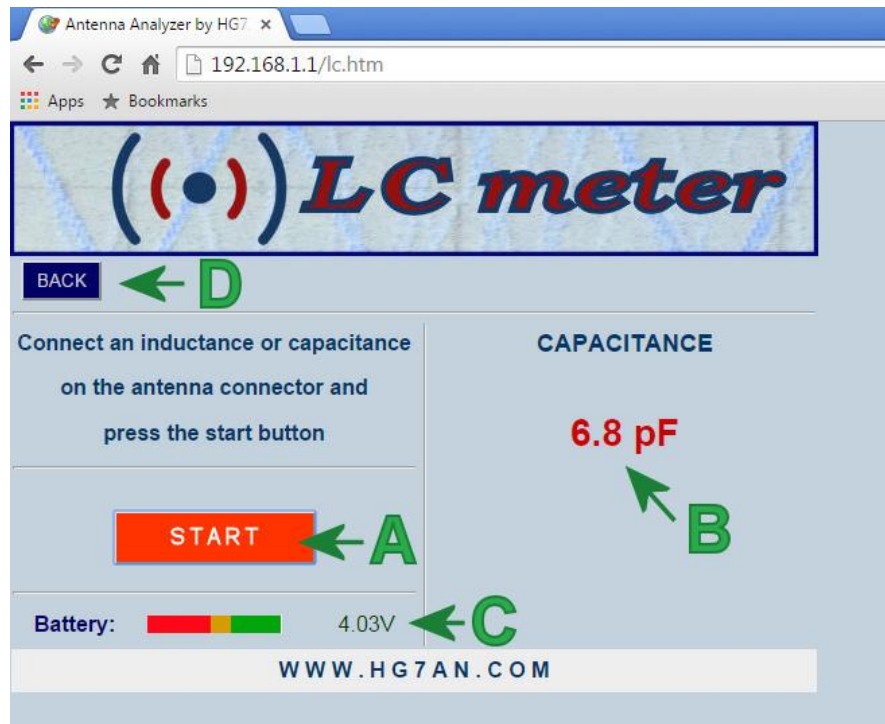D: Press the Start button and wait for the result of the measurement

E: Read the result

F: Display of the battery value

G: Press the Back button to return to the main page

L/C (LC meter):

A: Follow the instructions and press the Start button

B: Read the result

C: Display of the battery value

D: Press the Back button to return to the main page

Tips and tricks: For more accurate measuring of a capacitance or inductance, make a very short measuring cable and calibrate the analyzer with OSL method at the end of the measuring cable. Afterwards connect the capacitance or inductance at the end of the measuring cable and start the measuring.

Do not forget to recalibrate the Analyzer or load the default calibration value before measuring an antenna!

SPECT (Spectrum display):
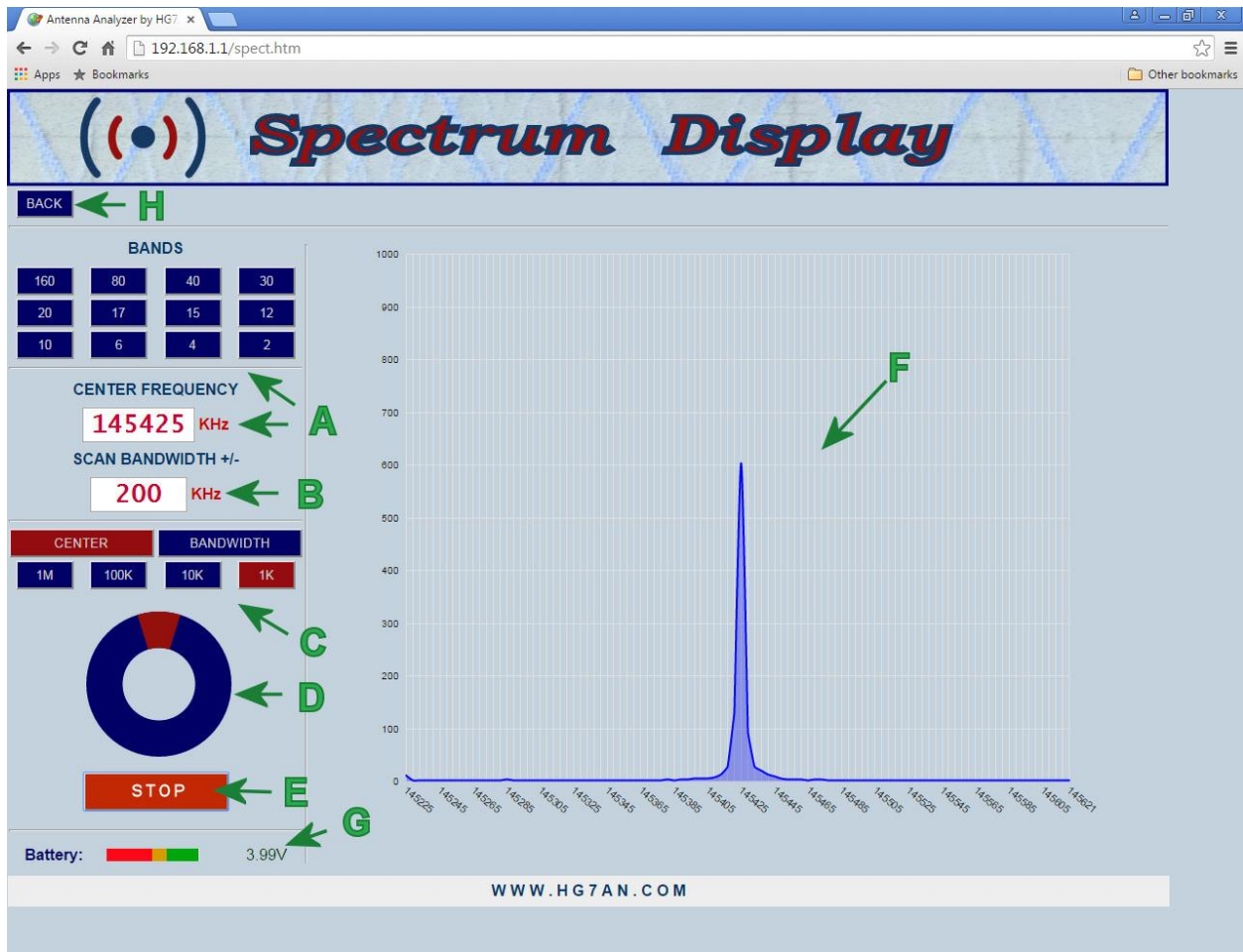
A: Choose a band or type the center frequency in the input field

B: Set the scan bandwidth

C: Choose the function of the frequency-tuning knob and the step value

D: Frequency-tuning knob. You can use the frequency-tuning knob to set the center frequency or scan bandwidth

E: Press the Start button and wait for the result of the measurement

F: Read the result from the the graph

G: Display of the battery value

H: Press the Back button to return to the main page

Warnings: Do not connect the antenna analyzer to transmitter RF-Output. RF signal from transmitter immediately damage the antenna analyzer!!!

SIGNAL (Signal generator):
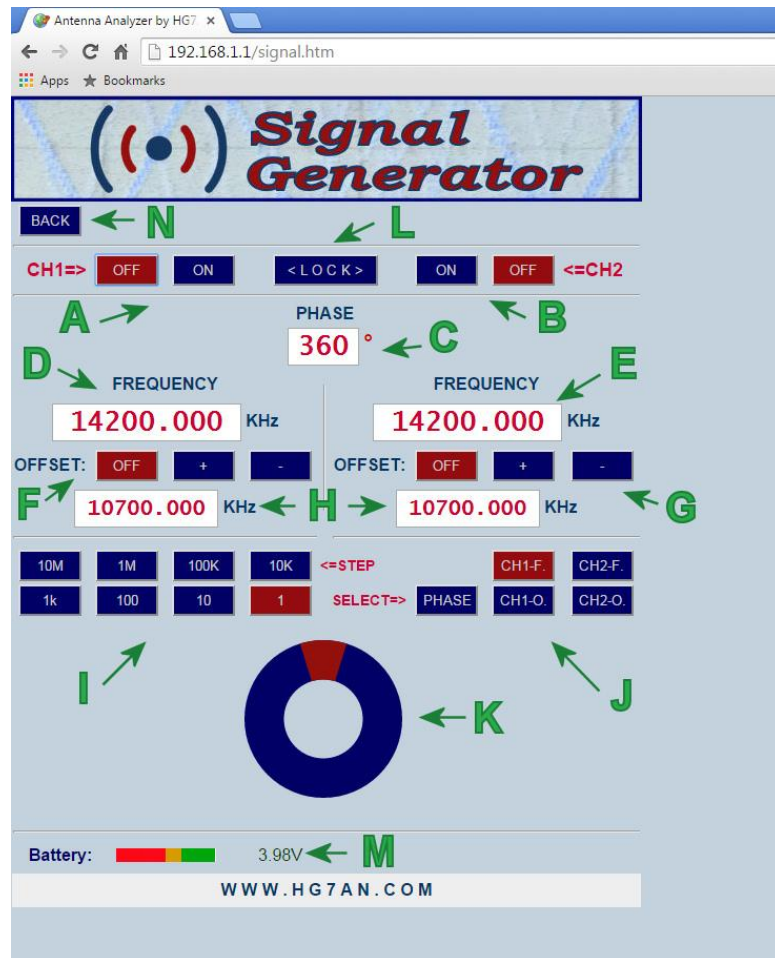
A: To switch on or off the Channel 1 output press the eligible button

B: To switch on or off the Channel 2 output press the eligible button

C: Set the phase value between the channels

D: Type the Channel 1 frequency in the input field

E: Type the Channel 2 frequency in the input field

F: Offset function selection buttons for Channel 1

G: Offset function selection buttons for Channel 2

H: Type the Offset 1 and Offset 2 frequency in the eligible input fields

I: Choose the step value of the tuning knob

J: Choose the function of the tuning knob

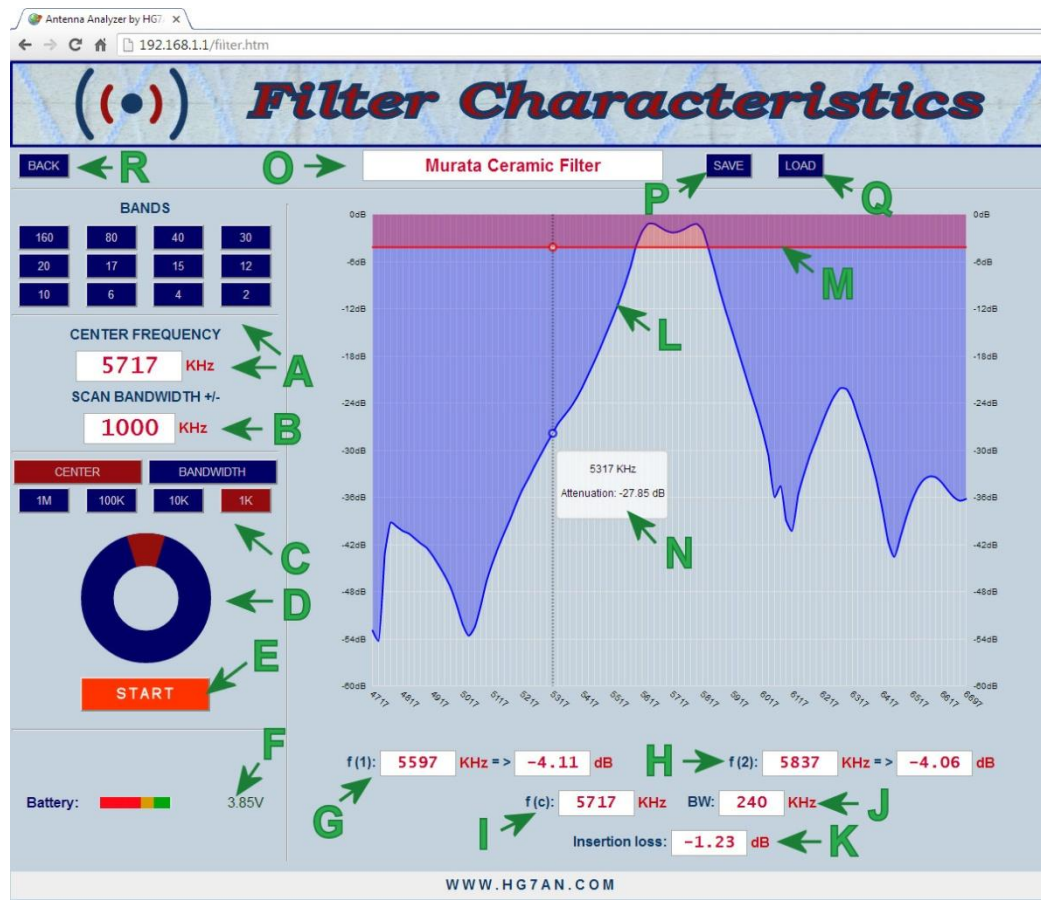K: Tuning knob. You can use the tuning knob to set the eligible frequency or phase value

L: Lock Button. You can link the Channel 1 and Channel 2 frequencies when you use the tuning knob (both frequencies will change with the same values)

M: Display of the battery value

N: Press the Back button to return to the main page

FILTER (Filter Transmission Characteristics Measurement):

A: Choose a band or type the center frequency in the input field

B: Set the scan bandwidth

C: Choose the function of the frequency-tuning knob and the step value

D: Frequency-tuning knob. You can use the frequency-tuning knob to set the center frequency or scan bandwidth

E: Press the Start button and wait for the result of the measurement

F: Display of the battery value

Analysis results:

      G: lower cut off frequency (-3dB) and attenuation value on that frequency

      H: upper cut off frequency (-3dB) and attenuation value

      I: Center frequency of the filter

      J: Bandwidth of the filter

      K: Insertion loss value

L: Transmission characteristics of the filter (blue graph)

M: -3dB level (red line)

N: Click on the graph to show the measured value in that point

O: Type the name of the measurement in the input field

P: Press the Save button if you want to save the result

Q: Press the Load button if you want to load a saved result

R: Press the Back button to return to the main page

Setup:

A: Load the original impedance calibration

B: Impedance calibration. You can calibrate the antenna analyzer with your „open/short/load" impedances. The „load" impedance must be 50 ohm. During the calibration follow the instructions

C: Filter modul calibration. For the calibration follow the the instruction on the screen

D: Load the original frequency calibration

E: Frequency calibration. Press the start button to switch on the test frequency on the Channel 2 output

F: Measure the test frequency on the Channel 2 output with an accurate frequency-counter and write the result [Hz] in the input field

G: Press the Save button to store the new calibration value

H: WIFI seteup. Write the new WIFI-SSID in the input field. If you leave the field empty, the previous text will remain as the WIFI-SSID

I: Write the new password in the input field. The password must be 13 characters long and use numbers or letters from the English alphabet! If you leave the field empty, the previous text will remain as the password

J: Press the Save button to store the new WIFI-SSID and/or password

K: Press the Back button to return to the main page

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