MA 1
AUTOMATIC MONITOR ALIGNMENT

INSTRUCTION MANUAL

Contents

MA 1 – Automatic Monitor Alignment

This document describes the requirements, structure and alignment procedure for using the MA 1 Automatic Monitor Alignment v1.4.
This version of the software supports stereo systems with and without subwoofers.

Hardware requirements

- Loudspeakers
  - 1 pair of KH DSP loudspeakers
    or
  - 1 or 2 KH 750 subwoofer in combination with a pair of KH DSP loudspeakers or with a pair of analog KH loudspeakers
- Neumann MA 1 measurement microphone
- PC or MAC (64 bit)
- Screen resolution of 1280 × 720 px or higher
- Audio interface with:
  - Balanced analog input with 48 V phantom power
  - 2 balanced analog outputs or AES3 output (only with KH 750)
- Network switch

Software requirements

- Operating system:
  - PC: Windows 10 64 Bit
  - Mac: macOS 10.13, 10.14,10.15 and 11
- MA 1 – Automatic Monitor Alignment software
- ASIO driver (for Windows)

DSP loudspeakers (network-enabled)

The following loudspeakers and subwoofers are network-enabled and can be controlled directly by the software:
- KH 80 DSP
- KH 750 DSP, KH 750 AES67

Analog loudspeakers (not network-enabled)

The following loudspeakers are not network-enabled and need to be connected via a network-enabled subwoofer in order to be included in the system setup.
- KH 120 A
- KH 120 D
- KH 310 A
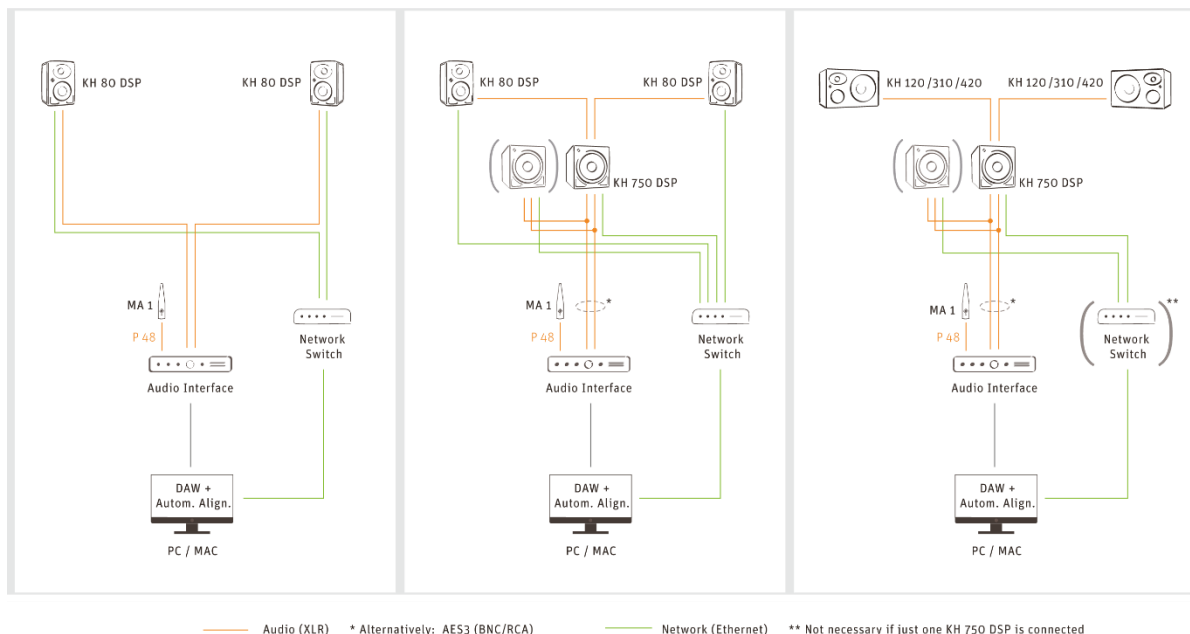- KH 310 D
- KH 420 / KH 420 + DIM 1

System setup

Proceed as follows to set up the system.

Compatibility with Neumann.Control iPad app

- The MA 1 – Automatic Monitor Alignment is not compatible with Neumann.Control iPad app. Use either the one or the other.

- Using the Neumann.Control app before, while or after using the MA 1 – Automatic Monitor Alignment app may cause invalid alignment results. To be certain that the alignment is and stays correct please:

  o Uninstall the Neumann.Control app from your iPad.

  o Perform a factory reset on your Neumann DSP devices (see below).

  o Use the MA 1 – Automatic Monitor Alignment app to align your system.

  o Do not use the Neumann.Control app on an aligned system.

- Once the MA 1 software has started and connected to the loudspeakers previously stored parameters from MA 1 alignment sessions before or from Neumann.Control setups are deleted.

- Neither MA 1 alignments nor Neumann.Control setups can be stored in the MA 1 software.

- If after the MA 1 alignment procedure the Neumann.Control iPad app is connected to the loudspeakers the MA 1 alignment will be overwritten by the iPad. To get back to the MA 1 automatic alignment the MA 1 alignment procedure must be redone or the previously stored alignments have to be reloaded.

Connect the hardware

Connect your hardware as shown in this diagram

Audio (XLR)   * Alternatively: AES3 (BNC/RCA)   Network (Ethernet)   ** Not necessary if just one KH 750 DSP is connected
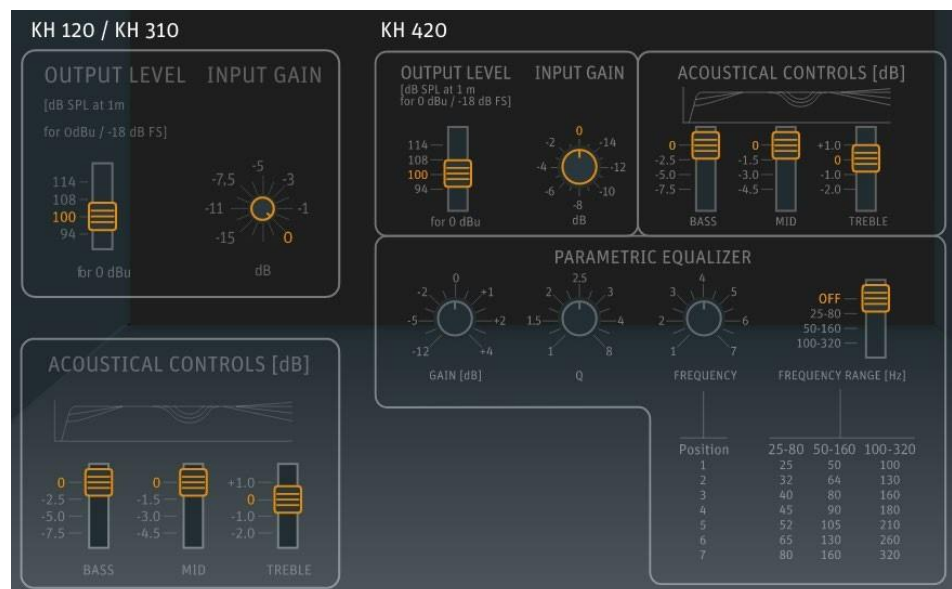
Set up the loudspeakers

Set the switch positions and level adjustments on the rear of your loudspeakers/subwoofer according to the following instructions.

Analog monitors in combination with KH 750
(KH 750 DSP + KH 120/KH 310/KH 420)Use the following settings for the KH 750.

Use the following settings for analog monitors (KH 120 A, KH 310 A, KH 420)

Use the following settings for D-version monitors (KH 120 D, KH 310 D, KH 420 with DIM 1)

Note! For optimal interaction with the subwoofersprocessing, the digital connection is not supported for KH 120 D and KH 310 D.

KH 80 DSP without KH 750

Use the following settings for the KH 80 DSP.
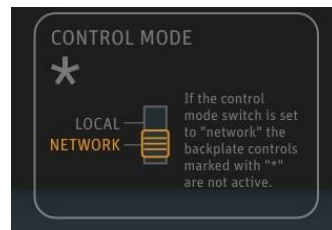

KH 80 DSP with KH 750

Use the following settings for the KH 80 DSP.
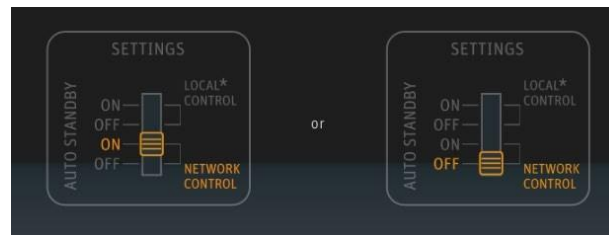
Use the following settings for the KH 750.

Note! During the process of the automatic monitor alignment do not change any settings at the back of the connected DSP loudspeakers/subwoofer.

Initial alignment using the MA 1 – Automatic Monitor Alignment

Upon initial start, the MA 1 software will guide you through a wizard. Perform the following steps in order to automatically align your setup using the MA 1 software and the MA 1 measurement microphone.

Start the process
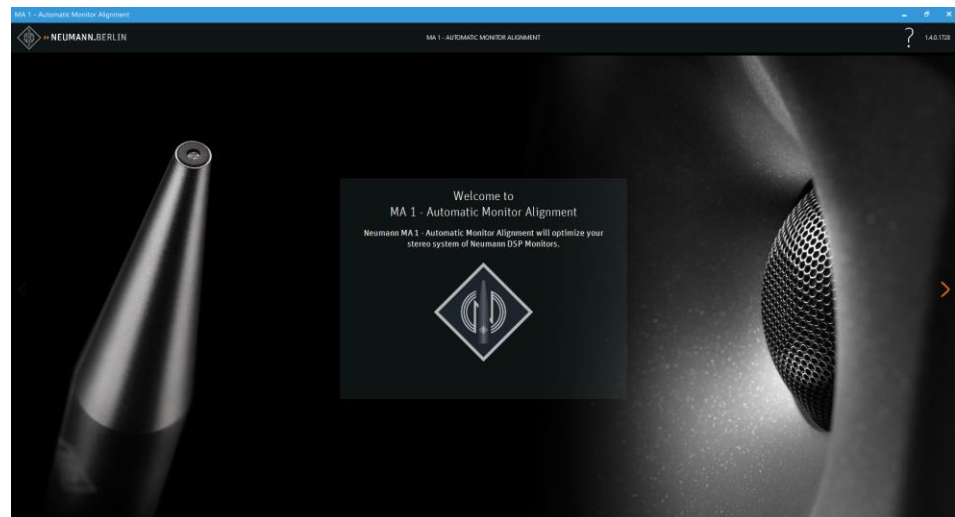
Click on the orange arrow on the right of the start screen to start the process.

Select your network
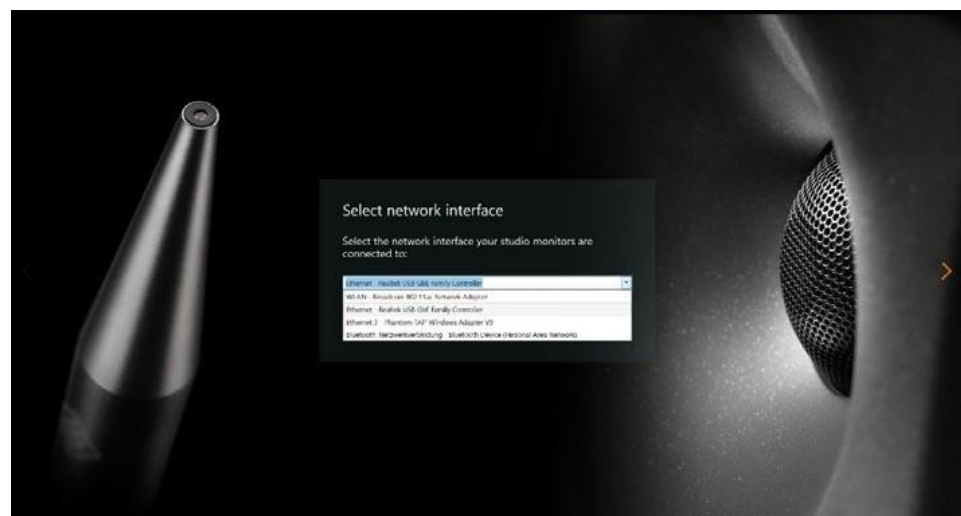
Select the network your loudspeakers/subwoofer are connected to.
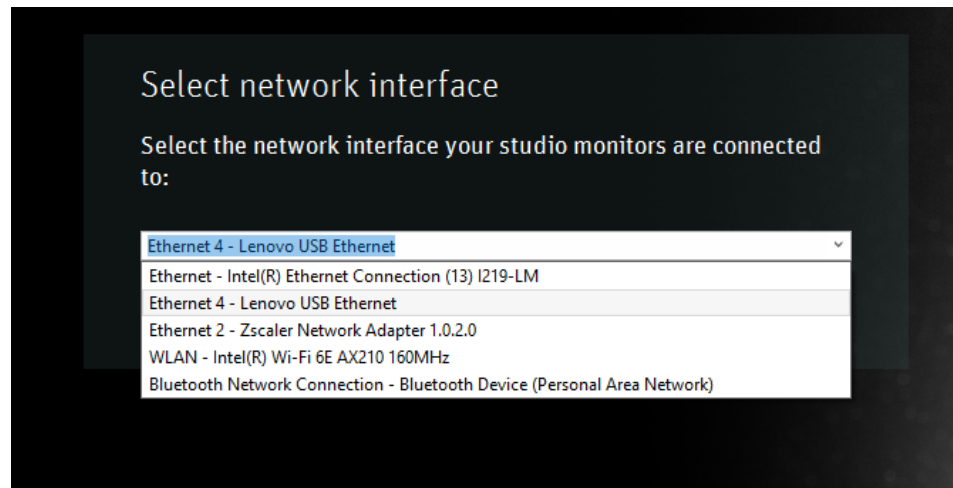
Create your hardware setup
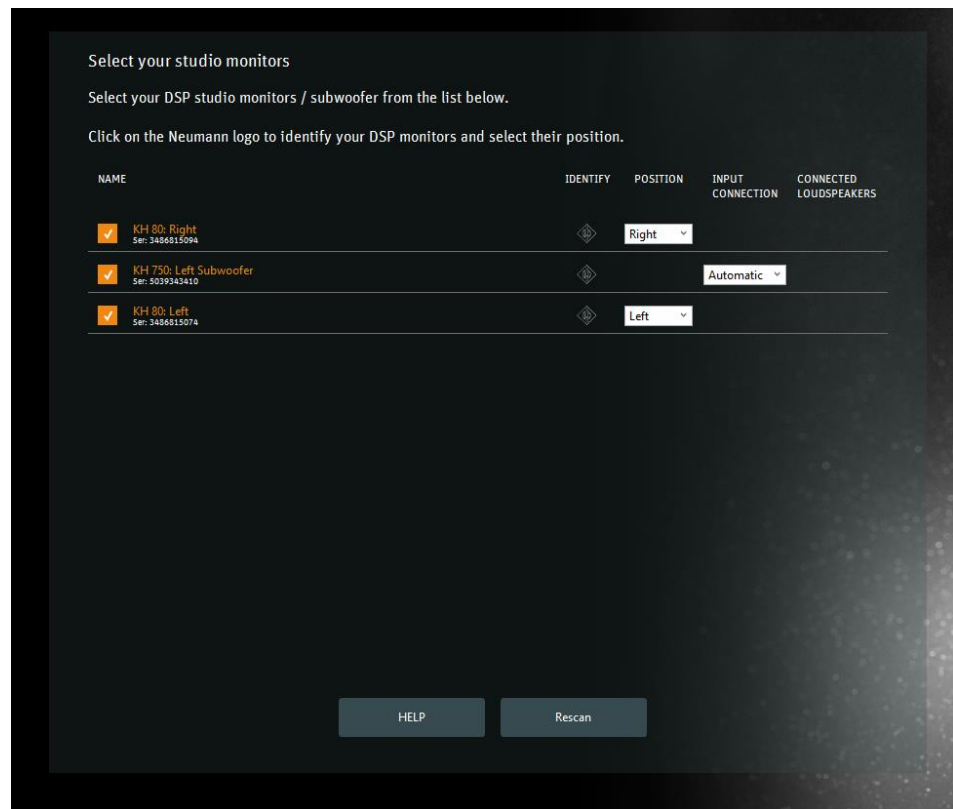
The software lists all loudspeakers/subwoofers found in the network.

If there are loudspeakers missing in the list or no loudspeakers at all, check the following aspects:

• Ensure that device discovery is activated in your network. This functionality could be labelled MDNS, UPnP, IGMP or Bonjour.

• The machine that runs this application needs to use the same network as your Neumann DSP devices.

- Make sure all Neumann DSP devices are connected to the same router or switch.

- Be sure all DSP devices are switched on.

- Ensure that the Neumann DSP devices are not in standby mode. If they are play some audio to wake them up.

- Switch the Neumann DSP devices off and on and wait for 60 seconds (180 s for KH 750 AES67).

- Check if IPV6 is enabled at router **and** PC/MAC

- Perform a factory reset (see below).

Factory reset for the KH 80 DSP

To reset the KH 80 DSP internal controls to their factory default values:

- Switch on the KH 80 DSP.

- While the logo is still red indicating boot up move the SETTINGS switch up and down repeatedly until a few seconds after it turned white.

Automatic (default): The subwoofer automatically chooses between analog or digital (AES3) input signals. Digital signals have priority over analog signals.

The logo will then start flutter flash red for a few seconds before reverting to white.

Factory reset for the KH 750

To reset the KH 750 internal controls to their factory default values:

- Switch on the KH 750.

- While the power light is solid red during the boot up phase, move the STANDBY switch up and down repeatedly until a few seconds after it turned green.

The power light will then flash red while the default settings are being applied before reverting to green.

In order to identify which loudspeaker/subwoofer in the list is which loudspeaker/subwoofer in your room you can click on the Neumann logo next to the loudspeaker/subwoofer.
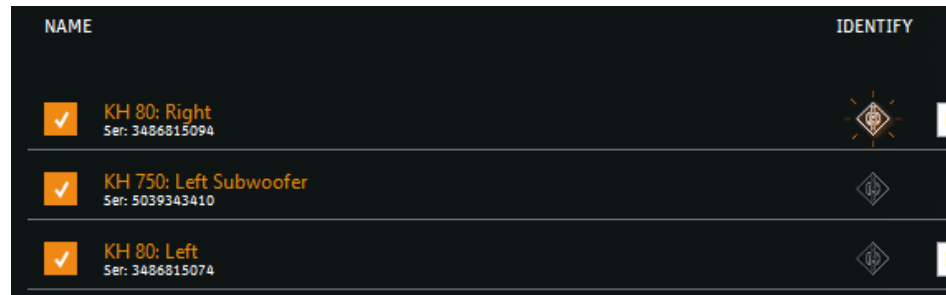
The logo on the front of the loudspeaker/the power LED on the subwoofer rear will flash rosé.

Selecting loudspeakers in a setup with DSP loudspeakers only

- From the list, select the loudspeakers which belong to your system.
- Choose the position the loudspeaker is placed.

Selecting loudspeakers in a setup of a DSP subwoofer with analog loudspeakers

- From the list, select the subwoofer which belongs to your system.
- Select the input signal option of the subwoofer.
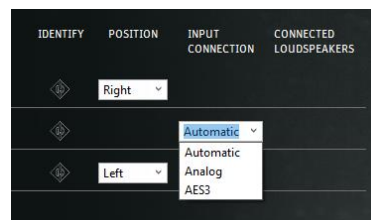
Automatic (default): The subwoofer automatically chooses between analog or digital AES3 input signals. Digital signals have priority over analog signals.

Analog: If analog is selected, only analog input signals will be received even if there are digital signals connected.

AES3: If AES3 is selected, only digital AES3 input signals will be received. The subwoofer doesn't automatically switches to analog if no or no valid AES3 signal is applied. In this case the loudspeaker is muted.

Choose the corresponding analog version if you use D-versions of the loudspeakers (KH 120, KH 310, KH 420).
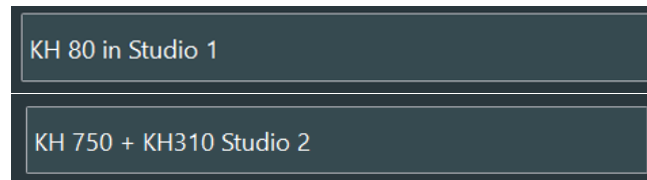
Make sure the loudspeakers are connected according to their physical position (left output of KH 750 to left loudspeaker, etc.).
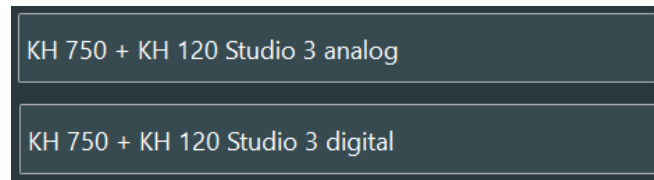
Save your hardware setup

Enter a name for the hardware setup which you have compiled and press SAVE
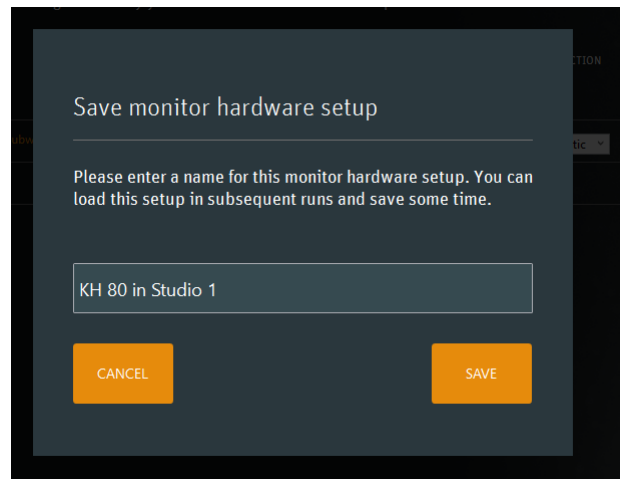
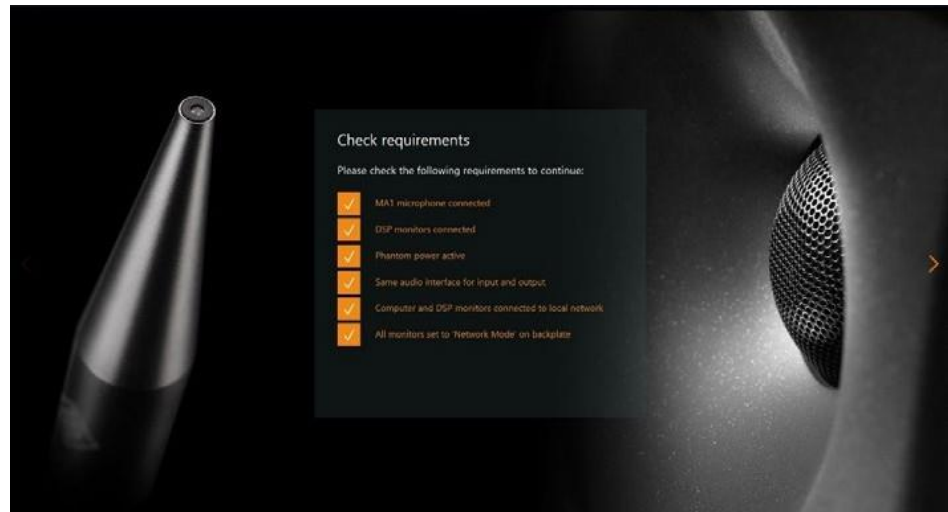You can compile multiple hardware setups.

This feature can be used to compile hardware setups using different input formats.

Check the requirements

Ensure all mentioned requirements are fulfilled and ticked.

Select and set up the audio interface

Observe the following steps for selecting and setting up the audio interface.

Install an ASIO driver on your Windows PC, if not done yet. ASIO Drivers are typically available on the website of your audio interface manufacturer.
If there is no specific ASIO driver available for your audio interface you can try the universal ASIO4ALL driver instead.
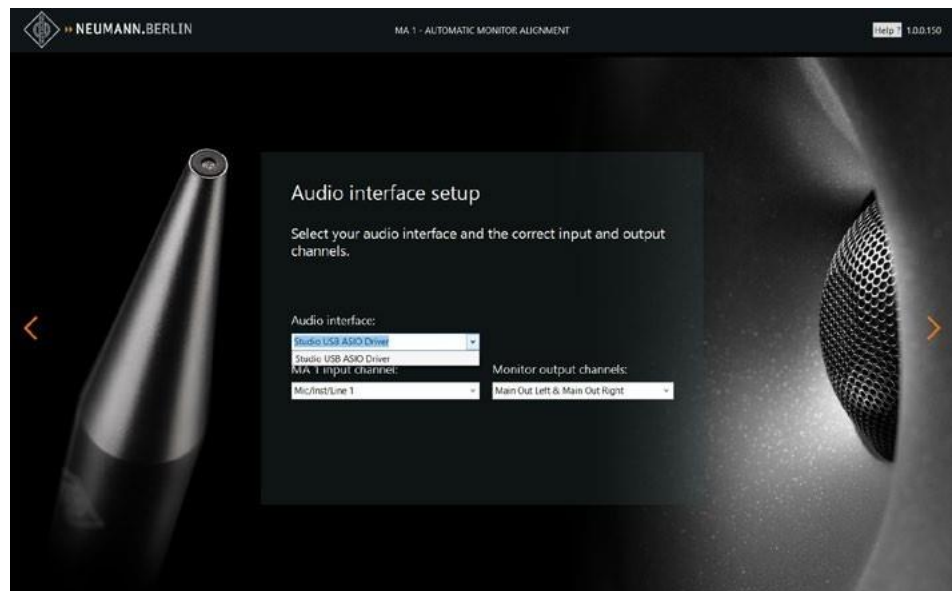
Select your audio interface-specific driver in the audio interface selection dropdown.

If no audio interface is found that may have the following reasons:

- Bluetooth headsets are not supported by the MA 1 software.

- Built in microphones and loudspeakers are not supported.

On MAC one audio interface can be shown as two devices. If this is the case please follow the instruction from Apple:

https://support .apple .com/en-in/guide/audio-midi-setup/ams6e21c3f61/mac
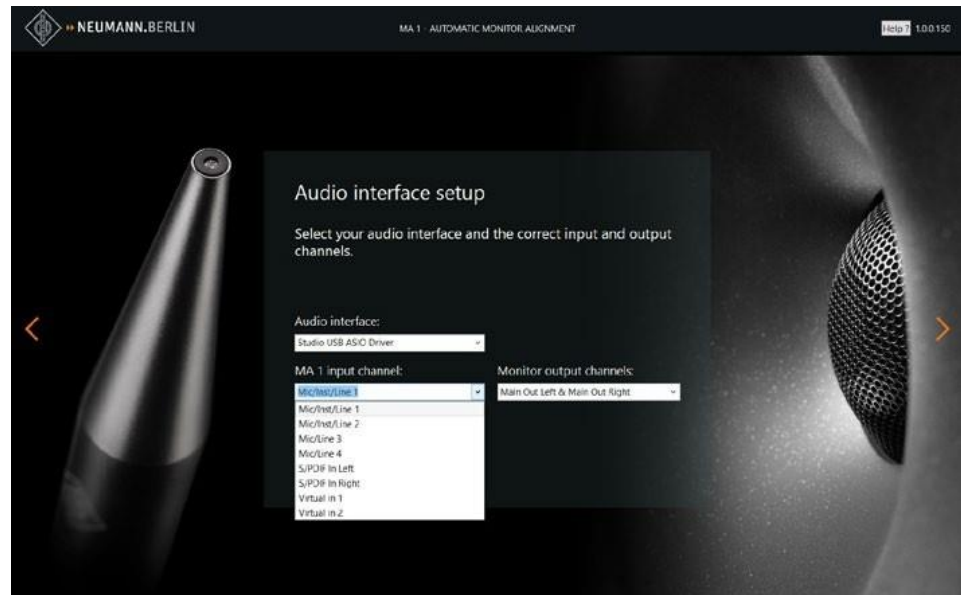
Select the input channel your MA 1 measurement microphone is connected to.
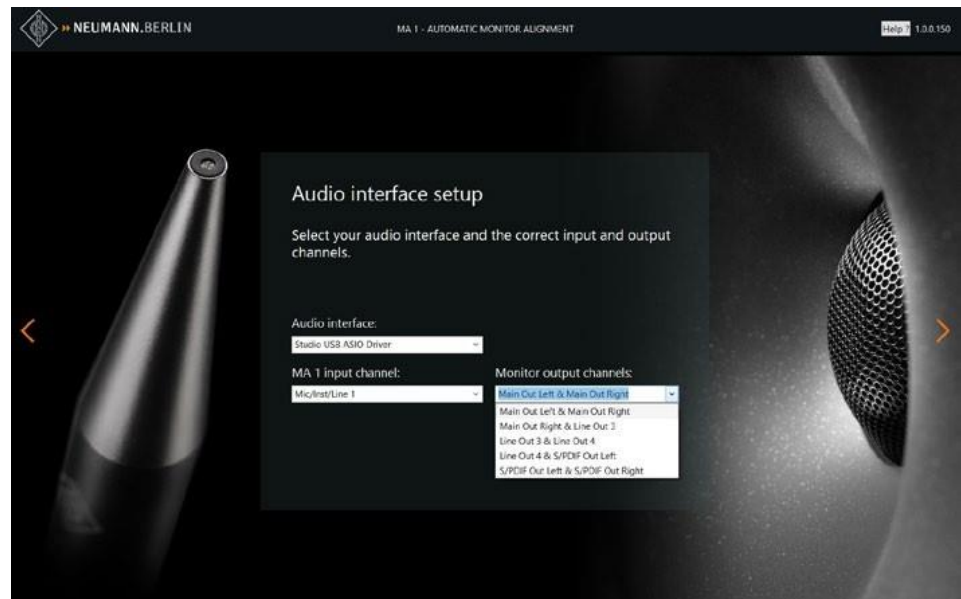
Select the output channels your loudspeakers or subwoofer are connected to.

Calibration of the MA 1 measurement microphone
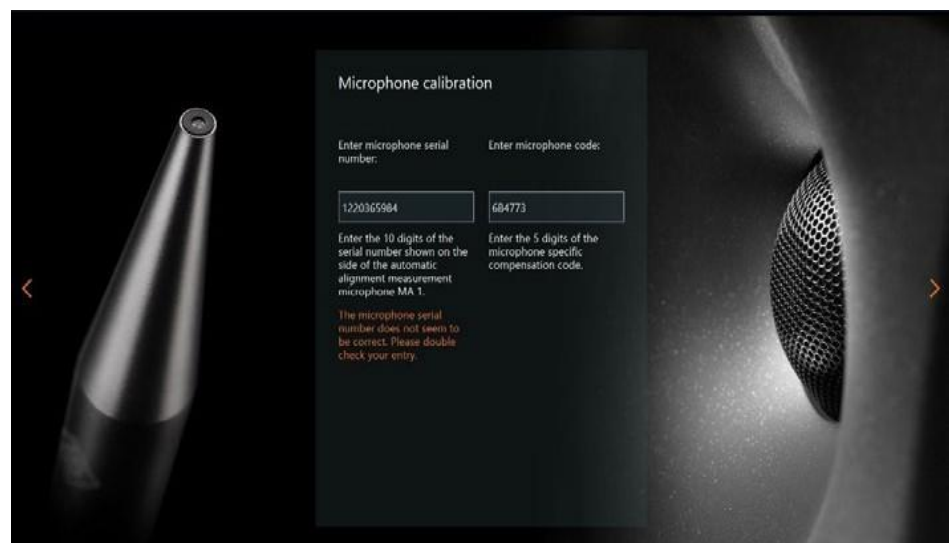
Enter the 10 digit serial number printed on your MA 1 measurement microphone.

Enter the 6 digit HEX code printed on your MA 1 measurement microphone.

This code provides the microphone-specific calibration information to linearize your measurement microphone.

Adapt the output level
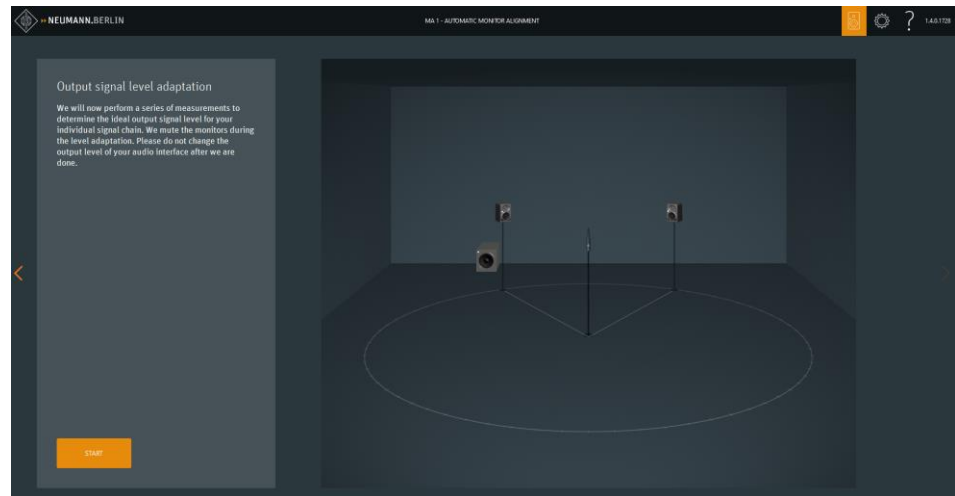
Click START to start the output signal level adaptation.
The system identifies the correct signal level which is then applied to the loudspeakers.
During this process the loudspeakers are muted.
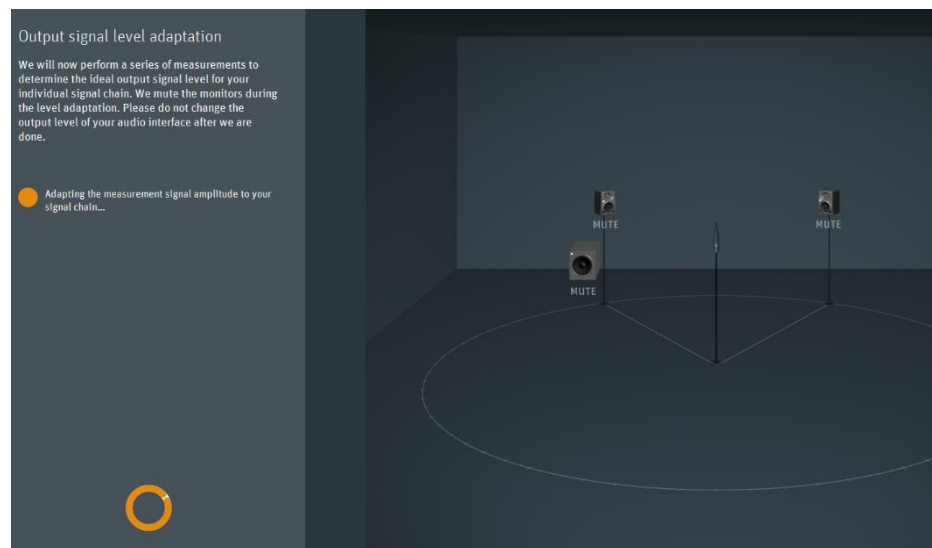
In case the output level of your audio interface is too low, the system will ask you to adapt it accordingly.

If the output level is correct you can step to the next screen.

Make sure both the left and the right channel are connected and have the same signal gain (panorama center).

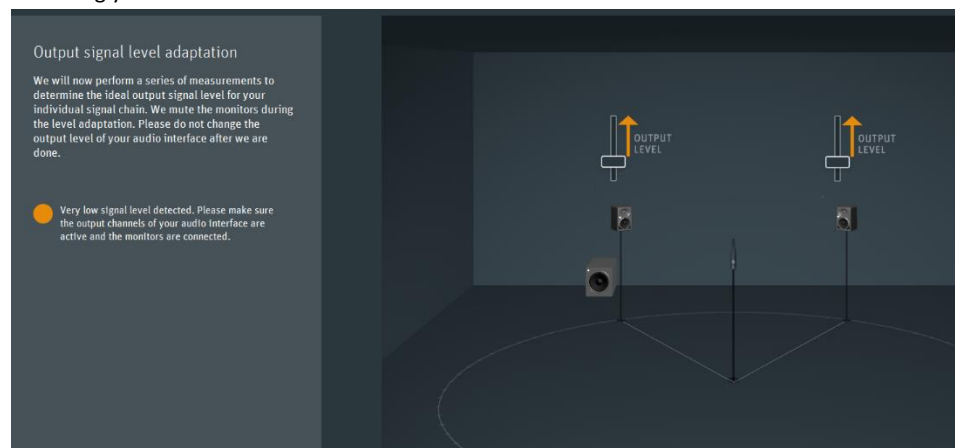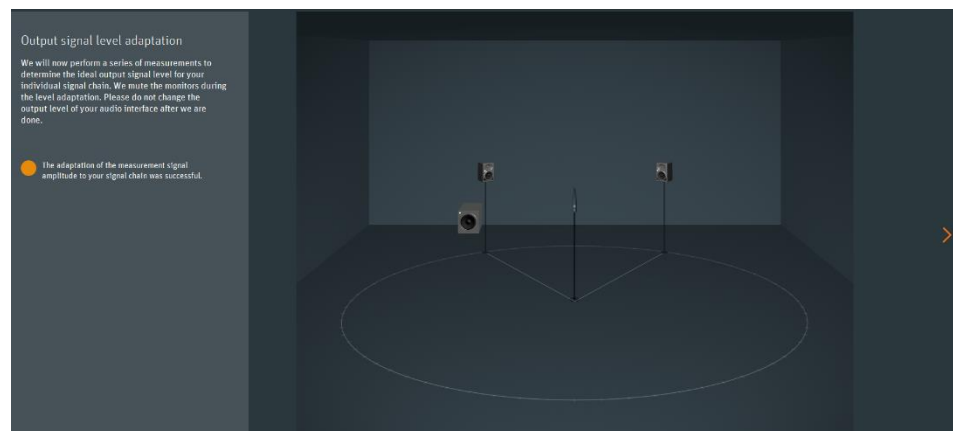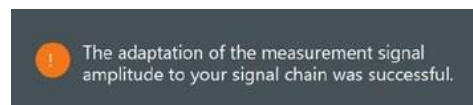Do not change the output level of your audio interface until all measurements are done. Once the level is set correctly, the system will inform you via below message.

In case this test failed please check the following points:

- Loudspeakers/subwoofer are set to network at their back
- You have selected the wrong network
- Proper audio connection from audio interface to loudspeaker/subwoofer
- Source output not muted

Positioning the microphone and loudspeakers/subwoofer

Before the alignment you need to ensure that your loudspeaker system is set up correctly.

- Arrange the loudspeakers and the listening position as an equilateral triangle. The distance between the tweeters of the loudspeakers and between tweeter and listening position is identical.
- Place the loudspeakers and all equipment/furniture as symmetrical as possible with regard to the listening axis.
- Angle the loudspeakers horizontally and vertically towards the listening position.
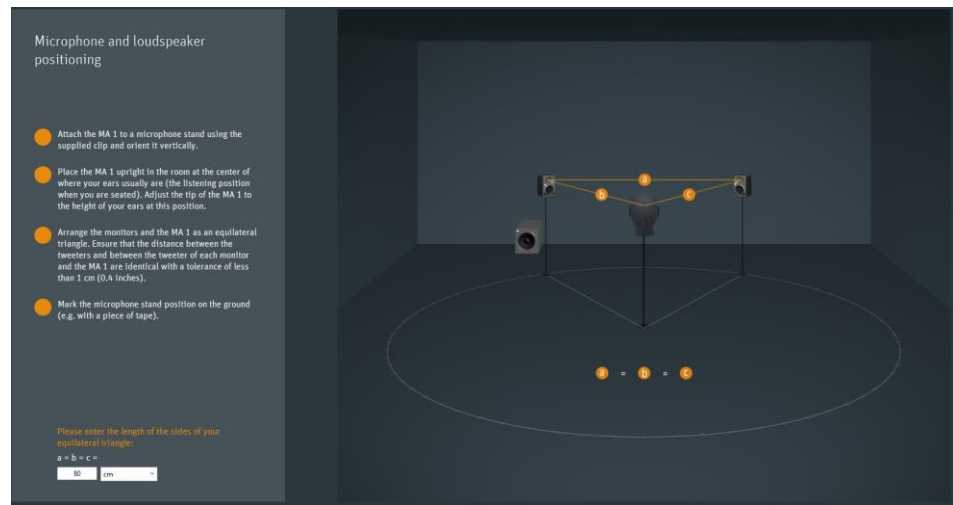
Measure the distance between the left and right tweeter and enter it in the text field.

Give in the measured distance between left and right tweeter (same as between tweeter and listening position).

MA 1 input channel

Measuring the signal chain and background noise

Before starting, make sure that:

- The microphone input gain of your microphone preamplifier is set to a reasonable value.
- All windows are closed.
- No fans, air conditioning devices or other noise generating devices are running.
- Nobody is talking or walking around.
- The phantom power of your microphone preamp is switched on.
- The microphone input channel of your audio interface is **not** routed to its output. If you increase the microphone input gain and a feedback occurs this indicates the routing is wrong. Open your audio interface software and correct the routing.
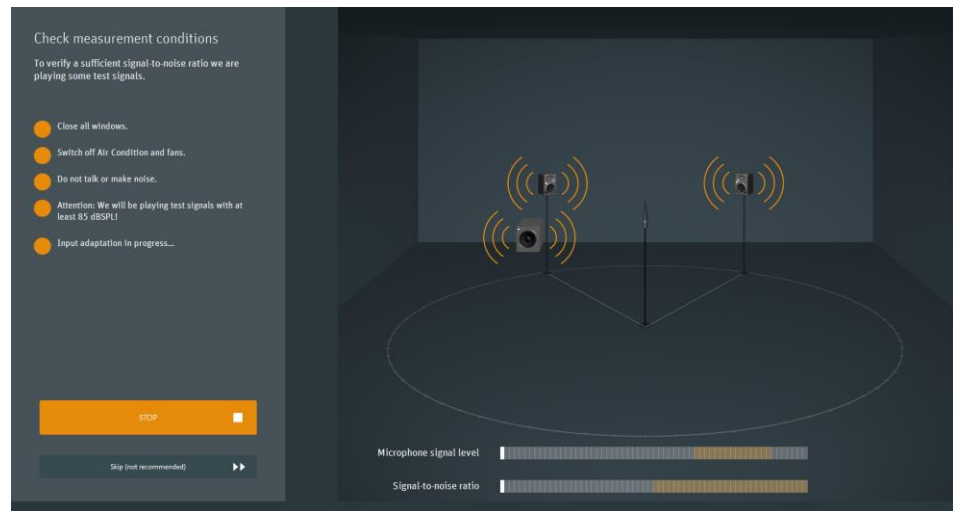
The system will check if:

- The input gain of your microphone preamplifier is set correctly.
- The input signal is clipping.
- The background noise of your environment is low enough.
- The signal-to-noise ratio of the entire measurement chain is sufficient.

⚠ CAUTION
Danger of hearing injury!

The system will play a loud pink noise signal.

If any of these results do not meet the requirements, the system will inform you accordingly.

If the noise level of your room is to high the system continuous to measure. If it is not possible to reduce your environmental noise level you can skip this test. This then may lead to worse results. So please do anything possible to achieve a good signal to noise ratio.

If the signal to noise ratio is sufficient you can step to the next screen
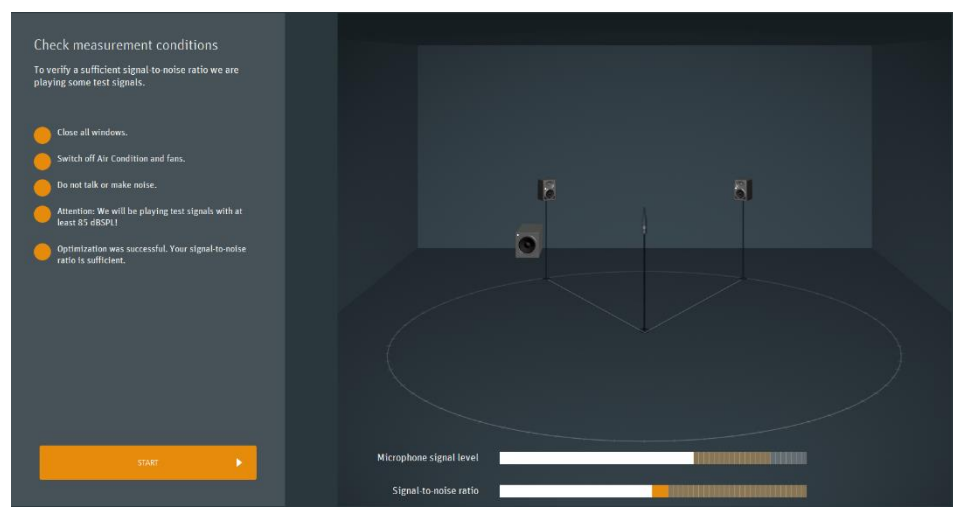
If no microphone signal is detected please check the following points:
- Wrong input channel selected
- Input gain/level set too low
- Phantom power P48 has not been activated

- App doesn't have permission to listen to the microphone input (privacy settings on Mac)
- Driver faulty
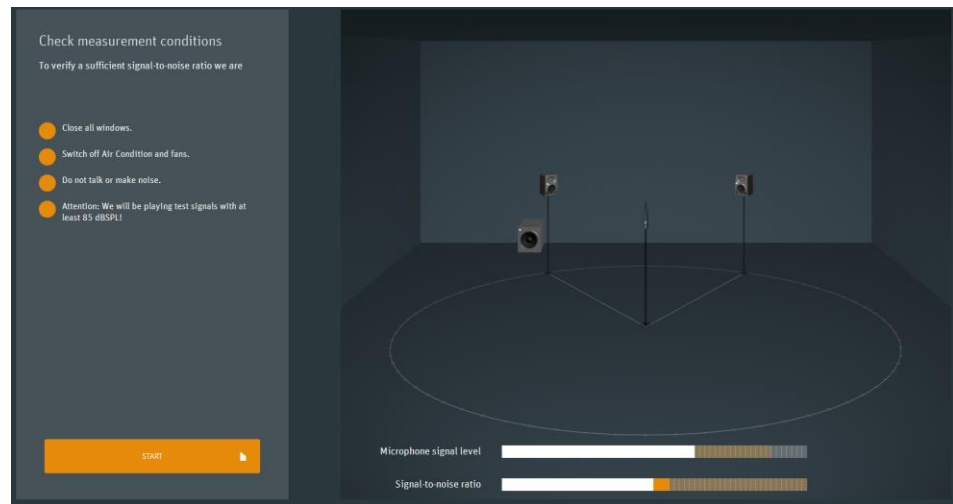- Driver/Channel used by other application in exclusive mode
- Use a balanced XLR cable to connect the microphone

Start the measurement

The software will now start measuring the loudspeakers in your system. For that purpose, sine sweep signals will be played out to every individual loudspeaker/subwoofer .

- Follow the instructions on the screen.
- Step back or to the side.
- Remain quiet.
- Start measuring at the main listening position with the microphone on a stand in an upright position.
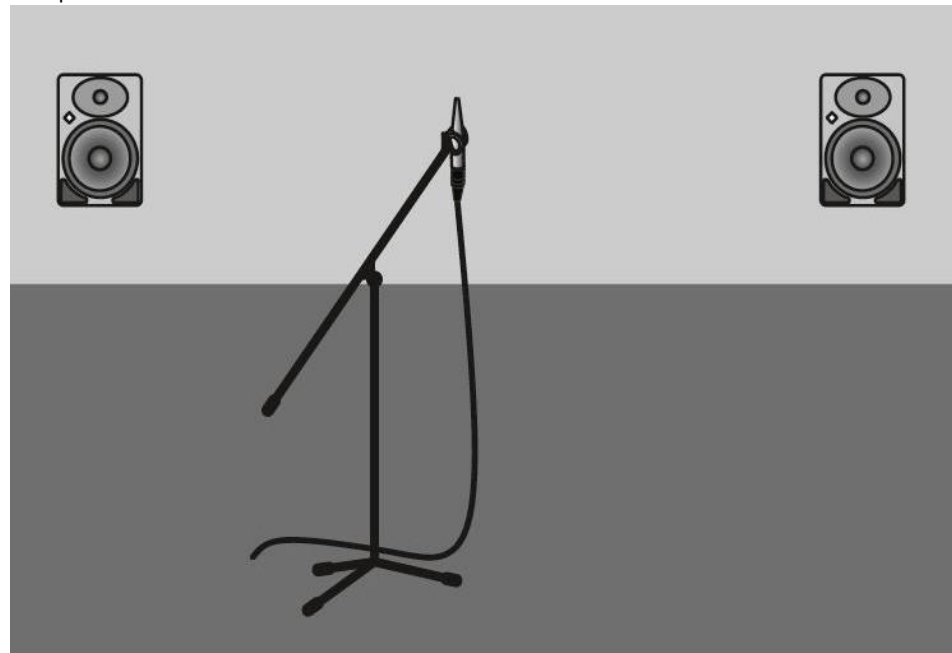
The first measurement is relevant to adjust the correct time alignment between the loudspeakers and the listening position. Take care that the position of the microphone is exactly (by cm) at the final listening position. This is essential for proper stereo imaging and signal localisation.

Make sure neither the microphone input gain nor the output level of your audio interface have changed.

Click START MEASUREMENT
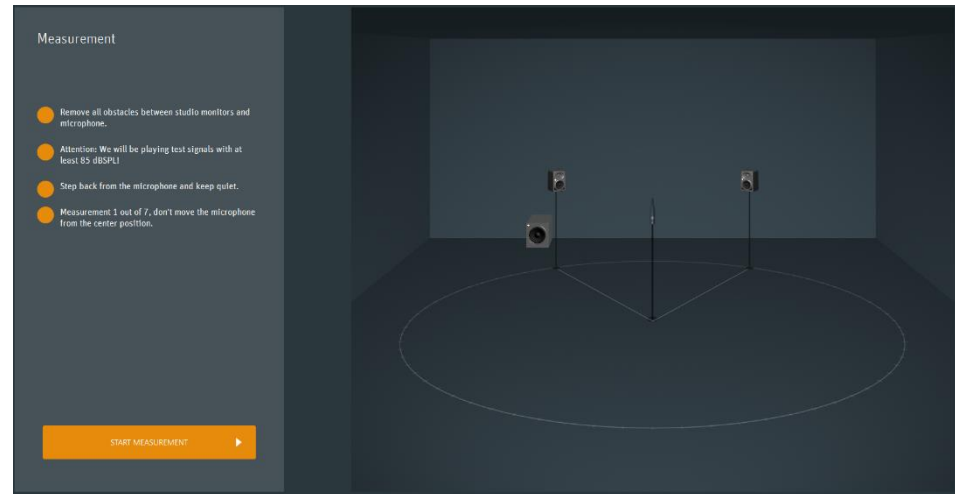
▶ Give in a waiting time between every measurement to allow you to move away before the measurement starts
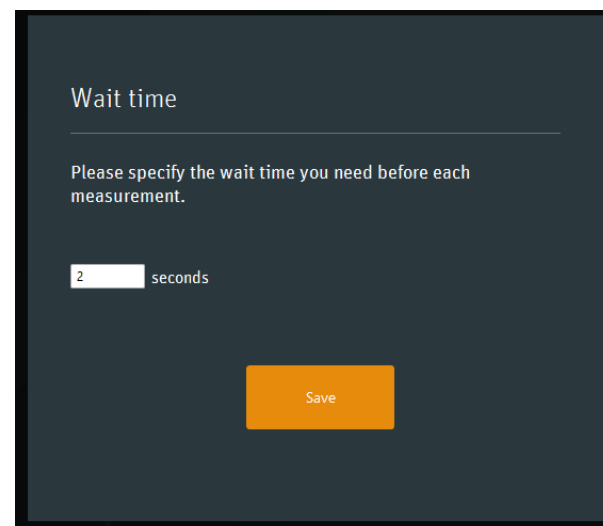
Click SAVE
Click START MEASUREMENT

Any loudspeakers which are not playing signals will be muted. Their front logo (just with KH 80) is illuminated rosé.
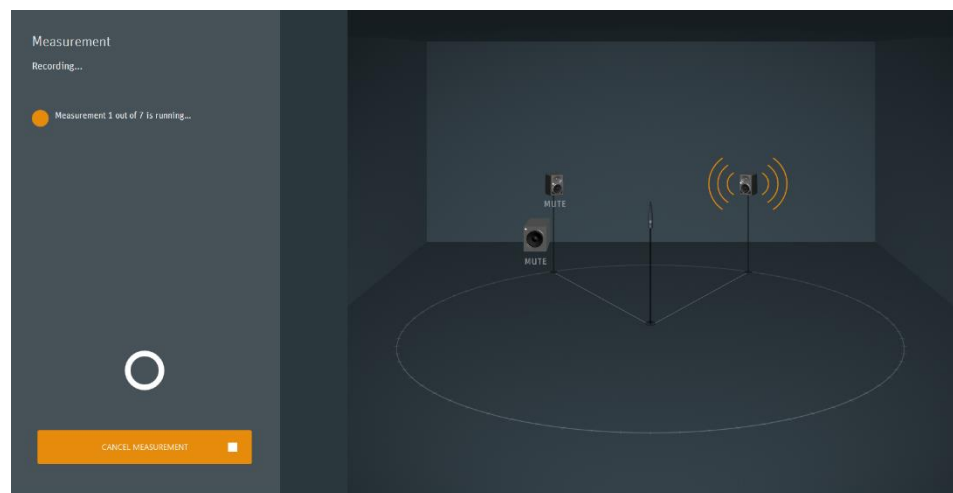
If during the measurement an environmental noise occurred which could have disturbed the measurement you should cancel this measurement and repeat it.

Follow the instructions and proceed with the next measurement
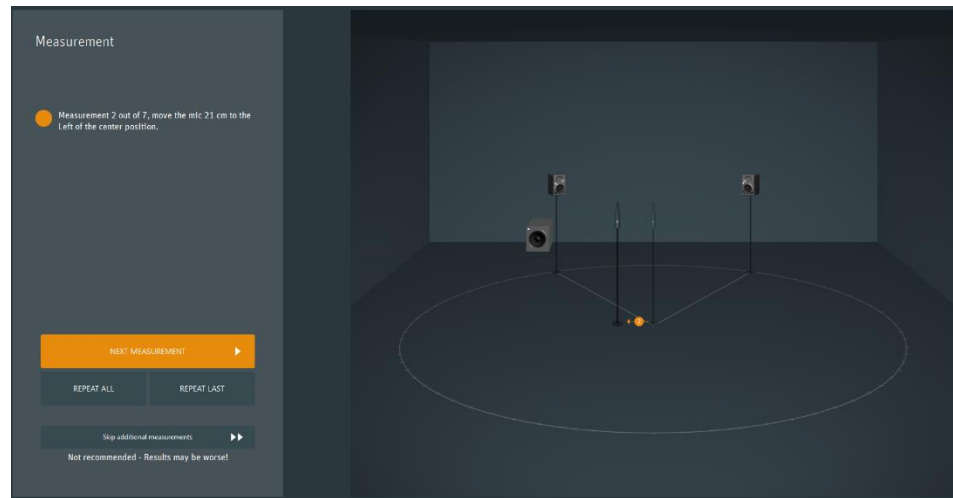
We highly recommend performing the measurements at every proposed microphone position in order to ensure the best possible results.
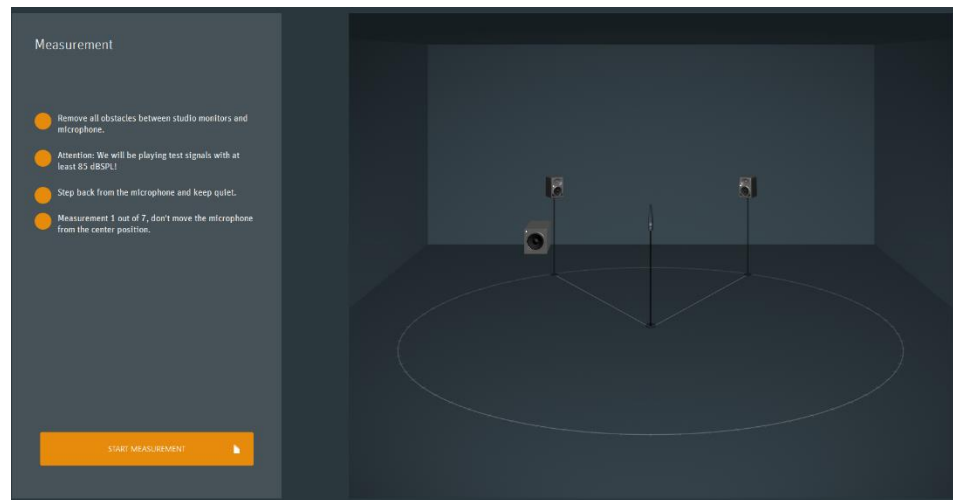However, it is possible to skip the measuring procedure after each of the 7 measurements. This might be useful if any potential for improvement in terms of repositioning the loudspeakers or other optimizations have been identified.

After the 7th measurement you can step to the next screen
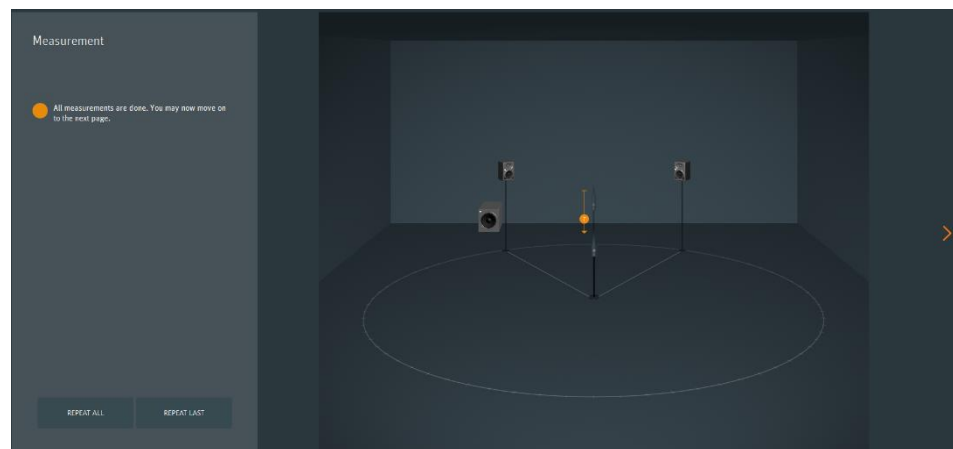
The alignment parameters are calculated and sent to the loudspeakers

Display of measurement results

After the measurement procedure the system will display the results.

The following curves are displayed:

- Orange curve:

  This shows the room-specific target response used by the system to align the measurement results.

  Please note that this curve is not necessarily ruler flat. The system will create a target response optimized for the character of the room. This target response depends on the acoustical behavior of the room, on the distance between the loudspeakers, the listening position and on the placement of the loudspeakers in the room.
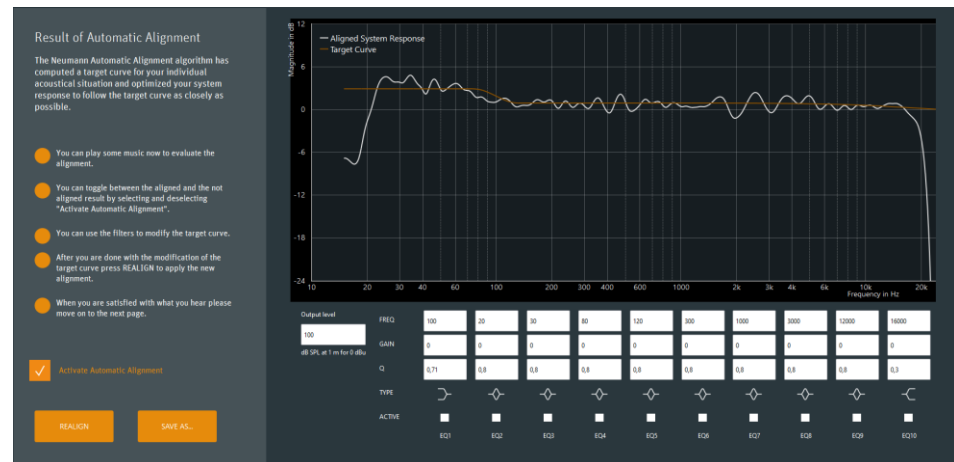
- White curve:

  This curve shows the combined magnitude response of the entire system. It represents the acoustical result after the alignment.

If you unselect the checkbox you can see and hear the system response with the default monitor settings.
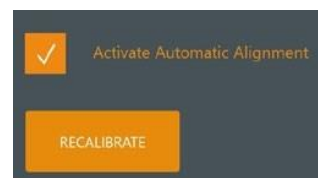
The combination of all measured loudspeakers/subwoofer with their default settings is shown in white.

Edit the target response

After the automatic alignment you can play any signal through your audio interface to your loudspeakers and listen to the result.

By selecting and unselecting the ACTIVATE AUTOMATIC ALIGNMENT checkbox you can switch between with and without alignment.

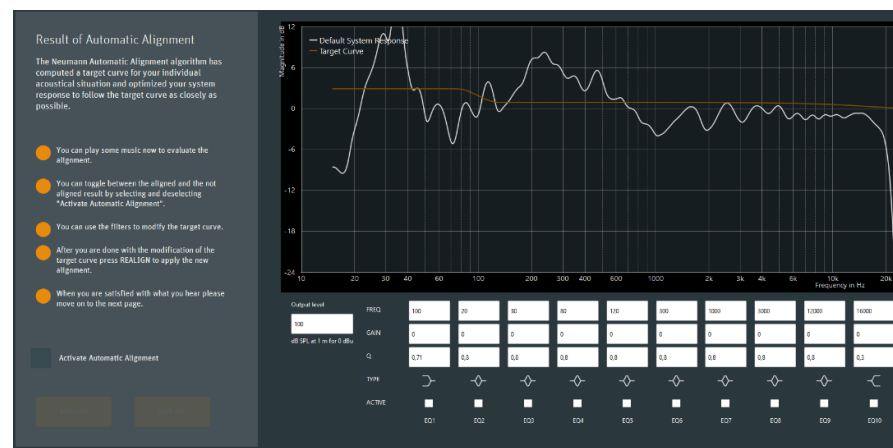Please note it will take a few seconds until all parameters have been transferred completely to the loudspeakers.

The EQ section below the graph now allows you to modify the result.

Please note that you can only modify the orange target response, not the measured curve. The target response can be modified with 8 fully parametric and two fixed shelf EQs.

Activate an EQ

Select the EQ-specific checkbox.

Enter frequency, gain and Q.
You can also change gain and frequency by grabbing the highlighted EQ number and moving it up, down, left, or right.

The effect will become visible immediately on the orange target response for all selected filters.

Apply the EQ modification

Once the modifications of the target response have been applied, you can realign the loudspeaker setup with these changes.

Click REALIGN

The software will use the original measurements to align your system to the modified target response.

Please note that the system will optimize the measured results as closely as possible to the new target response. It will take all deviations including those from the original alignment into account. Therefore, small adjustments of the target response may not lead to a different result because the available filters have already been used for more relevant optimizations.

Select/unselect the Activate Automatic Alignment checkbox to switch between the default monitor settings and the modified alignment.
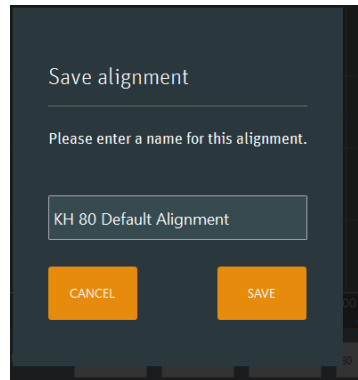
Save the alignment

The alignment process includes storing the resulting data on the loudspeakers.In order to switch between and edit alignments, all related data can be saved on the local computer.

Therefore click SAVE AS to save the alignment
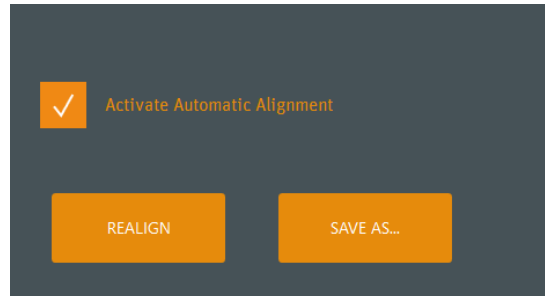
Enter a name for this alignment

Note: This will not affect stored hardware setups . This procedure refers to alignments only.

Press SAVE to store the alignment on your computer under the given name.

The MA 1 software will navigate to the Monitor Control page.

You can now disconnect the loudspeakers from the network.

Page navigation

The functionality of the MA 1 is structured in multiple pages:

- Monitor Control
- System Settings
- ? (Help)

The pages can be accessed by clicking on the respective symbols in the upper right hand corner of the screen.

The icon of the page that is currently displayed is indicated by highlighting the respective symbol.

Monitor Control page

This section explains the elements and related functionality of the Monitor Control page.

Setup Menu

The Setup menu displays all hardware setups that have been saved on this computer.

Clicking on an entry in the menu will activate control of the respective hardware setup. The saved alignment related to the specific hardware setup will be listed in the adjacent Alignment Menu.

Click on the Create New Setup entry of the menu to compile new hardware systems.
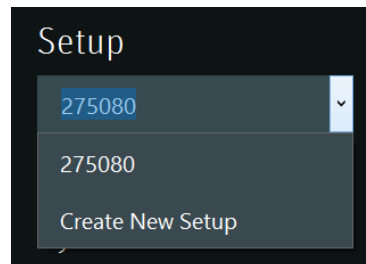
Alignment menu

The Alignment menu displays all alignment that have been saved on this computer that are related to the active hardware setup as selected in the adjacent menu.

Clicking on an entry in the menu will activate the respective alignment and send the alignment parameters to the speaker setup.

Click on the Create New Alignment entry of the menu to create a new alignment based on an existing alignment.

Click on the Create New Measurement entry of the menu to start the Automatic Monitor Alignment procedure for the currently active hardware setup.
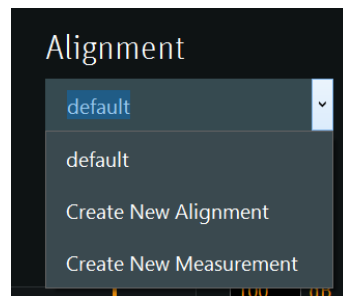
System level

A fader and an entry field allows to change the system level.

Generally, it is preferable to work with a reasonably high level along the signal chain and attenuate the level to the preferred monitoring level in MA 1 in order to achieve the best signal to noise ratio.

Bass management

When using a subwoofer for bass management, the BASS MANAGEMENT button allows you to disable the bass management function.
Clicking the button will toggle between
- bass management active: orange button; HPF applied to satellites, subwoofer on
- bass management inactive: grey button; satellites full range, subwoofer muted)

System Settings page

This section explains the elements and related functionality of the System Settings page.

Logo brightness

The brightness of the illuminated Logo on the front of the DSP loudspeakers can be changed.

The top most entry fields allows you to set the logo brightness for all DSP loudspeakers of the active hardware setup.

In order to individually set the logo brightness of the DSP loudspeakers of the active hardware setup, tick the checkbox INDIVIDUAL.

The logo brightness can be set between 0% (logo is off) and 125 %. Default value is 100%.

When indicating hardware warnings via flashing the logo red, the minimum brightness is 25% even if the general white logo indication is set to 0%.

Optimizing loudspeaker position or acoustical room behaviour

To do experiments in terms of optimizing loudspeaker position and/or rearrangement of interieur or acoustic elements you can proceed as follows:

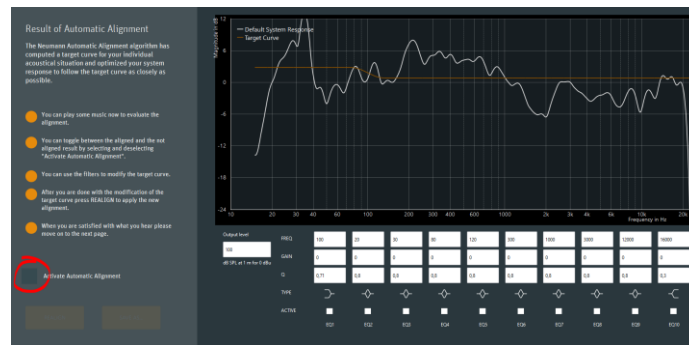Execute the one measurement at the listening position

Skip additional measurements

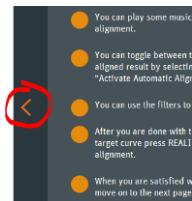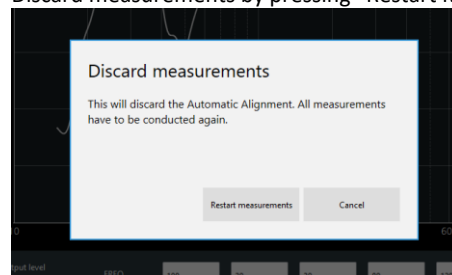The result for this optimization is shown at the next screen

Deactivate Automatic Alignment

Take a screen shot of this measurement, store it and step back to the previous screen
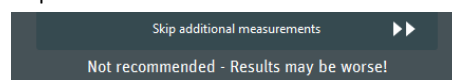

Discard measurements by pressing "Restart Measurement"

Change loudspeaker position and / or arrangement of interieur or acoustic elements
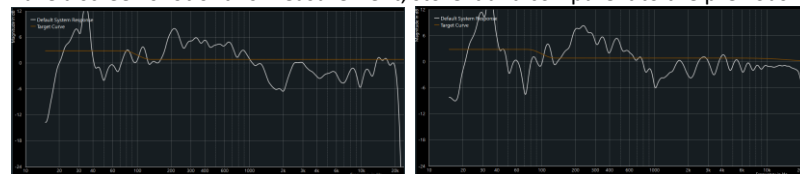
Start measurements with changed conditions

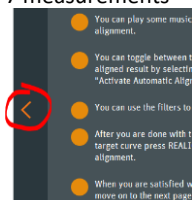Skip additional measurements:

Deactivate Automatic Alignment

Take a screen shot of this measurement, store it and compare it to the previous measurement

Compare the results and proceed with further trials until you are satisfied

Once you have found the best result step back to the measurement screen and proceed with all 7 measurements

Troubleshooting

The MA 1 App requires the audio input and output device to be identical. What if the input and output devices I want to use are registered with my Mac as different devices?

- You could try to aggregate your devices. The following instructions worked for us: https://support.apple.com/en-us/HT202000

My audio interface is not shown in the dropdown menu. What can I do?

- The MA 1 app only supports audio devices, which are configured for inputs AND outputs. Please check if your device is capable of this requirement.

- Furthermore, these device categories are not supported:
  - Bluetooth headsets
  - Built-in loudspeakers
  - Built-in microphones

- On a Windows system an ASIO driver has to be installed for the respective audio interface. Please check the interface's manufacturer site for the ASIO driver and install it before launching the app.

- If no ASIO driver is provided by the manufacturer you could try using a universal ASIO driver like ASIO4All. After the installation you need to reboot your system.

Different level on output signal level adaptation screen

- If you receive a message like this: "The measured level difference between your left and right channel is xx dB"

- Please ensure that:
  - The panorama is set to center.
  - Both channels have the same gain/level/pad settings.
  - Any additional gain elements in the signal chain are set to the same level (Analog mixing desk, etc.).

No microphone signal is detected

Possible causes:

- Microphone usage is prohibited by your operating system. Please check your privacy settings (on Mac) and make sure that the MA 1 App is allowed to use your microphone.

- The interface driver could be faulty or outdated. Please make sure you correctly installed the newest driver from your audio interface manufacturer.

- Phantom power (48V) is not enabled.

- You chose the wrong input in the MA 1 app.

- Driver is being used/blocked by another application.

- A Problem that sometimes occurs is, that the routing inside the audio interface is no set correctly. There must not be a direct connection between mic input and output to the loudspeakers. Otherwise there will be a feedback that way that the received mic signal is reproduced directly via the loudspeaker. That must be avoided. You should have a routing similar to standard recording settings with the soundcard. Means the mic signal goes directly to the computer and the computer output is connected to the loudspeaker.

How to find the best position for my subwoofer

Our recommendation is to place the subwoofer against the front wall and at ¼ or ¾ of the room
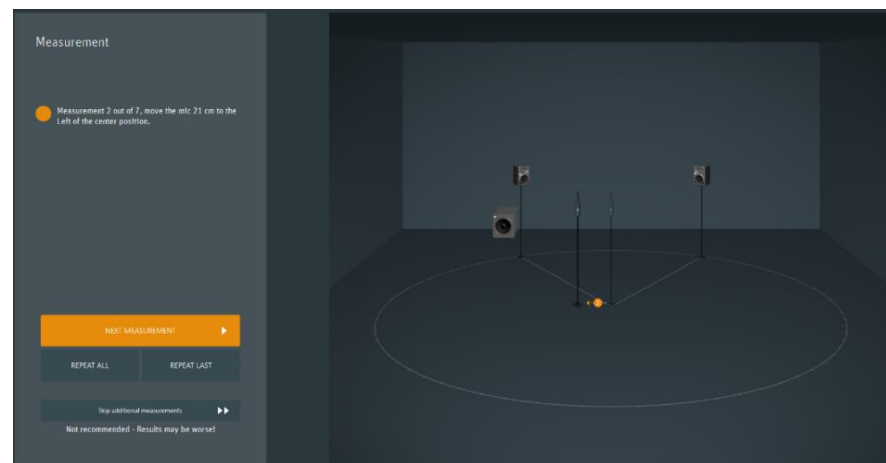
width and ¼ or ¾ of the room height.

In general, it is best to find the optimal position based on measurements. Therefore, you can use the MA 1 measurement routine to find out where to place the subwoofer. Just measure your system at the main listening position.
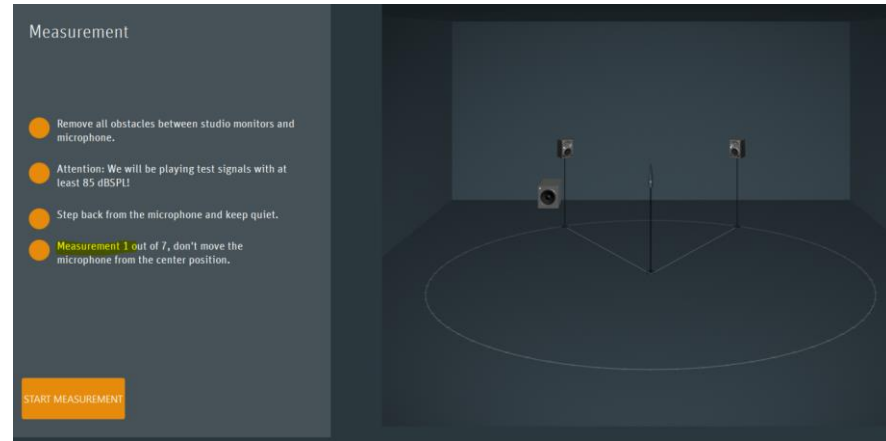
Then skip all further mic positions.

Proceed to the next screen with the shown result. Here, untick the button "Activate Automatic Alignment" and look at the results.
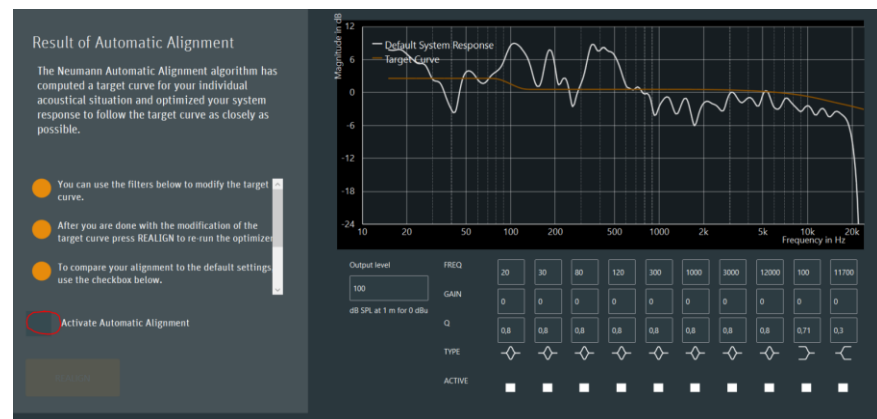
It may be useful to take a screenshot of the result.

Then head back to the previous page and repeat the measurement at a different position. Repeat this procedure until you have found a position where the non-linearity between 10 Hz and 90 Hz is at its lowest.
Once this is found, repeat the measurement procedure with all mic positions.