



▶▶ NEUMANN.BERLIN

▶ MA 1

AUTOMATIC MONITOR ALIGNMENT

INSTRUCTION MANUAL



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MA 1 – Automatic Monitor Alignment

This document describes the requirements and procedure for using the MA 1 Automatic Monitor Alignment. This version of the software just supports stereo systems with and without subwoofer.

Hardware requirements

- Loudspeakers
 - 1 pair of KH DSP loudspeakers
or
 - 1 KH 750 DSP subwoofer in combination with a pair of KH DSP loudspeakers or with a pair of analog KH loudspeakers.
- Neumann MA 1 measurement microphone
- Computer (Windows 10 (64 bit), macOS Catalina, 10.13, 10.14 und 10.15)
- Audio interface with:
 - Balanced analog input with 48 V phantom power
 - 2 balanced analog outputs **or** digital AES3 output (only with KH 750 DSP)
- Network switch

Software requirements

- Operating system:
 - PC: Windows 10 64 Bit
 - Mac: macOS 10.13, 10.14 or 10.15
- 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

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

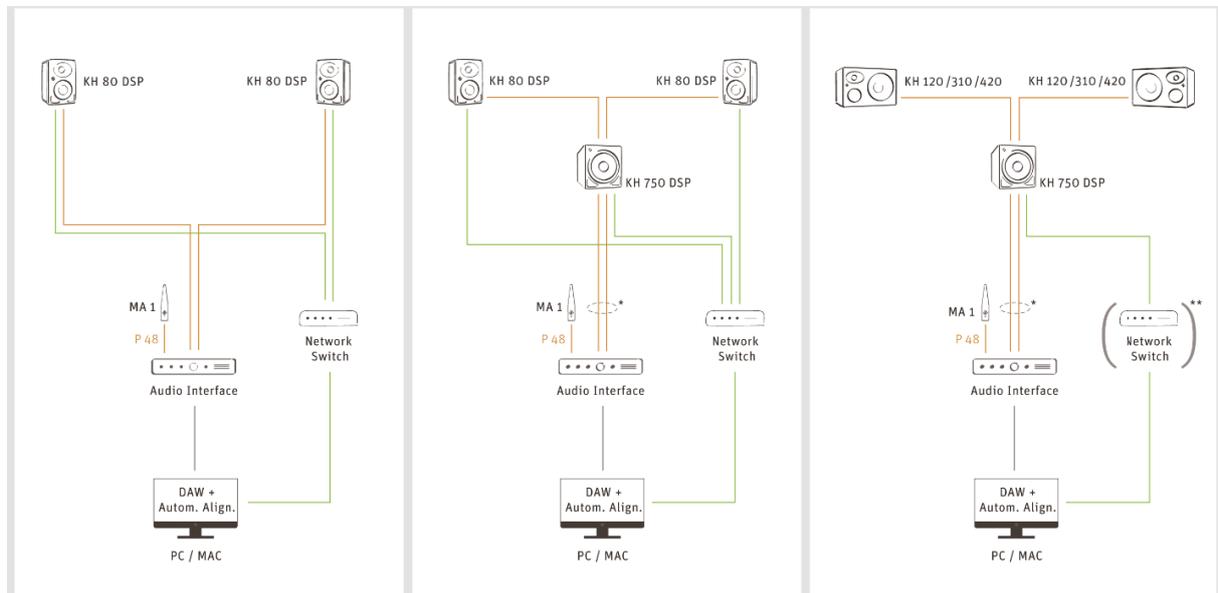
Proceed as follows to set up the system.

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 MA1 – Automatic Monitor Alignment app may cause invalid alignment results. To be certain that the alignment is and stays correct please:
- ▶ Uninstall the Neumann.Control app from your iPad.
- ▶ Perform a factory reset on your Neumann DSP devices (see below).
- ▶ Use the MA 1 – Automatic Monitor Alignment app to align your system.
- ▶ 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.

Connecting the hardware

- ▶ Connect your hardware as shown in this diagram



— Audio (XLR) * Alternatively: AES3 (BNC/RCA) — Network (Ethernet) ** Not necessary if Ethernet cable is used

Setting 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 DSP

(KH 750 DSP + KH 120/KH 310/KH 420)



Use the following settings for the KH 750 DSP.

KH 750

CONTROL MODE

LOCAL NETWORK

If the control mode switch is set to "network" the backplate controls marked with "*" are not active.

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

KH 120 / KH 310

OUTPUT LEVEL [dB SPL at 1m for 0dBu / -18 dB FS]

114, 108, **100**, 94 for 0 dBu

INPUT GAIN [dB]

7.5, 5, 3, 0, -1, -3, -5, -7.5, -11, -15

ACOUSTICAL CONTROLS [dB]

BASS: 0, -2.5, -5.0, -7.5; MID: 0, -1.5, -3.0, -4.5; TREBLE: +1.0, 0, -1.0, -2.0

KH 420

OUTPUT LEVEL [dB SPL at 1m for 0 dBu / -18 dB FS]

114, 108, **100**, 94 for 0 dBu

INPUT GAIN [dB]

2, -4, -6, -8, -10, -12, 0, -2, -14

ACOUSTICAL CONTROLS [dB]

BASS: 0, -2.5, -5.0, -7.5; MID: 0, -1.5, -3.0, -4.5; TREBLE: +1.0, 0, -1.0, -2.0

PARAMETRIC EQUALIZER

GAIN [dB]: 0, -2, -4, -5, -12, +1, +2, +4

Q: 1, 1.5, 2, 2.5, 3, 4, 8

FREQUENCY: 1, 2, 3, 4, 5, 6, 7

FREQUENCY RANGE [Hz]: OFF, 25-80, 50-160, 100-320

Position	25-80	50-160	100-320
1	25	50	100
2	32	64	130
3	40	80	160
4	45	90	180
5	52	105	210
6	65	130	260
7	80	160	320

► Use the following settings for D-version monitors (KH 120 D, KH 310 D, KH 420 with DIM 1)
Note! The digital connection is not supported.

KH 120 / KH 310

OUTPUT LEVEL [dB SPL at 1m for 0dBu / -18 dB FS]

114, 108, **100**, 94 for 0 dBu

INPUT GAIN [dB]

7.5, 5, 3, 0, -1, -3, -5, -7.5, -11, -15

ACOUSTICAL CONTROLS [dB]

BASS: 0, -2.5, -5.0, -7.5; MID: 0, -1.5, -3.0, -4.5; TREBLE: +1.0, 0, -1.0, -2.0

KH 420

OUTPUT LEVEL [dB SPL at 1m for 0 dBu / -18 dB FS]

114, 108, **100**, 94 for 0 dBu

INPUT GAIN [dB]

2, -4, -6, -8, -10, -12, 0, -2, -14

ACOUSTICAL CONTROLS [dB]

BASS: 0, -2.5, -5.0, -7.5; MID: 0, -1.5, -3.0, -4.5; TREBLE: +1.0, 0, -1.0, -2.0

PARAMETRIC EQUALIZER

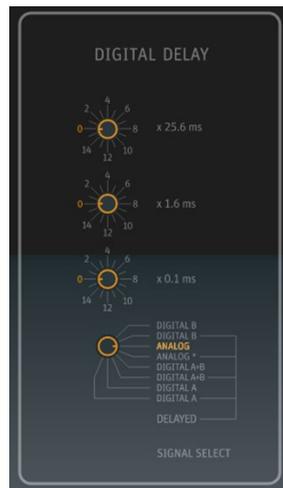
GAIN [dB]: 0, -2, -4, -5, -12, +1, +2, +4

Q: 1, 1.5, 2, 2.5, 3, 4, 8

FREQUENCY: 1, 2, 3, 4, 5, 6, 7

FREQUENCY RANGE [Hz]: OFF, 25-80, 50-160, 100-320

Position	25-80	50-160	100-320
1	25	50	100
2	32	64	130
3	40	80	160
4	45	90	180
5	52	105	210
6	65	130	260
7	80	160	320



KH 80 DSP without KH 750 DSP

- ▶ Use the following settings for the KH 80 DSP.

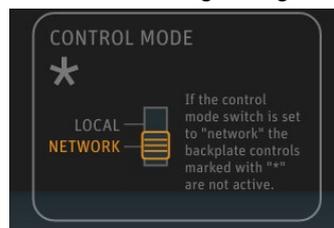


KH 80 DSP with KH 750 DSP

- ▶ Use the following settings for the KH 80 DSP.



- ▶ Use the following settings for the KH 750 DSP.



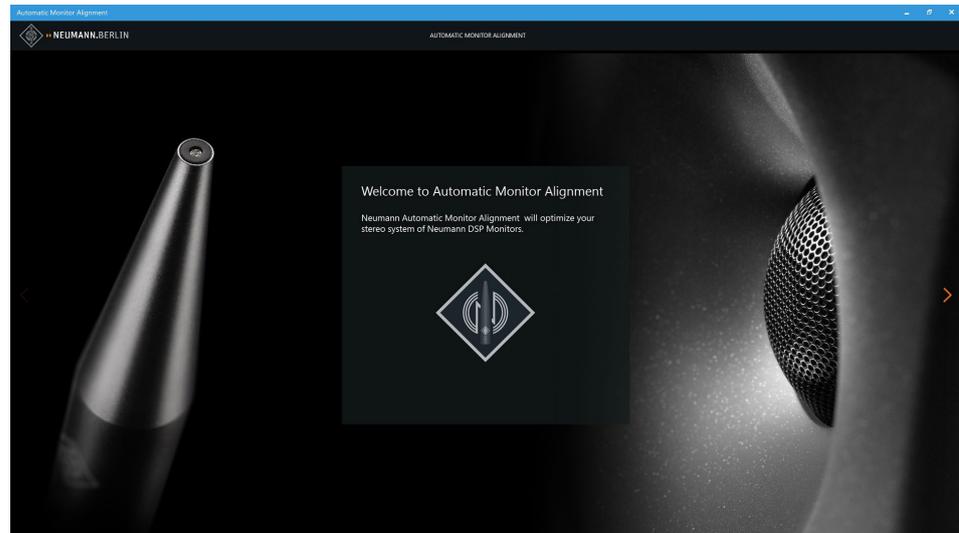
Note! During the process of the automatic monitor alignment do not change any settings at the back of the connected DSP loudspeakers / subwoofer.



Preparing the MA 1 – Automatic Monitor Alignment

Perform the following steps in order to automatically align your setup using the MA 1 software and the MA 1 measurement microphone.

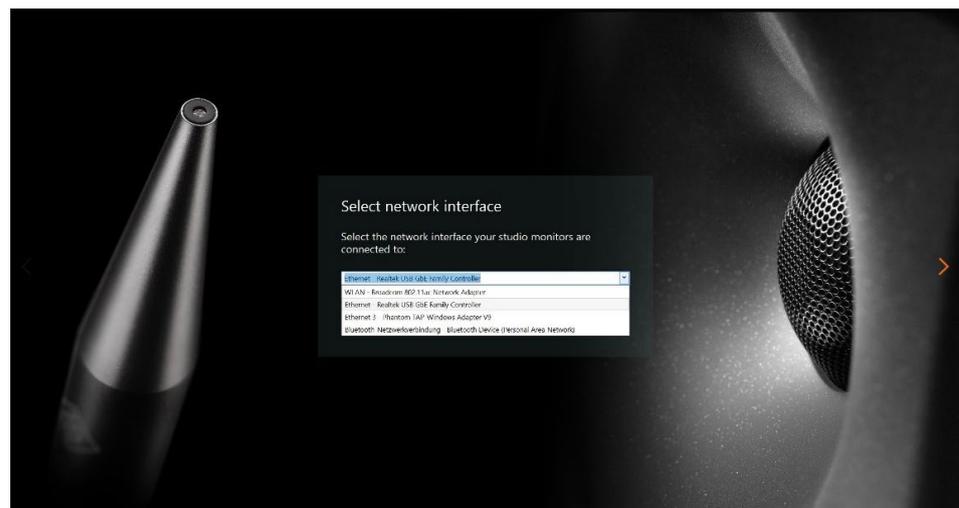
Starting the process



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



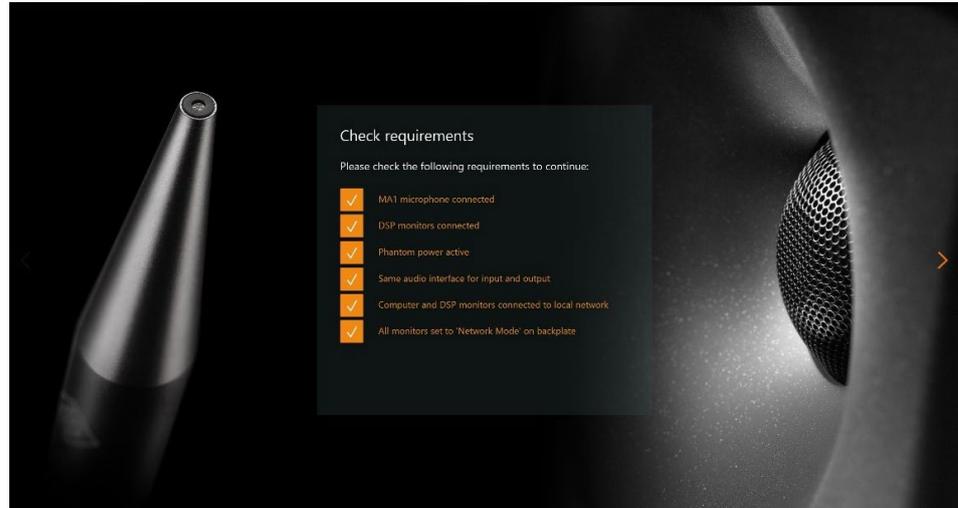
Selecting the network



- ▶ Select the network your loudspeakers/subwoofer are connected to.



Checking the requirements

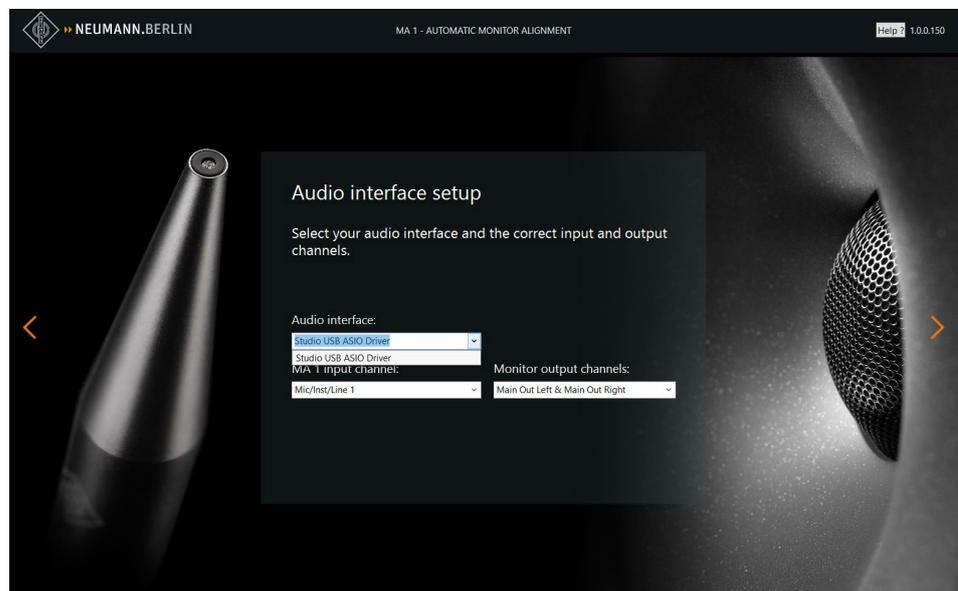


- ▶ Ensure all mentioned requirements are fulfilled and ticked.

Selecting and setting 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:

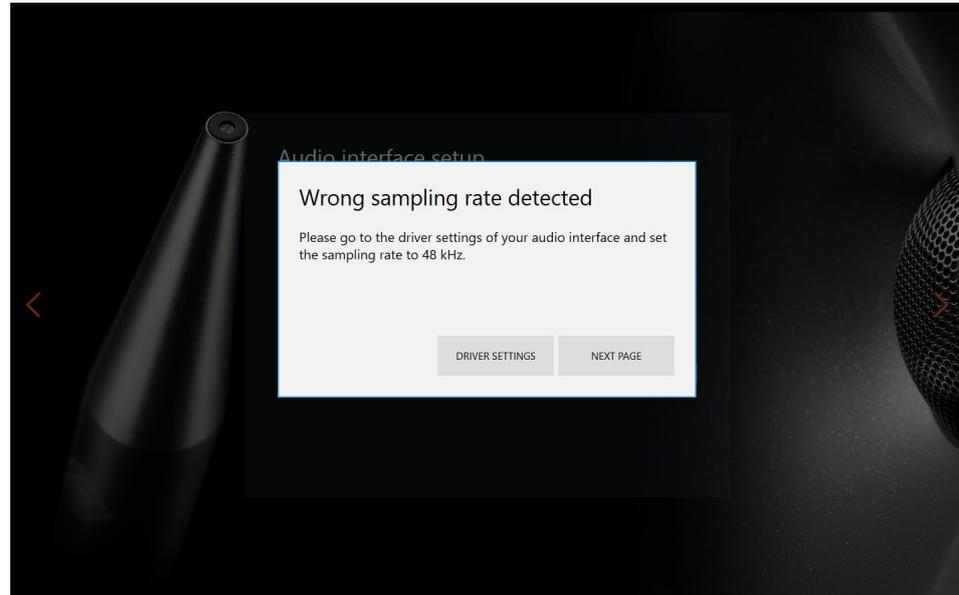
- ▶ Bluetooth headsets are not supported by the MA 1 software.
- ▶ Built in microphones and loudspeakers are not supported.



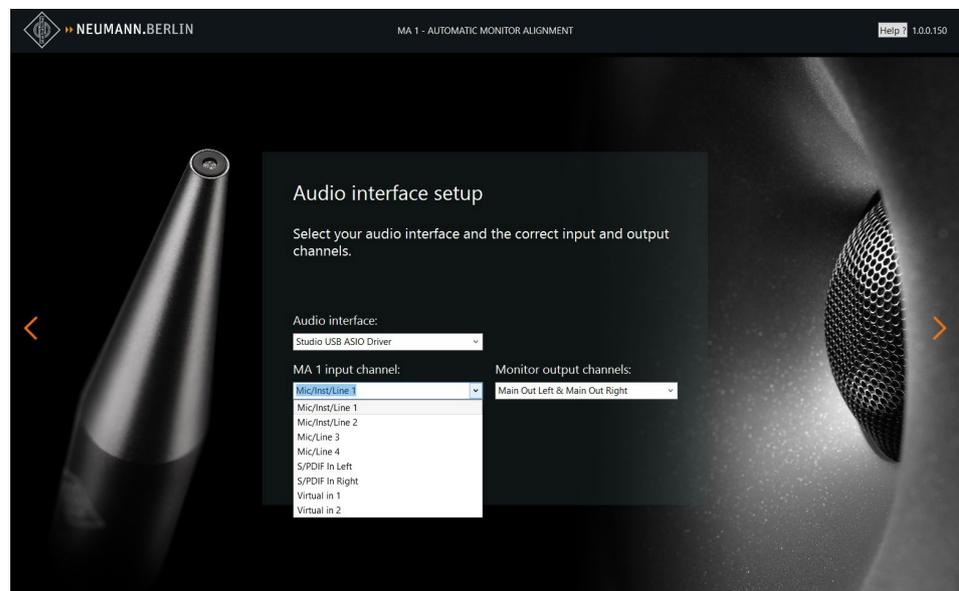
On MAC one audio interface can be shown as two devices. If this is the case please follow the instruction from Apple:

<https://support.apple.com/en-in/guide/audio-midi-setup/ams6e21c3f61/mac>

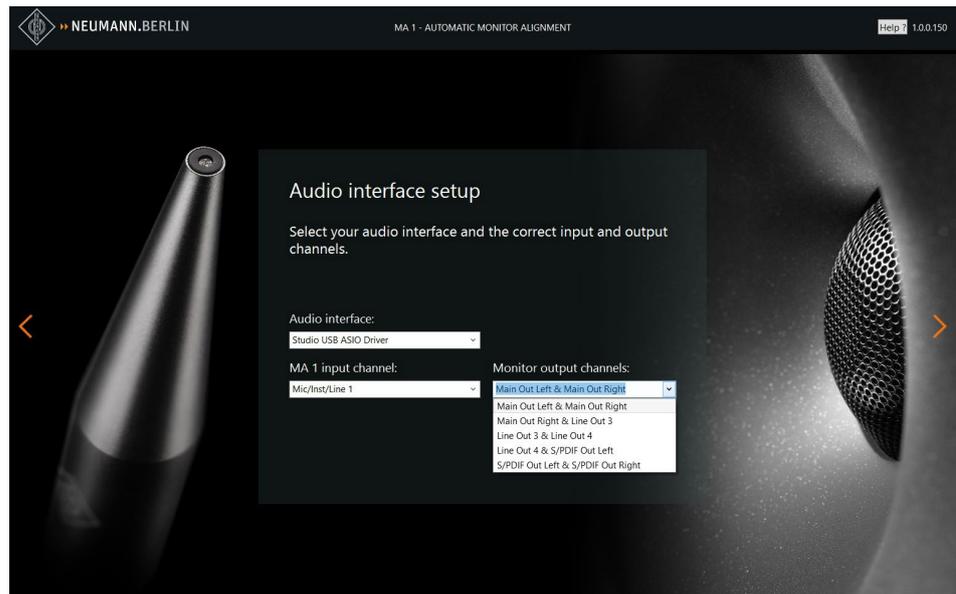
- ▶ Make sure the sample rate of the audio interface is set to 48 kHz.
You can check the settings of your audio interface via the SETTINGS button.



- ▶ Tick the Sample Rate 48 kHz checkbox after verifying the audio interface settings.

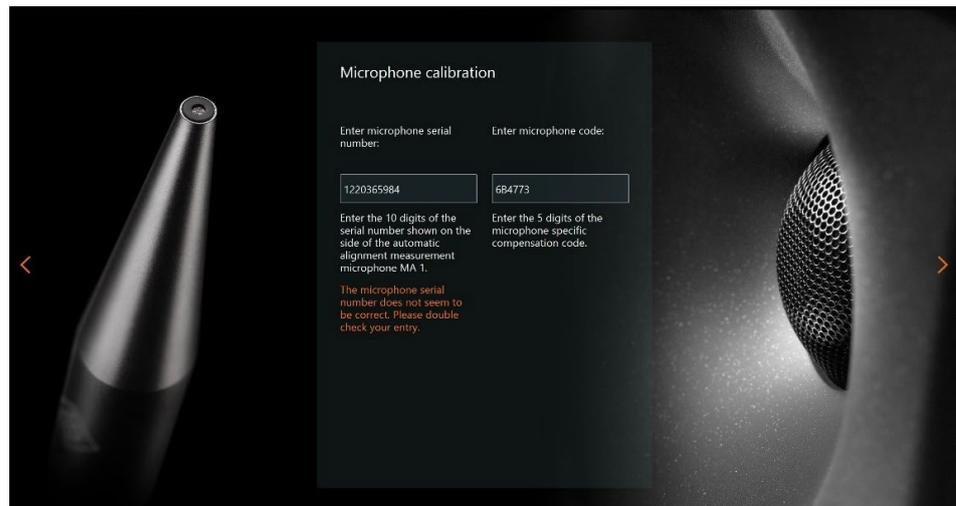


- ▶ Select the input channel your MA 1 measurement microphone is connected to.



- ▶ Select the output channels your loudspeakers or subwoofer are connected to.

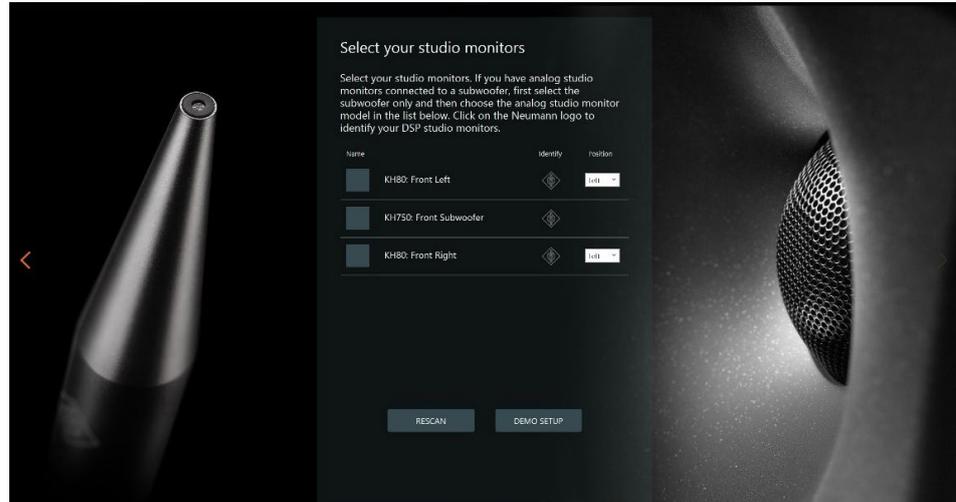
Calibrating the MA 1 measurement microphone



- ▶ 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.



Selecting the loudspeakers from the network



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.
- ▶ 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 DSP

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

- ▶ Switch on the KH 750 DSP.
- ▶ While the power light is solid red during the boot up phase, move the STANDBY switch up and down repeatedly.

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.



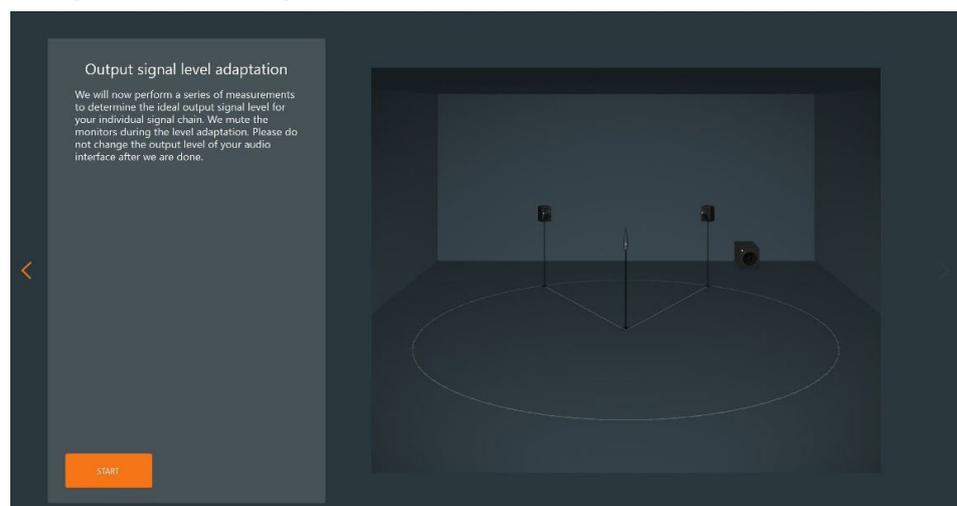
Selecting loudspeakers in a setup of a DSP subwoofer with analog loudspeakers

- ▶ 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.
- ▶ 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 DSP to left loudspeaker, etc.).

Adapting 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. If the output level of your audio interface too low, the system will ask you to adapt it accordingly.



- ▶ 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.

 The adaptation of the measurement signal amplitude to your signal chain was successful.

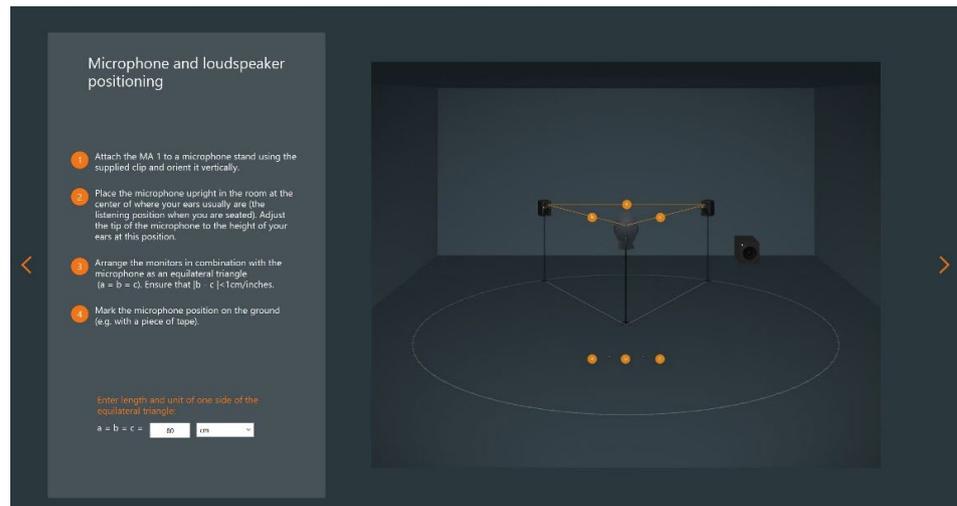
If this test failed please check the following points:

- ▶ Loudspeakers/subwoofer are set to network at their back
- ▶ 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.



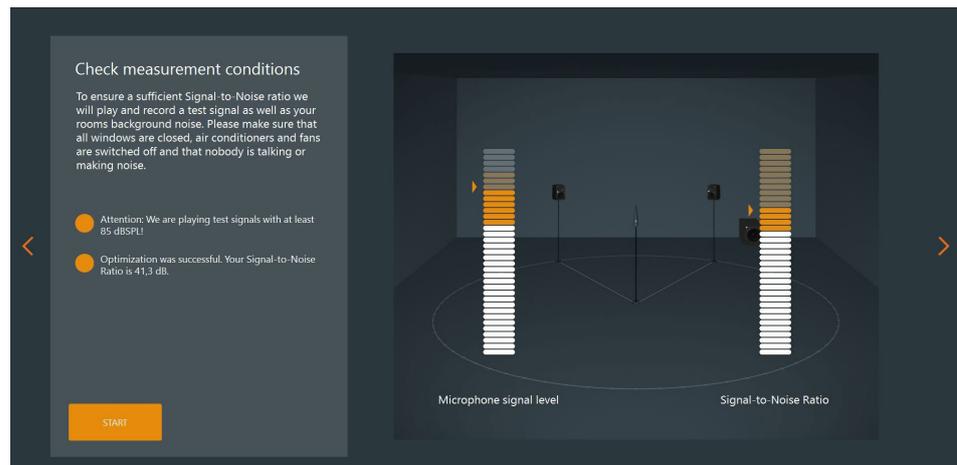
The system will check if:

- ▶ 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.

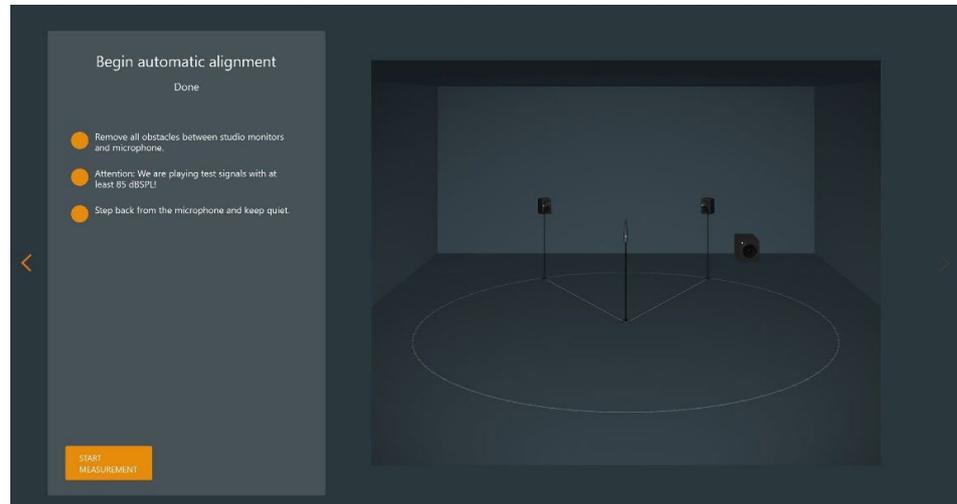
If the noise level of your room is too high the system continuously measures. If it is not possible to reduce your environmental noise level you can skip this test. This then may lead to worse results. So please do anything possible to achieve a good signal to noise ratio.



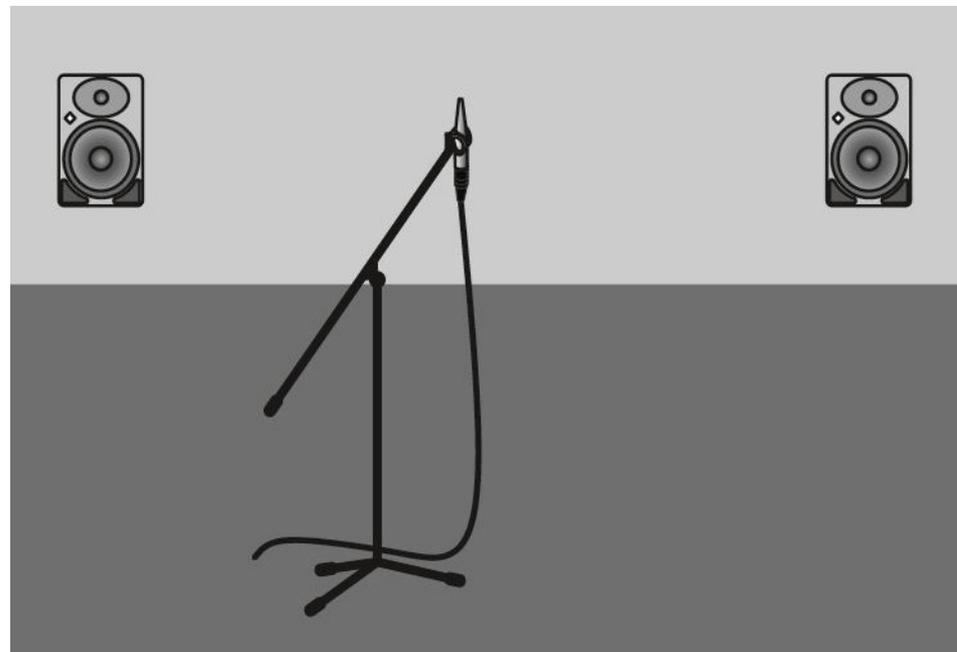
Performing the MA 1 – Automatic Monitor Alignment

Starting 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.



- ▶ Any loudspeakers which are not playing signals will be muted and shown in red.

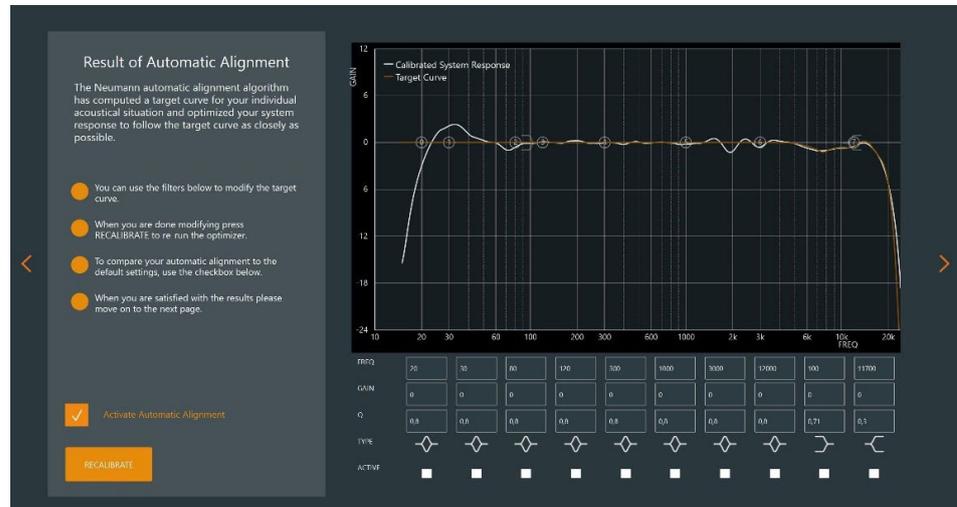
We highly recommend performing the measurements at every proposed microphone position in order to ensure the best possible results.

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.



Displaying the measurement results

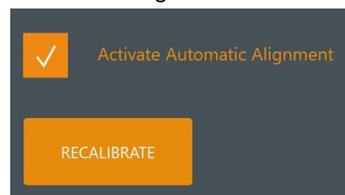
After the measurement procedure the system will display the results.



The following curves are displayed:

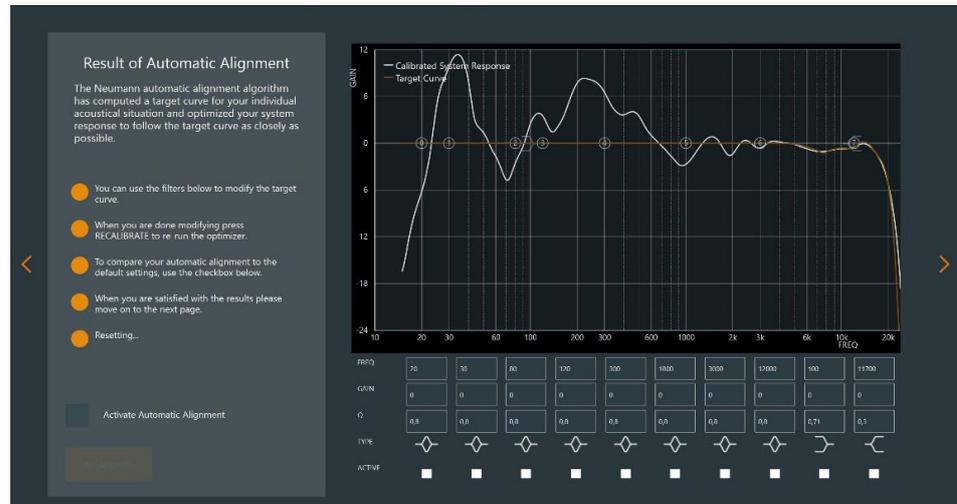
- ▶ **Orange curve:**
This shows the room-specific target response used by the system to align the measurement results.
Please note that this curve is not necessarily ruler flat. The system will create a target response optimized for the character of the room. This target response depends on the acoustical 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.

When 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.



Editing 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.

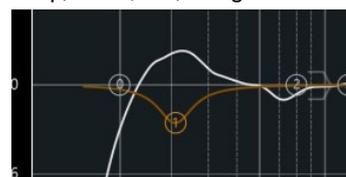
Activating an EQ

- ▶ 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.



Applying the EQ modification

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

- ▶ Click the RECALIBRATE button.



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

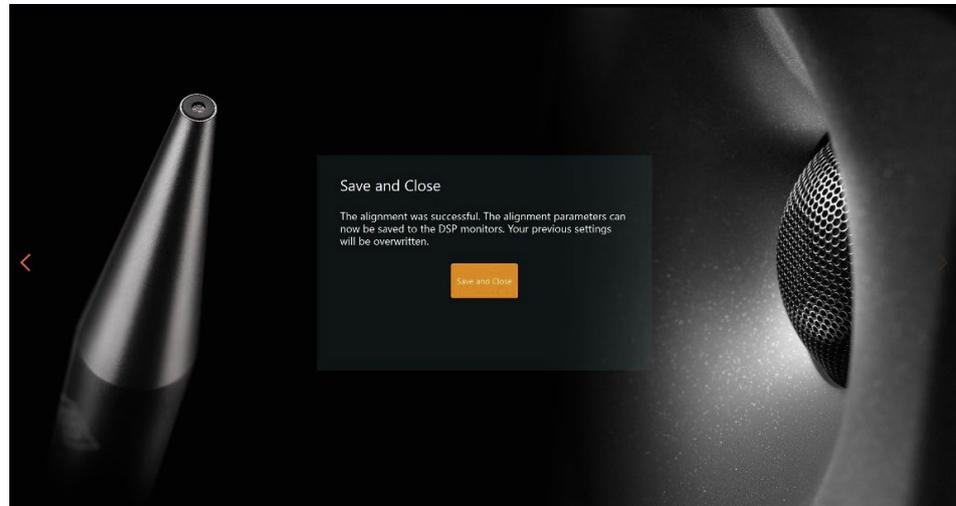
Please note that the system will optimize the measured results as closely as possible to the new target response. It will take all deviations including those from the original alignment into account. Therefore, small adjustments of the target response may not lead to a different result because the available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



Saving the results

After performing all modifications the results need to be stored permanently in the loudspeakers.



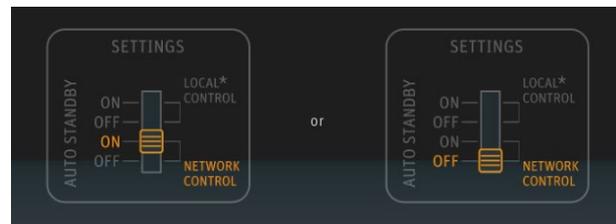
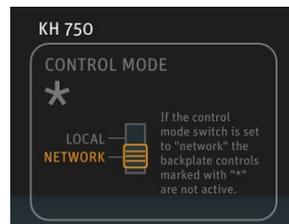
- ▶ Click Save and Close.
The alignment process is now finished. The loudspeakers will permanently use the alignment.

You can now disconnect the loudspeakers from the network.

To compare with the local backplate settings of the connected DPS loudspeakers/subwoofer, you can set the Network switch on their back to LOCAL.

All monitors and subwoofers need to be set to local, as the software wrote alignment parameters to both the KH 80 and the KH 750.

Note! Do not change any settings at the backplate of the DSP loudspeakers/subwoofer during the alignment process.



If you set the switch back to NETWORK, the previously stored calibration will be active again. Please note that if you want to recalibrate the system, the alignment process needs to be started from the beginning.

You cannot recall the result screen after the application has been closed.



How can I align my setup with MA 1 and two KH 750s?

The MA 1 Automatic Monitor Alignment currently doesn't support systems with more than 1 subwoofer. However, by using this procedure it is possible to circumvent this restriction:

Variante 1: Mono Sub (recommended)

- ▶ Both subwoofers have to have the same distance to the listening point.
- ▶ Calibrate the system just using the first subwoofer. Connect the input signal, both loudspeakers and the Ethernet connection to the first subwoofer and switch off the second subwoofer.
- ▶ Go through the automatic alignment. Take care to remember exactly where the microphone has been placed to be able to reproduce it exactly during the second measurement session. Use the possibility to edit the target response before storing the result to reduce the level by 6 dB. Enter these values: EQ1: $f = 20$ Hz, Gain = -6 dB, $Q = 0,35$; EQ2: $f = 58$ Hz, Gain = -1,8 dB, $Q = 1,17$.
- ▶ Recalibrate and store the results.
- ▶ After that connect the input signal, the two loudspeakers and the Ethernet connection to the second subwoofer and repeat the procedure. Ensure that the first subwoofer is disconnected from the Ethernet:
- ▶ Go through the automatic alignment and use the possibility to edit the target response before storing the result to reduce the level by 6 dB. Enter these values: EQ1: $f = 20$ Hz, Gain = -6 dB, $Q = 0,35$; EQ2: $f = 58$ Hz, Gain = -1,8 dB, $Q = 1,17$.
- ▶ After both subwoofers have been calibrated in combination with the two loudspeakers chose the first or the second subwoofer to connect it to the loudspeakers.
- ▶ Feed the source signal into both subwoofers using a Y-cable (splitter).
- ▶ Disconnect the Ethernet cable.

Variante 2: Stereo Sub (not recommended)

- ▶ Both subwoofers have to have the same distance to the listening point.
- ▶ Calibrate the system just using the first subwoofer. Connect the input signal, both loudspeakers and the Ethernet connection to the first subwoofer and switch off the second subwoofer.
- ▶ Go through the automatic alignment. Take care to remember exactly where the microphone has been placed to be able to reproduce it exactly during the second measurement session. Store the results.
- ▶ After that connect the input signal, the two loudspeakers and the Ethernet connection to the second subwoofer and repeat the procedure. Ensure that the first subwoofer is disconnected from the Ethernet:
- ▶ Go through the automatic alignment procedure.
- ▶ After both subwoofers have been calibrated in combination with the two loudspeakers connect one loudspeaker to the first subwoofer and the other loudspeaker to the second subwoofer. Feed the left channel of your source signal to the left subwoofer and the right source signal to the right subwoofer.
- ▶ Disconnect the Ethernet cable.