



CLA Nx

User Guide



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Product Overview

CLA Nx is a tool that lets you mix on headphones while monitoring in the exact space of Chris Lord-Alge's legendary Mix LA studio. Using Waves Nx technology, CLA Nx actually puts you in the Mix LA control room, so you can trust what you hear and mix with confidence.

Chris Lord-Alge is a powerhouse in music mixing. He's mixed thousands of songs and garnered five Grammy® Awards. He has a sought-after signature sound and a finely honed workflow. Part of Chris's consistent success stems from his custom-designed control room, which provides him a reliable, clear monitor sound. The room, designed by legendary acoustician/designer Vincent Van Hoff, is famous for its transparency and depth. Chris attributes this precise, honest sound to a combination of custom monitor loudspeakers and a unique space with innovative geometry, intelligent treatment, and a very high ceiling.

The Mix LA control room has given birth to many modern classics by Green Day, Bruce Springsteen, Muse, Avenged Sevenfold, Keith Urban, My Chemical Romance, and countless more. Now you too can monitor your mix in this room. CLA Nx uses state-of-the-art psychoacoustic modeling to achieve a natural, immersive, and transparent three-dimensional sound field for stereo mixes monitored on headphones. Mix as though you were sitting in Chris's chair and reliably judge depth, panning, stereo image, balance, and reverb. When you hear the mix played back in a speaker environment, you won't be surprised.

To provide greater immersion when mixing on headphones, CLA Nx links to the optional Nx HeadTracker, which changes your stereo headphones into a real-world acoustic space. It recreates a room in your headphones that behaves just like the Mix LA control room. CLA Nx does not change the processing of the mix itself, but rather the environment in which you monitor it.



Quick Start

Here are the essential steps for setting up CLA Nx to monitor your stereo mix. Each step is described in detail in later chapters.

1. INSERT THE PLUGIN

Insert one instance of the plugin on your master buss. (Note: don't use CLA Nx on individual tracks.)



Please Note: Before you bounce the final mix, make sure that the CLA Nx plugin is bypassed.

2. ESTABLISH THE CHARACTERISTICS OF YOUR HEADPHONE MONITORING

Studio Monitors

There are three loudspeaker types. This selection affects your perception of the sound of the speaker itself, as well as its interaction with the room. Refer to [Studio Monitor Select](#) in the next section.

Headphone EQ Curve

You have the option to apply a standardized EQ correction curve to your headphone signal. Refer to [Selecting a Headphone EQ Curve](#) later in this user guide.

3. SET UP HEAD TRACKING

Head Tracking is an important feature that coordinates your head movements with the sound imaging of the control room. It provides the same aural feedback that you experience in the studio—the information you need to make vital mix and sound field decisions. To get the most from CLA Nx, we recommend that you always work with Head Tracking on. Refer to [Head Tracking](#) later in this user guide.




CLA Nx Controls



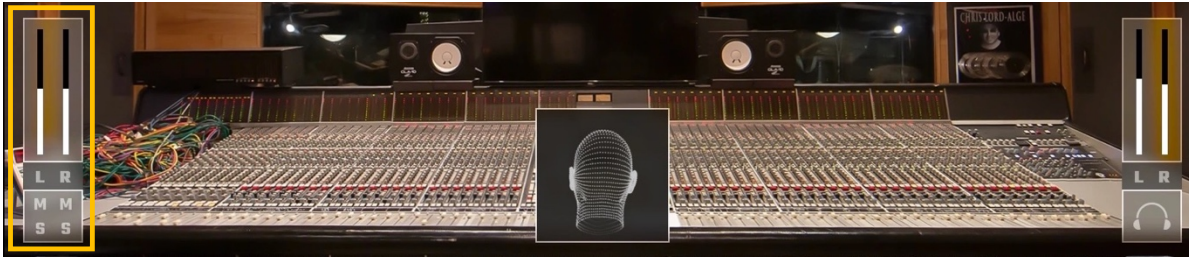
Studio Monitors

The CLA control room is outfitted with three sets of studio monitors.

Speaker Type	Description
CLA-10 + sub	Avantone/CLA near-field reference monitors with an Infinity 12" BU-2 sub-woofer under the desk
Main	Custom-built Ocean Way HR1 studio monitors (two 15" drivers and one horn per side)
Boombox	Rack mounted Sony ZMS-1 mini-disk boombox located in the rear of the control room  To move the boombox to the center of the visual image, click the circular arrow on the bottom of the button. This rotates the room.



Meters

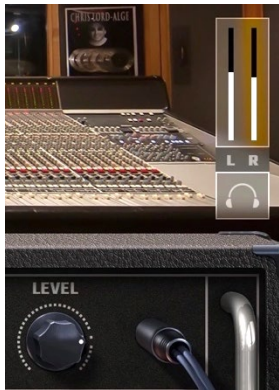


INPUT METERS

The stereo input signal has a full-scale meter with an infinite-hold clip indicator. Click on the clip indicator to reset it. Each channel has mute and solo buttons at the bottom of the input meter.

Range: -infinity to 0 dBFS

MONITOR LEVEL AND METERS



The binaural stereo headphone output is represented by a full-scale stereo meter with infinite-hold clip indicators. Use the knob below the meter to control the headphone monitor level.

Range: -infinity to 0 dBFS

Output volume control: -24 dBFS to +6 dBFS; Default: 0 dBFS

! Please note: Nx can introduce clipping at the output, especially when fed with a signal whose levels are controlled by a limiter. In such cases, use the output gain fader to reduce the output.

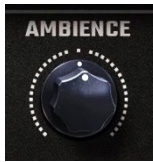


Rotate Studio



The **Rotate Studio** wheel rotates the studio around your position at the mixing desk. What you see and what you hear are defined by your orientation. This is what you experience when using Head Tracking, except that Rotate Studio is controlled manually.

Click the **0°** button or Alt+Click on the Rotate Studio wheel to reset rotation to its default position.



Ambience increases or decreases the amount of ambience in the room compared with the model. The specific and accurate sound signature of the Mix LA control room is modeled with impulse responses (IR). When you select a studio monitor type, the associated IR loads. This IR describes everything about the room: the speakers and how they interact with the space, the reflections, and the ambience of the space itself.

The Ambience control lets you adjust room ambience to taste. The default Ambience setting of 100% presents the modeled room ambience exactly as captured by the IR. By increasing or decreasing the Ambience setting, you can subjectively alter the amount of room ambience. Your monitoring reference will no longer precisely match the Mix LA control room, but it will provide a personalized mixing environment.

Range: -60% to 160%

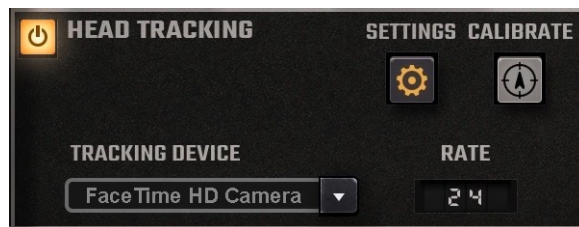


Head Tracking

When Head Tracking is **on**, the virtual room does not move. Instead, it's you—your headphones—that changes the orientation. This is how you experience a sound in the real three-dimensional world. This interaction with the studio space is vital in making critical imaging decisions. The wireframe head indicates the orientation of the engineer's head with respect to the studio. The head is grayed out when the user's head is outside the tracking range, when there is insufficient ambient light for camera tracking, or when Head Tracking is turned off.

When Head Tracking is **off**, the soundscape moves with you as you turn your head. This is normal stereo headphone behavior.

Head Tracking Controls



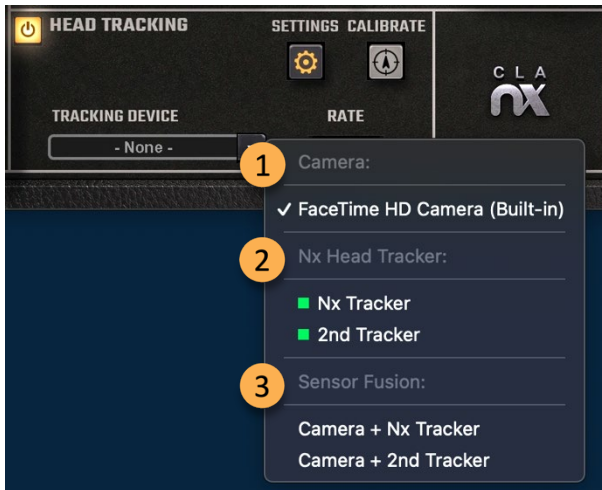
HEAD TRACKING ON/OFF

Toggles Head Tracking on or off. This does not affect Nx sound processing, which is always active.



TRACKING DEVICE MENU

Use this drop-down menu to select the device used for head tracking. CLA Nx can track head movement from two sources: **Camera** and **Nx Head Tracker**.



- 1 CAMERA activates the computer's camera for head tracking. If more than one camera is available, choose from the list.
- 2 NX HEAD TRACKER selects the Nx Head Tracker that will be used by CLA Nx. Choose one Head Tracker from the list.
- 3 The SENSOR FUSION mode uses the selected camera and one of the available Nx Head Trackers together. Using these two kinds of sensors simultaneously yields a tracking rate of up to 80 fps.

The **SETTINGS** button takes you to the HeadTracker application's control panel. Use it to reopen the application if it has been closed or if you want to tweak certain Head Tracker controls.



Please note: The Sensor Fusion mode can be used by only one person at a time. That is, the camera must be aimed at the person who is wearing the Nx Head Tracker.

CALIBRATE defines your head position as the center position. Hold your head centered, look straight forward, and click the button to let the system know where your center listening position is. Each time you start the system or change either your position or the camera's placement, you can recalibrate.

RATE indicates the rate of head tracking in frames per second (fps). The optimal rates are:

Camera: 25 fps to 30 fps

Nx Head Tracker: 35 fps to 50 fps

Sensor Fusion: 45 fps to 80 fps



When you are *not* using the Sensor Fusion mode, you can have several instances of the Nx Virtual Mix Room plugin with a different tracking device for each instance. This will enable you to have more than one Nx listeners with individual head tracking for each in the same session. Note that each Nx Virtual Mix Room plugin needs to be routed to a separate headphone output per listener; a simple headphone split will not work for this use case.

Head Modeling



You can significantly improve the accuracy of the Nx psychoacoustic effect by providing your head measurements: circumference around your head (over the ears) and a half circle from ear to ear, over the back of your head.

Nx is a binaural effect, so it incorporates these measurements to calculate the inter-aural delays, filters, and gains for each ear. If you do not provide these measurements, the default settings will be used.

! Please note: Entering values completely unrelated to your personal head measurements will compromise the effect. If you do not enter your individual measurements, it is advised that you use the default values.

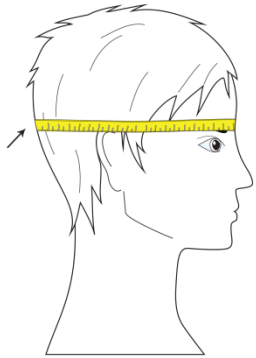


UNITS

Choose head measurement units: centimeters or inches.

CIRCUMFERENCE

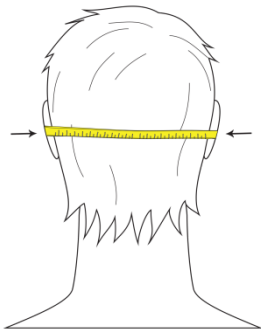
To find your head circumference, use a measuring tape to measure the longest distance around your head: over the back of the head, around your ears, and around your eyebrows. Enter values directly by dragging up or down over the value box.



Default: 55 cm / 21.7 in (average adult circumference)

Range: 35 cm to 75 cm / 13.8 in to 29.5 in

EAR-TO-EAR is the distance from ear to ear around the back of your head, on a plane parallel to the floor.



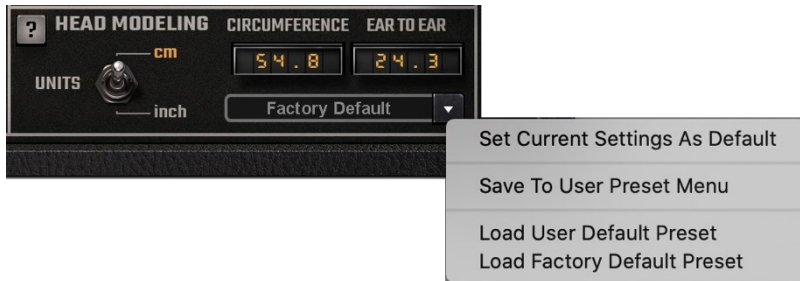
Default: 25 cm / 9.8 in (average adult ear-to-ear measurement)

Range: 15.0 cm to 40 cm / 5.9 in to 15.8 in



Head Measurements Presets

Head modeling measurements can be saved as user presets. This makes it easy to switch between mixers, for several people to participate in the mix, and to move your head tracking measurements from one system to another. Click on the arrow next to the Units panel to open the Head Modeling menu. Use this menu to save and load measurement presets.



When you open or enable the plugin, the factory preset is loaded. This sets the head measurements to their default values, even if the host session includes measurement settings. If you have saved your settings as the default preset, this will load when the plugin is opened or activated. You can also create user presets and add them to the Preset menu.

Save a preset to a new file to move it to another host.

Click the HELP BUTTON (?) to learn more about head modeling.



The Head Modeling menu is used to save and load measurement presets only. These presets do not contain settings for the plugin as a whole. Plugin presets are managed with the WaveSystem toolbar at the top of the interface. General presets do not affect the Head Modeling settings. Learn more about the [WaveSystem](#) at the Waves Download page.

Tips for Better Camera Tracking

1. Make sure there is enough light in the room to enable a tracking rate of at least 20 fps. Webcams generally have a tracking rate of up to 30 fps. The optimal rate is anywhere between 25 fps and 30 fps. The frame rate is shown on the Head Tracking panel.
2. Sit no more than 5 ft to 6 feet (150 cm–180 cm) away from the camera (optimal distance varies by camera).
3. Move no further than 30 degrees left or right, relative to the camera.



Selecting a Headphone EQ Curve

CLA Nx lets you monitor your stereo mix through headphones, while hearing the loudspeakers and room acoustics of this famous studio. To do this, the sound in your headphones must be as transparent as possible. Otherwise, the color of your headphones might compromise the accuracy of the virtual mix room.



To create a headphone mix that reliably translates to other spaces, you can modify the EQ curve of your headphones. All Nx plugins include a comprehensive list of more than 250 EQ correction curves. Each curve corrects the response of a specific model of headphones.¹ This ensures that what you hear while mixing will accurately reflect the Mix LA mixing environment.

Choose your headphones from the “Headphone EQ” drop-down menu. You will probably find your headphones in the list. If not, we suggest that you turn off the Headphone EQ section altogether and work without a correction curve. Also, if you are experienced in translating your headphone sound to another space, you may prefer to work with Headphone EQ off.

In most circumstances, we strongly recommend that you use the EQ correction curve that matches your headphones. Once a headphone model has been selected, it becomes the default correction curve and it will load automatically when you open a new instance of any Nx plugin. Turn on Headphone EQ to apply the curve.

WaveSystem Toolbar

Save and load presets, compare settings, and undo/redo adjustments using the WaveSystem toolbar, which is located above the plugin. Refer to the [WaveSystem User Guide](#) to learn more.

¹ For an up-to-date list of supported headphones, refer to this Waves support article: <https://www.waves.com/support/nx-headphone-eq-correction>.



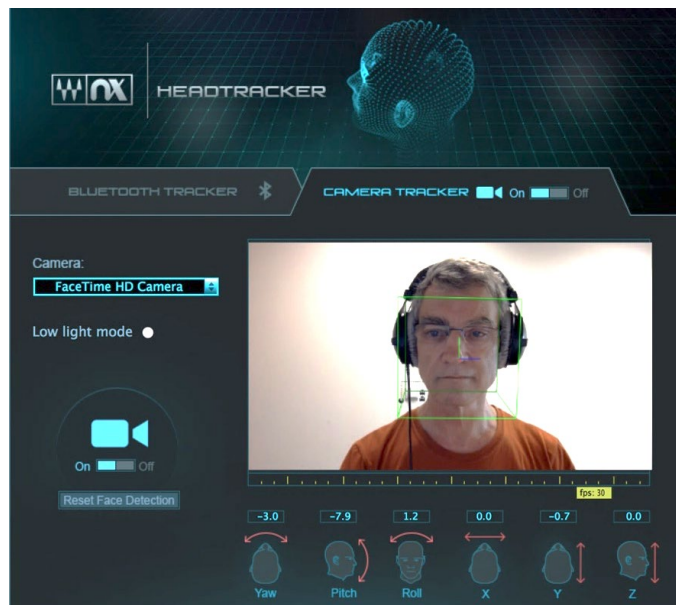
The Waves Nx HeadTracking Application

Waves Nx is the engine behind CLA Nx. Nx creates the Mix LA space and converts stereo or surround audio channels into a binaural headphone signal. NX HeadTracker is the Nx utility that uses camera and/or Bluetooth Head Tracker information to interpret the mix engineer's head movements.

If the HeadTracker app is closed, head tracking will stop. This will not affect the plugin or your DAW in any way: you can restart the application and re-establish head tracking. Click the Settings button in the Studio 3 Head Tracking section to bring the application forward or to reopen it if it's been closed.

The Camera Tracker and The Bluetooth Tracker are set up on separate tabs

Camera Tracker Tab



ON/OFF SWITCH lets you turn camera tracking **on** for tracking or **off** to save CPU resources. *This switch corresponds to the Head Tracking On/Off switch on the plugin.*

CAMERA SELECT MENU selects the camera to track with if you have more than one camera connected to the computer. *You can also select a camera in the Head Tracking panel of the plugin.*

RESET FACE DETECTION resets the face detection algorithm. Reset face detection whenever you change users or if you suspect that the tracking sensor is not tracking correctly.

LOW LIGHT MODE increases the frame rate in poor lighting conditions. It is available only when you are working with a “FaceTime HD” camera built into certain MacBook Pro computers.

FRAME RATE INDICATOR displays the current frame rate. Higher frame rates indicate greater tracking resolution, and therefore greater tracking accuracy.

TRACKING DATA value boxes display the continuously refreshed head positions captured by the camera tracking device.

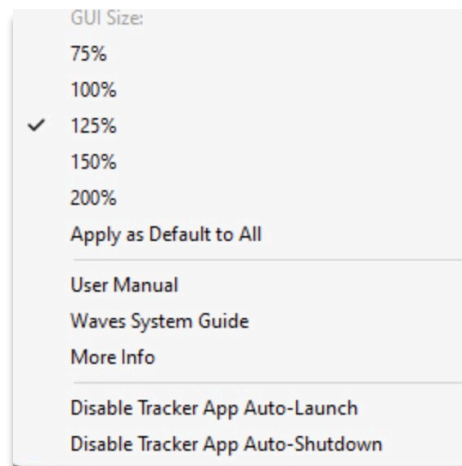




The Camera Tracker can follow motion on these axes: yaw, pitch, roll, x-axis, y-axis, and z-axis. Each type of motion is illustrated in the head diagrams.

Utility Menu

 A small file icon in the upper-right corner of the window opens a utility menu. The menu serves three purposes:



Resize the plugin interface. Select “Apply as Default to All” and the plugin will always open at the same size.

Open the manuals for the plugin or the WaveSystem. “More Info” takes you to the Waves web site.

Change Nx HeadTracker app open/close behavior.”

The *Nx HeadTracker* app launches automatically when you instantiate the CLA Nx plugin. If you don’t want to use Head Tracking, or you don’t want it to launch automatically, select “Disable Tracker App Auto-Launch.”

By default, Nx HeadTracker quits when you remove the plugin or make it inactive, or when you close the host application. To prevent it from quitting automatically, choose “Disable Tracker App Auto-Shutdown.”



Bluetooth Tracker Tab

The Bluetooth Tracker tab is used to connect Nx Head Tracker devices.



DEVICE LIST shows all available Nx Head Tracker devices, and indicates their status (Connected, Disconnected, Connecting, Unavailable). Up to seven Nx Head Tracker devices can be detected and connected simultaneously.

CONNECT (check box) – Check or uncheck this box in order to connect or disconnect an Nx Head Tracker device that appears in the device list.

REFRESH DEVICE LIST clears the list and rescans for Nx Head Tracker devices.

OPEN BLUETOOTH SETTINGS is used to manually unpair a device when needed as a troubleshooting step.

RENAME lets you rename your Nx Head Tracker device. Renaming is permanent. The device will advertise itself with the new user-defined name.

1. Click the “Rename” button. A text box will open.
2. Enter a new name for the Nx Tracker device (between five and fifteen characters) and click OK. This process can take up to three minutes.



3. The device will restart and reconnect automatically with the new user-defined name. This process can take up to twenty seconds to complete.

UPDATE initiates a firmware update on the selected Nx Head Tracker device. A message in red text will appear when a firmware update is available. If a firmware update is available, click Update. A dialogue box will open; follow its instructions to complete the update procedure.

IDENTIFY causes a light on the selected Nx Head Tracker device to blink. This helps to identify the specific head tracking device when you have more than one connected.

FW VERSION displays the current Head Tracker device firmware version.

AUTOMATIC CONNECT automatically creates a connection with any Nx Head Tracker device (when On). When Automatic Connect is unchecked, the application will automatically detect Nx Head Tracker devices and add them to the list, but the user will have to initiate the connection using the Connect button in the list.

We suggest that you select Off when there are several available Nx Head Trackers on different systems, in order to have better control of which system works with each Nx Head Tracker. This control is On by default.

TRACKING DATA value boxes display the continuously refreshed head positions captured by the Bluetooth tracking device.



The Bluetooth Tracker can follow motion in these directions: yaw, pitch, and roll. Each type of motion is illustrated in the head diagrams.



Setting Up the Nx Head Tracker

CONNECTING THE NX HEAD TRACKER

1. Mount the Nx Head Tracker on top of the headphone band, with the logo facing forward. Nx Head Tracker L and R identification should have the same orientation as the L and R on your headphones. Inaccurate positioning of the Nx Head Tracker will result in inaccurate head tracking.
2. Power up the Nx Head Tracker device. Make sure your computer's Bluetooth is on and that it supports Bluetooth Low Energy (BLE). The head tracking application will automatically connect to the Nx Head Tracker(s).
3. Select a Head Tracker device from the drop-down Tracking Device menu.
4. To take a device online or offline, rename it, or check battery status, go to the Bluetooth tab of the Nx Head Tracker app. You can bring Nx Head Tracker to the front by clicking the Settings button on the CLA Nx interface.
5. Calibrate Head Tracking in the CLA Nx plugin.

BASIC OPERATION

1. Move your head left and right, then up and down, to confirm that the virtual head in the CLA Nx interface moves in sync with you. Note that, with some DAWs, you will need to play a bit of audio for the virtual head to wake up.
2. Position yourself where you want to be located while you mix. Press the **Calibrate** button in the Head Tracking section. This will now be your center position in the studio.
3. Listen to some program material, preferably a high-quality reference that you're familiar with. Take a few minutes to let your ears adjust to the effect.

The default values of the plugin's controls are a good place to start.

Now you're ready to monitor your mix through headphones, as though you were in Chris's chair at Mix LA, using head tracking to realistically experience the three-dimensional space.



Troubleshooting Guide

Problem	Possible Solutions
Head does not move in interface – no tracking	<ol style="list-style-type: none"> 1. Verify head tracking is on in the plugin interface. 2. Check if tracker app is running. 3. Play audio through the plugin (plugin on CPU). 4. Check tracking rate box in plugin GUI.
Head tracking application is not running	<ol style="list-style-type: none"> 1. Restart head tracking through the plugin. 2. Inactivate/reactivate plugin.
Low tracking rate in the head tracking app (<20 fps) (Camera)	<ol style="list-style-type: none"> 1. Improve lighting conditions. 2. In MacBook only, select “low light” mode in the tracker app. 3. Point the camera up slightly for a brighter frame. 4. Make sure that your face is well lit and not shadowed.
Low tracking rate in plugin interface (<20 fps) (Camera)	<ol style="list-style-type: none"> 1. Check the tracking rate in the head tracking app. 2. Verify audio buffer size is 1024 samples or lower.
Head tracking app often loses track of your head (Camera)	<ol style="list-style-type: none"> 1. Position the camera closer and straight in front of your face. 2. Remove sunglasses, hat or anything covering your face. 3. Improve lighting conditions. 4. Stay within +/-30 degrees off the center of the camera. 5. Make sure you’re no further than 5-6 feet away from camera.
Nx Head Tracker will not connect (Windows only)	Make sure that the Nx Head Tracker is NOT currently paired to your computer in the Bluetooth Settings menu. If it is paired with the computer, remove it manually.



Problem	Possible Solutions
<p>Nx Head Tracker loses connection and doesn't move smoothly</p>	<ol style="list-style-type: none"> 1. Try using a new battery. 2. Try moving the Nx Head Tracker and the Bluetooth receiver closer together. 3. If you are using a BT-USB dongle on a desktop, connect the dongle on the front panel, or on an extension for better BT reception.
<p>Nx Head Tracker is tracking my movements but in wrong directions</p>	<p>Make sure the Nx Head Tracker is mounted on the top of the headphone arc with the logo side facing forward (L & R on the Nx Head Tracker should correspond to L & R on your headphones). Inaccurate positioning of the Nx Head Tracker will result in inaccurate head tracking.</p>
<p>Audio is not externalized enough; the virtual positions are not clear</p>	<ol style="list-style-type: none"> 1. Verify L/R placement and routing of your headphones. 2. Verify that Nx is inserted at the last summing buss in the signal flow, with no other channels bypassing it. 3. Verify that head tracking is working. 4. Recalibrate head tracking. 5. Mute/unmute individual virtual speakers by double-clicking on them and listening to their position. 6. Measure and set your personal Head Modeling parameters. 7. Make sure the head modeling section is set to your individual measurements or to the factory default settings. Unreasonable head size settings can ruin the spatial effect.
<p>No communication between head tracking app and the plugin</p>	<p>Close the head tracking app, inactivate and reactivate the plugin.</p>
<p>Head tracking shows some latency</p>	<ol style="list-style-type: none"> 1. Try to increase the tracking rate, optimally up to 30 fps. 2. Try to lower the buffer size. 3. In some DAWs, Nx must be on the master buss or on a live input AUX path in order to run with the user-set buffer size.
<p>FW update fails in the middle of the process.</p>	<p>Replace the battery.</p>

