

TN17

1 Introduction

This configuration requires the following elements:

- In this document, a basic setup of the whole system will be described, using the following connections:

- ## 2 Hardware Connection

The diagram illustrates the connection setup for a Powered DUT (Device Under Test) using Dante network technology. The components and their connections are as follows:

- Powered DUT:** A device with a speaker and a microphone input.
- Test Mic:** A microphone connected to the Powered DUT.
- Passive DUT:** A device with a speaker and a microphone input, connected to the Powered DUT.
- Diagnostics Mic:** A microphone connected to the Powered DUT.
- 48 V Power Supply:** Provides power to the Powered DUT and the Diagnostics Mic.
- Laptop:** Connected to the network switch via a USB cable.
- License Dongle:** Connected to the network switch via a USB cable.
- Network Switch:** A switch with multiple ports, including a PoE (Power over Ethernet) port.
- Powersoft Mezzo / Unica Series:** A network switch that provides PoE power to the Dante-XLR Adaptor and the PoE Injector.
- Dante-XLR Adaptor:** Connected to the network switch via a PoE cable.
- PoE Injector:** Connected to the network switch via a PoE cable.

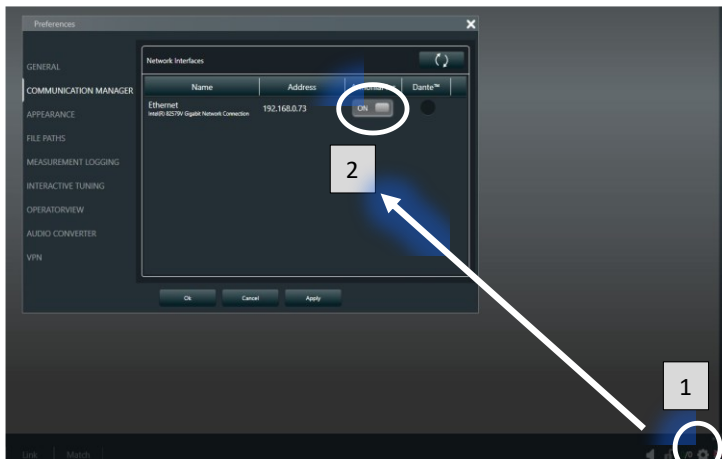
3 Powersoft Armonia Plus Setup

The software Powersoft ArmoniaPlus provides control and monitoring of a wide range of amplifier functions, such as attenuation, mute, internal temperature and voltage rail monitoring for the Powersoft amplifier series.

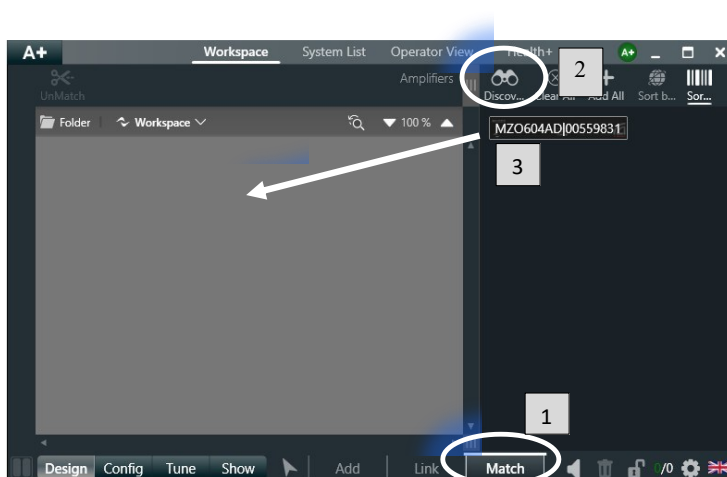
3.1 General Steps

First, it is required to add and match the device of interest to the Armonia workspace:

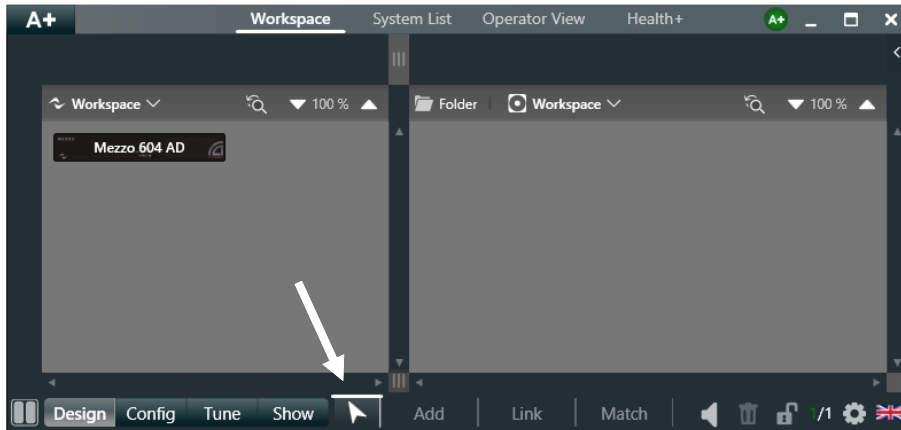
1. Open software ArmoniaPlus (no login or any specific project required)
2. Make sure the correct Ethernet interface is chosen. Click the “Configuration” icon at the bottom right and activate the “ArmoniaPlus” slider on the correspond



3. Activate the synchronization by clicking at the red “A+” at the top right corner and turn the synchronization to “on”
4. Find and match the corresponding Powersoft device by opening the “Match” window and click on “Discovery”. Move the device to the workspace by drag & drop to the left plane.

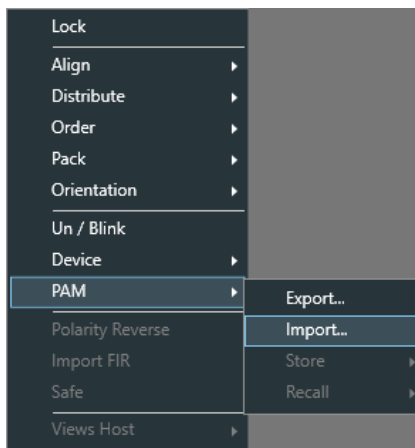


5. After the device has been added to the workspace, it can be edited by clicking on the arrow icon at the bottom



3.2 Load QC Preset for Powersoft Devices

Right click the device and select “PAM / Import”:

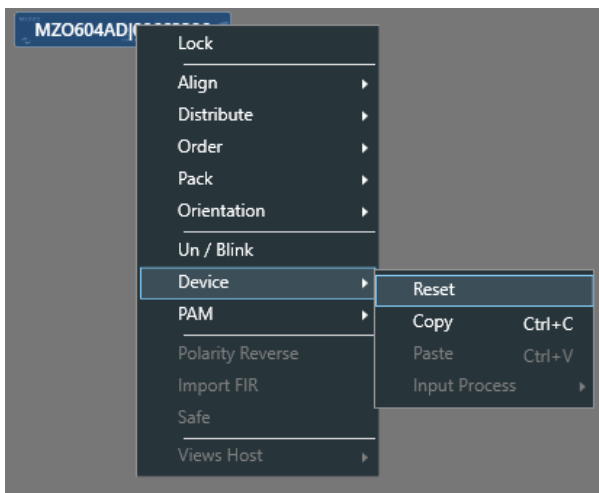


Select the preset file (extension.pam) attached to this technical note. This configures the Powersoft amplifier according to this document. However, you can configure your amplifier manually as well. To do it, follow the next instructions.

3.3 Manual Configuration

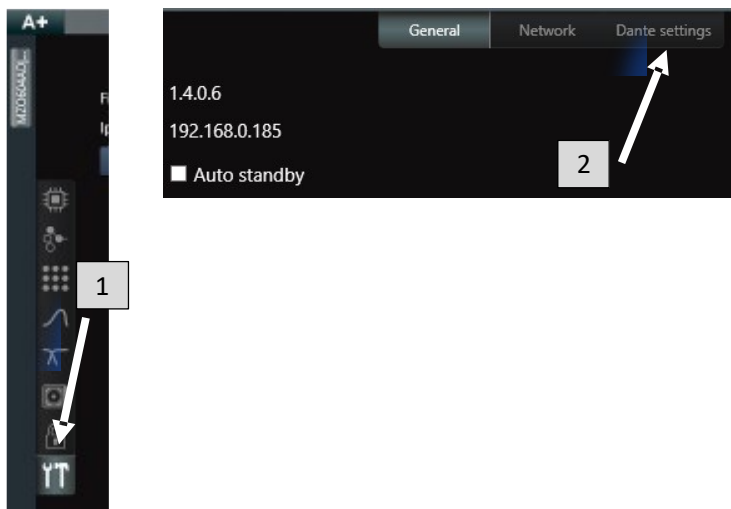
3.3.1 Reset Device

Right click on the device and go to “Device / Reset”:



3.3.2 Amplifier Dante Outputs Setup

1. Double click the device in the workspace.
2. Choose the “Setting” symbol and go to “Dante settings”.



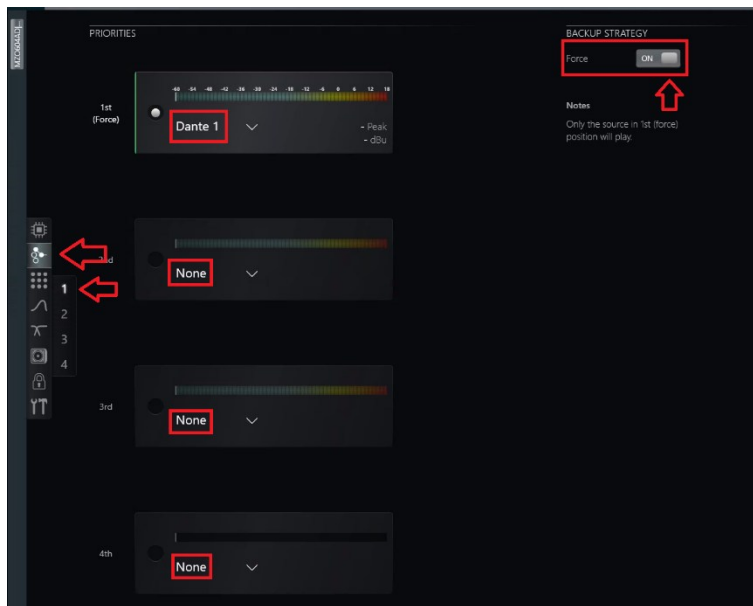
3. The table shows the four Dante outputs and their source signal. Uncheck the “Disabled” checkbox, select a “pick point” and a corresponding amplifier channel. The last column allows for custom gain adjustment (not recommended). The following configuration corresponds to the channel routing described in the introduction chapter and recommended for QC applications:

Transmitted channels					
		Disabled	Pick point		Trim (dB)
1	Dante OUT1	<input type="checkbox"/>	Out Voltage ▼	1 ▼	▼ 0 ▲
2	Dante OUT2	<input type="checkbox"/>	Out Current ▼	1 ▼	▼ 0 ▲
3	Dante OUT3	<input type="checkbox"/>	Physical IN ▼	Analog 1 ▼	▼ 0 ▲
4	Dante OUT4	<input type="checkbox"/>	Physical IN ▼	Analog 2 ▼	▼ 0 ▲

- 1: Provides the amplifier output voltage of amplifier channel 1
- 2: Provides the amplifier output current of amplifier channel 1
- 3: Provides the 1st analog input of the Powersoft amplifier (microphone input)
- 4: Provides the 2nd analog input of the Powersoft amplifier (optional ambient noise microphone input)

3.3.3 Sources Setup

Sources are the stimulus signals provided by the QC software to be amplified by the Powersoft amplifier. Check this configuration since it is critical to avoid unwanted signals at the amplifier outputs. Force all channels to use their corresponding Dante Channel as 1st priority and assign no priority the rest of them (Channel 1 → Dante 1; Channel 2 → Dante 2; ...).

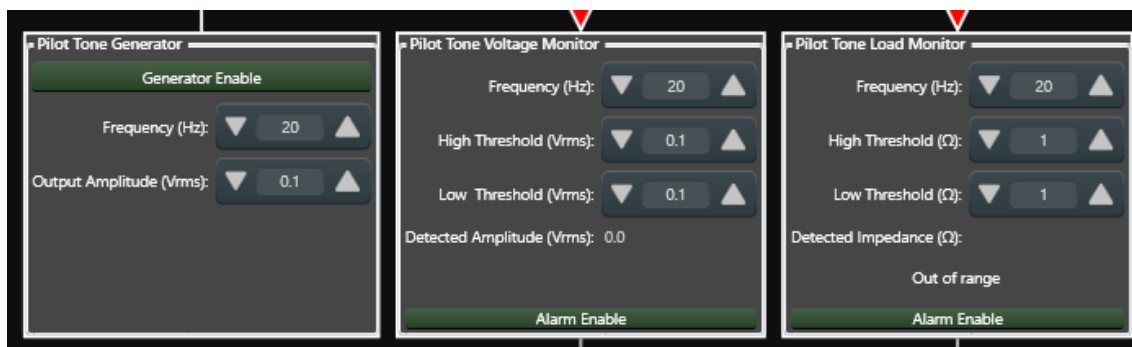


3.3.4 Check that Pilot Tone Monitor is deactivated

1. Double click the device in the working space.
2. Click the “Crossover” symbol and a corresponding channel to inspect. (Amplifier Channel 1 in the example below).
3. Click “Diagnostic” tab.



4. Confirm that the “Pilot Tone Generator” is deactivated at all channels:

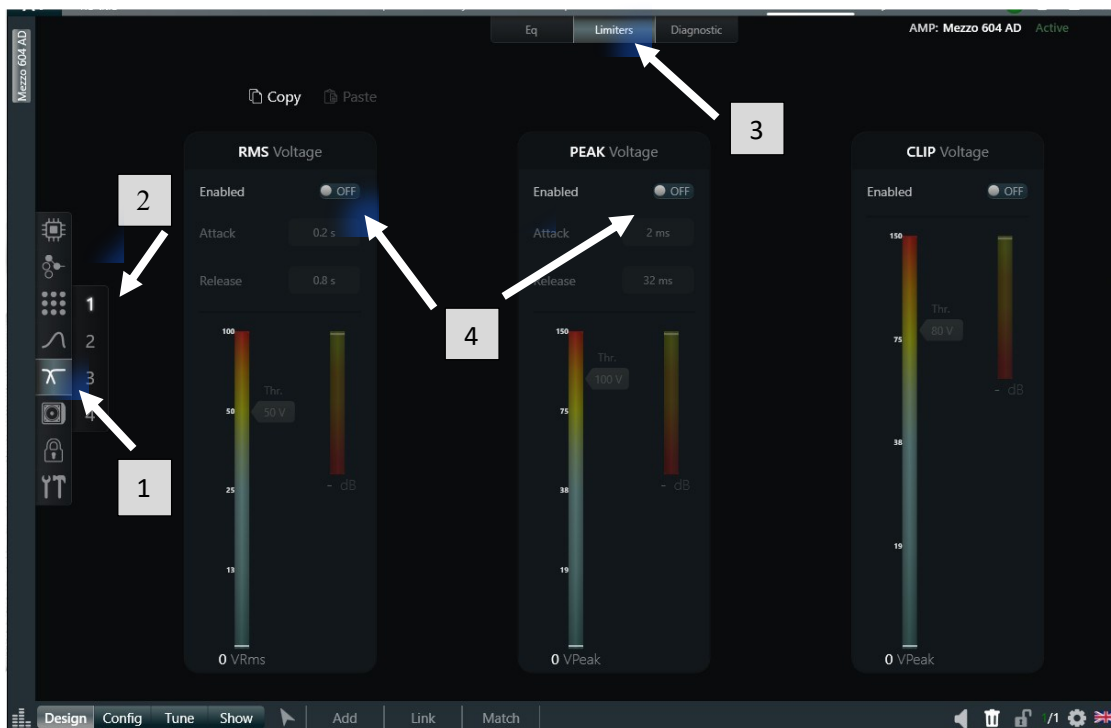


3.4 Further DUT Protection: Limiter and Equalization

3.4.1 Limiter (Recommended)

The use of a limiter to control the max. RMS and Peak voltages applied to the DUT terminals is highly recommended to avoid the destruction of the speakers if a wrong stimulus voltage or digital level is set up in the QC operation.

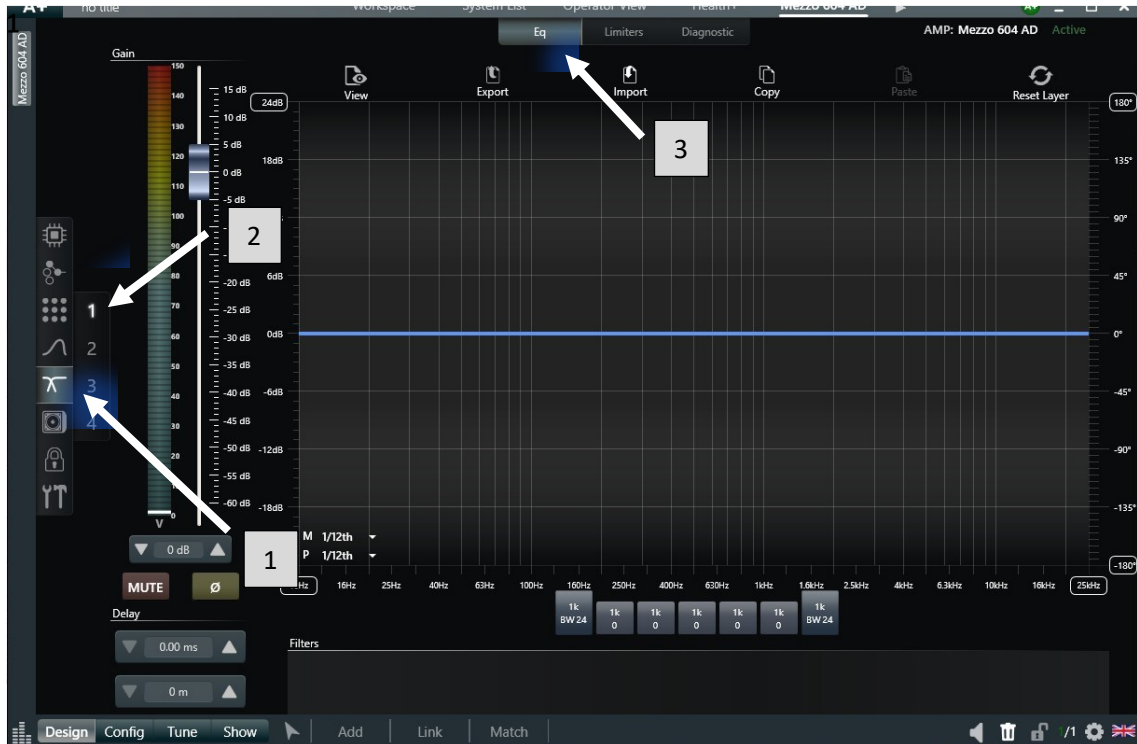
1. Double click the device in the working space.
2. Click the “Crossover” symbol and a corresponding channel to inspect. (Amplifier Channel 1 in the example below).
3. Click “Limiters” tab.
4. Activate “RMS” and “Peak Voltage” according to your application.



3.4.2 Equalizer (Optional)

Applying high- or low-pass filters can be mandatory in some special cases such as measurements of 2-way speakers that rely on external crossover as provided by system amplifiers. In this case, the equalizer can be configured as a crossover filtering stage.

1. Double click the device in the working space.
2. Click the “Crossover” symbol and a corresponding channel to inspect. (Amplifier Channel 1 in the example below).
3. Click “Eq” tab.

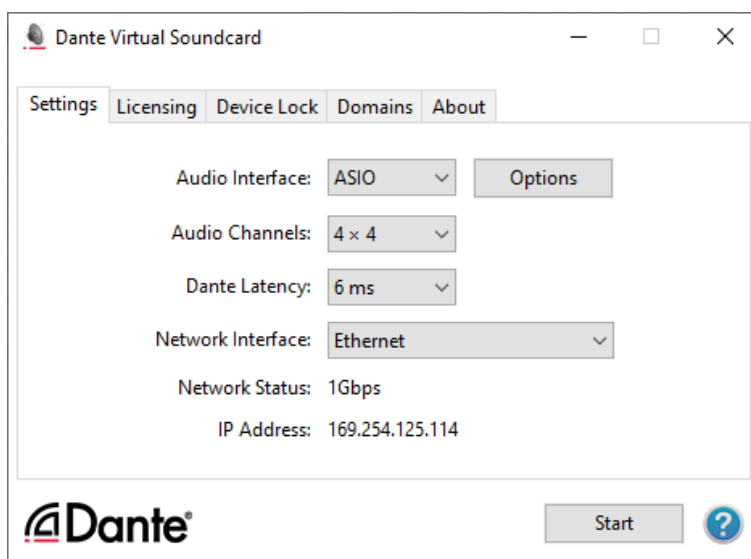


4 Dante Networking Setup

Dante audio-over-IP networking solution is used to transmit signals between dB-Lab and the Powersoft amplifier as well as the Dante-XLR adaptor. The Dante setup comprises two different software applications: Dante Virtual Soundcard and Dante Controller.

4.1 Dante Virtual Soundcard

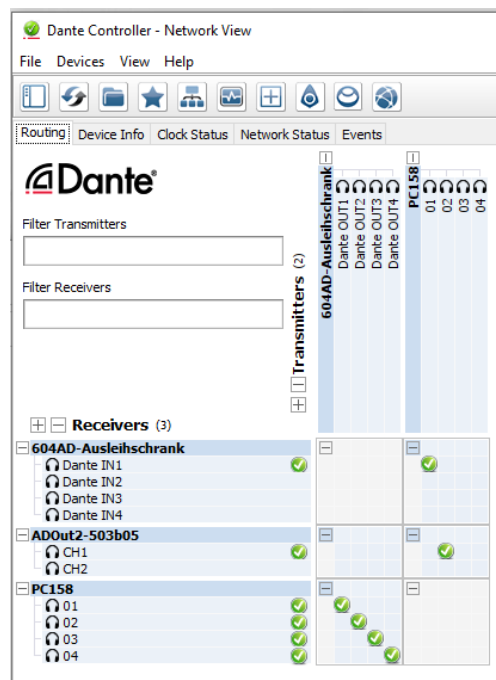
The Dante Virtual Soundcard is a software application which turns the PC into an ASIO Dante-enabled device allowing Dante audio traffic to be transmitted and received. Once it is installed and the license is activated, the Dante Virtual Soundcard is available and ready to work. Configure your Dante Virtual Soundcard using the following settings and start it:



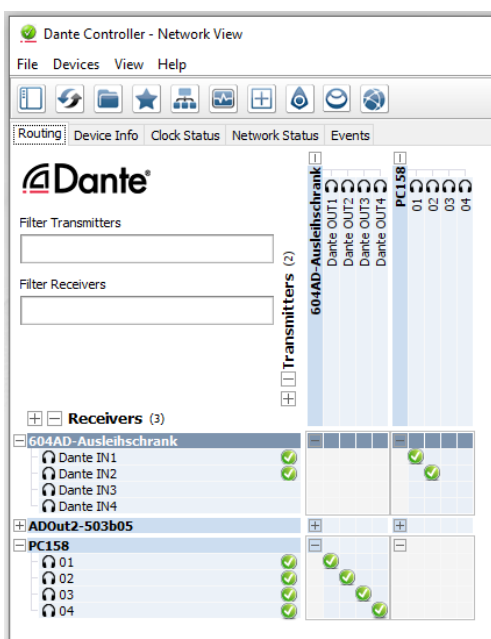
4.2 Dante Controller

The Dante Controller is a software application which allows users to configure and route audio around Dante networks. The Routing tab of the network view will show all the available devices and how they are connected. For Klippel QC applications we recommend to use the following configuration:

1. PC transmitters (Outputs 1/2) connected to the Powersoft amplifier receivers (Dante Input 1 and Dante Adapter ADOut2). Through these connections the stimulus signals will be transmitted from dB-Lab QC outputs 1/2 to the passive DUTs (through amp) and self-powered DUTs (through Dante Adapter) respectively.
2. Powersoft amplifier Dante OUT1 to 4 (Transmitters) connected to PC Inputs 1 to 4 (Receivers). All the measured signals will be transmitted from the Powersoft amplifier to dB-Lab to be analyzed by the QC operation.



Alternatively, both PC Outputs could be configured to feed passive DUTs using Dante IN 1/2 if the user application does not include any self-powered speaker (no Dante adapter required):



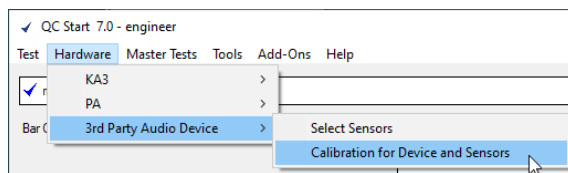
5 Klippel dB-Lab Setup

The configuration of dB-Lab comprises two different steps: the sound device and sensors calibration and the QC operation configuration.

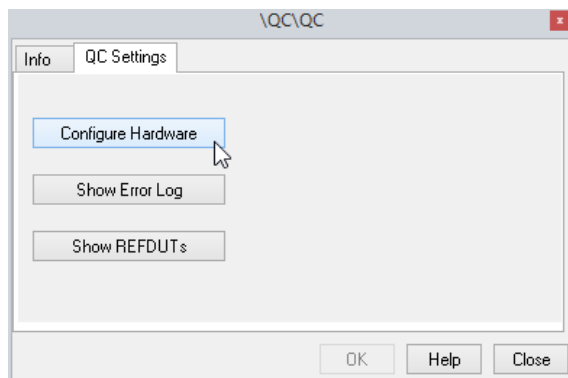
5.1 Calibration

The Powersoft amplifier will be used as playback and capture device via Dante Virtual Soundcard in dB-Lab (QC modules only). This configuration requires a first calibration of the device followed by a calibration of every sensor used in the measurement (microphones, amplifiers built-in voltage and current sensors). A digital multimeter and a high-power resistor are necessary to perform the calibration. Please follow these instructions to calibrate the system. This process is described also in online manual chapter [3rd Party Audio Device Based Setup](#):

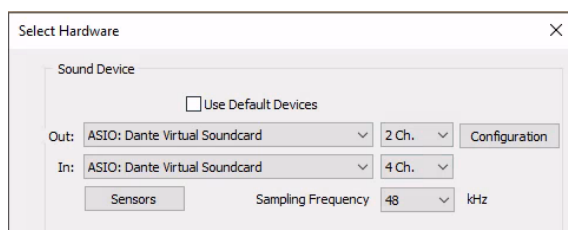
1. In QC Start - Engineer select "Hardware / 3rd Party Audio Device / Calibration for Device and Sensors":



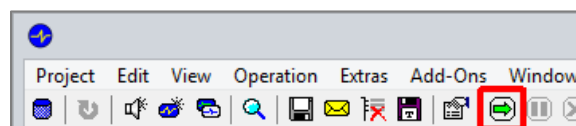
2. Open the property page "QC Settings" and select "Configure Hardware" to select the audio configuration:



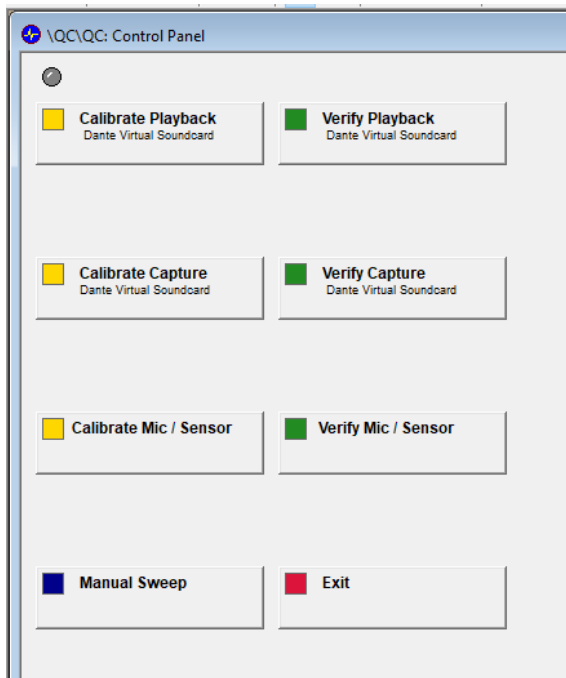
3. Select ASIO: Dante Virtual Soundcard, Out 2 Ch. and In 4 Ch.:



4. Save the settings in the hardware menu and log into the calibration procedure by clicking on the run icon (green arrow):

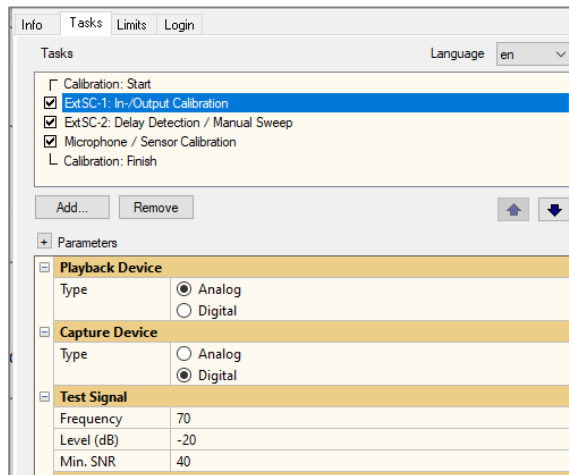


The “Control Panel” shows the available actions:



5. Playback / Capture Calibration: In the properties page select “Analog” as “Playback Device” and “Digital” as “Capture Device”. Select -20 dB or a lower value at Test Signal Level to avoid high voltages during calibration process:

Note: Playback device can be both digital and analog. The main advantage of analog calibration is that the test stimulus level can be defined directly in Volts (RMS). On the contrary, stimulus level is set in dB Full Scale (dBFs) if digital playback calibration is used.



- a. Click “Control Panel” button “Calibrate Playback” and follow the instructions.
 - b. Click “Control Panel” button “Calibrate Capture” and follow the instructions.
6. Calibrate Mic / Sensor: all sensors must be calibrated individually:

Electrical sensors (voltage and current): In the property page select “Measure with Internal Stimulus (Internal Playback)” as calibration mode. Fill in the sensor properties (Input Channel 1 -> Voltage sensor; Input Channel 2 -> Current sensor) and define stimulus at output channel 1. Click button “Calibrate Mic / Sensor” in “Control Panel” and follow the instructions:

a. Voltage:

Mode	
Calibration Mode	<input type="radio"/> Specify Sensor Properties <input type="radio"/> Measure with External Stimulus (e.g. Calibrator) <input checked="" type="radio"/> Measure with Internal Stimulus (Internal Playback) <input type="radio"/> Use Calibration Wavefile
Sensor Properties	
Sensor Name	Voltage Mezzo Ch1
Type	Voltage
Max Level (Peak)	150
Inverted Output	<input type="checkbox"/>
Channel	1
Stimulus	
Test Frequency	1000
Test Voltage	10
Output Channel	[1]

b. Current:

Mode	
Calibration Mode	<input type="radio"/> Specify Sensor Properties <input type="radio"/> Measure with External Stimulus (e.g. Calibrator) <input checked="" type="radio"/> Measure with Internal Stimulus (Internal Playback) <input type="radio"/> Use Calibration Wavefile
Sensor Properties	
Sensor Name	Current Mezzo Ch1
Type	Current
Max Level (Peak)	20
Inverted Output	<input type="checkbox"/>
Channel	2
Stimulus	
Test Frequency	1000
Test Voltage	10
Output Channel	[1]

Microphone: Microphones are calibrated using an external stimulus (a pistonphone or calibrator).

Note that channel 3 corresponds with the measurement microphone and channel 4 with the optional noise microphone:

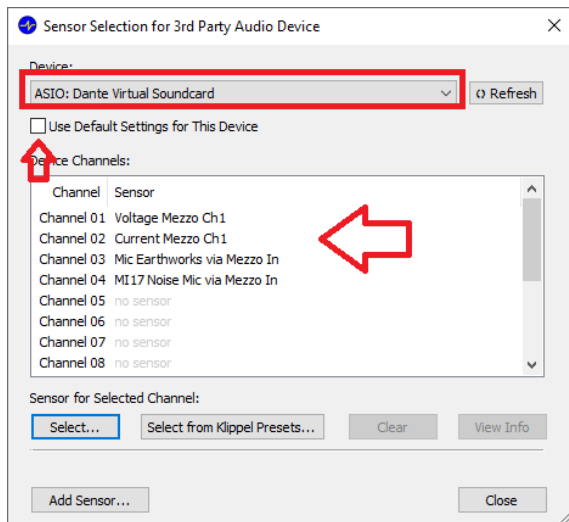
Mode	
Calibration Mode	<input type="radio"/> Specify Sensor Properties <input checked="" type="radio"/> Measure with External Stimulus (e.g. Calibrator) <input type="radio"/> Measure with Internal Stimulus (Internal Playback) <input type="radio"/> Use Calibration Wavefile
Sensor Properties	
Sensor Name	Mic Earthworks via Mezzo In
Type	Microphone
Max Level (Peak)	135
Inverted Output	<input type="checkbox"/>
Channel	3
Pistonphone	
Test Frequency	1000
Test Level	114
Level from File	

Note: If the sensitivity and max level values of sensor are known (e.g. microphone sensitivity), the sensor calibration can be skipped by specifying the sensor properties directly by using the calibration mode “Specify Sensor Properties”.

- Once all sensors are calibrated and the respective sensor data files are saved, the last step is to select and route the sensors for the different input channels for QC operations. To do that, log out of the calibration operation and open tab “Hardware / 3rd Party Audio Device / Select Sensors” menu:

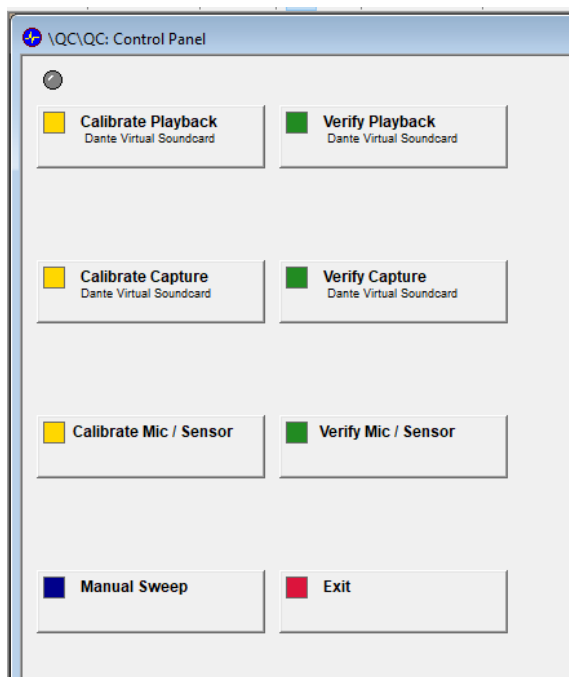
Hardware	Tools	Window	Help
KA3	>		
DA2 / Power Monitor	>		
KET	>		
PA	>		
3rd Party Audio Device	>	Select Sensors	
Dongle	>	Device Calibration for QC Operations	

Select the following sensor configuration:

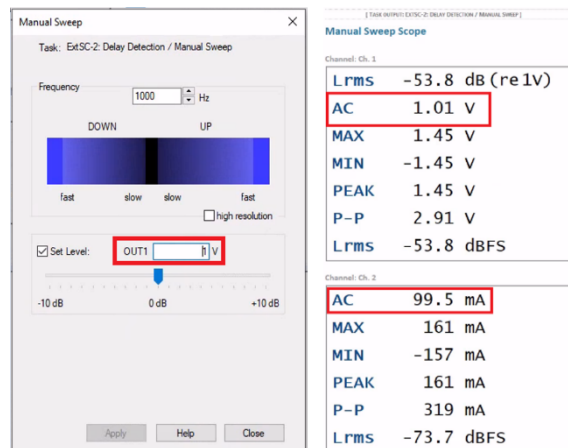


5.1.1 Verification

The verification of the calibration process can be done step by step using the “Verify” buttons. Alternatively, you can verify the playback through Powersoft amplifier Out 1 together with the electrical sensors with a measurement. To do that, connect a resistor at the terminals of the Powersoft amplifier output and click the “Manual Sweep” button on the control panel:

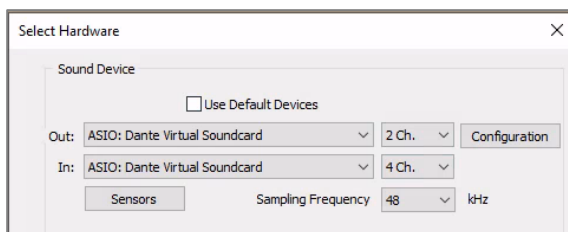


The window “Manual Sweep Control” will be opened and the test signal will be played automatically. Note that the playback channel (OUT1) corresponds to the Powersoft amplifier output whose electrical sensors are captured. For that reason, the AC/RMS value measured in the channel 1 (Voltage sensor) should coincide with the voltage value selected in the window “Manual Sweep Control” (OUT1). Furthermore, the AC/RMS value of the channel 2 (Current sensor) should correspond with the expected current according to the resistance value. In the following example 1 Volt is applied to a 10 Ohm resistor:



5.2 Configuration of QC Operation

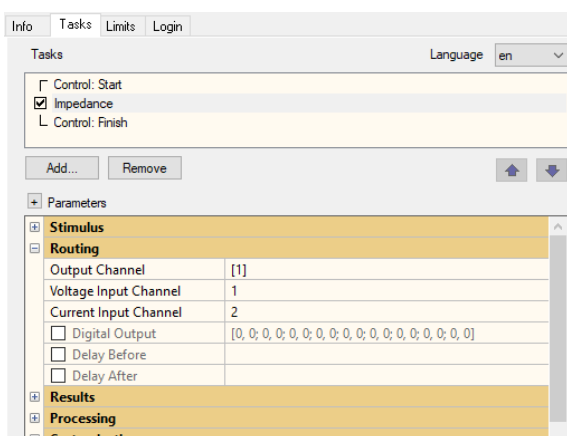
Once the calibration of 3rd party device and sensors is finished, the QC software is completely configured to run measurements. From now on you can create and run your own QC Operations using the templates available in dB-Lab or QC Start. Note that the correct playback and capture hardware and routing must be selected during the configuration of your QC Operations. Before logging into the QC Operation, select the same hardware settings as used previously for calibration:



In the test sequence, select the output and inputs channels according to your measurement requirements as shown in the following examples:

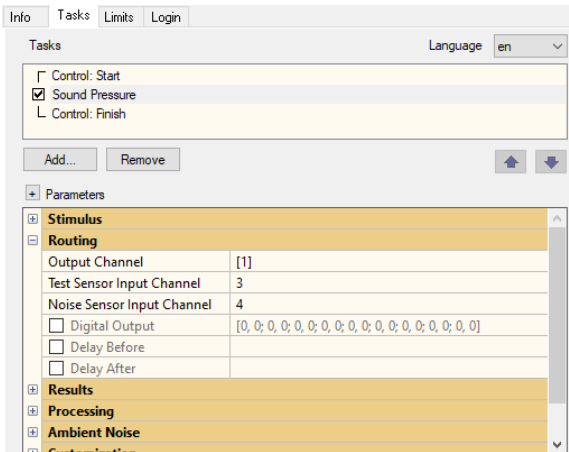
Impedance Task: applied to a passive DUT via Powersoft amplifier:

- Output Channel = 1: Powersoft amplifier Output 1
- Voltage Input Channel = 1: Voltage Sensor at Powersoft amplifier Output 1
- Current Input Channel = 2: Current Sensor at Powersoft amplifier Output 1



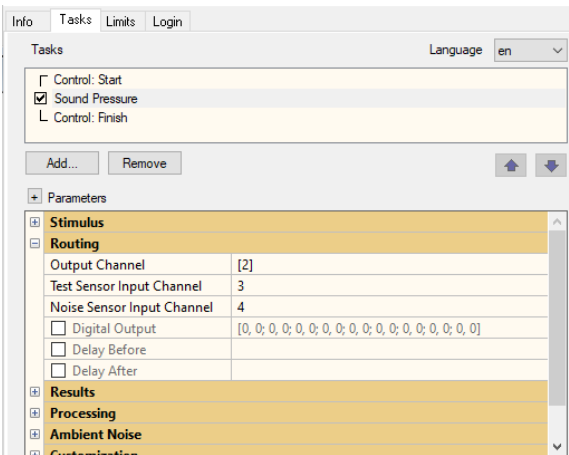
Sound Pressure Task: applied to a passive DUT via a Powersoft amplifier:

- Output Channel = 1: Powersoft amplifier Output 1
- Test Sensor Input Channel = 3: Signal Microphone
- Noise Sensor Input Channel = 4: Ambient Noise Microphone (opt)



Sound Pressure Task: applied to a self-powered DUT via a Powersoft amplifier:

- Output Channel = 2: Dante Adapter Ch1
- Test Sensor Input Channel = 3: Signal Microphone
- Noise Sensor Input Channel = 4: Ambient Noise Microphone (opt)



6 References

Specifications	C3: QC End-of-Line Test Framework
Manuals	QC Manual
Application Notes	AN 79b: Efficient, Mobile Quality Assurance of PA Speakers
Other Resources	Powersoft amplifiers ArmoniaPlus software Dante Virtual Sound Card Dante Controller

Find explanations for symbols at:

<http://www.klippel.de/know-how/literature.html>

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