

Setting Up Dante® & Powersoft TN17 Mezzo for QC Stand-Alone

Technical Note for the KLIPPEL Analyzer System (Document Revision 1.0)

1 Introduction

This document describes all the different components and steps required to set up the Klippel QC software for using the *Mezzo Series* network amplifiers from *Powersoft* as playback and capture device. This configuration requires the use of the *Dante®* networking technology to allow the communication between both dB-Lab and *Mezzo* system.

This configuration requires the following elements:

- *Dante Virtual Soundcard* (license required)
- *Dante Controller software*
- *Powersoft Mezzo Series*
- *Dante-XLR* and *Power over Ethernet (PoE)* adapters (optional, required for self-powered DUTs)
- Test microphone
- Secondary microphone, ambient noise or diagnostics (optional)

In this document, a basic setup of the whole system will be described, using the following connections in the dB-Lab QC operation:

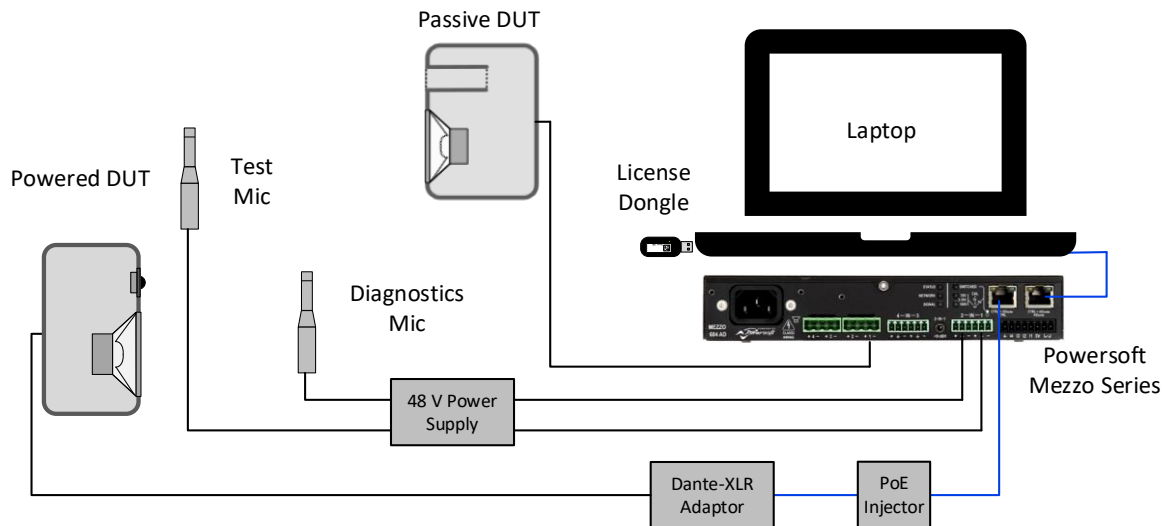
- Output channel 1 will be used to feed the stimulus to passive DUTs via *Mezzo* amplifier ch.1
- Output channel 2 will be used to feed the stimulus to self-powered DUTs via *Dante* adapter
- Input channel 1 will receive the voltage signal at DUT terminals (output 1)
- Input channel 2 will receive the current signal at DUT terminals (output 1)
- Input channel 3 will receive the microphone signal
- Input channel 4 will receive the ambient noise microphone signal (optional)

Note that this configuration can be customized according to the application requirements. For example, both output channels could be configured to feed stimulus to passive DUTs via *Mezzo* amplifier channels 1 and 2. In this case the electrical measurements would be available only for one output channel, since the *Mezzo Dante Channels* is limited to 4 signals.

In the following sections it will be explained in detail how every element of this chain shall be configured to run the measurements successfully.

2 Hardware Connection

Connect the devices according to the following schematic:



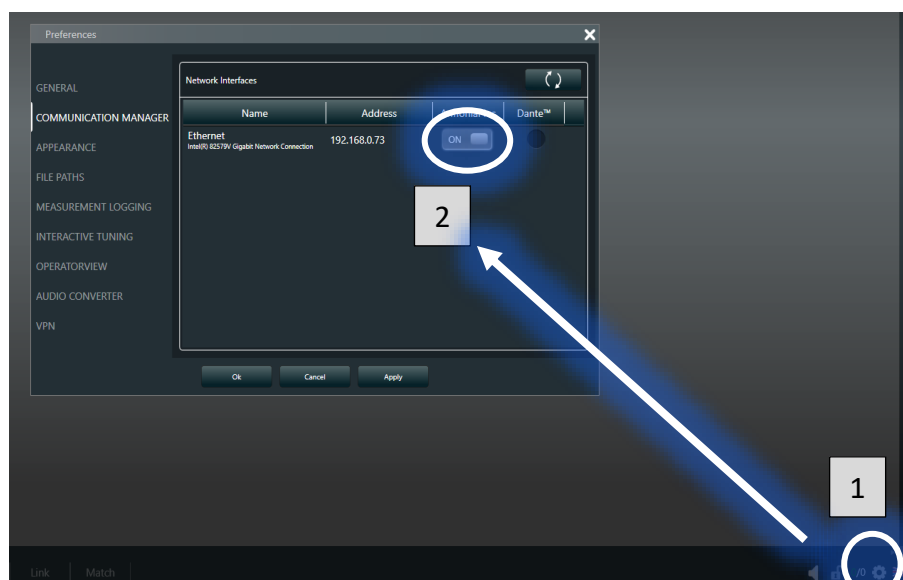
3 Powersoft Armonia Plus Setup

Powersoft Armonia Plus provides control and monitoring of a wide range of amplifier functions, such as attenuation, mute, internal temperature and voltage rail monitoring for the *Powersoft* amplifiers including the *Mezzo* series.

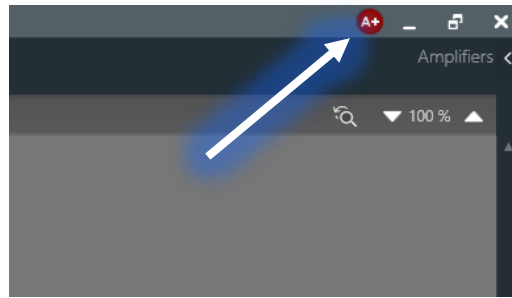
3.1 General Steps

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

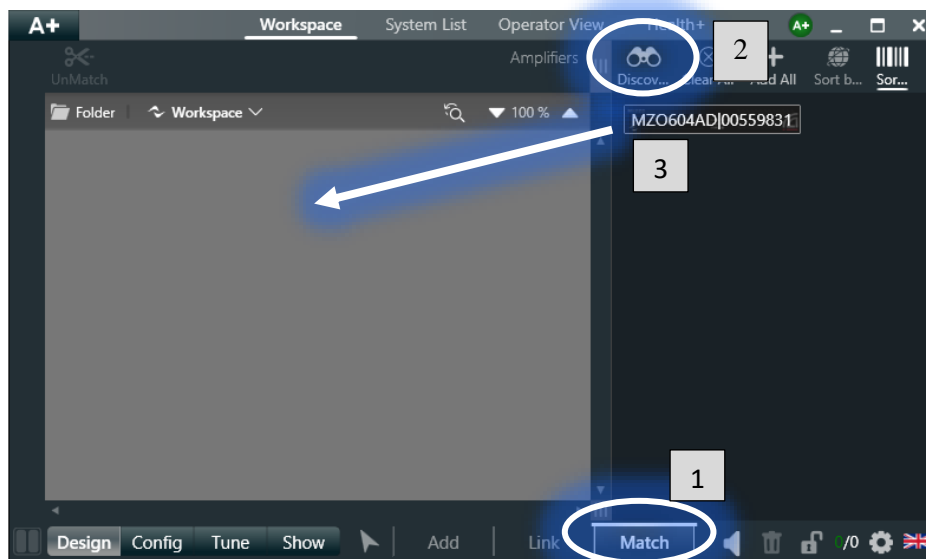
1. Open *ArmoniaPlus* (no login or any specific project required).
2. Make sure the correct Ethernet interface is chosen. Click the configuration icon at the bottom right and activate the *ArmoniaPlus* slider on the corresponding network:



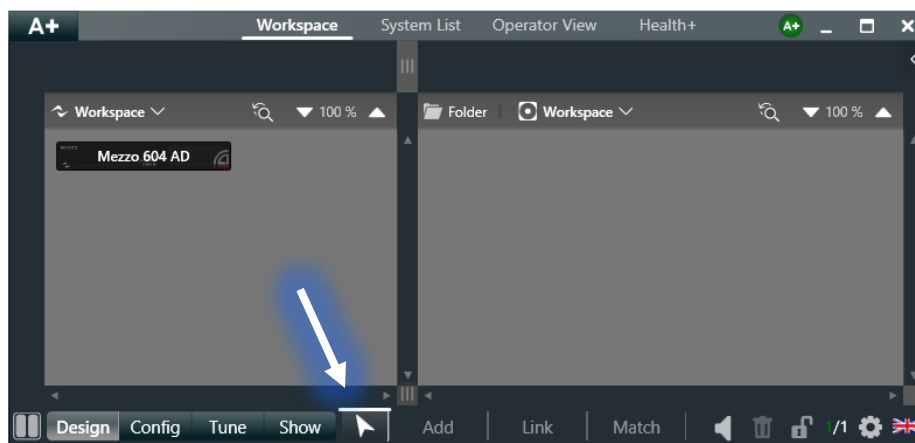
3. Activate the Synchronization by clicking at the red “A+” at the top right corner and turn the synchronization to “on”:



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.

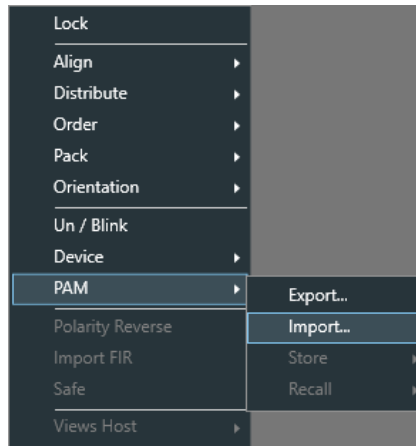


5. After the device has been added to the workspace, it can be edited by clicking on the arrow icon at the bottom:



3.2 Load QC Preset for *Mezzo 604 AD* Devices

Right click the device and go to *PAM / Import*:

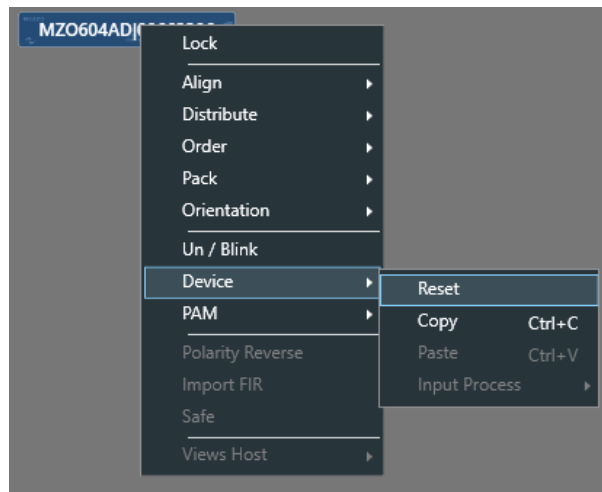


Select the preset file (extension *.pam*) attached to this technical note. This preset configures the *Mezzo* amplifier according to this document. However, you can configure your amplifier manually as well. To do it, follow the next instructions.

3.3 Manual Configuration

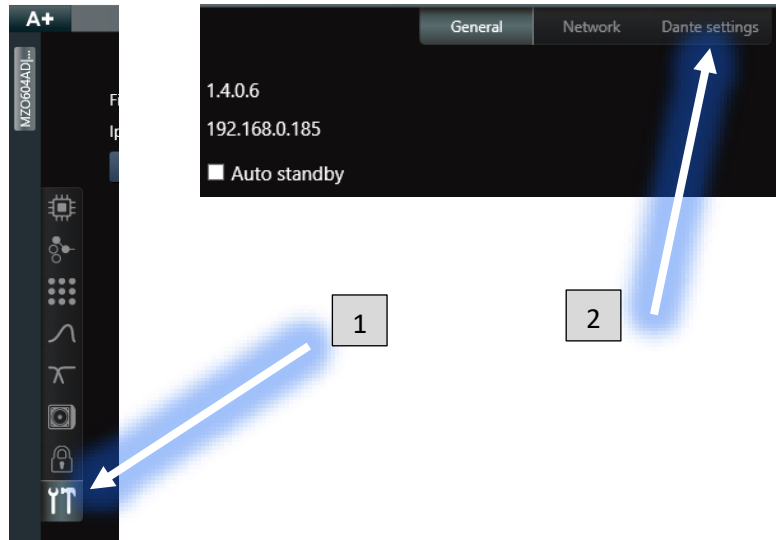
3.3.1 Reset Device

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*.



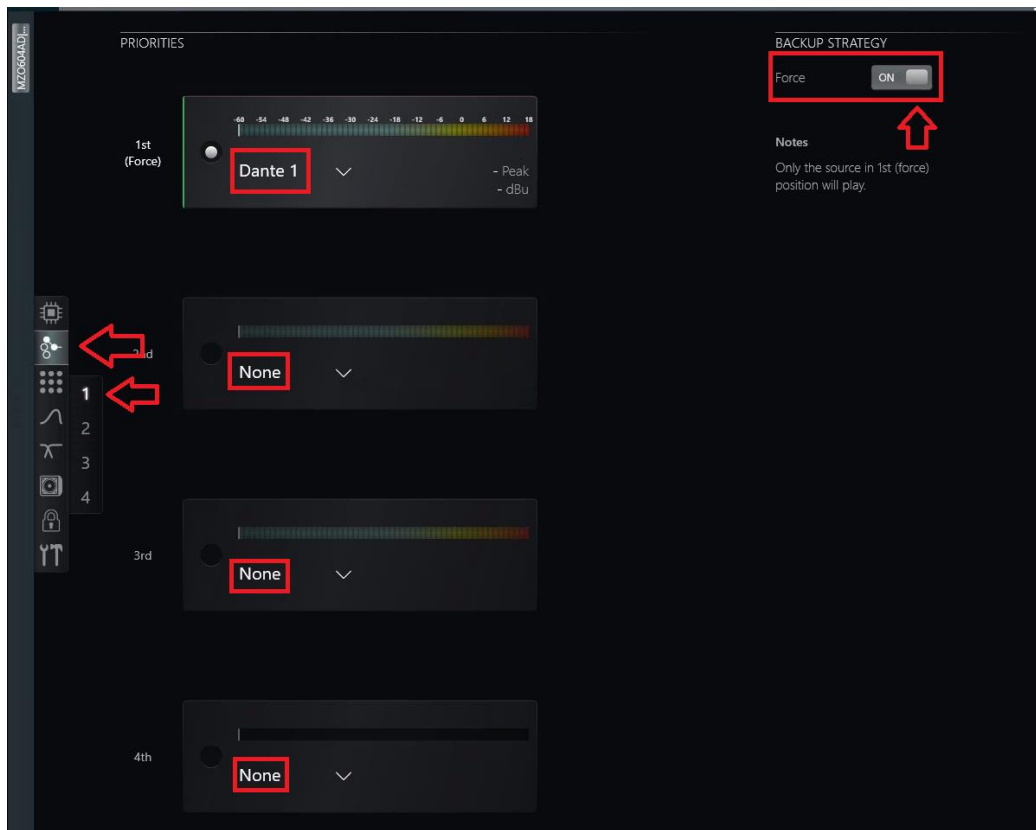
3. The table shows the four Dante outputs and their source signal. Uncheck the *Disabled* checkbox, select a *pick point* and a corresponding amplifier channel. The last column allows for custom gain adjustment (not recommended). The following configuration corresponds to the channel routing described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

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

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 *Mezzo*, which corresponds to the microphone input.
4. Provides the 2nd analog input of the *Mezzo*, which corresponds to the optional ambient noise microphone input.

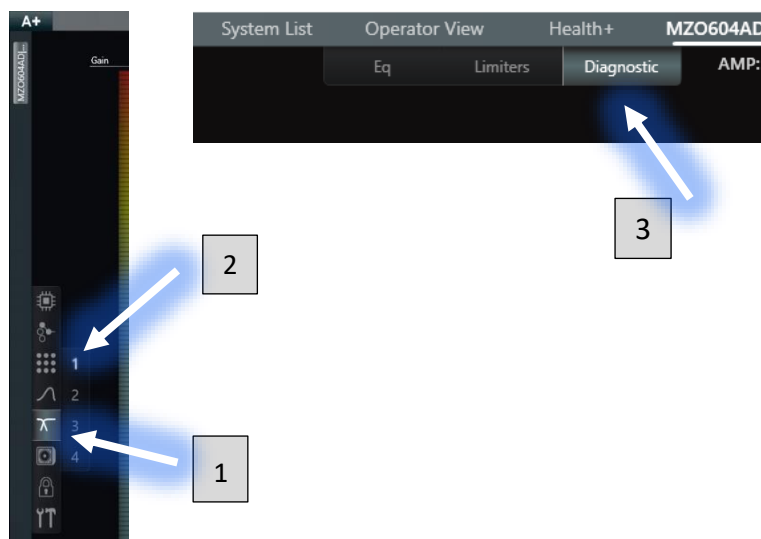
3.3.3 Sources Setup

Sources are the stimulus signals provided by the QC software to be amplified by the *Mezzo*. Check this configuration since it is critical to avoid unwanted signals at *Mezzo* 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...).

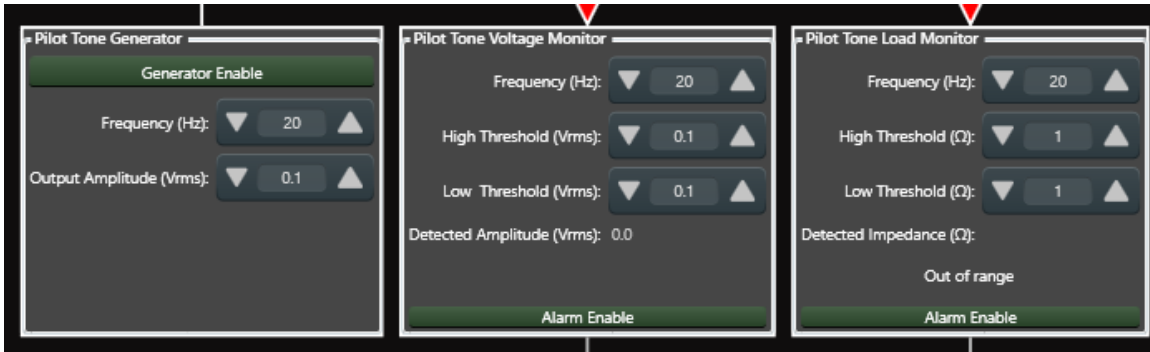


3.3.4 Check That Pilot Tone Monitor is Deactivated

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:

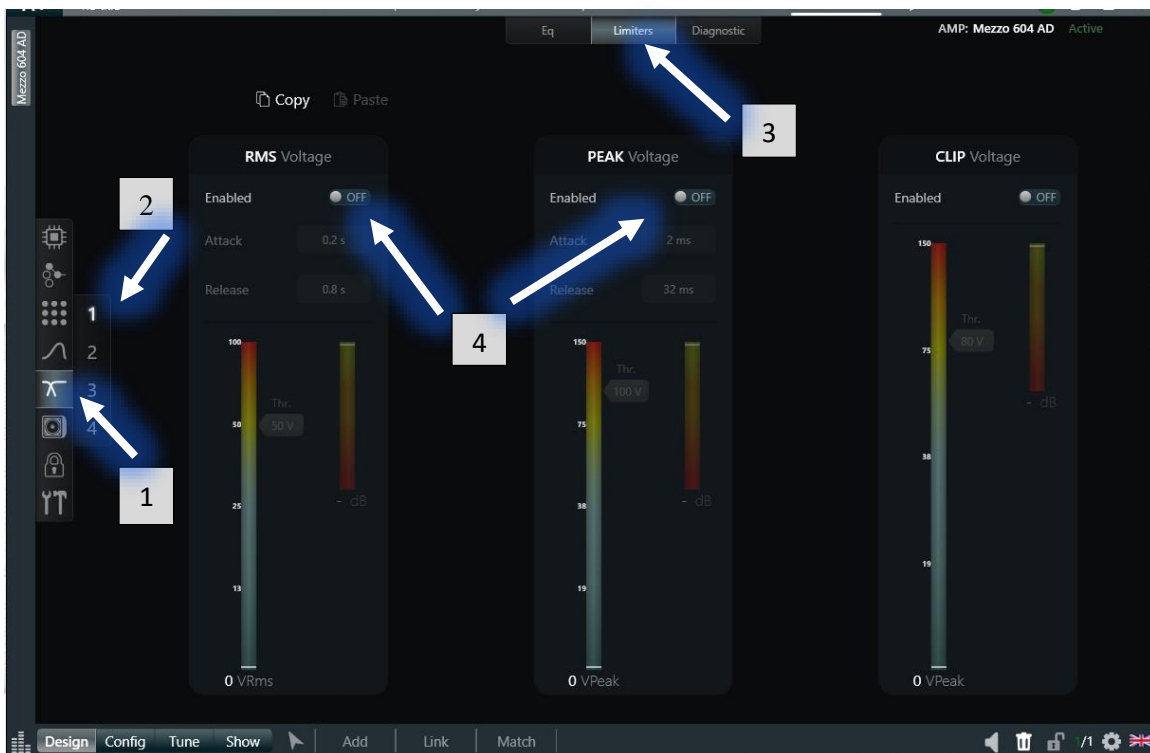


3.4 Further DUT Protection: Limiter and Equalization

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 Limiters* 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.

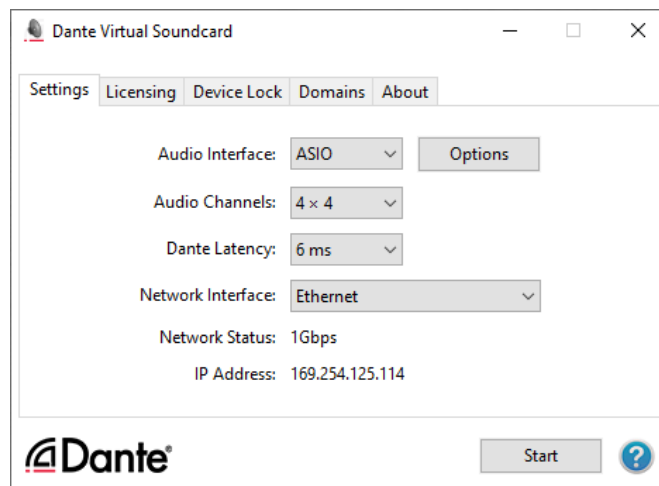


4 Dante Networking Setup

Dante audio-over-IP networking solution is used to transmit signals between dB-Lab and the Mezzo 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

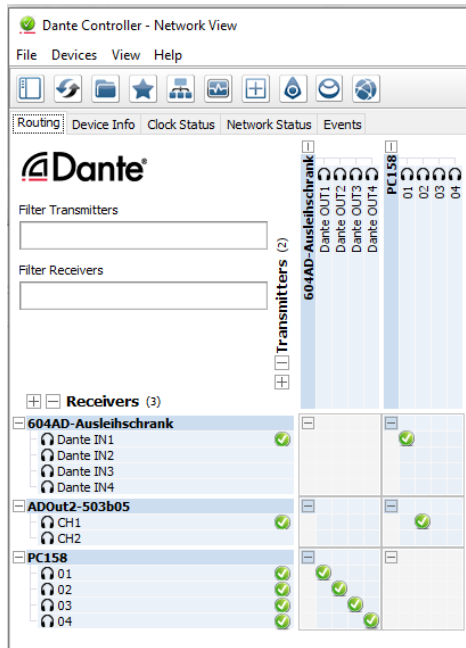
The *Dante Virtual Soundcard* is a software application which turns the PC into an ASIO Dante-enabled device allowing Dante audio traffic to be transmitted and received. Once it is installed and the license is activated, the *Dante Virtual Soundcard* is available and ready to work. Configure your *Dante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



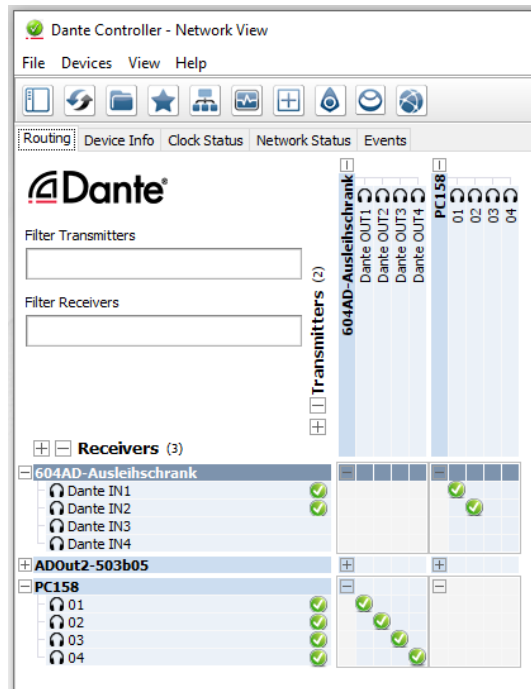
4.2 Dante Controller

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:

- PC Outputs 1 and 2 (*Transmitters*) connected to *Mezzo* (604AD) *Dante* Input 1 and *Dante Adapter* (ADOut2) CH1 (*Receivers*) respectively. Through these connections the stimulus signals will be transmitted from dB-Lab QC Outputs 1 and 2 to the passive DUTs (through *Mezzo*) and self-powered DUTs (through *Dante Adapter*) respectively.
- *Mezzo Dante OUT1* to 4 (*Transmitters*) connected to PC Inputs 1 to 4 (*Receivers*). All the measured signals will be transmitted from *Mezzo* 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 and 2 if the user application does not include any self-powered speaker (no *Dante Adapter* required):



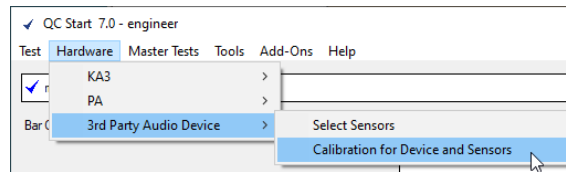
5 Klippel dB-Lab Setup

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

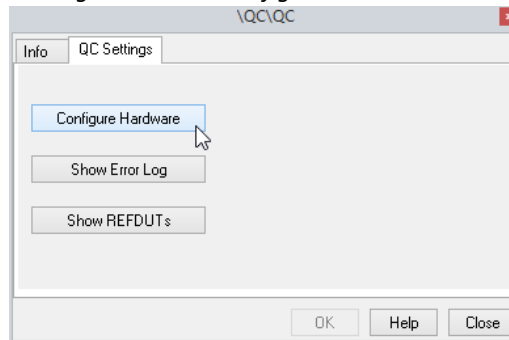
5.1 Calibration

The *Mezzo* 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 and *Mezzo* 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 in detailed in *QC Manual* chapter *3rd Party Audio Device Based Setup*:

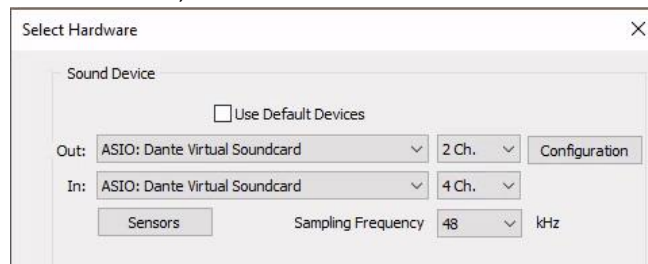
1. In *QC Start - Engineer* select *Hardware / 3rd Party Audio Device / Calibration for Device and Sensors*:



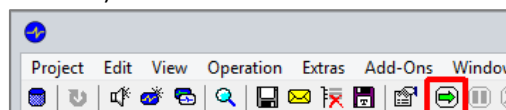
2. Open the property page *QC Settings* and select *Configure Hardware* to select the audio configuration:



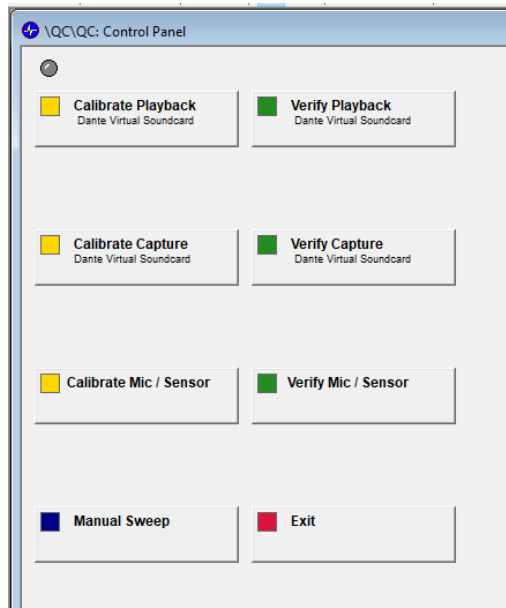
3. Select *ASIO: Dante Virtual Soundcard, Out 2 Ch.* and *In 4 Ch.*:



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

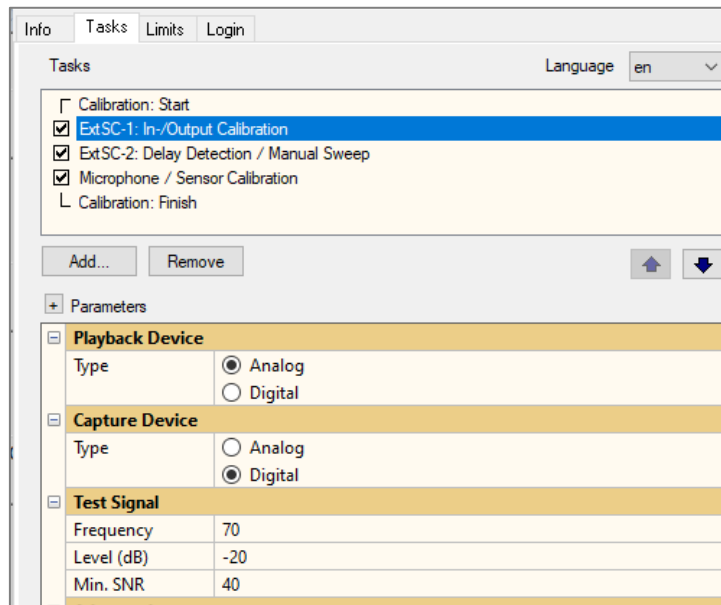


The *Control Panel* shows the available actions:



5. **Playback / Capture Calibration:** In the *Properties Menu* 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* or *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:
 - a. **Electrical sensors** (voltage and current): In the property page of *Microphone / Sensor Calibration*, select *Calibration Mode: Measure with Internal Stimulus*. Fill in the *Sensor Properties* settings (Note that *Channel* for Voltage Sensor is 1 and for Current is 2. *Output Channel* of stimulus is always 1), click *Control Panel* button *Calibrate Mic / Sensor* and follow the instructions:

i. 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]

ii. Current Sensor:

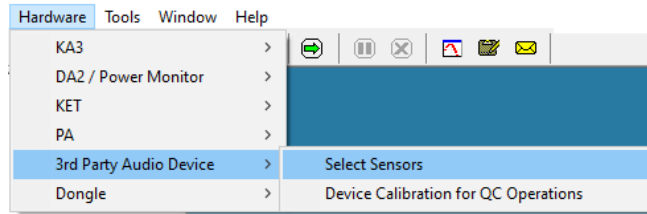
Mode	
Calibration Mode	<input type="radio"/> Specify Sensor Properties <input type="radio"/> Measure with External Stimulus (e.g. Calibrator) <input checked="" type="radio"/> Measure with Internal Stimulus (Internal Playback) <input type="radio"/> Use Calibration Wavefile
Sensor Properties	
Sensor Name	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]

- b. **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:

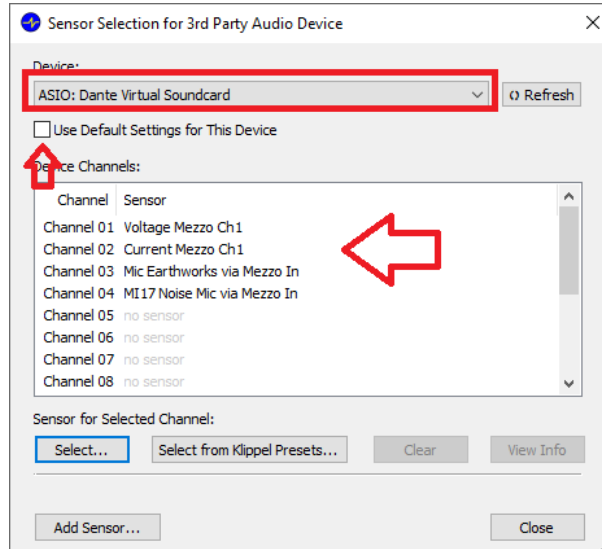
Mode	
Calibration Mode	<input type="radio"/> Specify Sensor Properties <input checked="" type="radio"/> Measure with External Stimulus (e.g. Calibrator) <input type="radio"/> Measure with Internal Stimulus (Internal Playback) <input type="radio"/> Use Calibration Wavefile
Sensor Properties	
Sensor Name	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*.

7. 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 *Hardware / 3rd Party Audio Device / Select Sensors* menu:



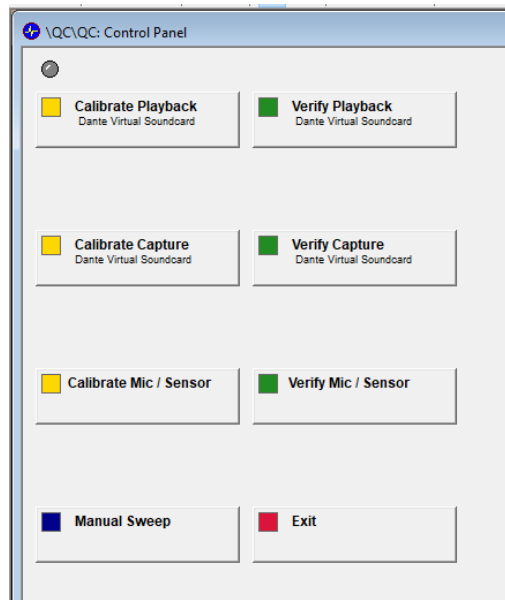
Select the following sensor configuration:



5.1.1 Verification

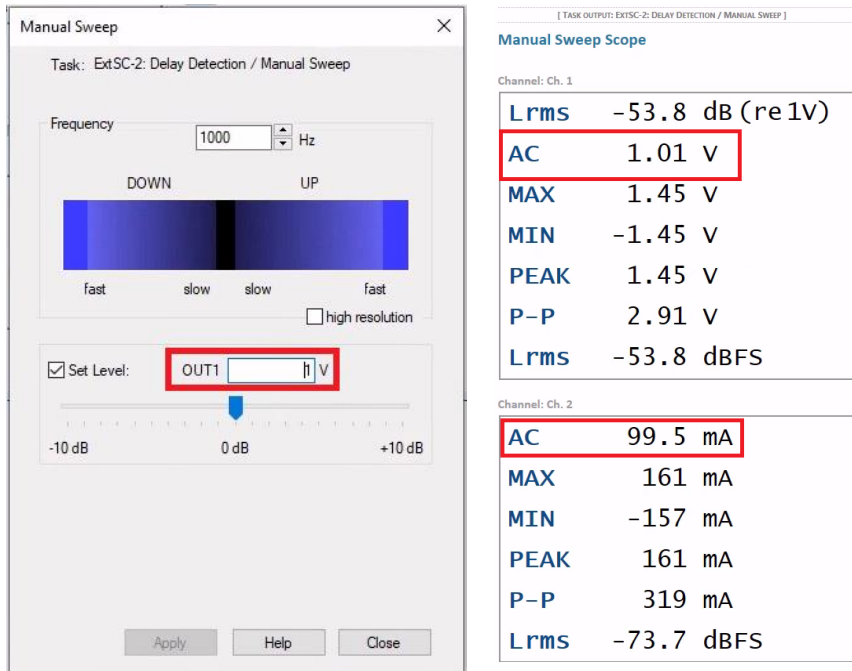
The verification of the calibration process can be done step by step using the *Verify* buttons.

Alternatively, you can verify the playback through *Mezzo Out 1* together with the electrical sensors with a measurement. To do that, connect a resistor at the terminals of the *Mezzo* output and click the *Manual Sweep* button on the control panel:



The *Manual Sweep Control Window* will be opened and the test signal will be played automatically. Note that the playback channel (OUT1) corresponds to the *Mezzo* 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 Manual Sweep Control Window (OUT1). Furthermore, the AC RMS Value of the Channel 2 (Current Sensor) should correspond with the expected current according to the resistance value.

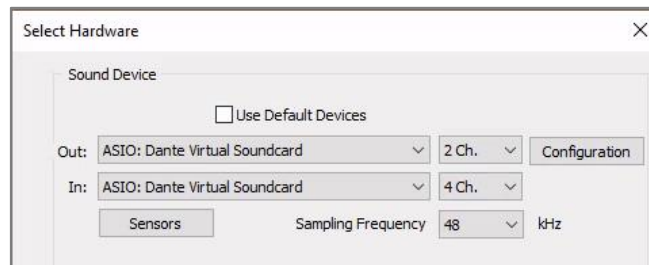
In the following example 1 Volt is applied to a 10 Ohm resistor:



5.2 Configuration of QC Operation

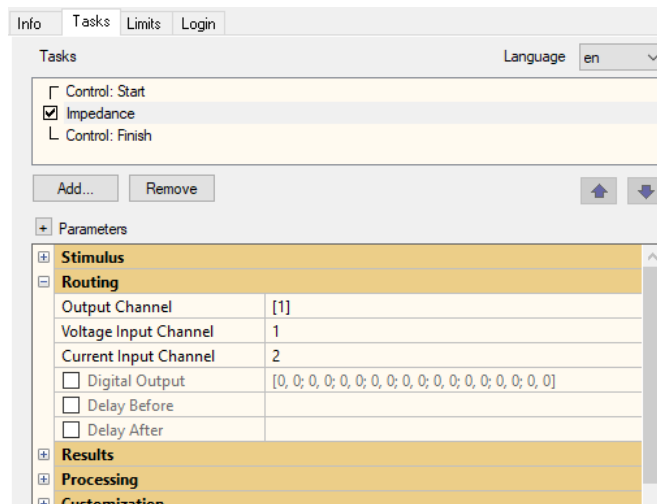
Once the calibration of 3rd party device and sensors is finished, the QC software is completely configured to run measurements. From now on you can create and run your own QC Operations using the templates available in *dB-Lab* or *QC Start*.

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:

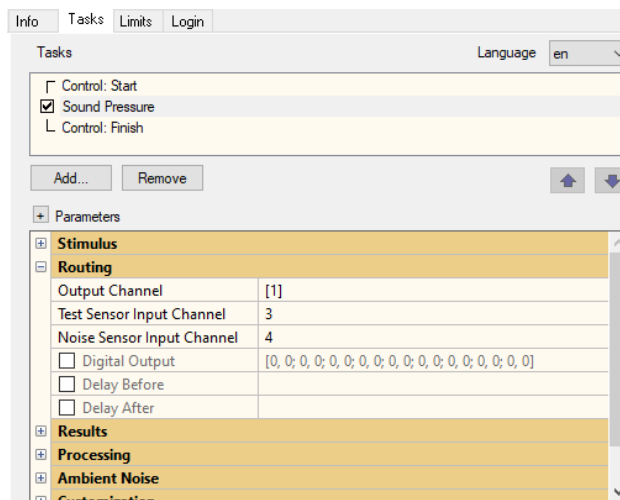


In the test sequence, select the output and inputs channels according to your measurement requirements as shown in the following examples:

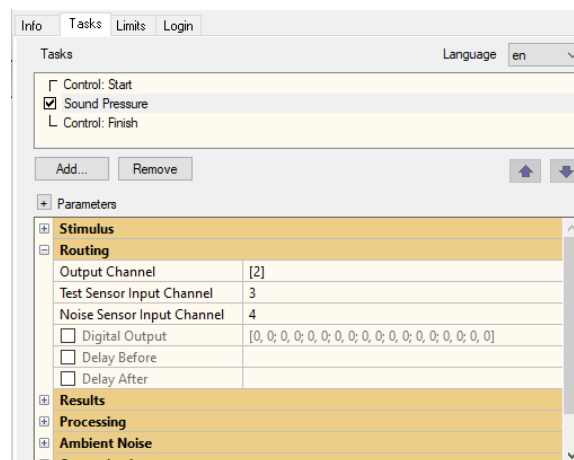
- *Impedance Task* applied to a passive DUT via *Mezzo*:
 - o Output Channel = 1: *Mezzo* Output 1
 - o Voltage Input Channel = 1: Voltage Sensor at *Mezzo* Output 1
 - o Current Input Channel = 2: Current Sensor at *Mezzo* Output 1



- *Sound Pressure Task* applied to a passive DUT via *Mezzo*:
 - o Output Channel = 1: *Mezzo* Output 1
 - o Test Sensor Input Channel = 3: Signal Microphone
 - o Noise Sensor Input Channel = 4: Ambient Noise Microphone (opt)



- *Sound Pressure Task* applied to a self-powered DUT via *Mezzo*:
 - o Output Channel = 2: *Dante Adapter* Ch1
 - o Test Sensor Input Channel = 3: Signal Microphone
 - o 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	<p><i>Powersoft:</i></p> <ul style="list-style-type: none">- <i>Mezzo:</i> https://www.powersoft.com/en/products/install-amps/mezzo-series/- <i>Armonia+:</i> https://www.powersoft.com/en/software/armoniapluse/ <p><i>Audinate:</i></p> <ul style="list-style-type: none">- <i>Dante Virtual Sound Card:</i> https://www.audinate.com/products/software/dante-virtual-soundcard- <i>Dante Controller:</i> https://www.audinate.com/products/software/dante-controller

Find explanations for symbols at:

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

Last updated: 27.07.2022

