









Technical Note for the Klippel Measurement Systems (Document Revision 1.2)

This Tech Note lists all HW components mandatory or optional and describes how they have to be combined into a Klippel Endurance Test (KET) system. It will also be used as an HW selection guide during the ordering process.

1 Measurement device

Measurement devices for the KET system are audio amplifiers from the Powersoft Mezzo series with included voltage and current sensing and Dante™ network signal streaming.

1.1 Supported measurement devices / amplifiers

Powersoft amplifier type	Description	Item-No.
MEZZO 604 AD	150W/4-channel Compact Amplifier with DSP and Dante™ Klippel recommended KET default amplifier	2700-041
		
MEZZO 324 AD	80W/4-channel Compact Amplifier with DSP and Dante™ recommended for micro-speakers and headphones	2700-040
		
<p>↑ Above listed 4 channel amplifiers are recommended due to their flexibility and cost-efficiency. ↑ Klippel will typically have the 4 channel types in stock.</p> <p>↓ Below listed 2 channel amplifiers could optionally be used for small setups. ↓ The 2 channel types are on request and typically not in stock at Klippel.</p>		
MEZZO 602 AD	150W/2-channel Compact Amplifier with DSP and Dante™ Alternative KET amplifier for systems limited to 2 channels	on request
		
MEZZO 322 AD	80W/2-channel Compact Amplifier with DSP and Dante™ Alternative KET amplifier for systems limited to 2 channels	on request
		
<p>MEZZO 322 A, 324 A, 602 A, 604 A with DSP are not supported by the Klippel Endurance Test (KET).</p> <p>MEZZO 322 A+, 324 A+, 602 A+, 604 A+ with DSP and AES67 are not supported by the KET.</p>		

1.2 Supply voltage, supply frequency, connector type, and current consumption

All supported Powersoft Mezzo series amplifiers have a wide range power supply input for worldwide usage.

If ordered from Klippel, just the required mains connector type has to be selected in the chapter *Your KET Setup*.

If ordered locally, it will be delivered with the locally typical power cable.

According to Powersoft’s [current draw and thermal dissipation documentation](#), even 64-channel setups with 16 Mezzo amplifiers could be operated at a typical 16 A fused power socket. 64 channels used for one measurement with an identical test signal could draw increased peak currents. This has to be considered selecting the fuse type by its switching characteristic. Depending on the loads to be measured and test signal levels it could be required to separate groups of Mezzo amplifiers to separately fused power lines.

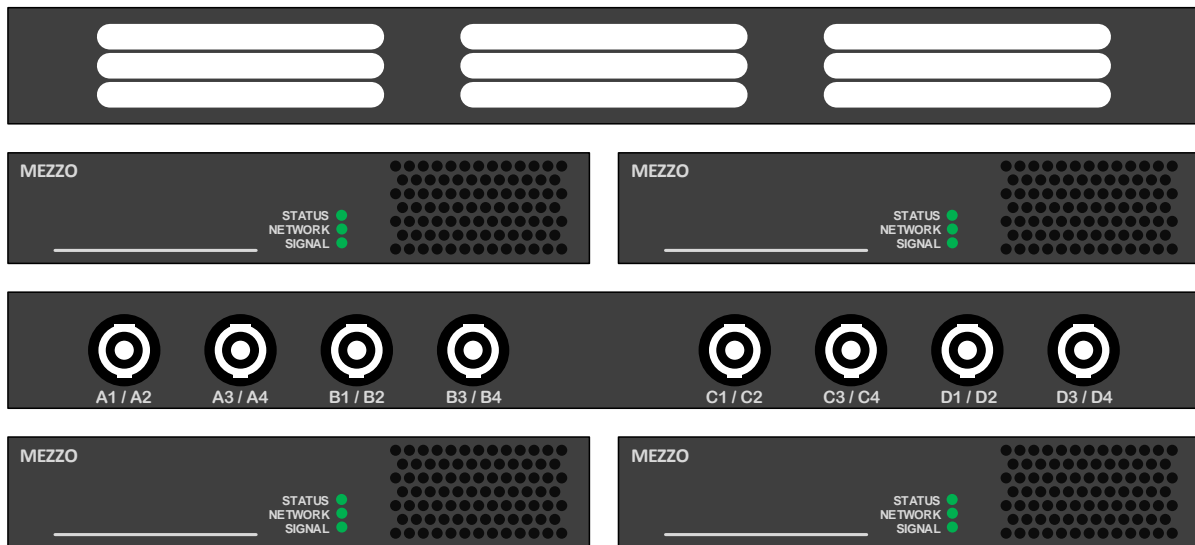


Figure 1-1: KET Dante setup with 16 channels / 4 Mezzi with patch-bay and dummy plate

The picture above shows a typical KET cluster for 16 channels with 4 Mezzo amplifiers, the 16-channel KET Patch-Bay, and a dummy plate above. This cluster could easily be multiplied for larger KET setups.

1.3 Installation

All Powersoft Mezzo series amplifiers are coming with an included rack mount kit for 19” standard racks. One or two amplifiers may be mounted into one height unit (1U). Brackets and screws to mount the brackets to the amplifiers are included. Only the screws for mounting it to the rack, typically supplied with the rack are not included.

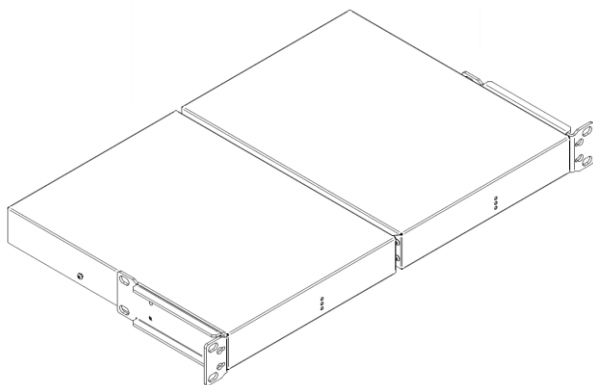


Figure 1-2: 2 Mezzi mounted in 1U

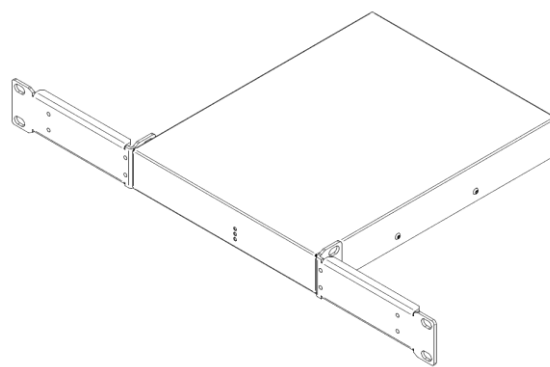


Figure 1-3: 1x Mezzo mounted in 1U

Although the Mezzo amplifiers are very efficient and Powersoft allows to stack 4 Mezzo amplifiers on top of each other, it is recommended to install them with some clearance for cooling if they are used for long-term

tests with continuous test signals. In the recommended setup above, for every height unit with two Mezzo amplifiers, one height unit with the optional KET Patch-Bay or a 1U dummy plate should be added.

2 KET control device

The KET control device could be any PC fulfilling the [Klippel PC requirements](#). HW interface requirements for this PC are just a LAN connection. A Dante™ Virtual Soundcard license enables the LAN connection to be an audio streaming network. Using a separate LAN connection exclusively for the Dante streaming is recommended for high operational safety although it is not required.

3 Dante™ network signal streaming

3.1 Measurement channel configurations

Channel	Configuration
<= 16	<u>Setup:</u> Up to 16 test channels could be set up in a very simple configuration without the need of additional network switches. Up to 4 amplifiers can be daisy chained (connected in serial).
	<u>LAN switch:</u> A network switch is not required for such a cost-effective setup but could increase reliability.
	<u>Rack space:</u> 16 test channels = 4 amplifiers = 2U minimum required rack space → 4U in total with additional 1U for a 16 CH patch bay and 1U clearance for cooling
<= 32	<u>Setup:</u> Up to 32 test channels are the maximum recommended and verified configuration the KET software supports on one PC.
	<u>LAN switch:</u> A Dante™ supported network switch with at least 9 ports is required. Alternatively, 3 Dante™ supported 5 port network switches could be used in a multiple-star topology. (see chapter <i>Network topology</i>)
	<u>Rack space:</u> 32 test channels = 8 amplifiers = 4U minimum required rack space → 8U in total with additional 2U for 2x 16 CH KET Patch-Bay and 2x 1U clearance for cooling
32 * X	<u>Setup:</u> The KET software supports up to 64 test channels on one PC. Although it is recommended to set up separate PCs each controlling a 32 test channel KET configuration for stability reasons, if multiples of 32 test channels are required.
	<u>LAN switch:</u> A Dante™ supported network switch with enough ports for all included devices is required. Alternatively, several Dante™ supported 5 port network switches could be used in a multiple-star topology. (see chapter <i>Network topology</i>)
	<u>Rack space:</u> Multiples of the above-described 32 test channel 8U clusters could be stacked in one rack.
<= 128	Dante™ supports up to 128 test channels, thus up to 4 PCs each controlling a 32 test channel KET setup can share the same Dante™ network.
<i>1U = 1 height unit (1¼") in a standardized 19" rack</i>	

3.2 Network topology

Dante™ audio streaming uses the default LAN network topology. All devices in a Dante™ network should be connected either in a “star” topology if only one switch is needed or in a “tree” or “multiple-star” topology with several distributed switches.

For compact setups with up to 16 test channels, the Powersoft Mezzo series amplifiers offer to change the topology to a serial so-called daisy-chain connection. The amplifiers offer a primary and secondary LAN connection, which could be used to connect them in series. In this configuration, no network switch will be required. It is recommended to limit this serial setup to a maximum of 4 Mezzo amplifiers.

KET 16 Channel Compact Setup

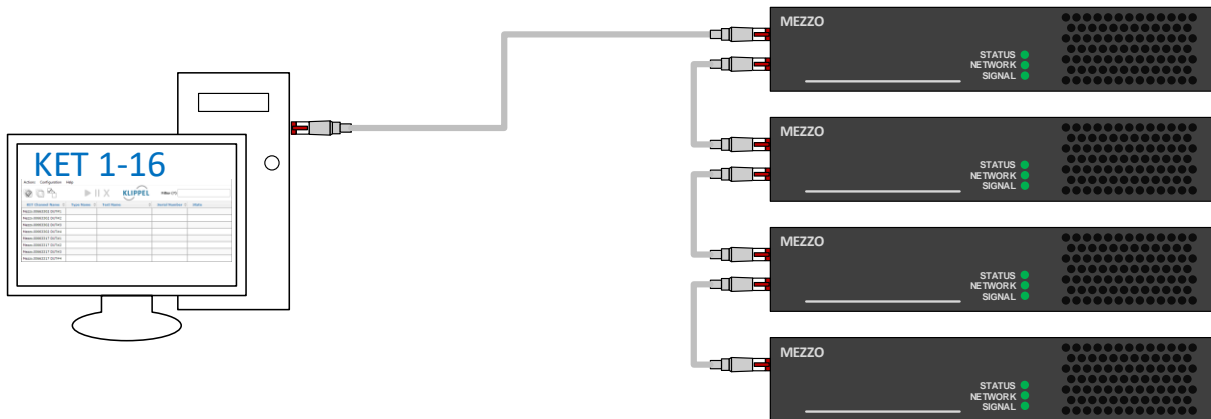


Figure 3-1: KET Dante setup with 16 channels / 4 Mezzi “daisy-chained”

For increased reliability and for setups with up to 128 test channels, a Dante-supported network switch may be added. Shown for 16 test channels and 4 Mezzo amplifiers, as in the example above, it could be extended up to 32 (64) channels and 8 (16) Mezzo amplifiers controlled by 1 PC and up to 128 channels and 32 Mezzo amplifiers controlled by 4 (2) PCs, requiring larger network switches.

KET 16 Channel Default Setup

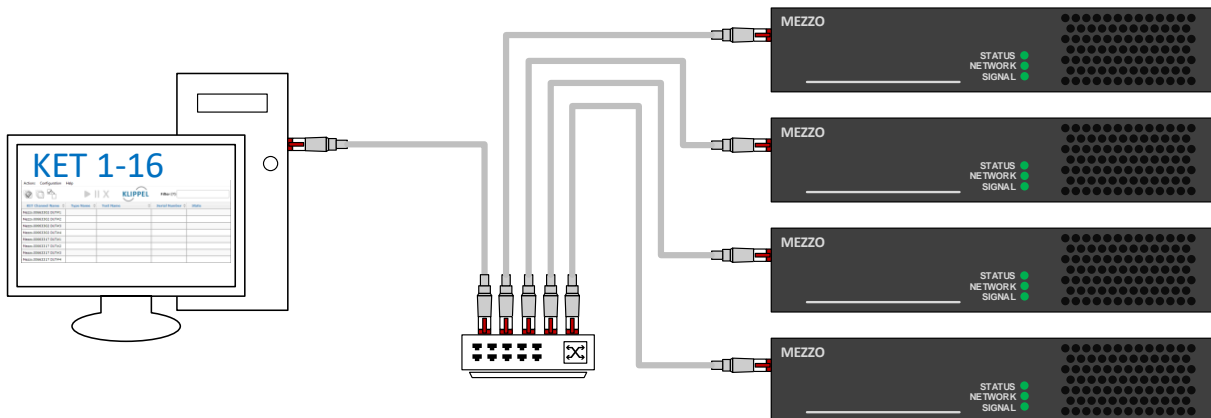


Figure 3-2: KET Dante setup with 16 channels / 4 Mezzi in “star” topology

For distributed setups, where clusters of test channels will be needed at different locations e.g., climate chambers the setup could be distributed by adding additional network switches.

KET 32 Channel Default Setup

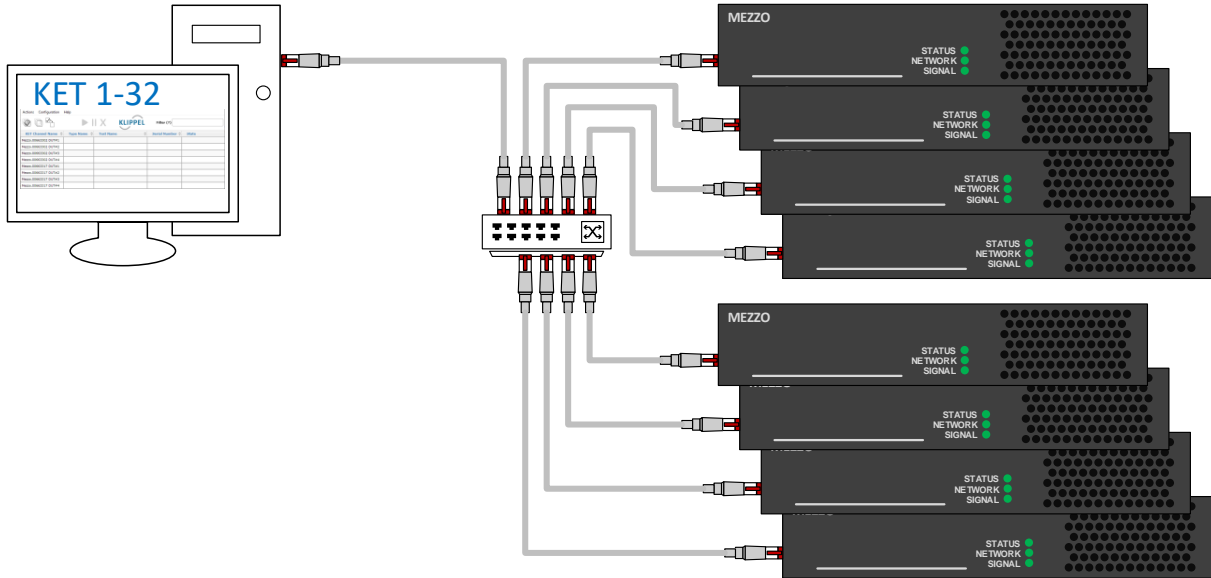


Figure 3-3: KET Dante setup with 32 channels / 2x 4 Mezzi in "star" topology

KET 32 Channel Distributed Setup

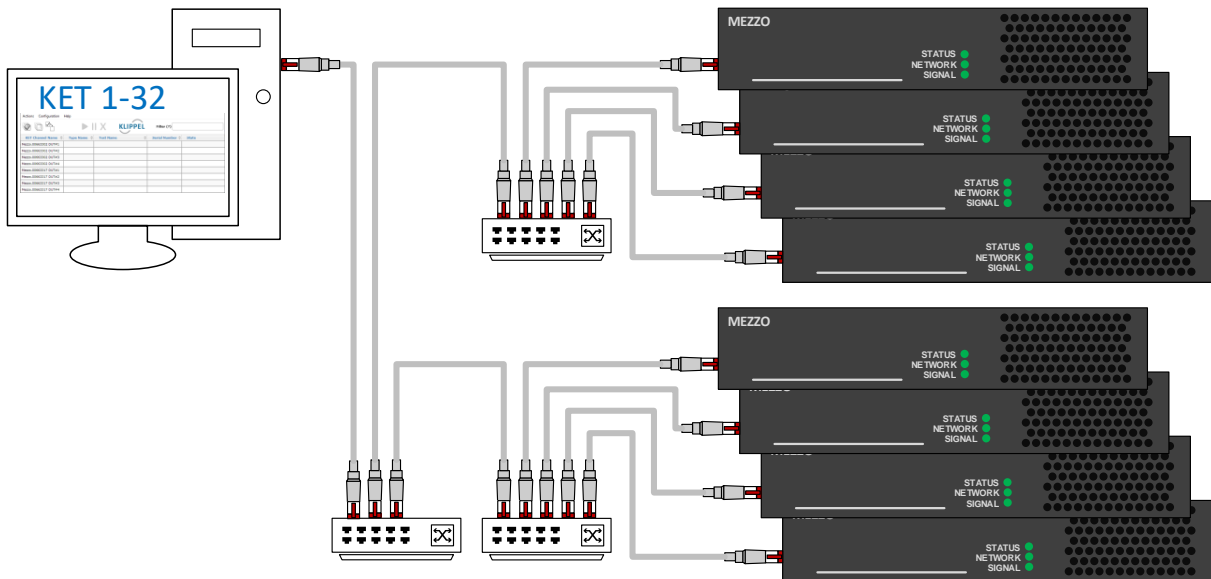


Figure 3-4: KET Dante setup with 32 channels / 2x 4 Mezzi in "tree" topology

Up to 4 clusters of 32 test channels each controlled by 1 KET PC could share one Dante™ network. Although separating the Dante™ networks is not required up to 128 channels, it causes negligible additional costs and could give more flexibility and robustness, especially if not all channels are used in parallel tests at the same time. Shown below for 64 test channels controlled by 2 PCs with separate Dante™ networks and with sharing the Dante™ network in the 2nd example.

KET 64 Channel Default Setup

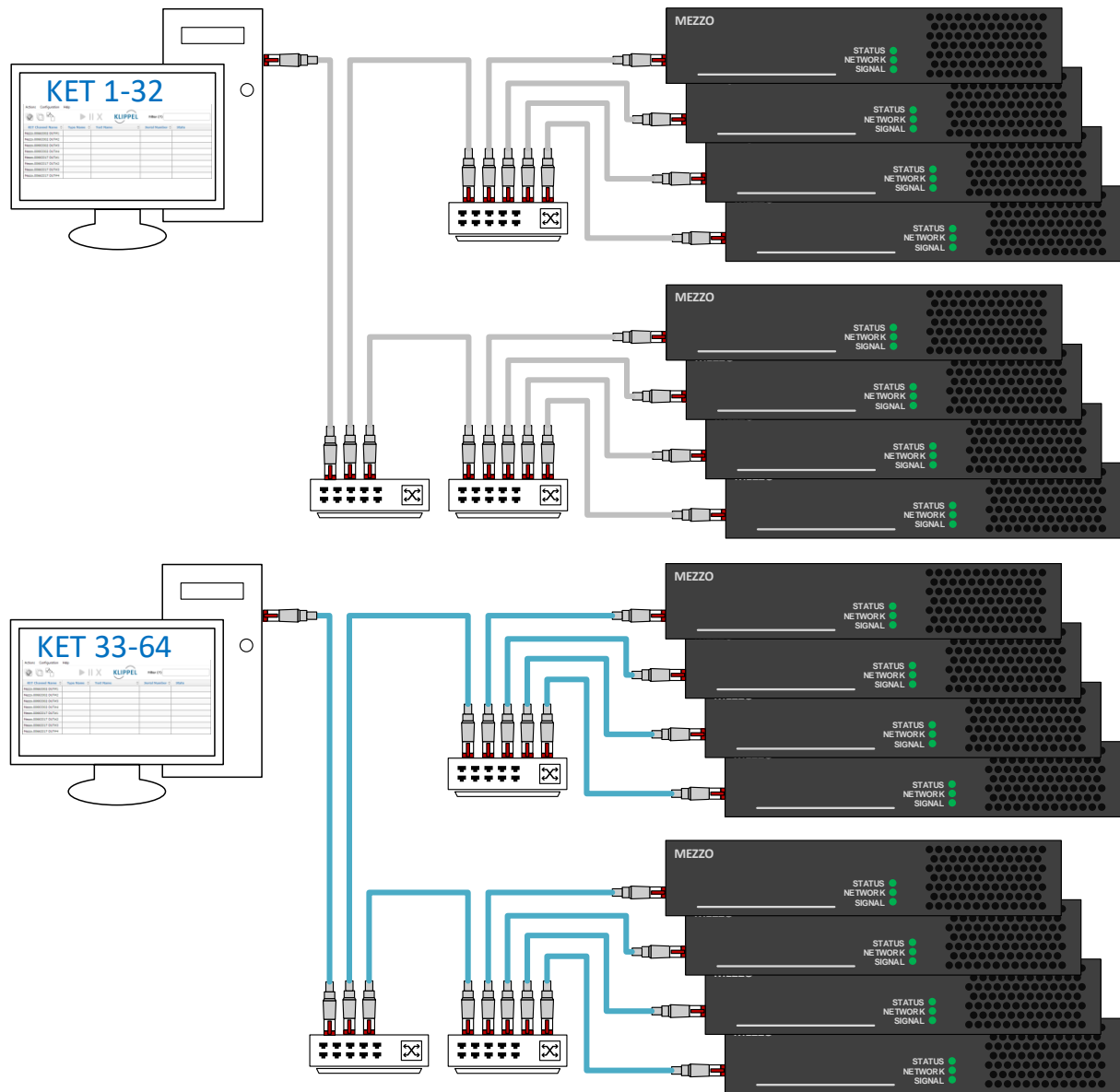


Figure 3-5: KET Dante setup with 64 channels / 4x 4 Mezzi in “tree” topology with 2 KET PCs with separate Dante network

KET 64 Channel Combined Setup

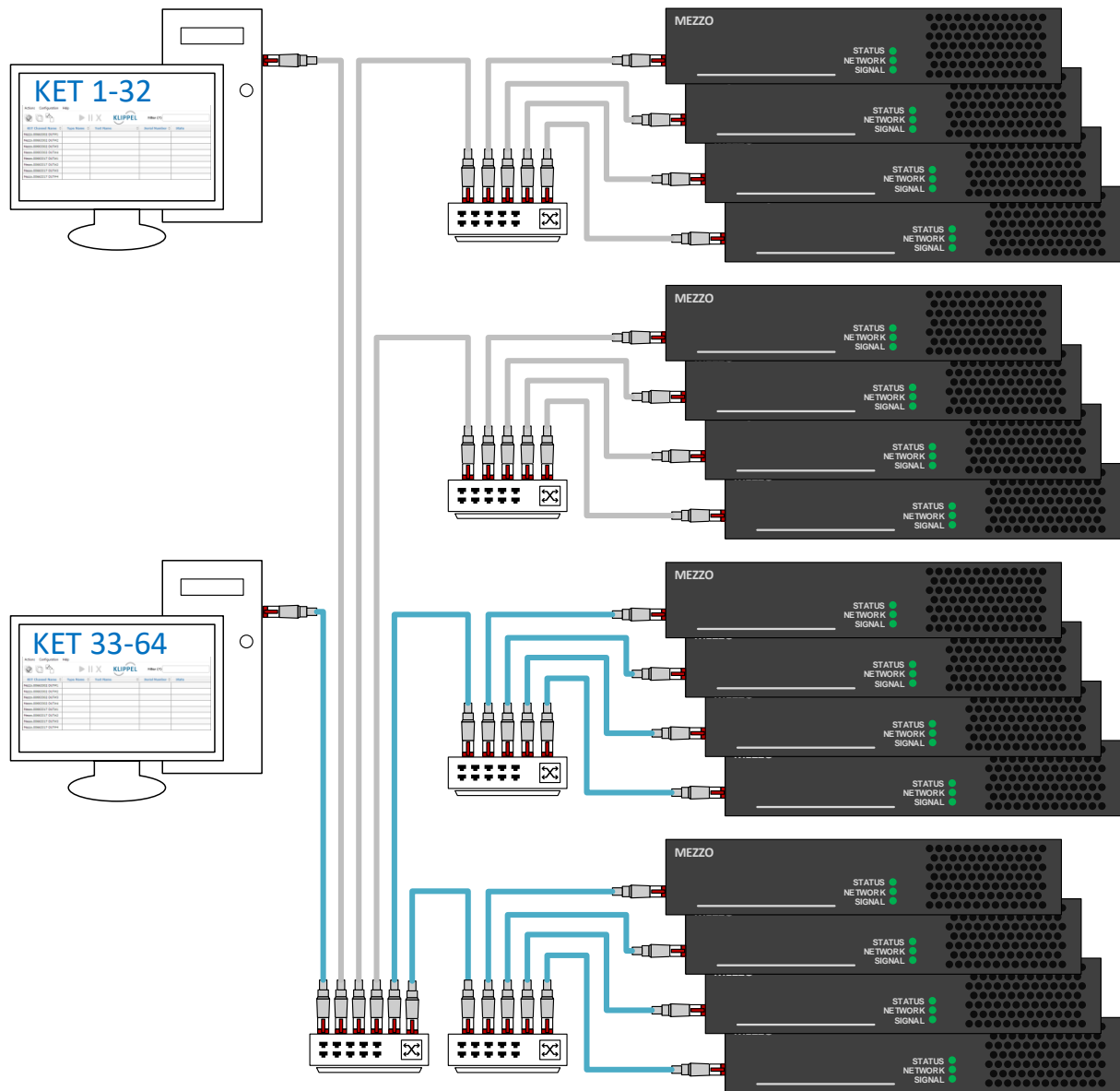


Figure 3-6: KET Dante setup with 64 channels / 4x 4 Mezzi in “tree” topology with 2 KET PCs with combined Dante network

The upper end of the technically possible but not recommend KET setup complexity will be the not shown 128 test channel setup, controlled by 2 KET PCs sharing 1 Dante™ network for all 32 Mezzo amplifiers with clusters of 4 daisy-chained Mezzo amplifiers.

For stability reasons Klippel recommends to multiply the verified setup shown in figure 3-5 for every increased channel requirement instead.

Redundant parallel network structures, as they are common in the live sound environment using Dante™ are not supported by the DVS – Dante™ Virtual Soundcard KET uses.

Using a separate network for the KET setup for the highest possible operational safety by adding a 2nd dedicated network card to the PC makes sense. (1st LAN-card for company network, 2nd LAN-card for KET)

But adding a 3rd LAN card for a redundant Dante™ network is not supported, as long as the DVS – Dante™ Virtual Soundcard will be used, even if the Mezzo amplifiers would support this.

For a redundant Dante™ network a Dante™ HW card, e.g. Dante™ PCIe card will be required. This is not tested by KLIPPEL yet.

KET Redundant Dante™ Setup

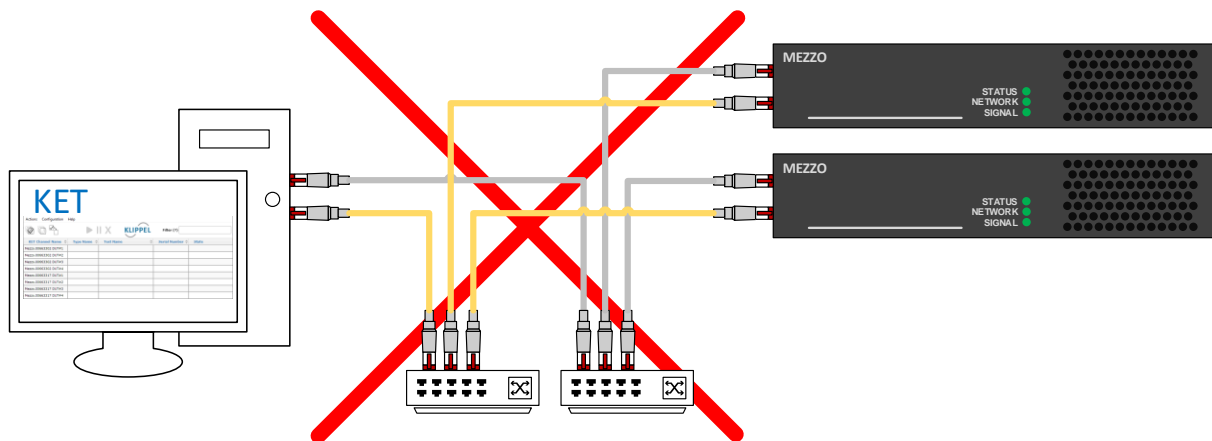


Figure 3-7: Redundant KET Dante setups are not supported

3.3 Network Components

Information for the Dante™ network administration could be found on the [Audinate website](#).

Documents with all relevant information for the [network administration and supported components](#) are available as well as the [Dante Controller User Guide](#).

In short words:

- CAT5e or better cables should be used
- DHCP is supported
- Energy Efficient Ethernet (EEE) or “Green ethernet” (IEEE 802.3az) is not supported / should be disabled

4 Connection of the DUTs

The Powersoft Mezzo amplifiers are dedicated to fixed installations. Therefore, they are using standardized 4-pin COMBICON connectors with a 5.08 mm (1/5") spacing. Screwable connectors for mounting solid wires, litz wires, and litz wires with crimped ferrules are included with the amplifiers. The connectors could be equipped with cables with a wire diameter of up to 2.5mm². As wire length, type, and connector at the DUT side highly depend on the needs of the certain KET installation, speaker cables are not included.

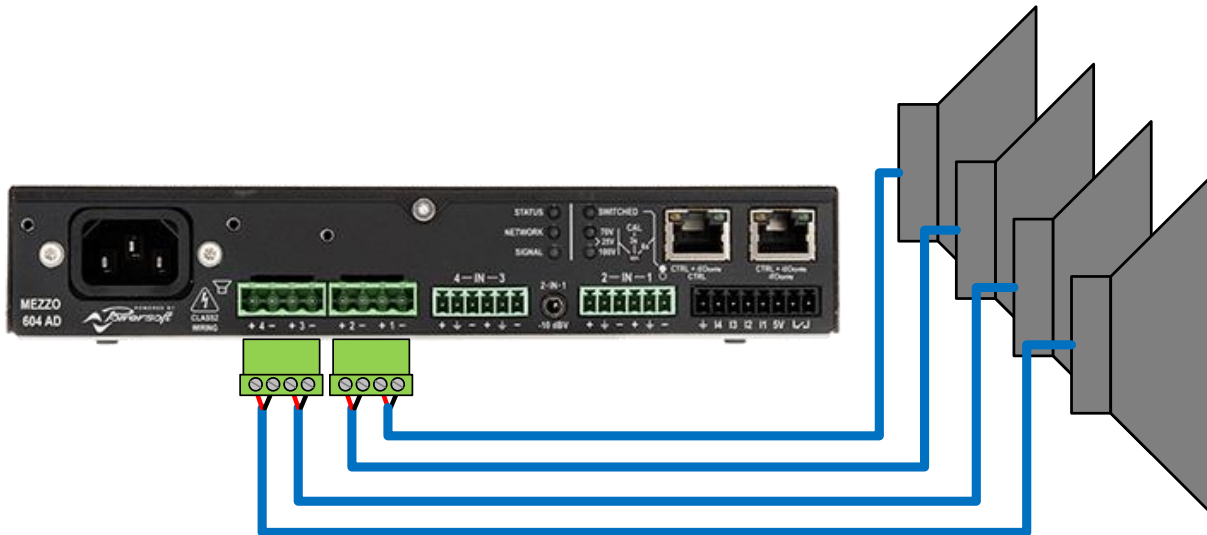


Figure 4-1: KET setup with 4-channel Mezzo and 4 DUTs connected directly

KET Patch-Bay

For complete out-of-the-box packages, the following optional accessories could be chosen:

- A KET Patch-Bay is available for:
 - Exchanging the DUTs quickly at the front side of the rack
 - Using cables with standardized speakON-connectors
 - Klippel Speaker Cables could be used, and alligator clips could be used
 - speakON-extension cables could be used.
 - For cost-effective and environmentally friendly setups one speakON-connector at the Patch Bay feeds two DUT channels. The Patch-Bay with its 8 speakON-connectors feeds 16 DUTs.
 - Klippel Speaker Cables allow connecting two DUTs which could be separated up to 1 m.
 - The KET Patch-Bay comes with COMBICON connectors mounted as a plug-and-play solution together with the Mezzo amplifiers.

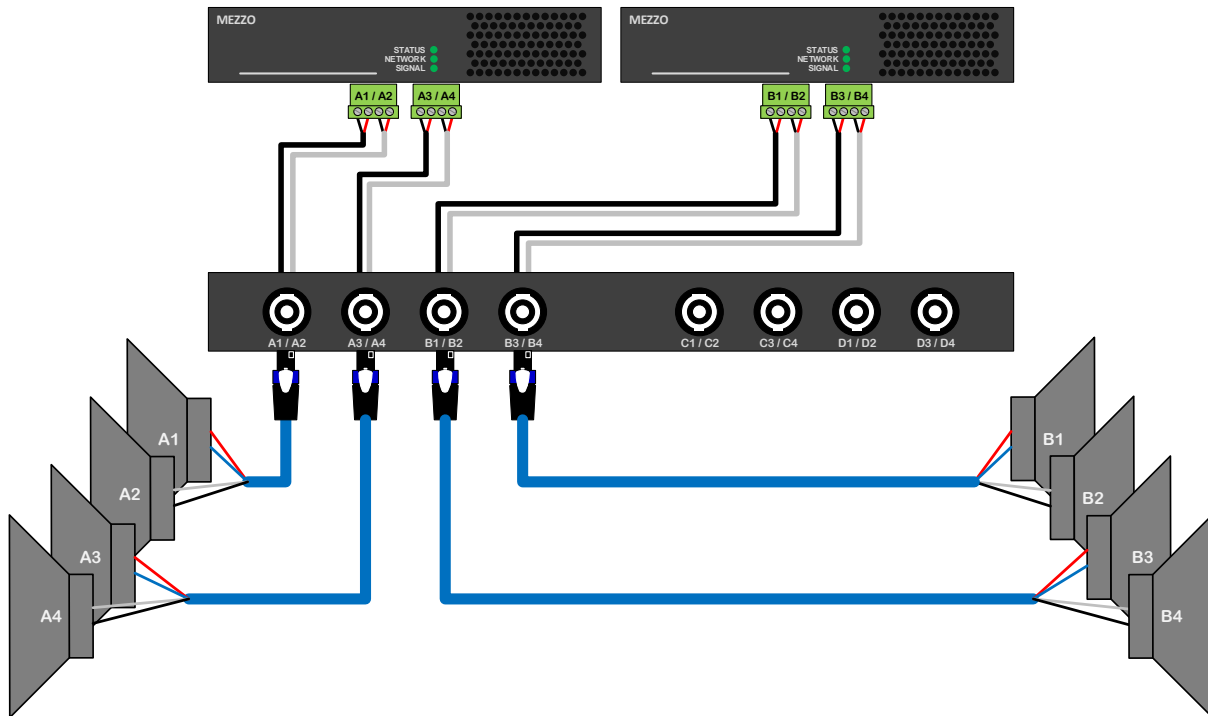


Figure 4-2: KET Dante setup with 8 channels / 2 Mezzi with KET Patch-Bay

Available Speaker cables and speakON-extension cables could be found in the [Amplifier and Speaker Cables specification](#).

KET HW components

The schematic and table below show all components for a plug-and-play 16-channel KET system with up to 8m between the KET rack and the DUTs. This is just an example with could be modified to every application and HW requirements.

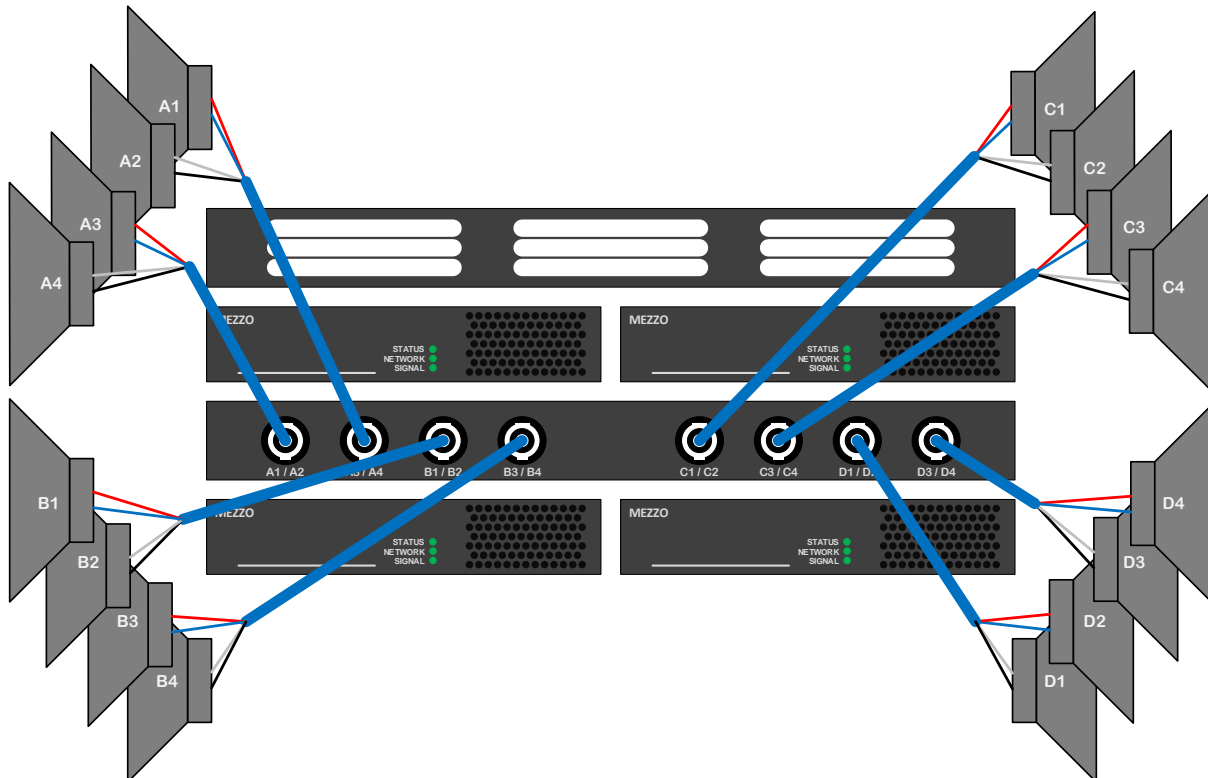


Figure 4-3: KET Dante setup with 16 channels / 4 Mezzi with KET Patch-Bay

KET component	Item-No.	quantity
MEZZO 604 AD / MEZZO 324 AD	2700-041 / 2700-040	4
KLIPPEL-Dongle, USB License Key for KET SW	incl. in KET Base SW	1
KET Patch-Bay, 8x speakON male – 8x COMBICON 4 pin, 1U	2300-500	1
optional: 19" / 1U blank plate with ventilation grid	self-supplied	1
Cable; speakON female - male, 5m, 4x4mm ²	2300-032	8
Speaker Cable without clips, 3m "Speaker"	2300-036	8
Alligator Clip; large, red & black, set	2300-020	16





5 Your KET Setup

5.1 Amplifier type

Powersoft amplifier type	Item-No.	quantity	comment
MEZZO 604 AD	2700-041		go ahead with 5.2 to 5.4
MEZZO 324 AD	2700-040		go ahead with 5.2 to 5.4
MEZZO 602 AD			self-supplied or on request
MEZZO 322 AD			self-supplied or on request

5.2 Power supply connector

Select the mains connector type for your local KET installation:

Type	Picture	Region	Selection
Type E & F		EU	
Type I		China	
Type B		US	
Type G		UK	

5.3 Accessories

Select the accessories according to your needs:

- KET Patch-Bay
- speakON-extension cables
- Klippel Speaker Cables
- Alligator Clips

Plan the needed network installation components:

- LAN cables
- LAN switches

6 References

Specification	S16 - KET Klippel Endurance Test A3 - Amplifier and Speaker Cables
Documentation	Powersoft Mezzo current draw and thermal dissipation documentation Klippel R&D and QC System Computer Requirements Dante network administration and supported components Dante Controller User Guide

Find explanations for symbols at:

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

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