



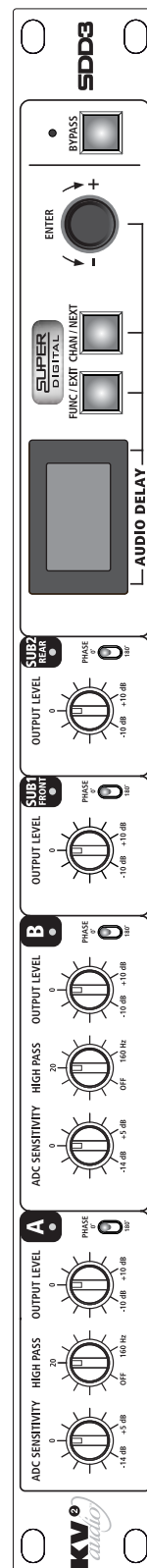
SDD3 User Guide



The future of sound. Made perfectly clear.

At KV2 Audio our vision is to constantly develop technologies that eliminate distortion and loss of information providing a true dynamic representation of the source.

Our aim is to create audio products that absorb you, place you within the performance and deliver a listening experience beyond expectation.



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Introduction

How to use this manual

As you read this manual, you'll find figures and diagrams to help you understand and visualise what you're reading. You'll also find numerous icons that serve as cues to flag important information or warn you against improper or potentially harmful activities.

Icons used include



"NOTE" identifies an important or useful piece of information relating to the topic under discussion.



"CAUTION" gives notice that an action can have serious consequences and could cause harm to equipment or personnel, delays, or other problems.

If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

11. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles and the point where they exit from the SDD3. The AC mains plug or appliance coupler shall remain readily accessible for operation.
12. Only use accessories specified by KV2 Audio.
13. The unit is intended for use in a 19" rack. Follow the mounting instructions.



CAUTION:

Installation should only be done by experienced professionals.

Important safety instructions

- 1 Read all product instructions.
2. Keep printed instructions, do not throw away.
3. Respect and review all warnings.
4. Follow all instructions.
5. Do not use this unit near water, in unprotected out door areas or in rain or wet conditions.
6. Clean only with dry cloth.
7. Do not block any ventilation openings.
8. Install in accordance with KV2 Audio's recommended installation instructions.
9. Do not install near any heat sources such as heat radiators, heat registers, stoves or other apparatus that produce heat.
10. Do not defeat the safety purpose of the grounding type plug. A grounding type plug has two blades and a third grounding connector. The third connector is provided for your safety.
14. Unplug SDD3 during lightning storms or when unused for long periods of time.
15. Refer all servicing to qualified service personnel. Servicing is required when the SDD3 has been damaged in any way, such as when the power-supply cord or plug has been damaged; liquid has been spilled or objects have fallen into the SDD3; rain or moisture has entered the SDD3; the SDD3 has been dropped; or when for undetermined reasons the SDD3 does not operate normally.
16. Do not remove top or bottom covers. Removal of the cover will expose hazardous voltages. There are no user serviceable parts inside and removable may void the warranty.
17. An experienced user shall always supervise this professional audio equipment.

Introduction

Introducing the SDD3

The SDD3 is a 2 channel full range stereo audio delay line, with one dedicated channel subwoofer delay line.

Full range channels are specifically for delaying audio signals for main PA systems or side fills, with a maximum delay time of 393,216ms (approx 134m / 442ft).

Each channel is equipped with a tunable high pass filter for easy side fills setup.

The full range channels use super digital technology with wide bandwidth and enhanced dynamic range. For optimal analog to digital converter driving, the full range channels are equipped with ADC sensitivity control, which increases input level and reduces output level at the same time, so the level pass in the SDD3 does not change when adjusting the ADC sensitivity. The input level can be seen on the level meters. Output level can be set in the range from -10 to +10dB.

The subwoofer channel is dedicated for delaying subwoofers with a bandwidth of $0 \div 120\text{Hz}$ and maximum delay time of 10ms (approx 3,43m / 11,25ft).

The subwoofer channel has two independent outputs which can be linked together for easy cardioid setup. The subwoofer channel is designed like a digitally controlled analog unit. The output level can be set in the range from -10 to +10dB.

Each audio input has parallel outputs for easy audio device branching. Each audio output features line drivers to maintain audio signal integrity over long cable lengths. Each output is equipped with a phase reverse switch and a true bypass feature. When the device is switched off, all channels are bypassed.



NOTE:

For the best performance, where possible use only KV2 Audio components, any other component may negatively affect the sound quality.



NOTE:

SDD3 has the same dimensions as the KV2 audio SAC2 crossover.

Getting started

Unpacking

Unpack the SDD3 and check to see if there is any damage to it. If you find any damage notify your supplier immediately. Only the consignee may institute a claim with the carrier for any damage incurred during shipping. Be sure to save the carton and all packaging materials for the carrier's inspection.

Should you ever need to ship the unit, only use the original factory packaging. If the shipping carton is unavailable, contact your supplier to obtain a replacement.

The SDD3 carton should contain:

- SDD3 Super Digital Audio Delay
- User Guide
- IEC Power Cable

Rack mounting

The SDD3 will mount in a standard 19" rack system. Use four screws and washers to mount the SDD3 to the rack rails. We recommend using a shock-mounted rack for touring use to prolong the life of your SDD3.

To prevent accidental adjustment of settings, or unwanted tampering in a fixed installation, KV2 Audio provide an additional security panel as an accessory.

AC Power requirements

The SDD3 uses a standard IEC 3-pole AC connector. The device must be connected to a mains socket outlet with protective earthing connection. The SDD3 operates in either 115V or 230V mode. This setup is preconfigured at the factory. The mains plug of the power supply cord shall remain readily operable.

Voltage requirements

The SDD3 operates safely and without audio discontinuity if the AC voltage stays within the operating window of 90V÷130V in 115V mode or 180V÷260V when working in 230V mode at 50 or 60Hz.

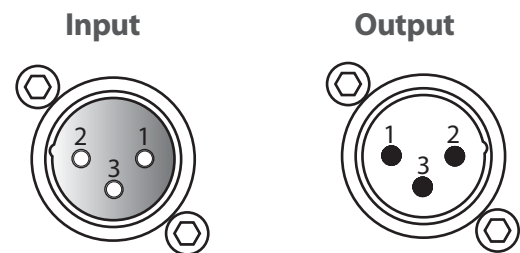


CAUTION:

If the any LED does not illuminate or the system does not respond to audio input remove AC power immediately. Verify that the voltage is within the proper range. If the problem persists, please contact KV2 Audio or an authorized service center.

Connector wiring

XLR Balanced Input and Output connectors



- 1 = Ground
- 2 = Hot (+)
- 3 = Cold (-)

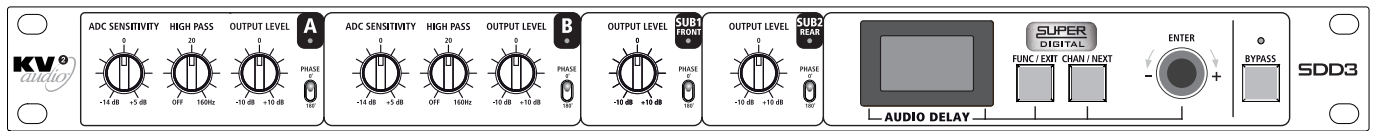


CAUTION:

If it is necessary to convert balanced output to unbalanced, it is impossible to short Hot(2) or Cold(3) pins with Ground(1). **In this event the Line Drivers will cause permanent disconnection.** For more information please refer to page 20.

Features

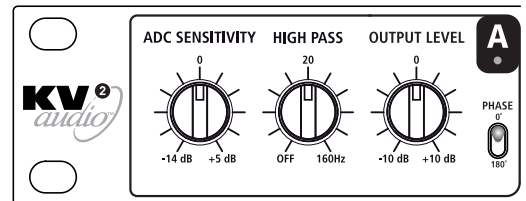
Front Panel



Channel A and B

ADC sensitivity

For optimal analog to digital converter driving, the full range channels (A and B) are equipped with ADC sensitivity control which increases input level and reduces output level at the same time, so the level pass in the SDD3 does not change when adjusting the ADC sensitivity. The input level can be seen on the level meters. For optimal ADC driving run the level meters so that the signal will exceed 0dB meter level, but never reaches clip level.



High Pass Filter

The full range channels (A and B) are equipped with a tunable high pass filter filter from 0 to 160Hz. It has a slope of 12dB/octave and it is used for easy and optimal setup for side fills, or to protect your subwoofer system from the frequencies that cannot reproduce efficiently and may cause damage.

Output level

The output level can be set in range from -10 to +10dB.

Phase

Each output is equipped with a phase reverse switch, which reverses the phase of the output signal.

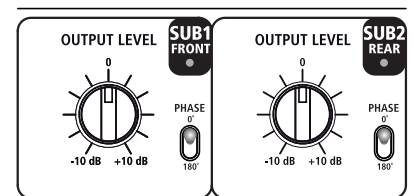
Subwoofer channel C

Output level

The output level can be set in range from -10 to +10dB.

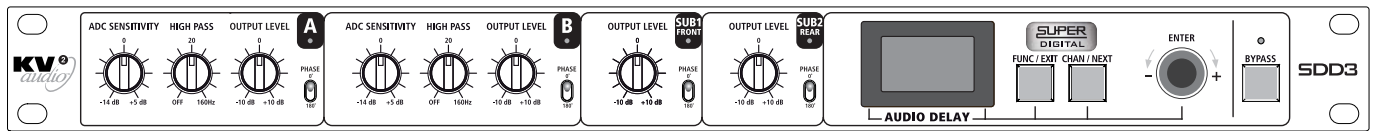
Phase

Each output is equipped with a phase reverse switch, which reverses the phase of the output signal.



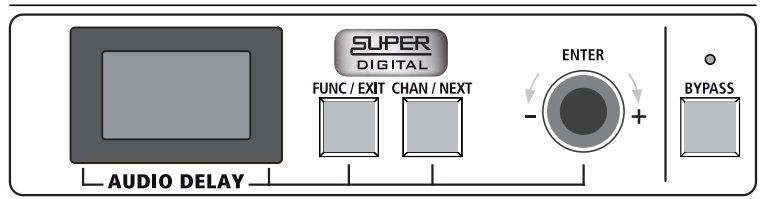
Features

Front Panel



Display

Indicates the input levels for each channel separately. Shows the set delays and allows settings of various functions in the menu



Function / Exit button

Allows the operator to toggle between three main screens - LEVELS, DELAY, MENU. When you are inside the menu, the button serves as exit.

Channel / Next button

This button switches between channels, the selected channel is indicated by green LED indicators. When you are inside the menu, this button serves as a skip to the next menu item.

Rotation encoder with Enter pustbutton

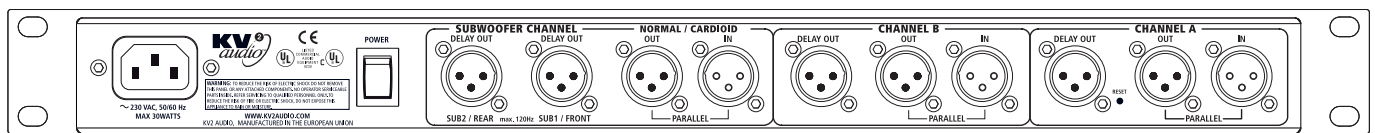
The encoder serves as the main way for increasing (clockwise), or decreasing (counterclockwise) values and menu positions. The encoder also serves as the ENTER button, allowing the operator to enter/leave the submenu in the main menu. When the DELAY main screen is selected, the Enter button changes the math point digits.

Bypass button

When the bypass button is pressed, all channels are bypassed, (true bypass). When bypassed, the function is indicated by the red LED light above this button.

Features

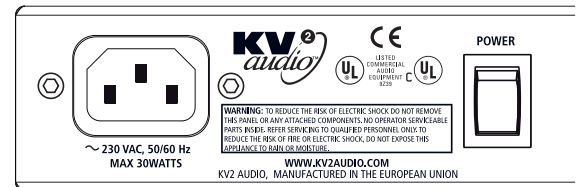
Rear Panel



POWER CONNECTION

Plug power connector

For connection to a standard IEC 3-pole AC connector. Before connecting make sure that the mains voltage corresponds to the SDD3's voltage requirements as stated on the unit.



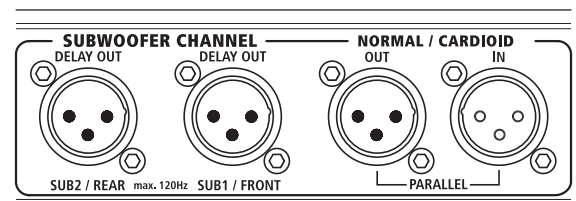
Power switch

Used to turn the SDD3 on or off.

SUBWOOFER CHANNEL CONNECTORS

Input

Balanced female - XLR connector for connecting the subwoofer signal. The audio input circuit presents a 20k Ω balanced input impedance.



Output

The through / output balanced male - XLR connector, wired in parallel to the audio input, will continue to provide the input signal if the SDD is turned off.

Delay output

Two separated subwoofer outputs with balanced male - XLR connectors. The max. allowed output frequency is 120Hz. When using the subwoofer channel in normal mode SUB1 and SUB2 delay outputs are separated. When using the subwoofer channel in cardioid mode, output SUB1/Front serves as the front subwoofer output and SUB2/REAR serves as the rear cardioid subwoofer output. In cardioid mode the delay setup is linked together for determined and easy cardioid setup. For more information about cardioid setup, please refer to the Cardioid setup part of this guide.

FULL RANGE CHANNELS (A and B) CONNECTORS

Input

Balanced female - XLR connector for connecting full range signal. The audio input circuit presents a 20k Ω balanced input impedance.

Output

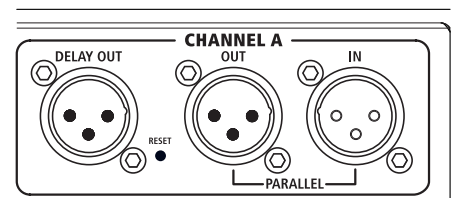
The through / output balanced male - XLR connector, wired in parallel to the audio input, will continue to provide the input signal if the SDD is turned off.

Delay output

Delayed output with balanced male - XLR connectors.

Reset

Pressing this button resets the SDD3 to factory setup.



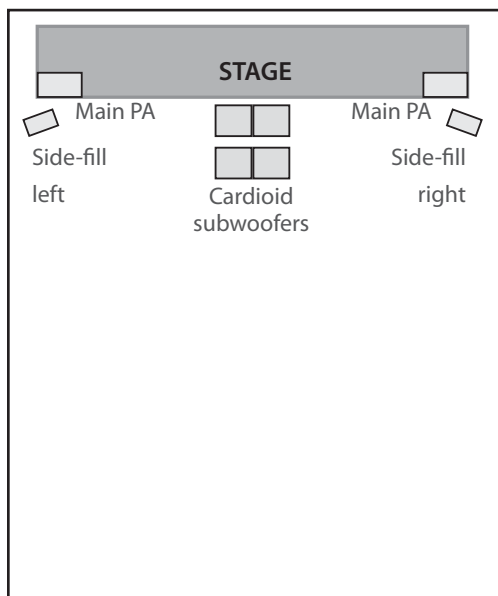
Using the System

Delay for additional PA / fill-in delay, with mono cardioid subwoofers in center

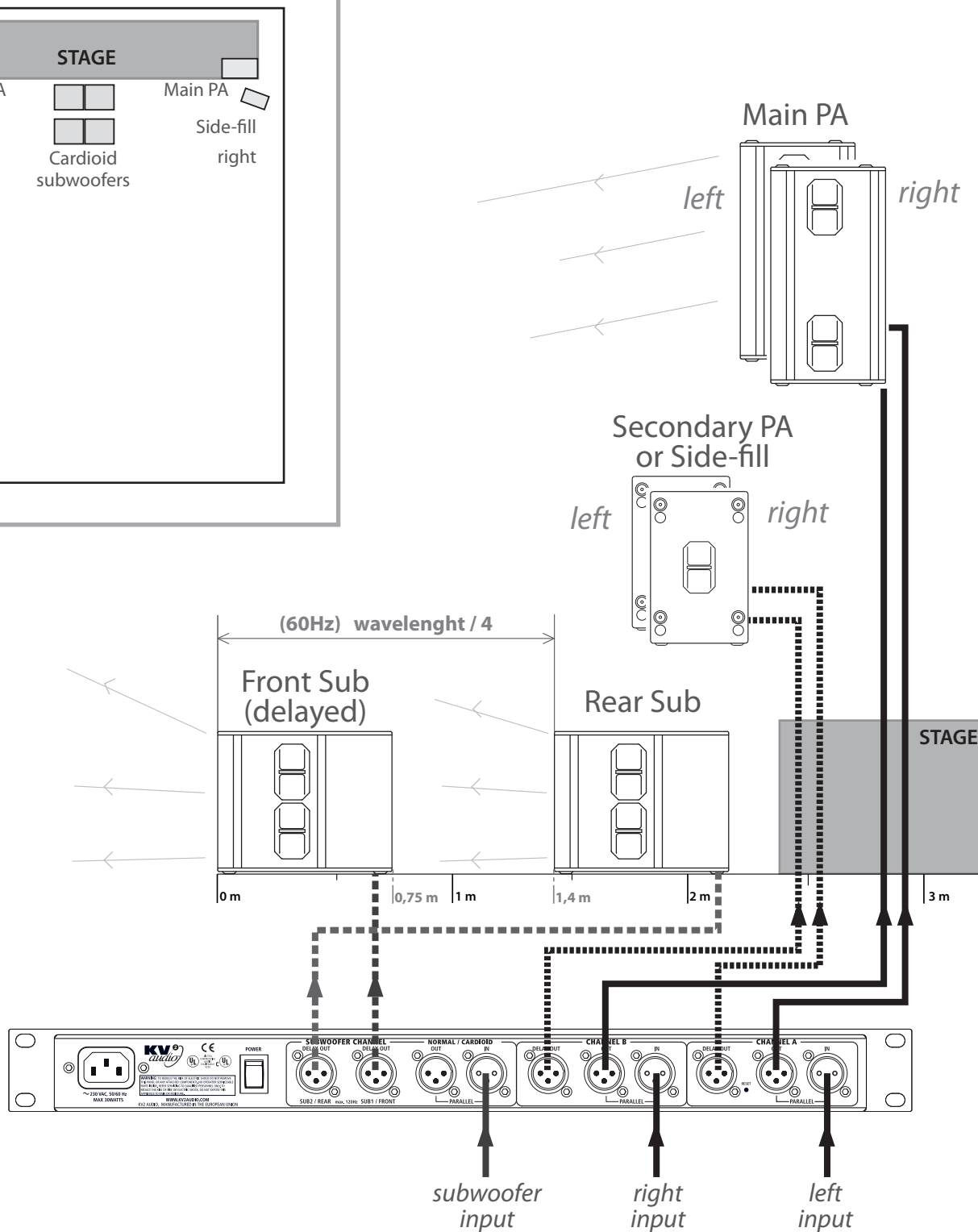
The main PA works directly, without delay. The left and right channel of the secondary, or side-fill PA works through the full range channels of the SDD3, (channel A and B) for proper time alingment with the main PA. Subwoofers are in the center and work in mono, cardioid mode.

When using this system, it is possible to move in time (change the distance) of sidefills and the mono subwoofers in cardioid mode compared to the main PA.

System with mono subwoofers - top view



System with mono subwoofers - wiring



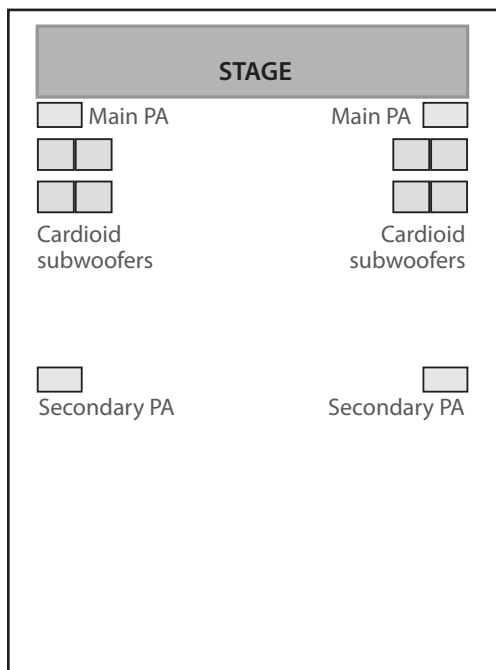
Using the System

Delay for main mono PA, delay for additional PA / mono fill-in delay, with stereo cardioid

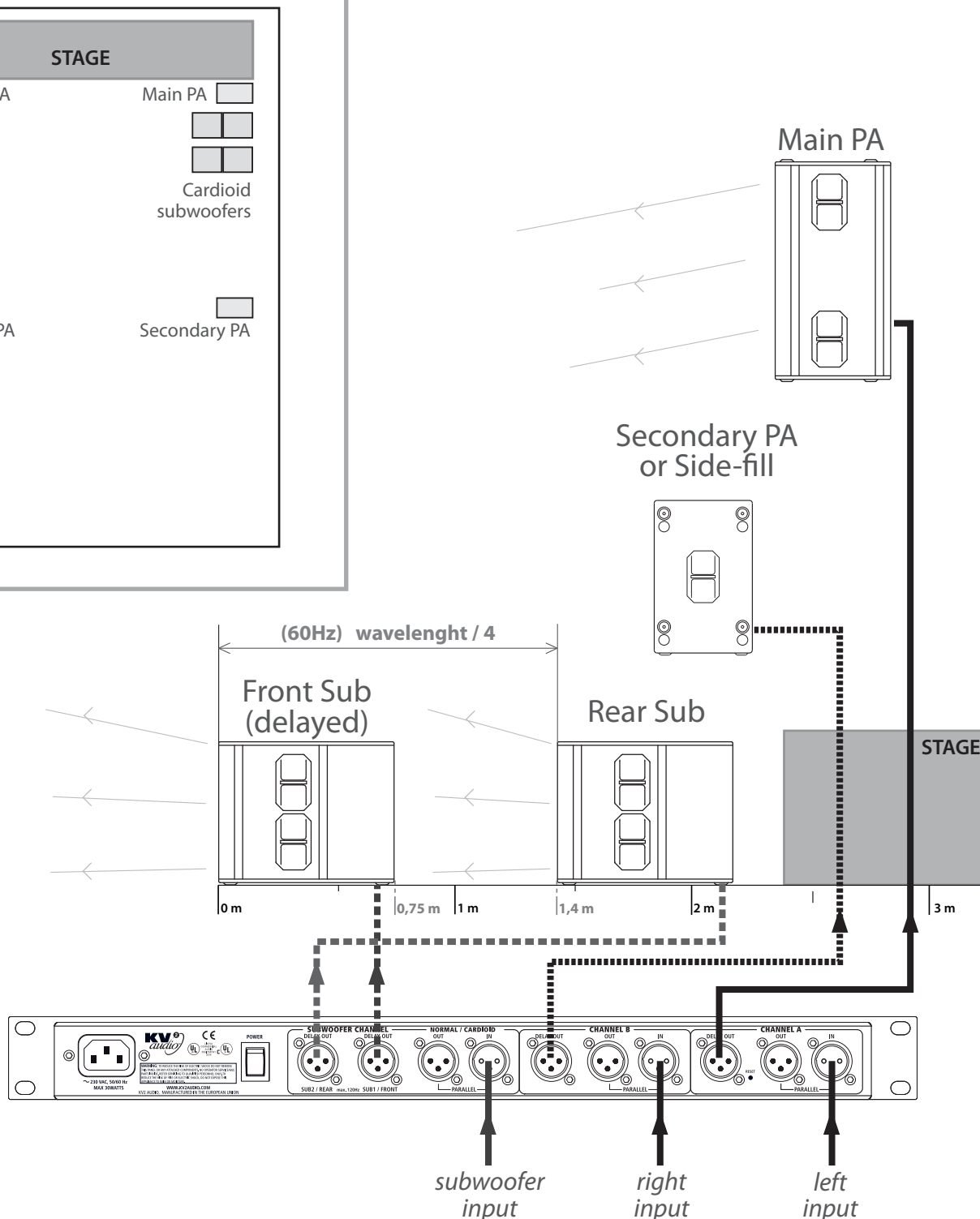
One SDD3 controls one channel of the system, the second channel controls the second SDD3 unit. The main PA works through SDD3 channel A to delay the PA for optimal time alignment with the stage position. The secondary, or side-fill PA works through the full range channel B of SDD3 for proper time alignment with the main PA. Subwoofers work in stereo, cardioid or normal mode.

When using this system, it is possible to move separately in time, (change distance) of the main PA, sidefills and subwoofers compared to the stage position.

Stereo delayed system - top view



Stereo delayed system - wiring



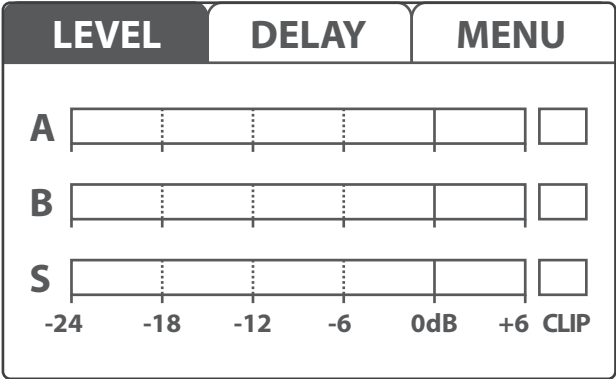
SDD3 Setup

Digital part description

The SDD3 has three main display screens for setup and input levels indication. Main screens are: LEVEL - for input levels indications, DELAY for delay setup and MENU for attributes settings. For switching between these screens use FUNC/EXIT button.

LEVEL

For optimal analog to digital converter driving the full range channels (channel A and B) are equipped with ADC sensitivity control which increases input level and reduces output level at the same time, so the level pass in the SDD3 is not changing when adjusting the ADC sensitivity. ADC sensitivity allows the optimal setup of signal to noise ratio. The input level can be seen on the input level meters indicators. For optimal ADC driving run the level meters so that the signal will exceed 0dB meter level, but never reaches clip level. Level meters are equipped with peak memory and 2 seconds auto reset.

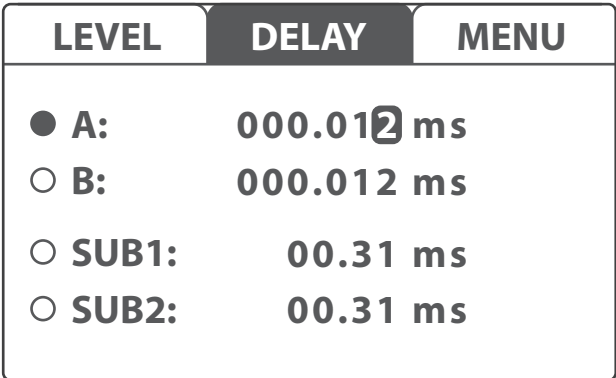


LEVEL screen

DELAY

Delay can be set for each channel individually, delays can be set in time or distance. Required delay is set by changing numbers on math point position. Delay numbers are changed by rotating the rotary encoder. Math position is changed by pushing the rotary encoder (ENTER). Delay changes are reflected in real time.

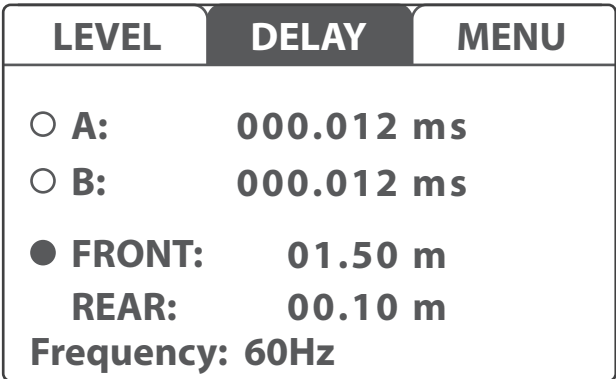
The current selected channel can be switched by pressing CHAN/NEXT button. The selected channel is indicated by an LED.



DELAY screen

The subwoofer channel can be set in 32 fixed steps, with step increments of 0.31ms. The subwoofer channel has two outputs, these outputs can be set individually in normal mode or linked in cardioid mode.

In normal mode, delay can be set in time or distance, in cardioid mode, delays are set in distance. The distance between the front and rear cardioid subwoofer is precalculated by a set cardioid frequency. Cardioid frequency can be set in the range of 40 to 100Hz. In cardioid mode cardioid delay is set for the entire cardioid pair.



DELAY screen - cardioid

SDD3 Setup

MENU

Units mode

Delay mode

Delay can be set in time (milliseconds) or in distance (meters or feet depending on Units setup). When switching between time and distance, the delay time is kept and recalculated to each other. The delay distance depends on the ambient temperature.

Units

It is possible to switch between metric (meters, °C) and imperial (feet, °F) units, when switching between each other, the distance is maintained.

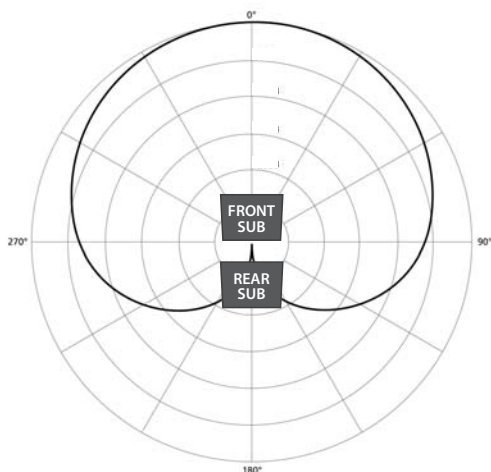
Link AB

It is possible to link channel A and B delay setup, when both delays are the same. When switching to Link AB, the delay of both channels is set by channel A.

Subwoofer mode

Cardioid setup

Bass is usually omnidirectional but by using a cardioid bass array you can reduce bass feedback on stage and also minimise noise pollution from events. When using cardioid mode, the front subwoofer is 1/4 wavelength of the tuned cardioid frequency in front of the rear subwoofer. The front subwoofer is fed with a 1/4 wavelength delay compared to the rear sub. This configuration results in a cardioid polar response, (because of addition and subtraction of the subwoofer signals).



Cardioid polar characteristics

LEVEL	DELAY	MENU
● Units mode ○ Subwoofer mode ○ Memory ○ Lock ○ Display ○ Temperature		

MENU screen - Units mode

LEVEL	DELAY	MENU
Units mode: ● Delay mode (time) ○ Units (metric) ○ Link AB (no)		

Units mode: Delay mode

LEVEL	DELAY	MENU
○ Units mode ● Subwoofer mode ○ Memory ○ Lock ○ Display ○ Temperature		

MENU screen - Subwoofer mode

Cardioid calculation - example

Subwoofers distance (d) corresponds to 1/4 wavelength (λ) of the tuned cardioid frequency (f).

Speed of sound (v) varies with temperature, for 20°C is approx 343m/s.

$$\lambda = 1 / 4f$$

$$d = v * \lambda$$

SDD3 Setup

Subwoofer mode

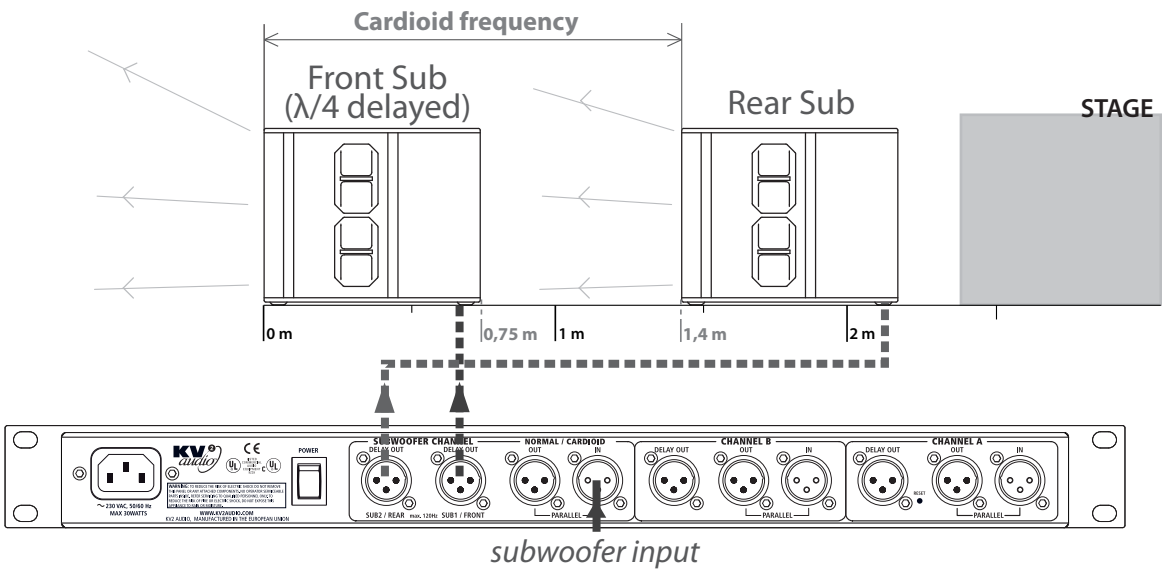
For cardioid setup, you can calculate and set the delay for each subwoofer manually, or you can use cardioid setup in the SDD3 menu.

For manual - independent sub outputs setup, use the normal mode. For cardioid setup use the cardioid mode. When cardioid mode is selected, the subwoofer outputs are linked together with $\lambda/4$ distance between front and rear subwoofer outputs. In cardioid mode, the selected cardioid tuned frequency can be operated in range from 40Hz to 120Hz with 10Hz steps.

The subwoofer pair's polar characteristics are cardioid on this frequency, whilst under and above this frequency the polar characteristics of the subwoofer pair are omnidirectional with increasing difference from cardioid frequency. The cardioid distance is shown on the cardioid frequency setup screen.

LEVEL	DELAY	MENU
Subwoofer mode:		
● Mode	(cardioid)	
○ Frequency	(60Hz)	
Subs distance: 1,04m		

MENU screen - Delay mode



Cardioid subwoofers wiring

SDD3 Setup

Memory

New memory

SDD3 is equipped with a dynamic memory list with up to 30 memory positions. New memory can be created when pressing ENTER at **New** in the memory list.

When a new memory is created, it is marked with a position number from 1 to 30 whilst the memory function select is switched to the rename position.

Rename memory

Memory name can contain up to 8 letters, space or numbers. To rename a memory select the memory position to rename and select **rename** at the memory function list, press ENTER.

When renaming, the renaming letter flashes, select the required letter by rotating the encoder. Switch between A - Z, a - z, spacebar 1 - 9 using **CHAN/NEXT** button.

To jump to the next letter position, press ENTER.

To exit renaming press **FUNC/EXIT** button.

When new memory is created the actual setup is automatically saved.

Save to memory

All delays, units, delay mode, and cardioid setup are saved into the memory.

To save to memory, select the memory position to save in and select **save** from the memory function list, press ENTER. When saved, the memory number, is shown in the top right corner.

Memory recall

To recall from memory, select the memory position to recall and select **recall** at the memory function list, press ENTER.

When recalled, the memory number, is shown in the top right corner.

Delete memory

To delete a memory, select the memory position to delete and select **delete** in the memory function list, press ENTER.

LEVEL	DELAY	MENU
☐ Units mode		
☐ Subwoofer mode		
☒ Memory		
☐ Lock		
☐ Display		
☐ Temperature		

MENU screen - Memory

LEVEL	DELAY	MENU
Memory:		
☒ 1 Hall		(rename)
☐ New		

Memory : New memory

LEVEL	DELAY	MENU
Memory:		M1
☐ 1 Hall		(recall)
☒ New		

*Recalled or saved memory is displayed
in right top corner*

SDD3 Setup

Lock

The SDD3 is equipped with an option to lock the setup of the dital control part. The SDD3 can be locked using four arbitrary capital letters. When the SDD3 unit is locked, it is not possible to change digital parameters. LEVEL meters and delay settings are still visible.

Set the Lock password

To set the lock password enter the Lock menu, select the **Password** position and select **set** at the Lock function list, press **ENTER**. Set the requested letter by rotating the encoder. To jump to the next letter position press **ENTER**.

To exit renaming press **FUNC/EXIT** button. The password must be set complete, with all 4 letters. Password consists only of capital letters.

Lock now

When the password is set, the SDD3 can be locked automatically using Autolock function, or manually using Lock now function.

Autolock

Automatic lock function can be selected between 1min, 10mins, 1hour, or can be switched off. After this time, when the SDD3 parameters are not being changed, the SDD3 unit is automatically locked.

Unlock

When locked, the MENU is replaced with unlock screen. To unlock, set the LOCK screen and set the correct password letter by rotating the encoder. To jump to the next letter position press **ENTER**. When all 4 letters are entered correctly, the SDD3 will unlock.

Forgotten password

A forgotten password can be deleted by using the **RESET** switch at the back of the SDD3. **Pressing the RESET button resets the SDD3 to factory default setup and all previous memory settings will be deleted back to factory default !**

LEVEL	DELAY	MENU
☐ Units mode ☐ Subwoofer mode ☐ Memory ☒ Lock ☐ Display ☐ Temperature		

MENU screen - Lock

LEVEL	DELAY	MENU
Lock:		
☐ Lock now	(	yes)
☒ Password	(	set)
A B C D		
☐ Autolock	(	1 hour)

Lock: Set password

LEVEL	DELAY	LOCK
LOCKED		
Enter password		
A B C D		

Unlock screen

SDD3 Setup

Display

The SDD3 is equipped with a high-contrast organic - LED display.

Contrast

The contrast of the display can be set in the range from 10% to 100% for comfortable use, depending on ambient lighting.

Autodim

To ensure long life of the display, the display automatically reduce s the contrast when the unit is not currently used.

Temperature

The SDD3 calculates delay distances using the speed of sound. Speed of sound varies with temperature. The SDD3 allows the user to set the ambient temperature to calculate accurate delay settings.

Ambient

The ambient temperature can be set in the range from -20°C to +40°C with 5°C steps. When the SDD3 units are set to imperial, the temperature is displayed in °F.

When the SDD3 unit is switched to distance mode, and the ambient temperature changed, you can select the new temperature, the delay time is then recalculated to keep the most consistent distance.

LEVEL	DELAY	MENU
☐ Units mode ☐ Subwoofer mode ☐ Memory ☐ Lock ☒ Display ☐ Temperature		

MENU screen - Display

LEVEL	DELAY	MENU
Display: ☐ Contrast (70%) ☒ Autodim (1hour)		

Display: Autodim

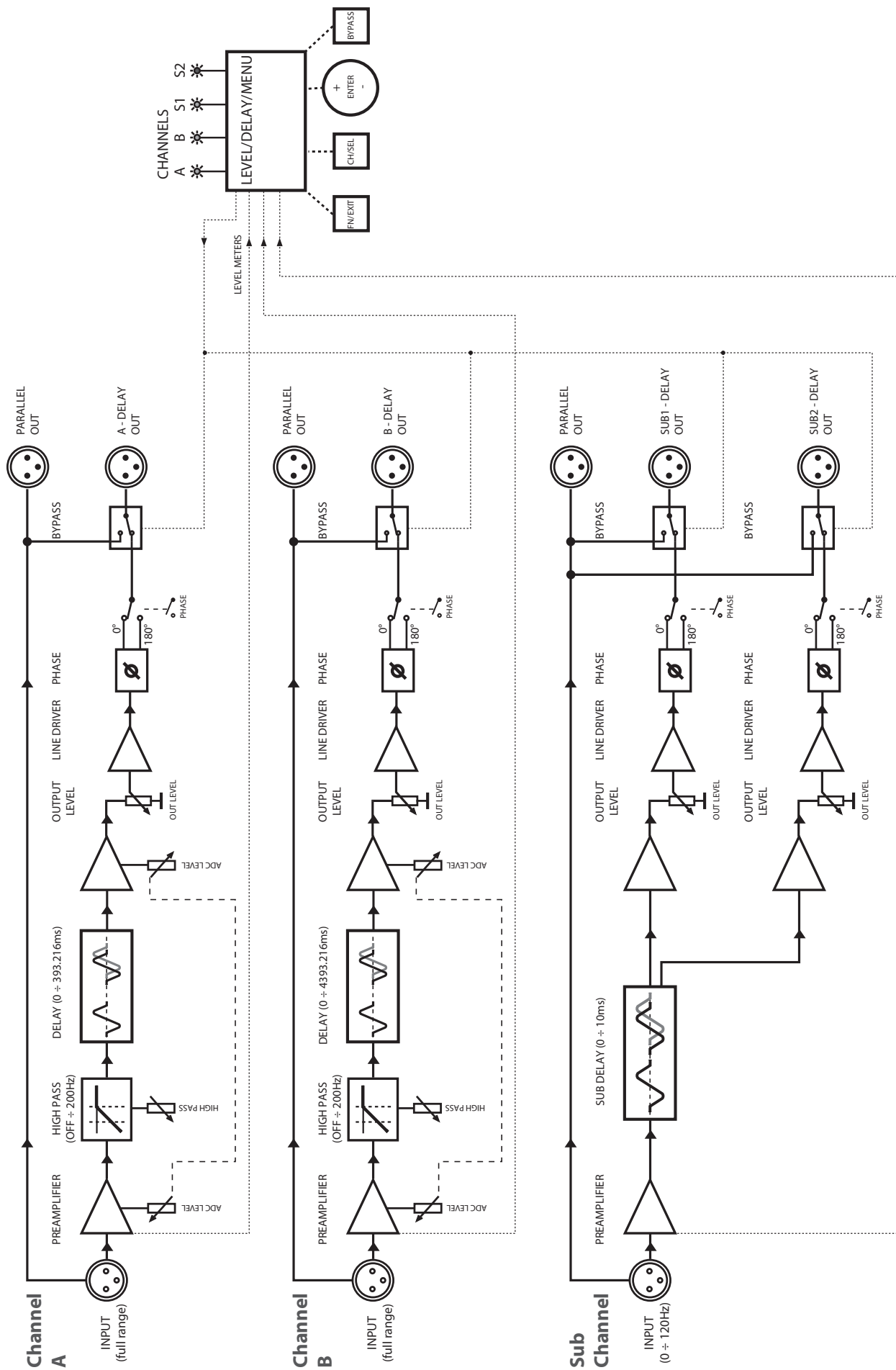
LEVEL	DELAY	MENU
☐ Units mode ☐ Subwoofer mode ☐ Memory ☐ Lock ☐ Display ☒ Temperature		

MENU screen - Temperature

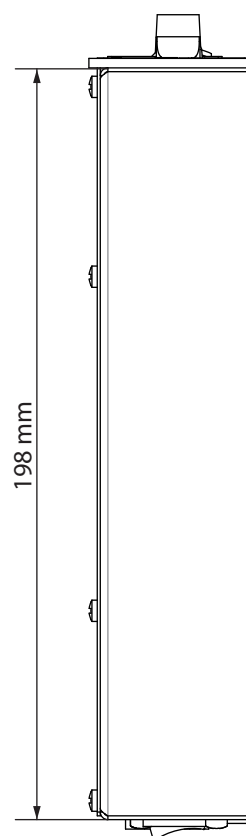
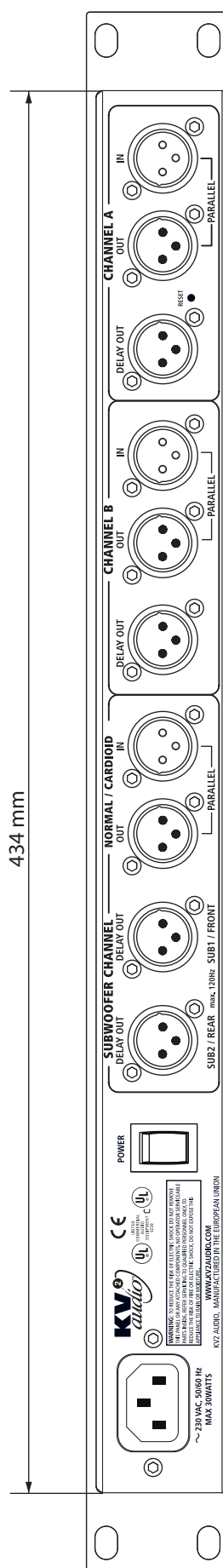
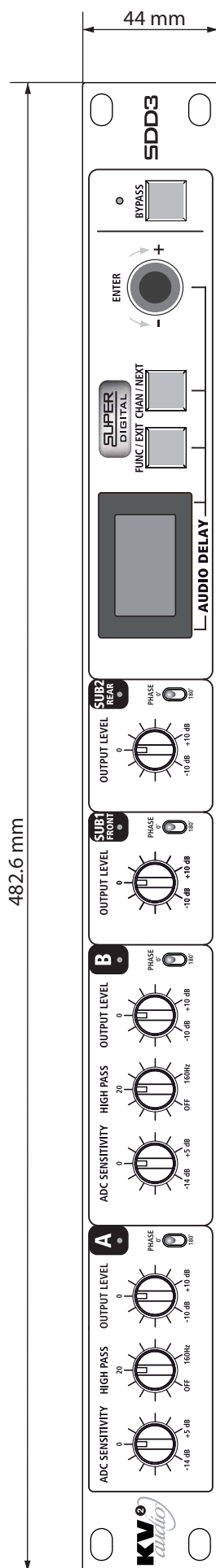
LEVEL	DELAY	MENU
Temperature: ☒ Ambient (20°C)		

Temperature: Ambient

Block diagram



Dimensions

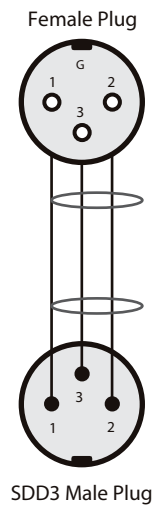


Input and output cables

SDD3 Input

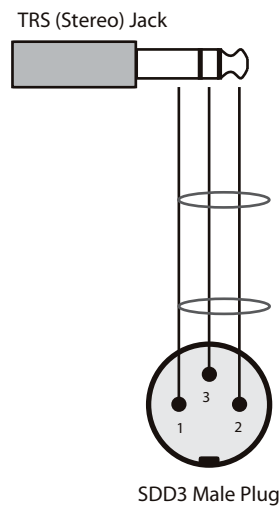
XLR output - XLR input

- Pin 2 - Pin 2 (Hot)
- Pin 3 - Pin 3 (Cold)
- Pin 1 - Pin 1 (Shield)



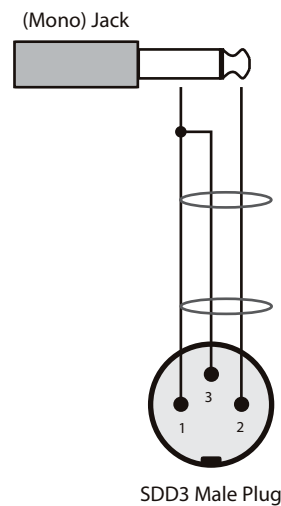
Jack output (balanced) - XLR input

- Tip - Pin 2 (Hot)
- Ring - Pin 3 (Cold)
- Sleeve - Pin 1 (Shield)



Jack output (unbalanced) - XLR input

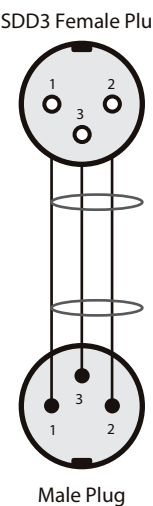
- Tip - Pin 2 (Signal)
- Sleeve - Pin 3 (Shield)
- Sleeve - Pin 1 (Shield)



SDD3 Output

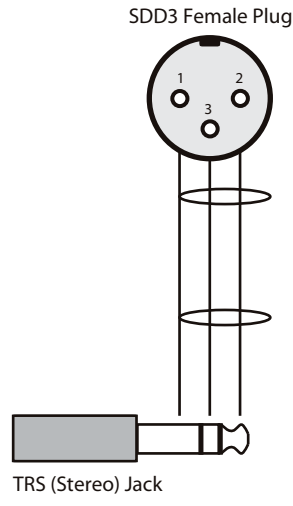
XLR output - XLR input

- Pin 2 - Pin 2 (Hot)
- Pin 3 - Pin 3 (Cold)
- Pin 1 - Pin 1 (Shield)



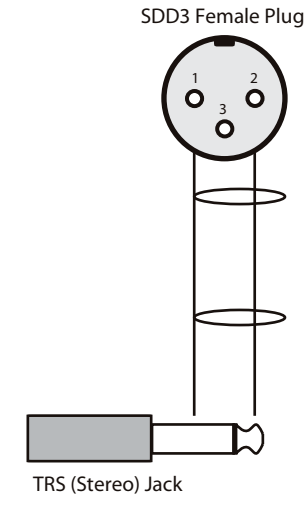
XLR output - Jack input (balanced)

- Pin 2 - Tip (Hot)
- Pin 3 - Ring (Cold)
- Pin 1 - Sleeve (Shield)



XLR output - Jack input (unbalanced)

- Pin 2 - Tip (Signal)
- Pin 3 - No Connection
- Pin 1 - Sleeve (Shield)



XLR Plugs seen from solder side

SDD3 Specification

System Acoustic Performance

-1dB Response	2Hz ÷ 40kHz
-10dB Response	2Hz ÷ 100kHz
Sampling Frequency	20MHz PDM
Dynamic Range	>105dB
Channel Crosstalk	90dB
Signal to Noise Ratio	105dB
Total Harmonic Distortion	0.005%

Signal Input

Input Channels	2 Full range + 1 Subwoofer
Input Impedance	20kΩ (balanced)
Max. Input voltage	+14dBu
Signal Output	XLR
Line input	XLR

Signal Output

Output channels	2 Full range + 2 Subwoofer
Output Impedance	50Ω
Line Output	XLR

Features

Level Control	-10 / +10dB
Subwoofer Level Control	-10 / +10dB
System setup	Normal / Cardioid mode
Delay Range	0.012ms ÷ 393.216ms, step 0.003ms
Full Range Mode	2 channels
Phase	0° / 180°
High Pass Filter	OFF to 200Hz
Indicators	OLED Display
Memory	30

Power

Power Connector	IEC 320
Operating Voltage	115V / 230V
Operating Voltage Range	90÷130V@60Hz 180÷260V@50Hz

Physical Dimensions

Height	44.5mm (1.75")
Width	483mm (19.0")
Depth	201mm (7.9")
Weight	3.6kg (7.94lbs)

Warranty, Service

Warranty

Your SDD3 is covered against defects in material and workmanship. Refer to your supplier for more details.

Service

In the unlikely event that your SDD3 develops a problem, it must be returned to an authorised distributor, service centre or shipped directly to our factory.

Because of the complexity of the design and the risk of electrical shock, all repairs must be attempted only by qualified technical personnel. If the unit needs to be shipped back to the factory, it must be sent in its original carton. If improperly packed, the unit may be damaged.

To obtain service, contact your nearest KV2 Audio Service Centre, Distributor or Dealer.

The future of sound. Made perfectly clear.

At KV2 Audio our vision is to constantly develop technologies that eliminate distortion and loss of information providing a true dynamic representation of the source.

Our aim is to create audio products that absorb you, place you within the performance and deliver a listening experience beyond expectation.



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