innosonix

MAXX-SERIES

DIGITAL POWER AMPLIFIERS

MA32/LP

USER MANUAL

INDEX

1. SAFETY INSTRUCTIONS . . . 1
   1.1. INSTALLATION INSTRUCTIONS . . . 3
   1.2. VENTILATION AND COOLING . . . 3
2. HARDWARE . . . 4
   2.1. CONTROLS . . . 4
   2.2. ETHERNET . . . 5
   2.3. AMPLIFIER . . . 5
      2.3.1. VOLTAGE, CURRENT AND POWER . . . 5
   2.4. GAIN . . . 6
   2.5. PROTECTION CIRCUITS . . . 6
      2.5.1. AMP CHIP / CHANNEL MAPPING . . . 7
   2.6. SPEAKER CONNECTION . . . 8
3. HEAT GENERATION AND DISSIPATION . . . 9
4. SOFTWARE . . . 10
   4.1. IDFM (FIRMWARE UPDATE AND IP CONTROL) . . . 10
      4.1.1. DISCOVERY . . . 11
      4.1.2. IP SETTINGS . . . 12
      4.1.3. FIRMWARE STORAGE . . . 13
      4.1.4. FIRMWARE UPDATE . . . 14
   4.2. DSP (internal) . . . 15
   4.3. USER INTERFACES . . . 16
      4.3.1. DISPLAY / BUTTONS . . . 16
         DISPLAY MENU . . . 17
         OVERVIEW . . . 18
         DISPLAY DEVICE LOCK . . . 18
      4.3.2. POWER LED . . . 19
      4.3.3. WEBSITE . . . 20
         HEADER . . . 20
         PAGES . . . 21
         SAVE INTERNAL STORAGE . . . 21
         PSU LIMIT . . . 21
         AMP STATUS . . . 22
         FOOTER . . . 23
         OVERVIEW . . . 24
         INTERFACES . . . 46
         DEVICE . . . 49
         MUTEGROUPS . . . 51
         PRESETS . . . 52
         LOGGING . . . 53

METERING . . . 54
4.3.4. ERROR CODES . . . 55
4.3.5. RESTful API . . . 57
GET DEVICE INFOMRATIONS . . . 58
SET CHANNEL MUTE . . . 58
GET CHANNEL VOLUME OPTIONS . . . 59
REMOVE PRESET WITH NAME TEST . . . 59
5. DIMENSIONS AND WEIGHT . . . 60
5.1. DIMENSIONS . . . 60
5.2. WEIGHT . . . 60
6. EU DECLARATION OF CONFORMITY . . . 62
6.1. EN 55032:2012 . . . 62
6.2. EN 55103-2 . . . 62
6.3. EN 62368-1:2014/AC:2015 . . . 63
6.4. MANUFACTURER . . . 63

Chapter 1. SAFETY INSTRUCTIONS

Before using the product, please read this manual and follow all Safety Instructions. They are used to protect you, help to avoid equipment defects and damages resulting from improper use. Keep this manual in a safe place.

CAUTION: THE POWER SUPPLY CORD IS USED AS THE MAIN DISCONNECT DEVICE, ENSURE THAT THE SOCKET-OUTLET IS LOCATED/INSTALLED NEAR THE EQUIPMENT AND IS EASILY ACCESSIBLE

ATTENTION: LE CORDON D'ALIMENTATION EST UTILISÉ COMME INTERRUPTEUR PRINCIPAL. LA PRISE DE COURANT DOIT ÊTRE SITUÉE OU INSTALLÉE À PROXIMITÉ DE L'ÉQUIPEMENT ET ÊTRE FACILE D'ACCÉS

CAUTION - DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE.

ATTENTION - DANGER D'EXPLOSION LORSQUE LA BATTERIE N'EST PAS REMPLACÉE CORRECTEMENT. REMPLACER UNIQUEMENT AVEC DES BATTERIES IDENTIQUES OU D'UN TYPE ÉQUIVALENT

CAUTION - THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED SERVICE PERSONNEL ONLY. TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

ATTENTION - CES CONSIGNES D'ENTRETIEN DOIVENT ETRE UNIQUEMENT EMPLOYES PAR LE PERSONNEL DE SERVICE QUALIFIÉ. POUR RÉDUIRE LE RISQUE DE CHOC ÉLECTRIQUE NE PAS EFFECTUER DES REPARATIONS AUTRES QUE CEUX CONTENUS DANS LES INSTRUCTIONS D'UTILISATION A MOINS QUE VOUS SOYEZ QUALIFIE POUR LE FAIRE

The amplifier is a device of protection class 1. Make sure that the protective conductor (earth) is connected properly. A missing earth can lead to dangerous voltages at the enclousure!

Keep the device away from dust, moisture, water and other liquids! In such case, the further usage is prohibited!

The amplifier has a relatively high output power and possibly can be a hazard for people and speakers. Pay particular attention to any defective set volume.

Do not touch the housing of the device, during operation. The surfaces can be hot. After switching off the device, wait 30 minutes till touching the device.

In the following cases it is necessary to return the amplifier for examination to the manufacturer. Contact details can be found on our website: www.innosonix.de

- The unit has been dropped, mechanically damaged or treated improperly.
- The power cord or plug has been damaged.
- Objects have fallen into the unit.
- Liquid has been spilled into the unit.
- The unit is not operating normally.
- The device displays errors.

1.1. INSTALLATION INSTRUCTIONS

All devices can be installed in a 19-inch rack. Screw the devices at each of the two Mounting holes of the mounting bracket on the front. Use Screws with a sufficiently large head diameter and lock washers.

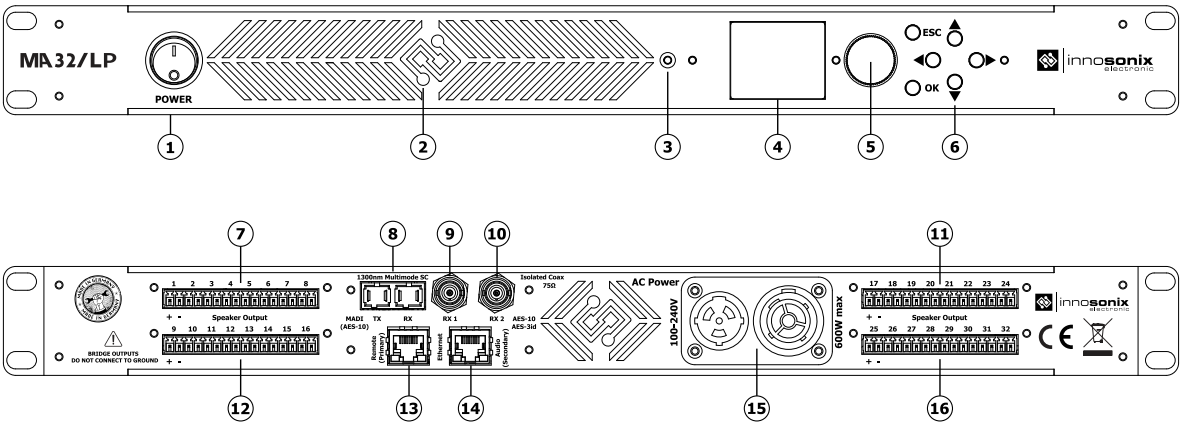
We recommend mounting the unit cantilevered. The use of guide rails and bearing surfaces can affect the convection.

1.2. VENTILATION AND COOLING

Built-in and 19-inch racks must be ventilated adequately. The passively cooled devices must not be placed directly over each other since the housing is cooled by convection. There must be at least 1U space under and above the unit.

Chapter 2. HARDWARE

2.1. CONTROLS



Element Nr.	Function
1	Power switch disconnects the unit from the mains
2	Ventilation grille. Please clean to ensure an unhindered airflow through the device
3	Power LED. Red, Yellow or Green
4	TFT Display
5	Encoder knob for adjusting values
6	Keys to enter values and menu navigation
7	Speaker terminals channel 1-8
8	MADI (AES10) Optical. SC Connector for Multimode Optics 1310nm
9	MADI (AES10) BNC Primary. Connection for 75Ohm coaxial cable, e.g. RG59
10	MADI (AES10) BNC Secondary. Connection for 75Ohm coaxial cable, e.g. RG59
11	Speaker terminals channel 17-24
12	Speaker terminals channel 9-18
13	Network connection for remote control and web server. 10 / 100BaseT Ethernet (DANTE Primary 1000BaseT)
14	Network connection for audio transport (Optional). 1000BaseT Gigabit Ethernet (DANTE Secondary 1000BaseT)
15	Mains Connection. Neutrik Powercon True 1 with Loop-through facility. 90 - 240V AC 2300W or 16A max

Element Nr.	Function
16	Speaker terminals channel 25-32

2.2. ETHERNET

- IEEE802.3 10/100Base-T Ethernet
- Static IP-Address / Dynamic IP-Address via DHCP
- Full remote control via Web
- JSON web service for integration in media control systems
- Across subnets working UDP broadcast discovery protocol which can be used to set IP-Address
- FTP access for FIR Filter- and Presetfiles

2.3. AMPLIFIER

2.3.1. VOLTAGE, CURRENT AND POWER

This Unit uses full bridge Class-D amplifiers. Only by the extremely high efficiency of a "switched" amplifier, it is possible to accommodate 32 channels in 1U.

Due to the H-Bridge concept used, all outputs are biased by half VCC which is approximately 11V. So no common ground for outputs exist.

All outputs are internal bridged pairs, no external bridging is possible

- **Internal Operating Voltage** 21V
- **Maximum voltage at the speaker terminal** 42Vpp 14.5VRms
- **Maximum output current** 5A peak
- **Power** 16 Ohm → 13W RMS (1% THD+N), 25W Peak 8 Ohm → 20W RMS (1% THD+N), 50W Peak 4 Ohm → 30W RMS (1% THD+N), 100W Peak

POWER DISTRIBUTION

- The power supply can deliver 500W continuous power. To ensure a stable operation in overload situations, the MA32 involves an overall power limiter. With an attack time of 100ms and a release of 3s the limiter softly reduces the gain of all channels simultaneously not to exceed the maximum available power. At 110V lines, a derating of 20% must be considered.
- The pulse power of 32*100W is buffered through 10.000uF of capacitors and is certainly available as a short burst only.
- An amplifier efficency of 85% can be expected.
- All amplifiers are sourced by one powersupply.
- Assuming a evenly distribution of load between all channels. The MA32/LP is able to give 12.5W continous sine power per channel. At 110V line it is after all 10W.
- Maximum continuous power output per channel is limited to 20W at 4 Ohms because of thermal reasons. (Continous power longer than 10 seconds). There is no limitation at 8 Ohm loads.

2.4. GAIN

28dB

Input in dBFS + 28dB = Output in dBV

Example: -12dBFS → 16dBV

2.5. PROTECTION CIRCUITS

The amplifier contains the following protection circuits to ensure safe operation under all conditions.

Protection Function	Description
Temperature	An assembly consisting of 8 channels shuts down at 85°C heat sink temperature. The remaining 24 stay active. With a Hysteresis of 25 ° C, i.e., at 60 ° C, the affected group turns on again. Each MOSFET bridge on a module has a shutdown threshold of 120 ° C. In this case, only two channels are affected, and the other 30 remains active.
Direct Current	If the polarity of the signal changes not for more than a second, the affected channel switches off and restarts again after a few seconds.
Short Circuit	The affected channel is switched off when the maximum current of 5A is exceeded. Recovery time is about two seconds.
Low Impedance	The amplifier works unconditionally stable at low impedance as long as the maximum current is not exceeded.

2.5.1. AMP CHIP / CHANNEL MAPPING

Every Amp Chip has two output channels. The assignment of Amp to Output channels is in the table below.

Internal Amplifier	Output Channel	Amplifier Module
Amp 1	25 / 26	1
Amp 2	27 / 28	1
Amp 3	29 / 30	1
Amp 4	31 / 32	1
Amp 5	17 / 18	2
Amp 6	19 / 20	2
Amp 7	21 / 22	2
Amp 8	23 / 24	2
Amp 9	9 / 10	3
Amp 10	11 / 12	3
Amp 11	13 / 14	3
Amp 12	15 / 16	3
Amp 13	1 / 2	4
Amp 14	3 / 4	4
Amp 15	5 / 6	4
Amp 16	7 / 8	4

If an error occurs, the power led (element no. 3) changes from green to yellow, and the display (Item no. 4) shows detailed information. An example error message for a static error in an Amplifier channel:

2.6. SPEAKER CONNECTION

The speaker terminal is a connector from Wuerth Elektronik. It is a 16-pin connector with 3.81mm grid and the item number 691361300016. Phoenix contact MC 1,5/16-ST-3,81 - 1803714 can be used, too. In procurement problems, please feel free to contact us.

We recommend a cable with a cross-section of at least 0.5 mm² for wiring. It is not critical to install several couples of different amplifier channels in parallel.

Chapter 3. HEAT GENERATION AND DISSIPATION

The idle power dissipation of the amplifier is approx 50W.

The maximum arise of heat is about 160 W. This has to be considered in the planning of ventilation and air conditioning as "worst case".

Table 1. Dissipation loss at different sine output power levels at 230V 50Hz

Power per channel	Total output power	Active power at line	Total loss
0 W	0 W	x W	x W
1 W	x W	x W	x W
2,5 W	x W	x W	x W
5 W	x W	x W	x W
7,5 W	x W	x W	x W
10 W	x W	x W	x W
12,5 W	x W	x W	x W
15 W	x W	x W	x W

Chapter 4. SOFTWARE

4.1. IDFM (FIRMWARE UPDATE AND IP CONTROL)

The IDFM (**I**nnosonix **D**iscovery and **F**irmware **M**anager) is available for Windows 10, MAC OSX and Linux. Have a look at our Download Area

It is desinged to discover MAXX Devices across subnets and across network modes (See ETHERNET). It also handles Firmware updates of MAXX Devices.

4.1.1. DISCOVERY

The Discovery process starts after opening the IDFM Tool. All available Devices will appear in the list view.

> **!** Be sure the firewall allows TCP and UDP connections.

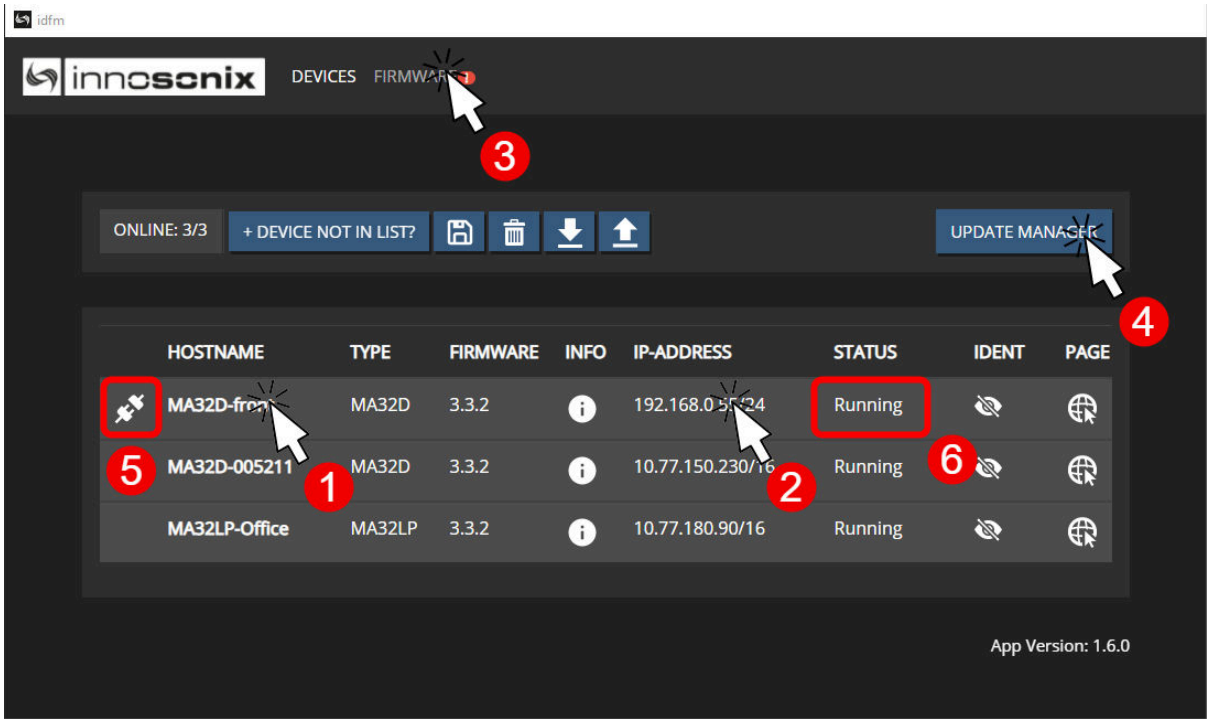


Figure 1. IDFM Discovery

NR	DESCRIPTION	REFERENCE
1	Change Hostname	
2	Change IP Settings	IP SETTINGS
3	Download / Import Firmware Files	see FIRMWARE
4	Update Devices	UPDATE
5	Device not in same Subnet ⇒ cannot be updated	
6	Actual Device Status (Update Status)	

4.1.2. IP SETTINGS

After clicking on the IP Address in IDFM Discovery view, following popup appears to change IP Settings.

IP Settings are described here Control IP

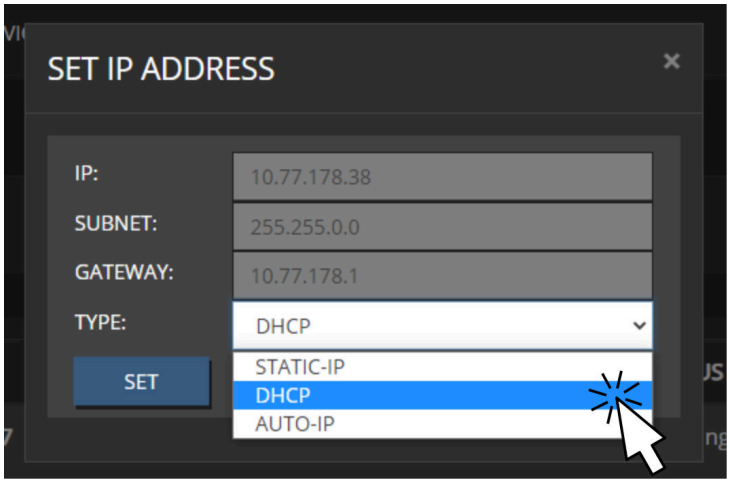


Figure 2. IDFM IP Settings

4.1.3. FIRMWARE STORAGE

To update the firmware of a MAXX Device, the correct Firmware must be available in the firmware storage.

If there is no Internet connection available, the newest firmware cannot be loaded from our server ❷. With ❶ a firmware image files can be uploaded manually.

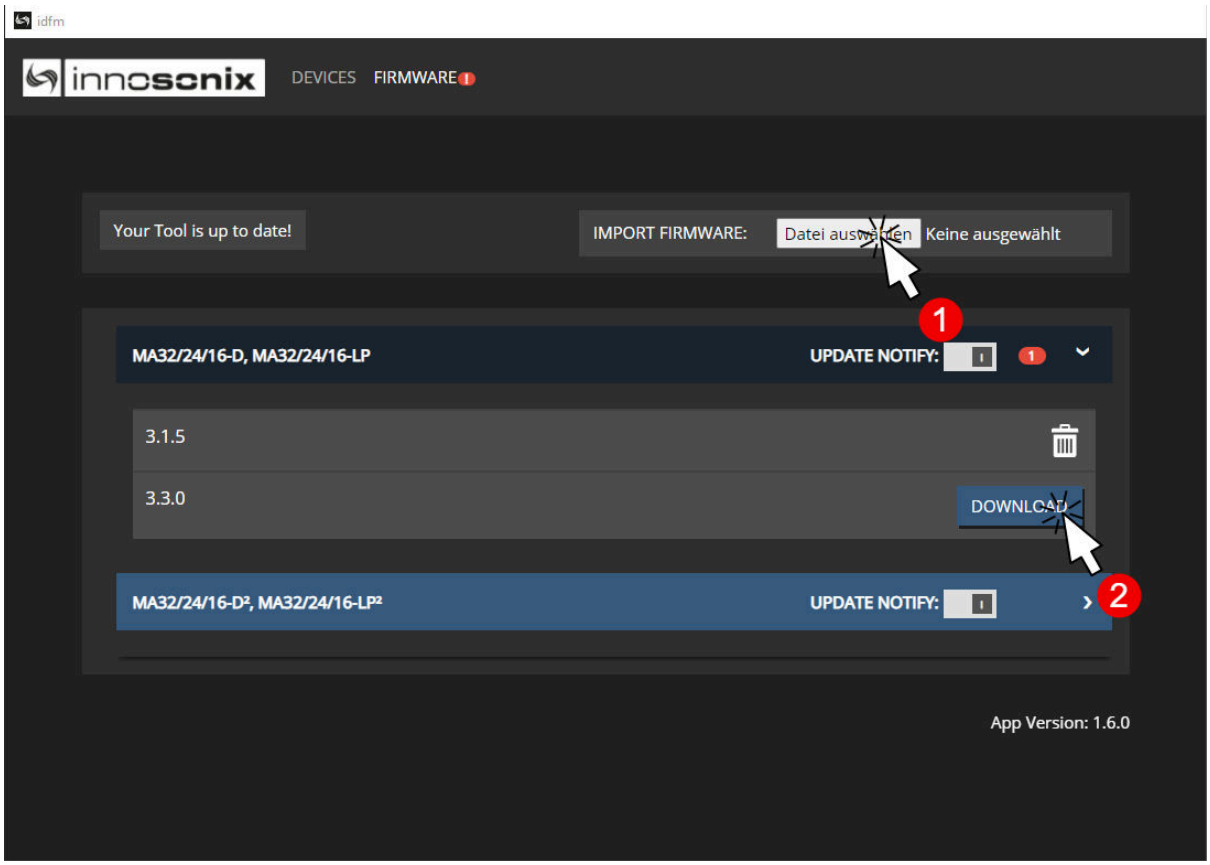


Figure 3. IDFM Firmware storage

4.1.4. FIRMWARE UPDATE

After loading a correct firmware file to the FIRMWARE STORAGE, the firmware can be selected in the firmware update popup. If no Firmware is selected, the device will be ignored. After confirming the update, the update status can be seen at ❻ on IDFM Discovery.

! After firmware Update completed, the Device restarts autimatically.

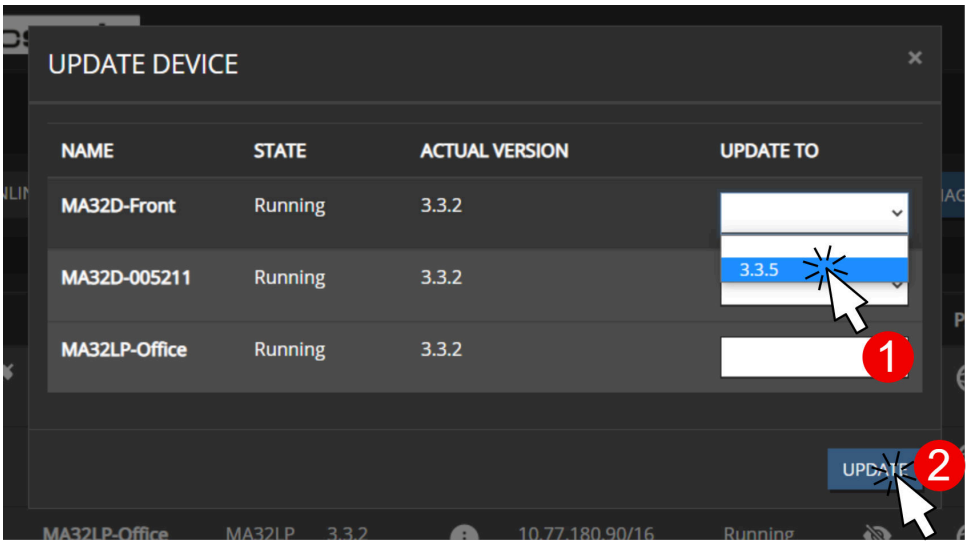


Figure 4. IDFM Firmware update

4.2. DSP (internal)

The internal signal path of a MAXX Device depends on the following software and hardware options:

- **Opt. M1** Speaker Monitoring

  Monitoring of the connected speakers using 20kHz pilot tone to detect defective speakers or failure in the supply cable to the speaker.

- **Opt. D1** DSP

  DSP functions for each channel: (EQ, High-/Lowpass, Compressor, Limiter, Volume, Delay)

- **Opt. D2** FIR Filter

  2048 tab filter / channel

- **Opt. IF1** Audinate Dante Interface

  32 input channels over Dante IP-Network.

Option **D1** and **D2** can be used independently

A DSP is a digital signal processing chain inside the FPGA that calculates the volume control, filtering and limiting parameters on the selected Input Source. There are as many DSP channels as amplifier outputs on the MAXX device. DSPs are "hardwired" to the corresponding amplifier, e.g. DSP channel 1 supplies an amplifier that is wired to CH1 Jack on the rear panel.

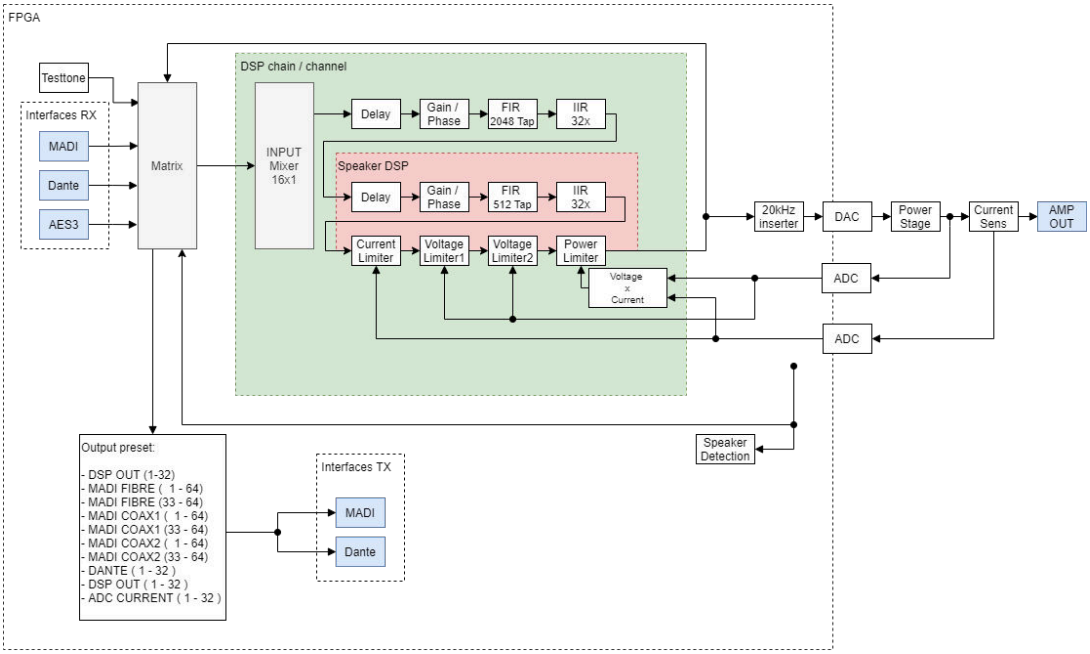


Figure 5. DSP Block Image

DSP Features

Architecture	FPGA based 32-bit fixed point
Inputs	16 x input matrix per channel (DANTE / AES3 / MADI)
	sine, white- pink- brown-noise
Level Control	Mute, Volume, Phase
Filter per channel	32 x EQ / Highpass / Lowpass
Filter types	bell, notch, highshelf, lowshelf
High- Lowpass types	6 - 48dB/Oct, Bessel, Butterworth, Linkwitz/Riley, Variable Q
FIR Filter	2048 Tabs, ASCII file import
Delay	48000 Samples / 330m / 1000ms per channel
CurrentLimiter	Threshold [Ap]
Voltagelimiter	2 x Threshold [Vp], Attack, Release
Powerlimiter	Threshold [W], Attack, Release
Speakerdetection	20kHz Pilot Tone generating with Volume, Threshold, Debounce

4.3. USER INTERFACES

4.3.1. DISPLAY / BUTTONS

See ❸ and ❹ on FRONT VIEW

DISPLAY MENU

Figure 6. MENU STRUCTURE

Table 2. MENU PAGES

NR	DESCRIPTION
1	Overview Page with Hostname, IP and Channel Status (see. OVERVIEW)
2	Status Page with Temperatures and PSU Load and Fan Speeds
3	Info Page with Model, Serial, Software Version and Software Options
4	Network Settings Page to change IP type and address

OVERVIEW

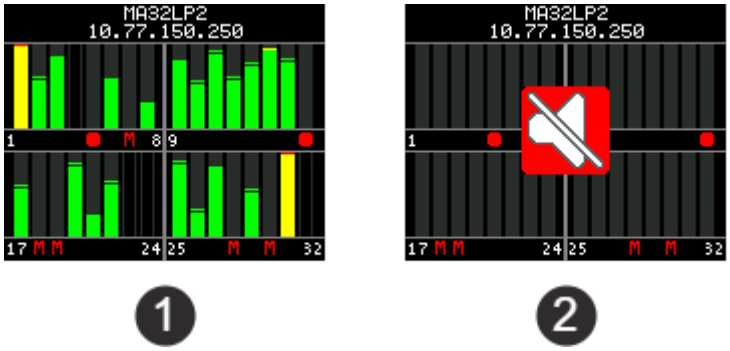


Figure 7. OVERVIEW EXAMPLES

The Overview Page appears at startup, and after a 30 seconds timeout, if another page is selected and no user input occurs. Every channel has its own Levelmeter from **-60dBFS** to **0dBFS** with **PEAK** as a bar and **HOLD** as a horizontal line. The Overview ❶ shows **CHANNEL MUTE** State (CH 7, 18, 19, 18, 30), if the amplifier channel is **disabled** (CH 4, 23, 24, 32) or the amp channel has an **error** (CH 5, 16).

If **Master Mute** is enabled, the crossed out loudspeaker appears ❷.

DISPLAY DEVICE LOCK

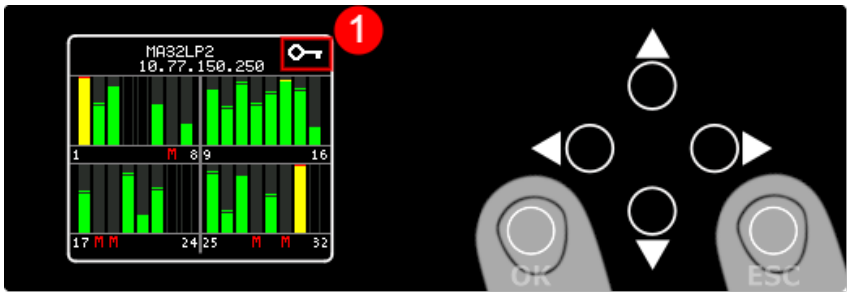


Figure 8. DEVICE LOCK

To enable and disable Display Device Lock, hold **OK** and **ESC** for about 2 seconds. The Device Lock prevents changing the IP settings on display. The small Key ❶ shows activated Device Lock on every Page.

4.3.2. POWER LED

See ❷ FRONT VIEW

Table 3. POWER LED states

COLOR	DESRIPTION
GREEN	everything is ok
ORANGE	system is booting up
RED	one or more channels are in error state

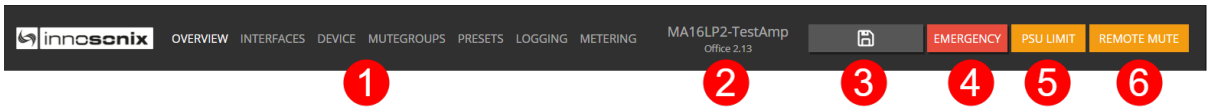
4.3.3. WEBSITE

To get to the website, open the IP or open the mDNS name. The website is the main User Interface to control every setting and get status informations of the amplifier.

Some DSP function and inputs are optional and depend on the software and hardware options of the device.

In single edit, value fields and buttons with blue background indicate the value is changed but not currently set to the device. In multi-edit it also indicates different values on the selected channel.

HEADER



NR	DESCRIPTION	REFERENCE
1	navigate through pages	PAGES
2	click to change hostname or location	
3	save button / autosave status	SAVE INTERNAL STORAGE
4	overall amp status	AMP STATUS
5	PSU Limit indication	PSU LIMIT
6	Remote Mute active indication	DEVICE

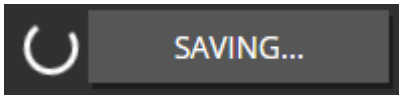
PAGES

See ❶ on WEBPAGE HEADER

Table 4. PAGES

IDENTIFIER	DESCRIPTION	REFERENCE
OVERVIEW	status and settings of amp channel	OVERVIEW
INTERFACES	device interface status and config	INTERFACES
DEVICE	device specific settings	DEVICE
MUTEGROUPS	mutegroup settings	MUTEGROUPS
PRESETS	device/channel preset edit/save/call/store	PRESETS
LOGGING	syslog with syslog server settings	LOGGING
METERING	show input / output level and measured voltage / current / power	METERING

SAVE INTERNAL STORAGE



After changing a setting, the auto save triggers, so all settings will be saved automatically after ten seconds.

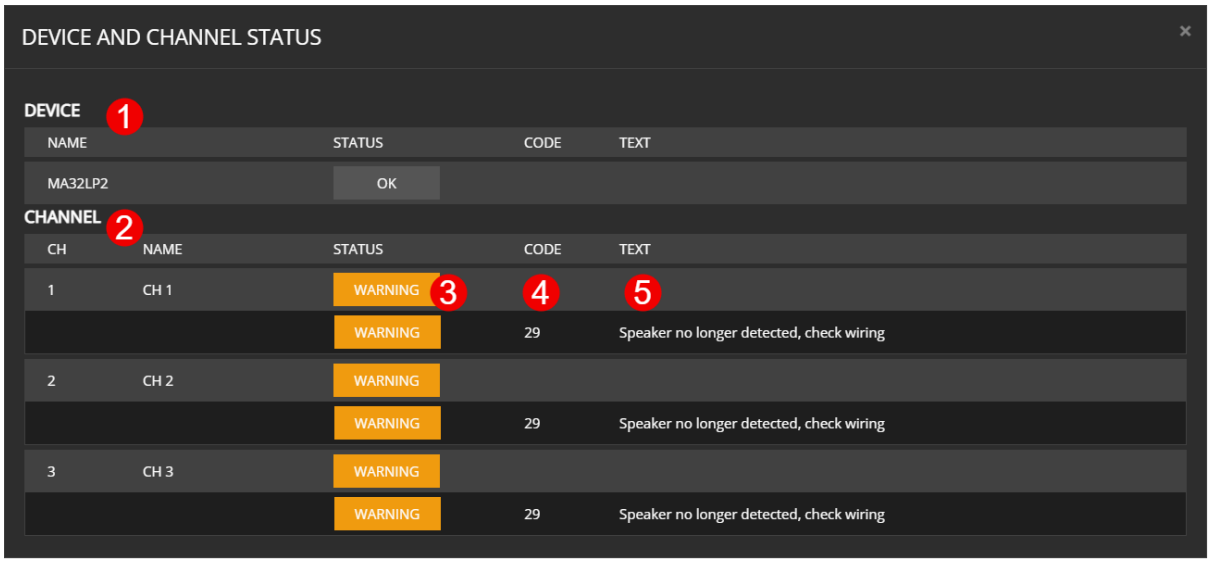
If you click on WEBPAGE HEADER ❸, the save process will be triggered manually, so the amplifier saves all current settings to load at the next startup.

PSU LIMIT

If maximum power of the PSU is reached, the amplifier reducts the output with an extra limiter, to avoid shutting down the amplifier. The indicator LED (WEBPAGE HEADER ❺) starts blinking, if reduction is active. To see the actual reduction value and load, see DEVICE ❹

AMP STATUS

The Amp Status shows all currently applicable errors. To see the chronological sequence of errors see LOGGING.



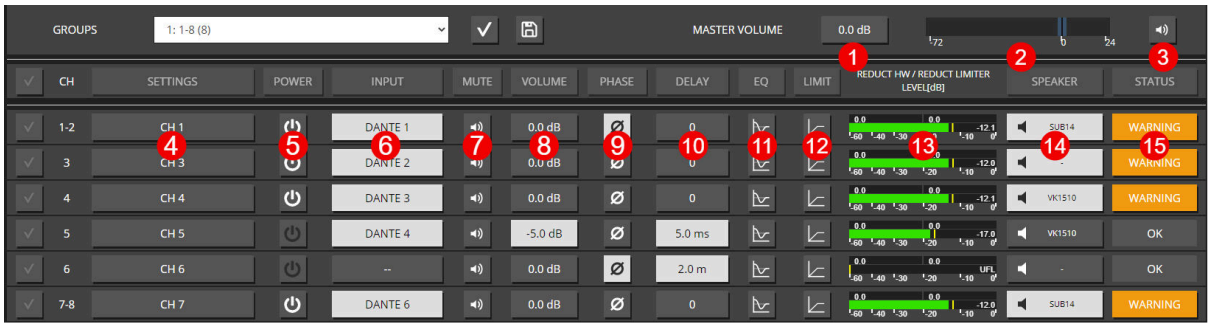
NR	DESCRIPTION	REFERENCE
1	device errors	
2	channel errors	
3	severity level	SEVERITY LEVEL
4	error code	ERROR CODES
5	error text	

FOOTER

NR	DESCRIPTION	REFERENCE
1	Amp and FPGA temperatures (at 80°C the Amplifier executes emergency shutdown)	
2	device serial number	
3	software version	
4	navigate to license page	
5	navigate to rest api doc	RESTful API
6	navigate to legacy api doc	

OVERVIEW

All channel setting can be done to single and multi-channel (see SELECTION AND GROUPING for multi-channel selection details).



NR	DESCRIPTION	REFERENCE
1	click to set master volume	
2	change master volume by moving the slider	
3	click to toggle master mute	
4	click opens channel settings modal	CHANNEL SETTINGS
5	click to toggle amplifier power	CHANNEL POWER
6	click opens input patching modal (∑ indicates, that multiple inputs are set)	CHANNEL INPUT
7	click to toggle channel mute (blinks if muted by mutegroup MUTEGROUPS)	CHANNEL MUTE
8	click opens channel volume modal	CHANNEL VOLUME
9	click to toggle channel phase (reverses phase)	CHANNEL PHASE
10	click opens channel delay modal	CHANNEL DELAY
11	click opens channel eq modal	CHANNEL EQ
12	click opens channel limiter modal	CHANNEL LIMIT
13	sample synchonous channel level after processing, hw limiter (sum of PSU Limit and Thermo Limit) and biggest limiter reduction	
14	click opens channel speaker settings modal	CHANNEL SPEAKER SETTINGS
15	if error occurs, click opens channel status modal	error shown like AMP STATUS

SELECTION AND GROUPING

Multiple channels can be selected by clicking on ✓. This feature enables the "multi-channel edit" functionality indicated by the active headline buttons (SETTINGS, POWER, ...). The headline buttons open the corresponding modal.

> The saved selection groups will be used as mute groups MUTEGROUPS and can be selected in the channel edit modal header MODAL HEADER.

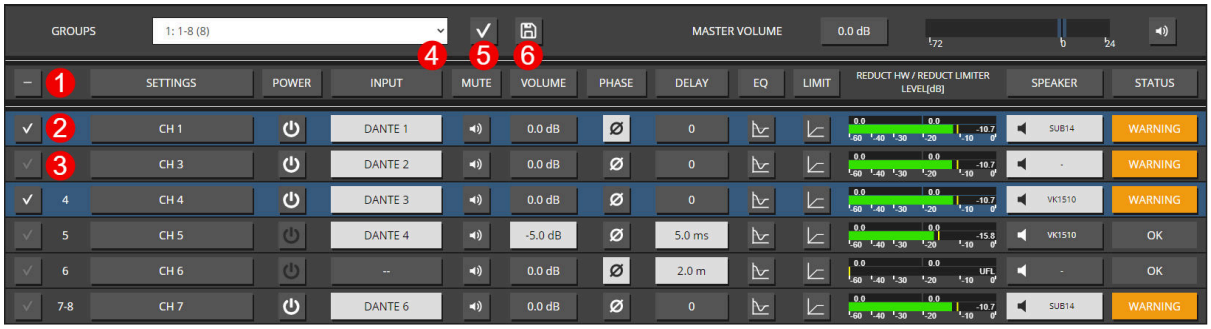
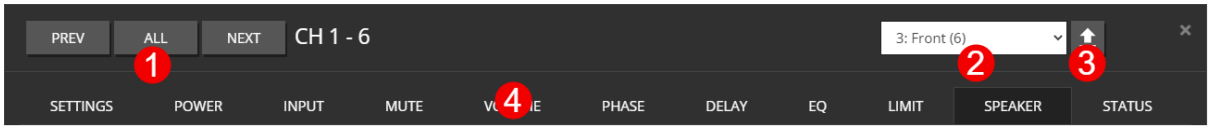


Figure 9. WEBPAGE GROUPING

NR	DESCRIPTION
1	Select/deselect all channels.
2	Channel is selected. Indicators are the white hook and the blue background of the channel line.
3	Channel is not selected.
4	Channel Groups drop-down list.
5	Loads the selected group to the selection.
6	Saves active selection to the selected group.

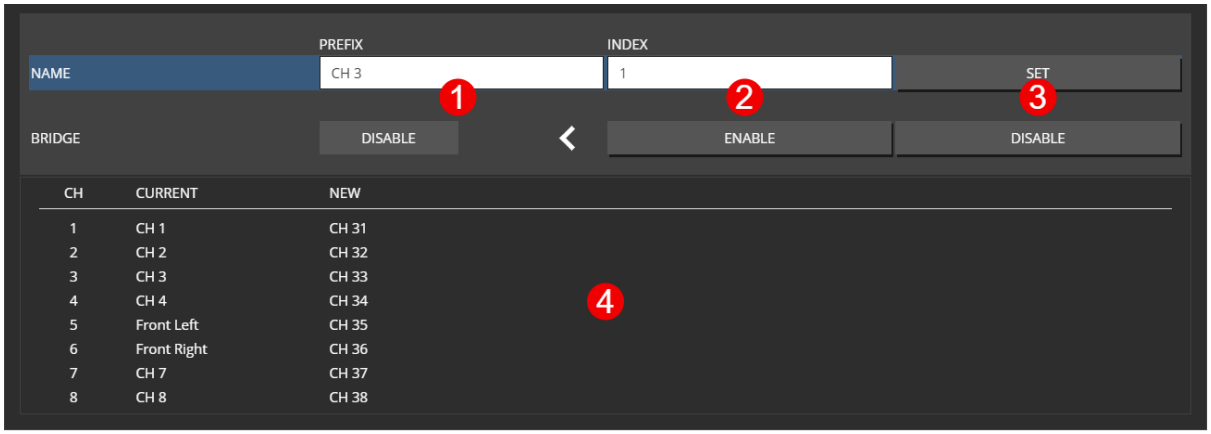
MODAL HEADER



NR	DESCRIPTION
1	Shows the current selected channels. The "PREV / ALL / NEXT" allows cycling through the selected channels to allow an easy single channel edit.
2	Select a selection group. (see. SELECTION AND GROUPING)
3	Loads the selected group to the selection.
4	Settings for the selected channels.

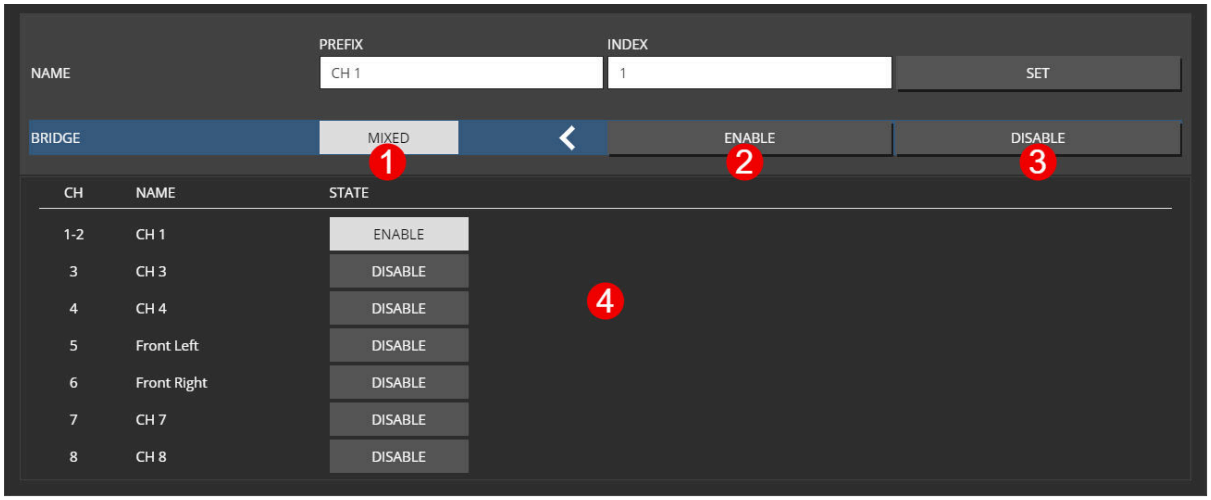
CHANNEL SETTINGS

CHANNEL NAME



NR	DESCRIPTION
1	Set channel prefix, which will be concatenated with the "INDEX" as final channel name.
2	Set an optional index which is incremented for each selected channel. (only available in multi-edit)
3	Execute changes.
4	Preview of channel names.

BRIDGE MODE



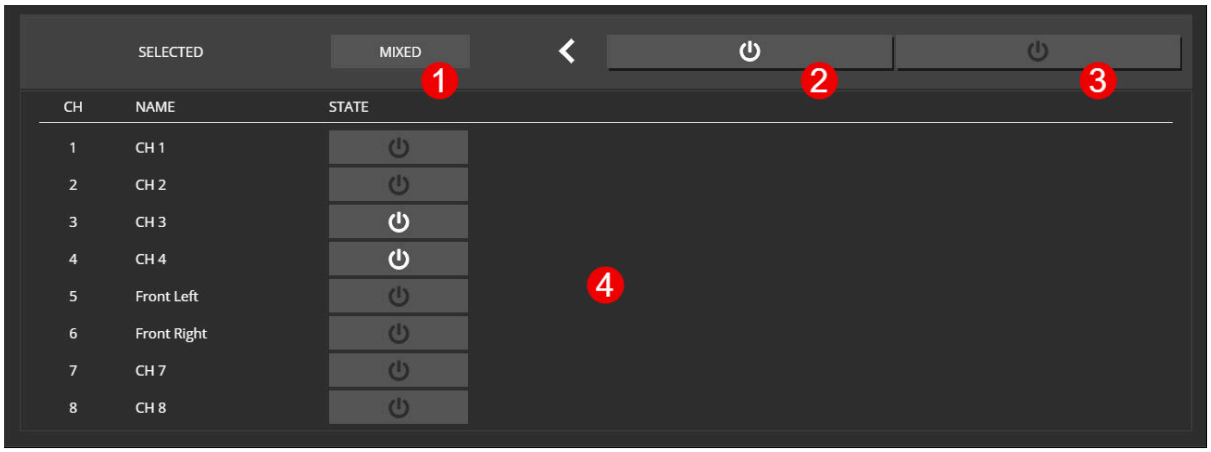
NR	DESCRIPTION
1	Indicates summarized state of selected channels.
2	Enable bridge mode for selected channels.
3	Disable bridge mode for selected channels.
4	States for all selected channels.

Only adjacent channel pairs can be set to bridge mode, channel 1/2 or 3/4 ...

Enabling the **BRIDGE MODE** for a channel pair will clear all settings of the EVEN channel.

CHANNEL POWER

Power-off a channel will stop the class-d amp from switching to save idle power.

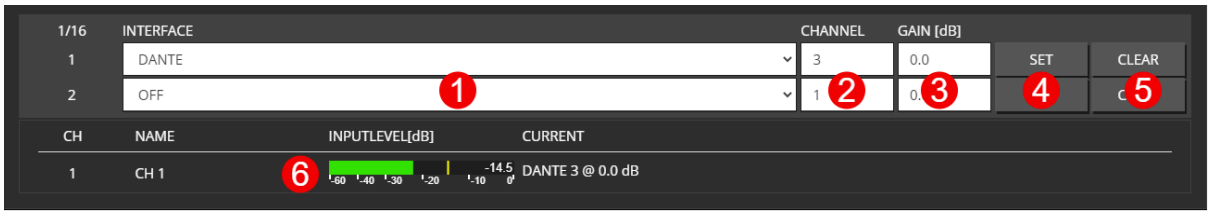


NR	DESCRIPTION
1	Indicates summarized state of selected channel.
2	Activate all selected channels.
3	Deactivate all selected channels.
4	States for all selected channels.

CHANNEL INPUT

Each DSP channel has its own 16x1 input mixer which allows a summation of up to 16 different sources with individual gains.

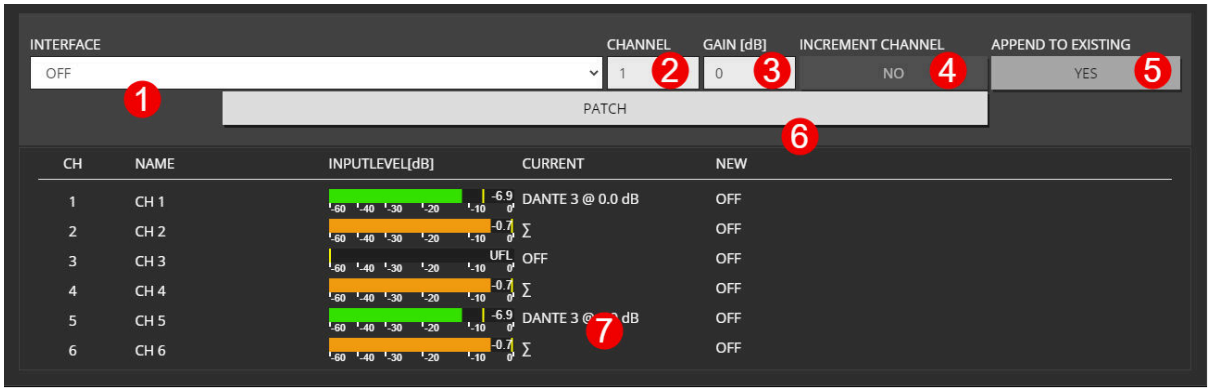
SINGLE CHANNEL



NR	DESCRIPTION
1	Select a input interface or test tone (depends on your hard- and software-options).
2	Select channel of interface type.
3	Gain for the selected source channel.
4	Sets slected parameters.
5	Remove the patch in the input mixer.
6	Mixer output level.

If you set the last slot, a new input slot appears till the maximum of 16 slots is reached.

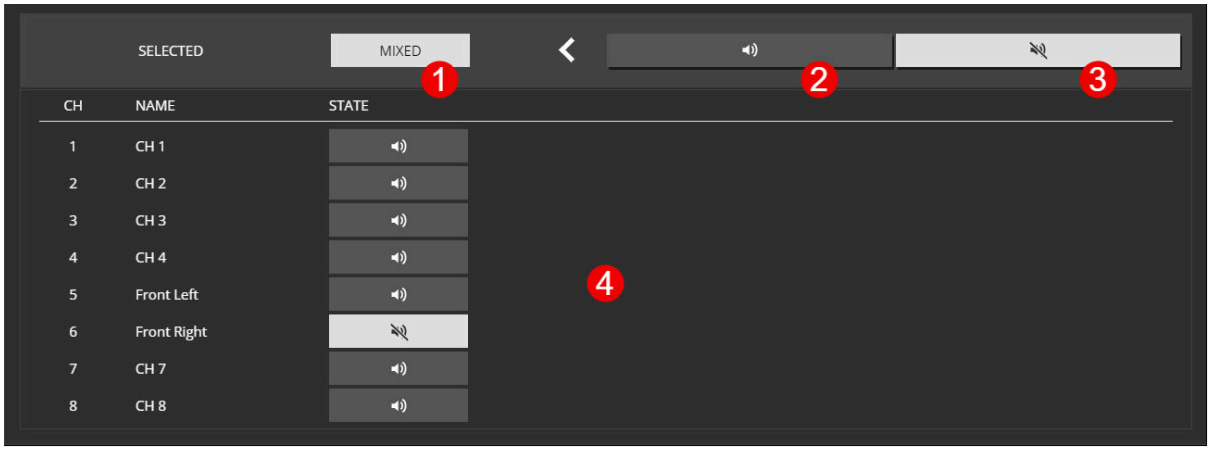
MULTI CHANNEL



NR	DESCRIPTION
1	Select a input interface or test tone (depends on your hard- and software-options).
2	Select channel of interface type.
3	Gain for the selected source channel.
4	Increments input channel through patch.
5	Appends selected patching to existing patches on the channels.
6	Execute the patch command.
7	Preview of selected combination.

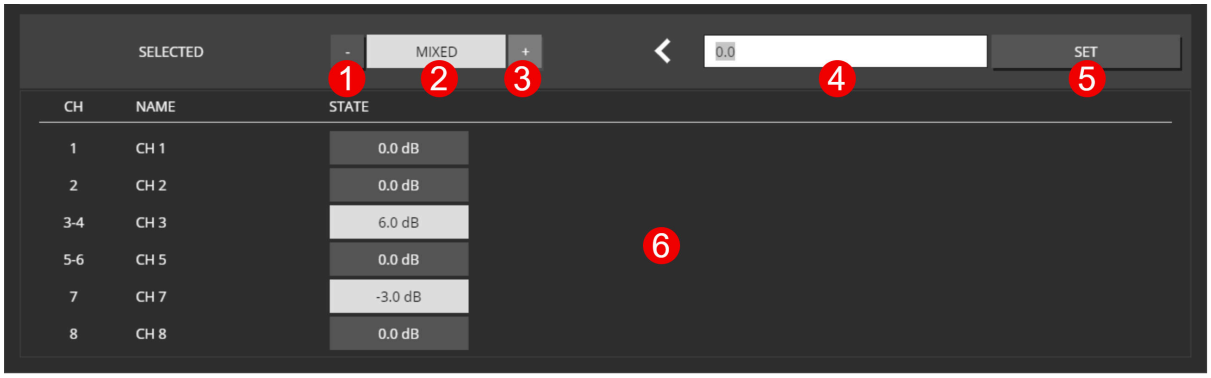
∑ indicates, that multiple inputs are set.

CHANNEL MUTE



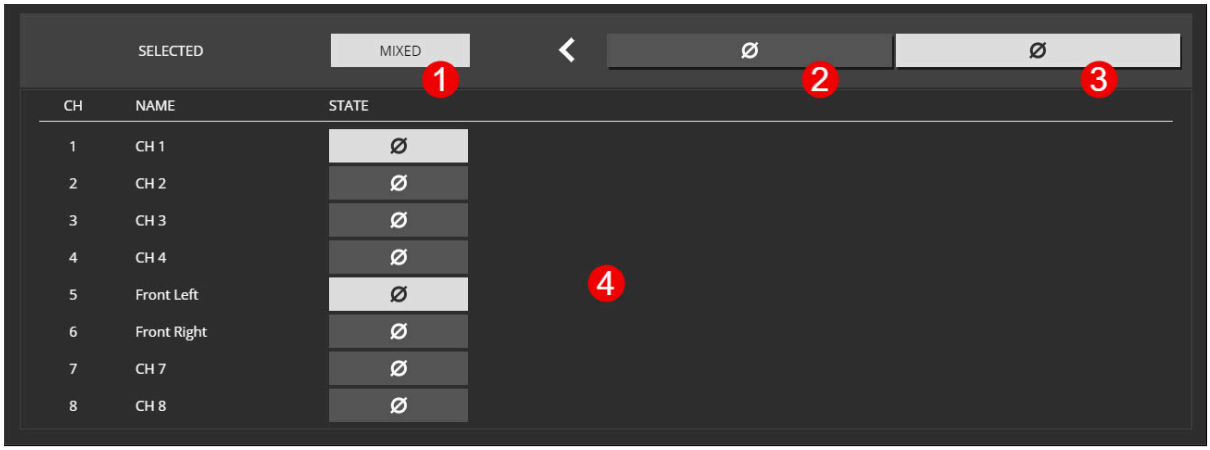
NR	DESCRIPTION
1	Indicates summarized state of selected channels.
2	Unmutes all selected channels.
3	Mutes all selected channels.
4	Shows states of all selected channels.

CHANNEL VOLUME



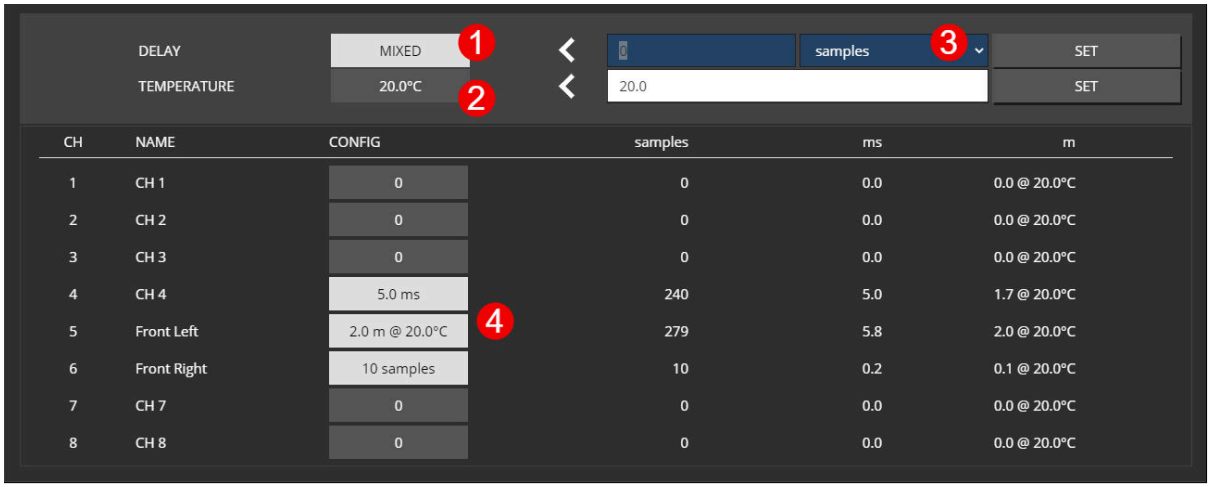
NR	DESCRIPTION
1	Decreases volume of selected channels by 1 dB.
2	Indicates summarized the state of selected channels.
3	Increases volume of selected channels by 1 dB.
4	Channel volume to set.
5	Apply Settings.
6	Shows vales of selected channels.

CHANNEL PHASE



NR	DESCRIPTION
1	Indicates summarized state of selected channels.
2	Set normal phase.
3	Set reverse phase.
4	Shows vales of selected channels.

CHANNEL DELAY



NR	DESCRIPTION
1	Indicates summarized delay of selected channels.
2	When setting the delay in meters, an air temperature has to be specified to calculate the speed of sound.
3	Delay can be set in different units, like samples, meters, milliseconds.
4	Shows vales of selected channels.

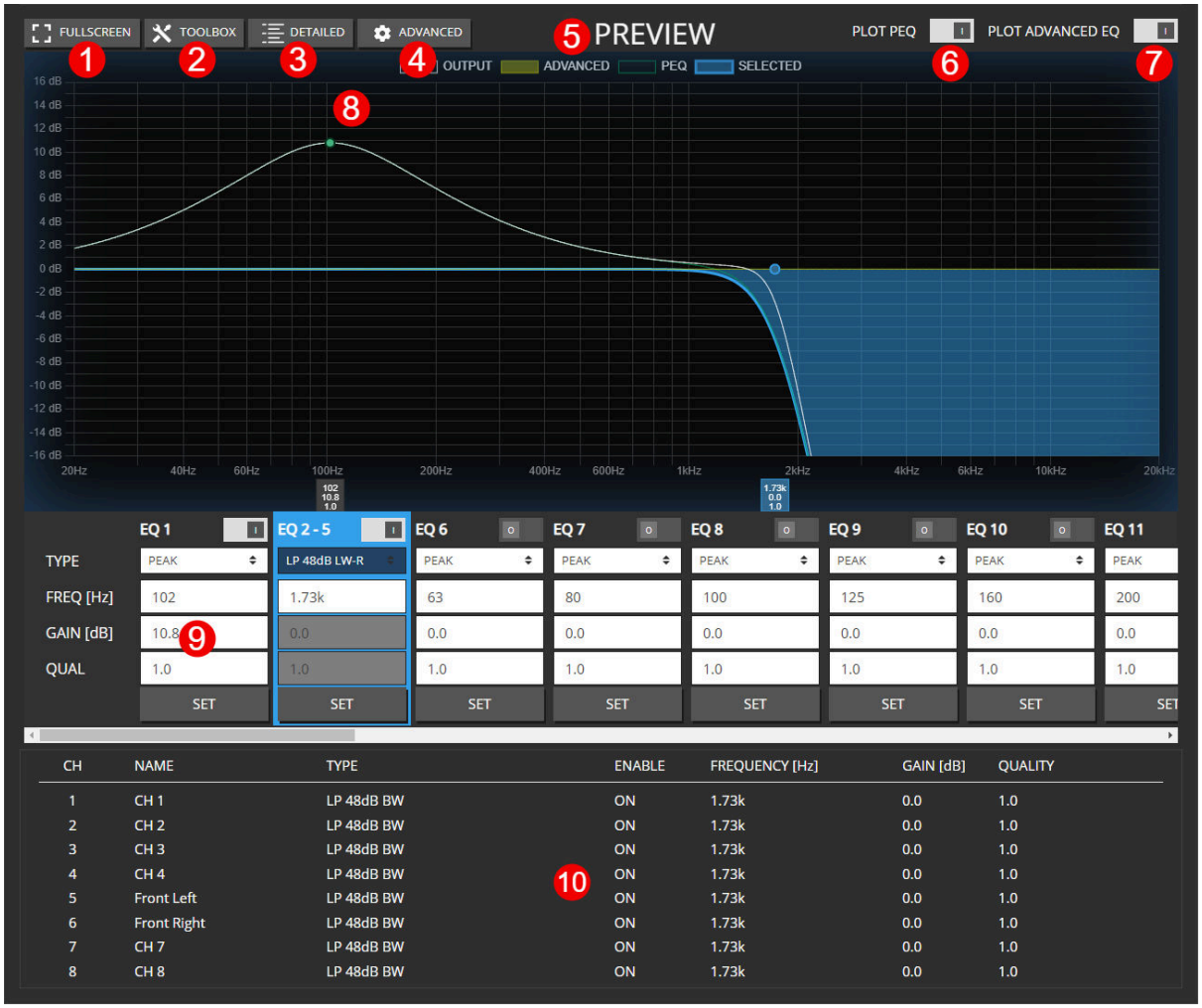
The values for ms and m will be calculated with given temperature and/or samplingrate. The result will be round to samples. 4 show calced value.

CHANNEL EQ

PEQ

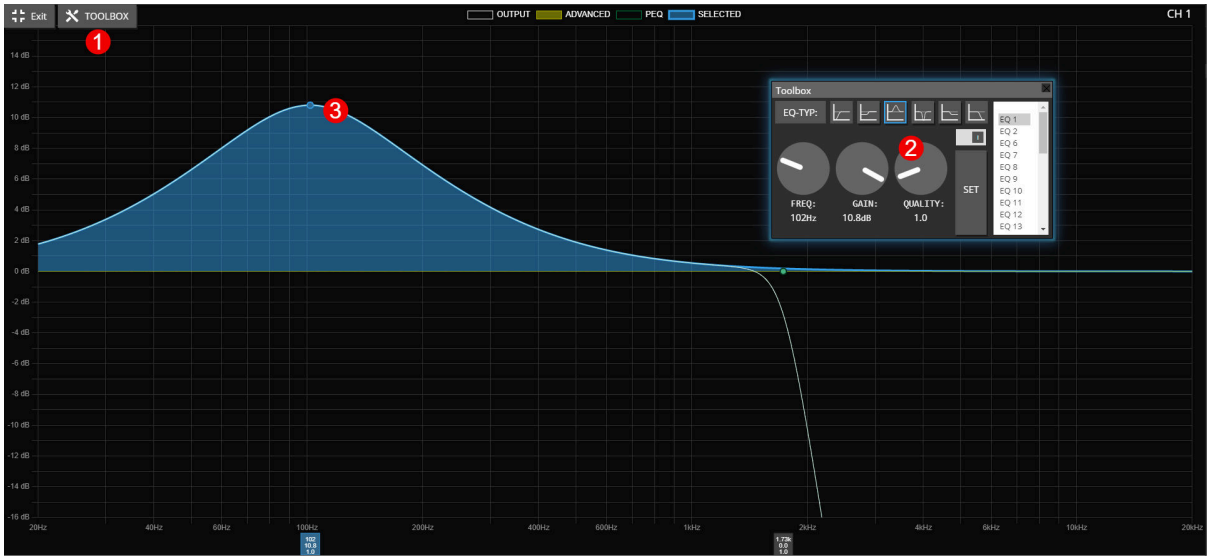
There are 32 EQ slots that can be set with several EQ types. Some EQ types need more than one EQ slot. 18dB/24dB Low/High passes require two, while 48dB Low/High require four slots.

When values are changed but not set to the device, the EQ is in preview mode ❷, and the PEQ plot only shows the theoretical EQ curve. The current enabled EQs are plotted in the output curve.



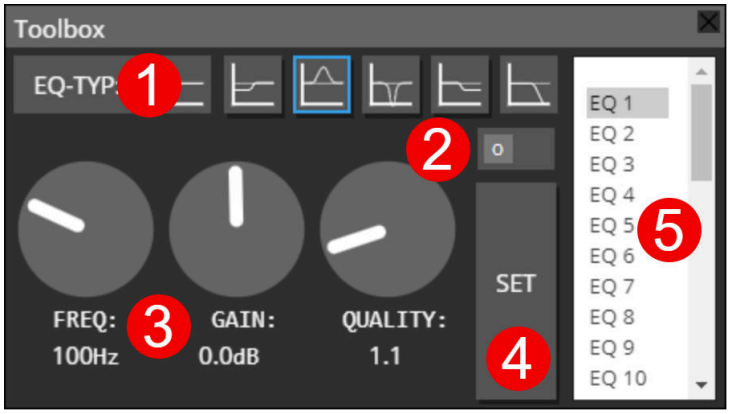
NR	DESCRIPTION
1	Enables fullscreen mode.
2	Show PEQ Toolbox.
3	Show Detail view (9).
4	Switch to ADVANCED EQ Settings.
5	Toggle visibility of peq sum plot.
6	Toggle visibility of advanced eq plot.
7	Indicates preview mode.
8	Drag the grab point with the mouse to change frequency/gain, use the mouse wheel to change the quality.
9	Edit / shows the parameter of all EQs.
10	Multi-edit values for all selected channels.

PEQ FULLSCREEN



NR	DESCRIPTION
1	Toggle toolbox view.
2	Edit / shows the parameter of the selected EQ slot.
3	Drag the grab point with the mouse to change frequency/gain, use the mouse wheel to change the quality.

PEQ TOOLBOX



NR	DESCRIPTION
1	Select PEQ Type.
2	Switch PEQ On/Off.
3	Change frequency/gain/quality.
4	Set selected PEQs parameter.
5	Switch between PEQs.

ADVANCED EQ (FIR)

CH	NAME	ON	FIRNAME	TAPS	CRC
1	CH 1	ON	FIR-Test	2048	5624
2	CH 2	ON	FIR-Test	2048	5624
3	CH 3	ON	FIR-Test	2048	5624
4	CH 4	ON	FIR-Test	2048	5624
5	Front Left	ON	FIR-Test	2048	5624
6	Front Right	ON	FIR-Test	2048	5624
7	CH 7	ON	FIR-Test	2048	5624
8	CH 8	ON	FIR-Test	2048	5624

NR	DESCRIPTION
1	Enable/disable the FIR filter on the selected channel.
2	Name of the loaded FIR filter.
3	Taps of the loaded FIR filter.
4	Internal calculated CRC over the fixed point coefficients to indicate even single bit differences in the loaded filters.
5	Download the selected FIR (only available on single edit)
6	Delete FIR filter.
7	Upload a FIR filter to the selected channels (a preview modal appears to check the filter)
8	Details of all selected cahnnels.

Supported File Formats

The Range of each coefficient is limited -4.0 to 3.999 due to the internal fix point representation. The maximum number of Taps is 2048.

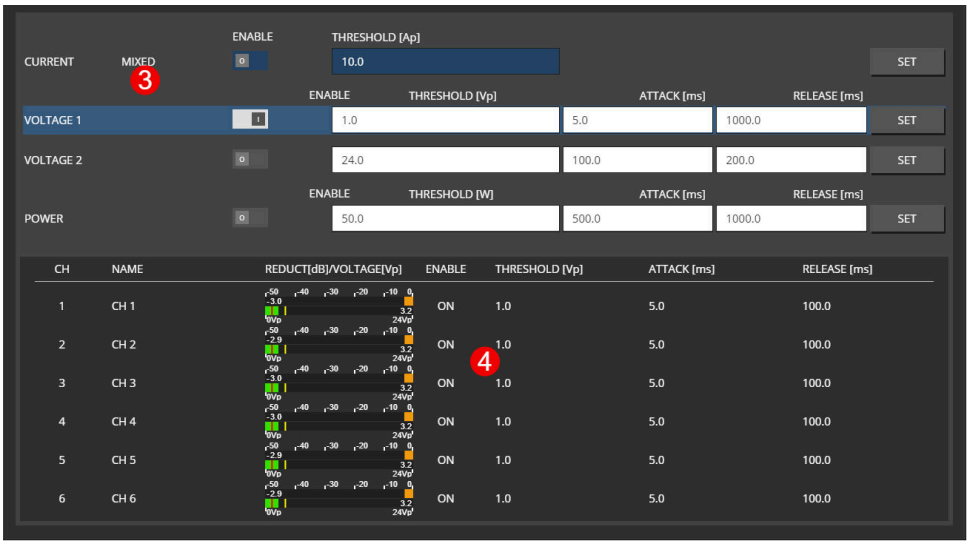
WAV The WAV File has to be 32Bit Float 48kHz

Coefficient File

line in file	coefficient	multiplied with sample
1	-0.1648560000	* n
2	0.0737233000	* (n-1)
3	-0.0973907000	* (n-2)
4	0.0139486000	* (n-3)
5	-0.0406976000	* (n-4)
6	-0.0222878000	* (n-5)
7	0.0227421000	* (n-6)
...		
2048	-0.0066785500	* (n-2047)

line in file	coefficient	multiplied with sample
1	-2.03711E-0003	* n
2	-2.03711E-0003	* (n-1)
3	-7.42133E-0004	* (n-2)
4	-2.41038E-0003	* (n-3)
5	1.85561E-0004	* (n-4)
6	-3.39548E-0003	* (n-5)
7	5.96577E-0004	* (n-6)
8	-1.78038E-0003	* (n-7)

CHANNEL LIMIT



NR	DESCRIPTION
1	Shows reduction and measured input level (Vp, Ap, or W) of each limiter.
2	Set threshold attack and release of individual limiter.
3	Reduction level disabled in multi-edit, each limiter can be selected and is highlighted by the blue line.
4	Shows limiter values of the selected limiter and selected channels.

Disabled limiters are set to the maximum threshold internally. Due to the internal headroom, it is still possible to see some reduction if the maximum thresholds are reached.

CHANNEL SPEAKER SETTINGS

SINGLE EDIT

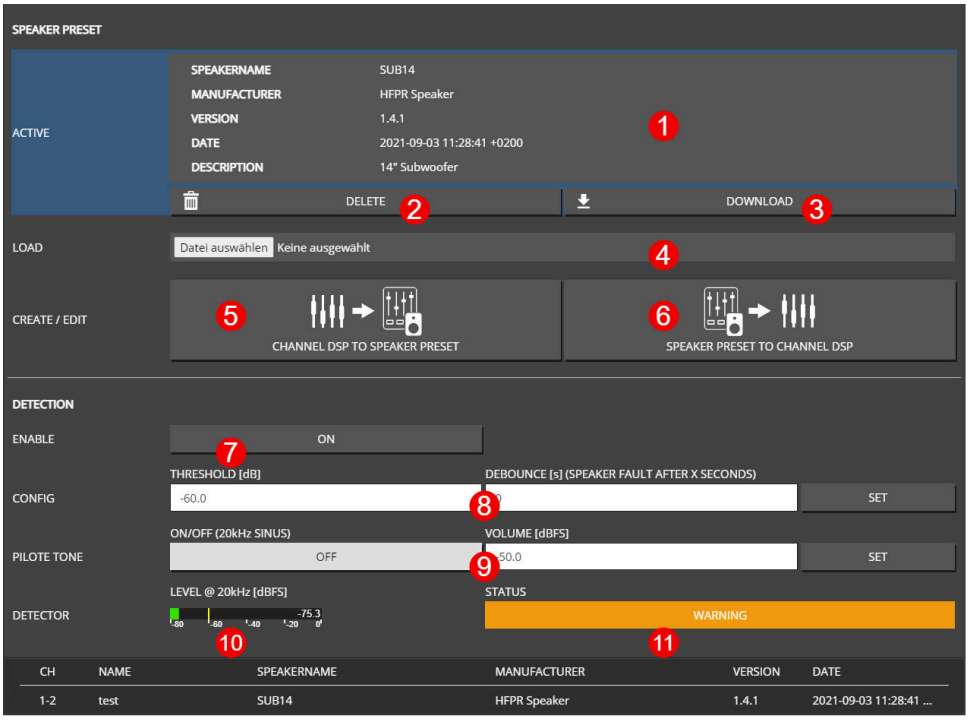


Figure 10. SPEAKER SINGLE CHANNEL EDIT VIEW

NR	DESCRIPTION
1	Metadata of the active speaker preset.
2	Remove the speaker preset.
3	Download the speaker preset file to share it or apply to others channels.
4	Load a speaker preset file from your computer.
5	Create a speaker preset from channel dsp data WEBPAGE SPEAKER PRESET CREATE.
6	Load the speaker preset dsp data to the channel dsp WEBPAGE SPEAKER PRESET LOAD.
7	Enable/Disable speaker detection.
8	Set detection threshold and debounce. The 20 kHz current value has to be lower than the threshold for "debounce" seconds to trigger an error.
9	Set 20 kHz pilot tone generator level in dBFS which will be added to the actual output signal of the amplifier.
10	Shows measured current at 20 kHz (yellow line indicates threshold)
11	Shows actual speaker detection status.

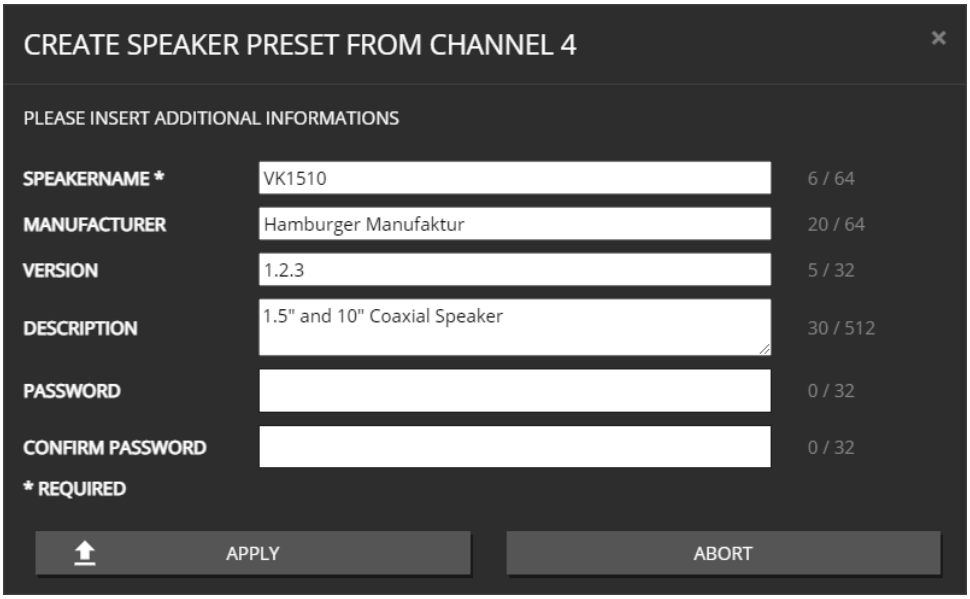


Figure 11. WEBPAGE SPEAKER PRESET CREATE

To create a speaker preset, tune your speaker with the channel DSP settings to your needs. The parameter which can be used inside the speaker preset are: VOLUME, PHASE, DELAY, 32x PEQ, ADVANCED EQ (FIR Filters with 512 Taps), LIMIT.

Once happy with your parameter work, create the speaker preset by clicking on the "CHANNEL DSP TO SPEAKER PRESET" button. This will copy all parameters listed above to a fully separated "SPEAKER DSP" and free up the "CHANNEL DSP".

Information like a speaker name is mandatory, all other parameters are optional. If the data have to be secure, please insert a password. This password is only required to load the speaker preset to the channel DSP (for further editing).

The FIR Filter in the speaker preset can only have 512 taps, instead of the full 2048 taps which are possible in the channel DSP.

The LIMIT section only exists once. If a limiter is used inside a speaker preset, it will just block that specific limiter from being used by the user.

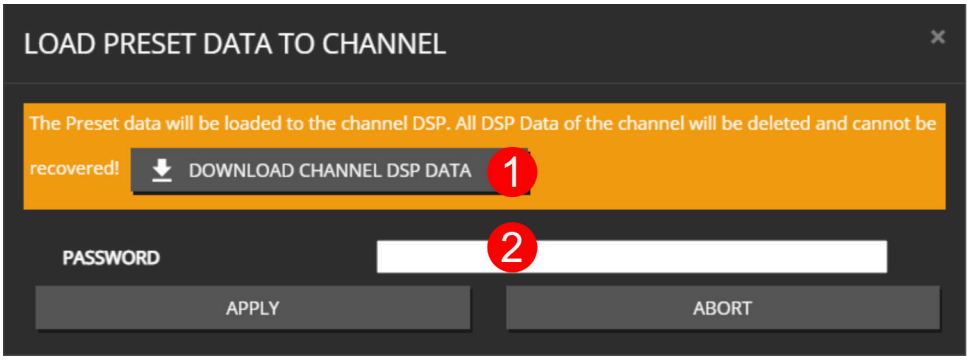


Figure 12. WEBPAGE SPEAKER PRESET LOAD

NR	DESCRIPTION
1	Since the channel DSP will be overwritten by the speaker preset values, a backup of the currently loaded settings can be downloaded as channel preset.
2	If a speaker preset is created with a password, the password is required to load the data to the channel

MULTI EDIT

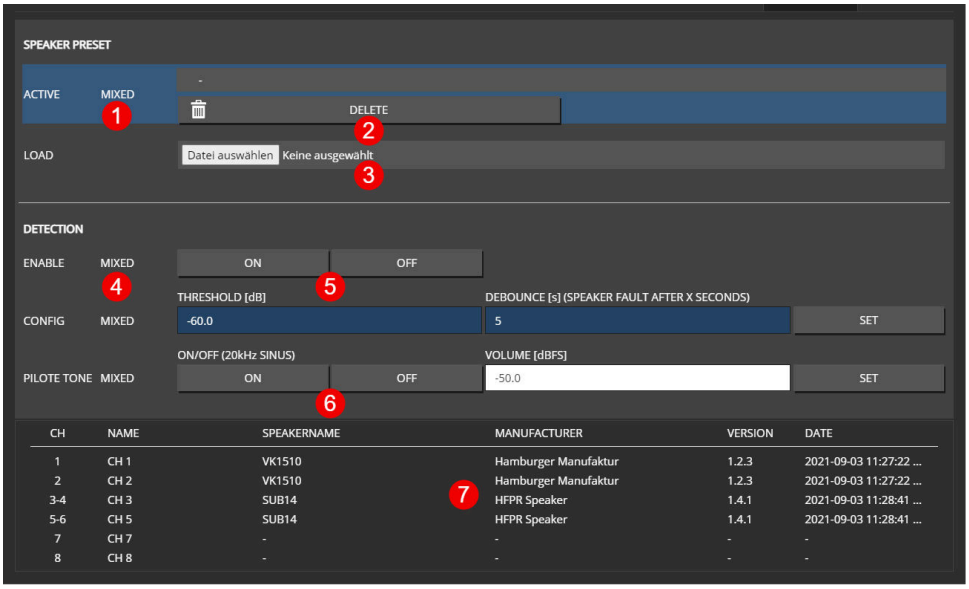


Figure 13. SPEAKER MULTI CHANNEL EDIT VIEW

NR	DESCRIPTION
1	Mixed speaker preset indicator (different speakers presets are loaded on the selected channel)
2	Delete the currently loaded speaker preset from all selected channels.
3	Load a speaker preset file from your computer to all selected channels.
4	Mixed value indicator of the speaker detection section.
5	Enable/Disable speaker detection.
6	Set 20 kHz pilot tone generator level in dBFS which will be added to the actual output signal of the amplifier.
7	Shows actual speaker detection status.

INTERFACES

Figure 14. WEBPAGE INTERFACES

NR	DESCRIPTION
1	Select an interface to synchronize the internal audio word clock generation.
2	Interface name.
3	Interface status see. SYNC STATUS
4	Sampling rate.
5	Available channel on this interface.
6	Open Interface Ouput Config. WEBPAGE INTERFACES OUTPUT

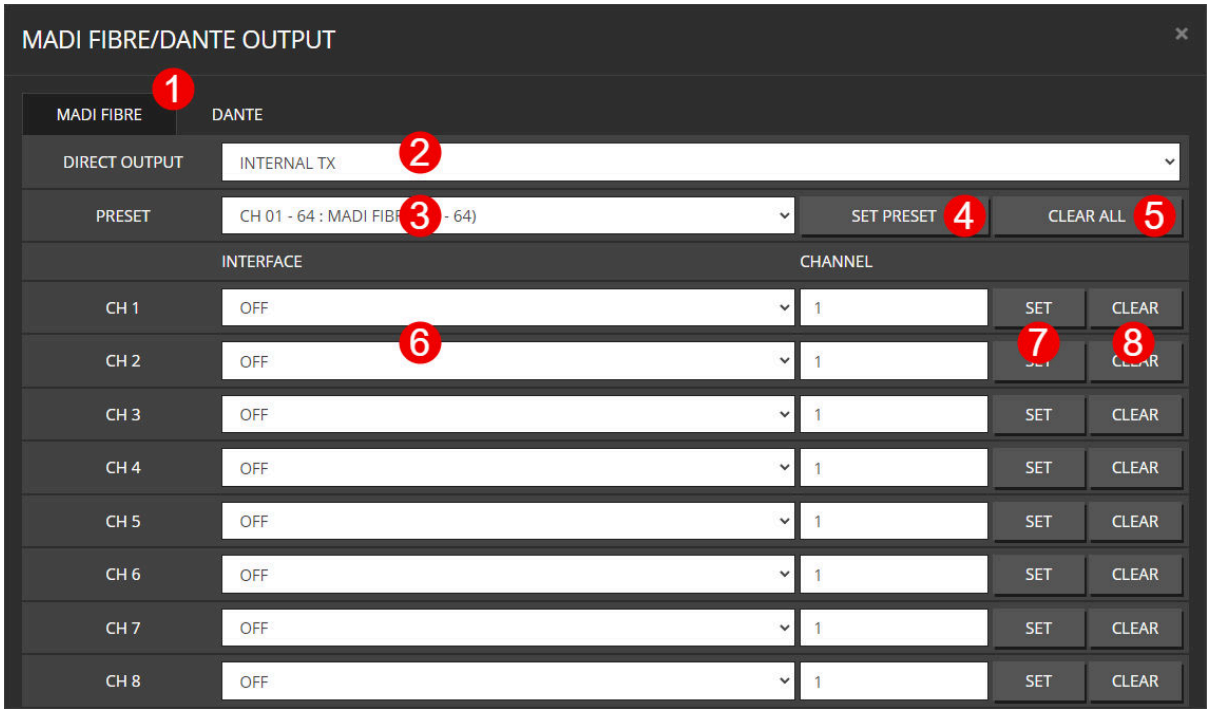


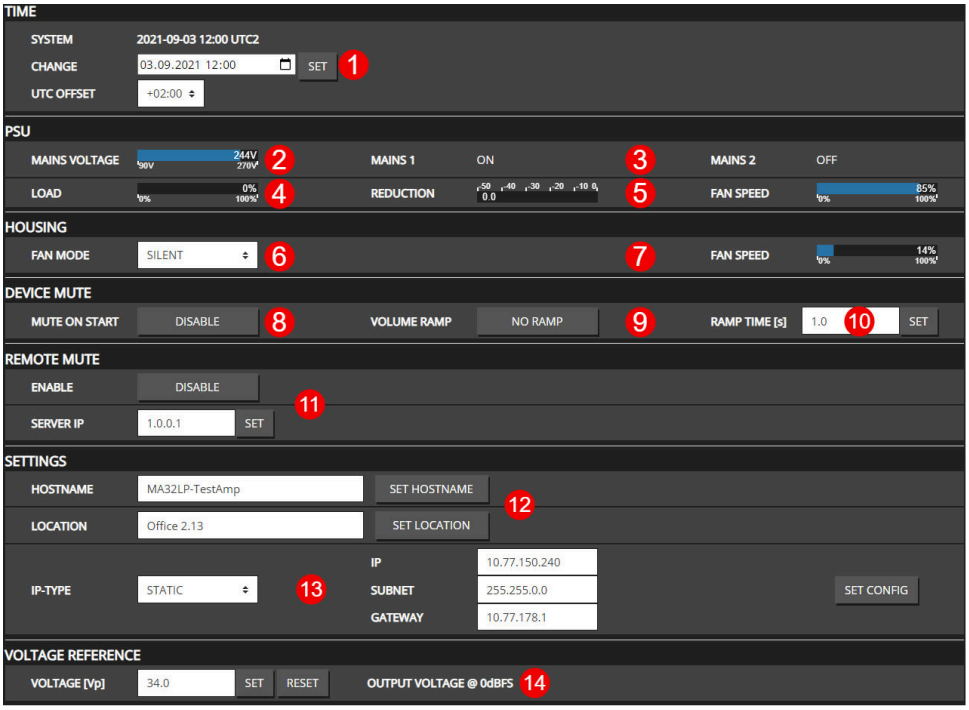
Figure 15. WEBPAGE INTERFACES OUTPUT

NR	DESCRIPTION
1	Select Output to Config
2	Select the source of the MADI FIBRE TX jack. This can either be "INTERNAL TX" which uses the internal MADI transmitter, or any of the other MADI RX jacks. In the case of an RX jack, the connection is direct routed through the FPGA with almost zero latency, but a jitter build-up has to be in mind. The direct through connection can be used to daisy-chain two devices to utilize all 64 channels on a MADI signal. Device 1 consumes CH1-32, device 2 CH33-64.
3	Select a Preset to Set
4	Set Selected Preset
5	Clear all Output Patchings
6	Select a Interface/Source with Channel
8	Set selected Source and Channel to interface output channel
9	Clear Patching from interface output channel

SYNC STATUS

STATUS	DESCRIPTION
unlock	No valid carrier or word-clock was detected on that interface.
lock	Valid carrier and word-clock but not in phase with the internal audio clock.
sync	Valid carrier and word-clock AND in phase with the internal audio clock.
error	Unsupported sample rate.

DEVICE

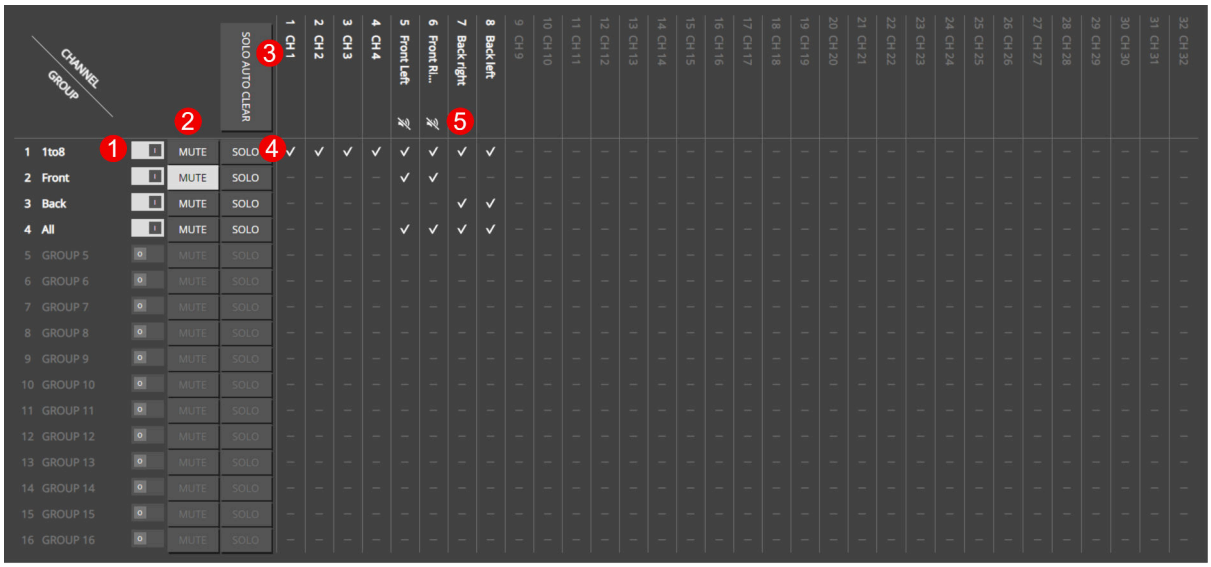


NR	DESCRIPTION
1	Set system time and time zone. If the device is connected to the internet, it will try to synchronize its RTC (real time clock) to an NTP time-server.
2	Shows measured mains voltage if the device does support it. If not, the user has to configure the current mains voltage which is required for the PSU limiting.
3	If the device has more than one PSU, it will indicate which one is plugged in. (HP² only)
4	Shows PSU Load.
5	Shows PSU reduction, which will reduce the output level of all channels simultaneously to not overload the PSU.
6	FAN MODE "NORMAL" is the recommended mode to keep all components as cool as possible to improve lifetime. When not much output power is required, the FAN MODE could be changed to "SILENT " or "PASSIVE" (LP² only) which will use different fan speeds to reduce noise.
7	Shows actual housing fan speed (depends on internal temperature).
8	En-/disable mute on startup, if enabled, the "MASTER MUTE" will be set on every start up.
9	En-/disable volume ramp after the master mute is disabled. This will linearly increase the dB value until it is reached its desired value.
10	Master Volume ramp-up-time in seconds, if enabled.
11	Enable remote mute, this will provide a GPI interface to mute the entire device, also known as dead man switch. Which require an external Innosonix Remote Mute Server, multiple devices can share one server.

12	The "HOSTNAME" is used in DNS for IP resolving. "LOCATION" is just a string to add some additional information to the device, like where is it located.
13	Set IP setting, this will disconnect the web page. Manually connect to the new IP or HOSTNAME in your browser.
14	"VOLTAGE REFERENCE" defines the maximal output peak-voltage when feeding an 0dBFS signal on any input interface. Due to different maximum rail voltages based on the hardware device, a clipping could occur.

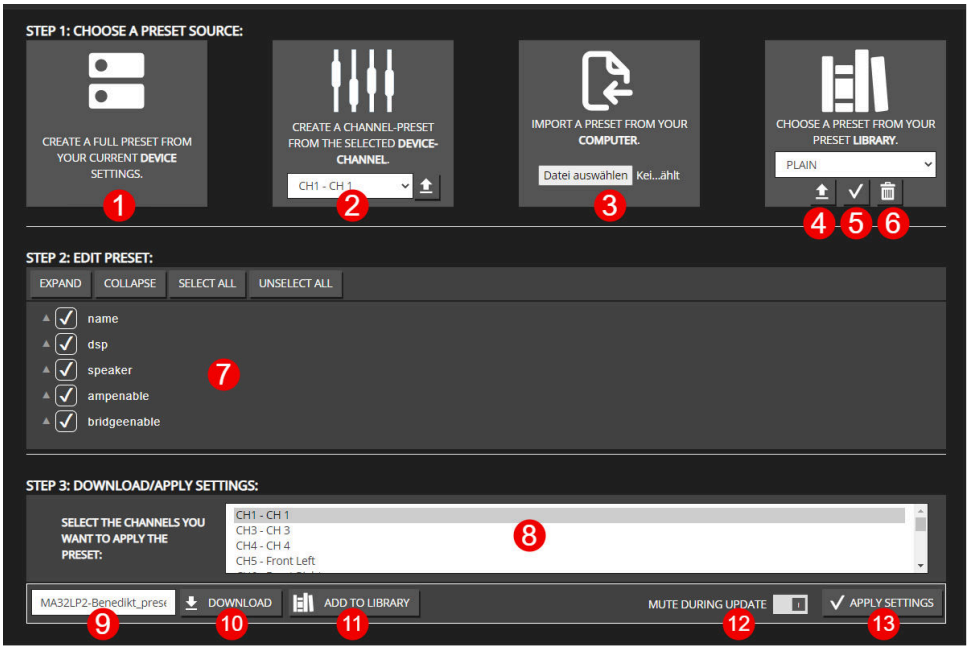
MUTEGROUPS

Mute groups assignment are derived from selection groups (SELECTION AND GROUPING).



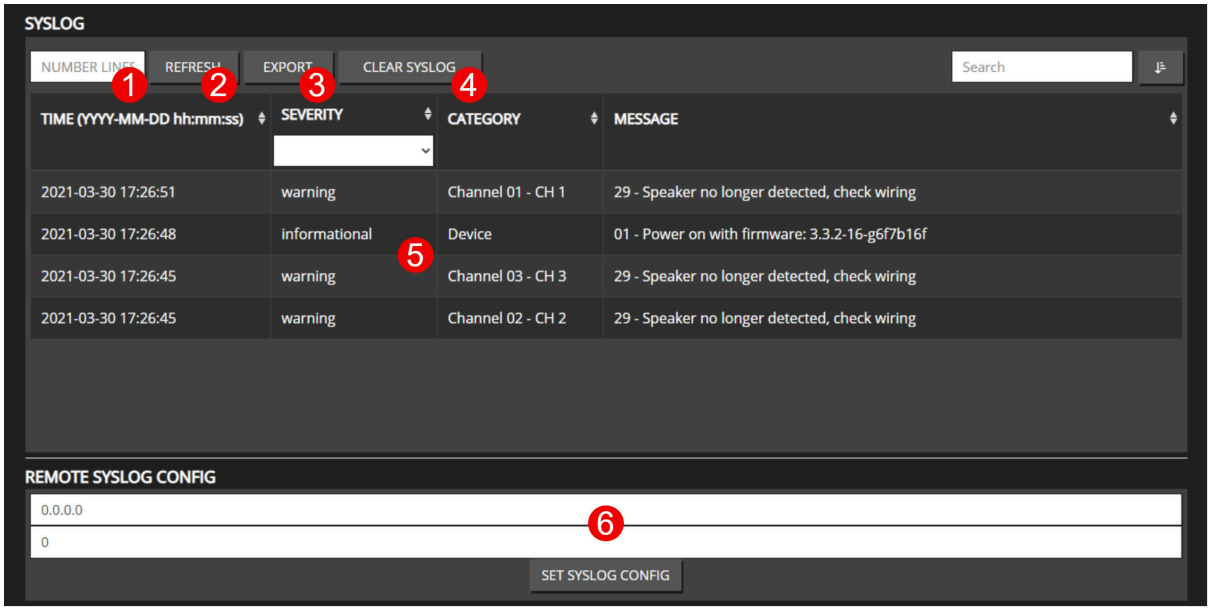
NR	DESCRIPTION
1	Only enabled mute groups are taken into account when the final mute result is calculated.
2	Mute / unmute mute group.
3	If solo auto clear is activated, only one solo can be active.
4	Active SOLO for the corresponding group. All other channels in an active mute group will be muted.
5	A speaker symbol and blinking MUTE button on the OVERVIEW indicates that the channel is muted due to a mute group assignment.

PRESETS



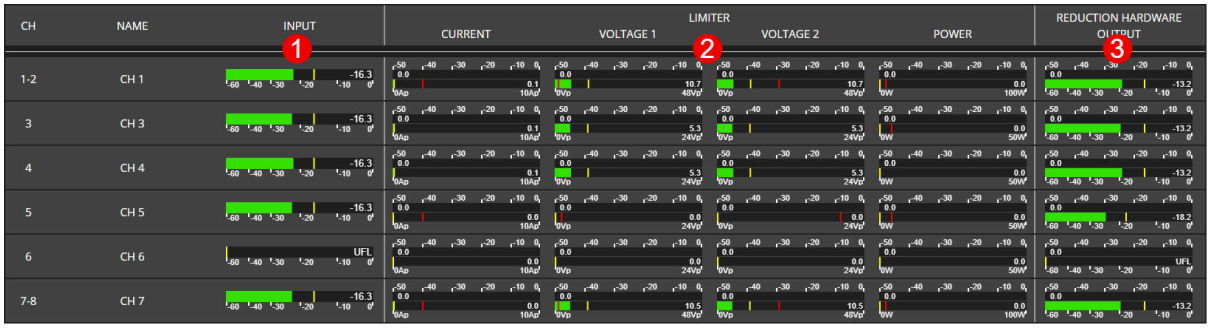
NR	DESCRIPTION
1	Load all device settings to the preset editor (7). Device presets do include fixed mapping of parameters to specific channels.
2	Load setting from one specific channel to preset editor (7).
3	Upload a file from your computer to the editor (7) . It can either be a channel or device preset.
4	Load preset from preset library in preset editor (7).
5	Recall the selected preset from the library to the device. This functionality can also easily be triggered via the RESTful-API to do a simple scene switch.
6	Delete selected preset from the library.
7	edit settings tree
8	select (multiple) channel to load preset to (only available if channel preset is loaded into the preset editor)
9	preset name to save in library or download
10	save selected settings as preset to library
11	download selected settings as preset file
12	mute device / channel during update settings from preset
13	apply selected settings to device

LOGGING



NR	DESCRIPTION
1	select syslog lines to load
2	refresh syslog table
3	export complete syslog from device
4	delete syslog files on the device
5	chronological errors
6	config connection to external syslog server

METERING



NR	DESCRIPTION
1	input level after input mixer
2	measured current, voltage and power with limiter reductions
3	output level with hardware reduction (sum of PSU Limit and Thermo Limit)

4.3.4. ERROR CODES

Table 5. SEVERITY LEVEL

TYPE	DESCRIPTION
EMERGENCY	system is unusable
ALERT	action must be taken immediately
CRITICAL	critical conditions
ERROR	error conditions
WARNING	warning conditions
NOTICE	normal but significant condition
INFO	informational

Table 6. ERROR CODES

NR	SEVERITY	DESCRIPTION
1	INFO	Power on
2	INFO	IP mode set to DHCP
3	INFO	IP mode set to AUTO IP
4	INFO	IP mode set to STATIC IP
5	ALERT	UDP Discovery error, device no longer available, please try to restart the device
6	INFO	device reboots for software update
7	ALERT	Interfaces monitoring and control no longer available, please try to restart the device
8	ALERT	Speaker monitoring no longer available, please try to restart the device
9	ERROR	Display Interface no longer available, please try to restart the device
10	INFO	Samplingrate changed, EQs, Limiter, FIR Filter will be recalced
11	ALERT	DSP monitoring/control no longer available, please try to restart the device
12	EMERGENCY,	Hardware verification failed, no Audio available
13	ERROR	Metering no longer available, please try to restart the device
14	ERROR	Amplifier overcurrent error
15	ALERT	Amplifier overcurrent Shutdown
16	ALERT	Amplifier recurring overcurrent error, check wiring and powercycle channel to try again
17	EMERGENCY	Amplifier communication error, please try to restart the device
18	WARNING	Amplifier overtemp
19	ALERT	Controller monitoring no longer available, please try to restart the device

NR	SEVERITY	DESCRIPTION
20	ALERT	FAN controller no longer available, please try to restart the device
21	CRITICAL	Overtemp emergency shutdown init, all Fans will turn up, till temperature out of critical range
22	ALERT	PSU monitoring no longer available, please try to restart the device
23	ERROR	No settings file available ⇒ using default settings
24	ERROR	Settings file corrupted, file will be deleted
25	ALERT	All Settings files corrupted, start with default settings
26	ALERT	User Settings cannot be saved anymore, please try to restart the device
27	ALERT	User Settings cannot be changed anymore, please try to restart the device
28	ALERT	User Settings cannot be restored correctly, please try to restart the device
29	WARNING	Speaker no longer detected, check wiring
30	EMERGENCY	Wrong PD Type installed
31	ERROR	No Calibration File available, Amp using default values
32	CRITICAL	Power distribution overcurrent, try to restart
33	EMERGENCY	Amp Module Hardware Error
34	EMERGENCY	Amplifier Shutdown caused by PSU Overcurrent
35	ALERT	Remote Mute no longer available, please try to restart the device
36	EMERGENCY	Start without initing all Amps
37	ALERT	DC not OK
38	EMERGENCY	Amplifier Shutdown caused by overtemp emergency shutdown
39	EMERGENCY	Power Distribution cannot be load, please try to restart the device
40	WARNING	Link unlock
41	WARNING	CRC errors
42	WARNING	Negative Rail Converter ready timeout
43	WARNING	Fan dirty or stuck, check logging for further informations
44	WARNING	Fan dirty, please clean Fan
45	ALERT	Fan stuck, please check Fan
46	EMERGENCY	Amplifier Shutdown caused by dc protection
47	CRITICAL	Amplifier Shutdown caused by overtemperature
48	WARNING	Switching Frequency Error (Channel will be restarted)
49	EMERGENCY	PSU Shutdown caused by dc protection
50	ERROR	DC Detection not ok, syslog no longer prevented
51	ERROR	Mains Dropout Detection not ok, syslog no longer prevented

4.3.5. RESTful API

There is a RESTful API with JSON data implemented on the device. Every Parameter can be set, and every status can be read over this Interface. All available commands are documented at REST API DOC on the webpage.

The Base URL is: **${HOST_IP}/rest-api/**.

Table 7. REST API HTTP REQUEST TYPES

TYPE	DESCRIPTION
GET	Get settings or status data
PUT	Set device/channel settings
OPTIONS	Get settings value range and unit
DELETE	Delete resource from device

For **PUT** and **DELETE** HTTP requests, an authentification TOKE in the HTTP header is required:

token:f4005bf8507999192162d989d5a60823

The command line tool **curl** can be used to execute a rest api request which allows some easy evaluation and debugging mechanism.

See some examples below.

GET DEVICE INFOMRATIONS

COMMAND	info/device
TYPE	GET
CURL-COMMAND	curl ${HOST_IP}/rest-api/info/device
RESPONSE	

```
{
    "model_name": "MA32LP2",
    "channel": 32,
    "options": ["D1","D2","IF1","M1","IF3"],
    "psu_fan": true,
    "housing_fan": true,
    "sd_card": true,
    "rtc": true,
    "sw_revision": "3.3.0",
    "fpga_revision": "2.9.1",
    "loader_revision": "2.1.4",
    "image_id": 1,
    "serial": "140619000221"
}
```

SET CHANNEL MUTE

COMMAND	settings/channel/{channel_id}/dsp/mute
TYPE	PUT
CURL-COMMAND	curl -X PUT -H 'token: f4005bf8507999192162d989d5a60823' -d "{\"value\":true}" ${HOST_IP}/rest-api/settings/channel/1/dsp/mute

On Success, the server responded with a **200** response.

On Error, the server returns a error message with a **400** response.

GET CHANNEL VOLUME OPTIONS

COMMAND	settings/channel/{channel_id}/dsp/volume
TYPE	OPTIONS
CURL-COMMAND	curl -X OPTIONS ${HOST_IP}/rest-api/settings/channel/1/dsp/volume
RESPONSE	

```
{"value": [-72.0, 24.0, 0.1 , "dB"]}
{"value": [MIN  , MAX , STEP, UNIT]}
```

REMOVE PRESET WITH NAME TEST

COMMAND	preset/storage/{preset_name}
TYPE	DELETE
CURL-COMMAND	curl -X OPTIONS ${HOST_IP}/rest-api/preset/storage/test

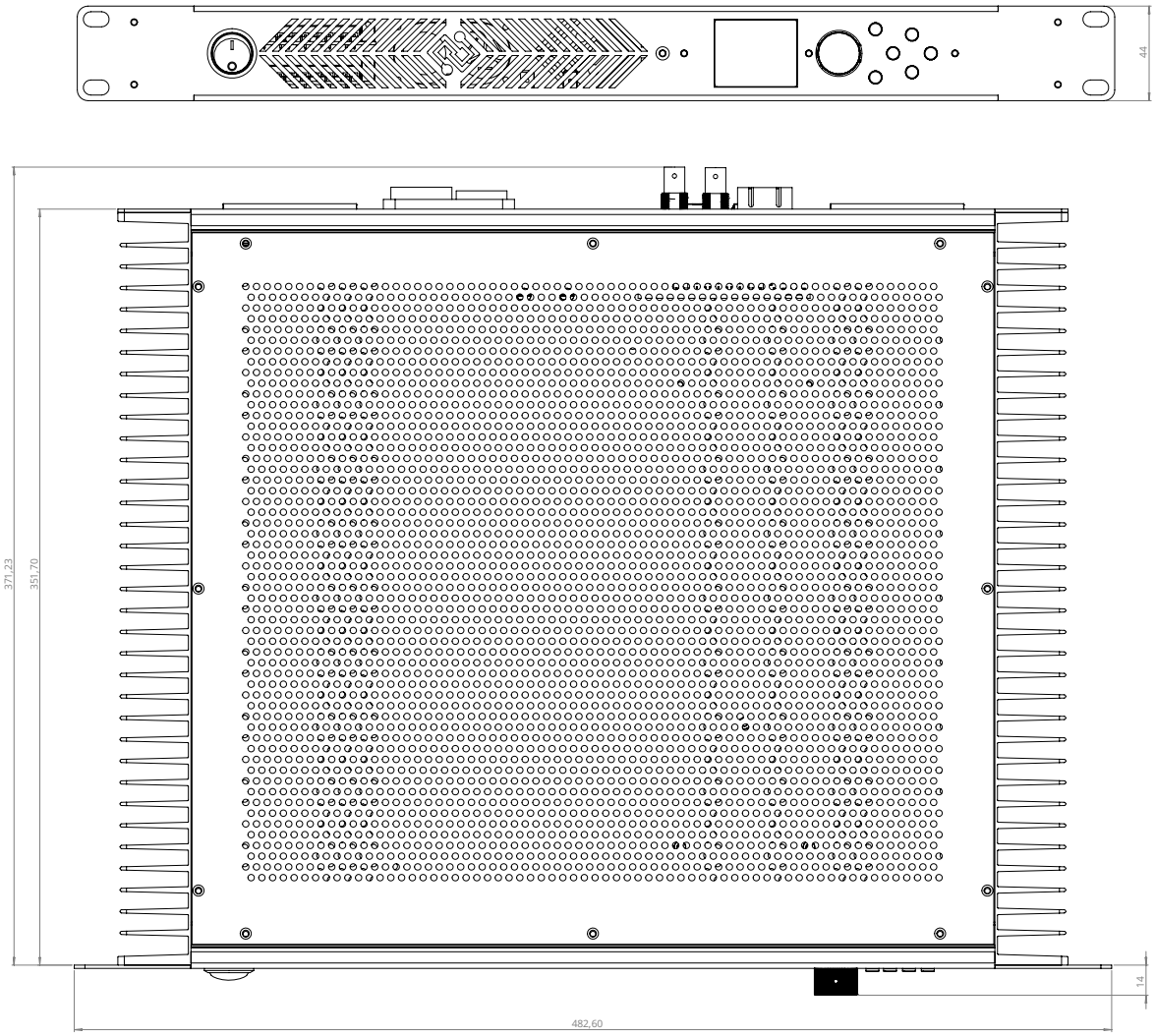
On Success, the server responded with a **200** response.

On Error, the server returns a error message with a **400** response. .DELETE error example

```
{
    "error": "preset not available: test"
}
```

Chapter 5. DIMENSIONS AND WEIGHT

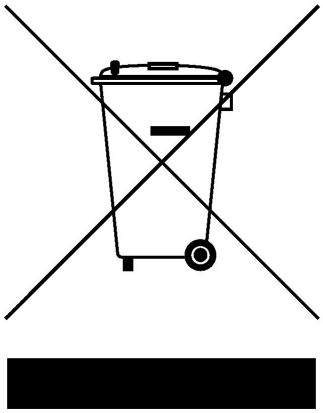
5.1. DIMENSIONS



5.2. WEIGHT

6.4 kg

Electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime. Please dispose of this product according to the respective national regulations or contractual agreements. If there are any further questions concerning the disposal of this product, please contact the manufacturer.



Chapter 6. EU DECLARATION OF CONFORMITY

The company Innosonix GmbH declares under sole responsibility that the product **MA32/LP** complies with the following directives and standards

- EMC Directive **2014/30/EU**
- Low Voltage Directive **2014/35/EU**
- RoHS Directive **2011/65/EU**

6.1. EN 55032:2012

Electromagnetic compatibility of multimedia equipment - **Emission requirements:**

Radiated, Conducted: Class A Limits

6.2. EN 55103-2

EMC Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 2: **Immunity** * **EN 61000-4-2:2008 Ed 2.0**

EMC Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 2: **Immunity** * **EN 61000-4-3:2010 Ed 3.2**

Radiated, Radio-Frequency, Electromagnetic Immunity (Environment E3, criteria B) * **EN 61000-4-4:2007**

Radiated, Radio-Frequency, EMC Immunity (Environment E3, Criteria B) * **EN 61000-4-5:2006**

Surge Immunity (Criteria B) * **EN 61000-4-6:2006**

Immunity to Conducted Disturbances Induced by Radio-Frequency Fields (Criteria A) * **EN 61000-4-11:2004**

Voltage Dips, Short Interruptions and Voltage Variation

6.3. EN 62368-1:2014/AC:2015

Audio/video, information and communication technology equipment **Part 1: Safety requirements**

6.4. MANUFACTURER

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