Manuals+ — User Manuals Simplified.

the t racks FIR DSP 408 Digital Speaker Management System User Manual

Contents

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Product Information

Specifications

- **Product Name:** FIR DSP 408 Controller

FAQ

- **Q:** Can I use the FIR DSP 408 Controller for live performances?
  - **A:** Yes, the FIR DSP 408 Controller is suitable for live performances as it is designed for amplification, mixing, and playback of signals from musical instruments and microphones.
- **Q:** Can I modify the device to enhance its performance?
  - **A:** No, it is not recommended to modify the device as it may result in improper functioning, personal injury, or property damage. Any modifications should only be performed by qualified professionals.
- **Q:** Can I connect multiple devices to the FIR DSP 408 Controller?
  - **A:** Yes, you can connect multiple musical instruments and microphones to the appropriate input ports on the device for amplification and mixing.
- **Q:** How do I update the firmware of the FIR DSP 408 Controller?
  - **A:** Please refer to the latest version of the user manual or contact our customer support for instructions on how to update the firmware of the device.

General Information

This document contains important instructions for the safe operation of the product. It is essential to read and follow the safety instructions and all other instructions provided. Please keep this document for future reference and ensure that it is available to all users of the product. If you sell the product to another user, make sure they also receive this document. Our products and documentation undergo continuous development and may be subject to change. Please refer to the latest version of the documentation, which can be downloaded from our website at **www.thomann.de**.

General information

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Symbols and signal words

In this section you will find an overview of the meaning of symbols and signal words that are used in this document.

Signal word	Meaning
DANGER!	This combination of symbol and signal word indicates an immediate dangerous situation that will result in death or serious injury if it is not avoided.
NOTICE!	This combination of symbol and signal word indicates a possible dangerous situation that can result in material and environmental damage if it is not avoided.

Warning signs	Type of danger
	Warning – high-voltage.
	Warning – danger zone.

Safety instructions

Intended use

This device is intended to be used for amplification, mixing and playback of signals from musical instruments and microphones. Use the device only as described in this user manual. Any other use or use under other operating conditions is considered to be improper and may result in personal injury or property damage. No liability will be assumed for damages resulting from improper use.

This device may be used only by persons with sufficient physical, sensorial, and intellectual abilities and having corresponding knowledge and experience. Other persons may use this device only if they are supervised or instructed by a person who is responsible for their safety.

Safety

DANGER: Risk of injury and choking hazard for children!

Children can suffocate on packaging material and small parts. Children can injure themselves when handling the device. Never allow children to play with the packaging material and the device. Always store packaging material out of the reach of babies and small children. Always dispose of packaging material properly when it is not in use. Never allow children to use the device without supervision. Keep small parts away from children and make sure that the device does not shed any small parts (such knobs) that children could play with.

DANGER: Danger to life due to electric current!

A short circuit could lead to a fire hazard and risk of death. Always use proper ready-made insulated triple-core mains cable with a safety plug. Do not modify the mains cable or the plug. In case of isolation damage, disconnect immediately the power supply and arrange repair. If in doubt, seek advice from a qualified electrician.

DANGER: Danger to life due to electric current!

Within the device there are areas where high voltages may be present. Never remove any covers. There are no user-serviceable parts inside. Do not use the device when covers, safety equipment or optical components are missing or damaged.

NOTICE: Risk of fire due to covered vents and neighbouring heat sources!

If the vents of the device are covered or the device is operated in the immediate vicinity of other heat sources, the device can overheat and burst into flames. Never cover the device or the vents. Do not install the device in the immediate vicinity of other heat sources. Never operate the device in the immediate vicinity of naked flames.

NOTICE: Damage to the device if operated in unsuitable ambient conditions!

The device can be damaged if it is operated in unsuitable ambient conditions. Only operate the device indoors within the ambient conditions specified in the "Technical specifications" chapter of this user manual. Avoid operating it in environments with direct sunlight, heavy dirt and strong vibrations. Avoid operating it in environments with strong temperature fluctuations. If temperature fluctuations cannot be avoided (for example after transport in low outside temperatures), do not switch on the device immediately. Never subject the device to liquids or moisture. Never move the device to another location while it is in operation.
In environments with increased dirt levels (for example due to dust, smoke, nicotine or mist): Have the device cleaned by qualified specialists at regular intervals to prevent damage due to overheating and other malfunctions.

NOTICE: Risk of fire due to installation of a wrong fuse!

Using fuses of a different type than compatible with the device may cause a fire and seriously damage the device. Only use fuses of the same type. Observe the labelling on the device casing and the information in the "Technical data" chapter.

Features

- Digital speaker management system with FIR filter
- AD/DA converter
- 32-bit DSP
- 4 × XLR input sockets
- 8 × XLR output sockets
- Comprehensive setting options for optimal sound
    - Parametric Equalizer
    - Graphic Equalizer
    - High- and low-pass filters
    - Noise Gate
    - Limiter
    - Phase inversion
- USB connection for control via PC using the supplied software
- D-sub connector (RS232 / 485) for remote control of the device or cascading of several devices
- Ethernet interface (RJ45) for integration of the device into a local network
- Operation on the device via buttons, rotary switch and display

Installation and starting up

Unpack and check carefully there is no transportation damage before using the unit. Keep the equipment packaging. To fully protect the product against vibration, dust and moisture during transportation or storage use the original packaging or your own packaging material suitable for transport or storage, respectively. Create all connections while the device is off. Use the shortest possible high-quality cables for all connections. Take care when running the cables to prevent tripping hazards.
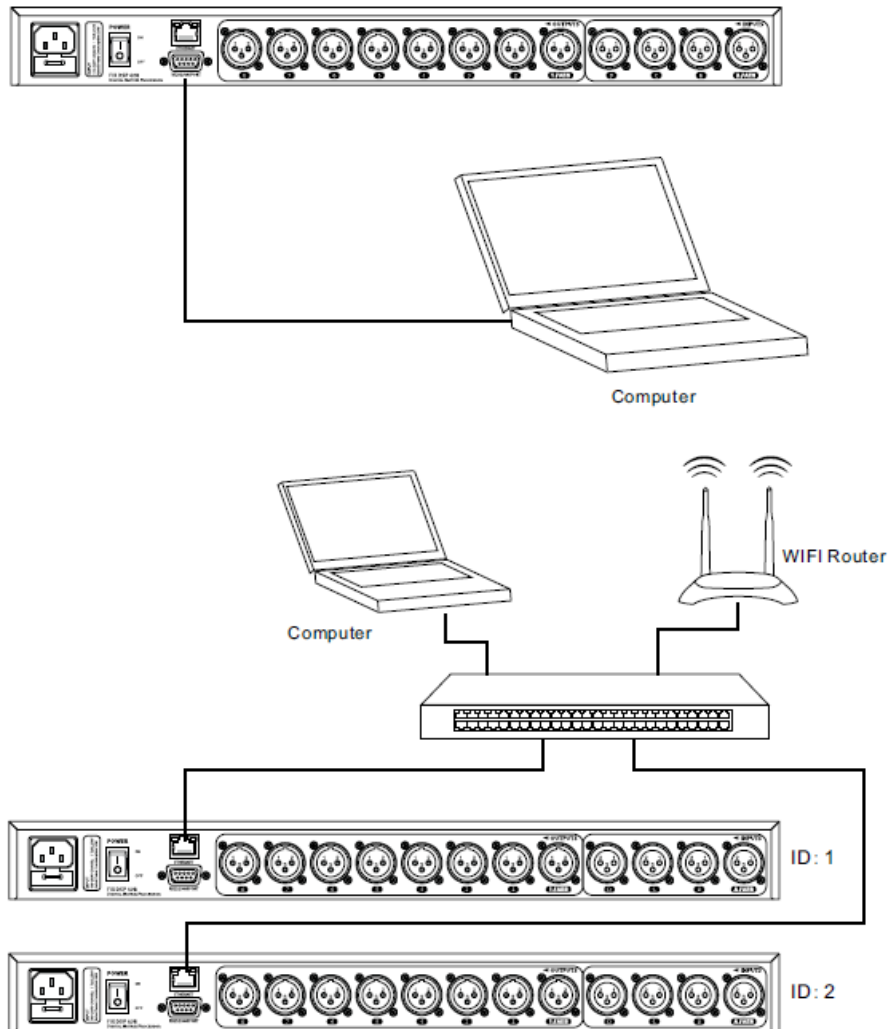
Rack mounting

- The unit has been designed for rack mounting in a standard 19-inch rack; it occupies one rack unit.

Configuration example 1
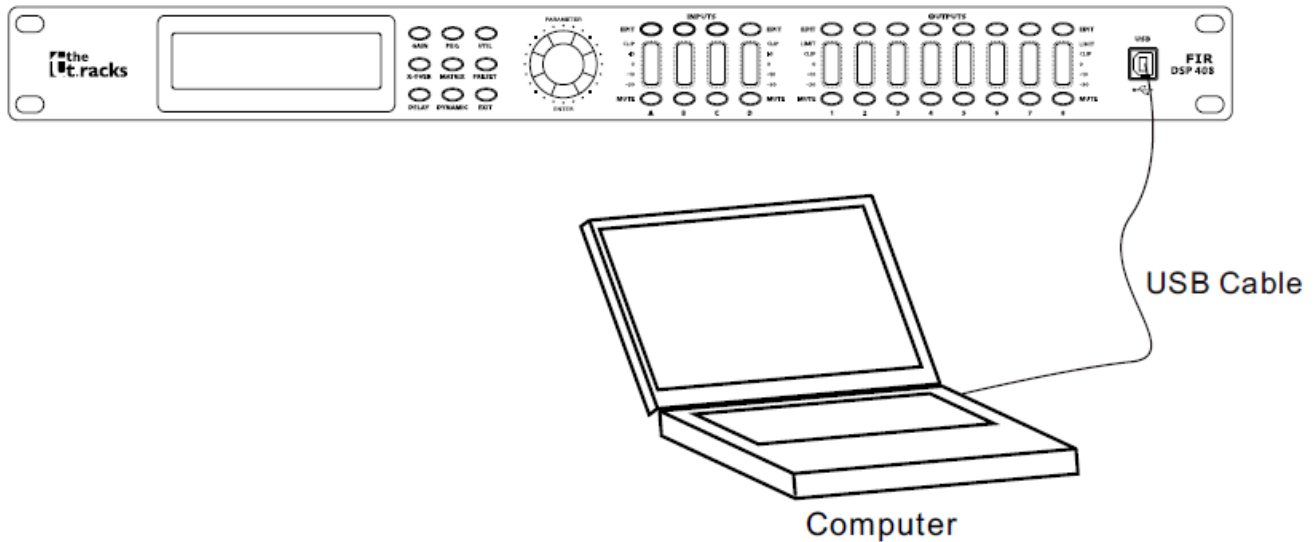
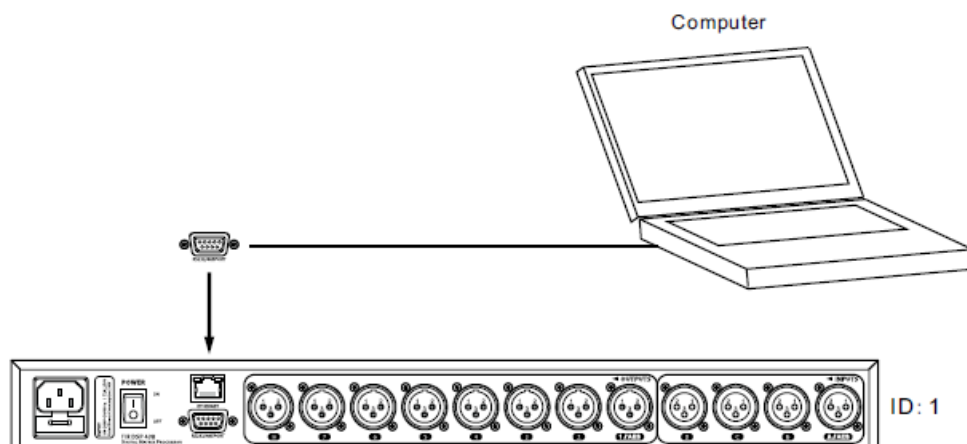- The figure schematically shows how the device can be controlled via a computer's USB port.

Configuration example 2

- The illustrations show schematically how one device or several devices can be integrated into a local area network (LAN).
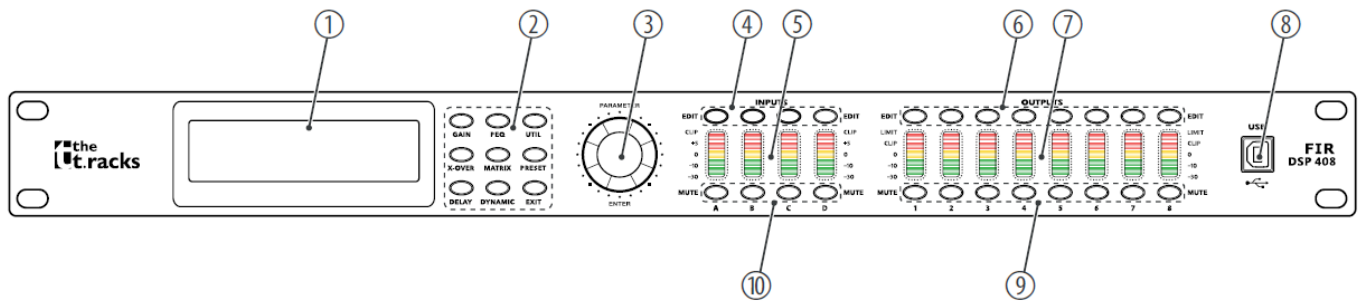
Configuration example 3

- The illustrations show schematically how a device can be configured via the serial port.

Connections and controls

Front panel

1	Display
2	Buttons for direct selection of a parameter. Use *[EXIT]* to exit Edit mode.
3	*[ENTER / PARAMETER]*	Rotary switch
4	*[EDIT]*	Buttons for selecting Edit mode for the respective input channel. The set parameters of the selected channel appear on the display.
5	*[INPUTS]*	Level display for the input channels The red *[CLIP]* LEDs indicate overloading (clipping). In this case, the level of the input signal is too high.
6	*[EDIT]*	Buttons for selecting Edit mode for the respective output channel. The set parameters of the selected channel appear on the display.
7	*[OUTPUTS]*	Level display for the output channels The red *[CLIP]* LEDs indicate overloading (clipping). In this case, the level of the output signal is too high. The red *[LIMIT]* LEDs indicate that the built-in limiter has responded.
8	*[USB]*	USB interface
9	*[MUTE]*	Buttons for muting or unmuting the respective output channel
10	*[MUTE]*	Buttons for muting or unmuting the respective input channel

Rear panel
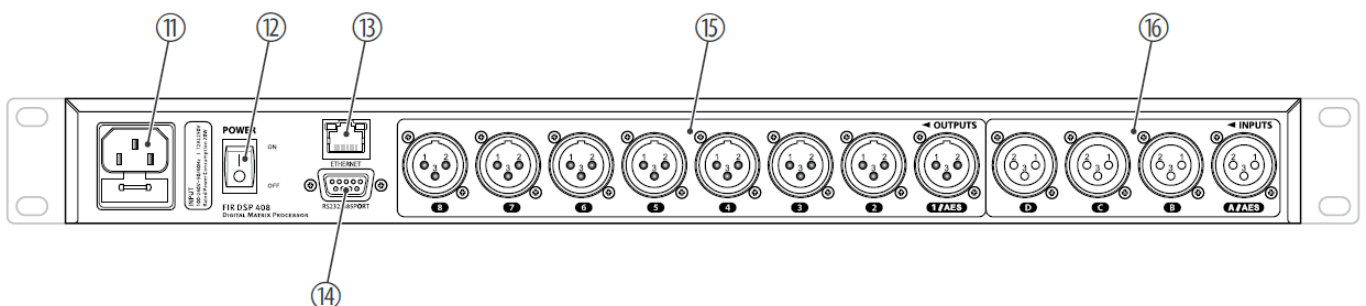
11	Rubber panel plug with fuse holder for power supply
12	*[POWER]*	Main switch. Turns the device on and off.
13	*[ETHERNET]*	RJ45 socket as LAN connection for connection to your network
14	*[RS232/485PORT]*	D-sub connector for remote control of the device or cascading of several devices
15	*[OUTPUTS]*	XLR panel plugs for the output channels. The number of channels depends on the device version.
16	*[INPUTS]*	XLR panel sockets for the input channels. The number of channels depends on the device version.

Operating on the unit

Starting the device

Connect the device to the power grid and turn it on with the main switch to start operation. After a few seconds, the display indicates that a reset is in progress. The device is then ready for use. The display shows the model name and user preset currently active. The device can only be operated directly with the buttons if it is not controlled via USB, LAN or the serial interface. The currently usable buttons light up permanently, the last used ones flash. Currently unavailable buttons remain unlit.

Default settings

1. Press [UTIL] repeatedly until the desired parameter appears in the display. The table below shows the available parameters and their value ranges.
2. Use the rotary switch to set the desired value of the parameter. Press the rotary switch to confirm.
3. Press [EXIT].

Parameter	Selection range	Meaning
'ID Number Select'	'1' … '254'	Unique identification of the device in a series connection. If multiple devices are connected in series, each must have a unique number.
'Manual IP Set'		If the device is integrated in a local network, its IP address can be set individually. The initial IP address is 192.168.1.101.
'Input Select'	'ANALOG'	Analogue input
	'AES / EBU'	Digital input
'Output Select'	'ANALOG'	Analogue output
	'AES / EBU'	Digital output
'Unit Lock PassWord'	'0000' … 'ZZZZ'	Four-digit device password. Any combination of numbers and letters is adjustable. The initial password is 1234.
'In Source Select'	'ANALOG INPUT' , 'PINK NOISE' , 'WHITE NOISE' , 'SINE xx '	Signal source selection: Either the analogue inputs or the internal test tone generator. The test tone generator optionally generates: Pink noise, white noise or a sine wave 20 Hz… 20 kHz.
'Copy CH select'		Transferring settings from one channel to another.
'LCD DISPLAY TIME'		Setting the backlight duration: Max. 200 ms

User presets

- All device settings can be stored in up to 20 different user presets and recalled when needed.
- This allows you to easily restore your settings for different rooms or stage setups.

Recalling user preset

1. Press [PRESET].
   - The menu 'Load preset' opens up.
2. Use the rotary switch to select a user preset between 'U01' and 'U20' or the default setting 'F00' . Press the rotary switch to confirm.
   - The settings are being loaded.

Saving user preset

1. Press [PRESET].
   - The menu 'Store Preset' opens up.
2. Use the rotary switch to select a user preset between 'U01' and 'U20' . Press the rotary switch to confirm.
3. Use the rotary switch to enter the name of the user preset by changing the default value Default Preset.
   - The settings are being saved.
4. Press [EXIT].

Settings for the inputs

1. Press the [EDIT] button corresponding to the desired channel.
   - The settings menu for the desired channel opens up. The display shows 'GAIN' .
2. In the default state of the menu, you can adjust the channel level in a range of -60 dB…+12 dB with the rotary switch.
3. To set additional parameters of the channel, press the corresponding button.
   - Use the rotary switch to set the desired value of the parameter. Press the rotary switch to confirm.
   - The table below shows the available parameters and their value ranges.

Parameter	Button	Selection range	Meaning
'PHASE'	[GAIN]	'0' , '180'	Phase reverse
'FIR BYPASS'	[X-OVER]		Bypassing the FIR filter; If no FIR filter is required, select 'ON' .
'DELAY'	[DELAY]	'0ms' … '680ms' '0m' … '234m' '0ft' … '766ft'	Delay time. The displayed unit depends on the basic setting of the device.
'IN-LINK'	[DELAY]		The settings of several input channels can be linked together. If the current channel is ' INA' , you can select ' INB' , ' INC' and 'IND' to change the parameters simultaneously.
'FEQ'	[PEQ]	'FEQ' : '1' … '9' 'G' : '–12dB' … '+12dB' 'FREQ' : '20Hz' … '20kHz' 'Q' : '0.4' … '128' 'Style' : 'PEAK' , 'L-SHLF' , 'H-SHLF' , 'LCUT' , 'HCUT' , 'A-PAS1' , 'A-PAS2' and 'BP'	For 9 frequency bands (numbered with the parameter 'FEQ') you can set the parameters of the parametric equalizer: Centre frequency, filter quality, slew rate, filter type, on or off (bypass)
'GATE'	[DYNAMIC]	'TH' : '–90dB' … '–0dB' 'Hold' : '10ms' … '999ms' 'AT' : '1ms' … '999ms' 'REL' : '10ms' … '3000ms'	Noise Gate parameters: Threshold, hold, attack, release
'COMPRESSOR'	[DYNAMIC]	'T' : '–60dB' … '+20dB' 'R' : '1:1' … '1:10' 'K' : '0dB' … '12dB' 'A' : '10ms' … '900ms' 'R' : '10ms' … '3000ms'	Compressor parameters: Threshold, ratio, soft knee, attack, release

Settings for the outputs

1. Press the [EDIT] button corresponding to the desired channel.
   - The settings menu for the desired channel opens up. The display shows 'GAIN' .
2. In the default state of the menu, you can adjust the channel level in a range of -60 dB…+12 dB with the rotary switch.
3. To set additional parameters of the channel, press the corresponding button.
   - Use the rotary switch to set the desired value of the parameter. Press the rotary switch to confirm.

- The table below shows the available parameters and their value ranges.

Parameter	Button	Selection range	Meaning
'PHASE'	[GAIN]	'0' , '180'	Phase reverse
'IIR'	[X-OVER]	'HP' : '20Hz' … '20kHz' 'LP' : '20Hz' … '20kHz' 'BUTTER-xx' (Butterworth), 'BESSEL-xx' (Bessel), 'LINK/R-xx' (Linkwitz-Riley) Slope: '–6dB/oct' … '–48dB/oct'	IIR filter. Digital high and low pass filter parameters: Cut-off frequency, filter type and slope
'FIR'	[X-OVER]	'T' : '256' … '1024' 'W' 'BY' 'HP' : '150Hz' … '20kHz' 'LP' : '150Hz' … '20kHz'	FIR filter. Number of FIR taps, FIR filter frequency response, bypass, cut-off frequencies for digital high-pass and low-pass
'DELAY'	[DELAY]	'0ms' … '680ms' '0m' … '234m' '0ft' … '766ft'	Delay time. The displayed unit depends on the basic setting of the device.
'OUT-LINK'	[DELAY]		The settings of several input channels can be linked together. If the current channel is 'OUT1' , you can select 'OUT2' … 'OUT8' to change the parameters simultaneously.
'FEQ'	[PEQ]	'FEQ' : '1' … '9' 'G' : '–12dB' … '+12dB' 'FREQ' : '20Hz' … '20kHz' 'Q' : '0.4' … '128' 'Style' : 'PEAK' , 'L-SHLF' , 'H-SHLF' , 'L CUT' , 'HCUT' , 'A-PAS1' , 'A-PAS2' and 'BP'	For 9 frequency bands (numbered with the parameter 'FEQ') you can set the parameters of the parametric equalizer: Centre frequency, filter quality, slew rate, filter type, on or off (bypass).

'MATRIX'	[MATRIX]		Assignment selection of input channels to the respective output channel. To each output channel, an input channel or the mix of several input channels can be freely assigned.

'MIX'	[MATRIX]	'T' : '–60dB' … '0dB'	For each of the input channels, which are assigned to the respective output channel, a level adjustment can be preset.
'LIMIT'	2 × [DYNAMIC]	'T' : '–60dB' … '+20dB' 'R' : '1:1' … '1:10' 'K' : '0dB' … '12dB' 'AT' : '10ms' … '999ms' 'REL' : '10ms' … '3000ms'	Limiter parameters: Threshold, ratio, soft knee, attack, release.

Operating on the computer

Install and start the software

1. Insert the software CD into the disk drive of your Windows PC and start the installation programme that matches the device version.
2. Follow the instructions of the installation programme to completion.
3. Connect your PC to the device via a USB cable and turn on the device.
    - The operating system detects the newly added USB device.
4. Open the PC programme. It automatically detects the connected device.
    - In the upper right corner of the programme window the 'Online' marking appears.

Exit software

1. In the programme window, click on the 'Online' control.
2. Close the programme window.

Components of the programme window

All tabs of the programme window have a similar structure and are divided into the following areas:

1	Tab for selecting a function group
2	Main menu
3	Button for the status of the connection to the PC
4	Display area
5	Control area
6	Buttons for quick access to important presets

Main menu

Menu item	Meaning
'File'	Loading user presets and saving them to the PC; Data upload to the PC and data download to the device
'Link'	Assignment of input to output channels
'Copy'	Copying parameter settings from one input or output channel to another
'Lock'	Changing device password
'Setting ID / IP'	Changing the unique identification of the device in a series connection or the IP address for the inte- gration into a local network
'In Select'	Select 'AES / EBU' for digital or 'ANALOG' .
'Out Select'	Select 'AES / EBU' for digital or 'ANALOG' .
'Test Tone'	Setting the internal test tone generator: Pink noise, white noise, sine wave 20 Hz…20 kHz.
'Channel Name'	Renaming of input and output channels
'Language'	Language selection for the user interface of the programme (English or Chinese)
'Help'	Display of control codes for the serial interface
'About'	Information about the programme version

Buttons for quick access to important presets

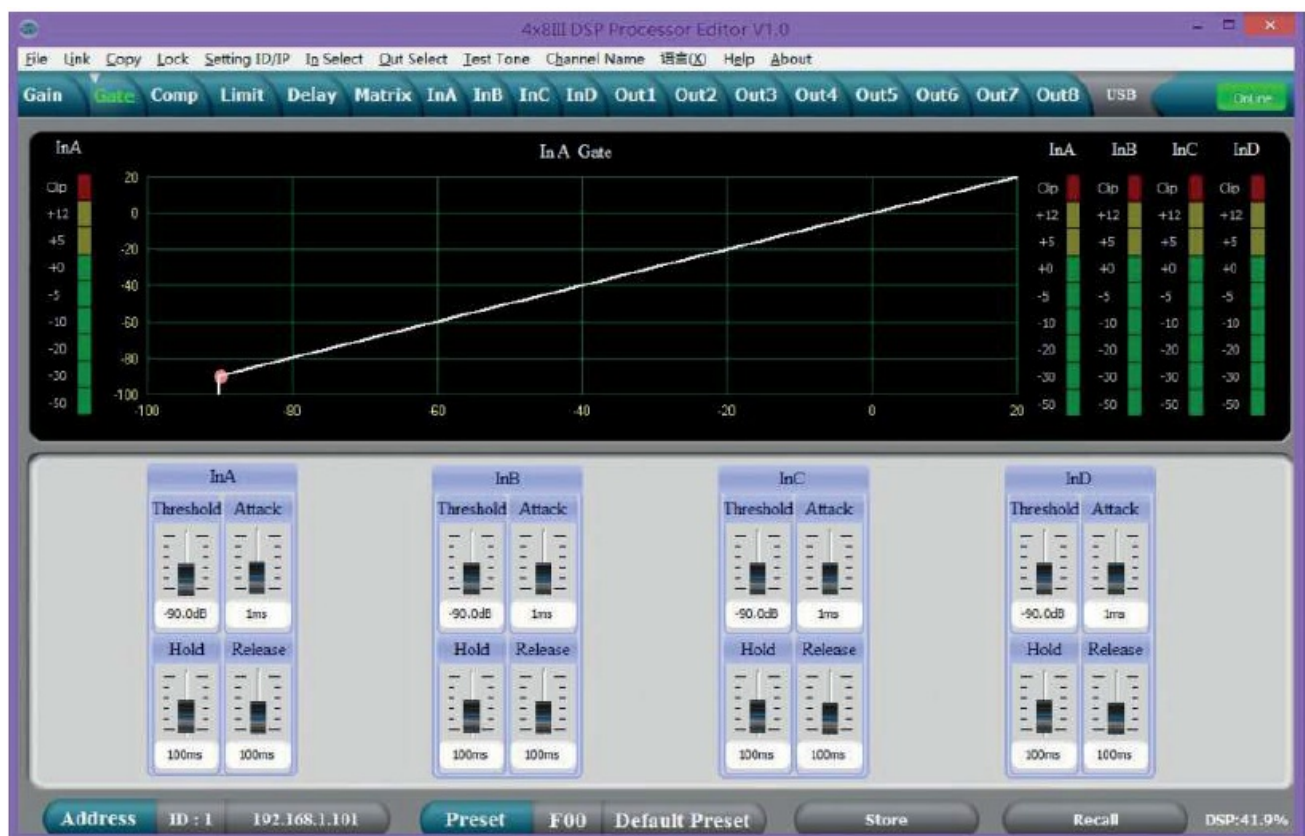| Range	Meaning
Address	Display of the device identification in a series connection and the IP address for integration into a local network
Preset	Display of the current user's preset
Store	Saving user preset
Recall	Recalling user preset

'Gain' tab

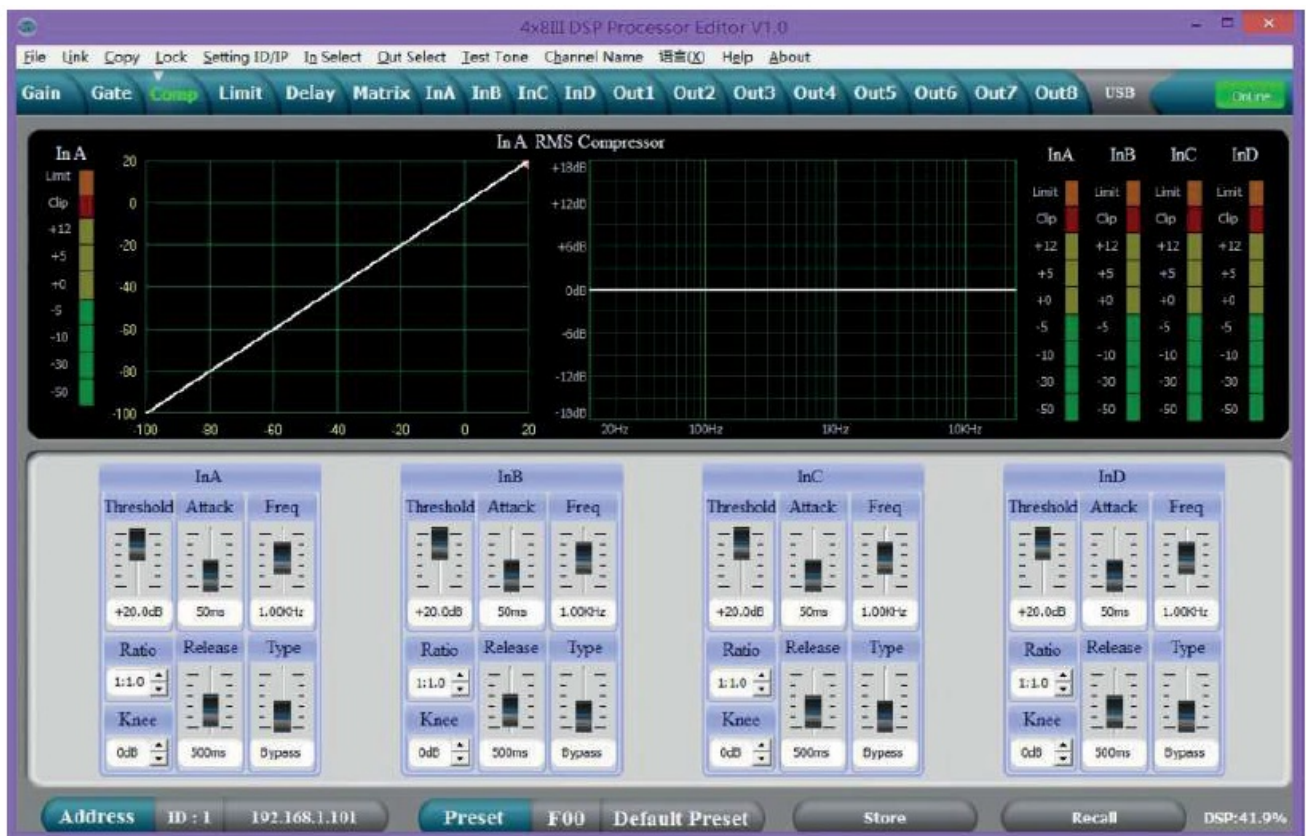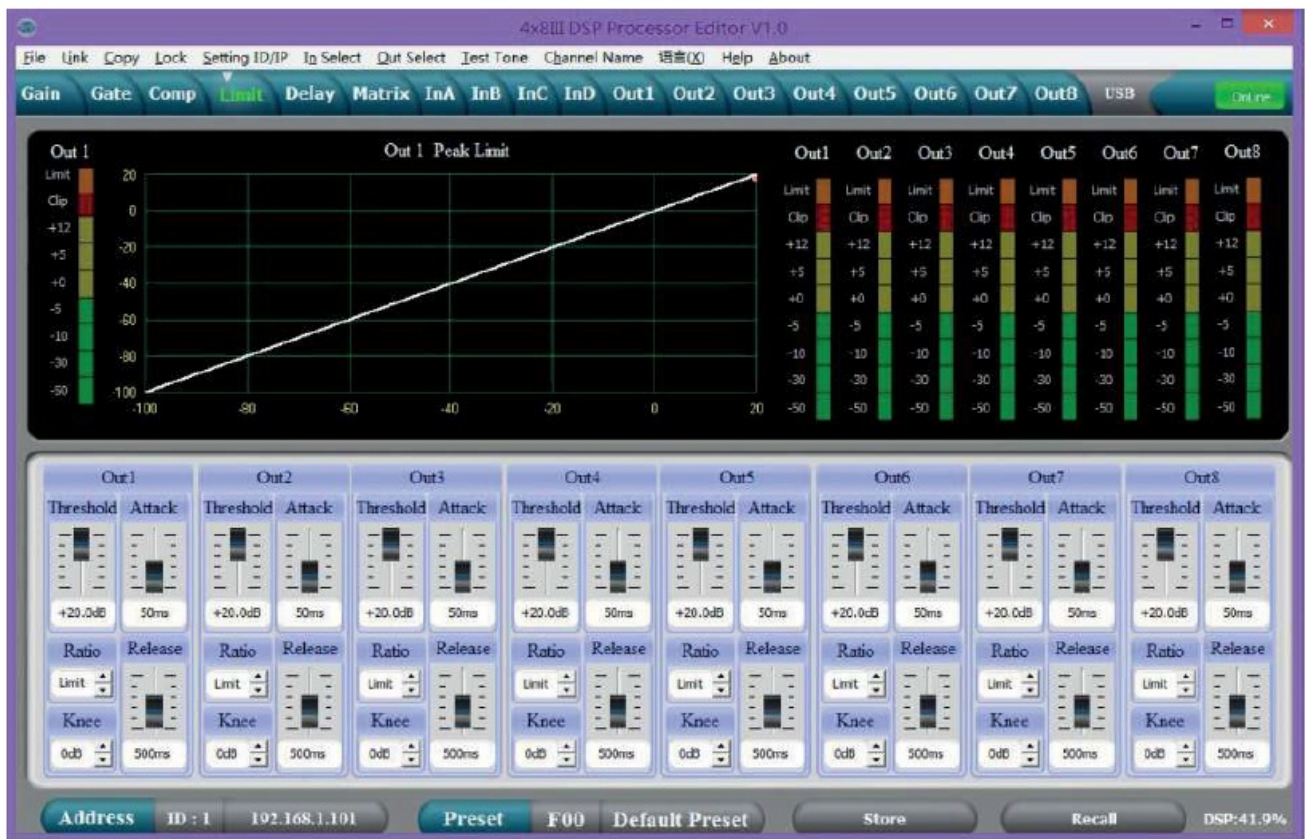| Range	Meaning
Display area	The waveform of input and output channels is graphically displayed. Use the radio buttons *'Inx'* and *'Outx'* to set the inputs and outputs to be displayed.
Control area	Drag the faders with the mouse to adjust the levels for the input and output channels. The *'Mute'* button mutes or unmutes the respective channel. The *'Normal'* / *'Inverse'* button inverts the phase of the respective channel by 180° when needed.

'Gate' tab

Range	Meaning
Display area	Shows the current settings of the noise gate for the respective channel, with a symbolic level indi- cator symbol appearing next to it for the input channels. The red dot in the curve corresponds to the current signal.
Control area	Drag the faders with the mouse to set the noise gate parameters for all input and output channels: Threshold, hold, attack, release.

'Comp' tab

Range	Meaning
Display area	Shows the current settings of the compressor function for the respective output channel, with a sym- bolic level indicator symbol appearing next to it for all output channels. The red dot in the curve cor- responds to the current signal.
Control area	Drag the faders with the mouse to set the compressor parameters for the output channels: Threshold, ratio, soft knee, attack, release, frequency, type.

'Limit' tab

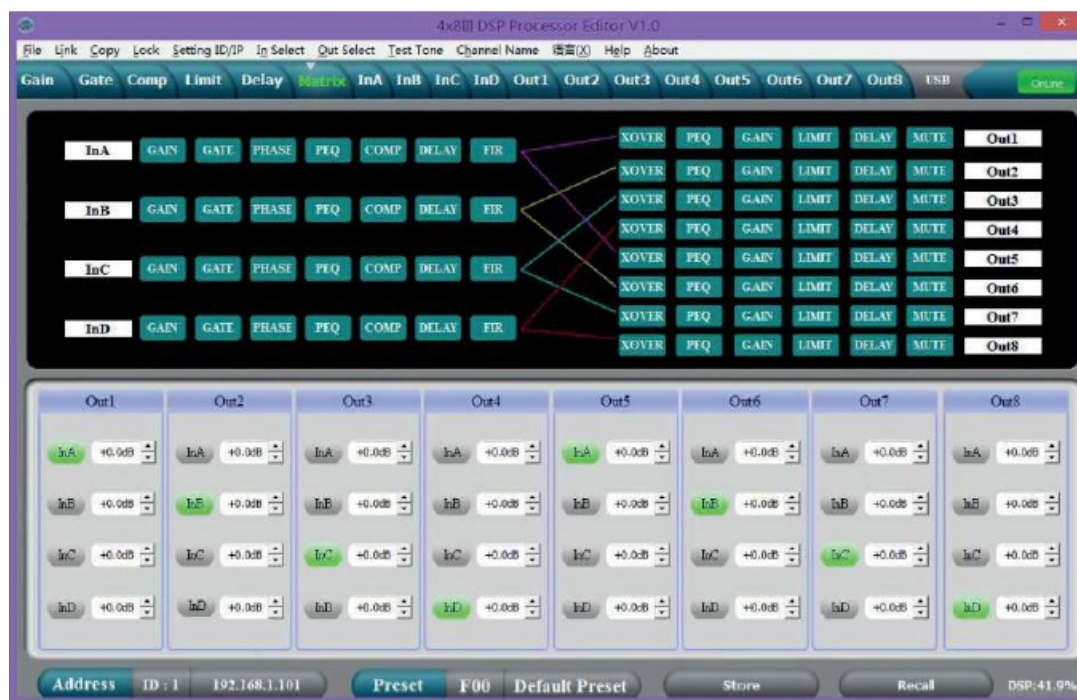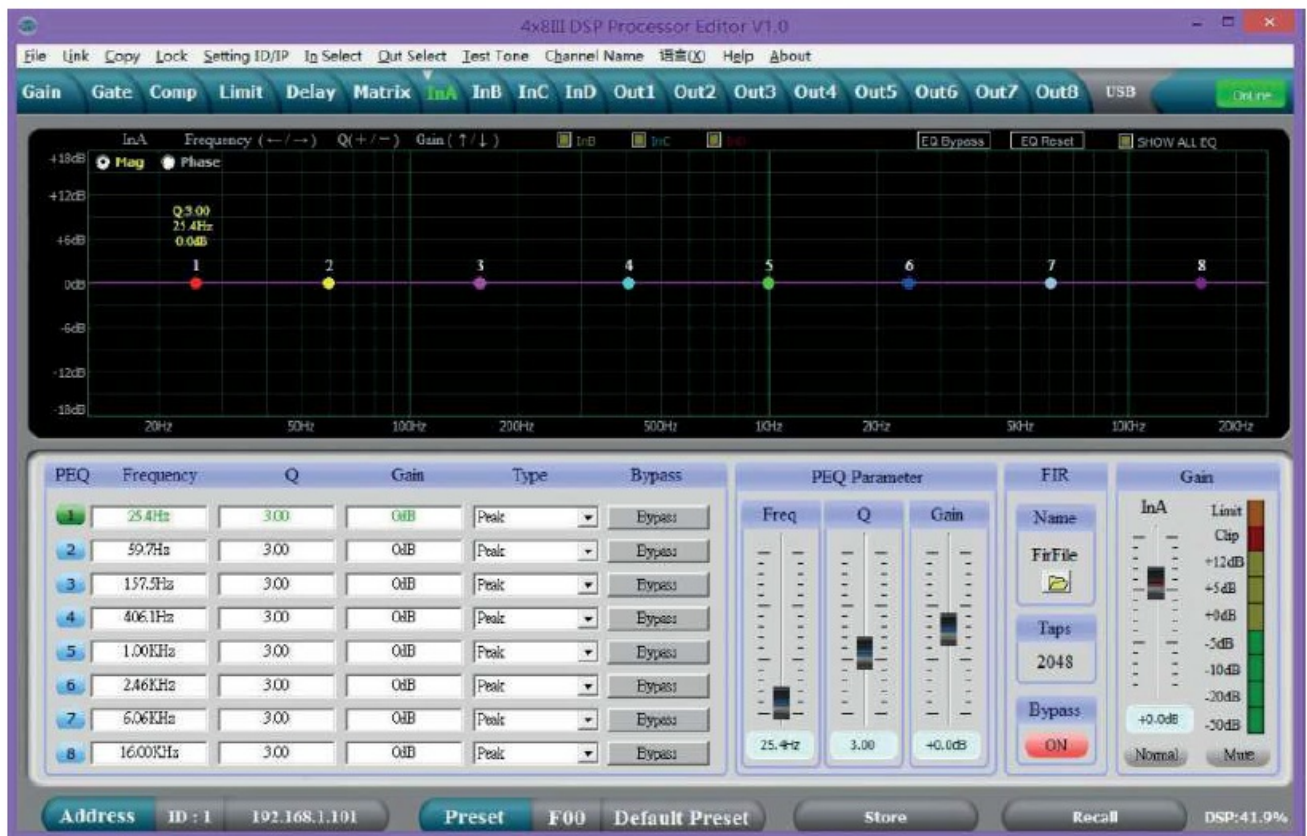| Range	Meaning
Display area	Shows the current settings of the limiter for the respective channel, with a symbolic level indicator appearing next to it for all channels.
Control area	Drag the faders with the mouse to set the limiter parameters for all input and output channels: Threshold, attack, ratio, soft knee, release.

'Delay' tab

Range	Meaning
Display area	Shows the set delays for all in and output channels.
Control area	Drag the faders with the mouse to adjust the delay for the respective channel. Press one of the but- tons *'ms'* , *'m'* or *'ft'* to select the unit to be used.

'Matrix' tab

Range	Meaning
Display area	Shows the current interconnection of input to output channels. Input and output channels can be renamed. Click on a functional area (e.g. *'PEQ'* or *'DELAY'*) to open the tab where you can enter the corresponding parameters directly.
Control area	With a mouse click you can interconnect each input with each output channel. To each output channel, an input channel or the mix of several input channels can be freely assigned. The green input channels are assigned to the respective output channel. You can adjust the level for each combination of input and output channel.

'In' tab

Range	Meaning
Display area	Use the radio buttons *'Mag'* or *'Phase'* to switch the diagram from Cartesian coordinates (level vs. frequency) to polar coordinates (angle vs. frequency). Use the radio button *'SHOW ALL EQ'* to display the parameters for all nine frequency bands.

Control area	For each input channel and all nine frequency bands (numbered with *'PEQ'*) you can enter the param- eters of the parametric equalizer directly as numerical values in the left part of the window: Centre frequency, filter quality, slope, filter type. With the *'Bypass'* button, the equalizer for the respective frequency band and the respective channel can be bypassed temporarily. In the middle part of the window (*'PEQ Parameter'*) you can adjust the parameters centre frequency, filter quality and slew rate with the faders or the arrow keys on the PC keyboard. The setting refers to the frequency band that is highlighted green in the left part of the window. The input channel can support 2048 FIR taps. To this, load the data in the folder *'Firfile'* (supported file formats: csv and txt). After import, the FIR coefficients are displayed, the *'PEQ'* diagram shows the *'FIR'* curve. Use the *'Bypass'* button to temporarily bypass the filter. Note: Since the FIR data is so extensive, only all channels together can support 4096 FIR taps. Each channel requires a homoge- neous distribution of FIR resources and the PC software displays the size of the FIR resources in the lower right corner. Once exhausted, the PC software displays a warning message. Better use only 512 FIR taps. If you use more taps, the process time on the PC becomes considerably longer and leads to longer delays; when using 1024 taps, the delay is already more than 10 ms. Drag the fader in the right part of the window using the mouse to set the level for the input channel. The *'Mute'* button mutes or unmutes the respective channel. The *'Normal'* / *'Inverse'* button inverts the phase of the respective channel by 180° when needed.

'Out' tab

Range	Meaning
Display area	Use the radio buttons *' Mag'* or *'Phase'* to switch the diagram from Cartesian coordinates (level vs. frequency) to polar coordinates (angle vs. frequency). Use the radio button *'SHOW ALL EQ'* to display the parameters for all nine frequency bands.
Control area	For each output channel and all nine frequency bands (numbered with *'PEQ'*) you can enter the parameters of the parametric equalizer directly as numerical values in the left part of the window: Centre frequency, filter quality, slope, filter type. With the *'Bypass'* button, the equalizer for the respective frequency band and the respective channel can be bypassed temporarily. In the middle part of the window (*'PEQ Parameter'*) you can adjust the parameters centre frequency, filter quality and slew rate with the faders and the arrow keys on the PC keyboard. The setting refers to the frequency band that is highlighted green in the left part of the window. When the IIR filter is selected, you can select the cut-off frequency and filter type for the low-pass and high-pass filters. Use the *'Bypass'* button to temporarily bypass the filter. If you select the FIR filter, the PC software displays the FIR coefficients. You can select and adjust the type (low-pass, high-pass, frequency band) and set the cut-off frequency for the high-pass and low- pass filters. The FIR curve appears with numerous setting options. Here you can select the number of taps from '512' … '1024' (preset: 512). The FIR filter becomes active when you click [OK]. To import external FIR coefficients, select for 'TYPE' 'External FIR' and click on the file to be imported (supported file formats: csv and txt). The imported FIR-PEQ is displayed immediately in the FIR curve. Drag the fader in the right part of the window using the mouse to set the level for the output channel. The 'Mute' button mutes or unmutes the respective channel. The 'Normal' / 'Inverse' button inverts the phase of the respective channel by 180° when needed.

Technical specifications

Input connections	Power supply	Rubber panel plug C14	
	USB interface	USB-B	
	LAN	RJ45	
	Serial interface	D-sub	
	Audio signal	Type	XLR input socket, balanced
		Level	+18 dBu (max.)

		Impedance	1 MΩ (stereo), 500 kΩ (mono)
Output connections	Audio signal	Type	XLR output socket, balanced
		Level	+20 dBu (max.)
		Impedance	< 500 Ω
Frequency response		20 Hz … 20 kHz, –0.3 dBu	
Total harmonic distortion (THD)		< 0.005% (1 kHz, 0 dBu)	
Signal-to-noise ratio		> 115 dBu	
Crosstalk		< 100 dB	
Digital signal processing	Digital signal processor	32 bit	
	A/D-D/A converter	24 bit	
	Sampling rate	96 kHz	
Supply voltage		100 – 240 V 50/60 Hz	
Power consumption		20 W	
Fuse		5 mm × 20 mm, 2 A, 250 V, slow blow	
Dimensions (W × H × D)		482 mm × 44 mm (1 RU) × 247 mm	
Weight		2.7 kg	
Ambient conditions		Temperature range	0 °C…40 °C
		Relative humidity	20%…80% (non-condensing)
Further information			
Channels		4	

| Number of frequency bands	9
Tube	No

Plug and connection assignment

Introduction

- This chapter will help you select the right cables and plugs to connect your valuable equipment in such a way that a perfect sound experience is ensured.
- Please note these advices, because especially in 'Sound & Light' caution is indicated: Even if a plug fits into the socket, an incorrect connection may result in a destroyed power amp, a short circuit or 'just' in poor transmission quality!

XLR plug (balanced)
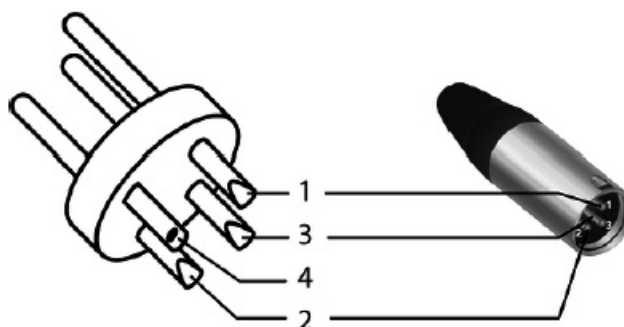
1	Ground, shielding
2	Signal (in phase, +)
3	Signal (out of phase, −)
4	Shielding on plug housing (option)

Protecting the environment

Disposal of the packaging material

- For the transport and protective packaging, environmentally friendly materials have been chosen that can be supplied to normal recycling.
- Ensure that plastic bags, packaging, etc. are properly disposed of.
- Do not just dispose of these materials with your normal household waste, but make sure that they are collected for recycling. Please follow the notes and markings on the packaging.

Disposal of your old device

This product is subject to the European Waste Electrical and Electronic Equipment Directive (WEEE) in its

currently valid version. Do not dispose with your normal household waste.
Dispose of this device through an approved waste disposal firm or through your local waste facility. When discarding the device, comply with the rules and regulations that apply in your country. If in doubt, consult your local waste disposal facility.

Contact

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- **Telephone:** +49 (0) 9546 9223-0
- **Internet: www.thomann.de**

Documents / Resources

the t.racks FIR DSP 408 User Manual Controller	**the t racks FIR DSP 408 Digital Speaker Management System** [pdf] User Manual FIR DSP 408 Digital Speaker Management System, FIR DSP 408, Digital Speaker Management System, Speaker Management System, Management System

References

- **ⓣ Buy musical instruments online from the market leader – Thomann United States**
- **User Manual**