DMP88

Digital Matrix Processor

USER'S MANUAL

ENGLISH

96MAN0185-REV.23/24

PROEL

IMPORTANT SAFETY INSTRUCTIONS

Watch for these symbols:
The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.

12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Warning: to reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
16. Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
17. To completely disconnect this apparatus from the ac mains, disconnect the power supply cord plug from the ac receptacle.
18. The mains plug of the power supply cord shall remain readily operable.
19. This apparatus contains potentially lethal voltages. To prevent electric shock or hazard, do not remove the chassis, input module or ac input covers. No user serviceable parts inside. Refer servicing to qualified service personnel.
20. This owner’s manual should be considered as a part of the product, it must accompany it at all times, and it needs to be delivered to the new user when this product is sold. In this way the new owner will be aware of all the installation, operating and safety instructions.
21. This apparatus should only be connected to a power source of type specified in this owner’s manual or on the unit.
22. You can clean the exterior of the unit with compressed air or with a dry cloth.
23. Don’t clean the unit using solvents like trichloroethylene, thinners, alcohol, or other volatile or flammable fluids.
24. To reduce the risk, close supervision is necessary when the product is used near children.

DISPOSAL OF OLD ELECTRICAL & ELECTRONIC EQUIPMENT

This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

DECLARATION OF CONFORMITY

CE

The product is in compliance with:
EMC Directive 2014/30/EU, LVD Directive 2014/35/EU, RoHS Directive 2011/65/EU and 2015/863/EU, WEEE Directive 2012/19/EU.

UK CA

The product is in compliance with:
S.I. 2016/1091 Electromagnetic Compatibility Regulations 2016, S.I. 2016/1101 Electrical Equipment (Safety) Regulations 2016, S.I. 2012/3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

CONDITIONS OF USE

Proel do not accept any liability for damage caused to third parties due to improper installation, use of non-original spare parts, lack of maintenance, tampering or improper use of this product, including disregard of ascertainable and applicable safety standards. Proel strongly recommends that this apparatus must be installed taking into consideration all current National, Federal, State and Local regulations. The product must be installed by qualified personal. Please contact the manufacturer for further information.

PACKAGING, SHIPPING AND COMPLAINT

This unit package has been submitted to ISTA 1A integrity tests. We suggest you control the unit conditions immediately after unpacking it.
If any damage is found, immediately advise the dealer. Keep all unit packaging parts to allow inspection.
Proel is not responsible for any damage that occurs during shipment.
Products are sold “delivered ex warehouse” and shipment is at charge and risk of the buyer.
Possible damages to unit should be immediately notified to forwarder. Each complaint for manumitted package should be done within eight days from product receipt.

WARRANTY AND PRODUCTS RETURN

Proel products have operating warranty and comply their specifications, as stated by manufacturer.
Proel warrants all materials, workmanship and proper operation of this product for a period of two years from the original date of purchase. If any defects are found in the materials or workmanship or if the product fails to function properly during the applicable warranty period, the owner should inform about these defects the dealer or the distributor, providing receipt or invoice of date of purchase and defect detailed description. This warranty does not extend to damage resulting from improper installation, misuse, neglect or abuse. Proel S.p.A. will verify damage on returned units, and when the unit has been properly used and warranty is still valid, then the unit will be replaced or repaired. Proel S.p.A. is not responsible for any "direct damage" or "indirect damage" caused by product defectiveness.

SUMMARY

INTRODUCTION

Thank you for choosing a PROEL product. Please take some time to read this manual to understand all the features of your system and take advantage of all its performance capabilities. All PROEL products are CE approved and designed for continuous use in professional applications.

DESCRIPTION

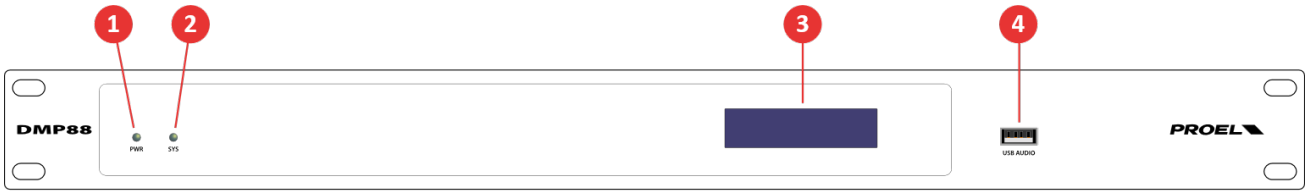
The DMP88 is an 8-input / 8-output digital audio matrix, featuring full signal routing capability and top-quality digital signal processing, including COMPRESSORS, EXPANDERS, AUTOMATIC GAIN CONTROL, PEQ, FEEDBACK SUPPRESSION, AUTOMIXER, ECHO CANCELLER, AUTOMATIC NOISE SUPPRESSION, CROSSOVER filters and LIMITERS. The DMP control software provides the remote control of all the parameter thru standard ETHERNET protocol and allows the creation of custom control panels on personal devices such as smartphones and tablets. The DMP88 can be connected to WP88 wall touch panel for local parameter controls and to RM88 8-zone paging microphone station.

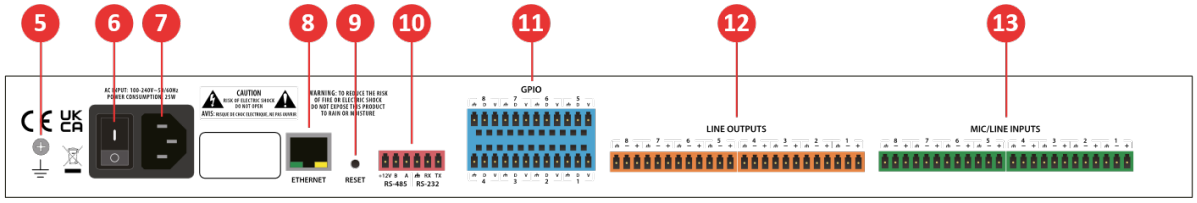
The DMP88 is suitable for high-quality, complex installations in shopping malls, restaurants, hotels, museums, conference rooms, where the number of inputs and outputs and the area of diffusion require precise parameterization.

MAIN FUNCTIONS

- N° 8 MIC / LINE inputs balanced on Euroblock terminals.
- N° 8 balanced LINE level zone outputs on Euroblock terminals.
- N° 8 GPIO customizable I/O ports.
- Ethernet, RS485, RS232 ports for remote control.
- USB port for Audio I/O and Media Player operation.
- Remote Video Cameras control with VISCA, PELCO or custom protocols.
- Windows-based DMP control software to configure and control all DMP88's parameters.
- 16 built-in presets, each with the possibility to flexibly customize the type of modules and their sequences in accordance with the designer's requirements.

PANEL OPERATIONS





1 PWR

LED power indicator.

2 SYS

The operation status indicator of the device.

3 DISPLAY

The display sequentially shows some information on the device settings:

Device:DMP88-00 IP: 192.168.200.20	Device model IP address
Firmware:2d.1.2.1 MAC:02-00-39-31-60-6E	Firmware version MAC address
0 1 I 0 N 8	8 channel input signal level
0 1 O 0 U 8 T	8 channel output signal level

4 USB AUDIO

USB soundcard (1-in-1-out), which can be used to achieve recording function.

5 GROUND

This is a supplementary chassis ground connection that can be used to assure a better safety ground protection of the device.

6 POWER SWITCH

Main switch to turn on or off the device.

7 AC~ SOCKET

Here's where you plug in your mains supply cord. You should always use the mains cord supplied with the device. Be sure that your device is turned off before you plug the mains supply cord into an electrical outlet.

The device can operate correctly in the voltage range of 100-240V~ ±10% 50/60Hz requiring a power less than 25W at temperatures ranging from 0°C (32°F) to 30°C (80F°).

8 ETHERNET CONNECTOR

The 10/100 Base-T Ethernet connector is used for remote control from PC and from WP88 wall panel.

9 RESET BUTTON

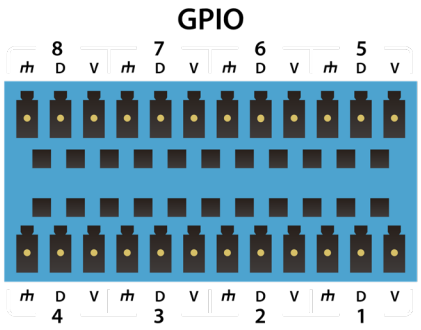
Pressing this button, the device is reset to default parameters, all settings are lost, preset, gain, equalization, dynamics, RS-485 RS-232 and ETHERNET setting are restored to factory default.

10 RS-485 RS-232 CONNECTORS

RS485 can be used for voice tracking control (or other output commands), or for bus input control. Typically used to connect the **RM88 Microphone Station (Port setting: 9600 baud, 8 data bits, 1 stop bit, no parity).**

RS232 can be used for the serial communication port Tx = sending or data output or Rx = receiving or data input that connects to a third-party control device. Typically used to control a third-party camera.

11 GPIO CONNECTORS



8-Channels Input/Output ports fully configurable by the software (3.81 mm terminals).

V = +4 Vdc (12 ohm - 50mA max)

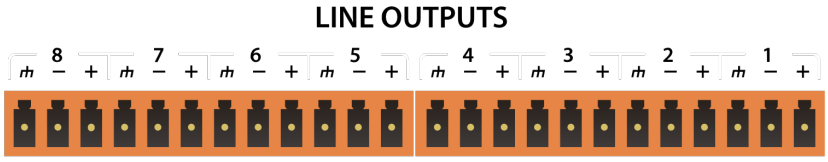
D (input) = Trigger High or Low / Analog

D (output) = 0 / +5 Vdc (50 ohm – 30mA max)

= Ground

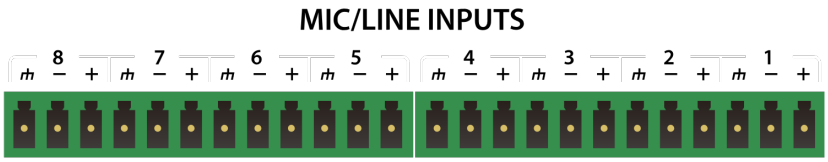
See further on this manual for a detailed configurations and examples.

12 LINE OUTPUTS



These are 8 internal balanced line outputs (3.81mm terminals), used to send the audio signal to different zones or environments.

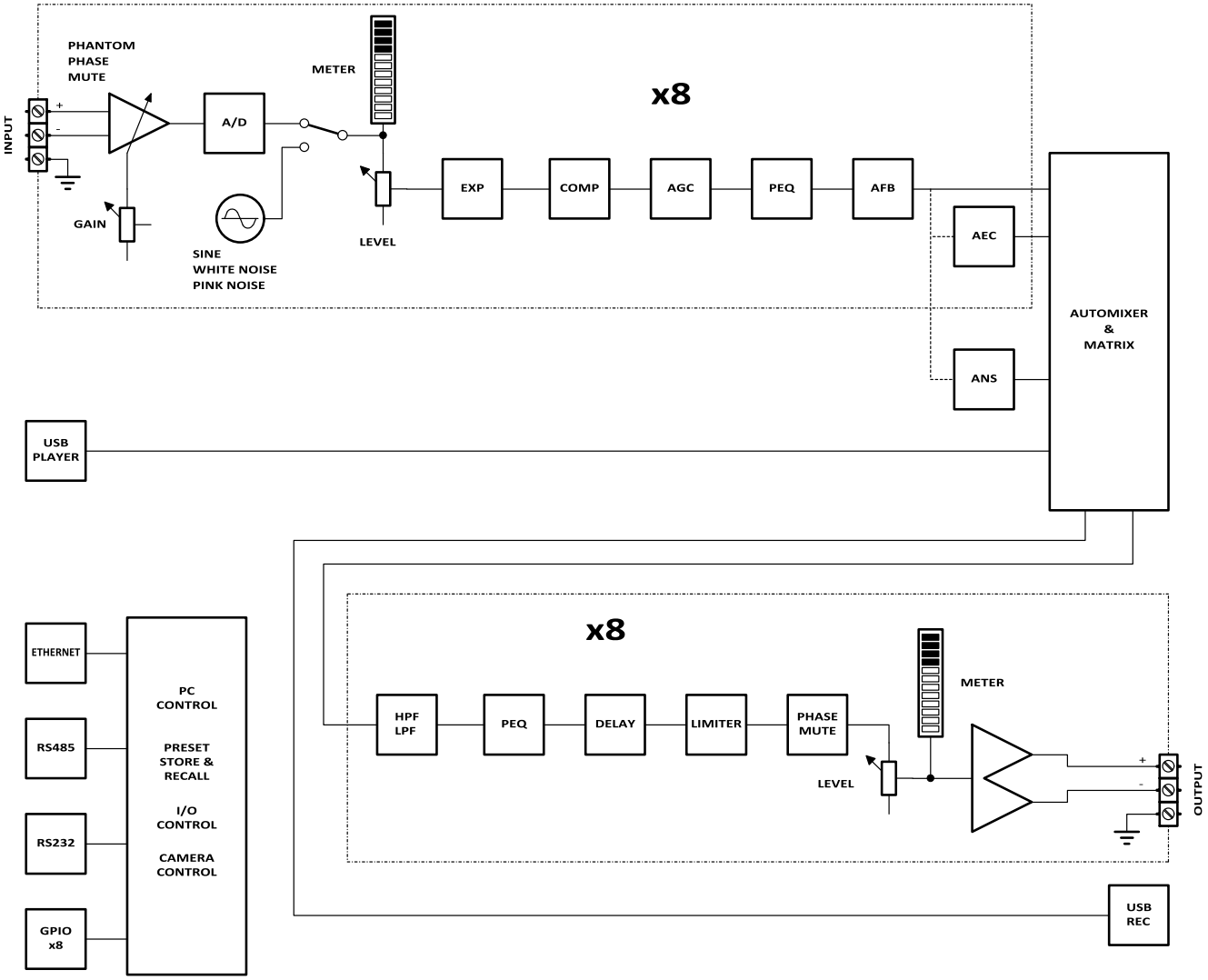
13 MIC/LINE INPUTS



These are the 8 analog inputs (3.81mm terminals), used to receive the audio signal from microphones or other audio sources.

MATRIX BLOCK DIAGRAM

For a better understanding of how the signal flows in the DMP88 see the figure below:



DMP88 – DSP CONTROL SOFTWARE

Software/Hardware requirements

A PC with a processor of 1 GHz or higher.

Windows 10 or higher version.

1 GB free storage space.

2 GB or higher memory.

Monitor with 1024 x 768 or higher resolution, 24 bit or higher color.

CAT5 cable.

Fully configured TCP/IP Ethernet network with ports available to connect the devices.

Software installation

The software can be downloaded from the website **commercialaudio.proel.com**.

Double click the downloaded file and install the software by following the instructions on the screen.

IMPORTANT: Administrator privileges are required to install and use the software.

Starts the software from the Desktop icon or from Start menu.

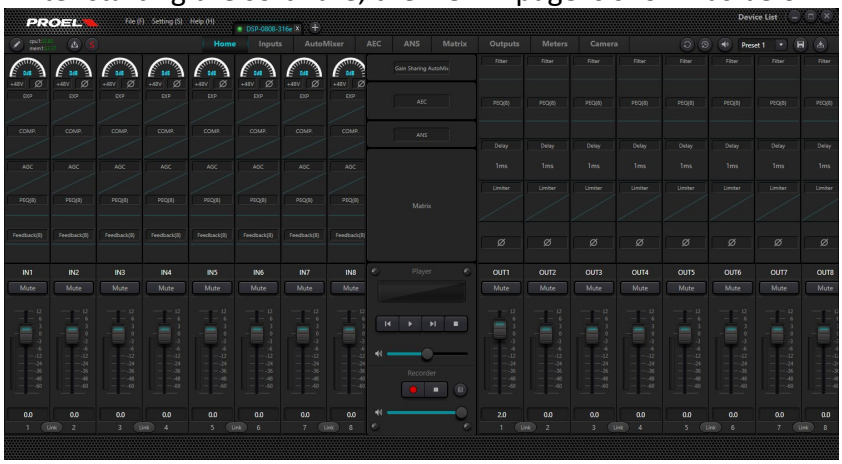
First run and setup

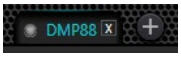
Connect the ETHERNET port to your network.

Double click on DMP control icon or choose it from start menu.

The DMP control allows to choose the matrix device model (at time printing of this manual DMP88 only). **Press OK**.

After starting the software, the HOME page is shown as below:





At the left of top bar you will note the DMP88 is selected but it is offline (grey indicator).

Press Device List at the right of the top bar.

DMP control search all DMP88 units connected to your network and after some seconds it appears, typically as factory default or after a full reset (8) it has an incorrect IP address like 169.254.10.227.

Press Set IP to set a correct IP address.

Ask to the network manager a **valid IP address** or search it using one of the suggested free below utility:
https://www.advanced-ip-scanner.com/ or https://nmap.org/
usually in the range 192.168.0.0 - 192.168.255.255 that is the typically IP private range for local network.

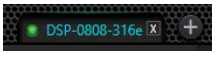
Type it in the Device IP Address box then Press OK.

The Device List now shows the same DMP88 unit with a valid IP.

Press Connect button.

Now the screen shows a chain to confirm the successful connection. Close the Device List Panel **re-clicking on Device List.**

At the left of top bar you will note the DMP88 has now the its full device name and the indicator is green.

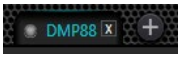


Normal run

Double click on DMP control icon or choose it from start menu.

The DMP control allows to choose the matrix device model (at time printing of this manual DMP88 only). **Press OK**.

After starting the software, the HOME page is shown as below:



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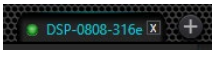
Press Device List at the right of the top bar.

DMP control search all DMP88 units connected to your network and after some seconds appears the DMP88 unit with a valid IP.
Press Connect button.



Now the screen shows a chain to confirm the successful connection. Close the Device List Panel **re-clicking on Device List.**
At the left of top bar you will note the DMP88 has now the its full device name and the indicator is green.

Edit Parameters of DMP88

The figure above shows the Home page: clicking on tabs at top is possible to choose a specific page between Home, Inputs, Automixer, ANS (automatic noise reduction), AEC (automatic echo canceller), Matrix, Outputs, Meters and Camera.

There are two methods to edit the channel parameters:

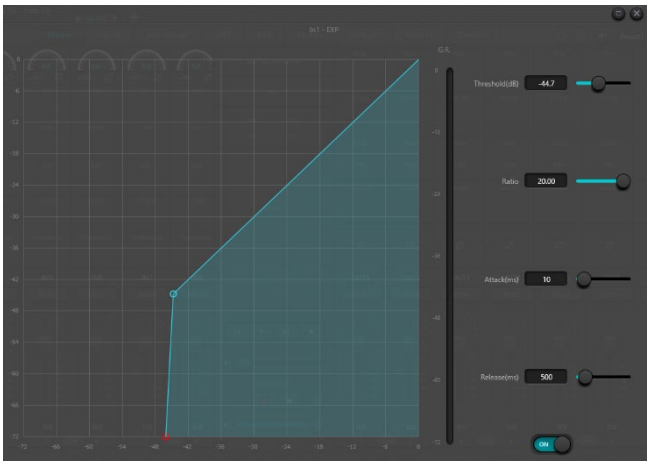
- **Left click** on a channel strip: an enlarged horizontal channel strip allows to change the parameters of the channel strip selected.
- **Right click** on a channel strip module: a window for specific module of that channel will pop out.

INPUT SOURCE

Sensitivity	Set the input gain at 3 dB step.
Phantom	Turn on the 48V for a condenser mike. **Do not enable phantom power with line input or when the power is not required, so as not to damage the external device**.
Phase	Switch 180° the channel phase.
Mute	Silence the channel.
Sine/White/Pink	Select the generator waveform.
Freq(Hz)	Select the Sine frequency.
Level(dBFs)	Set the generator level. **Be careful: high levels can damage the loudspeakers.**
Analog Signal **Signal Generator**	Select between analog input or generator.

Tip: the signal generator can be used to set up the system.

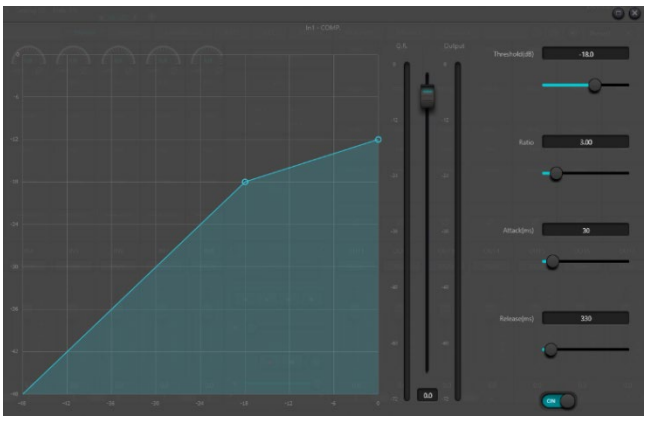
EXP - INPUT EXPANDER



Threshold(dB)	Sets the threshold in dBFs, the input signal below this value is attenuated.
Ratio	Sets the attenuation ratio (1:n).
Attack(ms)	Defines the time in which, after the signal returns above the threshold, the expander switches from the 1:n ratio to the 1:1 ratio (bypass).
Release(ms)	Defines the time in which the expander goes from the ratio (ratio) 1:1 to the set ratio (1:n)
On/Off	Switch on or off the expander.
G.R. meter	Shows the gain reduction in real time.

Tip: The expander module can be used to shut off a specific microphone when no one speak on it, you can use it in alternative or in conjunction with the Automixer module.

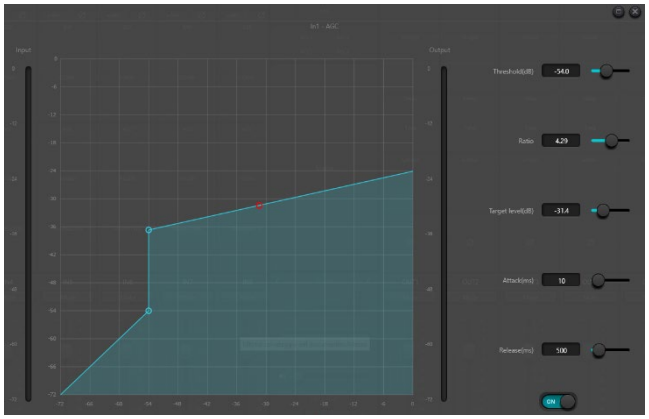
COMP – INPUT COMPRESSOR



Threshold(dB)	Sets the threshold in dBFs, the input signal above this value is attenuated.
Ratio	Sets the attenuation ratio (n:1).
Attack(ms)	Defines the time in which, after the signal exceeds the threshold, the compressor switches from the ratio (ratio) 1:1 to the set ratio (n:1)
Release(ms)	Defines the time in which, after the signal drops below the threshold, the compressor switches from the set ratio (n:1) to the 1:1 ratio.
On/Off	Switch on or off the compressor.
Fader	Allows to set a gain after the compression.
G.R. meter	Shows the gain reduction in real time.
Output meter	Shows the output signal in real time.

Tip: The compressor module allows you to attenuate the signal, for example, when a person screams into the microphone. Start with Threshold -18, Ratio 3:1, Attack 30ms, Release 300ms and adjust these parameters as needed.

AGC – INPUT AUTO GAIN CONTROL

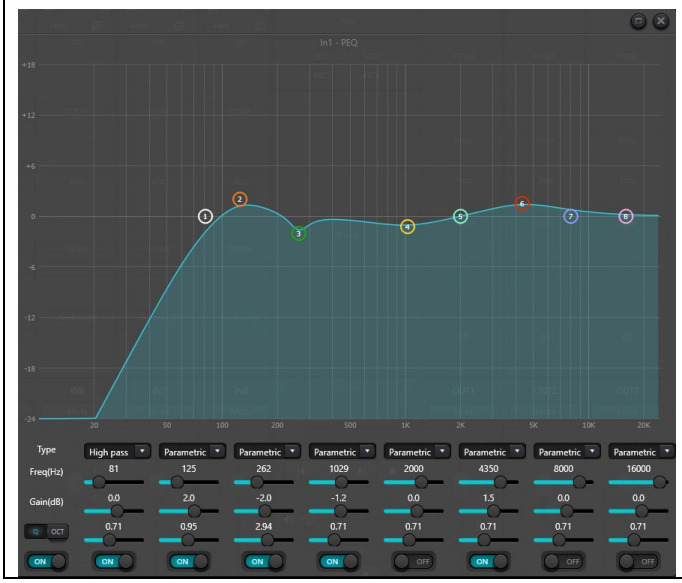


Threshold(dB)	Sets the threshold in dBFs, the input signal below this value is attenuated and above is compressed.
Ratio	Sets the compression ratio (n:1) after threshold.
Target Level (dB)	Sets the medium level of the desired output signal.
Attack(ms)	Defines the time in which, after the signal exceeds the threshold, the AGC is enabled.
Release(ms)	Defines the time in which, after the signal drops below the threshold, the AGC is disabled.
On/Off	Switch on or off the AGC.
Input meter	Shows the input signal in real time.
Output meter	Shows the output signal in real time.

Tip: Auto gain control (AGC) is an exception of compressor. Its threshold is set at a very low level with middle-to-slow starting time, long release time and low ratio. The purpose is to improve the signal with uncertain level to a target level, while maintaining the dynamic range at the same time. Most of the auto gain control includes silent detection to prevent the gain attenuation loss during the silent period. This is the only function that distinguishes auto gain control from ordinary compressor/limiter.

Auto gain control may be adopted to normalize the level of CD players that play background music, foreground music and music on hold, so as to eliminate the changes in the level of some paging microphones.

PEQ - INPUT/ OUTPUT PARAMETRIC EQUALIZER



Type	Selects the filter topology: High pass, Low pass, High shelf, Low shelf, Parametric.
Freq(Hz)	Sets the center frequency.
Gain(dB)	Increases or reduces the gain of a band.
Q or OCT	Sets the bandwidth of the filter.
ON or OFF	Switches on or off the equalizer or a specific band.

Feedback – INPUT ANTI FEEDBACK

Panic Limiter Threshold	Any level higher than the threshold is absolutely a feedback. Once the output level is lower than this threshold, the gain will be recovered to normal state. If the value is set as 0, this function is disabled.
Feedback Threshold	Any level lower than this threshold is absolutely not a feedback.
Filter Depth	It refers to the maximum attenuation of a single filter.
Step	Minimal octave step between filters.
1/5 or 1/10 octave	1/10 and 1/5Oct can be chosen.
Clear All	Click the button to instantly clear up all filters.
Manual/Dynamic	Sets a filter manually or automatically.
On/Off	Switches on or off the Anti Feedback

If you want to get higher system transmission gain and feedback inhibition effect, it is recommended that you follow the steps below:

a) Reduce the system gain and use the button "Clear" to reset all filter parameters.

b) Set up parameters for the feedback inhibition module. Also, decrease the panic threshold to reduce the feedback level.

c) Open all microphones and slowly increase system gain until the feedback occurs. Stop increasing system gain when the feedback occurs.

d) Wait for the feedback inhibition module to take effect: after the feedback disappears, continue to increase gain.

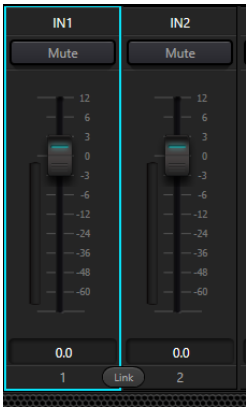
e) Repeat the operation until the system reaches the required gain or until all filters are fully distributed.

f) Change the panic threshold to a maximum level just higher than the expected non-feedback signal. At this time, if needed, you may set Fixed mode for each filter or save the dynamic status to deal with possible feedback during the performance period. Additionally, you may copy the filter to the notching filter module (such as equalizer). In this way, you may add more filter capacity.

Tip: Antifeedback does not work miracles. To obtain the best results traditional methods must still be used, such as limiting the number of microphones to be opened, reducing the distance between the speaker and the microphone to a minimum, positioning and directing microphones and speakers to obtain a minimal feedback and balance the room to achieve a flat response.

Tip: For speaker outputs it is advisable to use a limiter module as additional protection. Set an appropriate limiter to ensure that the speaker is not damaged even if all notch filters are exhausted or the antifeedback cannot effectively control the feedback, as in the case of excessive system gain.

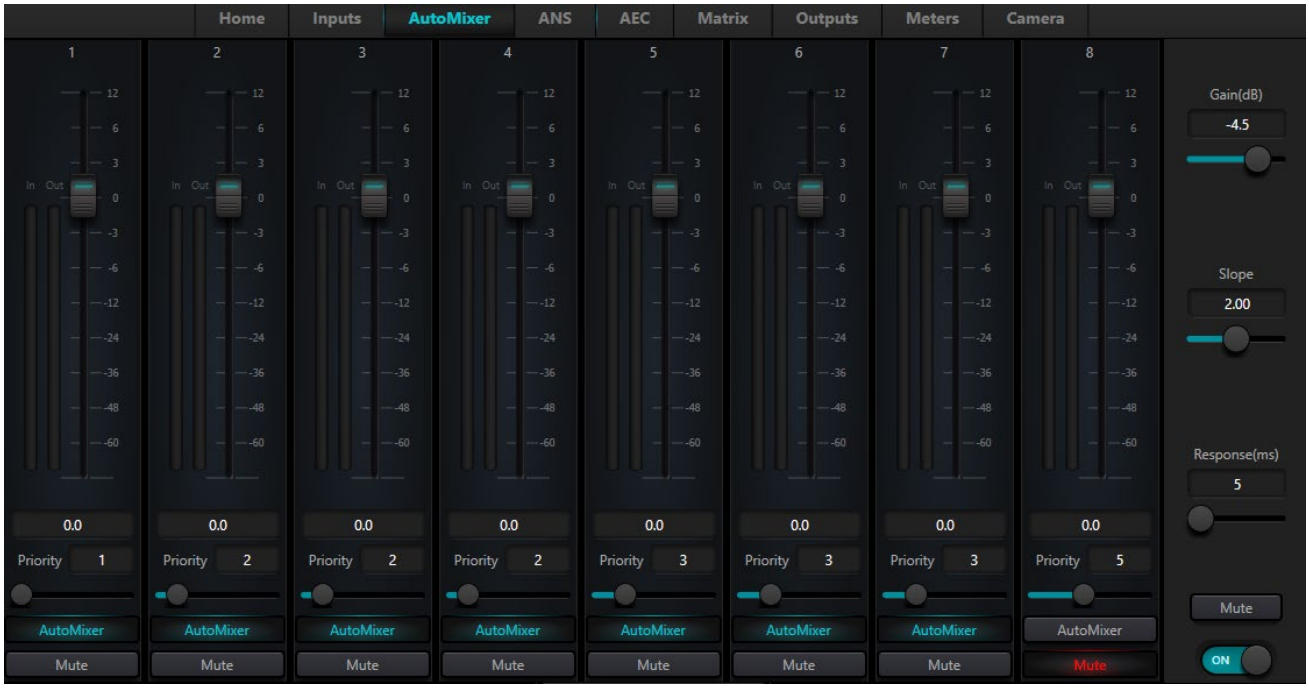
INPUT LEVEL & MUTE



Channel Name	Double click on the “INn” text and assign a custom name to the channel.
Mute	Click on Mute button to switch on or off the channel.
Fader	Moving the fader you can change the channel level from -72 to +12dB range.
Meter	The meter shows the signal level in real time.
Link	With Link button activated the left channel is coupled with the right channel.
Group setting… **Minimum/Maximum Gain**	By right-clicking on the channel two further settings are possible: Group Setting: There are 4 groups of channels, all channels in the same group have the same level. Set the minimum and maximum level range for the fader, this option can be useful for reducing a user's level setting.

The Link button replicates the parameters on the other connected channel only after it is pressed, all parameters modified before activating the link are valid only for the single channel.

AUTOMIXER



The Automixer can be useful in any situation where multiple microphones are installed in the same environment, such as in a conference room or an auditorium. If all the microphones are open, even if you are using only one microphone all the other microphones pick up the amplified signal in the room and the intelligibility is negatively affected. If the other microphones are attenuated with the Automixer, then the intelligibility increases considerably.

To simplify the operations, it is recommended to use same kind of microphones for all channels assigned to the Automixer.

The Automixer opens an input channel when a signal is present and, at the same, time attenuates all the other channels without any signal. To do that, all those channels must be assigned to the Automixer.

Furthermore, the Automixer module allows you to give a priority to each assigned channel: the channel with higher value of priority (10…) attenuates the audio of all channels with lower value of priority (…1), each step of priority corresponding to 2dB of attenuation.

As example with two microphones on a podium, where mic1 has set priority 10 and the mic2 has set priority 1: in this case typically only mic 1 works and mic2 is attenuated of 18dB, avoiding any combing filtering. When mic1 is not used, then mic2 takes over mic1.

Another example: in a conference room when several mikes are on the table, it can be useful to give priority 10 to the chairman and lower priority to other conference guests.

Gain (dB): controls main output volume of Automixer microphones.

Slope: the slope control influences the attenuation of lower-level microphones. If the slope is higher, the attenuation of lower-level channel will rise. It is suggested that the value be set at or around 2.

Response Time: faster response times can ensure that the initial letters of speeches are not truncated. A slower response time allows for smooth operation if there are pauses during speech. Practice shows that the best effect will be produced when the response time is between 100 ms and 1000 ms.

AutoMixer Button: pressing this button the channel is assigned to the automix.

Mute button on each Automixer Channel: pressing this button will mute the respective channel on the Automixer output, but if a priority is set it will be active. For example, if we have IN1 with priority at 10 and IN2 with priority at 1, activating Mute from Automixer on IN1, the IN1 signal will not be reproduced at the output but IN2 will still be attenuated by 18 dB. So, if you want to mute completely the channel, is preferable to use the mute in the input section.

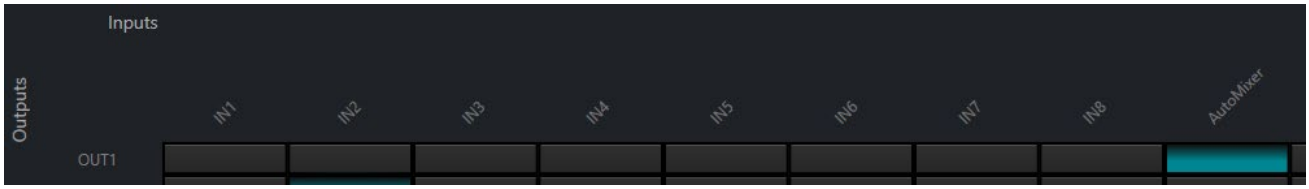
Fader on each Automixer Channel: fader adjustment may increase/decrease the volume proportion of the respective channel in Automixer without affecting the priority level detection. Elsewhere if you use the fader on input section, any adjustment affects both output level and priority level detection.

Mute Automixer button: the Automixer mute button silences completely the Automixer output.

Priority: this setting gives greater relevance to certain channels than others. The Priority parameter ranges from 1 to 10: the higher the value, the higher the priority.

ON/OFF: switch on or off the Automixer module.

To be used effectively, the Automixer output must be routed exclusively to the outputs as show below:



Note: the input channels assigned to the AutoMixer module must not be assigned to the same outputs where the AutoMixer module is assigned, otherwise the unprocessed input channels are added to the output processed by the Automixer, nullifying its intervention.

Note: In some settings, users should be very careful when using large priority differences between channels, such as priority 1 and 10. If a high priority channel recognizes background music or noise as a signal, it may mask the lower priority channels even if it is not used. Using a noise gate or expander on the high priority channel can improve the situation by setting a threshold at a level such that the channel is not opened with music or background noise.

AEC (Acoustic Echo Canceller)

Acoustic Echo Canceller (AEC for short) is a digital audio signal processing technology used in audio/video conference. When conferees in local conference room are talking with one or more speakers at certain distance, ***AEC program can increase remote speaker's phonetic intelligibility cancelling acoustic echo generated in local room.***

Echo cancellation module for remote calls can be used to carry out local amplification of remote voice signals and attenuate the interference caused by acoustic echo. Its basic operation principle is simulating echo channel, estimating possible echo generated by remote signals and then subtracting the estimated signal from input signal of microphones: thus, there will be no echo generated in input voice signal to achieve the goal of cancelling echo.

There is only one echo cancellation module in the DSP controller. The local and the remote must be set to achieve echo cancellation of the signal, as shown in the figure.

The following parameters can be adjusted:

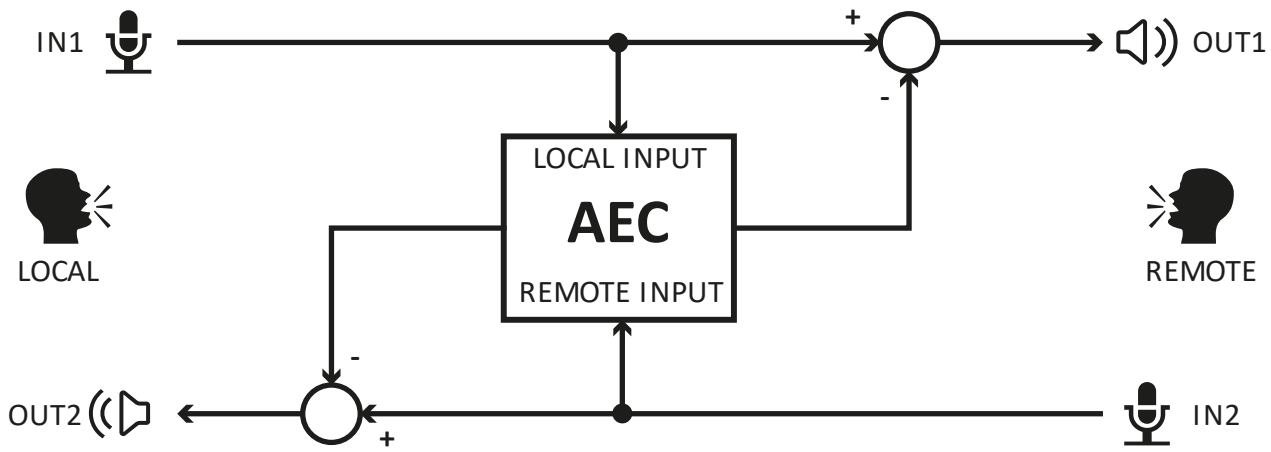
Local Input: sets the channels for the local input.

Remote Input: sets the channels for the remote input.

NLP: non-linear filter, three types including Conservative, Moderate and Aggressive can be selected to determine echo suppression level.

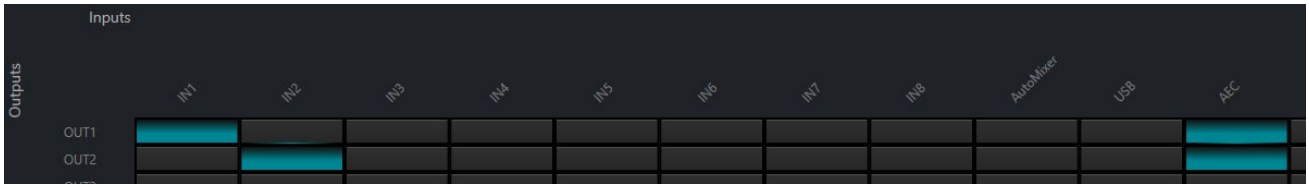
ON/OFF: switches on or off the AEC module.

As example the following figure shows an implementation using IN1 OUT2 as Local and IN2 OUT1 as Remote:



The parameters are set as follow:

The settings of echo cancellation module shall be used cooperatively with matrix module setting signal router as follow:



ANS (Automatic Noise Suppression)

The noise suppression module can effectively remove any background noise except the human voice.

There is only one noise suppression module in the DSP and you can adjust the following parameters:

Input channels: selects the channels for the input. Keep in mind that, even if multi-channel inputs are available, they are all mixed together on the single output of the ANS module in the matrix: it is therefore recommended to only select the channels where the ANS is actually an indispensable operation for better intelligibility.

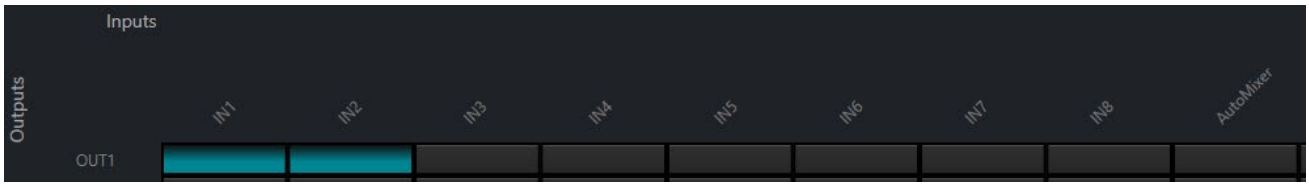
Level: there are four levels of noise attenuation: 6 dB (soft), 10 dB (moderate), 15 dB (medium) and 18 dB (aggressive). The higher the number, the higher the noise reduction will be, but the voice quality will inevitably also worsen.

Note: the input channels assigned to the ANS module must not be assigned to the same outputs where the ANS module is assigned, otherwise the unprocessed input channels are added to the output of the same channels processed by the ANS, nullifying its intervention.

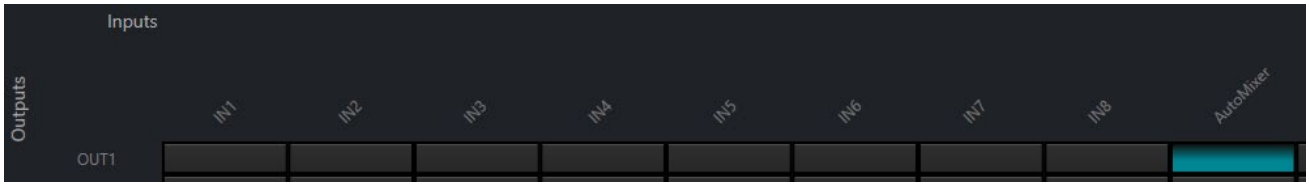
MATRIX

Matrix has two operational functions, which include routing and sound mixing. As shown in the figure, the upper horizontal bar indicates the input channels and the left vertical bar indicates the output channels. The default is one-to-one entry and exit.

For example, if you need to mix the signals of input 1 and 2 and send them to output 1, you only need to click both cells of input 1 and 2 in the output 1 row.



For example, if inputs 1 and 2 participate in automixing, you should only set the automixer channel to output 1.

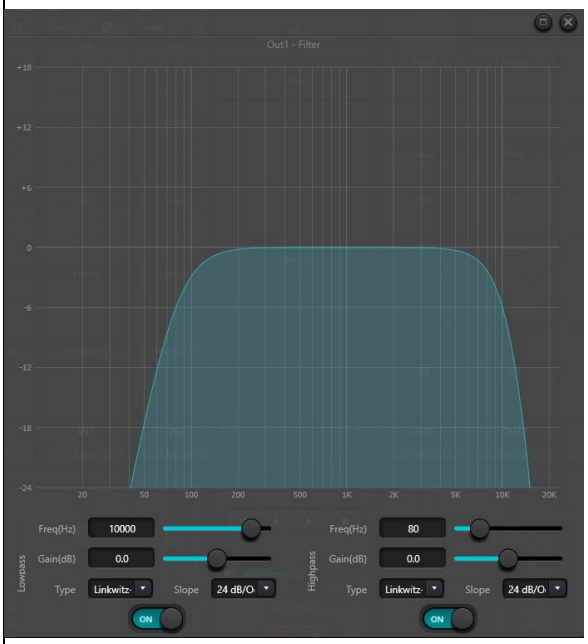


Similarly, for ANS noise suppression module.

Users need to set the matrix to get the correct signal path relationship.

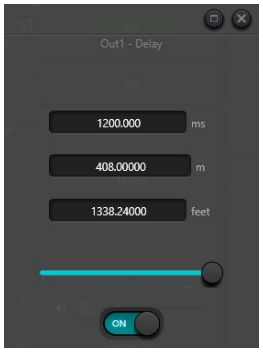
OUTPUT Filter - High & Low Pass Filter

Each output channel provides high-pass and low-pass filters modules. Each filter has four kinds of parameters as follows:



Frequency	The cutoff frequency of filters. The cutoff frequency of Bessel and Butterworth is defined at -3 dB, and the cutoff frequency of Linkwitz-Riley is defined at -6dB.
Gain	Increase or attenuates the gain of the filter.
Type	There are three types of filters including Bessel, Butterworth and Linkwitz-Riley. Butterworth has the flattest passband.
Slope	It refers to attenuation values of transition zone of filters. There are totally 8 attenuation values including 6, 12, 18, 24, 30, 36, 42 and 48dB/Oct. For example, 24dB/Oct indicates that the attenuation range is 24dB for each octave difference existed in frequency in transition zone.
On/Off	Switches on or off the filter.

OUTPUT Delay



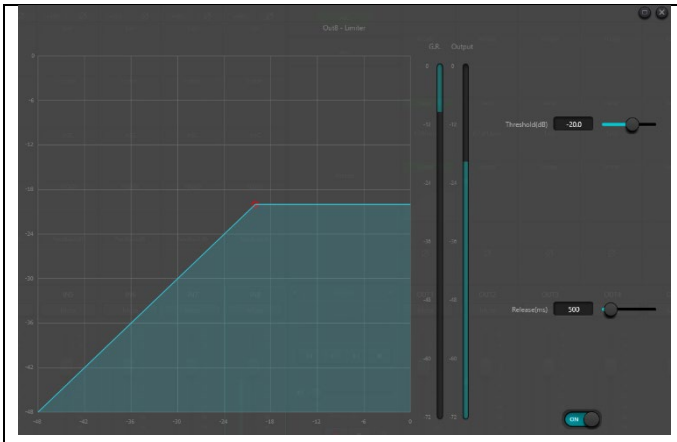
In this panel it is possible to set a time delay on each output. The output delay is a useful function that allows you to align speakers positioned differently in the same room in time. For example, in a very deep hall by positioning two speakers in the middle the sound will be reinforced, but these speakers will also need to be aligned with the delay to the main system for better intelligibility.

Cursor: The value varies from 1 to 1200 milliseconds, both meters and feet are displayed, 340 m/s is the reference for the speed of sound in air.

On/Off: activates the established delay.

OUTPUT Limiter

An audio limiter acts a lot like an audio compressor, with a few key differences. As its name suggests, limiting sets a limit, or ceiling to the output level. In other words, no sound beyond that threshold can get through. So, limiting doesn't allow that crossing at all. It's more of a brick wall. In a PA system the main use is protection: it prevents the signal from exceeding the capability of subsequent amplifiers and speakers.



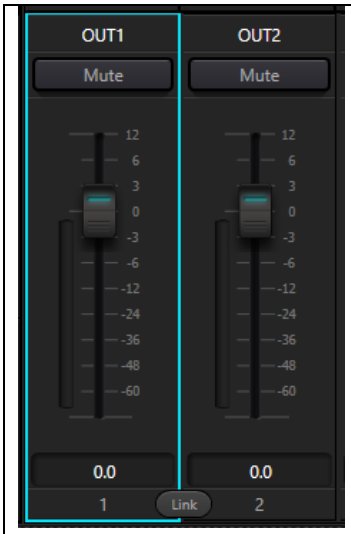
Threshold (dB)	Sets the threshold in dBfs of the brick wall.
Release (ms)	It is the amount of time it takes for the limiter to stop after the signal falls below the threshold. If you want a smoother sound, try 250ms or above.
On/Off	Switches on or off the limiter.
G.R. meter	Shows the gain reduction of the signal.
Output meter	Shows the output level.

OUTPUT Setting

Phase: 180-degree audio signal phase invert.

Mute: Set mute/unmute.

OUTPUT LEVEL & MUTE

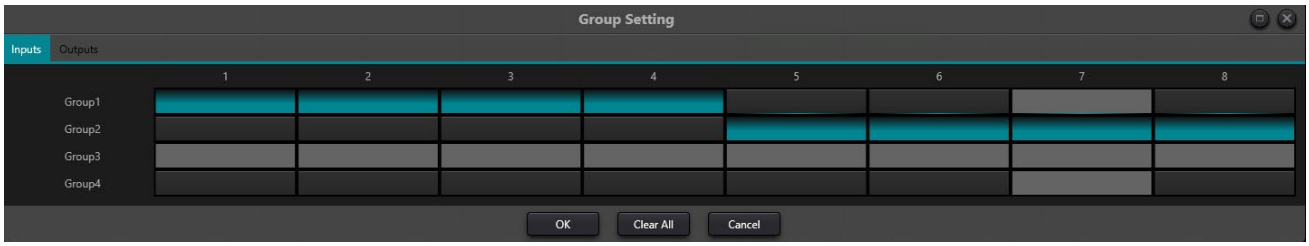


Output Name	Double click on the "OUTn" text and assign a custom name to the output.
Mute	Click on Mute button to switch on or off the output.
Fader	Moving the fader, you can change the channel level from -72 to +12dB range.
Meter	Shows the signal level in real time.
Link	With Link button activated the left channel is coupled with the right channel.
Group setting… **Minimum/Maximum Gain**	By right-clicking on the channel two further settings are possible: Group Setting: there are 4 groups of channels, all outputs in the same group have the same level. Minimum/Maximum Gain: set the level range for the fader, which can be useful for reducing a user's level setting.

The Link button replicates the parameters on the other connected output only after it is pressed, all parameters modified before activating the link are valid only for the single output.

Group Setting

By clicking with the right mouse button on the fader of a channel a menu appears on the screen from which you can open the Group Setting window, which allows you to vary both the Mute and Level of the channel inputs or outputs together.



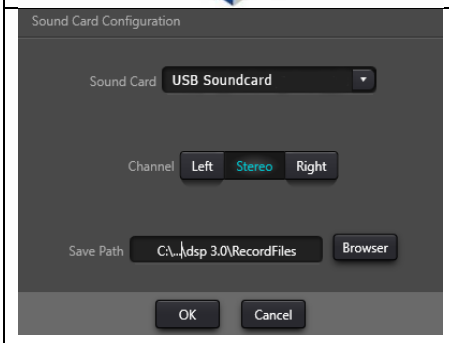
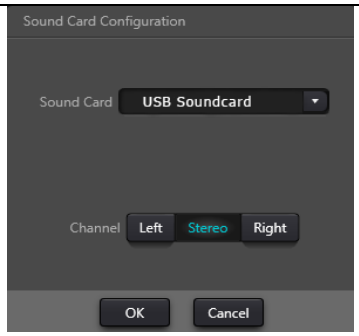
Four groups are available, on the main panel they differ in the color of the fader slider:

Note: the group setting sets the same mute and level for all the selected channels, no other parameters are affected.

USB MEDIA PLAYER/RECORDER

Soundcard Setting:

- To connect the DMP88 processor and a computer (PC Windows 10 or more) you need to connect the devices with a USB cable with both ends being type A.
- The first time you connect, the message "Found New Hardware" will appear on your computer screen and the driver will be installed automatically.
- After installation, the USB sound card will appear in your computer's sound card list, as shown in the figure. Users need to select it from the software settings.

	Required cable: USB TypeA-TypeA max length 2m.
  	Click on settings  and choose the right soundcard. Using the Browser button, it is possible to set the folder on the computer where the recordings are stored: (C:\Program Files (x86)\DMP control\DSP 1.0\RecordFiles) It is the default path.

Record and Playback

The USB sound card is used to perform two functions, record and play audio files using a personal computer.

Player	Song playing information, double click to enter playlist
	Previous song
	Play
	Next song
	Stop/Pause
	Play volume level
Recorder	Start recording
	Stop recording
	Setting (see above)
	Record volume level

With the Recorder is possible to record any input assigned to USB in the Matrix window. Using record button, the program starts to record into a file (filename is “Recorder date time.wav”), pressing stop button the record ends. With the volume it is possible to vary the record level. All recorded files are stored into the path set in the “Save path” folder specified in the settings.

Users can manage song files and save them as playlists.

With a double click in the player display area is possible to specify a list of playable files (.wav or .mp3). The name “default.list” is reserved for the current list, but is possible to save or recall another list “yourname.list” of playable files.

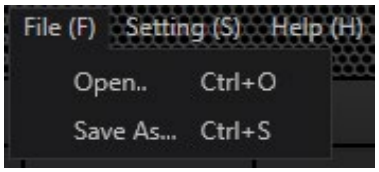
They could also open them directly next time they use the device.

As shown in the figure, click  at the bottom of the playlist to open file folder and select songs to be added to the playlist,  to clear the full playlist and  to enter in the settings.

By stopping the mouse cursor over a file these icons appear  : clicking on the trash can remove the file from the current list, clicking on the folder opens the Windows File-Manager in the folder where the file is located.

Menu Options

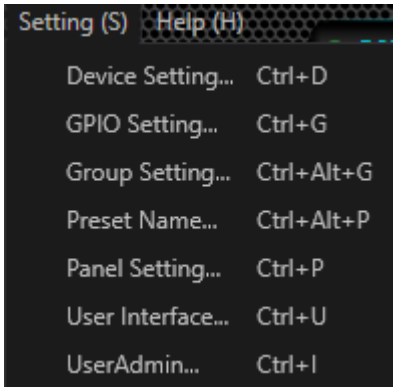
File Menu



The file menu allows the user to Open or Save all the device settings to a file (.dmdsp) on the computer.

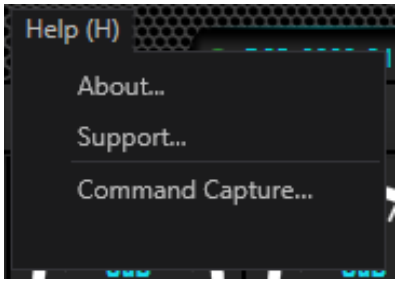
The Open… command is available only if the program is offline and is used to load a preset when you are disconnected from the DMP88 unit.

Setting Menu



The Setting Menu allows the user to configure various device settings. Each one of these settings is explained in detail further in this manual.

Help Menu

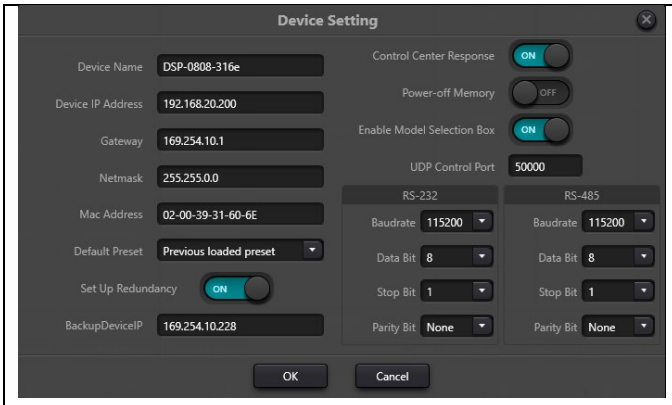


The Help Menu allows the user to show some information:

About…	Shows the app version.
Support…	Provides information for downloading the manual and the control software.
Command Capture…	Capture the string of the current command that can be used with GPIO Setting, see further on this manual.

Device Setting

This dialog box allows the user to configure the main parameters of the device:

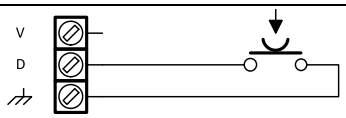
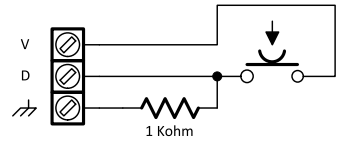
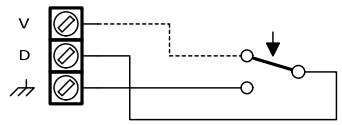
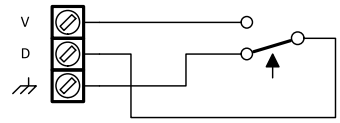


Device Name	Shows the device name, which can be changed by the user.
Device IP Address	Allows to change the unit's IP address.
Gateway	Allows to set the gateway.
Netmask	Allows to set the netmask.
Mac Address	Unit's Mac address, not editable.
Default Preset	Allows to select which preset must be loaded at power on.
Set Up Redundancy	As default is set to OFF, if it is ON allows to set up a backup device with a different IP address.
BackupDeviceIP	Specify the IP address of the backup device.
Control Center Response	As default is set to ON, so the unit responds to the receiving RS485 commands. When set to OFF the unit doesn't respond to RS458 commands. **To communicate with the RM88 station it must be set to ON.**
Power-off Memory	As default is set to OFF, so the current settings are not saved when the unit is powered off and the current preset (1-16) is restored after a power on. If set to ON, the current settings of the unit are stored at the power off and restored at the power on.

Enable Model Selection Box	Allows the app to connect to the device, typically leave this option always ON, preferably use the password to restrict the access to the device.
UDP Control Port	Set the number of the UDP control port.
RS-232	Set the parameters for the RS232 communications.
RS-485	Set the parameters for the RS485 communications.

GPIO Setting

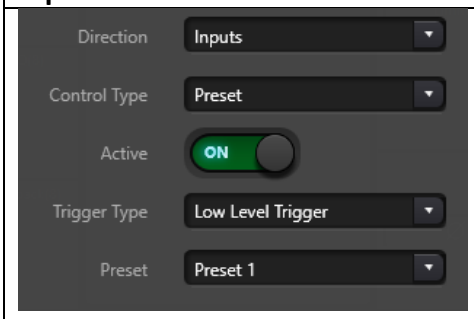
Each GPIO port has input D forced high, for this reason it is suggested to use the following circuits for the various types of triggers:

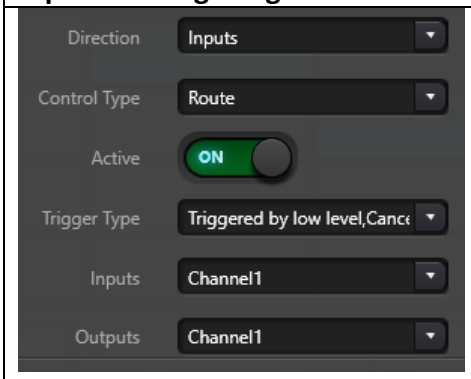
Low Level Trigger (more simple and stable)	
High Level Trigger (it is always preferable to use the above method)	
Triggered by low level, cancelled by high level (Note: since D is forced high the V connection can be omitted)	
Triggered by high level, cancelled by low level	

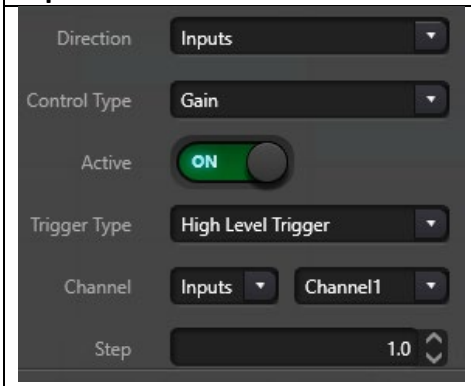
This dialog box allows the user to configure the GPIO (General Purpose Input/Output) ports:

1…8	GPIO port number.
Direction	Allows to set port as input or output.
Control Type	Allows to select the type of control of the device.
Active	Activate the GPIO.
Trigger Type	Allows to set the trigger type in case of a GPIO switch.
Channel	Depending on the previous configurations these options allow to control a device parameter.

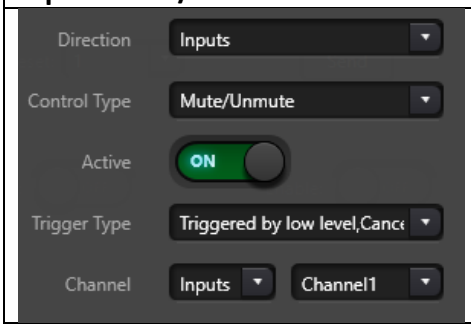
Save As…	Save all the GPIO ports configuration to a .GPIO file type.
Open…	Recall all GPIO ports configuration from a .GPIO file type.
Save	Save in the device memory all the GPIO settings.

Input: Preset recall	
	By providing a logic pulse to the GPIO port the processor will switch to the Preset when the Trigger condition is satisfied. Examples:
	Trigger Type: Low Level Trigger on the GPIO port going from a high logic level to a low logic level the falling transient will recall Preset 1.
	Trigger Type: High Level Trigger on the GPIO port, going from a low to a high logic level the rise transient will recall Preset 1.

Input: Routing assign	
	By providing a permanent logic level to the GPIO port the processor activates/deactivates a specific input/output combination of the matrix. Examples:
	Trigger Type: Triggered by low Level, Canceled by High level - on the GPIO port in the presence of a low logic level, Input 1 will be sent to Output 1. - on the GPIO port in the presence of a high logic level, the assignment of Input 1 to Output 1 will be cancelled.
	Trigger Type: Triggered by High Level, Canceled by low level - on the GPIO port in the presence of a high logic level, Input 1 will be sent to Output 1. - on the GPIO port in the presence of a low logic level, the assignment of Input 1 to Output 1 will be cancelled.

Input: Gain increase or decrease	
	By providing a logic pulse to the GPIO port the processor increases (step at +..) or decreases (step at -..) the level of a specific input or output channel, typically two GPIOs are installed, the first to increase the level and the second to lower it. Examples:
	Trigger Type: High Level Trigger on the GPIO port, going from a low to a high logic level the rise transient will increase the Gain of Input 1 by 1 dB (Value set in the “Step” window).
	Trigger Type: Low Level Trigger on the GPIO port, going from a high to a low logic level the falling transient will increase the Gain of Input 1 by 1 dB (Value set in the “Step” window).

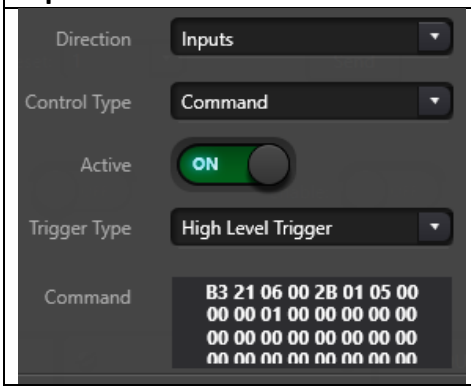
Input: Mute/Unmute



By providing a permanent Logic Level to the GPIO port the processor mutes/unmutes a specific input/output channel.
Example:

Trigger Type: Triggered by low Level, Canceled by High level
- on the GPIO port in the presence of a low logic level, the MUTE of Input 1 will be activated.
- on the GPIO port in the presence of a high logic level on Input 1, the MUTE of Input 1 will be deactivated.

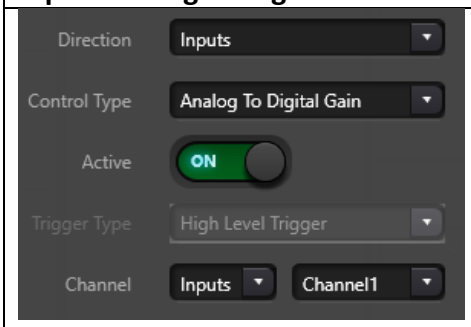
Input: Command send to RS232



By providing a logic pulse to the GPIO port the processor when activated sends a sequence of commands to the RS232 port, for example a specific command to control a camera connected to RS232.

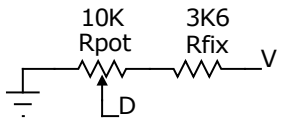
Note: to understand how the other "Trigger Type" settings work, also refer to the previous examples.

Input: Analog To Digital Gain

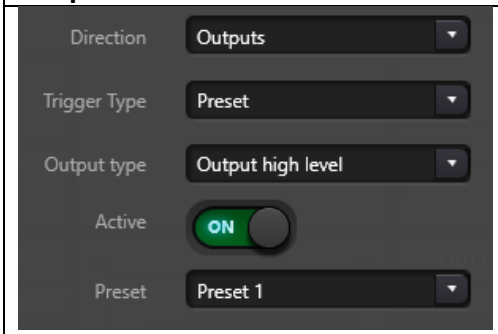


Connecting a linear potentiometer to a GPIO port adjusts the gain of the input or output channel.

Note: to obtain better control of the regulation, use a classic 10 Kohm potentiometer connected to the positive terminal with a 3.6 Kohm fixed resistor.

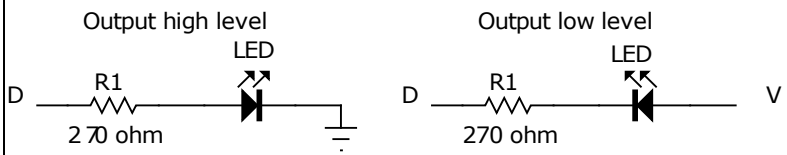


Output: Active Preset

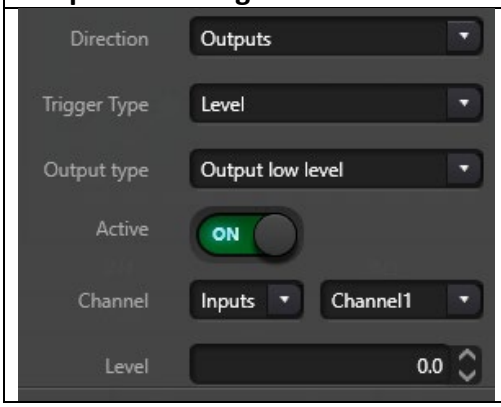


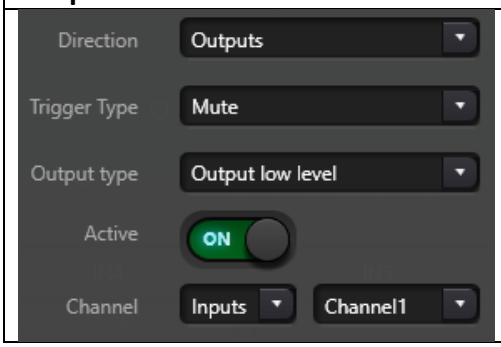
When the specified preset is active, the GPIO port outputs a high or low level logic signal.

As an example, we show two diagrams in which a LED is lit:



The output port also allows you to activate a small 5V 150-200 ohm relay. If it is necessary to drive larger relays, rely on generic relay cards or modules.

Output: Reaching a Level	
	GPIO outputs a logical high or low level when the designated channel level reaches the preset level threshold. *For example, by turning on a LED as in the previous example it is possible to visually signal either the presence of a signal or the achievement of a high level.*

Output: Mute Status	
	GPIO outputs a logical high or low level when the channel is muted. On the contrary, the opposite level will be output when cancelling mute. *For example, by turning on a LED as in the previous example it is possible to visually indicate whether a certain microphone is on or off.*

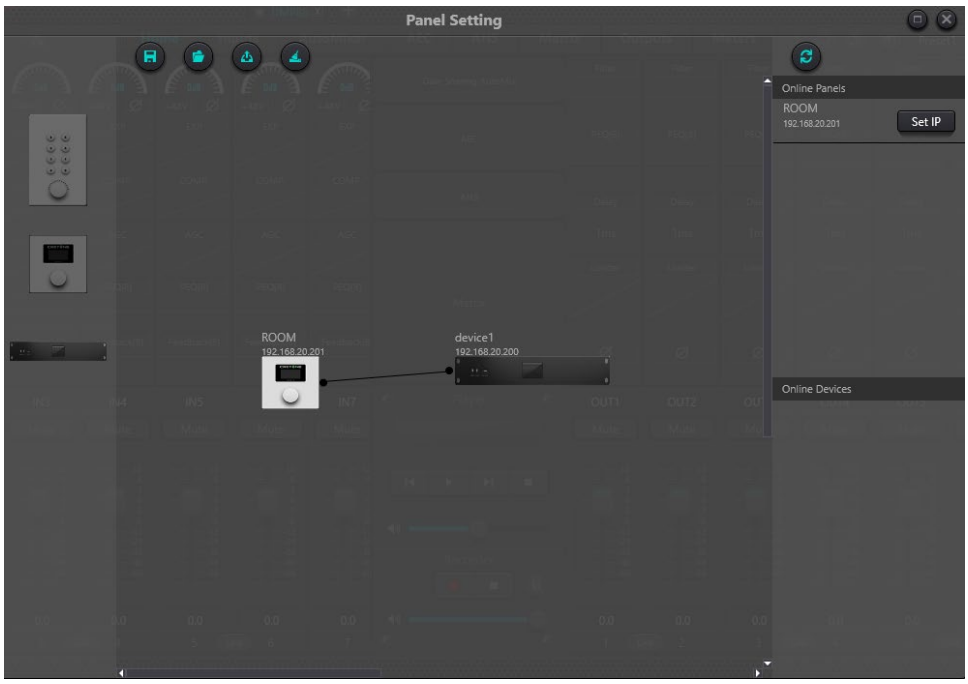
Group Setting

Chapter described previously (see above).

Preset Name

This dialog allows the user to name each preset as they like.

Panel Setting (WP88 REMOTE CONTROLLER)

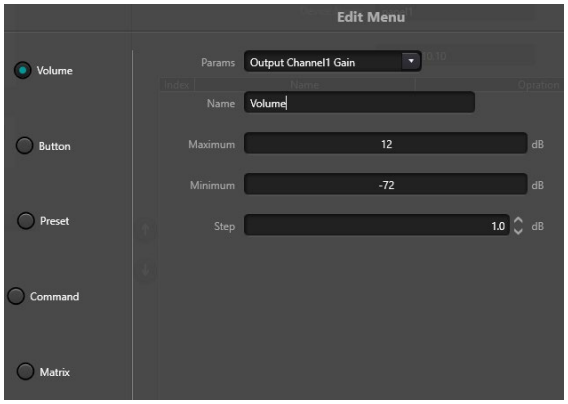


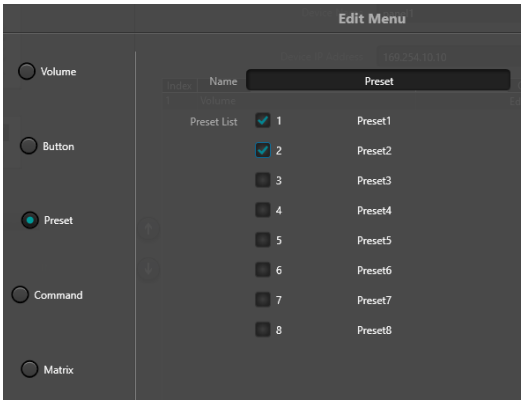
Panel Setting allows the user to set up the remote control panel **WP88**:

- **WP88 must be connected to a PoE switch** in the same network where is connected the **DMP88** unit.
- Press  button and the **WP88** appears on the right side in the Online Panel list.
- Press  button and set a valid address for your network (always a number +1 of the DMP88 IP address):

- Press OK.
- Press  button again and the **WP88** appears on the right side with the correct IP.
- For the first setup drag the offline **WP88** device from the left panel column to the panel design surface, then double-click to edit it.

- In the Device Name field, you can specify the name of the **WP88** controller, usually it refers to the room or hall it is installed.
- In the Device IP Address field, you must specify the same address above used for the online **WP88** device.
- Now using the + Add Menu button is possible to add the operations controlled by the **WP88**:





In the example above a Volume and Preset recall commands are added.

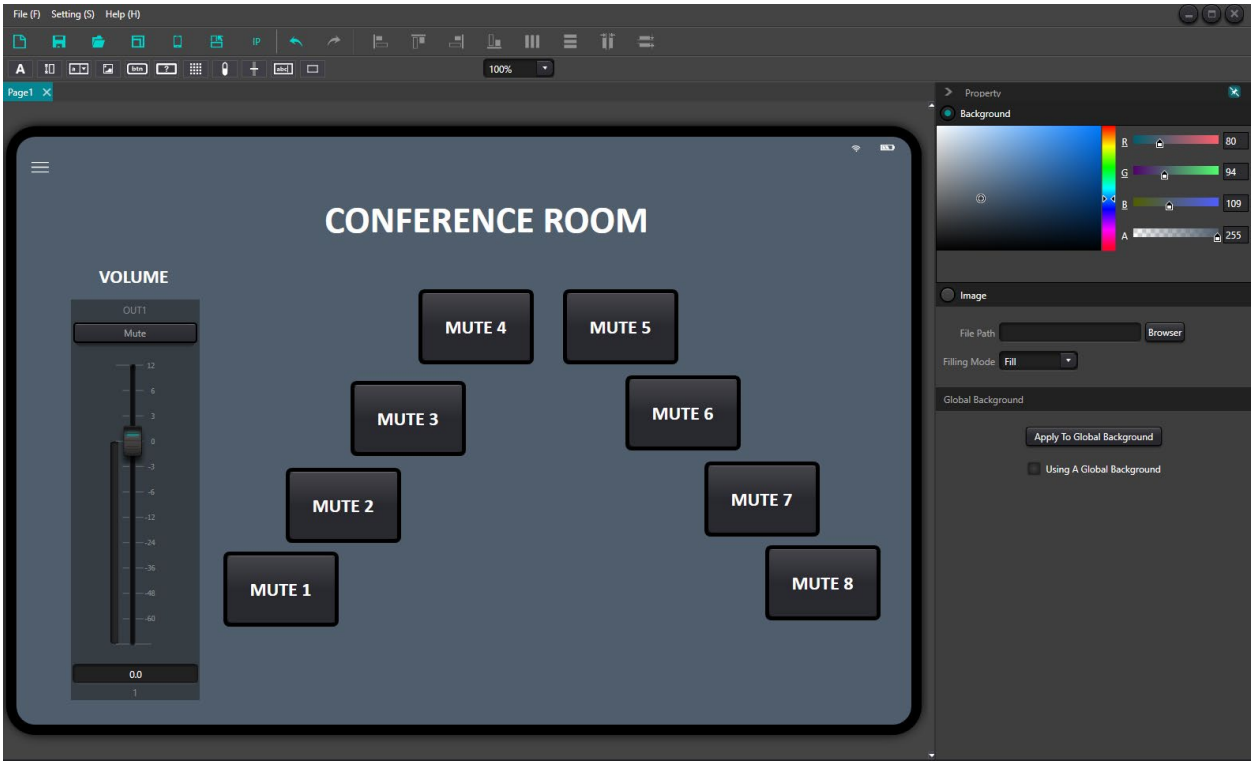
- Press OK.
- Still dragging it from the left side, take a DMP88 unit, place it on the desktop and double click on it.
- Set the correct IP address of the DMP88 unit.

- Then connect the WP88 controller with the DMP88 unit simply dragging a wire from the dot to the dot.

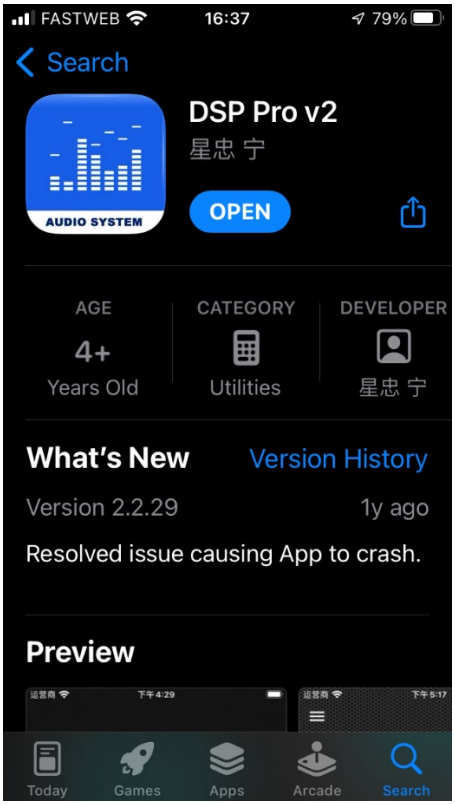
- Press  button to upload the configuration to the **WP88** controller.
- Check if it operates correctly.
- Now is possible to save or recall  a configuration to disk and clear the desktop  .
- To modify a pre-existent **WP88** configuration is possible to drag from right column the WP88 on the desktop and edit it. Always press  button to upload a modified configuration.

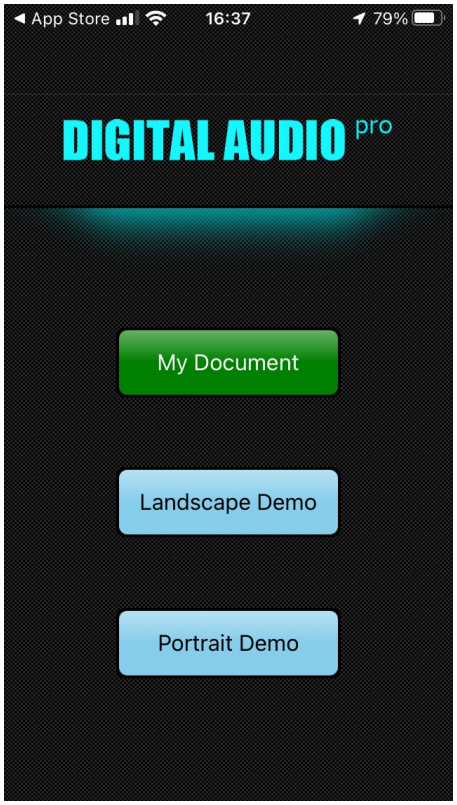
User Interface (TABLET OR SMARTPHONE REMOTE CONTROL)

This menu option opens the DSP Controller editor. This utility enables to create custom interfaces for tablet or smartphones, that allow the user to access only the controls allowed by the system designer. It supports both Android or iOS devices.

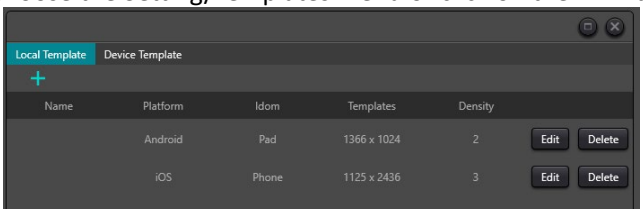


- **iOS devices**: look for the application **dsppro v2** through the App Store and install it.

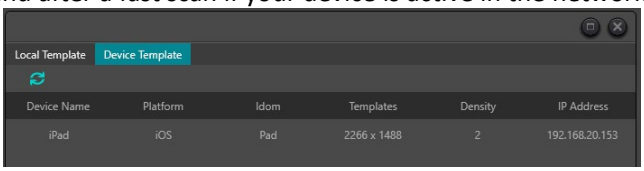




- **Android devices**: go to PROEL COMMERCIAL AUDIO web site (https://commercialaudio.proel.com), download the app file **DSPPro_2.x.xx.apk** from the DMP88 product page.
- The tablet or smartphone must be connected to the same network as the DMP88.
- **Start the app on the mobile device** and leave it active.
- **Start the DSP Controller editor** from the user interface menu option: a blank screen without any template active or an empty page (with the latest template used) appears.
- **Select an existing template or create a new template:**
  - Choose the Setting/Templates menu or click on the button:

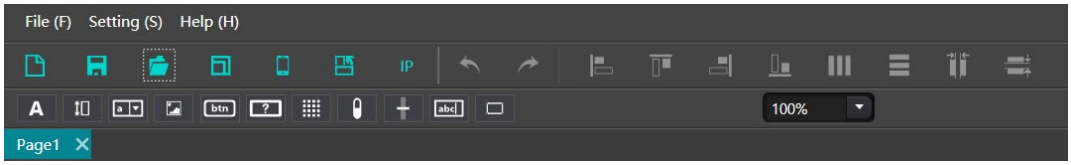


  - If there is an already done template choose it and press Apply, elsewhere click on Device Template and after a fast scan if your device is active in the network it appears in the list, choose it.



  - Is possible to Edit, Delete or naming the templates.

- **Edit function:**



Upper toolbar options:

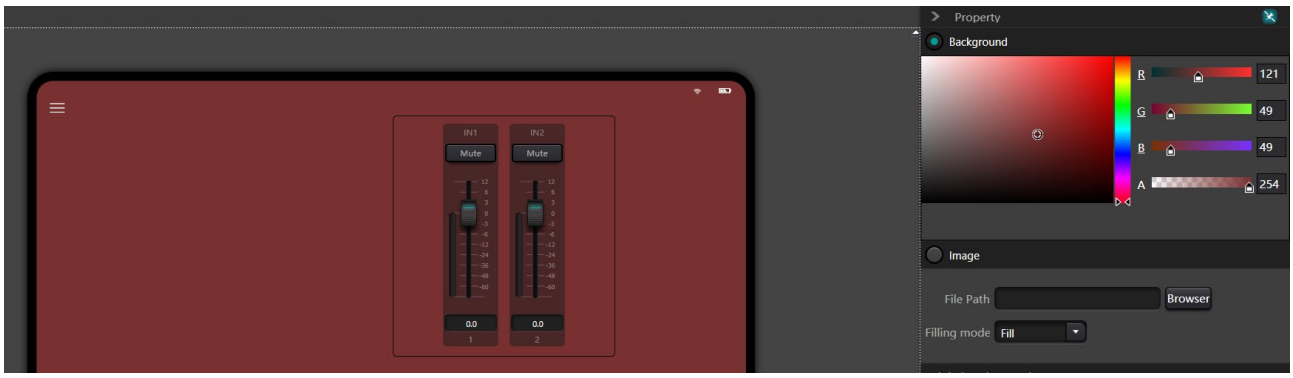
	Create a new page, you can add multiple pages.
	Save the edited page to the specified directory of the computer.
	Open the edited page stored on the computer.
	Local template and online template selection.
	SYNC button to upload the edited page to the mobile terminal.
	Rotate, switch between horizontal screen and vertical screen.
IP	Replace IP: you can quickly replace the same IP on the page with the specified IP.
	Undo the last operation.
	Redo the last operation.
	Align selected elements to left.
	Align selected elements to top.
	Align selected elements to right.
	Align selected elements to bottom.
	Align selected elements evenly spaced horizontally.

	Align selected elements evenly spaced vertically.
	Arranges the selected elements horizontally by n pixels.
	Arranges the selected elements vertically by n pixels.

Lower toolbar options:

A	Add text, and modify the font, font size, text color, etc. in the property bar on the right.
	Add channel controls, name, mute, level display, volume control. In the property bar on the right, you can adjust the size, color, background color. You can also set the channel type: input or output; set the channel number; set the IP address of the associated device. Note that the IP address of the associated device of each control is very important: it is the IP address of the processor to be controlled, which needs to be filled in correctly.
	The preset recall control has 16 preset options: remember to check the corresponding preset number to be recalled and the IP address of the associated device in the property bar on the right.
	Add a picture: note that large picture files require a lot of time to be uploaded to the mobile device, use preferably small images.
btn	Add a button: press to send a custom command. The property bar sets the size and color of the button and 3 commands can be added to the command bar: RS232, RS485, UDP. The command format is hexadecimal.
	Add a Status button. The difference between the status button and the button is that the status button has two states: pressed down and popped up. For these two states, the command bar can set commands respectively. Similarly, three kinds of commands can be added: RS232, RS485, UDP. The Command format hexadecimal. In addition to custom commands, status buttons can also **set system commands, including I/O mute, system mute, and matrix routing**.
	Add a Matrix of specified size, changing the color, size, etc. of the property bar on the right.
	Add a Level meter: it displays the current channel level. Set the size, color, etc. in the property bar on the right. You can also set the current channel alarm level: when the set level value is reached, the current channel will display red and emit an alarm sound to remind the user.
	Add a Volume fader adjustment of a specified input or output channel.
abc	Add a Volume value, set the volume value of a specified input or output channel.
	Add a Frame to the editing area. Adjust the size and color of the frame in the property bar on the right.
100%	Enlarge or shrink the device image.

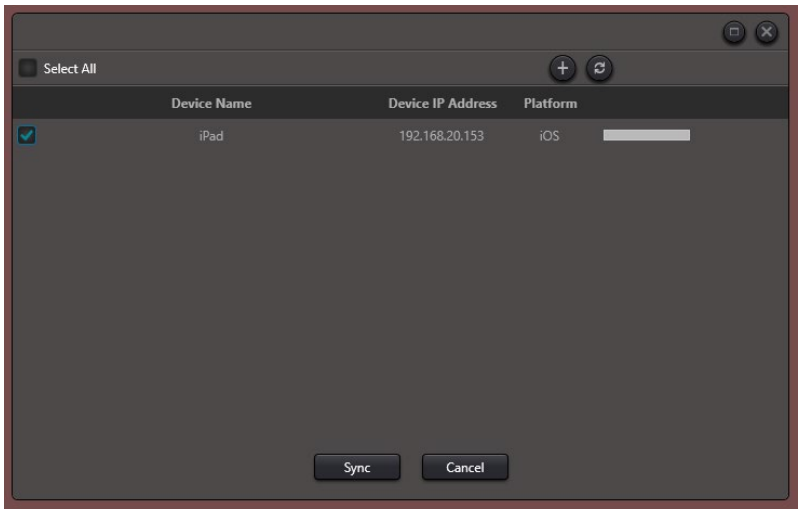
- Without any object selected is possible to set the Background area page color, add background image.



- **Upload and check the User Interface**

  After you have terminated to design the user interface you have to upload it to the connected device and check it:

- Press the  SYNC button and the following box appears:

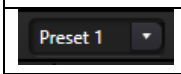


- The tablet or smartphone and the **DMP88** processor must be in the same network segment of the same local network, and the correct IP address of the processor must be entered in the control properties.
- When uploading the user interface, the tablet or smartphone must have the dedicated application in the foreground and active, otherwise the program will not detect the tablet/smartphone.
- If it has not been activated, activate it and press refresh button  .
- Once the tablet/smartphone has been identified it appears in the list, you need to select it  and then press the SYNC button  : the left bar will display the progression of the transfer.
- At the end of the upload the designed interface appears on the device. Check in the DMP control software that all the functions on the tablet/smartphone can effectively control the DMP88. If not, reopen the program, make the necessary changes and re-upload until you are satisfied.
- A useful tip is to always save your changes on your computer.

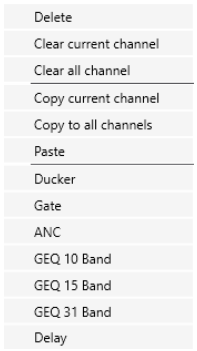
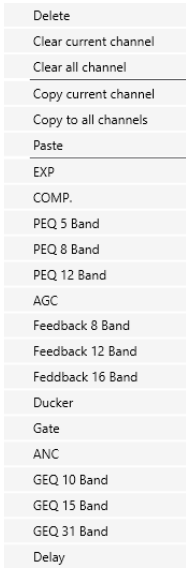
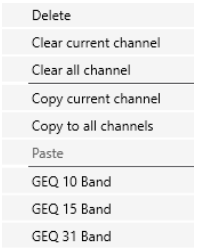
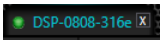
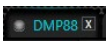
WORKING WITH PRESET

In the top bar there are some buttons that allows to operate with the preset and other functions.

At the top left bar there are:

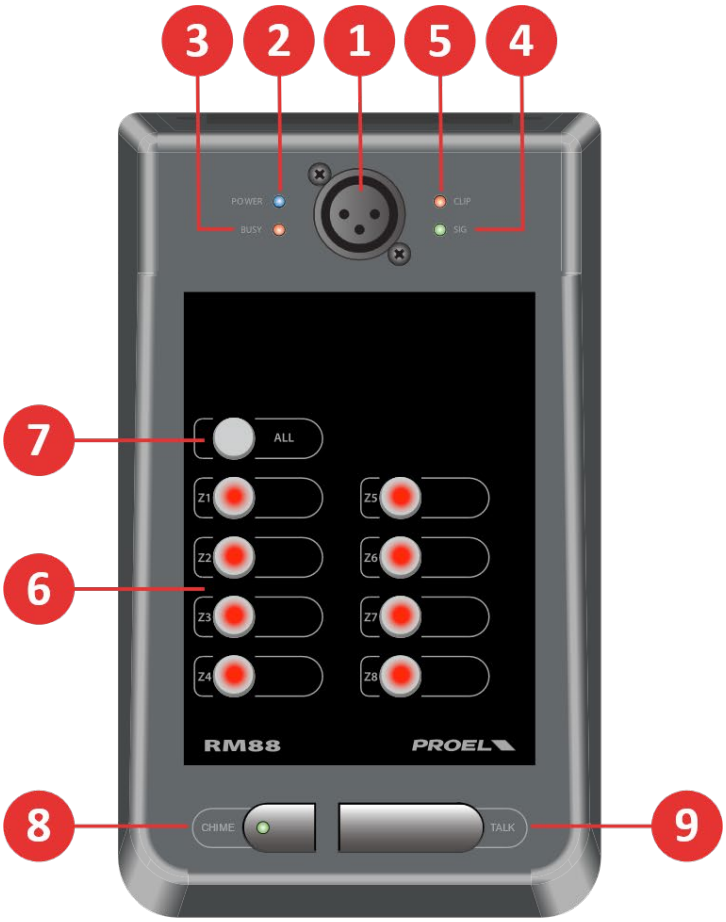
	**Reset To Defaults**: this button reset all the preset stored in the DMP88 to the factory default preset. A confirm dialog box appears: choose Yes or No.
	**Restore Factory Setting:** this button reset all the parameters in the DMP88 to the factory settings. A confirm dialog box appears: choose Yes or No.
	**System Mute:** this button silences all the outputs. When silenced the button shows:  Press it again to re-open the outputs.
	This button allows to choose one of the sixteen stored preset.
	**Preset Save:** this button allows to save the current parameters of DMP88 in one of the 16 internal memory locations. Choose one preset and a dialog box will confirm the storage. Be aware that the previous stored preset in the same location will be erased.
	**Preset Load:** this button allows to load in the current preset location a file **.dmpdsp** previously saved in your pc by means of File Save As… (Ctrl+S) command.

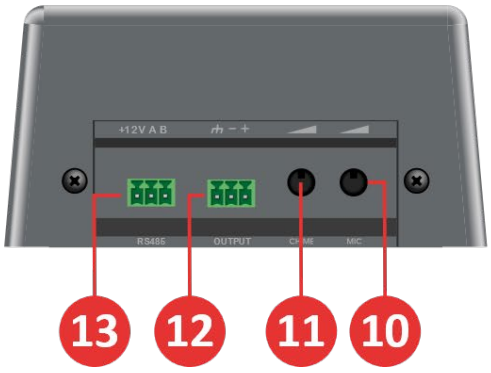
At the top right bar there are:

	**Edit Module:** this button allows to change the DSP module sequence in each INPUT or OUTPUT for the current preset. Scrolling with the mouse on the interface the modules that you can edit are highlighted in red: click on the module with the mouse right button and one of the following menu appears:     With these commands is possible to build a custom channel strip for any input or output.
	**Upload Params To Device:** clicking this button the current parameters and channel strip layout are send to the DMP88 and stored in the current preset. *Note: the Preset Save button only saves the parameters in a specified preset, while Upload Params To Device stores the parameters and channel strip layout in the current preset.*
	This icon appears when the currently selected device is an online machine:  and disappear when the currently selected device is an offline machine: 

RM88 – 8 ZONE PAGING MICROPHONE STATION

RM88 is the paging microphone base designed to be combined with the DMP88 to create a zone system with call on a single zone, a group of zones or all zones.





1 MIC INPUT

Input for the supplied gooseneck microphone: it can operate with any balanced condenser microphones that accepts the +12V phantom power supply.

2 POWER

This LED lights on when the station has the power supply.

3 BUSY

This LED lights on when the station sends a command to the DMP88.

NOTE: if this LED stays always on there is a communication error, please check the configuration further on this manual.

4 SIG

This LED lights on when an audio signal is sent to the DMP88.

5 CLIP

This LED lights on when excessive signal is sent to the DMP88.

NOTE: ignore if it lights up sporadically, if it stays on almost all the time, lower the CHIME or MIC levels.

6 Z1…Z8

These buttons enable the selected zones when the TALK button is pressed.

7 ALL

This button enables all the zones when the TALK button is pressed.

8 CHIME

Press this button to enable the attention tone on the selected zones each time you press the TALK button: the LED shows that the chime is activated.

9 TALK

Press and hold this button to make your announcement thru the PA system in the zones selected with buttons above. Release the button when the announcement is completed.

10 MIC LEVEL

This potentiometer sets the level of the gooseneck microphone. Try and set a suitable level avoiding speaker feedback.

11 CHIME LEVEL

This potentiometer sets the level of the attention tone signal.

12 SIGNAL OUTPUT

This is the balanced LINE output of the CHIMES and MIC signals: **it must be connected using a balanced shielded cable to the LINE INPUT 1 of the DMP88 unit.**

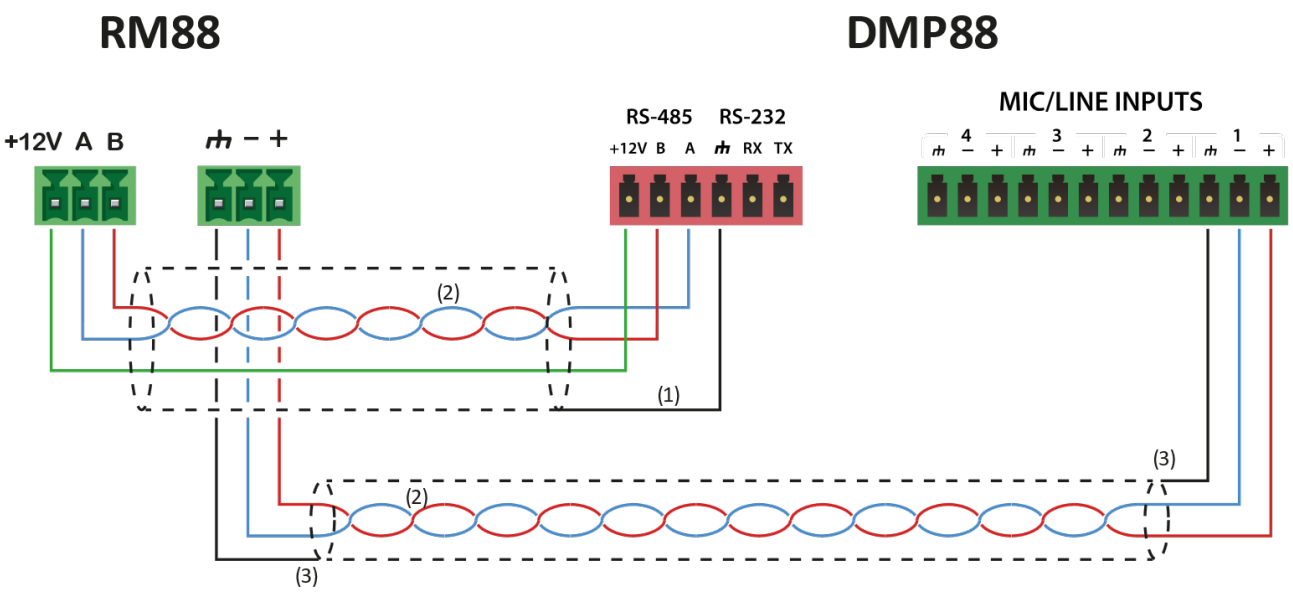
13 +12V and RS485 CONNECTION

This is the RS485 data port and +12V supply input port, and must be connected to the correspondent port of DMP88.

DMP88 must have the **RS485 (Menu Setting / Device Setting…)** set as follow:

and the Control Center Response to ON:

Use the following connection diagram:



(1) FOR LONG CABLES ALWAYS USE SHIELDED CABLES AND CONNECT THEM ONLY TO THE DMP88 SIDE.
(2) TWISTED TWIN CABLES ENSURE GREATER IMMUNITY TO EXTERNAL ELECTROMAGNETIC INTERFERENCE.
(3) ALWAYS USE A SHIELDED CABLECONNECTED TO BOTH DMP88 AND RM88.

DMP88 - TECHNICAL SPECIFICATION

Model:	DMP88	Connectors
Processor	ADI SHARC 21489	
Sampling rate/bit	48 KHz / 24 bit	
System Delay	3 mS	
Input Channels	8x Balanced MIC/LINE	*2x Phoenix COMBICON MC 1,5/12-ST-3,81*
Input Gain	0 -48 dB (3dB step)	
Input Level	-72 to +12 dB	
Input Max Level	+ 24 dBu	
Input Impedance	9.4 Kohm	
Phantom Power	48 V	
Output Channels	8x Balanced LINE	*2x Phoenix COMBICON MC 1,5/12-ST-3,81*
Output Level	-72 to +12 dB	
Output Nominal Level	0 dBu (balanced)	
Output Max Level	+ 14 dBu (balanced)	
Output Impedance	102 ohm	
Frequency Response	20 – 20K Hz (±0.2 dB)	
THD+N	< 0.003% at -10 dBu	
Dynamic Range	110 dB	
Noise (A-weighted)	< -91 dBu	
CMRR @ 50/60Hz	> 80 dB	
Channel Isolation @ 1 KHz	> 108 dB	
USB player/recorder	DMP DSP control software (Windows)	*USB type A*
Controls	POWER and STATUS LED OLED DISPLAY DMP DSP control software (Windows) Tablet/Phone iOS Android via APP GPIO RS485/RS232 RM88 (optional) WP88 (optional)	 *RJ45 ETHERNET (TCP-IP protocol)* *2x Phoenix COMBICON MC 1,5/12-ST-3,81* *1x Phoenix COMBICON MC 1,5/6-ST-3,81* *RS485* *RJ45 ETHERNET PoE (TCP/IP UDP protocol)*
Operating temperature	0 ÷ +45°C	
Power Supply	100-230 V~ ±10% 50/60Hz	*VDE IEC C13*
Power Consumption	25 W	
Dimensions (WxHxD)	482 x 44 x 268 mm – 1U rack 19”	
Net Weight	2.7 Kg	

WP88 - TECHNICAL SPECIFICATION

Model:	WP88	Connectors
Controls	1.3“ OLED DISPLAY 1x KNOB with switch	
Connection	ETHERNET PoE (TCP/IP UDP protocol)	*RJ45*
Operating temperature	0 ÷ +45°C	
Power Supply	PoE	*RJ45*
Power Consumption	< 100 mW	
Finish	Aluminium White	
Dimensions (WxHxD)	86 x 86 x 32 mm	
Net Weight	0.26 Kg	

RM88 - TECHNICAL SPECIFICATION

Model:	RM88	Connectors
Input	1x MIC with 12V Phantom Power	*XLR 3 poles Female*
Input Max Sensitivity	-35 dBu	
Input Impedance	20 Kohm	
Frequency Response	80 Hz / 15 KHz	
Mic	1x Gooseneck Electrect microphone	
Output	1x LINE	*Phoenix COMBICON MC 1,5/3-ST-3,81*
Output Nominal Level	0 dBu	
Output Impedance	600 ohm	
THD+N	< 0.1% at -0 dBu	
Noise (A-weighted)	< -90 dBu	
Controls	1x MIC Level 1x CHIMES Level 1x CHIMES switch 1x TALK switch 9x ZONE switches	
Connection	RS485	*Phoenix COMBICON MC 1,5/3-ST-3,81*
Operating temperature	0 ÷ +45°C	
Power Supply	+12 V	
Power Consumption	100 mA	
Finish	Black	
Dimensions (WxHxD)	120 x 65 x 200 mm	
Net Weight	0.62 Kg 0.75 Kg with gooseneck mic	

PROEL S.p.A.

(World Headquarters - Factory)

Via alla Ruenia 37/43

64027 Sant'Omero (Te) – Italy

Tel: +39 0861 81241

Fax: +39 0861 887862

www.proel.com