



Zen 10 Stereo AGC User Manual

Creating the Most Exciting and Engaging FM Broadcast experience possible...

We're grateful that you have chosen an Aqua Broadcast product. We hope that you enjoy your Aqua Broadcast product for many years to come.

Everyone here at Aqua Broadcast is passionate about developing new and innovative products.

By shaping the future of FM Broadcast by delivering innovative, intuitive solutions that inspire our customers to create the most exciting and engaging content possible.

From everyone at Aqua Broadcast, thanks for your purchase.

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The installation and service instructions in this manual are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Refer all servicing to qualified personnel.

This product has an auto-ranging line voltage input. Ensure the power voltage is within the specified range stated on the rear of the unit.

Caution: Hazardous Voltages

This paragraph concerns safety instruction related to all Aqua Broadcast Transmitter products in general.

Aqua Broadcast makes every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system.

Aqua Broadcast products are compliant with safety rules for broadcasting transmitter as defined by IEC / EN 60215 and its amendment. According to this standard only skilled person are allowed to operate on Aqua Broadcast devices IEC / EN 60215 and its amendment defines the minimum requirements for skilled electrical personnel.

The compliance with this standard is a pre-condition for operating with Radio Broadcasting equipment. The operator or the operator's authorized representative is responsible for ensuring compliance with these guidelines. They are also responsible to achieve necessary authorization by site owner or according to local laws to operate hereunder. They must also ensure that the operating personnel meets the applicable country-specific training requirements. These requirements also may include any periodic training that is necessary.

The products described here have been designed, manufactured and tested according the relevant standards and directive, see EC/ EU declaration of conformity attached to this manual. The products described here have left the manufacturers facilities fully compliant with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. For any clarification on it, for any doubt or any suggestion please directly contact Aqua Broadcast at support@aquabroadcast.co.uk.

Furthermore it is your responsibility to operate the device in an appropriate manner. This product is designed to work in telecommunications centres only, except when expressly authorized, and must not be used in any way that may cause injury to persons or goods. In case the product is used for any intention other than its designated purpose or in disregard of its instructions you, the operator, are the sole responsible for any damage that this un-proper operation may cause.

The product is used properly when it is used in accordance with its instructions and under its operating conditions and its performance limits (refer to product manual, modules, manuals and products or modules datasheets). This condition may only be assumed by a skilled person with a basic knowledge of English (since all symbols, labels and message displayed are referred to in this language).

Skilled people also have to check if particular requirements or special equipment or tools are required depending on the product or the environment and to follow all instructions to use any additional special equipment.

The Product manual, and in particular safety instructions should be kept near the product in a safe place, in order to be available for all skilled personnel who operate the device. Observing the safety instructions will help prevent personal injury or damage to goods caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation or that are given on the operating site.



CHECK ALL ELECTRICAL CONNECTIONS ARE CORRECT AND SAFE BEFORE POWERING ON THE TRANSMITTER

Operating Environment / State / Position

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without any obstruction in product's ventilation. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all cases. Unless otherwise specified, the following environmental requirements apply to Aqua Broadcast products: Use only indoors, the maximum operating altitude 3000 m above sea level, maximum transport altitude 6000 m above sea level. A tolerance of $\pm 15\%$ shall apply to the nominal voltage and $\pm 5\%$ to the nominal frequency. Do not place the product on surfaces, cabinets, or tables that for reasons of weight or stability are unsuitable for this purpose.

Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or death. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or death. Do not install, operate, maintain the device if you are physically or mentally stressed.

Installation

If the information on electrical safety is not observed there is a possibility that electric shock, fire and/or serious personal injury or death may occur.

Prior to switching on the product, always ensure that the product nominal voltage setting matches with the nominal voltage of the AC supply network. If there is a mismatch do not connect the product to the power network until the mismatch is resolved. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.

In the case of products of safety Class 1 with a removable power cord and connector, operation is permitted only on sockets with an earth contact and protective earth connection.

Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

If the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable must be considered as the disconnecting device. In this case, always ensure that the power plug is always easily reachable and accessible. Ensure also that the plug-in connection is secure, bad connections may cause damage to the equipment and may be unsafe. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, a disconnecting device must be provided at the system level is site main electrical switchboard.

Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. Check the power cable is suitable for the power ratings of the device by taking appropriate safety measures and carefully laying the power cable, you must ensure that the cable will not be damaged and that no one can be hurt by. Tripping over the cable or suffering an electric shock.

The product may be operated only from TN/TT supply networks.

Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks could result in fire and/or injuries may occur.

For measurements in circuits with voltages $V_{rms} > 30\text{ V}$, suitable precautions (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.

Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, electrical shock, fire, or damage to the product.

Aqua Broadcast products are designed to be permanently installed, so the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made.

Permanently installed equipment must have either built-in fuses, circuit breakers or similar protective devices, moreover the supply circuit must be fused in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.

Use suitable over-voltage protection to ensure that no over-voltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock. Products are normally designed to operate in an indoor environment (IP 20 typically) no liquid protection is therefore given, the equipment must be protected from all liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.

Never use the product under conditions in which condensation has formed or can form in or on the product, e.g., if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.

Prior to cleaning the product, disconnect it completely from the power supply (e.g., AC supply network or battery). Use a soft, non-lining cloth to clean the product. Never use chemical aggressive cleaning agents such as alcohol, acid, acetone, or diluents for cellulose lacquers.

Operation

Operating the equipment requires trained and skilled personnel. It requires also intense concentration. Make sure that people who operates is physically, intellectually, and mentally fit to do so. Physical or mental stress may cause a fall in concentration, and this may cause injury or material damage.

Before you install, connect, operate, disconnect, or dismount the equipment, read the relative safety instructions. In case of fire, some hazardous substances may be released by the unit, such as gas or fluids. This can cause health problems. So, in this case necessary measures must be taken, such as protective masks, gloves, clothing and so on should be used.

Repair and Service

Special training is required to open and repair Aqua Broadcast devices. Before removing the lid and before opening it, the AC mains must be switched off and disconnected and then wait at least 30 seconds for the discharge of energy of any capacitors. Otherwise, there could be a risk of electrical shock.

It is strongly recommended to send faulty devices / modules to the factory for repair, if feasible. Otherwise only when authorized by Aqua Broadcast, trained personnel may perform repairs. All repairs require only original spare parts to be used. After repair a safety test is recommended (visual inspection, electrical test, insulation test, ground continuity test, leakage current measurement, functional test and so on) This helps to assure the continued safety of the device.

If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

Detailed Safety Instructions

All the safety and operation instructions should be read before the unit is operated.

Retain Instructions:	The safety and operating instructions should be retained for future reference. All warnings on the unit and in the operating instructions should be adhered to.
Follow instructions:	All operation and user instructions should be followed.
Water and Moisture:	The unit should not be used near water. The unit should not be exposed to dripping or splashing and objects filled with liquids should not be placed on or within close proximity of the Transmitter.
Ventilation:	The unit should be situated so that its location or position does not interfere with its proper ventilation. For example, the unit should not be situated on a surface that may block the ventilation openings, or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
Grounding or Polarisation:	Precautions should be taken so that the grounding or polarisation method of the unit is not defeated or compromised.
Power-Cord Protection:	Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles and the point where they exit from the unit.
Cleaning:	The unit should be cleaned only as recommended by the manufacturer. Wash your hands after any cleaning.
Non-use Periods:	The power cord of the unit should be unplugged from the outlet when left unused for a long period of time.
Object and Liquid Entry:	Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
Damage Requiring Service:	The unit should be checked and serviced by qualified service personnel when: The power supply cord or the plug has been damaged Objects have fallen, or liquid has been spilled into the appliance The appliance has been exposed to rain The appliance does not appear to operate normally or exhibits a marked change in performance The appliance has been dropped, or the enclosure damaged

Information Regarding Product Disposal

During product disposal the following directives must be adhered to:

- 2002/96/EC on waste electrical and electronic equipment (WEEE).
- 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



Once a product is at the end of its lifetime, the product must not to be disposed of in standard domestic civil refuse. Even disposal of on municipal collection points for waste electrical electronic device is not allowed. It has to be treated as electronic waste.

Hazards due to Beryllium Oxide / Beryllium Copper (BeO)

In case the apparatus contains components are using Beryllium Oxide / Beryllium Copper, these shall be labelled with special symbols.

- **DANGER!** Beryllium Oxide / Beryllium Copper is dangerous when inhaled, ingested or in contact with the skin, especially if cut or scratched. After handling products containing Beryllium Oxide / Beryllium Copper, wash your hands immediately.
- If handled correctly, parts or components containing Beryllium Oxide / Beryllium Copper are not hazardous to health. If used improperly, however, Beryllium Oxide / Beryllium Copper dust may be released. Beryllium Oxide / Beryllium Copper dust causes chronic disease (berylliosis); inhaling large amounts over an extended period of time is toxic, causing respiratory paralysis and death.

Rules for Handling Beryllium Oxide / Beryllium Copper:

- Parts or components containing Beryllium Oxide / Beryllium Copper ceramics must not be opened, mechanically processed, or destroyed.
- Above all, these parts or components must not be scratched, broken, ground, tempered and sandblasted, not even under exhaust hoods.
- In the transmitter, all components containing parts made from Beryllium Oxide / Beryllium Copper are marked with a warning symbols and a labels.



DANGER! Beryllium Oxide / Beryllium Copper

Warranty

Please ensure the warranty registration process is completed upon receipt of this product.

To do so, go to www.aquabroadcast.co.uk/support with your product's serial number to hand. Aqua Broadcast warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of up to Two years from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified limited warranty period that are not due to normal wear and tear and/or improper handling by the user, Aqua Broadcast shall, at its sole discretion, either repair or replace the product. If the warranty claim proves to be justified, the product will be returned to the user. The return freight for any Warranty repair or claim will be paid by Aqua Broadcast during the 2-year Warranty, thereafter freight will be the responsibility of the customer. Warranty claims other than those indicated above are expressly excluded.

NOTE: The warranty registration process must be carried out as described above to enable warranty cover.

Return authorisation number: To obtain warranty service, the buyer (or his authorised dealer) must contact Aqua Broadcast during normal business hours BEFORE returning the product. All inquiries must be accompanied by a description of the problem. Aqua Broadcast will then issue a return authorisation number. Subsequently, the product must be returned in its original shipping carton, together with the return authorisation number to the address indicated by Aqua Broadcast.

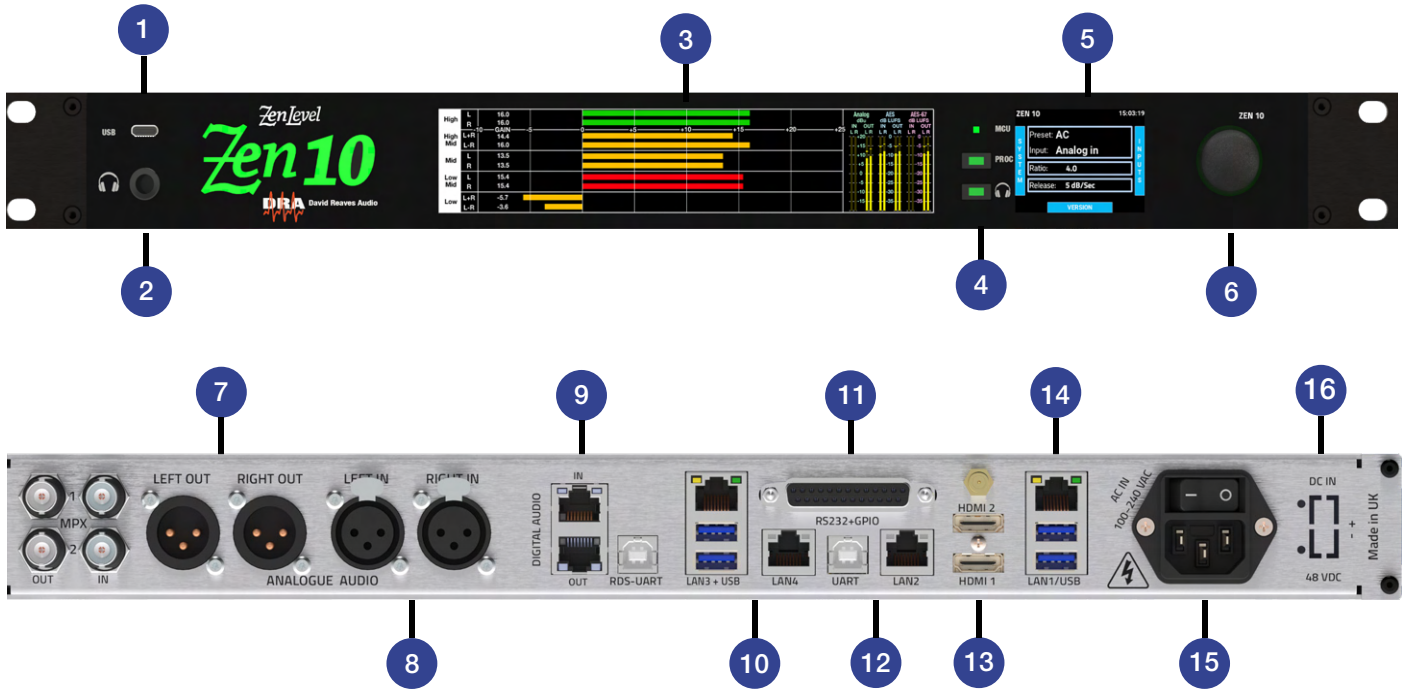
Warranty regulations: Any product deemed eligible for repair or replacement by Aqua Broadcast under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at Aqua Broadcast. If the product needs to be modified or adapted to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, Aqua Broadcast shall not be held responsible for any cost resulting from such a modification/adaptation. Free inspections and maintenance/repair work are expressly excluded from this warranty if caused by improper handling of the product by the user. This also applies to defects caused by normal wear and tear of potentiometers, keys/buttons, and similar parts. Damages/defects caused by the following conditions are not covered by this warranty: Misuse, neglect, or failure to operate the unit in compliance with the instructions given in Aqua Broadcast user or service manuals. Connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used. Damages/defects caused by force majeure or any other condition that is beyond the control of Aqua Broadcast. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty. If an inspection of the product by Aqua Broadcast shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer. Products that do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. Aqua Broadcast will inform the buyer of any such circumstance.

Warranty transferability: This warranty is extended exclusively to the original buyer (customer of the retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promises on behalf of Aqua Broadcast.

Claims for damages: Failure of Aqua Broadcast to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of Aqua Broadcast exceed the invoiced value of the product.

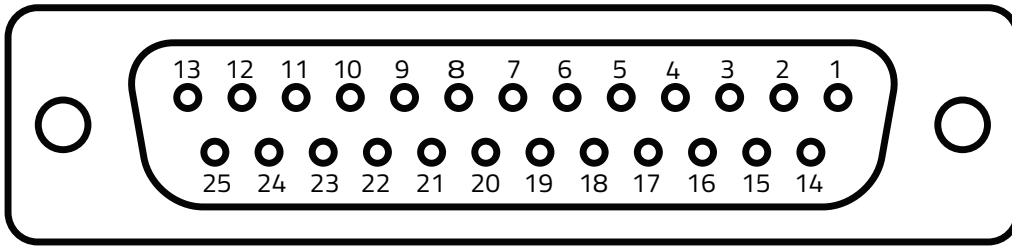
Other warranty rights and national law: This warranty does not exclude or limit the buyer's statutory rights provided by national law any such rights against the seller that arise from a legally effective purchase contract. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

Front and Rear Images



- | | | |
|----------------------|---------------------------|---------------------------------|
| 1. USB-C | 7. L & R Analog Audio Out | 13. HDMI 1 & 2 |
| 2. Headphones | 8. L & R Analog Audio In | 14. USB / LAN 1 |
| 3. Secondary Display | 9. Digital Audio I/O | 15. AC Power Input |
| 4. Quick Buttons | 10. UBS / LAN 3 & 4 | 16. OPTIONAL DC Power Input 48V |
| 5. Primary Display | 11. RS232 / GPIO | |
| 6. Joystick | 12. UART / LAN 2 | |

Pinouts

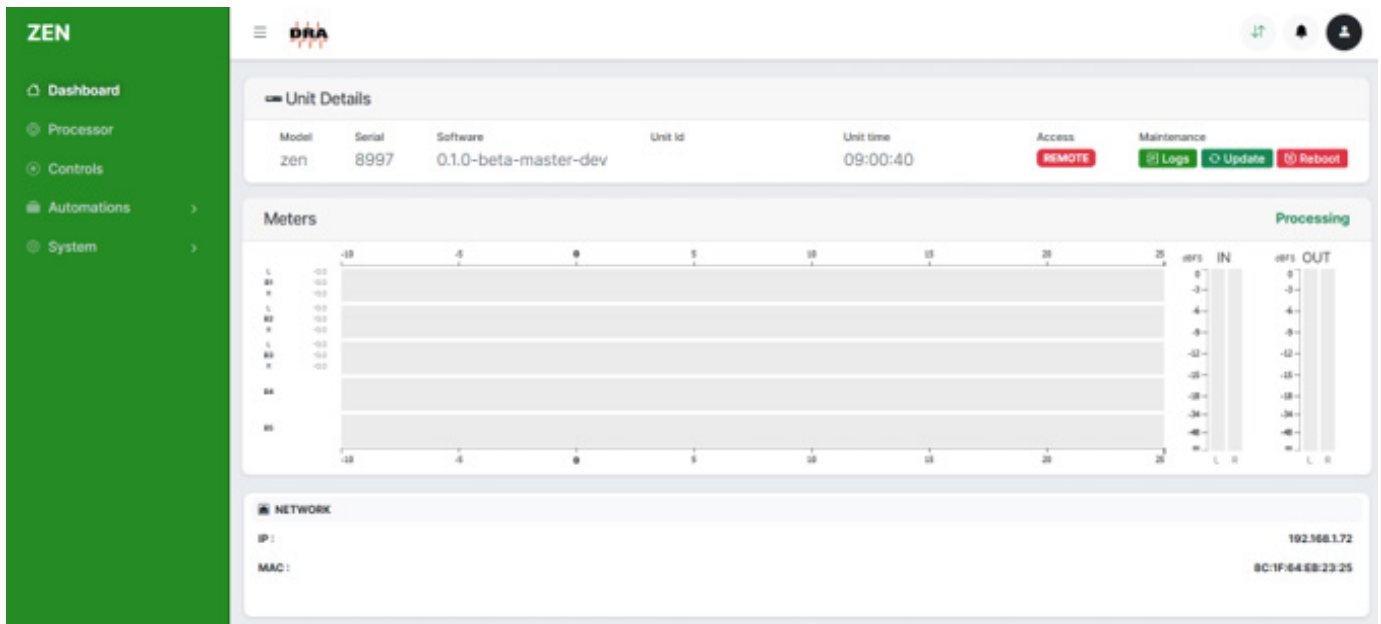


D-SUB 25 FEMALE CONNECTOR

PIN NUMBER	SIGNAL COMMAND
1	GP OUT
2	GP OUT
3	GP OUT
4	GP OUT
5	GP IN
6	GP IN
7	GP IN
8	GP IN
9	ANALOG OUT (330Ohm, 0-5 V)
10	ANALOG OUT (330Ohm, 0-5 V)
11	UART (RS232 CONVERTER)
12	5V (SPARE POWER) 250mA
13	INTERLOCK
14	GP OUT
15	GP OUT
16	GP OUT
17	GP OUT
18	GP IN
19	GP IN
20	GP IN
21	GP IN
22	ANALOG OUT (330 Ohm, 0-5 V)
23	ANALOG OUT (330 Ohm, 0-5 V)
24	UART (RS232 CONVERTER)
25	GND

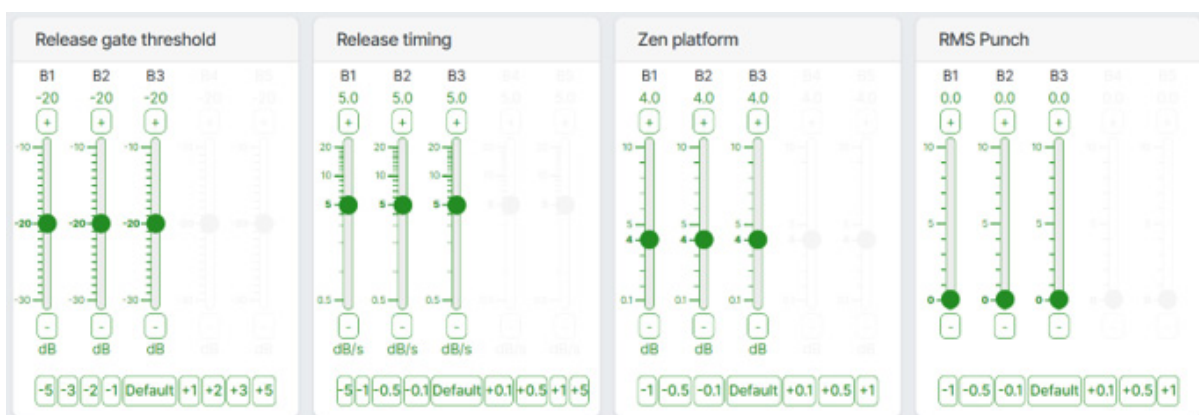
The Zen 10 “Zen Level” Stereo Level Controller, from David Reaves Audio and produced by Aqua Broadcast, is amazingly capable and extremely versatile!

Control Channels



There are ten identical audio gain control channels in the Zen 10. These are normally arranged as five stereo controller pairs, whose inputs are assigned to the five stereo outputs of the frequency-agile crossover, but the control can be set to as few as one, two, three or four bands. Each band’s control mode can be independently set to “Stereo”, allowing control based upon energy in the Left and Right channels, or “Matrix” wherein the controls are derived from the energy of the sum (“L+R”) and difference (“L-R”) of the two stereo channels. A “Loudness” EQ conforming to EBU standards can be used in the control channels’ sidechain.

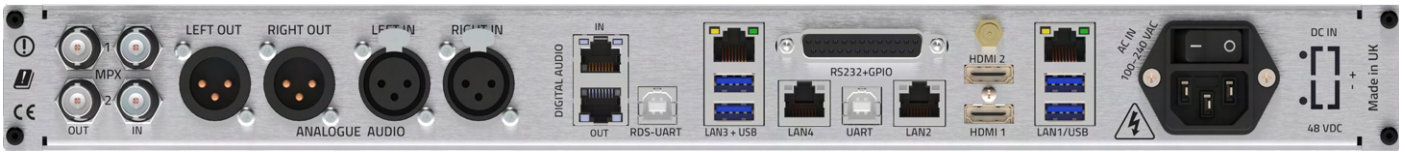
Band Controls



Each band features a group of controls that set the processing individually for that band. They are “Release Gating,” “Release timing,” “Zen Platform” and “RMS Punch.” In addition, the bands using Matrix control have their own set of the above four controls dedicated to the “L-R” channels. A “Ratio” control sets the density of the “stereo” or “L+R” control for the five bands, with a separate Ratio control for the “L-R” matrix bands.

Each of the band controls allow the user to selectively increase or reduce the effects of the Zen 10 processing, with the set goal of allowing transparent yet powerful control of program levels. Every band has its own adaptive peak limiter to prevent overshoots from clipping at output, and a final True-Peak limit controller is available for use if desired.

Connectivity and Input Features

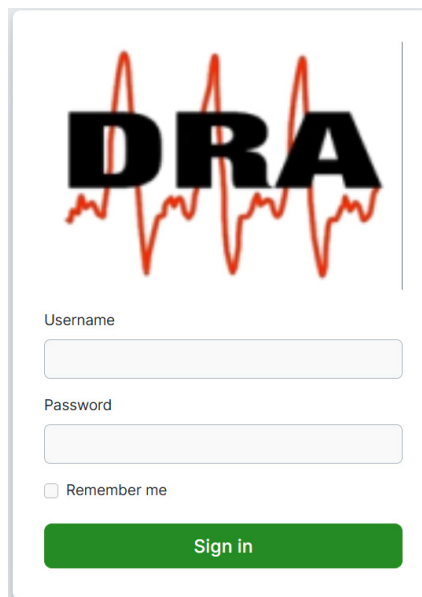


Balanced analog, AES digital and AES-67(Dante) connections are provided at input and output. “De-Clipping” is available at the Zen 10’s input to optionally reduce distortion of overly-processed programming. are derived from the energy of the sum (“L+R”) and difference (“L-R”) of the two stereo channels. A “Loudness” EQ conforming to EBU standards can be used in the control channels’ sidechain.

A full-featured web interface can be used for remote operation, or the user can make all control changes from the front panel, which features two full-color LCD displays.

Full metering is provided for all inputs and outputs, while gain control and status metering are graphically displayed both on the front panel and web interface to indicate each band's control status. Firmware updates can be made by simply downloading the latest file which is "dropped" onto the update location on the web interface.

The Zen 10 system uses two Analog Devices "SigmaStudio" DSPs (ADA1466) for audio processing. These are 32-bit, fixed-point dedicated audio devices, capable of 6144 mathematical operations per 48 kHz sample. The Zen 10 operates internally using a reference level of -20 dB below input clipping (0 dBFS). With its 32-bit operating range, internally the Zen 10 has eight more bits of headroom (+48 dB) than incoming 24-bit audio has.



Username

Password

Remember me

Sign in

Please enter the username and password, and sign in.

LOGIN DETAILS

THE DEFAULT USER LOGIN
CREDENTIALS FOR ALL ZEN 10
PRODUCTS IS

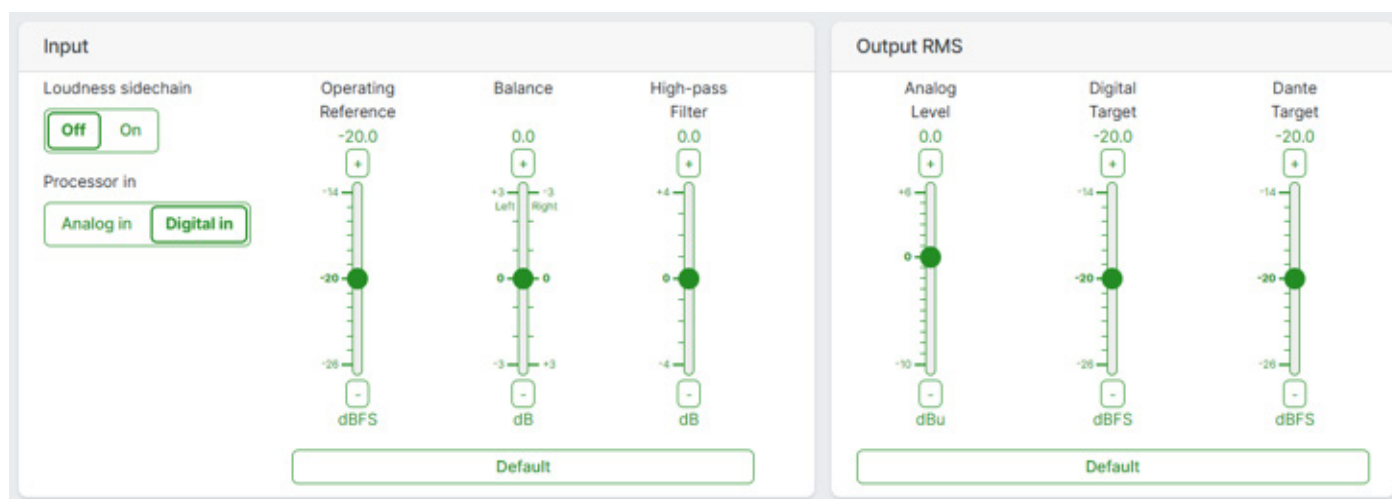
USERNAME - admin

PASSWORD - pass

NOTE

WE RECOMMEND TO CHANGE YOUR LOGIN DETAILS AFTER THE FIRST LOGIN!

ALL GRAPHICS IN THIS GUIDE ARE FROM THE WEB GRAPHICAL INTERFACE.



After choosing the input source - Analog, AES Digital or Dante AES-67 - the first control that needs setup attention is the Input Operating Reference level control. Your digital plant operates (or should) at a consistent average reference level below 0dBFS, and we want to set the neutral “0dB” RMS operating reference point of the Zen to match this. It can be set anywhere in the range between -14.0 dBFS and -26.0 dBFS, and can be adjusted in increments of 0.1 decibel.

Analog Input

If you are using the analog input, the input reference is similar: match the Zen’s reference to your House reference. If there is any need to balance your input channels, the Balance control can be moved anywhere between +3.0 dB Left/-3.0dB Right and -3dB Left/+3dB Right, in increments of 0.1 dB. The middle setting is +/- 0dB for both channels.

As with many of the Zen 10’s controls, clicking on the input panel’s “Default” button will set the input controls to the initial neutral factory settings. This will always be a good fallback if you are uncertain as to where a control should be set. The default input reference level is -20dBFS.

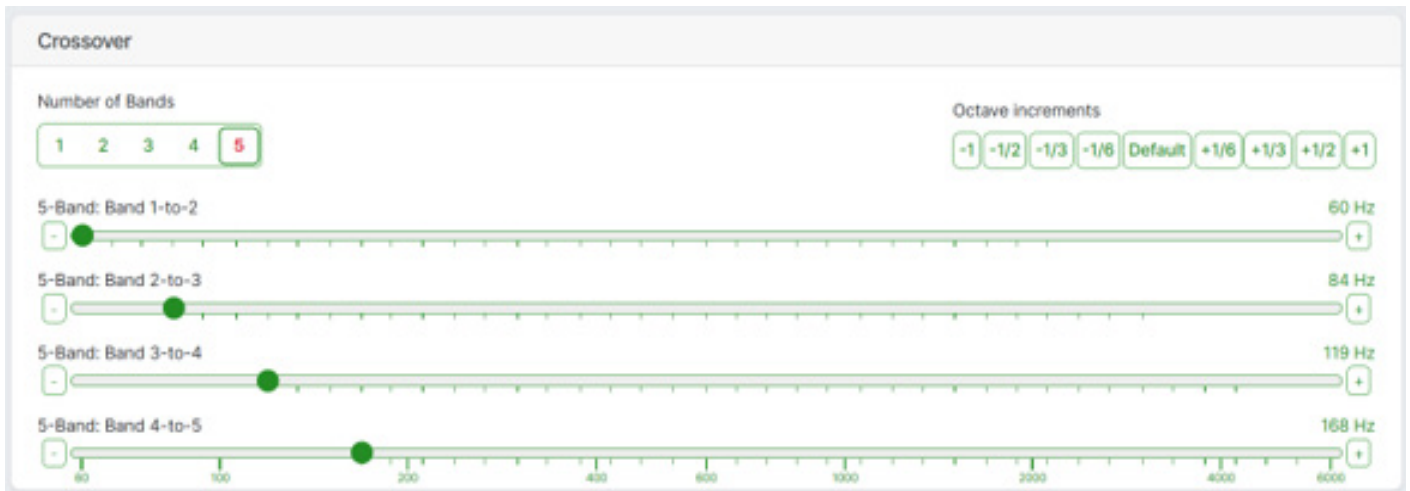
Loudness Sidechain Processing

With the input set, you can decide whether to use the Loudness Sidechain or not. This button will place loudness-compensating equalization in the control path, conforming with the EQ proposed in Recommendation ITU-R BS.1770 (EBU R 128). This EQ rolls off the bass with a -3dB turnover frequency just under 60 Hz, and has a shelving rise of 4 dB above 1 kHz. The EQ is not in the audio path itself, just for control.

There is an adjustable High-pass filter on the input signal. At the 0dB setting, the -3dB rolloff is below 15 Hz. By changing this control you can have a resonant boost of up to +4.0dB at 37 Hz, or, at the opposite extreme, a further rolloff of as much as -4.0dB, at 37 Hz. Using the boost can add a bit of ‘thud’ to the lowest bottom-end bass material, while cutting the level can reduce low-end noise.

Output RMS Reference Controls

The Output RMS reference controls are similar to the Input controls: they set a reference level the Zen 10 will use as its target. The default is -20 dBFS (or LUFS)



Now you need to decide how many bands of control you will use [We use the term “Band” to indicate the separate frequency bands, which consist of a pair of “Channels,” either Left/Right in Stereo mode or L+R/L-R in Matrix mode]. The default setup for the Zen 10 is five bands, but you can use any number from one to five. Using more bands offers more control and spectral consistency at the Zen 10’s output, at the potential subjective expense of altering the audio’s original spectral balance. The bands are referred to, from lowest to highest frequency, as Bands 1 through Band 5 (“B1” to “B5”).

For use in music where the preservation of the original spectral balance is a priority, using three or fewer bands may be an advantage. But even using five bands, careful determination and placement of crossover frequencies can mitigate obvious ‘spectral skewing’.

Crossover Design and Behaviour

The Zen 10’s crossovers which split the bands offer you great control of the amount of energy in each band. They are gentle, first-order subtractive filters, whose outputs sum identically to its input with no phase anomalies whatsoever. The crossover control interface allows you to set the frequencies wherever you prefer, on ISO 1/6th-octave centers from 60 to 6000 Hz, and automatically prevents placing any two crossover frequencies closer than one-half octave apart.

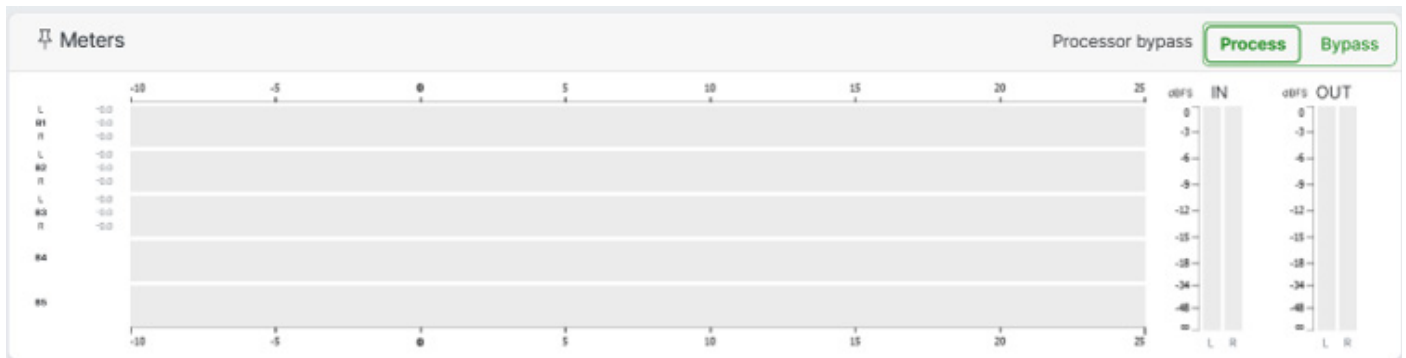
Setting Crossover Strategy

Setting the crossover frequencies to force a similar amount of RMS energy in each band greatly simplifies subsequent control setup. It will also ensure more consistent results at output. So we highly recommend choosing crossover frequencies that work best with your actual programming: set all processing controls to their defaults, then audition a variety of your expected programming sources while observing the gain reduction in each band. If a particular band has much greater RMS energy than the other bands, it will exhibit greater gain reduction than the other bands. To reduce its energy level, make its bandwidth smaller by shifting the corresponding crossover controls towards each other (if the lowest band is too hot, move its crossover control lower; if the top band is too hot, move its corresponding crossover control higher). Conversely, if a band has significantly lower RMS energy than the others, widen its bandwidth by spreading apart the corresponding crossover frequencies.

Recommended Starting Points

Our experience is that using somewhat low crossover frequencies overall offers more consistent RMS energy distribution. Though the top crossover frequency can be placed as high as 6000 Hz, setting the crossover this high should probably only be used for special applications. Usually, there will be little RMS energy above about 3000 Hz, and crossover settings of higher than even 2000 Hz can result in over-accentuation of higher frequency program material, when the higher band processors go 'looking' for more energy to bring up.

For five bands, a good starting point is to place the lowest crossover at or below about 100 Hz, and the highest crossover at around 1500-2000 Hz, with the other two crossovers set equally between (about 200 and 500Hz).



The bar-graph gain reduction metering is meant to give the user insight into just what the Zen 10 is up to at any given moment. It is colorful and responsive, updating about 25 times per second, with little delay with regard to programming. The front panel metering is duplicated almost identically on the web user interface.

The bar-graph meters for the five bands are stacked vertically, starting with the lowest frequency band (“B1”) at the top, and the highest band (“B5”) at the bottom.

Gain is indicated horizontally as plus or minus from the zero-dB operating reference. When a bar-graph stripe indicates to the left from 0dB, this shows gain reduction (0 to -10.0 db), while indication to the right of 0dB show gain addition (0 to +25.0 dB). Small text readouts on the left of the meters shows the actual gain of each band and channel at the moment.

Each band can show three horizontal “stripes,” stacked vertically. The top stripe is, depending on control mode, either the Band’s “Left” channel (Stereo mode), or its “L+R” channel (Matrix mode).

There is space for another stripe below this, to indicate peak limiting for that band. Peak limiting will only show to the left of 0dB, and is indicated in blue. You may never see this if your source material has no call for limiting, and peak limiting is very brief.

Below the peak limiting (middle) bar-graph is either the gain reduction for the Right channel (Stereo mode), or for the “L-R” channel (Matrix mode). If the matrix mode of this band is set to “Mono (L-R mute),” then this band will be blank.

The gain meters use color to indicate the status of the control in that band.

Red	The audio in that band is below the Release Gate threshold, and no gain change is occurring.
Green	The band is releasing, increasing the gain.
Amber	The band is in the Zen Platform condition, and no gain change is occurring.
Purple	The RMS Punch attack is happening in the band.

Processor

Processor bypass: Process, **Bypass**

Processor in: Analog in, **Digital in**

Analogue Out source: **Analog in**, Digital in, Test tone, Processed

Digital Out source: Analog In, **Digital In**, Test tone, Processed

Save

Here is where input and output selection is made.

Digital and analog inputs can be routed, unprocessed, directly to their respective outputs by using the “Process/Bypass” pushbutton.

The input to processing can be selected from either the analog or digital inputs.

A test tone is also available at output.

Headphones

Headphones 🔊 Disconnected

Monitoring source: Analog in, **Digital in**, Test tone, Processed

Headphones Volume [dB]: -59.5

Headphones Mute: Off, **On**

Save

Monitoring Source

This selects between the source for the Monitoring output. By default, this is set to Processor.

Headphone Volume

Adjust this to the desired Headphone output volume.

Headphone Mute

This will mute all output audio to the headphones and will override any set headphone volume level.

Digital In

Digital In

Digital In Level [dBFS]	Right Trim [dB]	Digital In L Polarity	Digital In R Polarity
<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>

Digital Out

Digital Out

Digital Out Level [dBFS]	Right Out Trim [dB]	Digital Out L Polarity	Digital Out R Polarity
<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>

Analog In

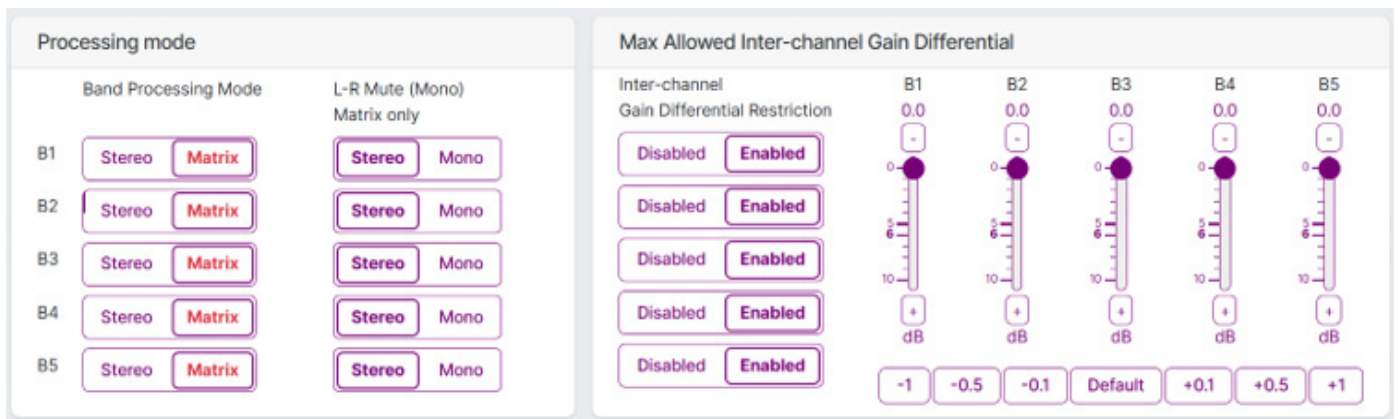
Analogue In

Analogue In Level [dBu]	Right Trim [dB]	Analogue In L Polarity	Analogue In R Polarity
<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>

Analog Out

Analogue Out

Analogue Out Level [dBu]	Right Out Trim [dB]	Analogue Out L Polarity	Analogue Out R Polarity
<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="-"/> 0.0 <input type="button" value="+"/> <input type="button" value="-"/> 0.000 <input type="button" value="+"/> <input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>	<input type="button" value="Normal"/> <input type="button" value="Invert"/>



Any band can be set to use either “Stereo” or “Matrix” processing. In the Stereo control mode, the Left and Right channels are controlled as a pair, separately or tied together. In the Matrix mode the Left and Right channels are ‘matrixed’ to produce sum (“L+R”) and difference (“L-R”) channels. These can be independently controlled, or the L-R can be forced to follow the control of the L+R channel. Those bands in Matrix mode have a further control, “L-R Mute (Mono)” which simply turns off the L-R channel altogether, making that band operate as pure monophonic.

Max Allowed Inter-Channel Gain Differential

Usually, it is desirable to have some sort of linking between a band’s channels’ controls, to prevent the two channels’ gains from wandering too far apart. Using the control buttons in this section, this linking feature can be enabled or disabled (this button is not available when a Matrix-mode band is set to “L-R Mute (Mono)”).

When disabled, there is no link between the two channels of that band.

When linking is enabled, in the case of Stereo mode processing a gain restriction of anywhere from 0.0 dB to 10.0 dB can be set. “0.0 dB” means that the gain controls of the Left and Right Channels are locked together, providing identical amounts of gain to each channel, with the channel whose energy is highest controlling the gain. By setting the gain restriction control to something other than “0.0”, either channel can operate with that much more gain than the other, depending upon the energy level present in each channel. This will tend to ‘balance’ the levels of the two channels, which may be desirable when seeking maximum loudness, but the gain differential between the channels can’t go any higher than what the slider control is set to.

The linking is similar when enabled using Matrix mode, but in this case, while the L+R controls the gain of the L-R (with the slider control determining the maximum allowable gain differential) the L-R cannot send control to the L+R, so a somewhat ‘hot’ L-R signal can’t diminish the level of the more important L+R signal.

As with most controls in the Zen 10, the “default” button takes you to the factory setting, and incremental steps up and down are available using the buttons available.

Input Drive

The amount of audio sent to each band's processor can be controlled with the "Input drive" sliders. These controls default to "+/-0.0 dB". They can be used to set the control sensitivity of each band independently. I would discourage setting these too far apart from each other but rather keep them all as near zero as possible, for the most consistent sound/spectral balance.

Ratio



The gain compression ratio control determines how much denser the signal becomes with processing. For example, using a 10:1 ratio, an incoming signal that has a variation of 10 decibels in its RMS energy will have a variation of only one decibel after processing.

There are two "Ratio" controls to set the density of the gain compression of the Zen 10. There is a main control for all "stereo" mode bands, which also applies to the "L+R" channels of the Matrix mode bands.

A separate Ratio control exists for only the L-R channels allowing for greater or lesser density in those channels, should it be desirable. This is of course only available to those bands whose processing is in Matrix mode.

Ratio is adjustable from a very mellow setting of "1.5:1" to the rather aggressive "10.0:1". The factory default is 3.0:1.

Keep in mind that "Zen Platform" activity will allow much of the audio to go through the Zen 10 with NO processing added, and thus during the times when the Zen Platform is active (amber-colored gain metering), the effective compression ratio is a very neutral "1:1".

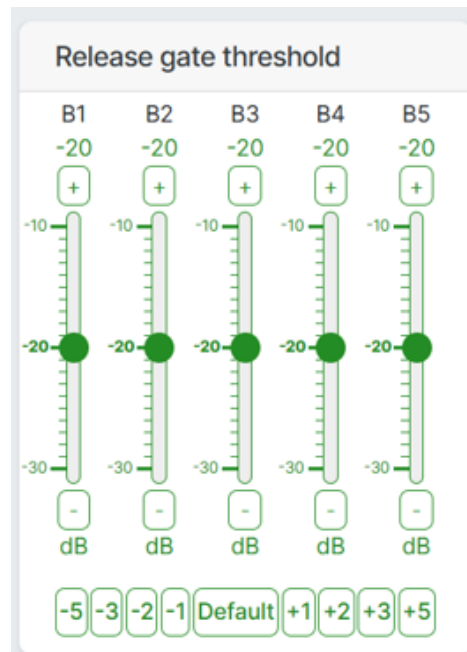
RTZ (Return to Zero)

Usually, it is desirable to have some sort of linking between a band's channels' controls, to prevent the two channels' gains from wandering too far apart. Using the control buttons in this section, this linking feature can be enabled or disabled (this button is not available when a Matrix-mode band is set to "L-R Mute (Mono)").

When disabled, there is no link between the two channels of that band.

The four main processing controls available for each band (“Release Gate,” “Release Timing,” “Zen Platform,” “RMS Punch”) will help you find and establish your desired sound with the Zen 10. Any one of them can either increase or decrease the overall density/activity of that band’s sound, just in different ways. There’s a LOT of room to experiment, and the “default” buttons are always the way ‘home’ if you get lost.

Release Gate Control



The Release Gate setting determines the threshold above which audio processing will occur. This allows the Zen 10 to ignore low level material and prevents it from being accentuated. When below the Release Gate threshold, quiet parts of a piece of music, low level audience background, etc., will not be brought up in level, but instead remain unprocessed.

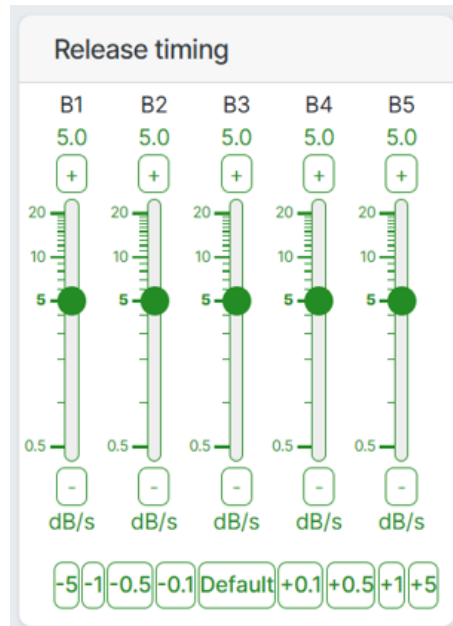
The system in the Zen 10 uses a very fast detector to follow the instantaneous RMS energy for each band and channel. When this level exceeds the user-determined threshold (adjustable from -30 to -10 dB below operating level) that channel’s processing is enabled. When audio remains below the threshold, that channel’s release function is disabled (‘gated’), holding the channels’s gain exactly where it was at the time the ‘Gate’ occurred.

The default setting is -20 dB below operating level. Setting this higher (that is, closer to the operating level) makes the processor less sensitive to the lower range of dynamics, resulting in a more open, less-processed output. On the other hand, setting the threshold to its lowest will allow the processor to be much more active, bringing up lower level material to the output more often.

The Gate signals for all the bands are AND’ed together to create a trigger to the RTZ (above), which will return all the bands’ controls to 0dB gain when all the bands have been gating for your user-specified period of time.

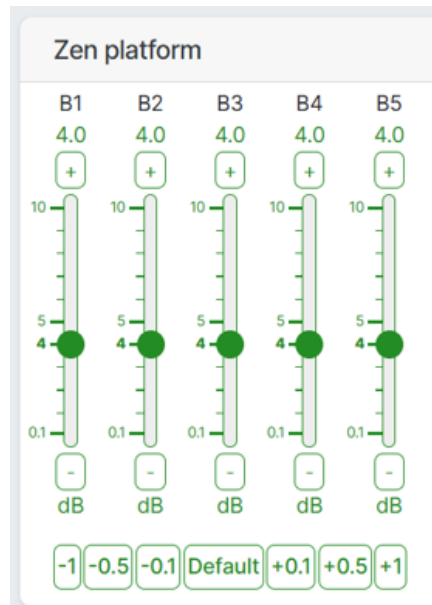
When the Release Gate is in effect, the gain metering for that band/channel will appear colored **red**.

Release Timing



This setting determines the speed with which the Zen 10 adds gain to each band/channel. The control range is from 20dB/second (fast) to 0.5 dB/Sec. (slow). Fast means more density, while slower makes the sound more open. Because the Release Gate and Zen Platform controls interrupt Release, you'll find that their 'duty-cycle' switching of the release function tends to allow faster instantaneous release than otherwise might be used. Release is only happening when you see **green** in a channel's gain metering.

Zen Platform



Here is where the Zen Level algorithm get its name: The “Zen Platform” feature adds a function that allows the processing to achieve the Zen goal of “doing something by doing nothing.”

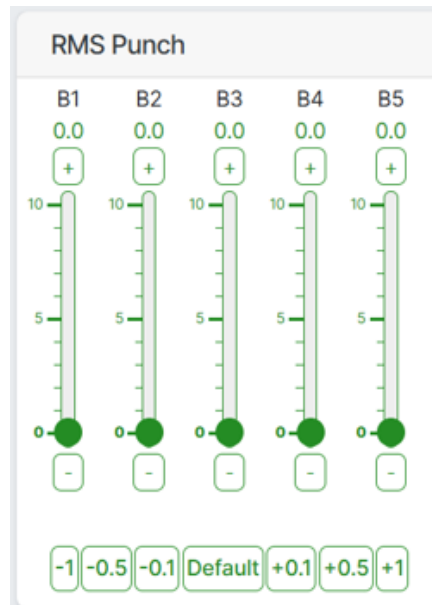
The idea comes from an adaptation of the CBS Laboratories’ “Audimax” AGC of the 1960s, where they introduced their “gain platform.” (The Audimax also introduced the release gating and RTZ functions we use). It was called a ‘platform’ because a graphical plot of the gain control’s activity over time included long horizontal ‘platforms’ of no change.

It works by using two thresholds, separated by however many decibels of original program dynamics the user wants to maintain. (The Zen 10’s “Zen Platform” is user-adjustable from 0.1 to 10.0 decibels on each band/channel). As long as the RMS energy of the audio remains within this ‘window,’ the processing is disabled, so the program comes through sounding identical to the original (because it IS identical!). As the audio comes to the upper limit of the window, it engages a momentary ‘attack’ function, reducing the gain of that channel in coordination with the Ratio control. The ‘window’ moves, too, to its new position and the audio once again can remain unprocessed. Should the audio drop in level to the lower limit of the window, this will engage the release function, which is much slower than the attack. This action adds to the gain of that channel, while once again moving the window to a new position. Attack and release can act in short bursts that are almost inaudible to the listener, both because they are short in duration and because they are typically limited in the amount of gain change that they apply.

So, as long as the audio’s RMS energy stays within the control window, there will be no gain change whatsoever. This condition can last for as long as many seconds, depending upon the program density, the Zen Platform setting and the Release timing.

As long as the audio remains within the Zen Platform window, the metering will be an **amber** color.

RMS Punch



The Zen 10 has an Attack timing system which has no user adjustment, but rather adapts to the incoming program material. It uses two stages, a slow $> \sim 1$ second long-term timing, supplemented by a faster program-determined attack that works on quick moments of heavy RMS density that the long-term attack doesn't respond to. The long-term timing sets the overall gain, while the short-term timing works with quick pokes, but also gets out of the way quickly.

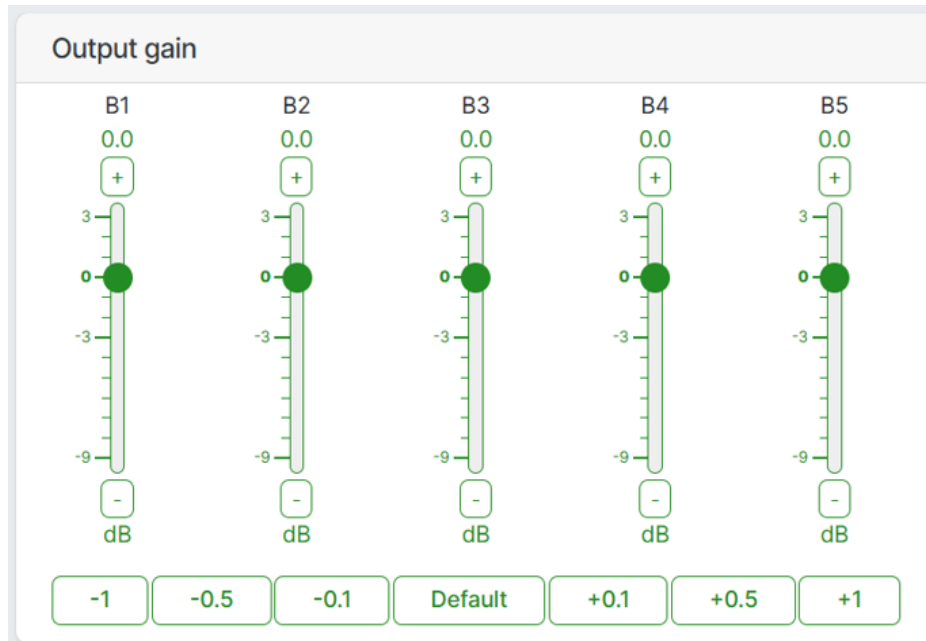
While developing this system, I discovered that the quick attack actually may be useful/subjectively appealing in heavier doses, thus the RMS Punch control came to life. "RMS Punch" does just that: it emphasizes the punchiness of the program material, by exaggerating the attack. Since it is part of the overall processing control, it is affected by the Ratio, and thus will be much more noticeable when higher ($> 5.0:1$) ratios are in use.

The control setting determines how much 'punch' it adds, using a threshold above the long-term timing. At "0" it is effectively out of the circuit, with the attack performing its normal, as-designed function, roughly 19 dB above the long-term attack. When RMS Punch is set to "10", its maximum effect, the threshold is much lower, about 7 dB above the long-term attack. Extreme settings of RMS Punch will reduce the overall level of the band. RMS Punch changes the metering to purple while it is in effect.

Each of the four main processing control sets (shown with green graphics) work for the bands using "Stereo" mode, and for the "L+R" channels of bands using Matrix mode.

Additional controls for all four functions are available for the "L-R" channels of matrix mode bands, shown with purple graphics. These controls will only appear for those bands which are in matrix mode.

Output Gain



Each band's output is summed with the others to create the final stereo output. It is also here where the final summation of matrix-processed L-R channels are summed into the output.

These controls are essentially 'mix' controls which determine the spectral balance of the final product. They are designed to minimally engage each band's peak limiter action. Adding more gain to a band may ultimately cause more limiting, also depending upon the nature of the audio of that particular program. The peak limiting is designed to be unobtrusive, increasing in ratio as the peak level increases.

Peak limiting is indicated by the middle, negative-gain blue-colored bar graph on the band where it is occurring.

There is also a final peak controller for the entire mix.

An optional True-Peak limiter can also be engaged. This function will add several milliseconds of latency, so might not be desirable in environments where live monitoring is required.

The screenshot displays a configuration management interface. At the top, there is an 'Actions' bar with buttons for 'Activate', 'Save', 'New', 'Remove', 'Import', and 'Export'. Below this, the 'Selected config' section shows a green bar for 'Default' with a UUID of 'default' and the description 'Default controls configuration'. To the right, there are input fields for 'Name' (containing 'Default') and 'Description' (containing 'Default controls configuration'). Below these is a 'Used sections' section with a radio button for 'Preset' which is selected. At the bottom, the 'Parameters preview' section shows a table of parameters for the 'Preset' section.

Parameters preview	
● Preset	
<input checked="" type="checkbox"/> Input Level Operating Reference	-20.0 dBFS
<input checked="" type="checkbox"/> Input Balance	0.0 dB
<input checked="" type="checkbox"/> Input High-Pass Filter	0.0 dB

To make a new Configuration is easy!

1. Setup all the required settings you need.
2. Click New.
3. Give it a name of your choice.
4. We advise adding a description, especially if you have multiple configs.
5. Once you have selected all you need for the config, click **SAVE**

Repeat the process for each Config you may need.

Services

HTTP <input checked="" type="checkbox"/> Enabled	SSH <input checked="" type="checkbox"/> Enabled
Port <input type="text" value="80"/>	Port: 22
<input type="button" value="Save"/>	<input type="button" value="Save"/>
HTTPS <input checked="" type="checkbox"/> Enabled	
Port <input type="text" value="443"/>	Certificate details No info to show
Certificate <input type="button" value="Choose File"/> No file chosen	
Private key <input type="button" value="Choose File"/> No file chosen	
	<input type="button" value="Save"/>
Telnet <input checked="" type="checkbox"/> Enabled	
Port <input type="text" value="23"/>	
<input type="button" value="Save"/>	

Here you can enable and set various additional services like SNMP, Telnet and RS232. After enabling and/or changing a parameter, please make sure you save each relevant section before proceeding to the next section.






Unit

Name Unit ID <input type="text"/> <input type="button" value="Save"/>	Buttons Headphone button function <input type="text" value="Headphones mute"/> <input type="button" value="Save"/>	User interface formatting Date format <input type="text" value="day.month.year"/> Temperature unit <input type="text" value="°C"/> <input type="button" value="Save"/>
Factory reset Factory reset wipes all user configuration and brings the unit into a clean state. <input type="button" value="Do factory reset"/> <input type="button" value="Do factory reset (keep network settings)"/>		
Front Panel Brightness [%] <input type="text" value="80"/> Local mode timeout [min] <input type="text" value="5"/> Screensaver level <input type="text" value="Display & LEDs"/> Screensaver timeout [min] <input type="text" value="5"/> <input type="button" value="Save"/>	Date and time <input type="button" value="NTP synchronized"/> <input checked="" type="checkbox"/> Use NTP to obtain current date and time Timezone <input type="text" value="UTC"/> NTP server override <input type="text"/> <input type="button" value="Fill browser values"/> <input type="button" value="Save"/>	
Lock screen <input checked="" type="checkbox"/> Enable <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> <div style="border: 1px solid green; padding: 5px; text-align: center;">U L A R D</div> </div> <input type="button" value="Save"/>		

Network

Network setting	
MAC address: 8c:1f:64:eb:23:25	
<input type="checkbox"/> DHCP	
IP address <input type="text" value="192.168.1.72"/>	Netmask prefix length <input type="text" value="24"/>
Gateway <input type="text" value="192.168.1.1"/>	
DNS 1 <input type="text" value="192.168.1.1"/>	DNS 2 <input type="text" value="1.1.1.1"/>
<input type="button" value="Save"/>	

User Management

User Management				 New user
USERNAME	FULL NAME	ROLE	SNMPV3	
admin	Admin	admin	-	 
viewer	Viewer	viewer	-	 

You can setup multiple users on every Zen. These can have different permission levels. When setting up a User, please remember to set the Role and Password for each user. Admin - set this for full control of the unit, with the ability to change any parameter.

Viewer - set this for limited control of the unit, restrictions will apply on certain parameters.

New user	
Username	Full name
<input type="text"/>	<input type="text"/>
Role	
<input type="text" value="Admin"/>	
Password	Password again
<input type="password"/>	<input type="password"/>

To setup, please click New User, Username

This may contain only lowercase characters, digits and '_' characters, no spaces can be used.

Full Name set this to identify the user

Role Choose the type for this user.

Password Choose your secure password

Logs

DATE	ACTIONS
01.06.2026	Show Download
28.05.2026	Show Download
27.05.2026	Show Download
18.05.2026	Show Download
29.05.2025	Show Download

System logs can be accessed from here. They are also accessible at all times from any page at the top right corner. Each relevant log will be sorted by the most recent timestamp.

Clicking “SHOW” will open up further information showing the log including any errors.

You can also download the log and save to your Computer for further reference, archiving, or to share the log with our support department.

Diagnostics

Autorefresh

Diagnosics

Front Panel MCU ✓ 2.1.2	FPGA ✓ 0.1	Audio Clock ✓	DSP ✓ 0.0.7	Network ✓	Headphones ✓
ADAU ✓ -5.9604644775391E-8					

CPU

Load (1m) ● 1.5	Load (5m) ● 1.54	Load (15m) ● 1.45	Temperature 62.6 °C	Frequency 1.9 GHz	Status 0x0
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ADAU

Lock ✓	Core 65535	Version -5.9604644775391E-8
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System

Fan speed 2985 RPM

The Diagnostics page gives you a quick and easy view of all relevant systems and statuses. These are useful if you need to check systems locally or remotely.

If you need and advice or support, we are always on hand to help you as fast as we can.

We have various ways that you can contact us, and we always recommend any additional information is sent to us so we can quickly assist you.

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