



**VMO16**  
Matrix Signal Processor with Dante  
**User Manual**  
Revision 1.4



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## EU DECLARATION OF CONFORMITY

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This declaration is issued under the sole responsibility of the manufacturer.

**We:**

NST Audio Ltd.  
Unit 4C Seph Way  
York Road Industrial Park  
Malton  
North Yorkshire  
YO17 6YF  
United Kingdom

**Declare that this declaration of conformity is issued under our sole responsibility and belongs to the following product and derivatives:**

**Kind of equipment:** Audio processor  
**Model:** VMO16

**The object of the declaration is in conformity with the relevant Union harmonisation legislation:**

2014/35/EU Low Voltage Directive (LVD)  
2014/30/EU Electromagnetic Compatibility Directive (EMC)

**The following harmonised standard and technical specifications have been applied:**

EN 62368-1:2014 - Audio/video, information and communication technology equipment - Safety requirements  
EN 55032:2015 - Electromagnetic compatibility of multimedia equipment - Emission requirements  
EN 55035:2017 - Electromagnetic compatibility of multimedia equipment - Immunity requirements

**Signed:**



**Name:** Dan Cartman

**Position:** Research and Development Manager

**Date:** September 2022



## IMPORTANT SAFETY INSTRUCTIONS

CAUTION: RISK OF ELECTRIC SHOCK. DO NOT OPEN.



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 of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**WARNING:** Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.

**WARNING:** To prevent injury, this apparatus must be securely attached to the rack in accordance with the installation instructions.

- 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 a 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 polarised or grounding-type plug. A polarised 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, 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 a tip over.
- 13 : Unplug this apparatus during lightning storms or when unused for a long period of time.
- 14 : Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as if the 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 : 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.
- 16 : To completely disconnect this equipment from the AC mains, disconnect the power cord from the mains circuit breaker.
- 17 : This unit is fitted with a 3-wire power cord. For safety reasons, THE EARTH LEAD SHOULD NOT BE DISCONNECTED IN ANY CIRCUMSTANCE.
- 18 : Only replace the IEC inlet fuse with the correct part: T 3.15A H 250V.

## INSTRUCTIONS DE SECURITE IMPORTANTES

ATTENTION: RISQUE DE CHOC ELECTRIQUE. NE PAS OUVRIR.



Le symbole représentant un éclair fléché dans un triangle équilatéral a pour but d'alerter l'utilisateur de la présence d'une "tension dangereuse" non isolée à l'intérieur du boîtier, pouvant être d'une force suffisante pour constituer un risque d'électrocution.



Le point d'exclamation dans un triangle équilatéral a pour but d'alerter l'utilisateur de la présence d'instructions importantes concernant le fonctionnement et la maintenance, dans la documentation qui accompagne l'appareil.

ATTENTION: Appareils de construction de CLASSE I doit être raccordé au réseau électrique via une prise de courant reliée à la terre.

ATTENTION: Pour éviter toute blessure, cet appareil doit être solidement fixé à la torture, conformément aux instructions d'installation.

- 1 : Lisez ces consignes.
- 2 : Conservez ces consignes.
- 3 : Respectez tous les avertissements.
- 4 : Respectez toutes les consignes d'utilisation.
- 5 : N'utilisez jamais l'appareil à proximité d'un liquide.
- 6 : Nettoyez l'appareil avec un chiffon sec.
- 7 : Veillez à ne pas empêcher la bonne ventilation de l'appareil via ses ouvertures de ventilation. Respectez les consignes du fabricant concernant l'installation de l'appareil.
- 8 : Ne placez pas l'appareil à proximité d'une source de chaleur telle qu'un chauffage, une cuisinière ou tout appareil dégageant de la chaleur (y compris un ampli de puissance).
- 9 : Ne supprimez jamais la sécurité des prises bipolaires ou des prises terre. Les prises bipolaires possèdent deux contacts de largeur différente. Le plus large est le contact de sécurité. Les prises terre possèdent deux contacts plus une mise à la terre servant de sécurité. Si la prise du bloc d'alimentation ou du cordon d'alimentation fourni ne correspond pas à celles de votre installation électrique, faites appel à un électricien pour effectuer le changement de prise.
- 10 : Installez le cordon d'alimentation de telle façon que personne ne puisse marcher dessus et qu'il soit protégé d'arêtes coupantes. Assurez-vous que le cordon d'alimentation est suffisamment protégé, notamment au niveau de sa prise électrique et de l'endroit où il est relié à l'appareil; cela est également valable pour une éventuelle rallonge électrique.
- 11 : Utilisez exclusivement des accessoires et des appareils supplémentaires recommandés par le fabricant.
- 12 : Utilisez exclusivement des chariots, des diables, des présentoirs, des pieds et des surfaces de travail recommandés par le fabricant ou livrés avec le produit. Déplacez précautionneusement tout chariot ou diable chargé pour éviter d'éventuelles blessures en cas de chute.
- 13 : Débranchez l'appareil de la tension secteur en cas d'orage ou si l'appareil reste inutilisé pendant une longue période de temps.
- 14 : Les travaux d'entretien de l'appareil doivent être effectués uniquement par du personnel qualifié. Aucun entretien n'est nécessaire sauf si l'appareil est endommagé de quelque façon que ce soit (dommages sur le cordon d'alimentation ou la prise par exemple), si un liquide ou un objet a pénétré à l'intérieur du châssis, si l'appareil a été exposé à la pluie ou à l'humidité, s'il ne fonctionne pas correctement ou à la suite d'une chute.
- 15 : N'exposez pas cet équipement au fait de tomber goutte à goutte ou au fait d'éclabousser et gardez-le au sec. Assurez-vous qu'aucun objet rempli de liquides, comme les vases, n'est placé sur l'équipement.
- 16 : Pour complètement débrancher cet équipement de la conduite principale de courant alternatif, débranchez la corde de pouvoir du disjoncteur de conduite principale.
- 17 : Cette unité est conçue pour correspondre avec une corde de pouvoir de 3 fils. Pour des raisons de sécurité, L'AVANCE DE TERRE NE DEVRAIT ÊTRE DÉBRANCHÉE DANS AUCUNE CIRCONSTANCE.
- 18 : Ne remplacez le fusible d'entrée IEC que par la pièce correcte: T 3.15A H 250V.

## WEEE

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Once your NST Audio product has reached the end of its useful life, please ensure that it is recycled in a proper manner.

"The WEEE Regulations 2013 are the UK interpretation of the EU WEEE Directive and aim to reduce the quantity of waste electrical and electronic equipment (WEEE) disposed of in the UK".

EEE producers are required to pay for the reuse, recycling and recovery of the products by registering as an EEE producer which requires them to join a producer compliance scheme.

NST Audio has been registered with producer compliance scheme Comply Direct since 2015 ensuring 100% compliance with the WEEE regulations 2013.

Our WEEE Producer Registration Number is WEE/HG5453ZY.

Old electrical equipment can be recycled along with its metal enclosure. Our products are marked with a crossed-out wheeled bin symbol on the rear of the product.

Please do not throw any electrical equipment (including those marked with the crossed out wheeled bin symbol) in your general waste bin.

NST Audio Ltd. is able to arrange WEEE collections for our customers through a trusted network of WEEE recycling facilities made available by Comply Direct. We are able to arrange collection and transportation of your WEEE to reprocess and recycle ensuring the minimum goes to landfill.

## ROHS

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The Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).

NST Audio Ltd products are RoHS compliant, and are available for export as lead-free and RoHS compliant.

NST Audio Ltd is committed to eliminating the use of hazardous substances in the materials, manufacturing and packaging of our products in strict accordance with the RoHS directive.

With regards to the RoHS Directive 2002 / 95 / EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, we declare that to the best of our knowledge, all products meet and fulfil all the requirements of the aforementioned directive.

## THANK YOU

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Thank you for choosing an NST Audio product for your application. Please spend a little time reading through this manual, so that you can obtain the best possible performance from the unit.

All NST products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this, or any other NST product, please do not hesitate to contact us.

## UNPACKING THE UNIT

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After unpacking, please check the unit carefully for any damage. If any is found, immediately notify the carrier concerned - you, the consignee, must instigate any claim.

Please retain all packaging, in case of future re-shipment.

## INSTALLATION

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### **Electrical Considerations:**

The NST device has been manufactured to comply with your local power supply requirements, but before connecting the unit to the supply, ensure that the voltage (printed on the rear panel) is correct, and that a mains fuse of the correct type and rating has been fitted.

Make sure power outlets conform to the power requirements listed on the back of the unit.

Damage caused by connecting to incorrect AC voltage is not covered by the warranty.

### **Mechanical Considerations:**

To ensure that this equipment performs to specification, it should be mounted in a suitable rack or enclosure. When mounting the unit in a rack or enclosure, ensure that there is adequate ventilation. The cooling fan sucks cool air in through the right side and blows warm air out of the left side of the unit through the ventilating grills. Take care when mounting other equipment in the same rack.

### **Operation:**

Read all documentation before operating your equipment and retain all documentation for future reference. Do not spill water or other liquids into or on the unit and do not operate the unit while standing in liquid. Do not block the fan intake or operate the unit in an environment that could impede the free flow of air around the unit. If the unit is used in an extremely dusty or smoky environment, it should be cleaned of any collected debris at regular intervals.

## OVERVIEW

Designed using NST second-generation DSP designs, the VMO16 brings no-compromise audio performance and system control to networked audio installations.

The VMO16 brings all the benefits and experience of our live sound filters and dynamics algorithms to an installation product. The 16 inputs from the audio network (Dante or AES67) go to a full 16x16 matrix mixer allowing any of the networked inputs to be routed to any analogue output channel. All of the 16 analogue outputs have 16 bands of parametric EQ, 48dB/Oct high and low pass filters, up to 1.3 seconds of delay as well as our high performance, two-stage PXL limiters for high performance loudspeaker protection.

All analogue audio connections are on Phoenix-type 3-pin 5.08mm pitch connectors. The 4 GPI connections allow configurable actions such as fire alarm mutes and preset recalls. Up to 30 presets can be stored with recall options allowing selective recall combinations of input, matrix and output sections.

Our D-Net control software for PC, Mac and iPad gives you complete control over ethernet and wifi. The VMO16 is also fully compatible with our VR1 PoE remote control panel for simple, flexible user control. Control via third party systems such as Crestron™ is available via our simple ethernet control protocol.

## KEY FEATURES

### Input and Output Connectivity:

- 16 Network Audio Inputs
- 16 Analogue Outputs
- Sample rate fixed at 96kHz

### Routing Matrix Modes:

- Mix Matrix, all Network Audio Inputs to all Analogue Outputs

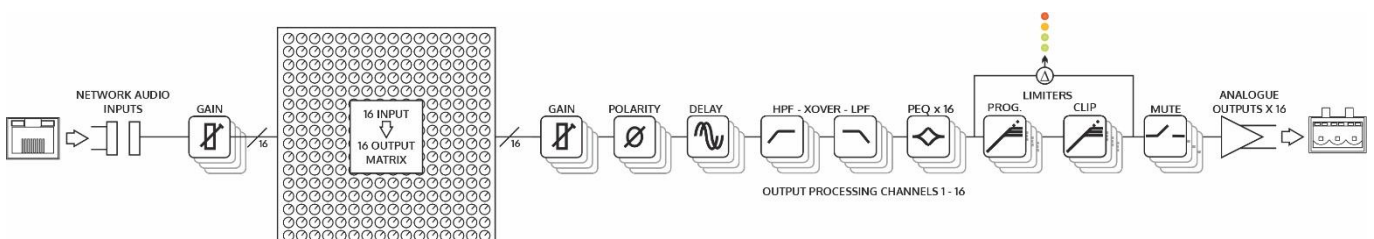
### Output Processing Features:

- 16 Parametric EQs
- Crossover Filters up to 48dB/Oct
- Network Audio Input Gain, Band Gain, Output Gain, Polarity, Delay (up to 1.3s per channel)
- 2-stage PXL Limiter

### Control Features:

- Remote control via 100Mbps Ethernet
- Up to 30 presets may be stored for offline recall
- Compatible with VR1 PoE remote control panel
- GPI muting for emergency evac systems programmable for either closed or open contact
- GPI closed contact programmable memory recall (x4)
- Simple Ethernet Control Protocol enables building control system integration for Crestron™ and other similar systems.

## SIGNAL PROCESSING DIAGRAM





### Front Panel Overview:



#### 1. Output Meters:

Real time LED output meters show level from the limiter threshold.

Signal present, 6dB below limiter threshold, Limiter threshold and 3dB into limiting.

#### 2. Dante:

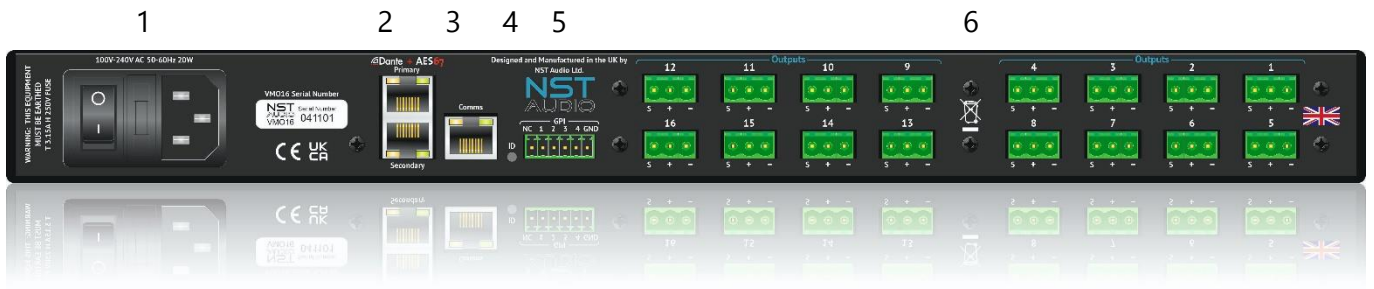
On Startup both Primary and Secondary LEDs flash alternately until the Dante card has initialised. Once initialised, the LEDs indicate when the primary and secondary network ports are connected successfully.

#### 3. Comms:

Activity: Flashes when communication is taking place between the device and D-Net software.

Link: Illuminates when a suitable Ethernet connection is established.

## Rear Panel Overview:



### 1. Mains Power Inlet, Fuse and Power Switch:

3-pin IEC input, fused, 100-250VAC, 50-60Hz <20W.

A spare fuse is located within the fuse holder – only replace with the correctly rated fuse specified in the Technical Specifications section.

### 2. Dante Ethernet Ports:

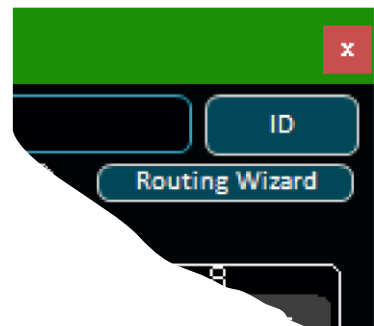
Dante RJ45 network Ethernet ports accept a standard CAT5 cable for connection to a network switch. The Dante ports are configured as redundant by default, but can be configured in switched mode in the Dante Controller software.

### 3. Ethernet Computer Control Port:

RJ45 network Ethernet port accepts a standard CAT5 cable for connection to a computer (or suitable network switch to control multiple units simultaneously).

### 4. ID LED:

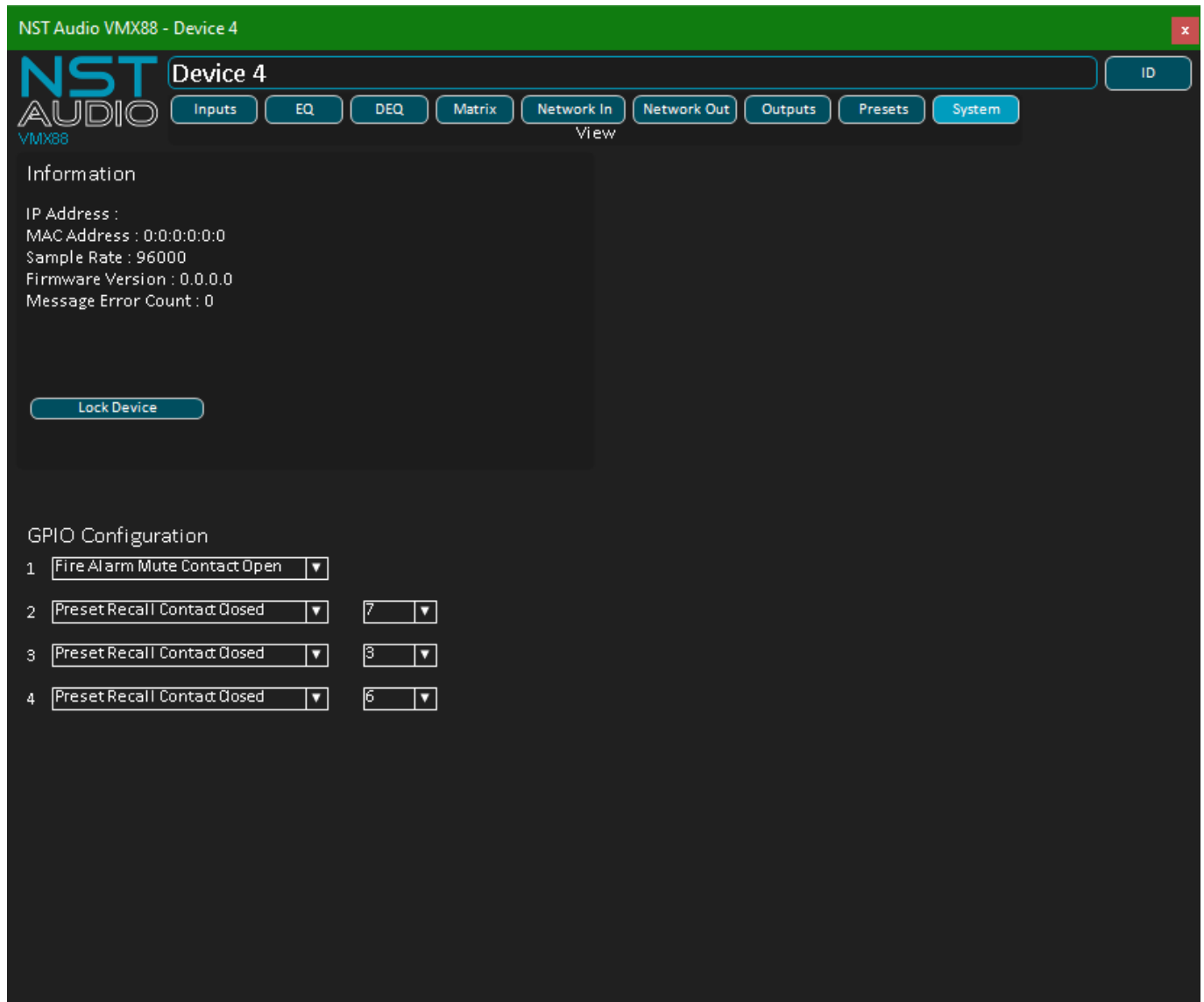
Flashes (in tandem with all front panel meters) to identify the unit in a network when the "ID" button is pressed in D-Net remote software on a unit's control panel:



Continues...

## 5. GPI Port:

The GPI port allows connection to a fire alarm relay to mute the device when the relay is either closed or opened (port pin 1 only), or to recall a preset when a selected GPI port pin is grounded (contact closed). The preset to recall can be chosen from 1-10 and port pin to associate this with is configured in the D-Net control software on the system page of each device.



NST Audio VMX88 - Device 4

**NST AUDIO** VMX88

Device 4

Inputs EQ DEQ Matrix Network In Network Out Outputs Presets System

View

Information

IP Address :  
MAC Address : 0:0:0:0:0:0  
Sample Rate : 96000  
Firmware Version : 0.0.0.0  
Message Error Count : 0

Lock Device

GPIO Configuration

|   |                              |   |
|---|------------------------------|---|
| 1 | Fire Alarm Mute Contact Open |   |
| 2 | Preset Recall Contact Closed | 7 |
| 3 | Preset Recall Contact Closed | 8 |
| 4 | Preset Recall Contact Closed | 6 |

## 6. Balanced Analogue Audio Outputs:

The analogue outputs are wired as follows:

Pin 1: Shield/Ground

Pin 2: Signal Hot (+)

Pin 3: Signal Cold (-)



D-Net is an Ethernet based computer control platform that gives you the ability to not only control all the devices on a network, but also to store presets and configure systems offline.

Compatibility with Microsoft Windows, Apple Mac and Apple iPad too, you can control your system the way that suits you. USB connection (Microsoft Windows only) is also available on some devices, allowing quick connection to a single device.

D-Net is available to download, free of charge, from the NST Audio website:



[nstudio.com/software-downloads](http://nstudio.com/software-downloads)



The iPad version is available from the Apple app store. (There is also a link to this from the software page shown above).



## TECHNICAL SPECIFICATIONS

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### **Analogue Outputs – 16**

Electronically balanced, Phoenix Connectors

Maximum Level: >20dBu

Dynamic Range: >122dB (20Hz – 20kHz A-weighted)

Source Impedance: <60Ω

### **Performance:**

Frequency Response 12Hz – 32kHz  $\pm$ 0.2dB

Dynamic Range: >122dB unweighted (in to out analogue)

THD + N (+10dB @ 1kHz): <0.001%

Latency: 0.427ms (in to out, analogue, 96kHz)

### **Processing:**

Routing Dante Inputs to Analogue Outputs in Network Matrix Mixer

Output Parametric EQ (per channel): 16 bands – parametric, low shelf, high shelf, notch, band-pass

Output High-Pass and Low-Pass Filter (per channel): Up to 48dB/octave (Bensen/Butterworth/Bessel/Linkwitz-Riley)

Output Gain (per channel): -30 to +15dB in 0.1dB steps, mute, phase

Output Delay (per channel): 0 to 1.3s in 10.4μs steps (at 96kHz)

Output Limiter (per channel): Threshold (-50 to +22dBu), attack, release, auto attack/release option

Presets: Up to 30

### **Power Requirements:**

3-pin IEC input, fused [5mm x 20mm, 3.15A, 250V, Anti-Surge (T)], 90-250VAC, 50-60Hz 20W

### **Environmental:**

Storage Temperature: -5 °C / 23 °F to 70 °C / 158 °F

Operating Temperature: 0 °C / 32 °F to 50 °C / 122 °F

Maximum Altitude: 3000m

### **Dimensions:**

Height: 44mm (1.75inch) 1U, Depth: 170mm (6.7 inches), Width: 482mm (19 inches)

### **Weight:**

Net: 2.2kg

Shipping: 3.4kg

## MAINTENANCE

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The unit will require very little routine maintenance, apart from occasional routine checking of the fan inlet outlets on the side panels. Cleaning the casework should only be done with a cloth lightly dampened with water only! The use of chemical or abrasive cleaners may damage the paint finish.

## SERVICING

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There are no user serviceable parts within the unit!

Please contact us to arrange returning any units to us that require servicing or repairing.

## WARRANTY

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This product comes with a warranty against defects in components and workmanship only, for a period of five years from the date of shipment to the customer. During the warranty period, NST Audio will, at its discretion, either repair or replace products that prove to be defective, provided that the product is returned, shipping prepaid, to an authorised NST Audio service facility.

Defects caused by unauthorised modifications, misuse, negligence, act of God or accident, or any use of this product that is not in accordance with the instructions provided by NST Audio, are not covered by this warranty.

This warranty is exclusive and no other warranty is expressed or implied.

NST Audio is not liable for consequential damages.

## CONTACT

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If you have any questions or comments about the information contained within this manual, or require further assistance, then please do not hesitate to contact us:



[www.nstaudio.com](http://www.nstaudio.com)



[support@nstaudio.com](mailto:support@nstaudio.com)



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*Thank you!*

**NST**  
AUDIO

The NST Audio team