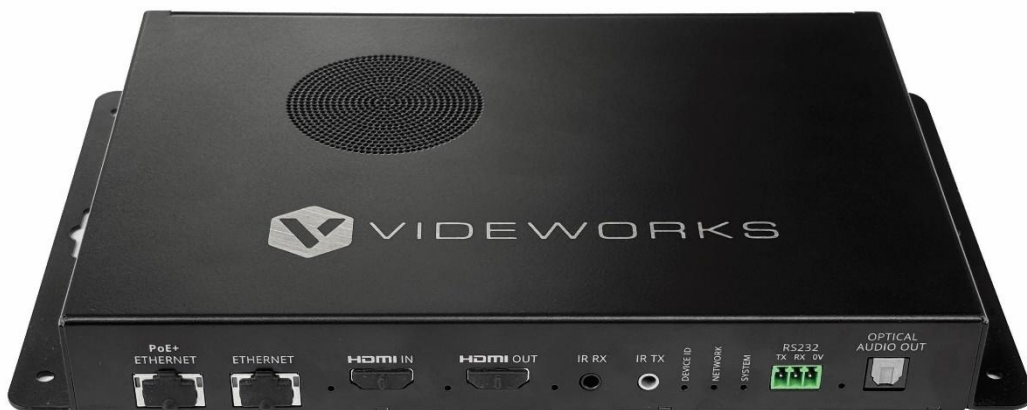




TETRATUNE

BY VIDEOWORKS



USER MANUAL

V1.0

HDMI®

HDCP2.3™

**MADE IN
BRITAIN**

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INTRODUCTION

Thank you for purchasing this Tetratune HDMI Video Processor. It has been manufactured to the highest standards to give you high performance and long service.

Designed to provide optimised display calibration and colour management, Tetratune works in conjunction with industry leading calibration software* and colour measurement tools* for the best possible picture for Professional or Home Cinema environments.

Tetratune works by using a customised colour look up table (LUT) created through use of the calibration software and measurement tools to adjust on-screen colour performance. The LUT is a 3-dimensional colour representation and, when video is passed through it, corrects for inaccuracies in screen performance.

Able to store multiple LUTs, Tetratune is a flexible product that can be used for different display colour setups or to add custom colour representation when required.

Using popular HDMI connectivity both for input and output ensures the widest compatibility with video source and display equipment in both professional and domestic environments too.

**Sold separately*

SAFETY NOTICES

Please read the instructions before attempting to install or operate this equipment.

Keep the following in mind as you unpack and install this equipment:

- Always follow basic safety precautions to reduce the risk of fire, electrical shock, and injury.
- To prevent fire or shock hazards, do not expose the unit to rain, moisture or install this product near water.
- To protect the unit from overheating do not block any vents or openings in the unit housing that provides ventilation.
- Allow sufficient space for air to circulate around the unit.
- Use a compatible PoE+ source or the Tetratune power supply. If you require additional power supplies, please contact your sales representative.
- Never push any objects into this product through any openings or empty slots as you may damage parts inside and/or cause an electrical shock.
- Do not allow anything to rest on the power cabling and avoid putting weight of any kind on it.
- Never spill liquid of any kind on or into this product.
- This product is intended for use in a clean (dust-free) residential environment.

Ventilation

It's important to keep the product well ventilated. Any electronic equipment will generate heat. A well-ventilated area helps to disperse heat. If placed in a poorly ventilated area, this product may heat up and cause irreparable damage. Allowing this device to run for prolonged periods under high temperatures may break down circuitry and electrical components. This risk also applies if the device is exposed to direct sunlight or placed near heat sources.

Over time, dust buildup can interfere with the functioning of the fan and electronics within this device. Dust particles contain various substances such as water, oil, minerals, and chemicals, which may lead to signal errors or degradation in internal chips and circuitry. Given the unpredictable nature of these effects, it is strongly advised to maintain products in a well-ventilated environment and ensure they remain as clean as possible.

In very rare occasions, insects or reptiles may establish nests in close proximity to or within the electronic casing. Although our products are engineered to provide optimal protection for internal electronics, it's important to note that these creatures are naturally attracted to such environments. In the unlikely event of such an occurrence, it can result in inadequate ventilation within the unit, impairing its ability to effectively dissipate heat. Please avoid stacking devices together. Ensure there's ample space between each unit to allow for proper airflow.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IN THE BOX

Inside the box you will find the following items.

- 1 x Videworks Tetratune unit
- 1 x 12V, 3A power supply unit
- 1 x RS232 Phoenix Connector

Tetratune is designed to work with additional equipment (see below) and requires at least one look up table (LUT) created by the user/installer during the calibration process. Tetratune can store up to 100 different LUTs giving a wide choice to the user.

ADDITIONAL EQUIPMENT

Calibration Software

Tetratune also requires access to compatible calibration software and to a display measurement meter able to work with the chosen software. An example of compatible calibration software is ColourSpace** from Light Illusion. Available separately to purchase or rent, this software works with Tetratune and with a range of measurement meters also sold separately. **

***See Light Illusion website for details.*

Display Measurement Meter

A wide range of measurement instruments are commercially available to work with the calibration software. Please consult the software provider for details of the most appropriate models for different budgets.

Personal Computer / Laptop

A computer with sufficient capability to run the software and to connect the chosen meter and Tetratune. Please contact the calibration software provider for more details.

Cables

Ethernet cables of the chosen length with a minimum CAT5e (preferably CAT6 or CAT6A) specification are required. Please note CCA (Copper Clad Aluminium) is not recommended as it can cause PoE+ issues due to higher DC resistance.

HDMI cables should be high speed HDMI 2.0 cables from reputable suppliers being able to support the full 18Gbps bandwidth reliably.

Switch

A network switch maybe used with the product. When it is not possible to power the Tetratune directly through local power, the Tetratune may alternatively be powered by a switch that supports PoE+ (Power over Ethernet).

HOW TO INSTALL THE PRODUCT

Positioning

Tetratune can be mounted either on the wall or placed flat on a shelf and can be fixed into position using the built-in wings for easy mounting.

Please allow sufficient airflow around the unit by ensuring airflow to the fan vent on the top of the unit and the vents on the sides of the unit are unrestricted.

Connections Overview

The following diagram and explanations cover the connectivity offered by Tetratune. Please take a moment to familiarise yourself with these.



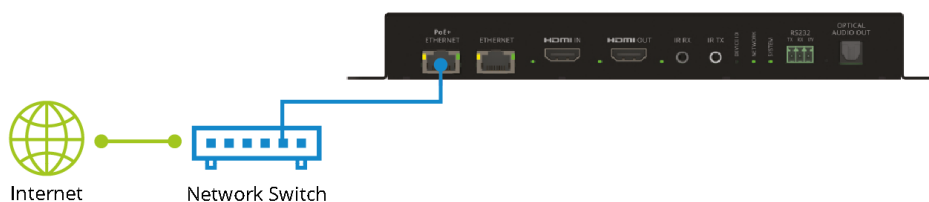
- A) **Power Connector:** The 4 pin DIN power supply is only to be used with the supplied 12V 3A DC power supply. When power is unavailable to the unit, Tetratune may be powered via POE+ using ethernet port B.
- B) **PoE+ Ethernet Port:** Connect to the 1GbE network being used for the Tetratune using an Ethernet cable (Cat5E or better).
- C) **Ethernet Port:** Connect to a separate local Ethernet device (e.g. TV or Set Top Box) for network connection sharing.
- D) **HDMI In Port:** Connect your source device (such as Blu-Ray players, Set Top Boxes etc) to this port via an appropriate high speed HDMI cable.
- E) **HDMI Out Port:** Connect your sink device (such as a display or projector) to this port via an appropriate high speed HDMI cable.
- F) **IR RX Port (Black):** Not used for this product.
- G) **IR TX Port (Grey):** Not used for this product.
- H) **Device ID LED:** This LED can be used to help identify Tetratune devices by pressing the 'Locate Device' button within the web interface.
- I) **Network LED:** Indicates the status of the Tetratune device network connection.
- J) **System LED:** Indicates the status of the Tetratune device system health.
- K) **RS232 Phoenix Port:** Not used for this product.
- L) **Optical Audio Out Port:** Digital Optical (S/PDIF TOSLINK) audio output that matches the audio from the HDMI Out Port.

Power

Power to the unit can either be through using the supplied power supply or through power on the ethernet cable using POE+. If power is provided through PoE+ (see the following section on Ethernet connection).

Ethernet

Connect a suitable Ethernet cable (Cat5e or better) between the switch and the Tetratune (see diagram) using the PoE+ terminal where power is to be provided via this method.

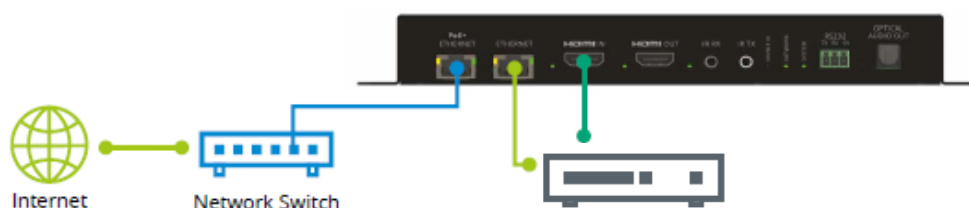


**It is recommended to use Cat6 or Cat6A to minimise the possibility of data loss. We do not recommend using CCA (copper clad aluminium) as this is known to cause PoE+ issues due to higher DC resistance.*

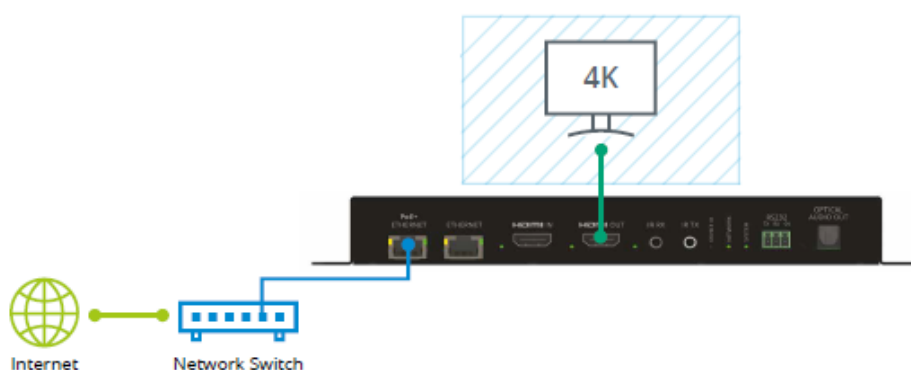
IMPORTANT: Please note that local building regulations may apply to the installation of cabling in properties. It is important to check building regulations to guarantee that you are in accordance with the law of your territory.

HDMI

Using a suitable high speed HDMI cable that can support the full 18Gbps bandwidth reliably, connect between a video source with an HDMI output to the HDMI input terminal of this device. (e.g. Blu-Ray player)



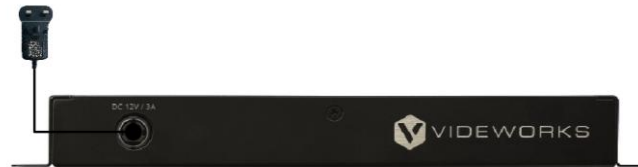
Connect a display device to this unit using a high-speed HDMI lead from the HDMI output terminal to the HDMI input terminal of the display device.



USING THE PRODUCT

Powering via local power supply

Power the unit using the local power supply.



The initialisation process takes approximately 2 minutes with the following steps.

- Device ID, Network & System LEDs illuminate momentarily.
- The fan runs at full speed until initialisation is complete.

Please note: At power on a firmware update may be available with a longer initialisation. Please wait and do not disconnect power until the update is completed.

Tetratune is successfully initialised when,

- System LED turns on (green)
- Network LED turns on (network established)



Please note: If the LEDs are not solid green, reinitialise the Tetratune before contacting support with any further issues.

Powering via PoE+

When the unit senses power it will automatically power on.



NETWORK DETECTION & USER INTERFACE








For ease of control, Tetratune can be controlled via a web UI, and allows the user to control the following.

- Choose a LUT from the memory (LUT selection)
- Copy or delete a LUT preset (LUT settings)
- Bypass a LUT (LUT disable)
- Administration settings

To control Tetratune using the web UI, observe the following steps to get started.

- Plug the Tetratune into the display using the HDMI cable
- Plug in a network cable connected to the local router
- Power up the unit without an HDMI source connected
- Once the unit has initialised, an IP address will be displayed on your screen
- Use the IP address in a web browser to access the web UI


Once you have accessed the web UI, the home screen will appear and display a range of options covering status and control.

 VIDEOWORKS	
SYSTEM	Video Information
 Tetratune Status	Input Detected ✓
 Tetratune LUT Selection	Input Supported ✓
NETWORK	Video Mode 3840x2160p24
 System Status	Colour Space YCbCr 4:4:4
QUICK ACTIONS	Bit Depth 10
 Locate Device 	Colour Information
 Admin Area	Colourimetry ITU-R BT.2020 Y'C'bC'r
	Quantisation Range Limited
	HDR Information
	EOTF ST2084
	Display Primaries (0.265, 0.69), (0.15, 0.06), (0.68, 0.0032)
	White Point (0.3127, 0.329)
	MaxMDL 10000
	MinMDL 0.0001
	MaxCLL 10000
	MaxFALL 250
	Audio Information
	Channels 2
	Frequency 48000

**Please note data shown is for illustrative purposes only.*

For further administration settings consult the admin area under the main menu. The UI requires a password to access the administration area.

The default password is “**admin**” when first used. Once logged into the admin area you will see the following.

	
ADMINISTRATION	Video Information
<ul style="list-style-type: none"> Tetratune Status Device Health Cloud Connection Network Settings Device Settings Hardware Details 	<ul style="list-style-type: none"> Input Detected ✓ Input Supported ✓ Video Mode 3840x2160p24 Colour Space YCbCr 4:4:4 Bit Depth 10
TETRATUNE CONFIGURATION	Colour Information
<ul style="list-style-type: none"> Tetratune LUT Settings Tetratune LUT Selection Tetratune Demo Settings 	<ul style="list-style-type: none"> Colourimetry ITU-R BT.2020 Y'C'bC'r Quantisation Range Limited
QUICK ACTIONS	HDR Information
<ul style="list-style-type: none"> Locate Device User View Change Password Logout Reboot Device 	<ul style="list-style-type: none"> EOTF ST2084 Display Primaries (0.265, 0.69), (0.15, 0.06), (0.68, 0.0032) White Point (0.3127, 0.329) MaxMDL 10000 MinMDL 0.0001 MaxCLL 10000 MaxFALL 250
	Audio Information
	<ul style="list-style-type: none"> Channels 2 Frequency 48000

**Please note data shown is for illustrative purposes only.*

We recommend changing the default password after first gaining access to the administration area. This can be done through the “**Change Password**” function shown in the illustration above.

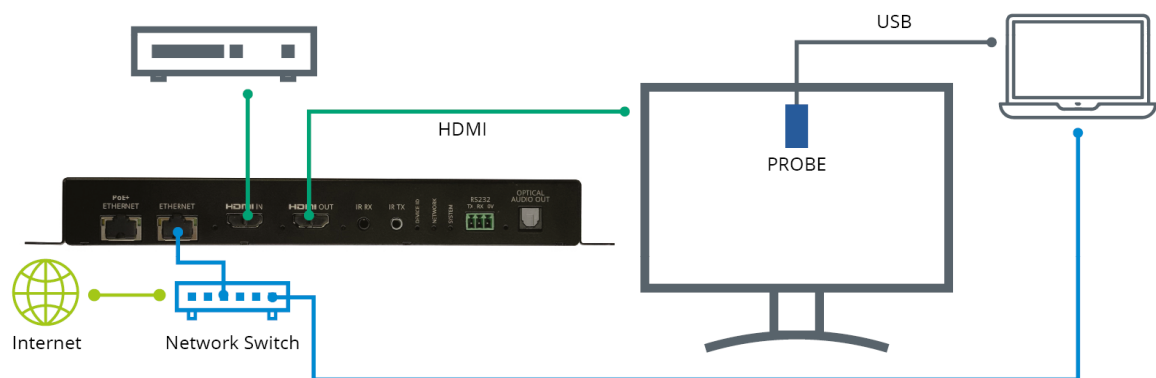
TUNING THE DISPLAY

Tetratune requires access to a proprietary display calibration software program (e.g. ColourSpace). Please seek access directly from the software provider.

To tune the chosen display, the following items are required.

- PC / Laptop (Consult the calibration system provider for minimum requirements).
- Colour calibration software (E.g. ColourSpace).
- USB measurement probe (Consult the calibration system provider for recommendations).
- Tetratune.
- Display (TV, Projector etc)
- Media Player

The following illustrates how the system is connected when tuning.



Once the system has been set up, please proceed through the following steps.

- Set up the measurement device, placing it centrally on the screen as indicated. Please ensure it is on the screen and where the colour TPG (Test Pattern Generator) patches will be for the most accurate measurements.
- Start the chosen software and follow guidance on use of the software. Please consult the software providers webpage and documentation for more information.
- Follow the software instructions for running a measurement and storing a LUT (Look Up Table).

***Please note:** Different calibration software programs operate differently and guidance on how to operate them should come from the software guidance documentation or from the software provider directly.

After tuning the display, and in normal use, the system is connected as follows.



BYPASS MODE

Tetratune can be used in a video signal path in a bypass configuration. This allows users to switch the LUT in or out of the signal path for convenience and comparison. This can be done through the control menus as follows.

- Access the Tetratune menu through the web interface.
- Click on Tetratune LUT Selection.
- Click Enable Tetratune to disable or enable the Bypass Mode.
- Select a chosen look up table (LUT) when disabling Bypass Mode.

LUT STORAGE

Tetratune can store a maximum of 100 LUT's, allowing a wide choice for the user. These can be accessed and managed through the calibration software. Please see documentation with the software for more details.

For further information on how to use the Tetratune with the chosen software, please consult guidance documentation on the calibration software.

TECHNICAL SPECIFICATION

Operation Modes	Colour Tuning (LUT enabled) Bypass (LUT disabled)
Video	
Colour Space	RGB, YCbCr
Colour Space & Chroma Subsampling	RGB 4:4:4, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Colour Depth	8-bit, 10-bit, (12 bit—Passthrough)
Max Resolution	4K@60Hz
Supported Resolutions (Min/Max)	720x480@60Hz Interlaced to 4096x2160@60Hz Progressive
HDMI Support	HDMI 2.0b In / Out
HDMI Copy Protection	HDCP 1.4, HDCP 2.2, HDCP 2.3
Look Up Table	33 ³ , Tetrahedral Interpolation, Up to 100 stored in memory
LUT Selection	EOTF (Auto or Manual detect) & user defined screen & mode
Input Format	SDR BT.709, HDR BT.2020 / ST 2084 (PQ/HDR10) HDR BT.2020 / ARIB STD-B67 (HLG), Other
Patch Generator (TPG)	Integrated & controllable through ColourSpace for SDR & HDR
Automatic EDID Management	Yes
Control & Monitoring	
Control Web UI / Display	Tetratune Web UI - Mobile Friendly
Monitoring	Tetratune Web UI
Calibration Software Support	ColourSpace by Light Illusion
Connectivity	
HDMI	HDMI 2.0b In / Out (18Gbps)
Ethernet	Cat5e or better (inc passthrough) 850Mbit/s, 2 x 1GbE (1x PoE+ Capable)
IR	Reserved for future use
Power Input	PoE+ or provided DC power supply
Local Power Rating	12V 3.0A 50/60Hz
PoE+ Power Consumption	Max 30W @48VDC
Construction	
Enclosure	Powder Coated Aluminium
Dimensions	25cm x 15.5cm x 3cm
Product Weight	0.6 kg
Operating Temp	0° to +35°C (32°to +95°F)
Storage Temp	-20°C to 60°C (-4°F to 140°F)
Humidity	5 to 90% RH (no condensation)
Safety & Certification	UKCA, CE, FCC, RoHS
Country of Origin	Great Britain

TROUBLESHOOTING

Should you encounter installation difficulties or issues with device communication, the following checklist of common issues and causes should help resolve your issues. If you still continue to experience issues, please contact us for further assistance.

No or Poor Picture Quality

- Connected and powered? Double check that all HDMI, Ethernet and power cables are firmly connected to the correct ports and all devices are correctly powered.
- Signal strength? The use of cable joins, stranded patch panels, wall outlets and stranded patch leads as interconnects between them can significantly reduce signal strength. Use solid core straight through connections wherever possible.
- If you reduce the resolution of the source (e.g. from 4K to 1080P), do you get a picture? If so, this suggests a conflicting resolution between the source and display or a bandwidth capacity issue with your cable. Check all inputs and outputs share the same resolution capabilities.
- Pink or off-colour picture? This could be caused by an invalid EDID or the source device failing to read the EDID from the unit. Try re-booting the unit and all source devices to force the re-reading of the EDID.
- Cable quality and condition – HDMI cable/connectors can easily be damaged, and the quality of materials can vary. Always use good quality leads and cables and try swapping cables that are known to be working into the solution to see if this improves your image.

EDID Handshake

There may be times you will need to perform an EDID Handshake on your unit. This is often after a new piece of equipment has been introduced to your setup or any changes have occurred.

To do an EDID Handshake:

1. Turn off the unit and all sources.
2. Turn on all TVs, and make sure these are not set to standby.
3. Wait 45 seconds.
4. Power on all units and wait for 2 green lights on the front panel.
5. Wait a further 2 minutes.
6. Turn on all sources.

FREQUENTLY ASKED QUESTIONS

- Can I use more than one Tetratune on a network for multiple displays and control them from the same web interface?
Yes, you can use more than one Tetratune, identified in the UI by the IP address.
- Can I use any equivalent rated power supply with the Tetratune?
We recommend use of the supplied power supply only.
- Can I control Tetratune via IR?
No, this function is not enabled for use with Tetratune.

SPARES

Tetratune is supplied with a compatible 12v 3A power supply which has a KPPX-4P connector. Where a replacement is needed, please contact your supplying dealer. The order code for the power supply is P8-ONEIP-PSU.

WARRANTY TERMS & CONDITIONS

This product is developed on hardware supplied and manufactured by Pulse-Eight Limited. This warranty is subject to the following terms and conditions for the hardware.

IMPORTANT INFORMATION ABOUT YOUR RIGHTS AND OBLIGATIONS, AS WELL AS LIMITATIONS AND EXCLUSIONS THAT MAY APPLY TO YOU. YOUR RIGHTS AND THIS LIMITED WARRANTY.

This Limited Warranty gives you specific legal rights. You may also have other legal rights that vary by country, state, province, or jurisdiction.

The disclaimers, exclusions, and limitations of liability under this Limited Warranty will not apply to the extent prohibited by applicable law.

For a full description of your legal rights, you should refer to the laws applicable in your jurisdiction and you may wish to contact a relevant consumer advisory service.

1. WHAT THIS LIMITED WARRANTY COVERS; PERIOD OF COVERAGE

Pulse-Eight Limited ("Pulse-Eight"), 8-12 Alder Hills, Poole, BH12 4AL, UK, warrants to the owner of the enclosed product that the product contained in this box ("Product") will be free from defects in materials and workmanship for a period of three years from the date of delivery following the original purchase (the "Warranty Period"), or if this product has been professionally installed, the warranty start date is from the date your installer purchased the item, not your system commissioning date. Please check with your installer for their purchase date. If the Product fails to conform to this Limited Warranty during the Warranty Period, Pulse-Eight will, at its sole discretion, either (a) repair or replace any defective Product or component; or (b) accept the return of the Product and refund within 45 days of return the money actually paid by the original purchaser for the Product. Repair or replacement may be made with a new or refurbished product or components, at Pulse-Eight's sole discretion.

If the Product or a component incorporated within it is no longer available, Pulse-Eight may replace the Product with a similar product of similar function, at Pulse-Eight's sole discretion. This is your sole and exclusive remedy for breach of this Limited Warranty. Any Product that has either been repaired or replaced under this Limited Warranty will be covered by the terms of this Limited Warranty for the longer of ninety (90) days from the date of delivery or the remaining Warranty Period. This Limited Warranty is transferable from the original purchaser to subsequent owners, but the Warranty Period will not be extended in duration or expanded in coverage for any such transfer.

2. TOTAL SATISFACTION RETURN POLICY

If you are the original purchaser of the Product and you are not satisfied with this product for any reason, you may return it in its original condition within thirty (30) days of the original purchase and receive a full refund. If this is a professionally installed product, you must check with your installer regarding their own returns policy.

3. WARRANTY CONDITIONS; HOW TO GET SERVICE IF YOU WANT TO CLAIM UNDER THIS LIMITED WARRANTY

Before being able to claim under this Limited Warranty, the owner of the Product must (a) notify Pulse-Eight of the intention to claim by emailing support@pulse-eight.com during the Warranty Period and providing a description of the alleged failure, and (b) comply with Pulse-Eight's return shipping instructions, and (c) ship the Product at owner's cost (except where prohibited by applicable law) to Pulse-Eight for repair or replacement. Pulse-Eight will have no warranty obligations with respect to a returned Product if it determines, in its reasonable discretion after examination of the returned Product that the Product is an Ineligible Product (defined below). Pulse-Eight will bear all costs of return shipping to the owner, except with respect to any Ineligible Product, for which the owner will bear all shipping costs.

4. WHAT THIS LIMITED WARRANTY DOES NOT COVER

This warranty does not cover the following (collectively “Ineligible Products”): Products marked as “sample” or sold “AS IS”; or Products that have been subject to: (a) modifications, alterations, tampering, or improper maintenance or repairs; (b) handling, storage, installation, testing, or use not in accordance with the Installation Guide or other instructions provided by Pulse-Eight; (c) abuse or misuse of the Product; (d) breakdowns, fluctuations, or interruptions in electric power or the telecommunications network; or (e) Acts of God, including lightning, fire, flood, tornado, earthquake, or hurricane. This warranty does not cover consumable parts, including batteries unless damage is due to defects in materials or workmanship of the Product, or software (even if packaged or sold with the product). Pulse-Eight recommends that you use only authorized service providers for maintenance or repair. Unauthorized use of the Product or software can impair the Product’s performance and may invalidate this Limited Warranty. Pulse-Eight does not warrant that operation of the Product will be error-free or uninterrupted or that the Product will in every case process all data correctly.

5. DISCLAIMER OF WARRANTIES

Except as stated previously in this limited warranty, and to the maximum extent permitted by applicable law, Pulse-Eight disclaims all express, implied, and statutory warranties and conditions with respect to the product, including the implied warranties of merchantability, fitness for a particular purpose. To the maximum extent permitted by applicable law, also limits the duration of any implied warranties or conditions to the duration of this limited warranty.

6. LIMITATION OF DAMAGES

In addition to the above warranty disclaimers, in no event will Pulse-Eight be liable for any consequential, incidental, exemplary, or special damages, including any damages for lost data or lost profits, arising from or relating to this limited warranty or the product, and Pulse-Eight’s total cumulative liability arising from or related to this limited warranty or the product will not exceed the amount actually paid for the product by the original purchaser.

7. LIMITATION OF LIABILITY

Pulse-Eight disclaims all liability of any kind of Pulse-Eight’s suppliers. The Pulse-Eight online services (“services”) may provide you with information (“product information”) regarding your product’s performance and/or peripherals connected to your product (“product peripherals”). The type of product peripherals that may be connected to your product may change from time to time. Without limiting the generality of the disclaimers above, all product information is provided for your convenience, “as is”, and “as available”. Pulse-Eight does not represent, warrant, or guarantee that product information will be available, accurate, or reliable. You use all product information, the services, and the product at your own discretion and at risk. You will be solely responsible for (and Pulse-Eight disclaims) any and all loss, liability, or damages, including to your HVAC system, plumbing, home, product, product peripherals, computer, mobile device, and all other items and pets in your home, resulting from your use of the product information, services, or product. The product information provided by the services is not intended as a substitute for direct means of obtaining the information.

8. VARIATIONS THAT MIGHT APPLY TO THIS LIMITED WARRANTY

Some jurisdictions do not allow limitations on how long an implied warranty lasts or exclusions/limitations on incidental or consequential damages, so some of the limitations set out above may not apply to you.

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CONTACT DETAILS

For Tetratune support please contact your supplier in the first instance who will assist with product related queries.



TETRATUNE
BY VIDEOWORKS

[VIDEOWORKS.COM/TETRATUNE](https://videoworks.com/tetratune)