DARK1616

DANTE NETWORK AUDIO
16 INPUT 16 OUTPUT AES3 & LINE LEVEL ANALOGUE INTERFACE

PRODUCT DETAILS

GLENSOUND ELECTRONICS LTD, THE DESIGN BUILDINGS,
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Glensound Electronics Ltd

Thank you for choosing a new Glensound product.

All rights reserved.

Information contained in this manual is subject to change without notice, if in doubt please contact us for the latest product information.

If you need any help with the product then we can be contacted at:

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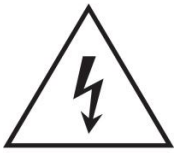
IMPORTANT SAFETY INSTRUCTIONS

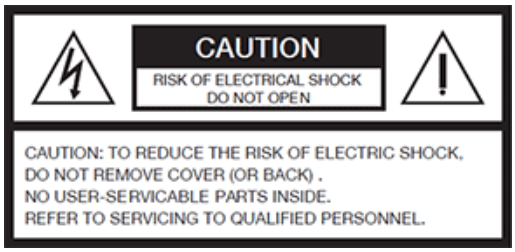


This symbol is intended to warn that dangerous voltages within the product are present and constitute a risk of electric shock.

This symbol is intended to highlight that there are important operating & maintenance instructions in the literature accompanying this unit.

English: This symbol is intended to highlight that the equipment must have a valid earth connection with the protective earthing conductor.
Danish: Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.
Finnish: Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.
Norwegian: Apparatet må tilkoples jordet stikkontakt.
Swedish: Apparaten skall anslutas till jordat uttag.

CAUTION – SHOCK HAZARD: DISCONNECT ALL POWER SOURCES.
This symbol is intended to warn that the product can be energised from more than one Mains power source. Care must be taken if accessing internal components. Ensure that both Mains Power supplies are fully disconnected.



WARNING:

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

1) Read these instructions
2) Keep these instructions
3) Heed all warnings
4) Follow all instructions
5) This product is intended for indoor use only
6) The intended ambient operating temperature of this product is 0°c to 40°c
7) Do not use this apparatus near water
8) Clean only with a dry cloth
9) Do not block any ventilation openings. Install in accordance with manufacturer's instructions
10) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat
11) Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has 2 blades with one wider than the other. A grounding type plug has 2 blades and third grounding prong. The wider blade or the 3rd prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet
12) Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles and the point where they exit from the apparatus
13) The mains plugs and rear-panel IEC appliance couplers serve as the disconnect devices. Both mains cords must be unplugged to completely isolate the unit from mains power. The socket-outlets used for mains power must be installed near the equipment and be easily accessible
14) Use only approved detachable 3-core earthed mains cords (minimum H05VV-F 3G0.75 mm² with IEC 60320-1 C13 connector) rated for the country of installation: • United Kingdom: Use a BS 1363-1 approved moulded plug fitted with a 5 A ASTA-approved BS 1362 fuse. • European Union: Use a CEE 7/7 (Schuko/French) earthed plug. • Denmark: When connecting to wall socket-outlets in Denmark, use an approved 3-pin earthed plug complying with DS 60884-2-D1 (Standard Sheet DK 2-1a) to ensure protective earthing is maintained
15) Only use attachments/ accessories specified/ supplied by the manufacturer
16) This product is designed for stationary installation in a standard 19-inch equipment rack (1RU). Secure the unit to the front rack rails using all four mounting holes on the integral rack ears with appropriate rack screws (e.g., M6 screws and cage nuts). Ensure that the ventilation slots on the left and right sides of the chassis are not obstructed by rack walls or cabling.
17) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/ apparatus combination to avoid injury from tip over

18) Unplug this apparatus during lightning storms or when unused for long periods of time
19) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped
20) Do not attempt to modify this product. Doing so could result in personal injury and/ or product failure.
21) The product contains no user serviceable parts and **must not** be dissasembled in any way
22) This equipment is not suitable for use in locations where children are likely to be present
23) Any optical SFP transceiver modules installed in this product must be certified Class 1 Laser Products in accordance with IEC/EN 60825-1. Do not look directly into open optical ports or fibre-optic cable ends while the equipment is energized.

PRODUCT WARRANTY:

All equipment is fully tested before dispatch and carefully designed to provide you with trouble free use for many years.

We have a policy of supporting products for as long as possible and guarantee to be able to support your product for a minimum of 10 years.

For a period of one year after the goods have been despatched the Company will guarantee the goods against any defect developing after proper use providing such defects arise solely from faulty materials or workmanship and that the Customer shall return the goods to the Company’s works or their local dealer.

All non-wear parts are guaranteed for 2 years after despatch and any defect developing after proper use from faulty materials or workmanship will be repaired under this warranty providing the Customer returns the goods to the Company's works or their local dealer.

EU DECLARATION OF CONFORMITY FOR:

DARK1616

Sixteen channel AoIP, AES3/Analogue I/O interface

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

This equipment is manufactured by Glensound Electronics Ltd of Brooks Place Maidstone Kent ME14 1HE is CE marked and conforms to the following Union harmonisation legislation:

Product safety:	EN IEC 62368-1:2020 + A11:2020
Emissions:	EN55032:2015
Immunity:	EN55035:2017

Signed for and on behalf of Glensound Electronics Ltd.

Marc Wilson, Managing Director
Maidstone, Kent, England

Date: 20/10/2026

RoHS DIRECTIVE

RoHS 2 Directive 2011/65/EU as amended by (EU) 2015/863 restricts the use of the hazardous substances listed below in electrical and electronic equipment.

This product conforms to the above directive and for this purposes, the maximum concentration values of the restricted substances by weight in homogenous materials are:

Lead	0.1%
Mercury	0.1%
Hexavalent Chromium	0.1%
Polybrominated Biphenyls	0.1%
Polybrominated Diphenyl Ethers	0.1%
Bis(2-ethylhexyl) phthalate	0.1%
Benzyl butyl phthalate	0.1%
Dibutyl phthalate	0.1%
Diisobutyl phthalate	0.1%
Cadmium	0.01%

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT REGULATIONS 2006 (WEEE)

Glensound Electronics Ltd is registered for business to business sales of WEEE in the UK our registration number is:

WEE/JJ0074UR

GLENSOUND DARK1616
Handbook Contents

Issue 7

Description Page No.

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OVERVIEW

The Glensound DARK1616 is an analogue to digital and digital to analogue converter designed to connect AES3 and line level analogue audio circuits to a Dante audio network.

Dante network audio is a common protocol for distributing high quality linear audio over standard IP networks and it is widely used by many audio equipment manufacturers. The Glensound Dark1616 Dante audio interface will be compatible with any other manufacturers Dante audio interface. Further details of Dante network audio can be found at www.audinate.com

Being designed for live on-air broadcast applications the Glensound Dark1616 has been designed with multiple redundancy capabilities. It has 2 mains power sources and it also has fully redundant network connections for both Copper & Fibre circuits.

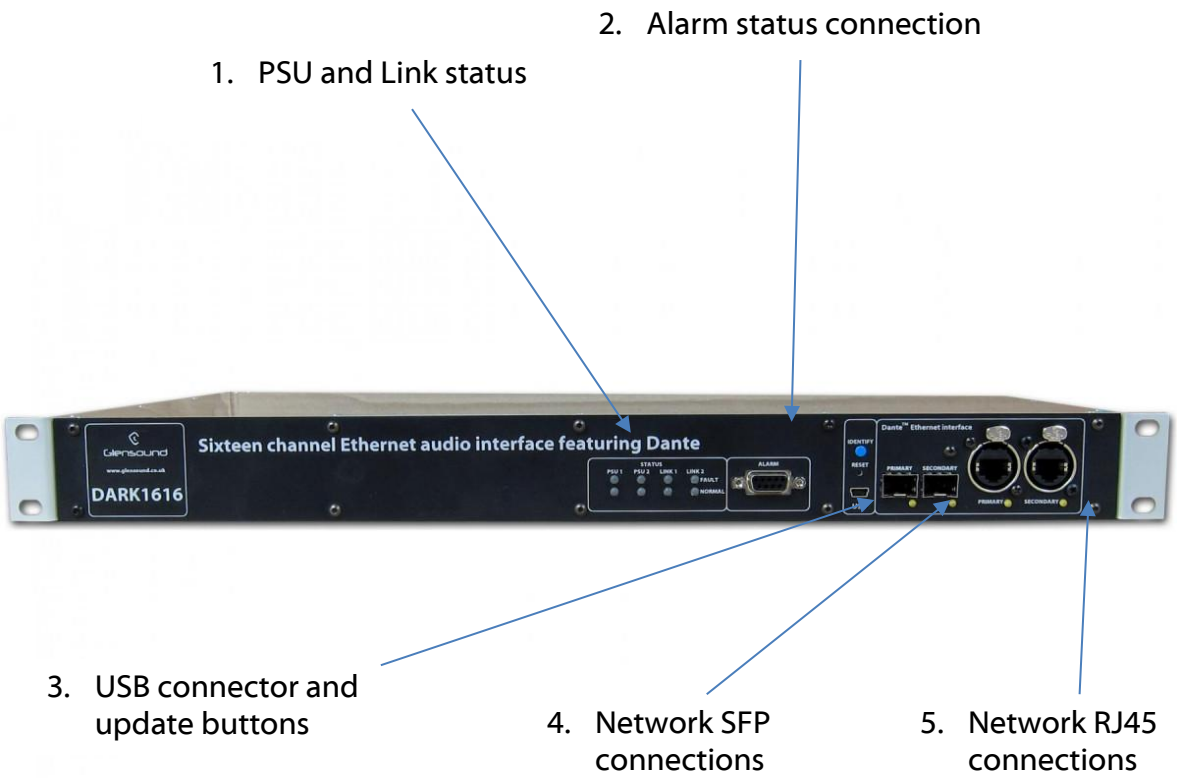
The Dark1616 provides 8 balanced AES3 inputs and 8 balanced AES3 outputs to the Dante network and 16 analogue line level (0dB) inputs to the Dante network and 16 analogue line level (0dB) outputs from the Dante network on rear panel D25 connectors wired to AES59 (also known as the Tascam standard).

The analogue and AES3 outputs are both always used and the same audio signal from the Dante newtork that is presented on one channels AES3 output will appear as an analogue audio signal on the equivalent analogue output.

For each channel only 1 audio input signal can be sent to the Dante network, the AES3 input has priority over the analogue. Therefore if there is both an analogue and AES3 input signal for one channel only the AES3 will be sent to the Dante network.

As per our other Dante equipment 0dBu = -18dBFs

DARK1616 FRONT PANEL LAYOUT



1. **PSU and Link status**

   There are 4 red LEDs and 4 green LEDs that illuminate depending on the status of the link. Red indicates no connection, green indicates a successful connection.

   For example, if you have connected the DARK1616 to two separate PSUs, only one of which works then you will have a red 'Fault' LED illuminate to warn you that there is no power detected on the connection that is not receiving mains power.

2. **Alarm status connection**

   This 8-way female D-type connector will report the failure of a link status if one is detected whilst in operation.

3. **USB connector and update buttons**

   The MINI USB connection allows the firmware of the DARK1616 to be updated. To prepare the DARK1616 for a firmware update; power on the unit, press and hold down the reset button, press and hold down the identify button, release the reset button and then release the identify button a second after.

4. **Network SFP Connections**

There are 2 standard network data SFP sockets provided to allow redundant network connectivity if using Dante network audio protocol. They are both gigabit network connections. They accept standard SFP modules. The status LEDs flash to show when data is being correctly communicated with the attached switch.

If you require SFP modules then please email sales@glensound.com for a quotation.

Network Note

Factory default is to have the SFP & RJ45 sockets set to work in redundant mode.

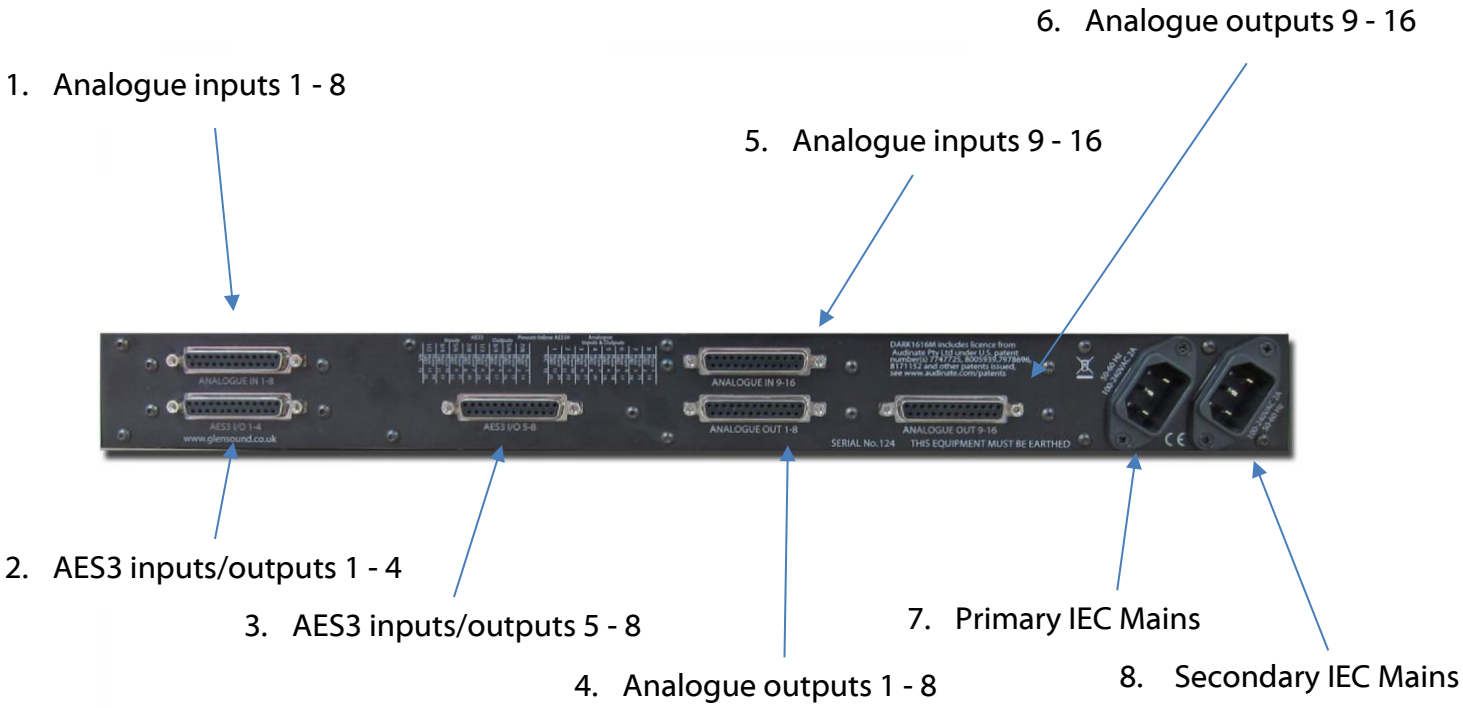
It is possible using Dante controller to set these network interfaces to work as a network switch instead of the redundant mode, meaning other network equipment can be connected to them.

5. **Network RJ45 connections**

There are 2 standard network data RJ45 sockets provided to allow redundant network connectivity if using Dante network audio protocol. They are both gigabit network connections. The status LEDs flash to show when data is being correctly communicated with the attached switch.

DARK1616 REAR PANEL LAYOUT

A detailed wiring table for the pins of all rear panel connections can be found at the end of the



1. Analogue inputs 1 - 8

A 25-way female D-type connector allows a breakout cable to be attached to send analogue line level (0dB) signals **in** to the DARK1616 on channels 1 - 8. This connector is wired to AES59 standard (also known as the Tascam standard).

The signals can then be routed via Dante to anywhere on a network or back out of the DARK1616S via it's analogue or AES3 digital outputs.

2. AES3 inputs/outputs 1 - 4

A 25-way female D-type connector allows a breakout cable to be attached to send and receive 1 – 4 balanced digital AES3 signals. This audio can be routed to anywhere on a network via Dante.

AES3 digital inputs signals always take priority over analogue inputs.

Therefore, sending an input to channel 1 in both digital and analogue domains will result in the digital signal being accepted and the analogue signal being disregarded.

Despite this, the DARK1616 will always ouput audio simultaneously to both digital and analogue connections.

3. **AES3 inputs/outputs 5 – 8**

A 25-way female D-type connector allows a breakout cable to be attached to send and receive balanced digital AES3 signals on channels 5 - 8. This audio can be routed to anywhere on a network via Dante.

4. **Analogue outputs 1 – 8**

A 25-way female D-type connector allows a breakout cable to be attached to send analogue audio signals **out** of the DARK1616 on channels 1 - 8. This connector is wired to AES59 standard (also known as the Tascam standard).

The signals output from this connection can be audio received via the Dante network.

5. **Analogue inputs 9 – 16**

A 25-way female D-type connector allows a breakout cable to be attached to send analogue line level (0dB) signals from channels 9 - 16 **in** to the DARK1616S. This connector is wired to AES59 standard (also known as the Tascam standard).

The signals can then be routed via Dante to anywhere on a network or back out of the DARK1616 via it's analogue or AES3 digital outputs

6. **Analogue outputs 9 – 16**

A 25-way female D-type connector allows a breakout cable to be attached to send analogue signals **out** of the DARK1616 on channels 9 - 16. This connector is wired to AES59 standard (also known as the Tascam standard).

The signals output from this connection can be audio received via the Dante network

7. **Primary IEC Mains**

The standard IEC C14 mains inlet accepts external AC voltages of 100–240 V~, 50/60 Hz, 2 A, 75 W max. There is a non-accessable internal fuse for this input.

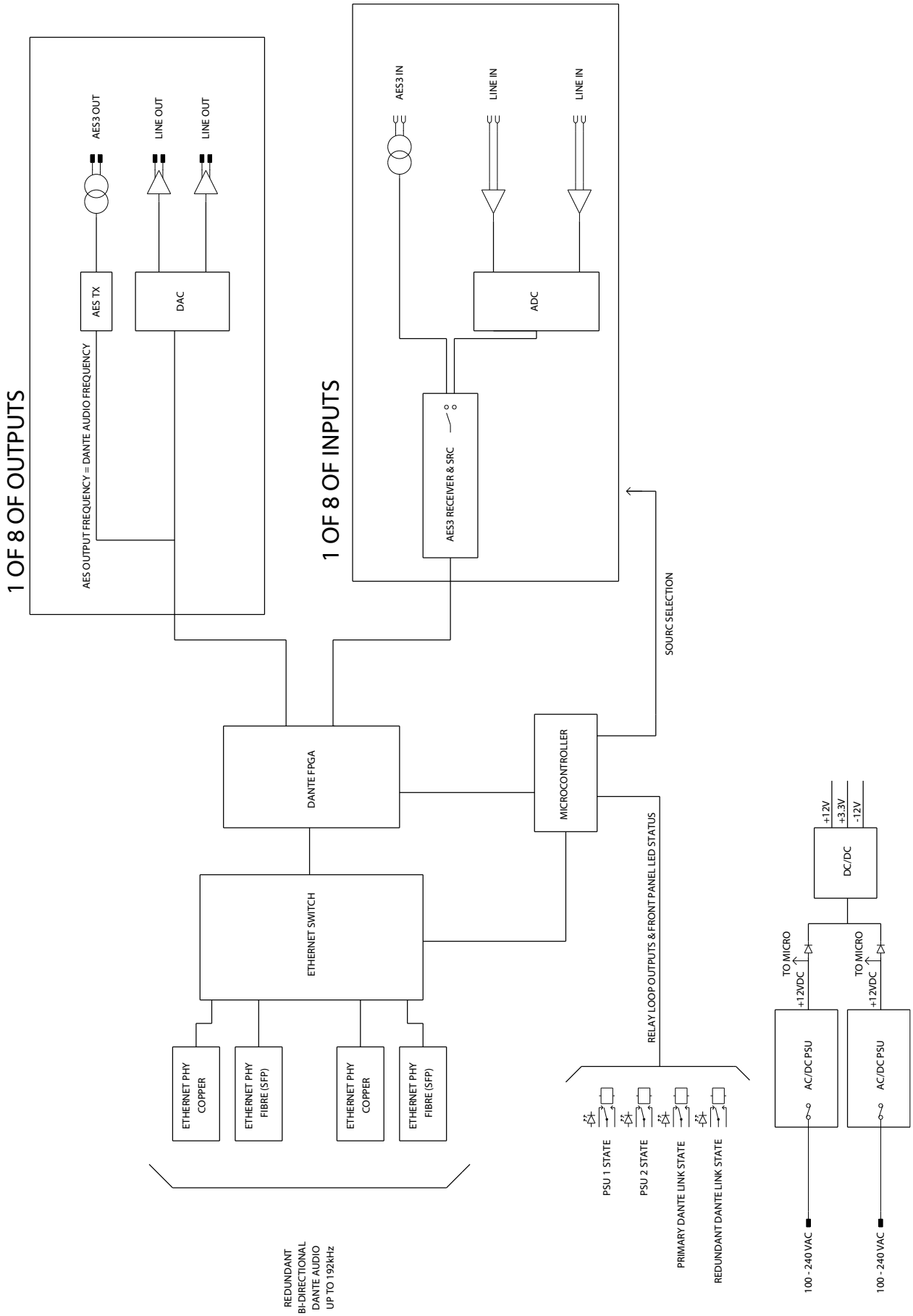
The DARK1616 is designed to operate with either primary or secondary mains sources or both for power redundancy.

8. **Secondary IEC Mains**

The standard IEC C14 mains inlet accepts external AC voltages of 100–240 V~, 50/60 Hz, 2 A, 75 W max. There is a non-accessable internal fuse for this input.

The DARK1616 is designed to operate with either primary or secondary mains sources or both for power redundancy.

SIMPLIFIED BLOCK DIAGRAM



CONNECTING THE DARK1616 TO A DANTE NETWORK

The Dark1616 is a network audio device utilizing the reliable and versatile Dante audio over IP protocol. Dante is a proprietary system (although very widely used) the originators of which are Audinate.

The information below is only meant as a very basic guide. Full details of the power of Dante network audio and instructions for using it can be found at www.audinate.com

Getting Dante Controller

If you are connecting the product to a new Dante network the first thing you will need to do is to get the free Dante controller software from Audinate.
This can be downloaded by visiting Audinate's web site at www.audinate.com

Connecting Dark1616s To The Network

Dark1616s can be connected to the network that you are going to use for your audio distribution simply by plugging in either, and, or any of the network connections on the rear. Once connected to the network it will be possible to see the Dark1616 from within the Dante controller and route its' audio circuits.

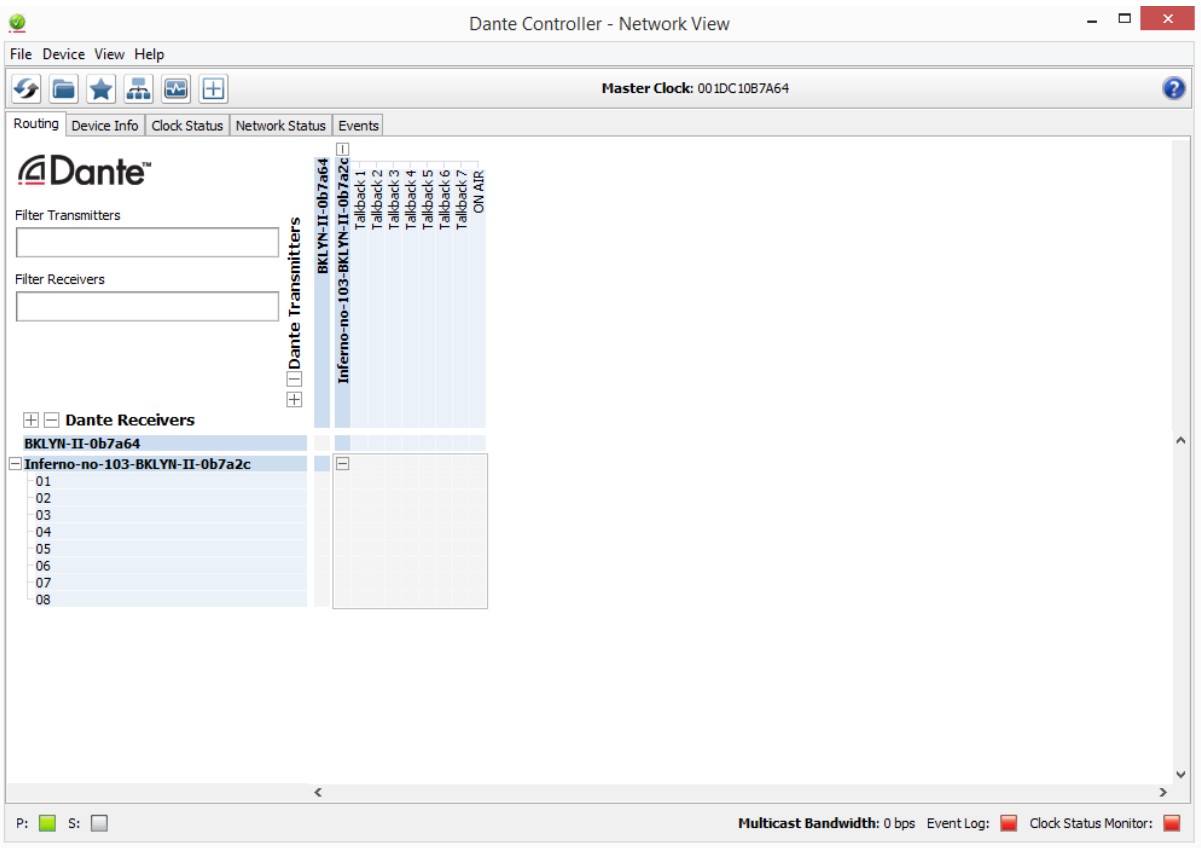
Audio Over IP Network

We strongly recommend that you consider your network topology carefully and would not recommend sharing broadcast audio and general data on the same network.

For more details of audio over IP network structure please visit www.audinate.com

Running Dante Controller

At the time of writing this manual the Dante Controller looks as per the screenshot below:



The product will have been named at the factory during test to allow them to be identified by the Dante controller.

The format used for the factory name is:

‘Dark1616-no-103-BKLYN-II-ob7a2c’

Where ‘Dark1616-no-103’ refers to the Glensound product i.e. Dark1616 and its serial no (in this case 103) and ‘BKLYN-II-ob7a2c’ refers to the units Dante Brooklyn II module and its MAC address.

Dante Controller TIP

If you have never run Dante controller before then make sure that on the bottom left of the Dante controllers’ screen ‘P’ or ‘S’ is next to a green square as this indicates that it is connected to a network. By clicking ‘P’ or ‘S’ a pop up box opens to allow you to set what network interface the controller is using.

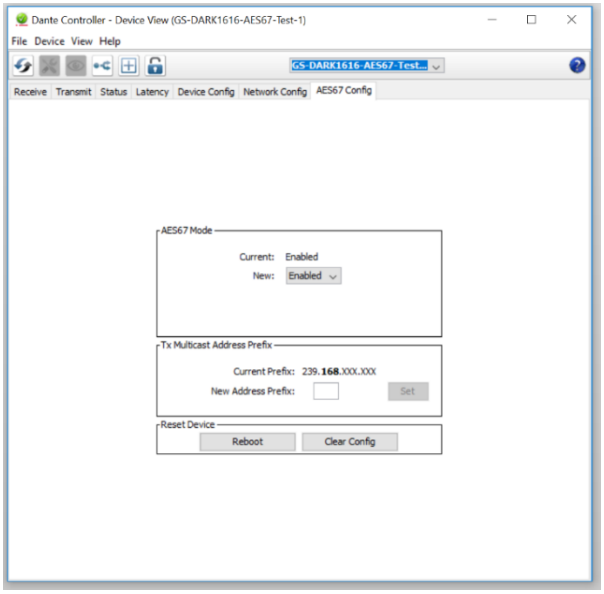
AES67 MODE

The Dark1616 uses a module from Audinate called a Brooklyn Module for its network audio interface. Audinate are the company behind Dante® and as such the module's primary network audio protocol is Dante®, however Audinate have enabled their module to comply with AES67 and therefore the Dark1616 can be set to AES67 mode for interaction with other AES67 devices.

Please note however that Glensound are relying on Audinate's AES67 interface and are unfortunately not able to provide full AES67 support for the unit. AES67 support should be sought directly from Audinate.

1. Turning On AES67 Mode

If you want to use your Dark1616 on an AES67 network and it has not been set to AES67 mode then this can be set in Dante controller by double clicking the Dark1616 to open the Device View window where you will find an AES67 tab to enable AES67 support.

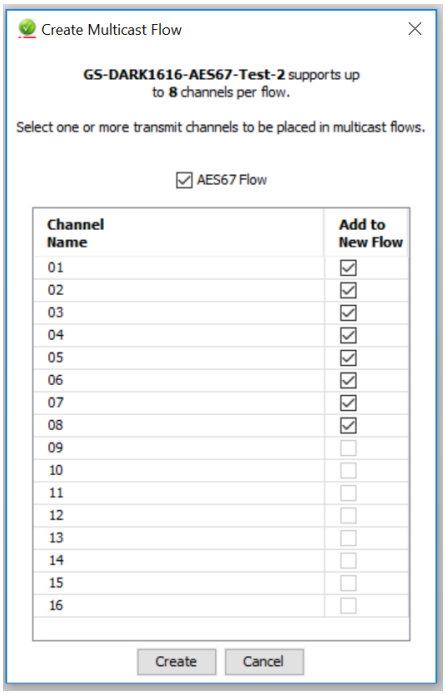


Once the AES67 drop down box has been enabled you'll have to reboot the Daek1616 for the change to take effect. After the reboot go back to the AES67 tab and set the multicast prefix address to one that is suitable for your newtork.

2. Sending AES67 Audio

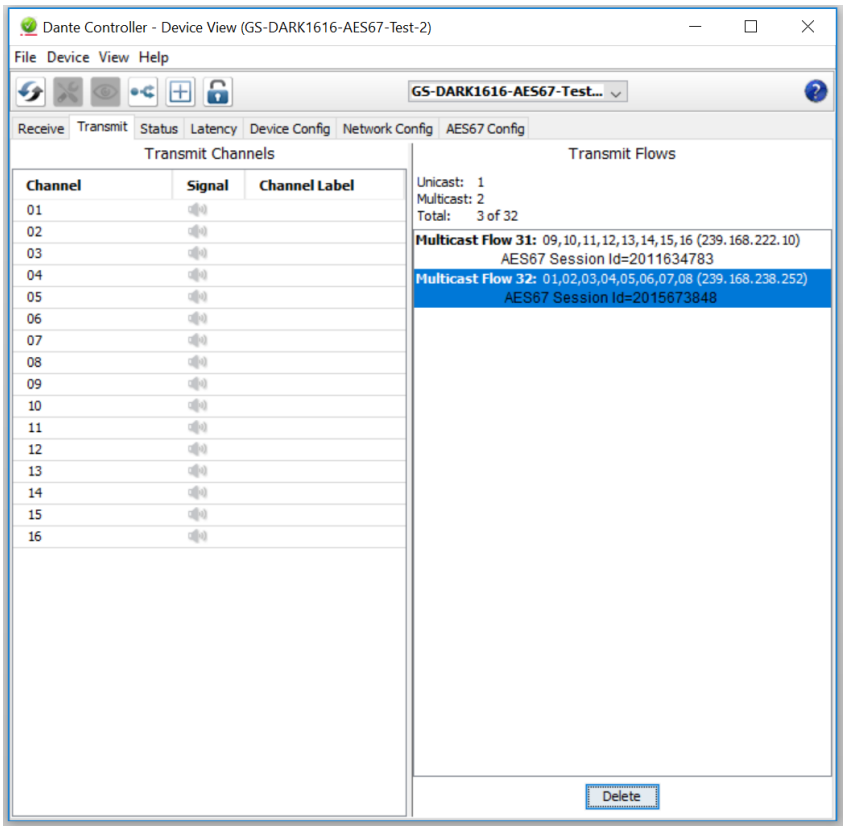
To transmit AES67 audio to the network a multicast flow must first be setup.

This is done by selecting the 'Create New Multicast Flow' Icon in the Device View.



Tick the AES67 Flow check box, then select up to 8 channels to be included in the flow then click 'Create'

Once set the flows can be seen in the transmit tab of the device view.



3. Receiving AES67 Audio

Once a compatible AES67 stream is detected on the network by Dante Controller the AES67 flows will appear in the Dante Transmitters section in the Routing tab.

4. AES67 Restrictions

AES67 flows can only be generated with the following constraints:

- Multicast Only
- Non-redundant
- Destination address in range 239.nnn.0.0 to 239.nnn.255.255 (239.nnn/16), port 5004
- 48kHz sampling rate
- 24 bit linear (L24) encoding
- 1 msec packet time
- Up to 8 channels per stream

Received AES67 flows have the following constraints:

- Multicast Only
- Non-redundant
- Destination address in range 239.nnn.0.0 to 239.nnn.255.255 (239.nnn/16), port 5004. Must match destinatio address range.
- 48kHz sampling rate
- L16 or L24 encoding
- 125usec, 250usec, 333usec, 1 msec packet time
- Up to 8 channels per stream

UPDATING FIRMWARE

Equipment needed

- A windows based PC
- USB Type A to Mini B cable
- A copy of 'DfuSe Demo' software
- The latest firmware from Glensound
- A DARK1616M and mains power

Instructions

1. Download and install DfuSE Demo
   'DfuSE Demo' is a firmware updating tool that is required for loading new firmware on to the DARK1616.

   It can be downloaded from the STMicroelectronics website found here: https://goo.gl/AbzhsA. It is the file named "STSW-STM32080".

   Once you have downloaded this file you will need to extract the .exe "DfuSe_Demo_V3.0.5_Setup.exe", then run and install it.

2. Install DFuSE driver

   Once DFuSE is installed, navigate to the following location on your machine:

   C:\Program Files(x86)\STMicroelectronics\Software\DfuSe v3.0.6\Bin\Driver\Win10

   You now need to run the following driver.
   -If your machine is 64 bit run 'dpinst_amd64.exe'
   -If your machine is 32 bit run 'dpinst_x86.exe'

   This will install the driver you need.

3. Connect To A PC

Figure 1 Front panel USB connector

Connect the DARK1616 to the PC via the USB cable. The Mini USB connector is located on the front panel of the DARK1616.

4. <u>Firmware update preperation</u>

   To prepare the DARK1616 for a firmware update;

   1. Power on the unit
   2. Press and hold down the reset button
   3. Press and hold down the identify button
   4. Release the reset button and then release the identify button a second after

   Your PC should make an audible sound when this process is successful as windows is detecting a new USB device.

5. <u>Loading the firmware</u>

   Now open DfuSe Demo. If the DARK1616 successfully entered DFU mode then it will appear as 'STM Device in DFU Mode' under the 'Available DFU Devices tab'.

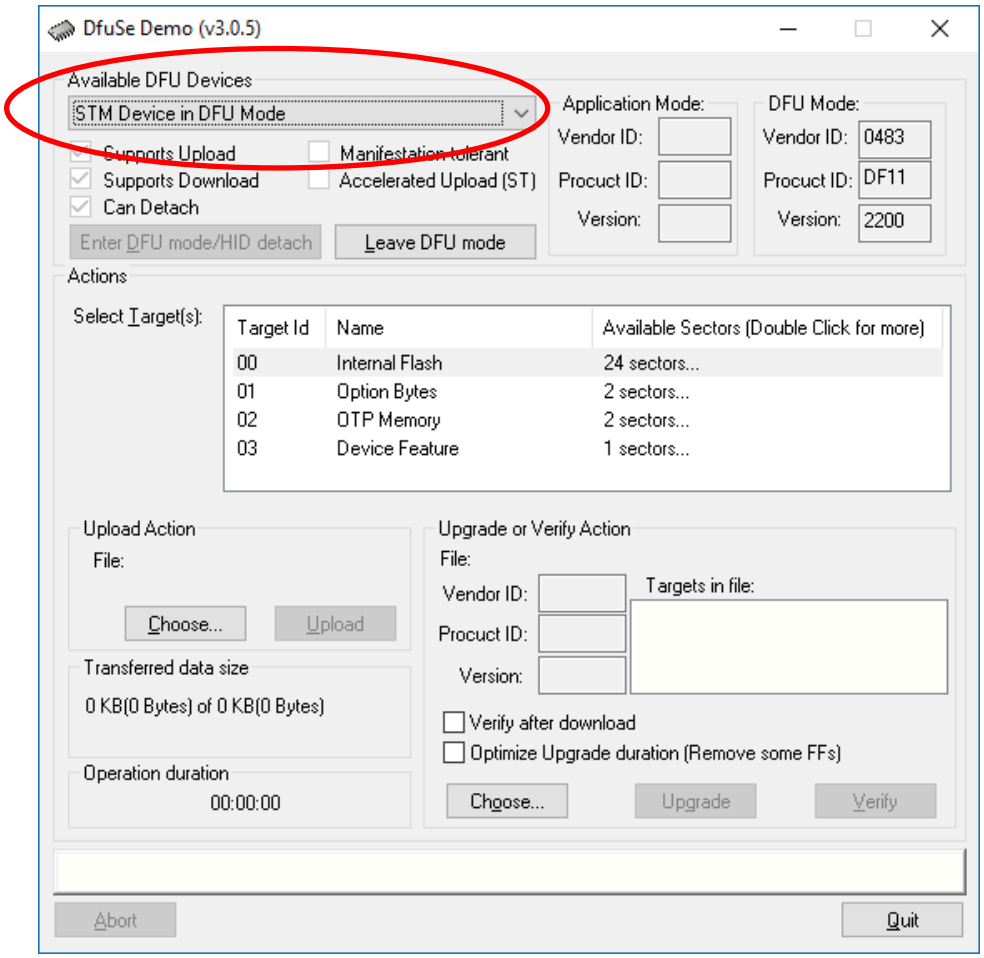


Figure 2 Device successfully recognised

Now the .dfu file needs to be selected so that DfuSe Demo knows the correct firmware to put on to the DARK1616.

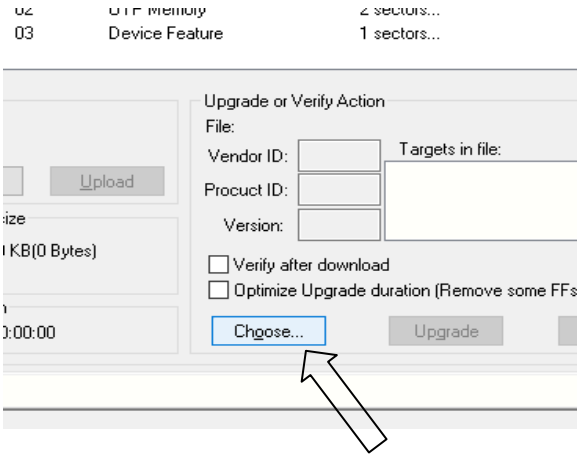


Figure 3 Choose .dfu file

Click choose and then select the .dfu file that you have obtained from Glensound. This will be located in your downloads folder by default.

If the file loads successfully then it will read along the bottom 'File correctly loaded'.

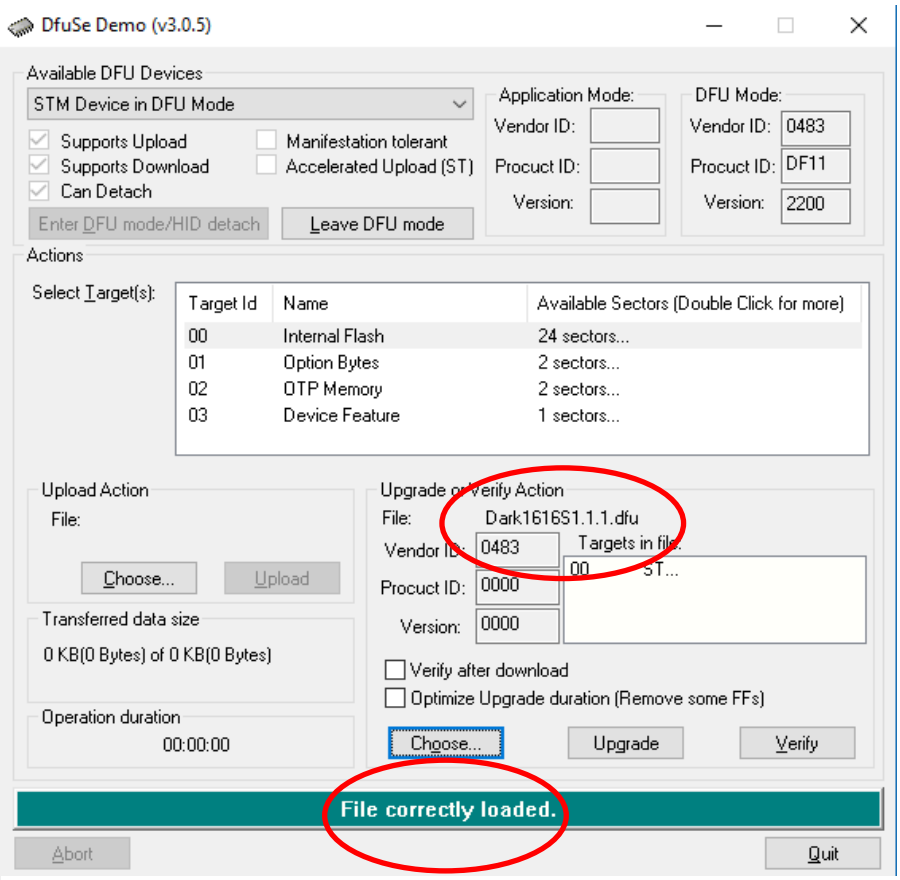


Figure 4 .dfu successfully loaded

6. Upgrading the DARK1616 firmware

The firmware is now ready to be put on to the DARK1616. Tick the 'Verify after download' box first and then click 'Upgrade'.

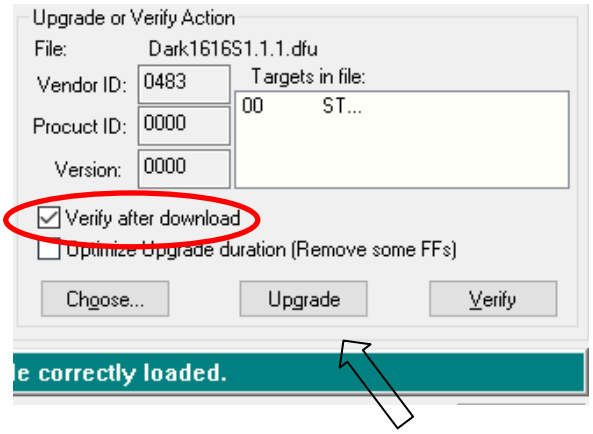


Figure 1 Upgrade

Click yes to proceed

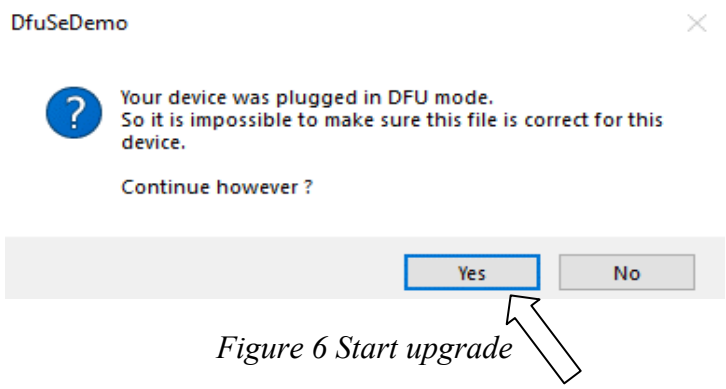


Figure 6 Start upgrade

The progress bar along the bottom will show the status of the operation.

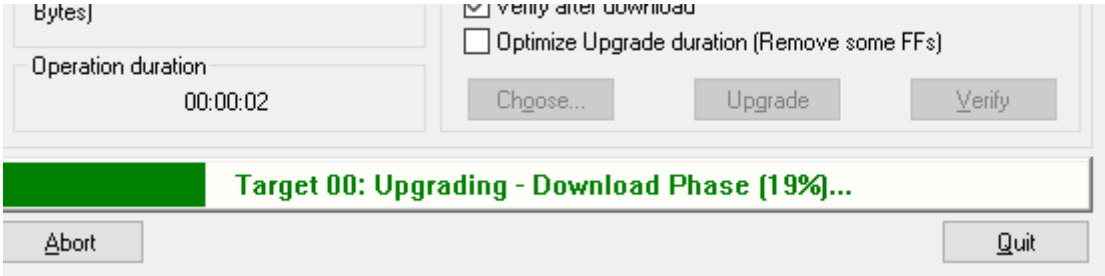


Figure 7 Upgrade status

If the operation was successful, DfuSe Demo will report that “Targery 00: Verify Successful!”.

You may also see that it will report how much data was successfully transferred.

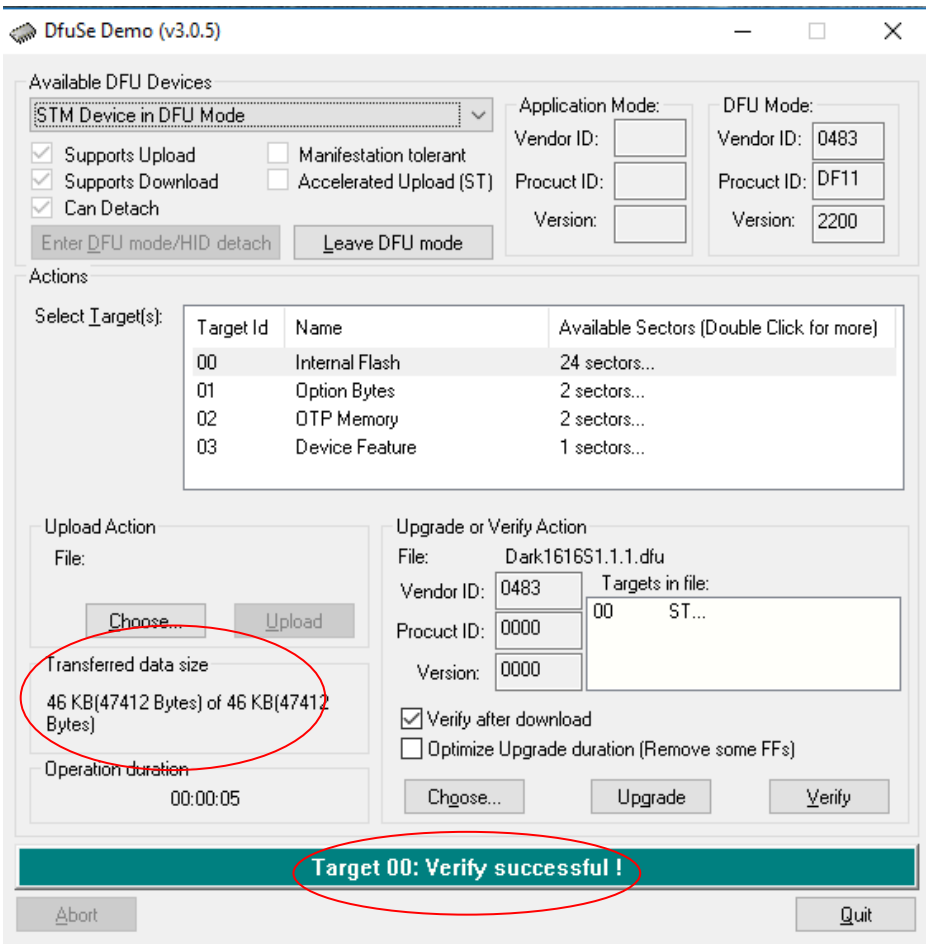


Figure 8 Successful upgrade!

7. <u>Final steps</u>

Now click “Leave DFU mode” to finish the procedure.

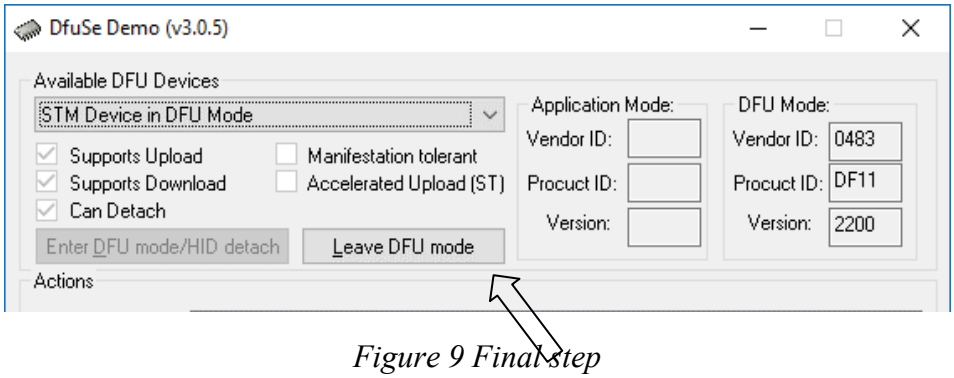


Figure 9 Final step

You may now disconnect the USB cable and continue to use the DARK1616 with the freshly updated firmware!

UPDATING THE DANTE FIRMWARE

Dante specific firmware runs on the Dante chipset in the device. This is updated seperately from the main device firmware.

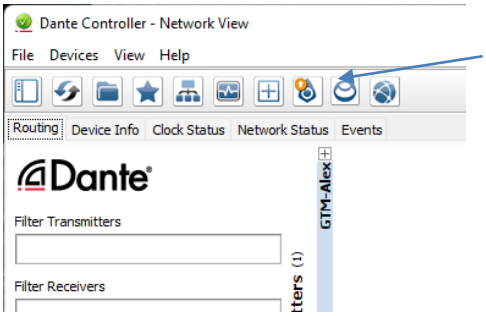
Updating the device

The firmware that runs in the Dante Chipset can be updated using the built-in Dante Updater in Dante Controller. Please ensure you have a connection to the internet.

If you want to update devices on a Dante network that is not connected to the Internet, you can download the files ahead of time to your computer, move the computer to the offline network, and then update the devices using the downloaded files.

Dante Updater displays a list of all online firmware files in the Library tab, so you can choose which files to download, or even download the entire database if you are not sure which files you will need. For further details please visit www.audinate.com

1.

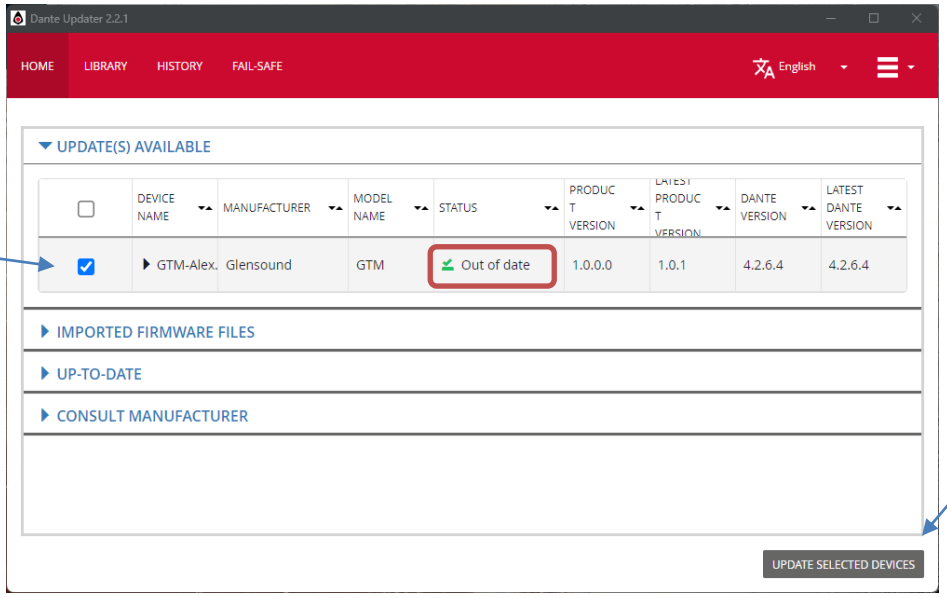


Dante controller notifies you if a device on your network is out of date.

Click the icon

2.

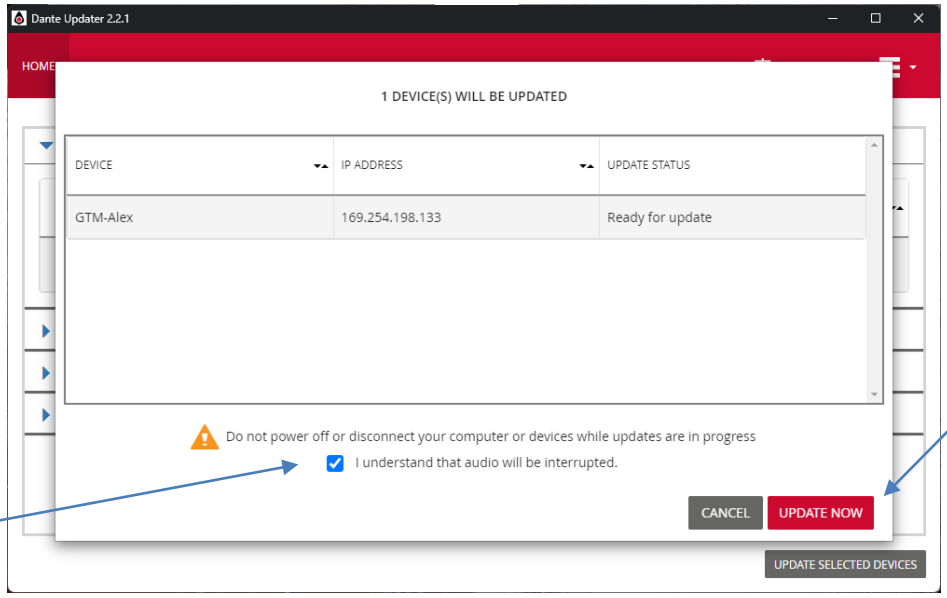
A. Tick the box to choose your unit for updating



B. Press to update device

3.

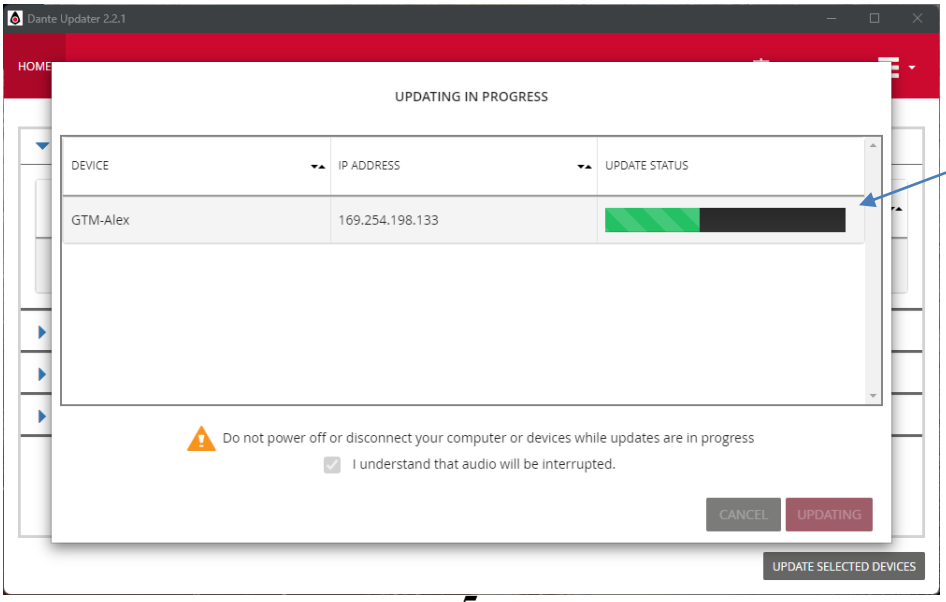
Caution! Audio will be interrupted during the device update



A. Tick box to confirm

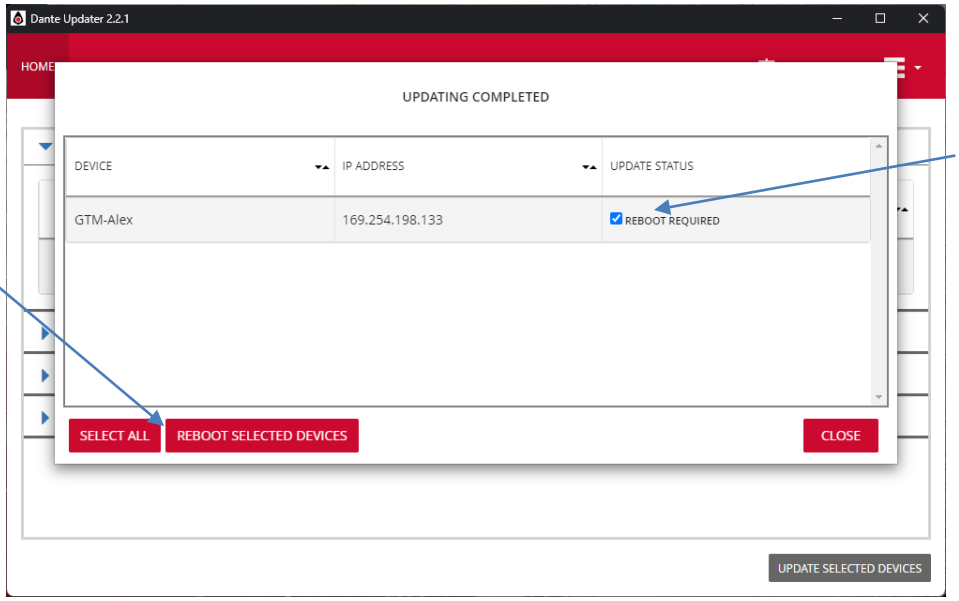
B. Press to update device

4.



Update is in progress

5.



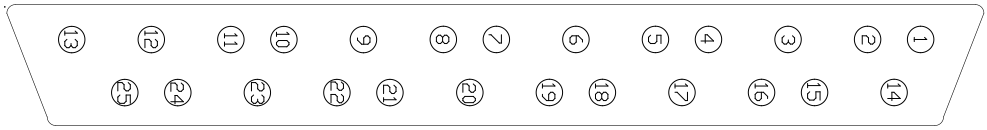
A. Update finished. Tick box to continue

B. Press to reboot device

Update finished, device will now reboot

WIRING INFORMATION

AUDIO I/O D25 SOCKET PIN OUT



The wiring used for the DARK1616 conforms to AES59 (Also known as the Tascam standard). Pre-made break out cables are available from a number of suppliers.

ANALOGUE AUDIO INPUTS 1 - 8

Input 1	Pins 24, 12, 25	In Phase, Mate, Ground
Input 2	Pins 10, 23, 11	In Phase, Mate, Ground
Input 3	Pins 21, 9, 22	In Phase, Mate, Ground
Input 4	Pins 7, 20, 8	In Phase, Mate, Ground
Input 5	Pins 18, 6, 19	In Phase, Mate, Ground
Input 6	Pins 4, 17, 5	In Phase, Mate, Ground
Input 7	Pins 15, 3, 16	In Phase, Mate, Ground
Input 8	Pins 1, 14, 2	In Phase, Mate, Ground

ANALOGUE AUDIO INPUTS 9 - 16

Input 9	Pins 24, 12, 25	In Phase, Mate, Ground
Input 10	Pins 10, 23, 11	In Phase, Mate, Ground
Input 11	Pins 21, 9, 22	In Phase, Mate, Ground
Input 12	Pins 7, 20, 8	In Phase, Mate, Ground
Input 13	Pins 18, 6, 19	In Phase, Mate, Ground
Input 14	Pins 4, 17, 5	In Phase, Mate, Ground
Input 15	Pins 15, 3, 16	In Phase, Mate, Ground
Input 16	Pins 1, 14, 2	In Phase, Mate, Ground

ANALOGUE AUDIO OUTPUTS 1 - 8

Output 1	Pins 24, 12, 25	In Phase, Mate, Ground
Output 2	Pins 10, 23, 11	In Phase, Mate, Ground
Output 3	Pins 21, 9, 22	In Phase, Mate, Ground
Output 4	Pins 7, 20, 8	In Phase, Mate, Ground
Output 5	Pins 18, 6, 19	In Phase, Mate, Ground
Output 6	Pins 4, 17, 5	In Phase, Mate, Ground
Output 7	Pins 15, 3, 16	In Phase, Mate, Ground
Output 8	Pins 1, 14, 2	In Phase, Mate, Ground

ANALOGUE AUDIO OUTPUTS 9 - 16

Output 9	Pins 24, 12, 25	In Phase, Mate, Ground
Output 10	Pins 10, 23, 11	In Phase, Mate, Ground
Output 11	Pins 21, 9, 22	In Phase, Mate, Ground
Output 12	Pins 7, 20, 8	In Phase, Mate, Ground
Output 13	Pins 18, 6, 19	In Phase, Mate, Ground
Output 14	Pins 4, 17, 5	In Phase, Mate, Ground
Output 15	Pins 15, 3, 16	In Phase, Mate, Ground
Output 16	Pins 1, 14, 2	In Phase, Mate, Ground

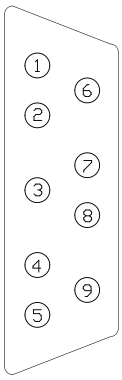
AES3 AUDIO INPUTS/ OUTPUTS 1 - 4

Input 1/2	Pins 24, 12, 25	In Phase, Mate, Ground
Input 3/4	Pins 10, 23, 11	In Phase, Mate, Ground
Input 5/6	Pins 21, 9, 22	In Phase, Mate, Ground
Input 7/8	Pins 7, 20, 8	In Phase, Mate, Ground
Output 1/2	Pins 18, 6, 19	In Phase, Mate, Ground
Output 3/4	Pins 4, 17, 5	In Phase, Mate, Ground
Output 5/6	Pins 15, 3, 16	In Phase, Mate, Ground
Output 7/8	Pins 1, 14, 2	In Phase, Mate, Ground

AES3 AUDIO INPUTS/ OUTPUTS 5 – 8

Input 9/10	Pins 24, 12, 25	In Phase, Mate, Ground
Input 11/12	Pins 10, 23, 11	In Phase, Mate, Ground
Input 13/14	Pins 21, 9, 22	In Phase, Mate, Ground
Input 15/16	Pins 7, 20, 8	In Phase, Mate, Ground
Output 9/10	Pins 18, 6, 19	In Phase, Mate, Ground
Output 11/12	Pins 4, 17, 5	In Phase, Mate, Ground
Output 13/14	Pins 15, 3, 16	In Phase, Mate, Ground
Output 15/16	Pins 1, 14, 2	In Phase, Mate, Ground

ALARMS D9 SOCKET PIN OUT



ALARMS

PSU1 Failure NC	Pin 1	Closed Contact when PSU1 fails
PSU1 Failure NO	Pin 6	Open Contact when PSU1 fails
PSU2 Failure NC	Pin 2	Closed Contact when PSU2 fails
PSU2 Failure NO	Pin 7	Open Contact when PSU2 fails
LINK Primary Failure NC	Pin 3	Closed Contact when Primary link fails
LINK Primary Failure NO	Pin 8	Open Contact when Primary link fails
LINK Secondary Failure NC	Pin 4	Closed Contact when Secondary link fails
LINK Secondary Failure NO	Pin 9	Open Contact when Secondary link fails
COMMON	Pin 5	Common for above (Internally linked to Ground)