



GlenSound

# DARK16AO

**DANTE® / AES67 NETWORK AUDIO  
16 ANALOGUE OUTPUT LINE LEVEL  
INTERFACE**

## **PRODUCT DETAILS**



# 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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General enquires: [office@glenSound.co.uk](mailto:office@glenSound.co.uk)

Technical enquires: [techinfo@glenSound.co.uk](mailto:techinfo@glenSound.co.uk)

Sales enquires: [sales@glenSound.co.uk](mailto:sales@glenSound.co.uk)

## 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.



**SAFETY WARNING**



The DARK16AO contains no user serviceable parts and **must not** be disassembled in any way.




## EU DECLARATION OF CONFORMITY FOR:

### **DARK16AO**

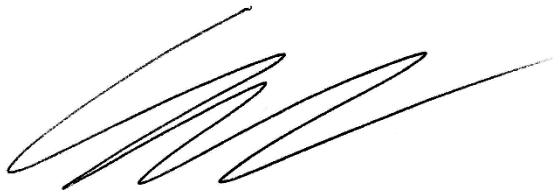
*Sixteen channel AoIP, Analogue Output interface*

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  marked and conforms to the following Union harmonisation legislation:

Low Voltage Directive:	EN60065 and EN62368-1:2014
Emissions:	BS EN55032:2015
Immunity:	BS EN55035:2017

Signed for and on behalf of Glensound Electronics Ltd.



Gavin Davis, Managing Director  
Maidstone, Kent, England

Date: 01/03/2019

# RoHS DIRECTIVE

EC directive 2002/95/EC 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%
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 DARK16AO

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Description

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## **OVERVIEW**

The Glensound DARK16AO is a digital to analogue converter designed to connect outputs from a DANTE®/ AES67 audio network to line level analogue audio inputs on 3<sup>rd</sup> party equipment.

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 DARK16AO DANTE® audio interface is compatible with all DANTE® audio interfaces across all manufacturers. Further details of DANTE® network audio can be found at [www.audinate.com](http://www.audinate.com)

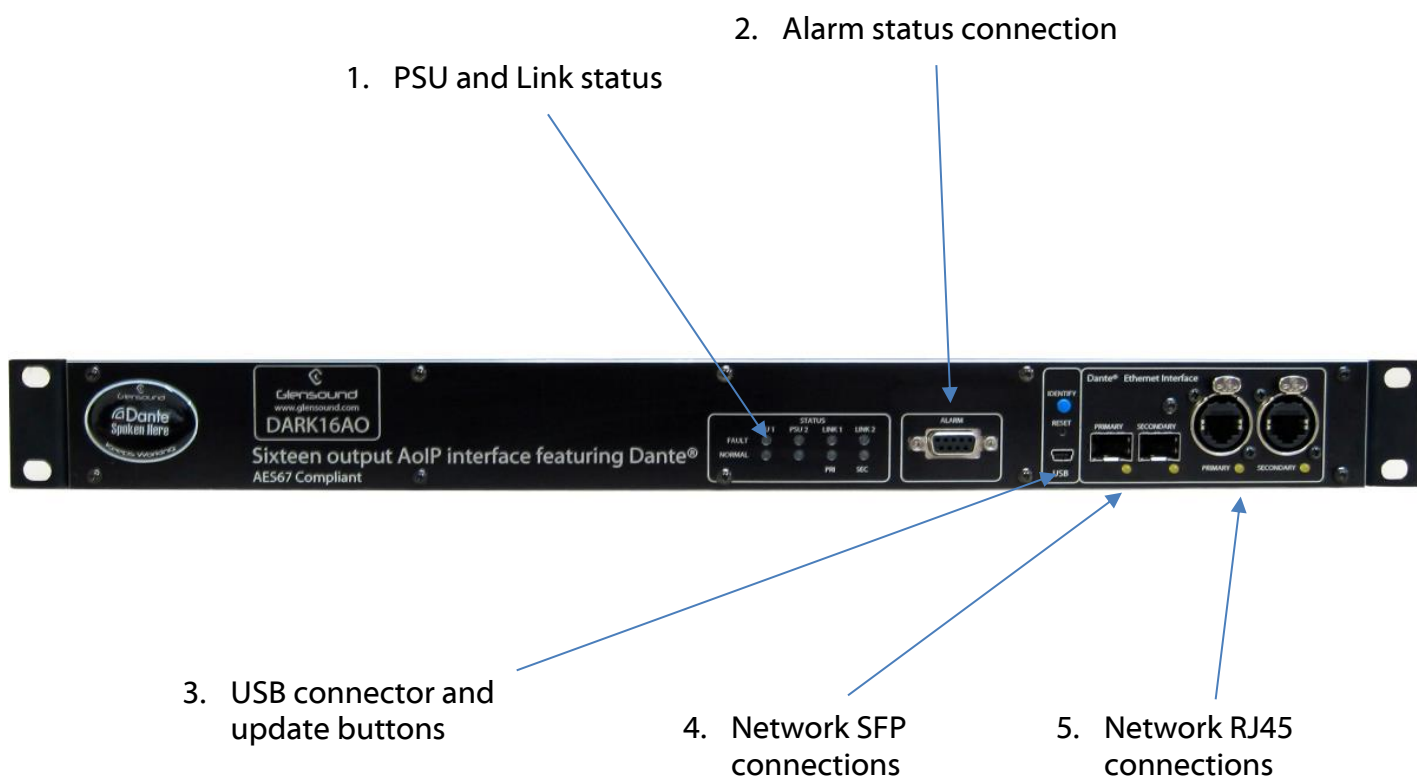
Intended for live on-air broadcast applications, the DARK16AO has been designed with multiple redundancy capabilities. It has 2 mains power sources and it also has fully redundant network connections for both Copper & Fibre circuits.

The DARK16AO provides 16 analogue line level (0dB) outputs from the DANTE® network. These outputs are provided on rear panel electronically balanced XLRs.

Internally the DARK16AO features a Brooklyn module from Audinate (the company behind Dante®). This module can be set such that it is AES67 compliant, and as therefore it can be integrated in an AES67 AoIP network instead of a DANTE® one if required.



## DARK16AO 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 DARK16AO 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 DARK16AO to be updated. To prepare the DARK16AO 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@glen sound.co.uk](mailto:sales@glen sound.co.uk) for a quotation.

##### *Network Note*

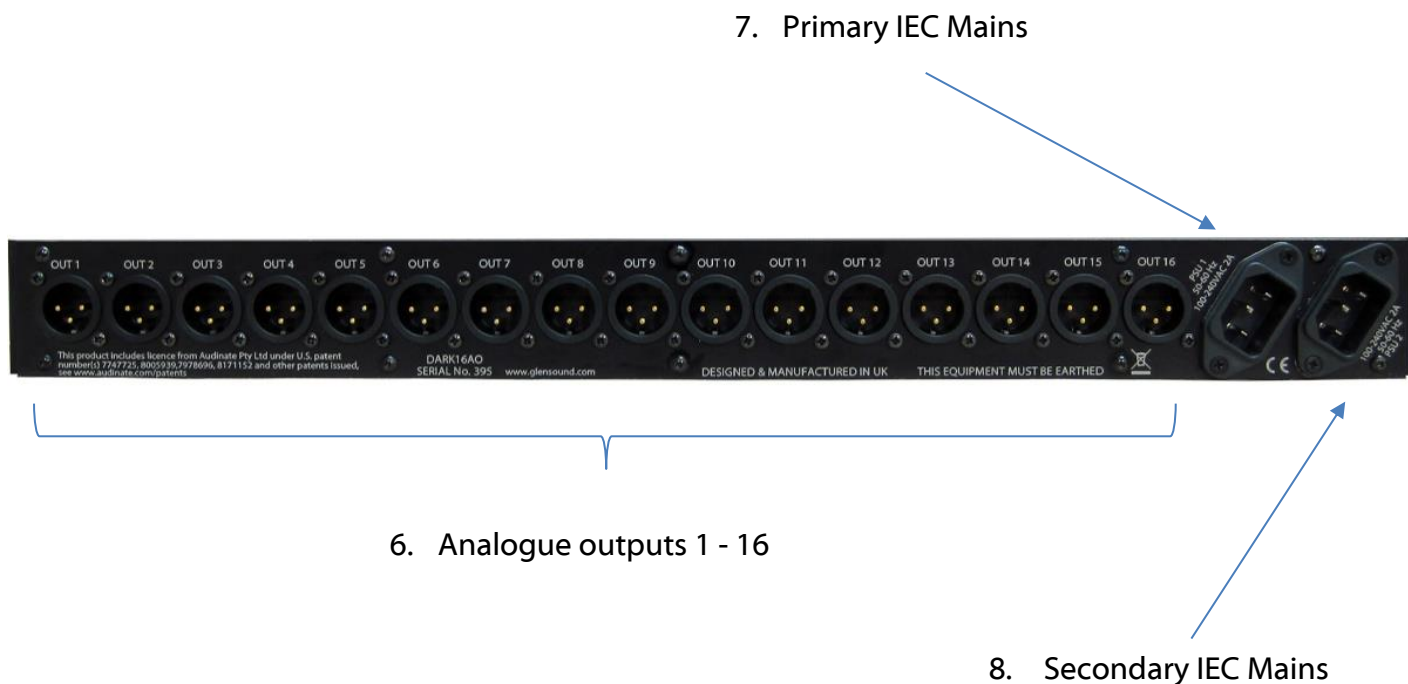
Factory default is to have the SFP & RJ45 sockets set to work in redundant mode.

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.

## DARK16AO REAR PANEL LAYOUT



### **6. Analogue outputs 1 – 16**

Each XLR provides one line level balanced audio channel output from the DANTE® network.

### **7. Primary IEC Mains**

The standard IEC mains plug accepts external AC voltages of 100 - 240 VAC +/- 10%. There is a non-accessable internal fuse for this input.

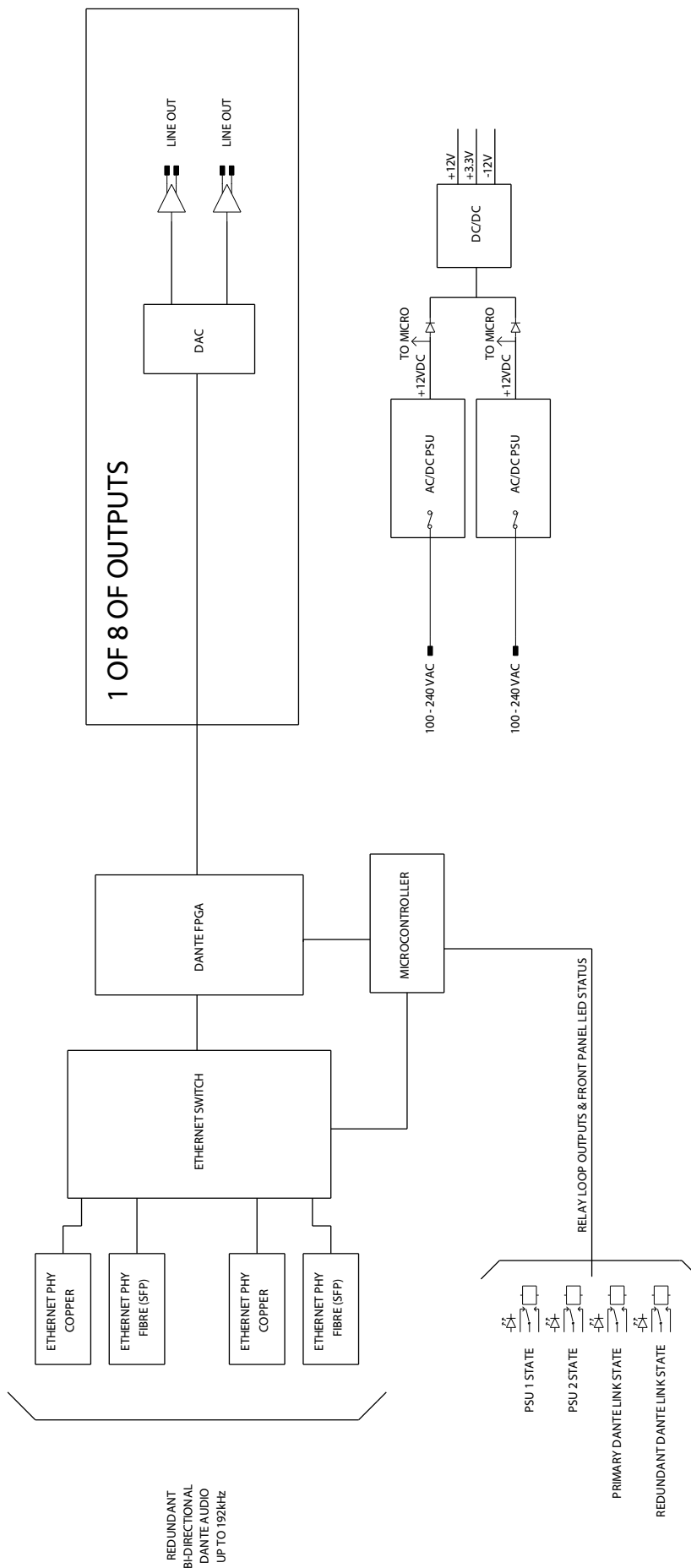
The DARK16AO is designed to operate with either primary or secondary mains sources or both for power redundancy.

### **8. Secondary IEC Mains**

The standard IEC mains plug accepts external AC voltages of 100 - 240 VAC +/- 10%. There is a non-accessable internal fuse for this input.

The DARK16AO is designed to operate with either primary or secondary mains sources or both for power redundancy.

# SIMPLIFIED BLOCK DIAGRAM



## **CONNECTING THE DARK16AO TO A DANTE® NETWORK**

The DARK16AO is a network audio device utilizing the reliable and versatile DANTE® audio over IP protocol. DANTE® is a widely used proprietary system made by Audinate.

For full details of the power of DANTE® network audio and instructions for using it, visit [www.audinate.com](http://www.audinate.com)

### **Getting Dante® Controller**

If you are connecting the DARK16AO 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](http://www.audinate.com)

### **Connecting DARK16AO To the Network**

The DARK16AO 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 front panel. Once connected to the network it will be possible to see the DARK16AO from within the Dante® controller and route its' audio circuits.

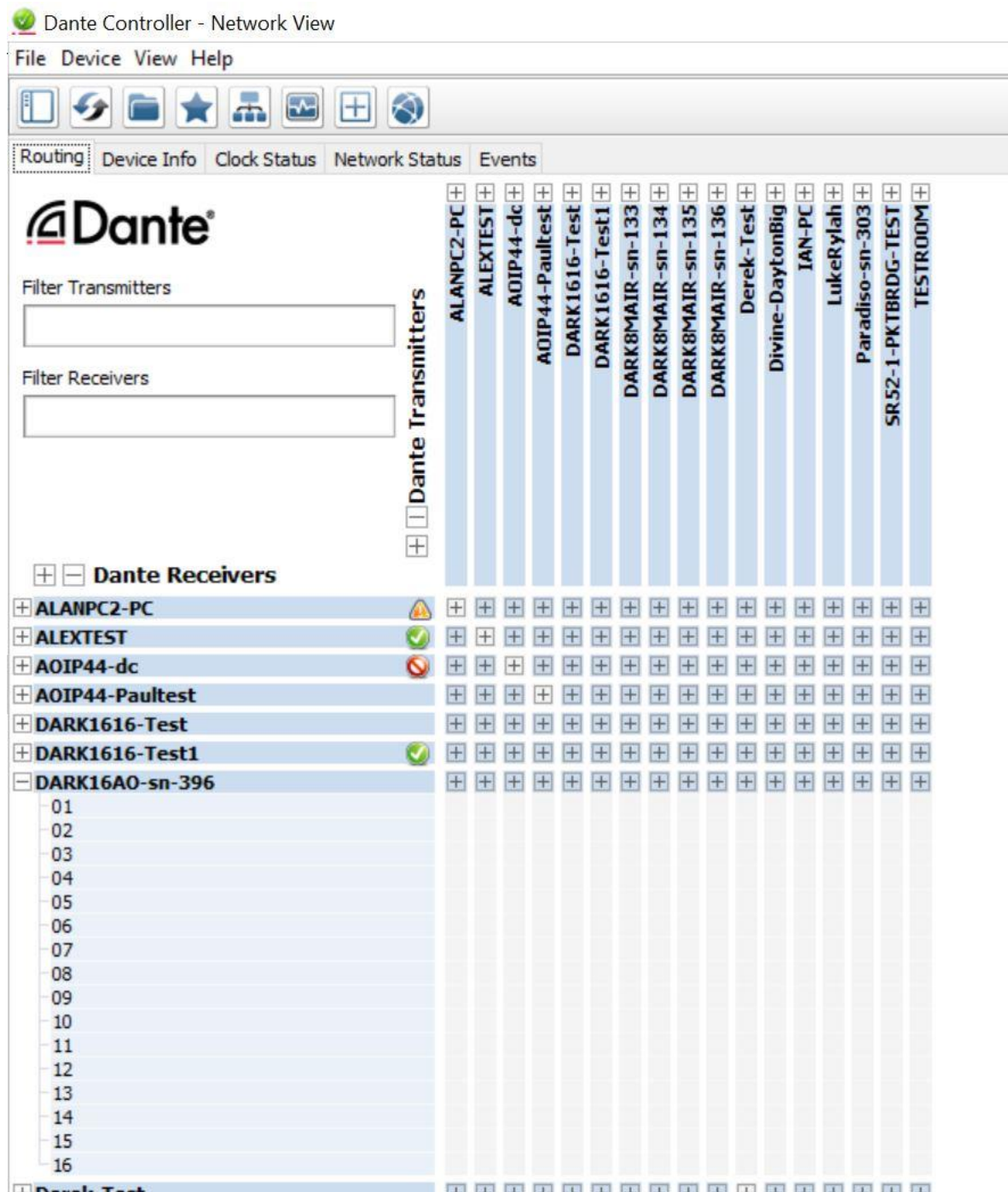
### **Audio Over IP Network**

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](http://www.audinate.com)

## Running Dante® Controller

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



The DARK16AO 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:

'DARK16AO-sn-396'

Where 'sn-396' refers to the its serial number of the unit.

### **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.

## UPDATING FIRMWARE

The DARK16AO is a complex digital audio system comprising of a DSP and several Micro Controllers. All these items run software and may need to be occasionally updated.

### 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 DARK16AO 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 DARK16AO.

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. Download firmware

The latest firmware for the DARK16AO can be found on the Glensound website, under the product page for DARK16AO. Once you have downloaded the file, place it in a folder or location of your choice.

Name	Date	Type	Size
 Dark1616S1.1.1.dfu	21/03/2018 11:18	DFU File	47 KB

*Figure 1 Example filename*

#### 3. Connect To A PC

Connect the DARK16AO to the PC via the USB cable. The Mini USB connector is located on the front panel of the DARK16AO.



*Figure 2 Front panel USB connector*



#### 4. Firmware update preparation

To prepare the DARK16AO 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. Loading the firmware

Now open DfuSe Demo.

If the DARK16AO successfully entered DFU mode then it will appear as 'STM Device in DFU Mode' under the 'Available DFU Devices tab'.

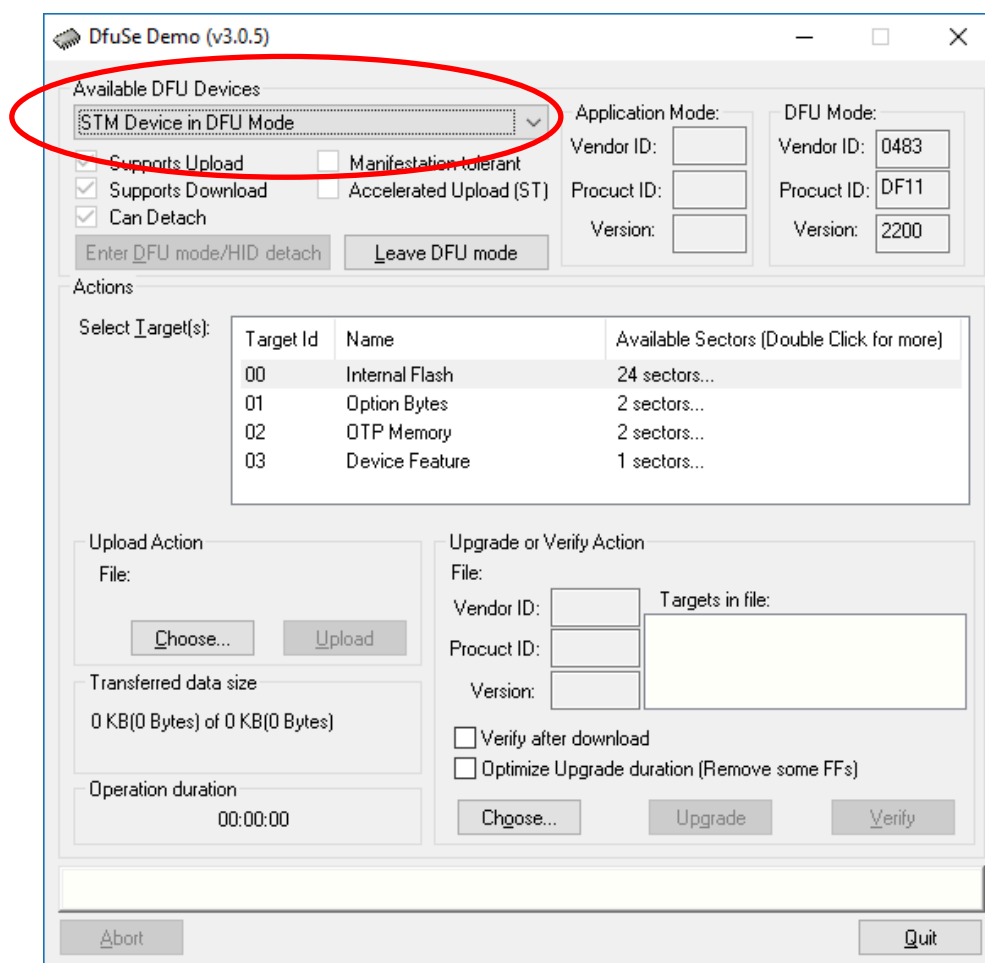


Figure 3 Device successfully recognised

Now the .dfu file needs to be selected so that DfuSe Demo knows the correct firmware to put on to the DARK16AO.

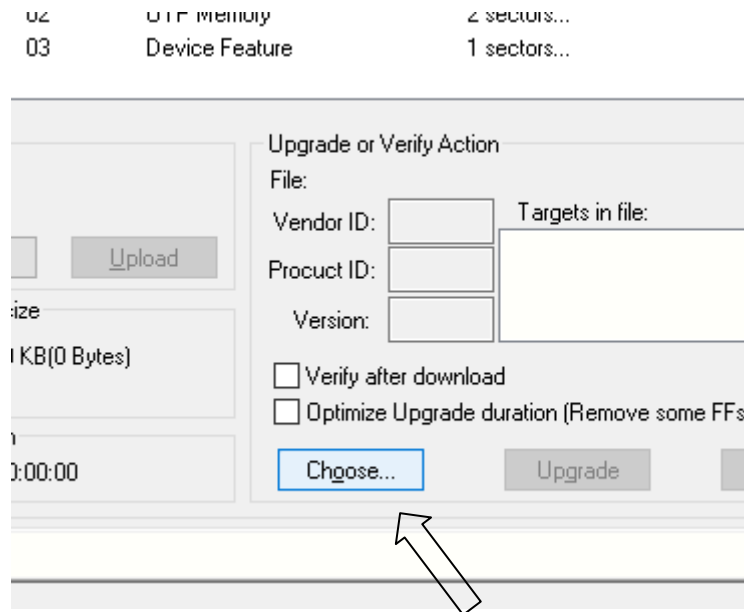


Figure 4 Choose .dfu file

Click choose and then select the .dfu file that you downloaded from the GlenSound website. 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'.

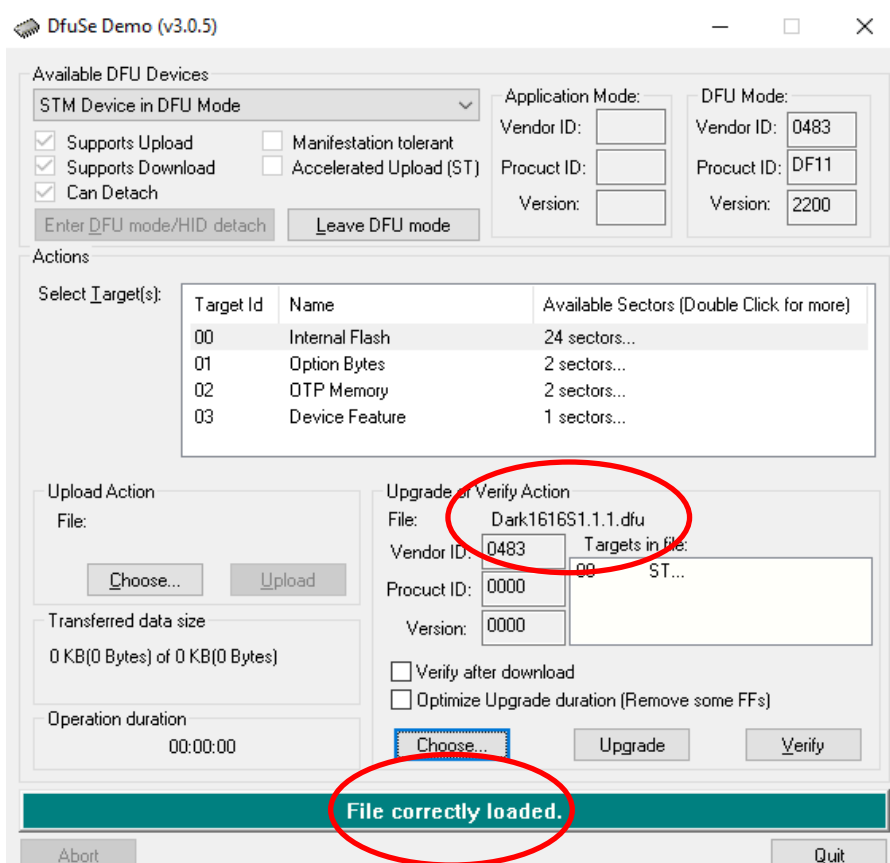


Figure 5 .dfu successfully loaded

## 6. Upgrading the DARK16AO firmware

The firmware is now ready to be put on to the DARK16AO. Tick the 'Verify after download' box first and then click 'Upgrade'.

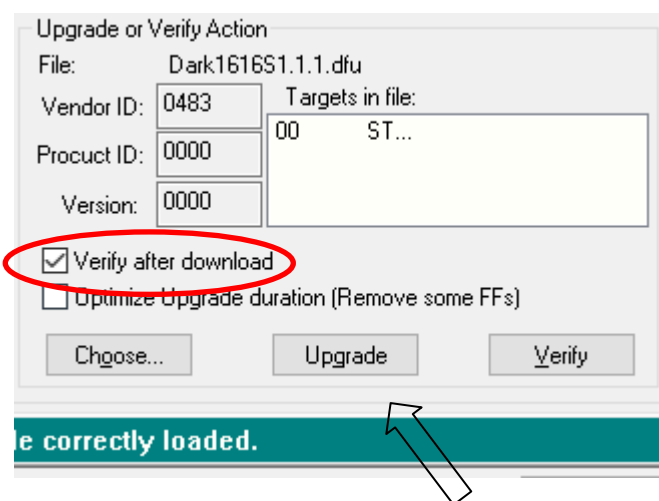


Figure 6 Upgrade

Click yes to proceed.

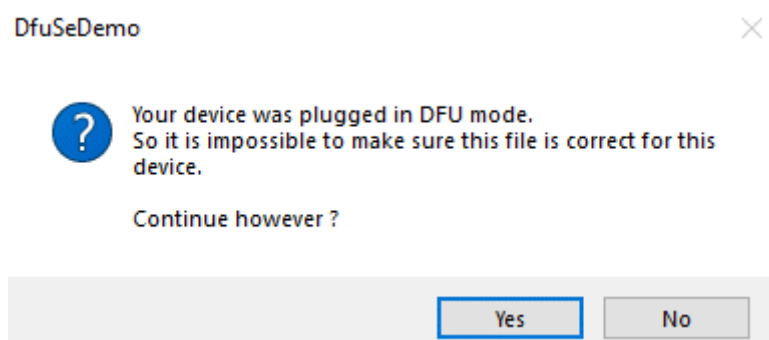


Figure 7 Start upgrade

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

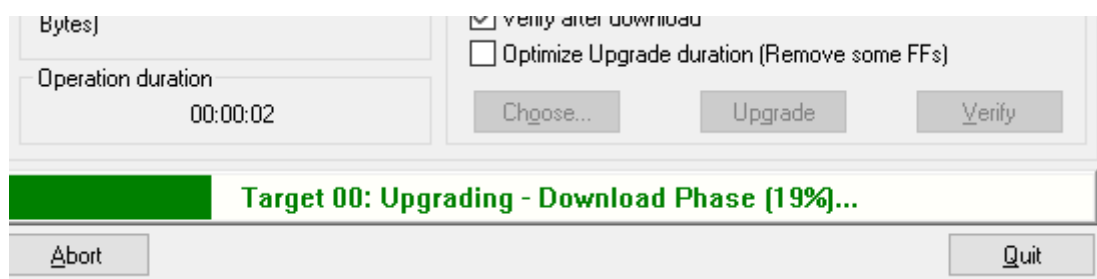


Figure 8 Upgrade status

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

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

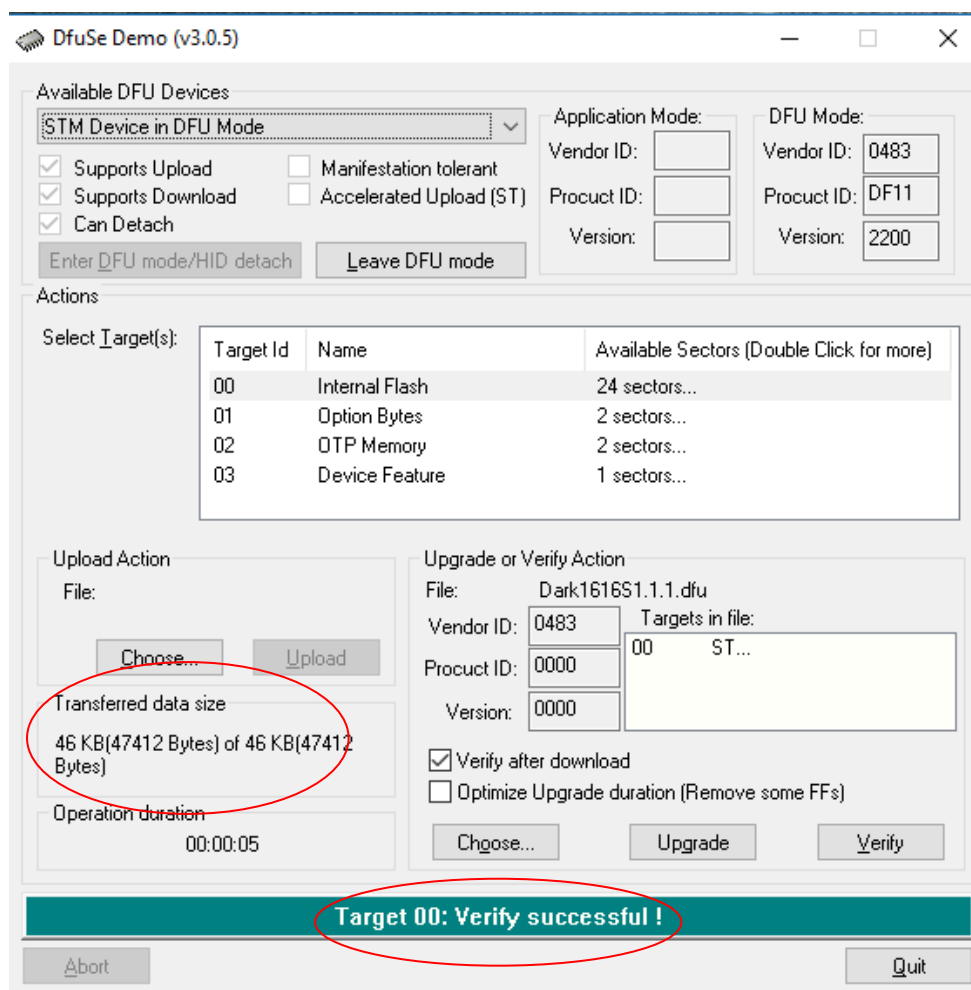


Figure 9 Successful upgrade!

## 7. Final steps

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

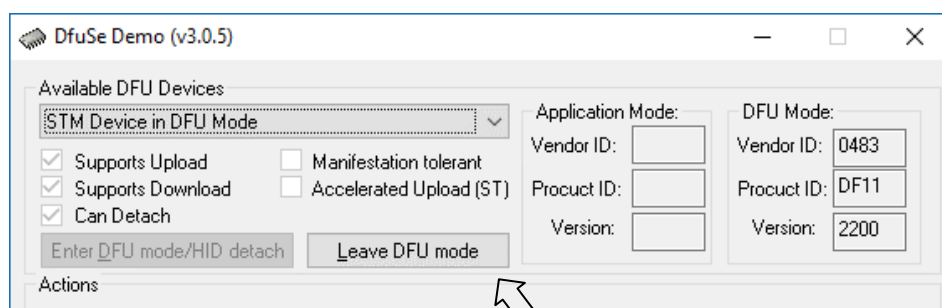


Figure 10 Final step

You may now disconnect the USB cable and continue to use the DARK16AO with the freshly updated firmware!

## **UPDATING THE BROOKLYN MODULE**

The Brooklyn module is a device supplied by Audinate that does most of the processing for the actual Dante®/ AES67 network audio streams. There is one Brooklyn module in each Dark16AO. We supply special code (a .dnt file) that sets up/ initiates the Brooklyn module and makes it work in particular way and we also run extra code on its internal microprocessor to make it work correctly with the Dark16AO.

### **1. Finding Out Current Installed Version**

Open Dante® Controller.

Open Device Info tab.

Double Click in the device that you are working with....a new window will open called 'Device View (name of device'

Open the status tab.

The Firmware Version (of the Brooklyn module) will be found under the 'Device Information' heading.

### **2. Finding Out What The Latest Available Version Is**

Go the Dark16AO's web page at <http://www.glen-sound.co.uk/product-details/dark-16AO/> and open the 'Firmware Latest Version' Tab.

This will give both the latest version numbers/ file names and also the location to download the file from.

### **3. Updating the Brooklyn Module**

The firmware that runs on the Brooklyn module is updated using Audinate's Firmware updating tool. The updating tool and a user guide can be downloaded from Audinate's website:

<https://www.audinate.com/products/firmware-update-manager>

Please note we strongly advise that when you do the update that only your PC and the Dark16AO that you want to update are on the network to save accidentally updating the wrong Dante® device.

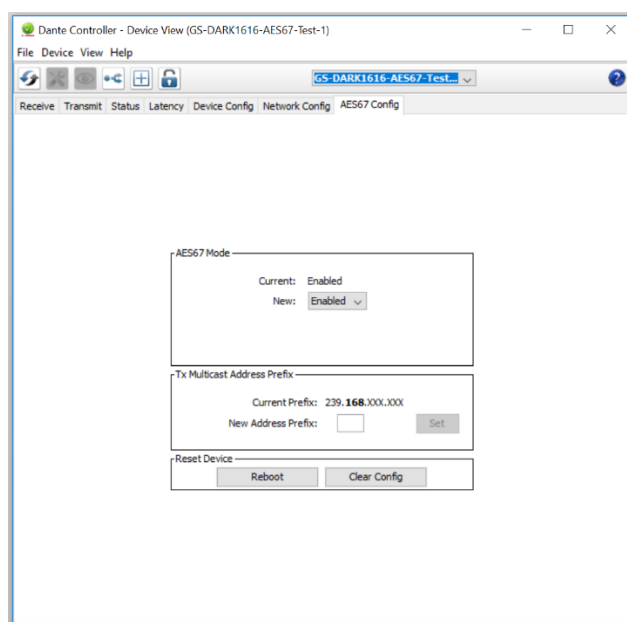
## AES67 MODE

The DARK16AO 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 DARK16AO 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 DARK16AO 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 DARK16AO 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 Paradiso 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 network.

## **2. 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.

## **3. AES67 Restrictions**

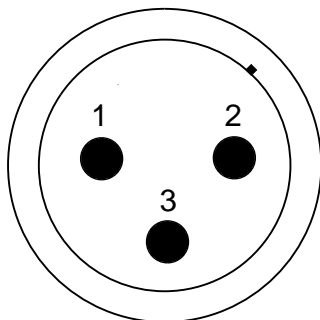
AES67 flows can only be generated with the following constraints:

- 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 destination address range.
- 48kHz sampling rate
- L16 or L24 encoding
- 125usec, 250usec, 333usec, 1 msec packet time
- Up to 8 channels per stream

## WIRING INFORMATION



XLR PLUG (MALE)

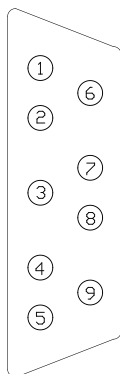
### STANDARD XLR AUDIO PINOUTS:

**1: Ground/ Earth**

**2: INPHASE/ POSITIVE/ MIC +**

**3: MATE/ NEGATIVE/ MIC -**

### ALARMS D9 SOCKET PIN OUT



#### ALARMS

**PSU1 Failure NC**

**PSU1 Failure NO**

**PSU2 Failure NC**

**PSU2 Failure NO**

**LINK Primary Failure NC**

**LINK Primary Failure NO**

**LINK Secondary Failure NC**

**LINK Secondary Failure NO**

**COMMON**

Pin 1

Pin 6

Pin 2

Pin 7

Pin 3

Pin 8

Pin 4

Pin 9

Pin 5

Closed Contact when PSU1 fails

Open Contact when PSU1 fails

Closed Contact when PSU2 fails

Open Contact when PSU2 fails

Closed Contact when Primary link fails

Open Contact when Primary link fails

Closed Contact when Secondary link fails

Open Contact when Secondary link fails

Common for above (Internally linked to Ground)