Network I/O - A16.D16

Dante Network I/O

User Guide

Revision: 1.0

Solid State Logic

OXFORD • ENGLAND

Solid State Logic
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Visit SSL at:
www.solidstatelogic.com

PLEASE READ ALL INSTRUCTIONS, PAY SPECIAL HEED TO SAFETY WARNINGS.

E&OE

December 2017

Document Revision History

FIRST VERSION	Revision 1.0	20th December 2017

Table of Contents

Introduction

Overview

A16.D16 is a 2U, 32-input and 32-output Dante I/O device featuring 4 SuperAnalogue™ mic/line inputs, 12 SuperAnalogue line inputs, 8 AES3 inputs, 16 SuperAnalogue line outputs, 8 AES3 outputs and 4 GPIO connections. All analogue audio, AES audio and GPIO connectors are 25-pin D-type.

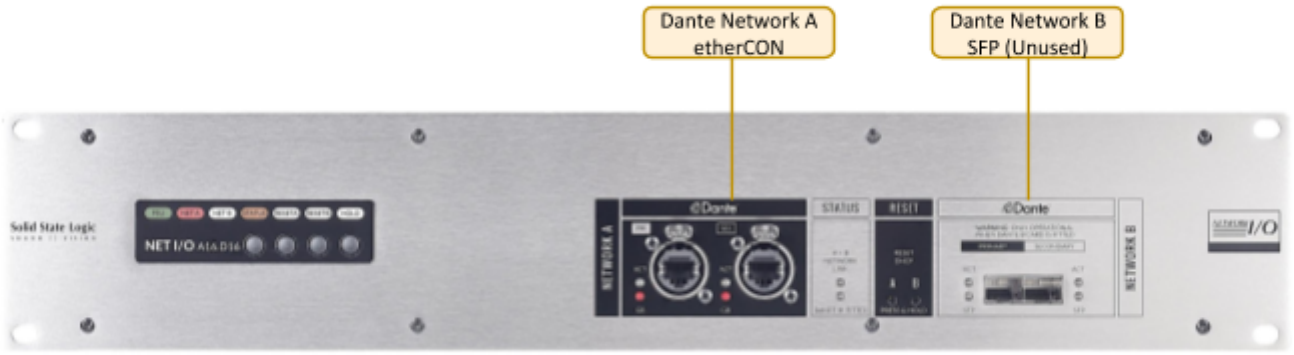
A16.D16 can be controlled remotely from SSL System T and SSL's Network I/O Controller app for PC.

A16.D16 is ideally suited for bulk analogue and AES I/O connections from control or machine rooms, featuring a high-density combination of analogue and digital inputs and outputs, GPIO, redundant power and network connections.

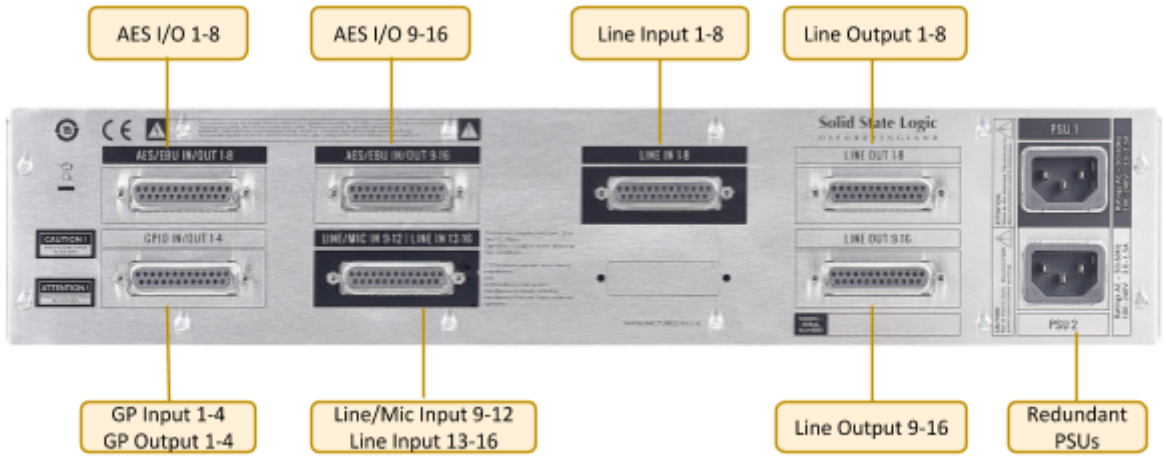
Key Features

- Interface between control/machine room analogue/AES connections and IP audio networks using Dante
- Redundant PSUs and Dante network connections
- 4 SSL SuperAnalogue Studio Grade preamps
- A further 12 line inputs and 16 line outputs
- 8 pairs of AES inputs and 8 pairs of AES outputs
- Device and parameter ownership assignment to avoid control conflicts
- Front facing Dante network connections
- Rear facing audio and GPIO connections
- Silent operation - no cooling fans

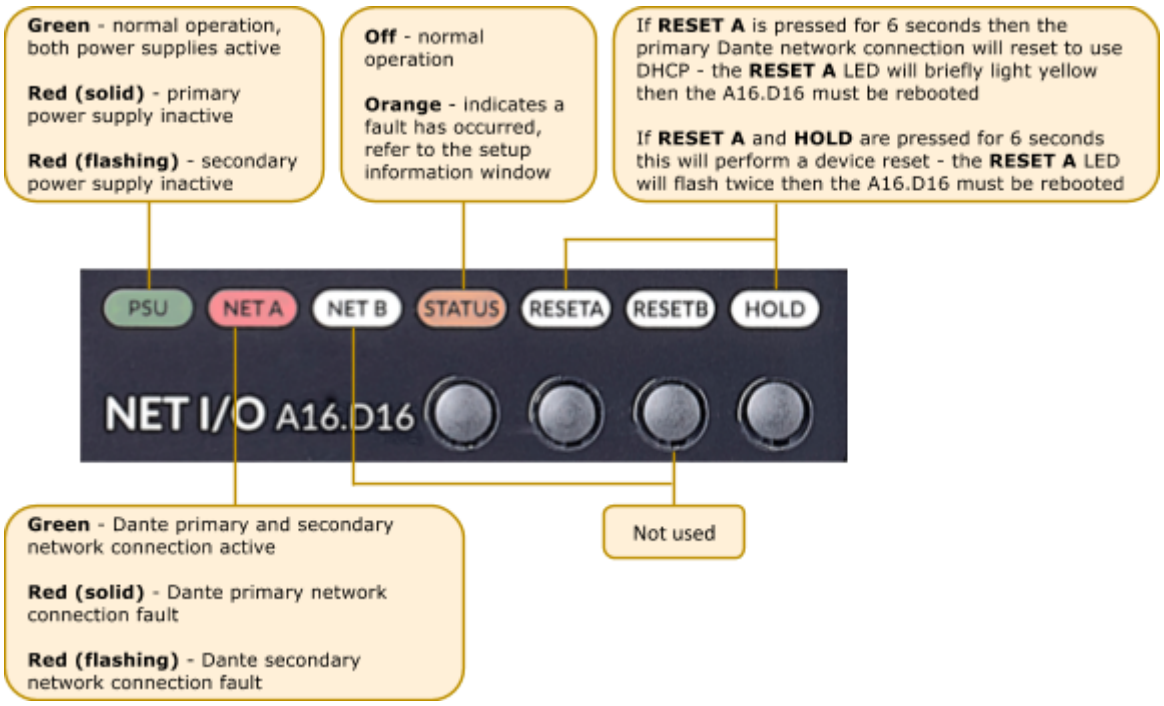
A16.D16 Front Panel



A16.D16 Rear Panel

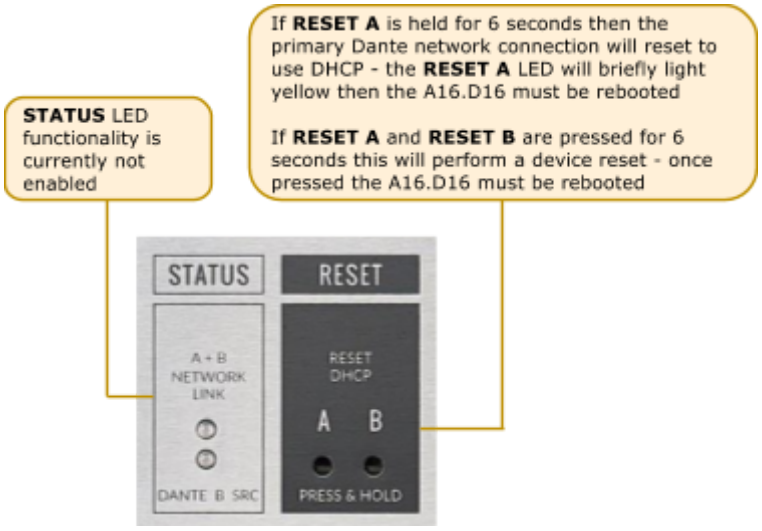


Status LEDs and User Buttons



Status and Reset

These reset buttons have the same functionality as the front-facing RESET A and RESET B user buttons.



Device Reset

Performing a device reset will clear the SSL device settings. This includes ownership, input and GPIO states. This does not clear Dante Brooklyn card settings.

Brooklyn Reset

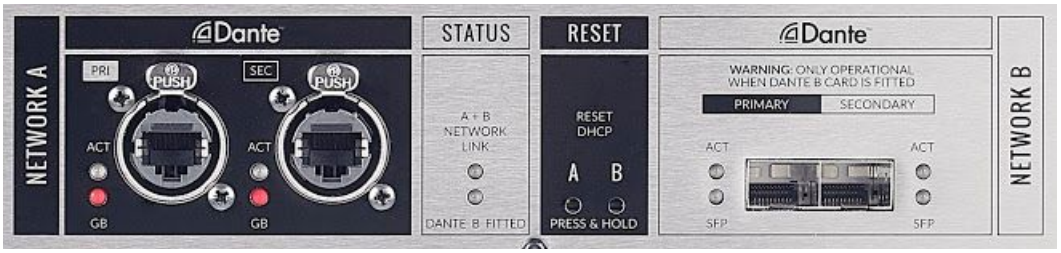
Resetting the Dante Brooklyn card to default settings is performed from Dante Controller. Under the 'Device Config' tab for a device select 'Clear Config'. This clears the device name, channel labels, IP address settings, sample rate, latency and existing audio routes. This does not clear SSL Ownership settings.

Hardware Connections

Mains Power Connections

The A16.D16 includes redundant PSUs with IEC connectors; either supply can individually power the unit. Ideally these should be connected to separate power circuits to provide redundancy of incoming AC power.

Dante Connections



A16.D16 has two redundant sets of network connections. The Network A ports feature etherCON ruggedised RJ45 connectors. The Network B ports are SFP cages which can be fitted with either RJ45, single-mode or multi-mode LC fibre connectors. This connectivity would require an additional Dante card which is not currently available.

Note: Network B functionality is currently not enabled.

Connecting a PC

SSL Network I/O Controller PC Application

When the A16.D16 is used without an SSL console, configuration and control is achieved using the SSL Network I/O Controller PC application. This can be downloaded from the SSL website.

Double-click the downloaded file to run the installer, then follow the on-screen instructions.

Once the application has installed, connect the Windows PC to the same subnet as the A16.D16. The SSL Network I/O Controller application uses TCP/IP to communicate with the A16.D16, so check Windows firewall settings if communications are not working.

The computer's TCP/IP settings may need to be changed to match the Dante subnet.

Network configuration should be done before opening the application; subsequent changes to network settings may require 'Network I/O Controller' to be restarted.

Set the computer to 'Never Sleep' to maintain communication.

For additional information see the Dante Controller section.

IP Address

Unless shipped as part of a preconfigured system, the A16.D16 is set to obtain an IP address automatically.

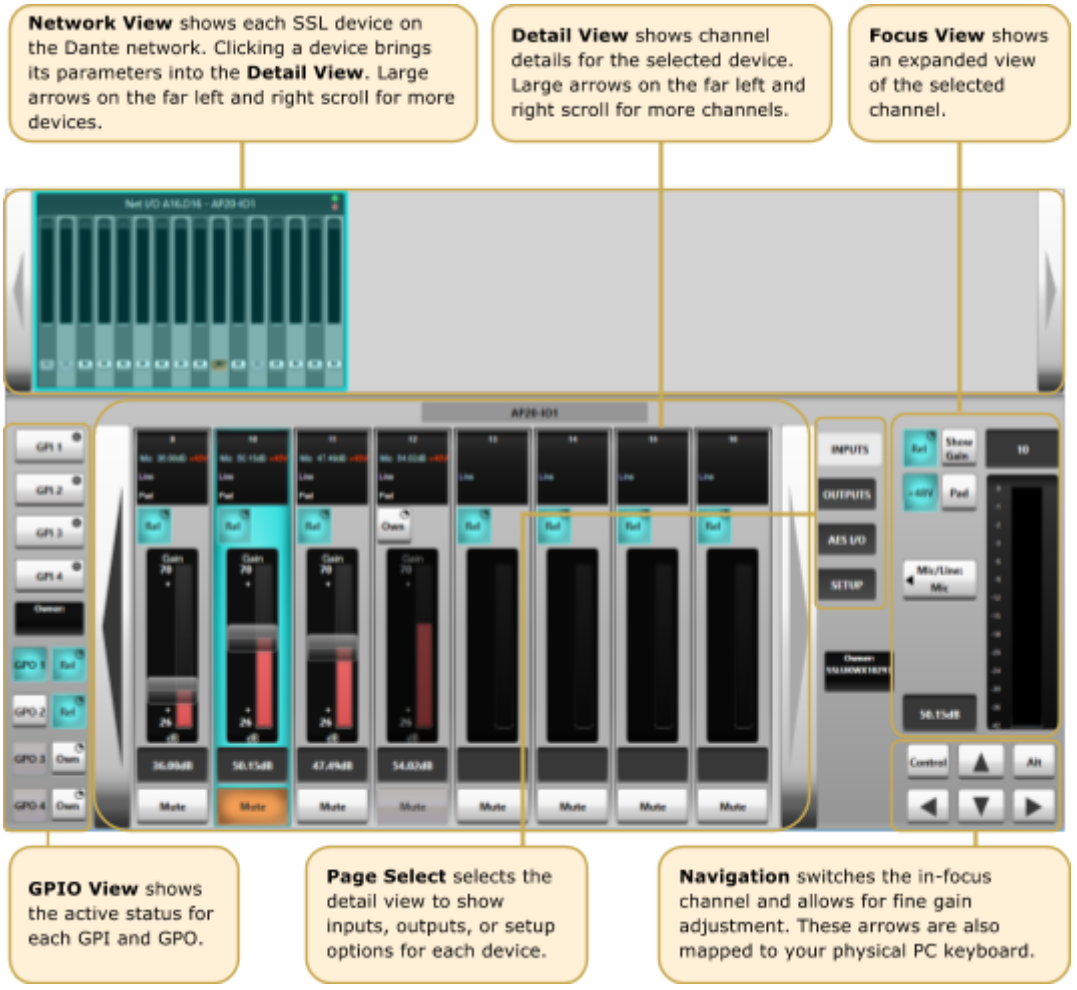
If the IP settings need to be changed to a fixed address – to match the network environment in which the unit is to be installed – this can be achieved using the Dante Controller application.

Remember that the computer's TCP/IP network settings will also need to be updated to match those of the A16.D16.

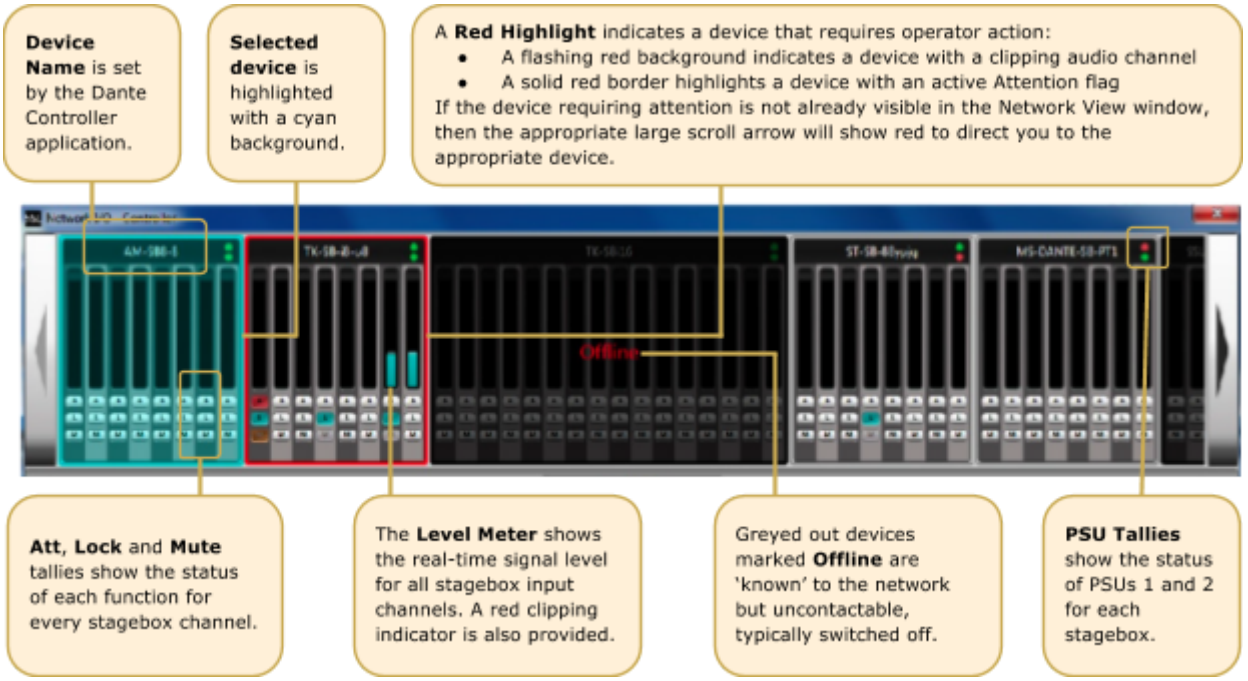
Software Control

The GUI

The application window is divided into six sections:

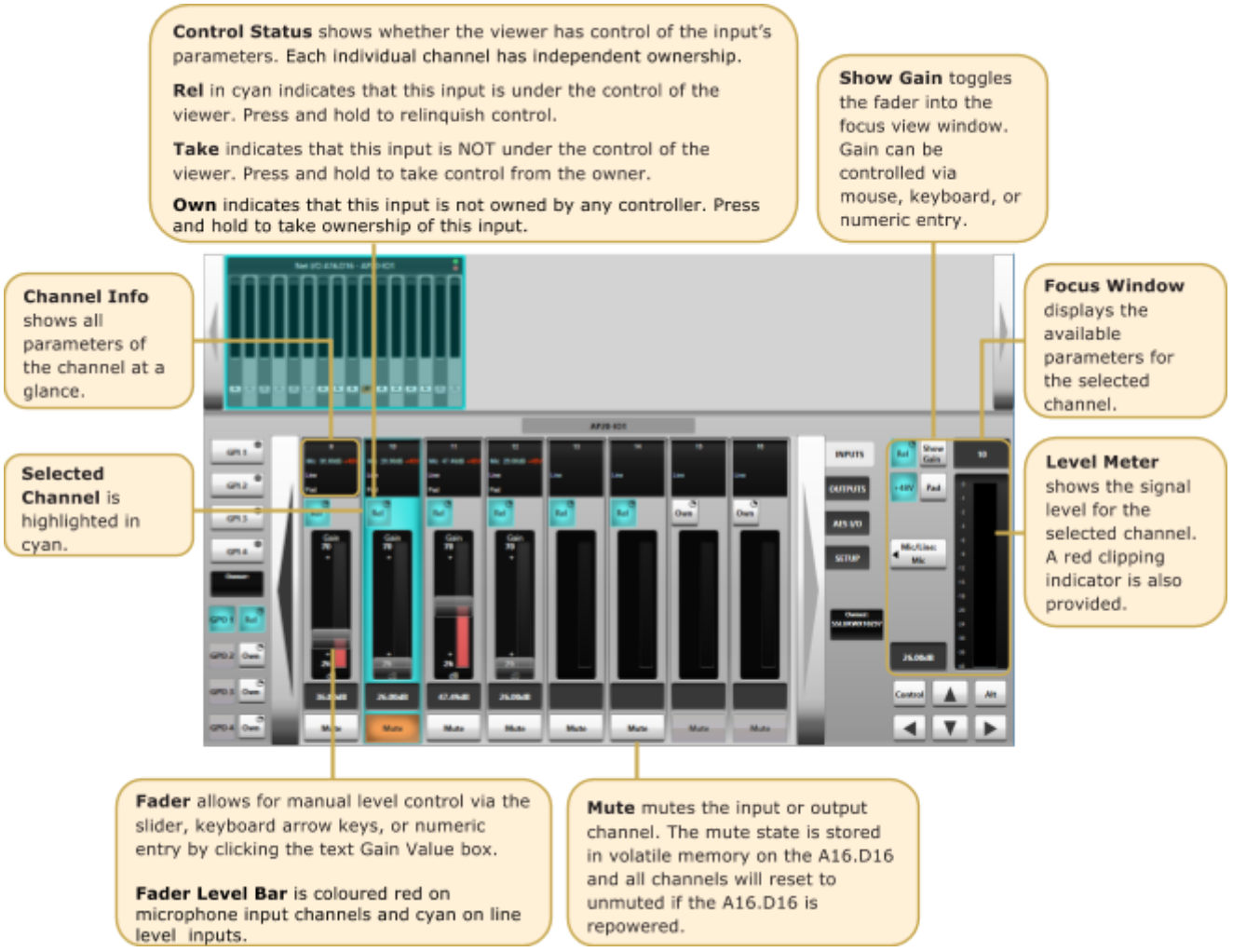


Network View

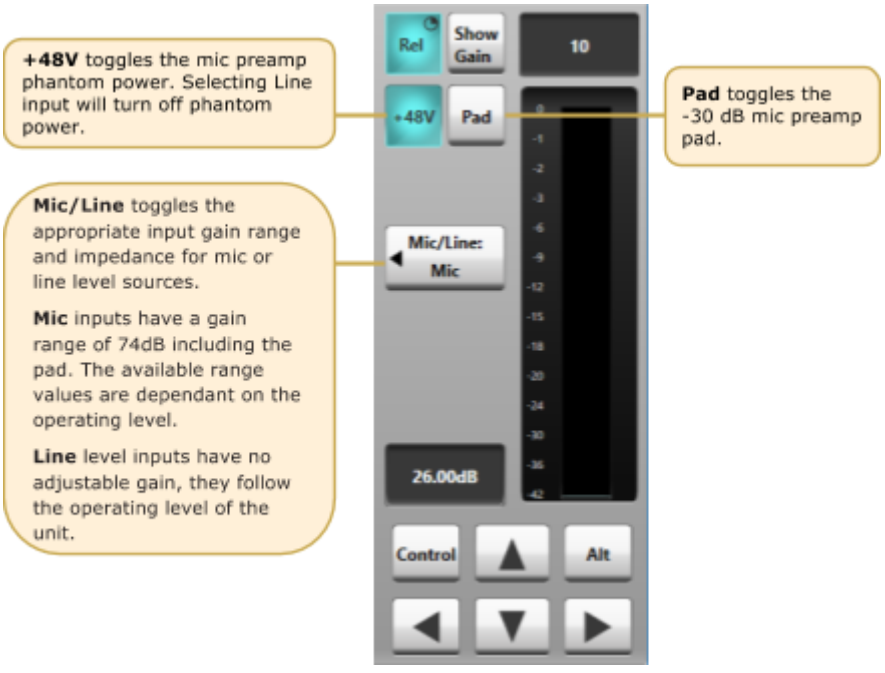


Inputs/Outputs
Select the Inputs, Outputs or AES I/O tab in the Page Select area to view I/O available on the network.

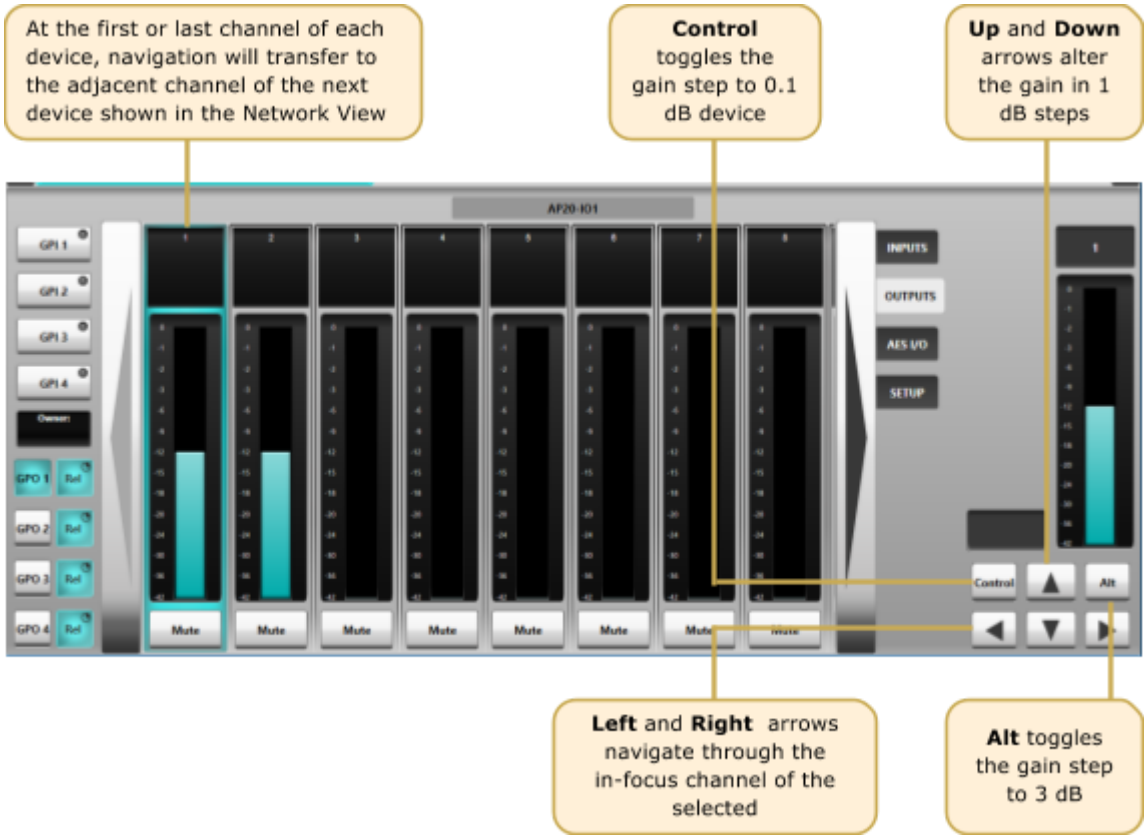
Inputs



The following controls are available for inputs 9-12 only:

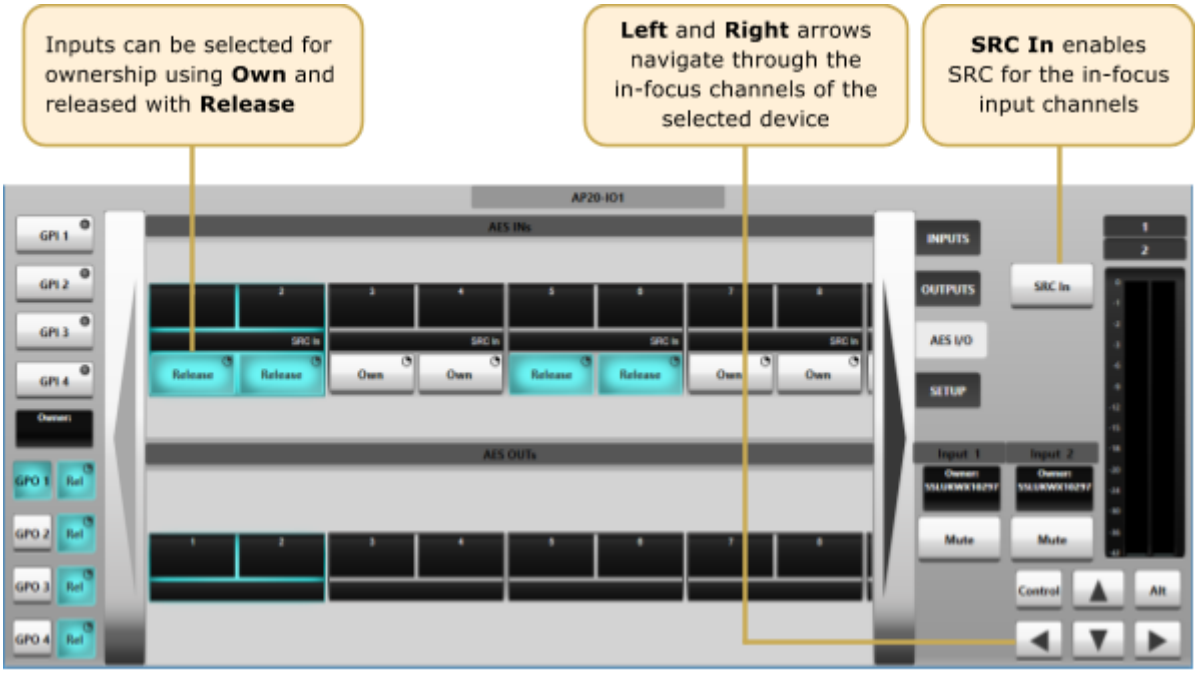


Outputs



The keys and combinations are mapped to the PC keyboard. For example, pressing ALT+UP on the keyboard will increase the gain by 3 dB.

AES I/O



Ownership

Ownership offers a level of protection to mic inputs: when an input is owned by a console the input parameters can only be modified by the device that owns it. This prevents control conflicts between networked consoles and control computers sharing resources. Parameters covered by ownership are:

- Mic gain
- Mic/line switching
- Pad
- Input mute
- Audition
- Limiter

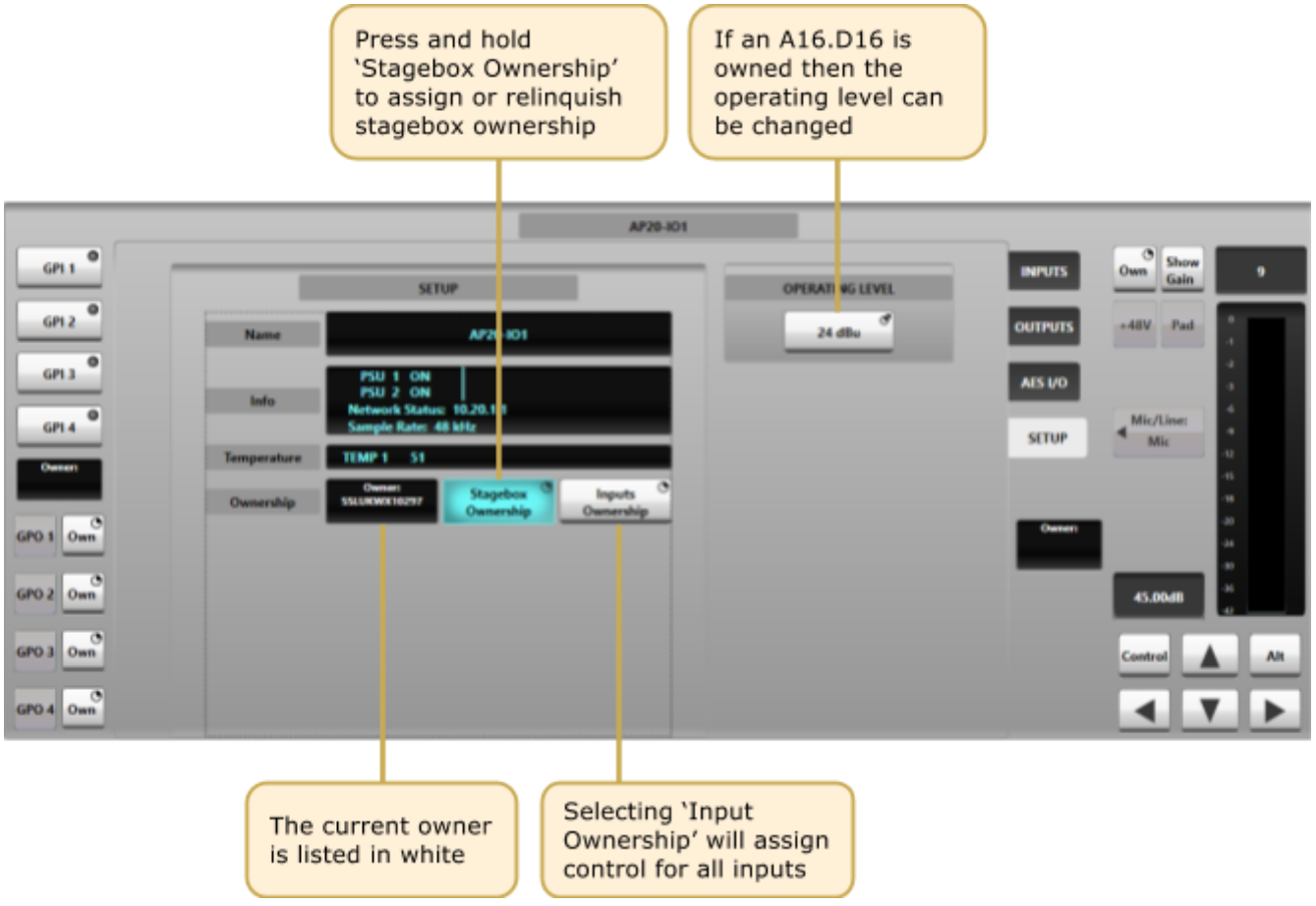
Note that multiple consoles can share the same input signal but only one device can control the input parameters. Altering the input settings will affect all consoles using the input.

Any System T console, Live console or instance of the SSL Network I/O Controller PC application can control ownership. There are three levels of ownership:

- Stagebox ownership: control A16.D16 setup information only
- Input ownership: control input parameters only
- Input *x* ownership: control of input parameters on a per input basis

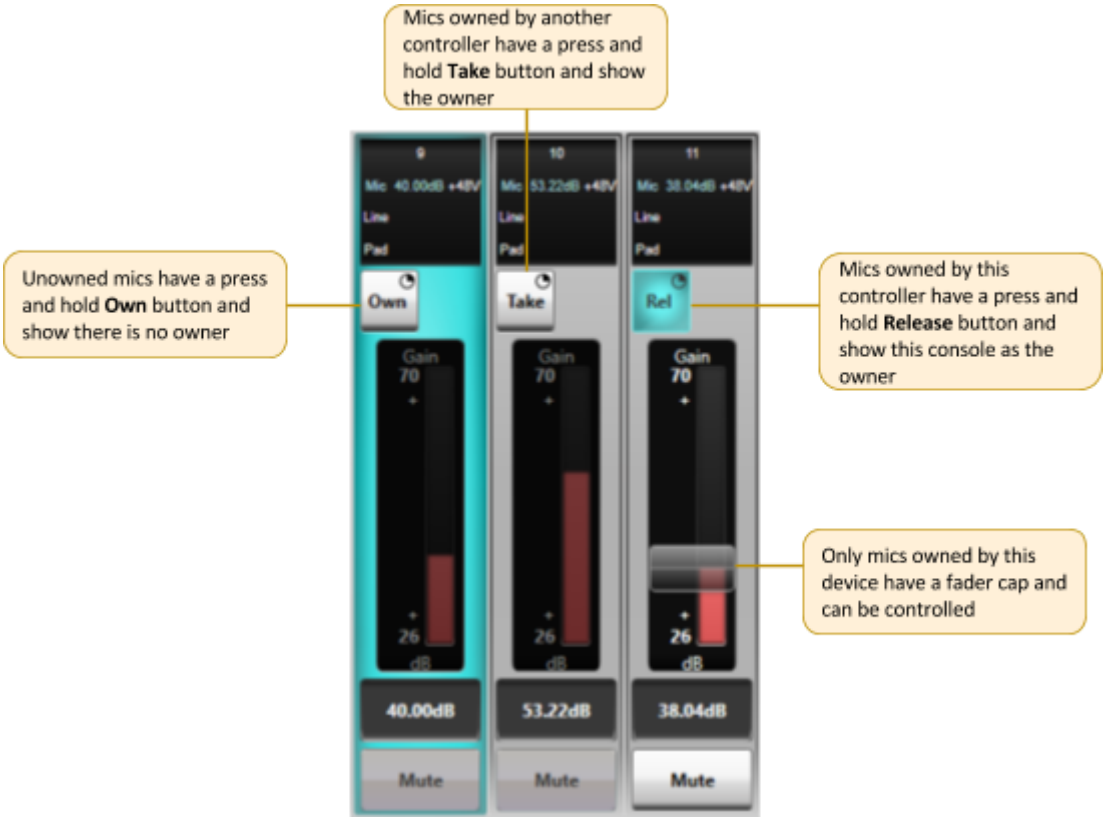
N.B. Ownership settings are stored on the A16.D16. The mute state is stored in volatile memory on the A16.D16 and all channels will reset to unmuted if the A16.D16 is repowered.

Stagebox and Input Ownership



Individual Input Ownership

One of three options will be displayed when an A16.D16 mic input is selected on a device, depending on the current ownership state. These options are 'Own', 'Take' and 'Release':

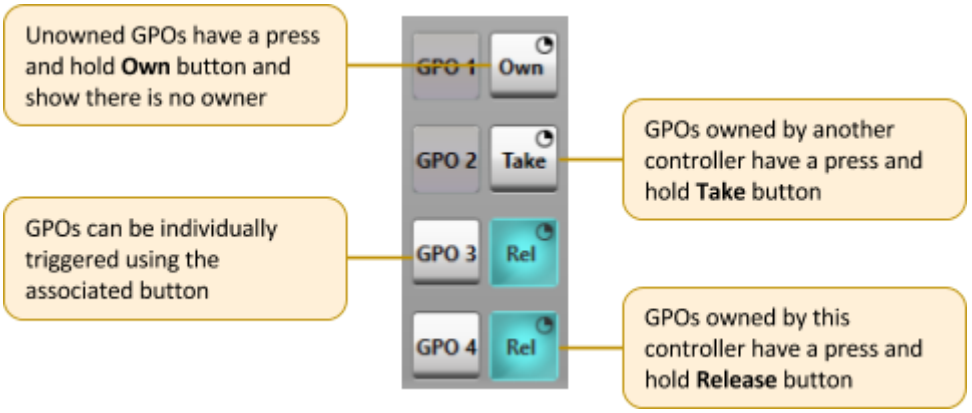


If a mic is not owned and it is routed to an SSL console, the console will automatically take ownership. If a mic is owned by a different controller then routing will not automatically take ownership, 'take' ownership will need to be performed if input control is required on this device. Ownership from the Network I/O controller app is manually controlled.

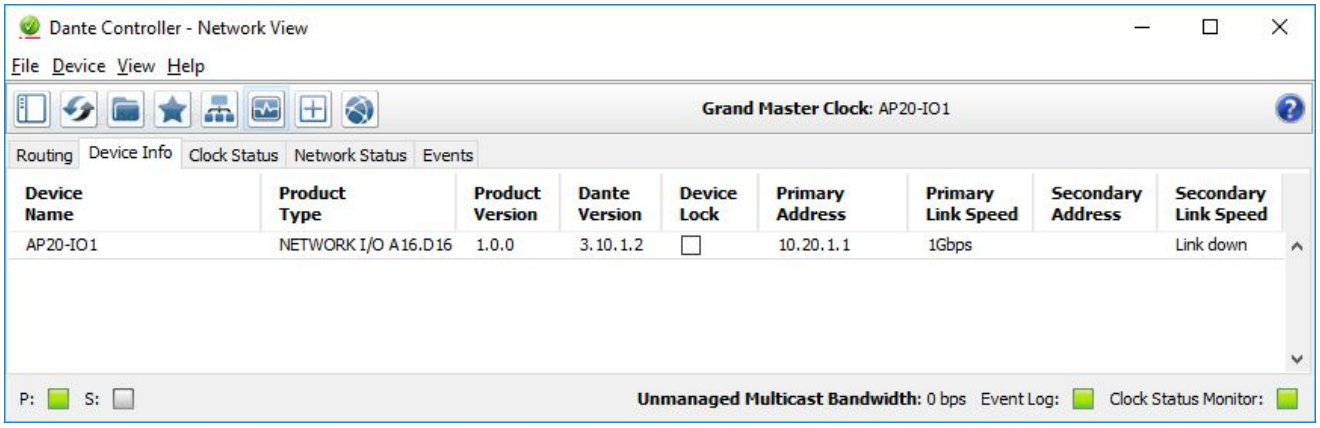
Note that the audio route will still be made regardless of whether ownership is assigned.

GPO Ownership

The four A16.D16 GPO connections also have ownership status. The available ownership states are identical to those for mic inputs.



Dante Controller



Refer to Audinate's user guide for complete information on Dante Controller software. The information below details the basics required to get started.

Clock sync, device naming and network management are all done within Dante Controller.

Dante utilises the device name for routing. Each device must have a unique name – if a name is duplicated it will be appended with a number.

IP Config

Each device requires its own unique IP address. This may be automatically configured, provided by a DHCP server or assigned manually. The primary and secondary ports must not be connected to the same logical network. Ideally, separate switching hardware should be provided for primary and secondary networks. Creating VLANs on shared hardware is acceptable but does not provide the most robust redundancy.

Device Info tab shows an overview of all devices on the Dante network including name, product type, software version, IP address, link speed and status.

Device > **Device View** provides configuration and diagnostics for each device including Tx and Rx subscription and signal status, software and firmware version information, network utilisation and real-time latency measurement, as well as configuration of device name, sample rate, bit depth, latency, IP address and AES67 parameters. The Network Config tab provides IP address configuration options.

The device will resolve to a link-local address if it is set to obtain an IP address automatically and no DHCP server is present. To access via link-local, set your computer to obtain an IP address automatically, directly connect to the device's primary port and wait for the link-local addresses to resolve. Link-local addresses for the Primary Dante interfaces obtain IP addresses in the 169.254.xxx.xxx range, secondary Dante interfaces obtain addresses in the 172.31.xxx.xxx range.

Linking/Unlinking Networks A and B

A16.D16 Network B functionality is not yet enabled. The Network Config tab within Dante Controller Device View allows for Networks A+B to be linked/unlinked, this currently has no functional effect on the unit.

Appendices

Appendix A – Physical Specifications

Dimensions

Parameter	Value	Notes
Depth	460 mm (18.11")	
Height	88.5 mm (1.75")	2 RU
Width	438 mm (17.25") 482 mm (19")	Excluding rack ears Including rack ears
Weight	9.5 kg (21 lb)	
Power	< 100 W	
Boxed size	538 x 538 x 228 mm (21.2 x 21.2 x 9.0")	
Boxed weight	12.5 kg (27.6 lbs)	

Ventilation

Ventilation is from the side and top of the unit.
1RU of ventilation must be provided above each unit.

Appendix B - Connector Pin Outs

Analogue Inputs/Outputs (1–8, 9–16 In, 1–8, 9–16 Out)		
Location:	Rear Panel	
Connector Type:	25-way D-type female	
Pin	**Description**	**Notes:**
1	Channel 8 (+ve)	Same circuit arrangement for Inputs and Outputs Circuits offset by 8 for connector 2
14	Channel 8 (–ve)	
2	0V	
15	Channel 7 (+ve)	
3	Channel 7 (–ve)	
16	0V	
4	Channel 6 (+ve)	
17	Channel 6 (–ve)	
5	0V	
18	Channel 5 (+ve)	
6	Channel 5 (–ve)	
19	0V	
7	Channel 4 (+ve)	
20	Channel 4 (–ve)	
8	0V	
21	Channel 3 (+ve)	
9	Channel 3 (–ve)	
22	0V	
10	Channel 2 (+ve)	
23	Channel 2 (–ve)	
11	0V	
24	Channel 1 (+ve)	
12	Channel 1 (–ve)	
25	0V	
13	n/c	

AES/EBU Inputs/Outputs (1–8, 9–16)		
Location:	Rear Panel	
Connector Type:	25-way D-type female	
Pin	**Description**	**Notes:**
1 **14** **2** **15** **3** **16** **4** **17** **5** **18** **6** **19**	Out channels 7/8 + Out channels 7/8 - Ground Out channels 5/6 + Out channels 5/6 - Ground Out channels 3/4 + Out channels 3/4 - Ground Out channels 1/2 + Out channels 1/2 - Ground	Outputs
7 **20** **8** **21** **9** **22** **10** **23** **11** **24** **12** **25** **13**	In channels 7/8 + In channels 7/8 - Ground In channels 5/6 + In channels 5/6 - Ground In channels 3/4 + In channels 3/4 - Ground In channels 1/2 + In channels 1/2 - Ground n/c	Inputs

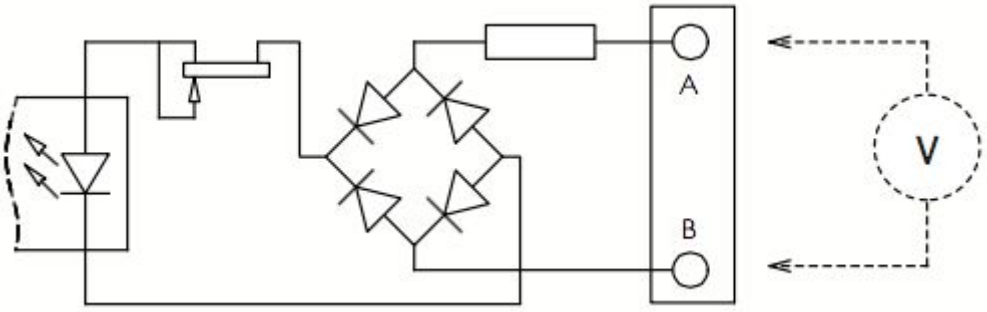
GPIO

GP Outputs
All output switch closures are via DIL relay.

DO NOT use these outputs to directly switch capacitive or reactive loads; always use a separate external relay with suitable contact rating.

DIL Relay Ratings:
- 100V DC, 125V AC
- 100mA max.

GP Inputs
Inputs are triggered by applying an AC or DC voltage of between 4V and 24V. The current drawn is approximately 10mA. Minimum input pulse duration 50mS.



GP Inputs / Outputs		
Connector Type:	25-way D-type male	
Pin	**Description**	**Notes:**
1	Input 1A	See input requirements above
14	Input 1B	
2	Input 2A	
15	Input 2B	
3	Input 3A	
16	Input 3B	
4	Input 4A	
17	Input 4B	
5		
18		
6		
19		
7	+12V Output	0.5A max (both pins), Linked to pin 13
20	Chassis	Reference for 12V output
8	Output 1A	See contact ratings above
21	Output 1B	
9	Output 2A	
22	Output 2B	
10	Output 3A	
23	Output 3B	
11	Output 4A	
24	Output 4B	
12		
25		
13	+12V Output	As pin 7

Appendix C – Performance Specifications

Mic/Line Inputs		
Parameter	**Value**	**Notes**
Gain Range	+26 to +70 dB -4 to +30 dB -4 to +40 dB	Mic mode, 0 dBFS, 0.1 dB gain step size Line mode, 0 dBFS, 0.1 dB gain step size Mic mode with pad engaged
Maximum Input Level	+27.5 dBu	30 dB Pad inserted
Frequency Response	± 0.2 dB	Mic mode, 20 Hz – 20 kHz (@48kHz) Typically ± 0.1 dB
Equivalent Input Noise	< -123 dB	Mic mode, 70 dB gain, A-weighted filter, 22 kHz bandwidth. Typically -124 dB
Usable Dynamic Range	> 115 dB	Mic mode, 0 dBFS, A-weighted filter, 22 kHz bandwidth. Typically 116 dB.
Input Impedance	2.3 kΩ / 10 kΩ	Mic / Line. Selectable per channel
CMRR	> 70 dB > 90 dB	Mic mode, 20 Hz – 20 kHz, 0 dBu Mic mode, 1 kHz, 0 dBu
Crosstalk	> -75 dB > -90 dB	20 Hz – 20 kHz 1 kHz
THD+N	< 0.01 %	Mic mode, 20 Hz – 20 kHz, -1 dBFS, 22 kHz bandwidth.
Phantom Power (Mic Input)	+48 V ±4 V 10 mA	Selectable per channel
Pad (Mic Input)	30 dB	Selectable per channel
Operating Levels	+24, +22, +20, +18, +15 dBu	
Sample Rates	44.1, 48, 88.2 or 96 kHz	
Resolution	24 bit	

Measurement Parameters

Sample Rate:	96 kHz
Operating Level:	+24 dBu = 0 dBFS
Mic input termination:	150Ω
Mic Mode Gain:	26 dB (unless stated otherwise)
Reference frequency:	1 kHz (unless stated otherwise)

Line Inputs		
Parameter	**Value**	**Notes**
Maximum Input Level	+24 dBu	10 kΩ load
Frequency Response	± 0.1 dB	-1 dBFS, 20 Hz – 20 kHz
Usable Dynamic Range	> 116 dB	0 dBFS, A-weighted filter, 22 kHz bandwidth Typically >117 dB
THD+N	< 0.005 %	20 Hz – 20 kHz, -1 dBFS, 22 kHz bandwidth Typically < 0.004%
Sample Rates	44.1, 48, 88.2 or 96 kHz	
Resolution	24 bit	

Line Outputs		
Parameter	**Value**	**Notes**
Maximum Output Level	+24 dBu	600 Ω / 10 kΩ load
Output Impedance	< 50 Ω	
Frequency Response	± 0.3 dB	-1 dBFS, 20 Hz – 20 kHz
Usable Dynamic Range	> 116 dB	0 dBFS, A-weighted filter, 22 kHz bandwidth Typically >117 dB.
Crosstalk	> -90 dB > -105 dB	20 Hz – 20 kHz, 0 dBFS 1 kHz, 0 dBFS
THD+N	< 0.01 %	20 Hz – 20 kHz, -1 dBFS. 22 kHz bandwidth Typically < 0.004%
Output Symmetry	> 40 dB	20 Hz – 20 kHz Typically > 50 dB
Sample Rates	44.1, 48, 88.2 or 96 kHz	
Resolution	24 bit	

Measurement Parameters

Sample Rate: 96 kHz

Operating Level: +24 dBu = 0 dBFS

Reference frequency: 1 kHz (unless stated otherwise)

Digital Inputs		
Parameter	**Value**	**Notes**
Input Impedance	110 Ω	Transformer coupled
Sample Rates	44.1, 48, 88.2 or 96 kHz	176 kHz or 192 kHz with sample rate converters enabled
Sample Rate converters	Yes	Selectable per AES channel pair
Resolution	24 bit	

Digital Outputs		
Parameter	**Value**	**Notes**
Output Impedance	110 Ω	Transformer coupled
Sample Rates	44.1, 48, 88.2 or 96 kHz	
Resolution	24 bit	

Appendix D – Safety Notices

General Safety

1. Please read and keep this document.
2. Adhere to all warnings and follow instructions.
3. This electrical equipment should not be used near water.
4. Cleaning should only be with dry cloths or products compatible with electrical devices – never when the unit is powered.
5. Keep the unit free of dust and use in a clean environment.
6. Do not use near any heat source or in direct sunlight.
7. Do not use near naked flames.
8. Do not place heavy objects on the unit.
9. Only use attachments/accessories recommended by the manufacturer.
10. Unplug the device during lightning storms or long periods of nonuse.
11. The unit can only be serviced by qualified personnel – Seek immediate service if:
    I. The unit has been exposed to moisture
    II. The unit has been dropped
    III. The unit does not operate normally
12. Do NOT modify this unit – alterations may affect performance, safety and/or international compliance standards.
13. SSL does not accept liability for damage caused by maintenance, repair or modification by unauthorised personnel.

Installation Notes

1. When installing this apparatus either fix it into a standard 19” rack or place the apparatus on a secure level surface.
2. When this apparatus is rack mounted, fit all rack screws. Rack shelves are recommended for this apparatus.
3. Allow a 1U gap above and below this apparatus for cooling.
4. Do not obstruct any ventilation cut-outs or exhaust fans.
5. Ensure that no strain is placed on any cables connected to this apparatus. Ensure that all such cables are not placed where they can be stepped on, pulled or tripped over.

Power Safety

1. The unit is not supplied with a mains lead allowing you to use IEC distribution of mains cables of your choice. Any mains cable used must fulfill the following:
   I. Refer to the ratings label on the rear of the unit and always use suitable mains cords.
   II. The unit should ALWAYS be earthed with the earth on both IEC sockets (when both are used).
   III. Please use a compliant 60320 C13 TYPE SOCKET. When connecting to supply outlets ensure that appropriate sized conductors and plugs are used to suit local electrical requirements.
   IV. Maximum cord length should be 4.5m (15').
   V. The cord should bear the approval mark of the country in which it is to be used.

2. The appliance coupler is used as the disconnect device, ensure that it is connected to an unobstructed wall outlet.

3. The unit is designed for connection to single phase supplies only.

4. The clear markings regarding redundant power supplies detailed on the unit must be transferred into the installation to ensure both power sources are removed before qualified personnel service the unit.

GB The apparatus shall be connected to mains socket outlets with a protective earthing connection

DEN Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord

FIN Laite on liitettävä suojamaadoituskoskettimilla va rustettuumpistorasiaan

NOR Apparatet må tikoples jordet stikkontakt

SWE Apparaten skall anslutas till jordat uttag

ATTENTION! This equipment must be Earthed. Refer to manual for installation instructions.

CAUTION! Disconnect all power sources before removing any panel (s). No user-serviceable parts inside – to be serviced only by qualified personnel.

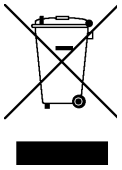
WARNING! Un-Earthed metal parts may be present inside enclosure. Check for hazardous voltages before touching.

For protection against risk of fire – replace only with same type / rating of fuse. Do not expose to rain or moisture.

For EU

The stagebox is CE compliant and fully conforms with the current protection requirements of the European community council directives on EMC and LVD. Note that any cables supplied with SSL equipment may be fitted with ferrite rings at each end. This is to comply with the current regulations and these ferrites should not be removed. Any modifications to this equipment may adversely affect the CE compliance of this product.

Environmental Declaration



The symbol shown here, which is on the product or its packaging, indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste using a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can dispose of your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

RoHS notice

Solid State Logic has conformed and this product has conformed to European Union's Directive 2011/65/EU on Restrictions of Hazardous Substances (RoHS) as well as the following sections of California law which refer to RoHS, namely sections 25214.10, 25214.10.2, and 58012, Health and Safety Code; Section 42475.2, Public Resources Code.

For USA

To the User:

1. Do not modify this unit! This product, when installed as indicated in the instructions contained in the installation manual, meets FCC requirements.
2. Important: This product satisfies FCC regulations when high quality shielded cables are used to connect with other equipment. Failure to use high quality shielded cables or to follow the installation instructions may cause magnetic interference with appliances such as radios and televisions and will void your FCC authorisation to use this product in the USA.
3. Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Electromagnetic Compatibility

EN55103-1:2009, EN55103-2:2009 Environments E1, E2, E3 and E4

Typical average initial half-cycle inrush current: 1.3 A. Typical peak inrush current: <5 A.

The audio input/output and network ports are screened-cable ports and any connections to them should be made using braid-screened cable and metal connector shells in order to provide a low impedance connection between the cable screen and the stagebox. All network connections should be of Cat5e standard or above.

Environmental

Temperature	Operating:	+5 to 40 deg. C	Storage:	-20 to 50 deg. C
Vibration	Operating:	< 0.2 G (5–200 Hz)	Non-operating:	< 0.4 G (5–200 Hz)
Shock	Operating:	< 3 G (11 ms max.)	Non-operating:	< 10 G (11 ms max.)