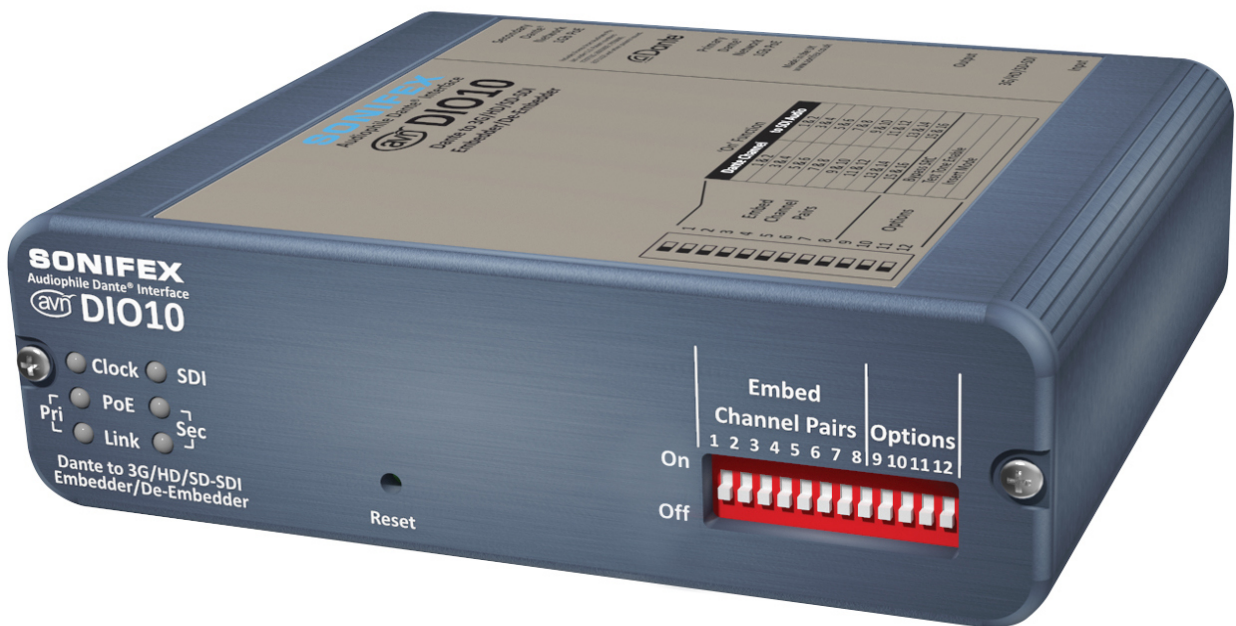# AVN-DIO10

Dante® to 3G/HD/SD-SDI Embedder/De-Embedder
Handbook

SONIFEX

Manufacturers of Audio Products for AV,
Installed Sound, Broadcast Radio & Broadcast TV

Registration & Warranty

This handbook is for use with the following products:
AVN-DIO10 Dante® to 3G/HD/SD-SDI Embedder/De-Embedder
Artwork: AW11007 Stock Code: 30-387

Made in the UK by **SONIFEX**

Register Online for an Extended 2 Year Warranty

Product: _____

Serial No: _____

www.sonifex.co.uk/register

Product Warranty - 2 Year Extended

As standard, Sonifex products are supplied with a 1 year back to base warranty. In order to register the date of purchase and so that we can keep you informed of any product design improvements or modifications, it is important to complete the warranty registration online. Additionally, if you register the product on the Sonifex website, you can increase your product warranty to 2 years. Go to the Sonifex website at: www.sonifex.co.uk/register to apply for your 2 year warranty.

Sonifex Warranty & Liability Terms & Conditions

1. Definitions

'the Company' means Sonifex Ltd and where relevant includes companies within the same group of companies as Sonifex Limited.

'the Goods' means the goods or any part thereof supplied by the Company and where relevant includes: work carried out by the Company on items supplied by the Purchaser; services supplied by the Company; and software supplied by the Company.

'the Purchaser' means the person or organisation who buys or has agreed to buy the Goods.

'the Price' means the Price of the Goods and any other charges incurred by the Company in the supply of the Goods.

'the Warranty Term' is the length of the product warranty which is usually 12 months from the date of despatch; except when the product has been registered at the Sonifex website when the Warranty Term is 24 months from the date of despatch.

'the Contract' means the quotation, these Conditions of Sale and any other document incorporated in a contract between the Company and the Purchaser.

This is the entire Contract between the parties relating to the subject matter hereof and may not be changed or terminated except in writing in accordance with the provisions of this Contract. A reference to the consent, acknowledgement, authority or agreement of the Company means in writing and only by a director of the Company.

2. Warranty

a. The Company agrees to repair or (at its discretion) replace Goods which are found to be defective (fair wear and tear excepted) and which are returned to the Company within the Warranty Term provided that each of the following are satisfied:

    i. notification of any defect is given to the Company immediately upon its becoming apparent to the Purchaser;

    ii. the Goods have only been operated under normal operating conditions and have only been subject to normal use (and in particular the Goods must have been correctly connected and must not have been subject to high voltage or to ionising radiation and must not have been used contrary to the Company's technical recommendations);

    iii. the Goods are returned to the Company's premises at the Purchaser's expense;

    iv. any Goods or parts of Goods replaced shall become the property of the Company;

    v. no work whatsoever (other than normal and proper maintenance) has been carried out to the Goods or any part of the Goods without the Company's prior written consent;

    vi. the defect has not arisen from a design made, furnished or specified by the Purchaser;

    vii. the Goods have been assembled or incorporated into other goods only in accordance with any instructions issued by the Company;

    viii. the defect has not arisen from a design modified by the Purchaser;

    ix. the defect has not arisen from an item manufactured by a person other than the Company. In respect of any item manufactured by a person other than the Company, the Purchaser shall only be entitled to the benefit of any warranty or guarantee provided by such manufacturer to the Company.

b. In respect of computer software supplied by the Company the Company does not warrant that the use of the software will be uninterrupted or error free.

c. The Company accepts liability:

    i. for death or personal injury to the extent that it results from the negligence of the Company, its employees (whilst in the course of their employment) or its agents (in the course of the agency);

    ii. for any breach by the Company of any statutory undertaking as to title, quiet possession and freedom from encumbrance.

d. Subject to conditions (a) and (c) from the time of despatch of the Goods from the Company's premises the Purchaser shall be responsible for any defect in the Goods or loss, damage, nuisance or interference whatsoever consequential economic or otherwise or wastage of material resulting from or caused by or to the Goods. In particular the Company shall not be liable for any loss of profits or other economic losses. The Company accordingly excludes all liability for the same.

e. At the request and expense of the Purchaser the Company will test the Goods to ascertain performance levels and provide a report of the results of that test. The report will be accurate at the time of the test, to the best of the belief and knowledge of the Company, and the Company accepts no liability in respect of its accuracy beyond that set out in Condition (a).

f. Subject to Condition (e) no representation, condition, warranty or other term, express or implied (by statute or otherwise) is given by the Company that the Goods are of any particular quality or standard or will enable the Purchaser to attain any particular performance or result, or will be suitable for any particular purpose or use under specific conditions or will provide any particular capacity, notwithstanding that the requirement for such performance, result or capacity or that such particular purpose or conditions may have been known (or ought to have been known) to the Company, its employees or agents.

g. i. To the extent that the Company is held legally liable to the Purchaser for any single breach of contract, tort, representation or other act or default, the Company's liability for the same shall not exceed the price of the Goods.

ii. The restriction of liability in Condition (g)(i) shall not apply to any liability accepted by the Seller in Condition (c).

h. Where the Goods are sold under a consumer transaction (as defined by the Consumer Transactions (Restrictions on Statements) Order 1976) the statutory rights of the Purchaser are not affected by these Conditions of Sale.

Unpacking Your Product

Each product is shipped in protective packaging and should be inspected for damage before use. If there is any transit damage take pictures of the product packaging and notify the carrier immediately with all the relevant details of the shipment. Packing materials should be kept for inspection and also for if the product needs to be returned.

The product is shipped with the following equipment so please check to ensure that you have all of the items below. If anything is missing, please contact the supplier of your equipment immediately.

Item	Quantity
Product Unit	1

Repairs & Returns

Please contact Sonifex or your supplier if you have any problems with your Sonifex product. Email technical.support@sonifex.co.uk for the repair/upgrade/returns procedure, or for support & questions regarding the product operation.

CE and UKCA conformity

The products in this manual comply with the essential requirements of the relevant UK and European health, safety and environmental protection legislation. The technical justification file for this product is held at Sonifex Ltd. Relevant declarations of conformity can be found at: https://www.sonifex.co.uk/declarations

WEEE Directive

Directive 2012/19/EU of the European Parliament and of the Council of 4th July 2012 lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE).

The policy of Sonifex Ltd is to comply with all applicable laws of all jurisdictions having authority over Sonifex's business, including the WEEE directive. Accordingly, Sonifex has implemented a rigorous program designed to ensure compliance of its products with the WEEE directive. The latest statements can be found at: https://www.sonifex.co.uk/company/recycling

Atmosphere/Environment

This apparatus should be installed in an area that is not subject to excessive temperature variation (<0°C, >50°C), moisture, dust or vibration.

This apparatus shall not be exposed to dripping or splashing, and no objects filled with water, such as vases shall be placed on the apparatus.

AVN-DIO10 Dante® to 3G/HD/SD-SDI Embedder/De-Embedder

Fig 1-1: AVN-DIO10 Front View

Fig 1-2: AVN-DIO10 Rear View

The easiest way to connect legacy SDI equipment to the Dante® network, the AVN-DIO10 can be used for simultaneous embedding and de-embedding. This simple plug and play audio/video interface provides a convenient and elegant method of connecting legacy 3G/HD/SD-SDI equipment to the Dante® AoIP audio network.

The AVN-DIO10 takes an SDI feed, de-embeds the 16 audio channels and places them on channels 1-16 of the Dante network, mapped using Dante Controller. It simultaneously takes the 16 input channels mapped to the device on Dante Controller and re-embeds them onto the SDI output.

The unit can be controlled by either the switches found on the front panel or via the built-in web server. These controls primarily allow embedding of Dante channels onto the SDI output per channel pair and there are two modes of operation: Insert Mode enabled allows embedding to overwrite existing SDI audio selectively per channel pair. Insert Mode disabled clears any incoming audio channels on the SDI output and then allows selective embedding onto the SDI output per channel pair.

A Test Tone Mode allows 1kHz, 2kHz, 3kHz and 4kHz signals to be output on channels 1 to 4 respectively, for any group where embedding is enabled. In this way downstream SDI audio outputs can be tested without Dante sources.

It's powered using Power over Ethernet (PoE), using Neutrik EtherCON connectors, with primary and secondary ports for power and data redundancy. The AVN-DIO10 uses the latest Audinate Dante® chipsets so is AES67 and Dante Domain Manager® compliant.

Front panel LEDs indicate network clock status, SDI lock status, AoIP Primary & AoIP Secondary link status, PoE Primary power & PoE Secondary power active.

A web interface is available for firmware updates, control and status information. Up to 3 of the AVN-DIO10 units can be rackmount in the 1U AVN-DIORK
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Front Panel DIPSwitch Settings

The DIPSwitches provide control of the embedding process and other settings which are detailed below. A top panel label shows the DIPSwitch functions. The unit can also be controlled by using the built-in webserver. See embedded webserver section for more details

Embed Channel Pairs

These switches enable the embedding of the Dante audio channels onto the SDI output with each individual switch enabling embedding of a specific group channel pair. For example, setting switch 1 to the ON position will embed Dante channels 1 & 2 onto SDI output group 1 channels 1 & 2. How these switches affect the existing SDI audio is dependent on the setting of the Insert Mode switch.
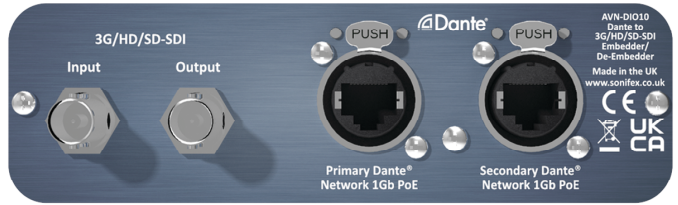
Insert Mode

When Insert Mode is enabled it allows embedding to overwrite existing SDI audio selectively per channel pair. For example, enabling channels 1 & 2 by setting switch 1 to the ON position will embed Dante channels 1 & 2 onto SDI group 1 channels 1 & 2, but retain the original audio on groups 3 & 4, if any. With Insert Mode disabled, any groups that are enabled for embedding will clear any incoming audio channels on those groups.

Bypass SRC

This switch controls the enabling and disabling of the Sample Rate Converter which sits between the Dante and SDI audio clock domains. Normally this switch should be set to the OFF position. In situations where the Dante and SDI clock domains are synchronous, such as when the AVN-DIO10 is the preferred master and the 'Enable Sync To External' option is selected, then this switch can be set to the ON position. This reduces latency through the system and also passes the audio between SDI and the Dante network unmodified. Note that this switch only has effect when the Dante sample rate is set to 48kHz, any other sample rate selection would force sample rate conversion.

Test Tone Enable

When this switch is set to the ON position, it puts 1kHz, 2kHz, 3kHz and 4kHz signals on channels 1 to 4 respectively, for any group where embedding is enabled, overriding any Dante audio that is routed to the SDI output. This is so that on downstream SDI audio outputs, any enabled embed channel pairs will have their Dante audio sources replaced with test tones. Note that these test tones are not available on the de-embedded channels which are directed to the Dante network, and are only for the SDI output.

Dante® Controller

Dante Controller is an application provided by Audinate and can be downloaded from their website: https://www.audinate.com/

Use Dante Controller as you normally would to setup the audio routes on the unit. For troubleshooting information please see the official Dante® FAQs at:

https://www.audinate.com/resources/faqs

And Dante® Controller User Guide at:

https://dev.audinate.com/GA/dante-controller/userguide/pdf/latest/
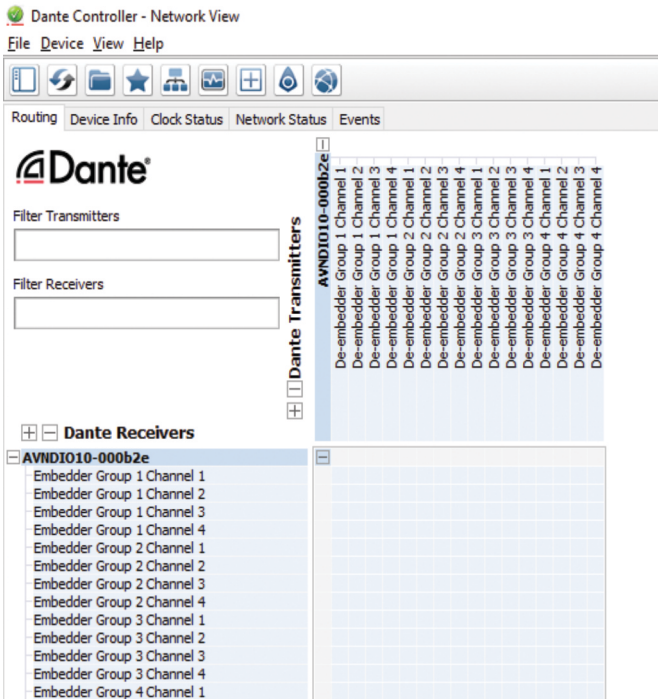
Embedded Web Server

The AVN-DIO10 has an embedded web server which provides easy access to control and network settings, status information and allows for firmware updates when new releases are available

The device has two Ethernet ports on the back panel. One is the 'Primary' Ethernet port and the other is the 'Secondary' Ethernet port. When set to switched mode in Dante Controller, either of these ports can be connected to a network and a computer on the same network which can then access the embedded web server. When set to redundant mode, only the primary Ethernet port will allow access to the web server.

By **default**, the **embedded web server is set to static address mode** and the IP address is **192.168.0.100** with a subnet mask of 255.255.255.0. If the network address mode for the port to be used has been set to 'Dynamic', the unit will attempt to acquire an IP address from a DHCP server. If no DHCP server is found an automatically generated IP address will be used.

The active IP address for the network port can be found using a service discovery tool such as the 'Discovery Application' which can be found on the Sonifex website (http://sonifex.co.uk/technical/software/index. shtml#sfxsrvdisc).

Information

The Information tab has a Device Information page and a Status page.
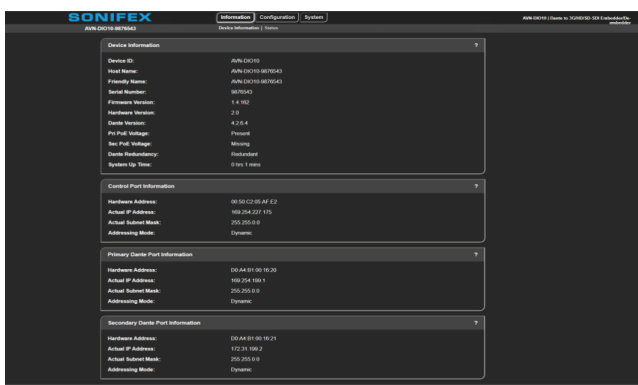
Device Information

The **Information** tab shows the current status of the unit as well as the software versions of the various modules running on the unit. When contacting Sonifex technical support, it is important to provide the information shown on this page. The lower half of the page shows the configuration of the network ports; the 'Control Port Information' shows the network address configuration of the embedded web server which can

be accessed on both the 'Primary' and 'Secondary' Ethernet connections. The 'Primary Dante Port Information' and the 'Secondary Dante Port Information' shows the configuration information of each port to the Dante audio network. The network settings of these two ports can be controlled via the Dante controller application or via the 'network' configuration web page. If the Dante redundancy setting for the unit is set to "Switched" via Dante controller then only the Control Port and Primary Dante Port Information are shown here.

Status

The status page shows the current status of the SDI input. This includes the current lock status, the input standard and transport format along with presence indication for each audio group

Configuration

The Configuration tab has the Network page and Control page.

Network

The **Configuration** tab has the Network page which shows the current configuration of the control port which is used to access the devices web server. The friendly name and security options can also be set here.

Friendly Name

The friendly name identifies the unit on the network. It is a good idea to assign a user name or location as this is easily recognised by other users. The default friendly name is made from the device ID and the 7-digit product serial number i.e. AVN-DIO10-1234567. The friendly name can only contain letters, numbers and hyphens although it cannot start or end with a hyphen.

Password

In order to prevent other users connected to the same network from modifying the configuration of the device it is possible to protect your device with a password. The password may be between 4 and 8 characters long and may only contain numbers and letters.

Removing Password Protection

Password protection can be removed from a device by clearing both the 'Password' and 'Retype Password' fields and clicking submit.

HTTP Port

The HTTP port number can be set to any integer from '1024' up to and including '65535', or to '80' the default value. The value entered determines which port the web server on the device will use. When the port number is modified the unit will be restarted automatically. To view the web pages of a device with a modified port number, the port number must be specified in the address bar of the web browser after the IP address and separated by a colon. For example, if the HTTP port of a unit is set to '1024' and the IP address of the unit is '192.168.0.100' then 'http://192.168.0.100:1024' would need to be entered into the address bar of the web browser. When the port is set to its default value of '80' a port number doesn't need to be specified when accessing the web server. The web server on the unit is advertised as an Avahi / Bonjour service so tools like Sonifex Service Discovery or avahi-browse will be able to discover the address and port number being used by the unit's web server.

Address Mode

The address mode determines how the port obtains its IP address. When set to dynamic, the unit will attempt to acquire an IP address automatically from either a DHCP server or via auto configuration if no DHCP server is found. The actual IP address is shown on the device information page. When static mode is used, the IP address & subnet mask values entered will be assigned to the port.

Static IP Address

This is the IP address that will be assigned to the port when static address mode is selected. It is important to ensure that this IP address is not

currently in use on the network. This value is not used when the address mode is dynamic.

Static Subnet Mask

This is the subnet mask that will be used for the port when static address mode is selected. This value is not used when the address mode is dynamic.

Static Gateway

The router IP address used for the port when static address mode is selected.

Note

If the device is in switched mode the secondary Dante network port settings are not displayed. If any of the network configuration options are changed, the unit automatically restarts to implement the new settings. If the address mode of the control port is changed, a new connection is made once the unit has restarted and the IP address assigned via DHCP is known. Otherwise, the new page will be reloaded automatically once the restart of the unit is complete.

Control

The Control page provides allows the user to remotely override the front panel switch settings. Each swtich setting is described in detail earlier in this handbook or instructions are provided via the help button found on the web interface. To enable the remote settings, the local override switch must be enabled.
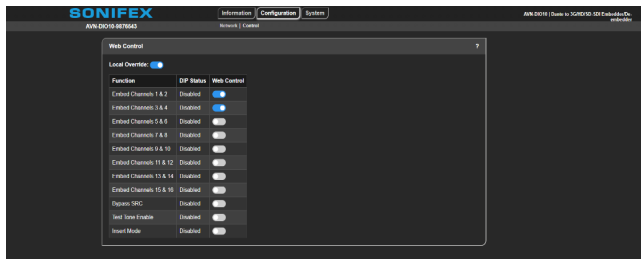
System

The System tab is used for the following;

- Updating the unit.
- Rebooting and resetting the unit.

Update Firmware

In this section the current firmware version on the connected unit is shown. New versions of firmware will be released as new features are added, and when any bug fixes are completed, click on the software downloads link to visit the firmware downloads webpage of the Sonifex website. If an update is available for your unit you can download it as a zipped archive file, you will need to extract the 'SWU' file from the archive, this can be done in Windows by right-clicking the archive and selecting extract all.

Reboot or Factory Reset

The unit can be rebooted using the reboot button, a quick reboot can often fix any issues with the unit, after rebooting the webpage should automatically be reloaded. The factory reset button restores the unit to factory settings, restoring the factory settings will also cause the unit to reboot.

Bootstrap Mode

In the unlikely event that power is lost during a firmware upgrade then the unit may enter bootstrap mode. This is a limited firmware set that allows firmware upgrades to take place to return the unit to a normal working state. This is indicated by both primary and secondary PoE and Link LEDs flashing in unison. Firmware updates are performed using a TFTP client running on a host PC.

Forcing Bootstrap Mode

If you need to force the unit into bootstrap mode, this is done by pressing and holding the reset button down for more than 5 seconds. After 5 seconds the front panel LEDs will start to flash slowly, this indicates that the unit will be forced into bootstrap mode with a static IP address of 192.168.0.100. If the reset button is held for more than 10 seconds, the LEDs will flash faster which indicates that the unit will be forced into bootstrap mode with dynamic mode addressing set. The unit will now attempt to get an address from a DHCP server or fall back to a link-local IP

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address using Auto-IP. If the reset button is held for more than 15 seconds, the LEDs will flash even faster and the unit will now perform a factory reset and clear all of the current configuration settings.

Upgrading Firmware in Bootstrap Mode

Once the device has been put into bootstrap mode, a TFTP client can be used to transfer firmware to it. The IP address of the device must be known - the Sonifex Service Discovery Application can be used to find the IP address of the device. Many TFTP clients are available, on MS Windows a free application called TFTPD64 is available. Within TFTPD64, select the TFTP tab, enter the device's address in the host field and 69 in the port field. Next navigate to the firmware update file (this has the .dwn file extension). The 'Remote File' field should be left blank and the 'Block Size' left on default. Finally press the button labelled 'Put', the progress of the upload will then be displayed. The device will reboot and now be using the uploaded firmware. If you are still experiencing issues, try holding the reset button for 15 seconds to perform a factory reset.

Fig 1-3: AVN-DIOBT Brackets & Belt Clip

Fig 1-4: AVN-DIOMT Deskbar Fittings

Fig 1-5: AVN-DIO Front View Shown with AVN-DIOBT Brackets and Belt Clip Attached

Fig 1-6: AVN-DIO Iso View Shown with AVN-DIOBT Brackets and Belt Clip Attached

Fig 1-7: Iso View Shown with AVN-DIOMT Deskbar Attached

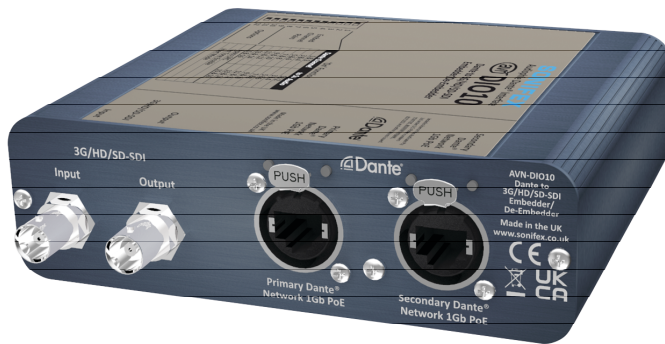Fig 1-8: AVN-DIO Front Iso View Shown without Accessories

Fig 1-9: AVN-DIO Rear Iso View Shown without Accessories

Technical Specification For AVN-DIO10

Parameter SDI Input	
Input Impedance:	75Ω Unbalanced
SDI Supported Standards:	270Mbps SMPTE-259M-C (SD) 1.485 or 1.4835Gbps SMPTE-292M (HD) 2.97 or 2.967Gbps SMPTE-424M (3G)
Supported Video Formats:	525/59.94 (SMPTE-125M) 625/50 (ITU-R BT.656) 720p/23.98, 24, 25, 29.97, 30, 50, 59.94, 60 (SMPTE-296M) 1035i/59.94, 60 (SMPTE-260M) 1080i/50, 59.94, 60 (SMPTE-274M) 1080p/23.98, 24, 25, 50, 59.94, 60 (SMPTE-274M) 1080pSF/23.98, 24, 25, 29.97, 30 (RP-211) 1080i/50 (SMPTE-295M) 1080p/50 (SMPTE-295M)
Embedded Audio:	48kHz, synchronous SMPTE-272M-ABC SMPTE-299M
Supported Image Mapping:	SMPTE-425M-AB

Parameter SDI Output	
Output Impedance:	75Ω Unbalanced
Alignment Jitter:	<0.2UI
Output Level:	800mV ±10%
Return Loss:	<15dB @ 1.5GHz
SDI Supported Standards:	Output follows input
Supported Video Formats:	Output follows input
Embedded Audio:	48kHz, synchronous SMPTE-272M-C SMPTE-299M

Latencies	
SDI I/O	
SD:	<30us
HD:	<10us
3G:	<05us
Audio	Example latencies using an AVIOAES and Phabrix SxE with Dante at 48kHz and 1ms latency setting.
De-embedding	Phabrix -> DIO10 -> AVIOAES - < 3.5ms
Embedding	AVIOAES -> DIO10 -> Phabrix - < 7ms

Network and AoIP	
AoIP Standard:	Dante
Channels:	16 receive, 16 transmit
Flows:	16 receive, 16 transmit
Sample Rates:	44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz
Encoding:	PCM 16, PCM 24, PCM 32
AES67 Support:	Yes
Connectivity:	2 x etherCON (RJ45 compatible)
Speed:	1Gbps or 100Mbps
Network Modes:	Switched or redundant
Dante Domain Manager Ready:	Yes
Clock Source:	Internal (PTP Leader), Network PTP Leader or from SDI input (Sync to External)

PoE Power	
Standard:	802.3af
Redundancy:	Yes
Class:	0
PD Power Range:	0.44 W to 12.94 W
Typical PSE Power Usage:	6 W
Max PSE Usage:	15.4 W

Equipment Type	
AVN-DIO10:	Dante to 3G/HD/SD-SDI Embedder/De-Embedder

Physical Specification	
Dimensions (Raw):	14.0cm (W) x 13.6cm (D) x 4.2cm (H) 5.5" (W) x 5.4" (D) x 1.7" (H)
Dimensions (Boxed):	17.8cm (W) x 17cm (D) x 5.6cm (H) 7.0" (W) x 6.7" (D) x 2.2" (H)
Weight:	Nett: 0.36kg Gross: 0.55kg Nett: 0.79lbs Gross: 1.21lbs

Accessories	
AVN-DIOBT:	AVN-DIO Large Unit Belt Clip Kit
AVN-DIOMT:	AVN-DIO Large Unit Underdesk Mount
AVN-DIORK:	AVN-DIO 1U 19" rack kit (5 x small DIO or 3 x large DIO)

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