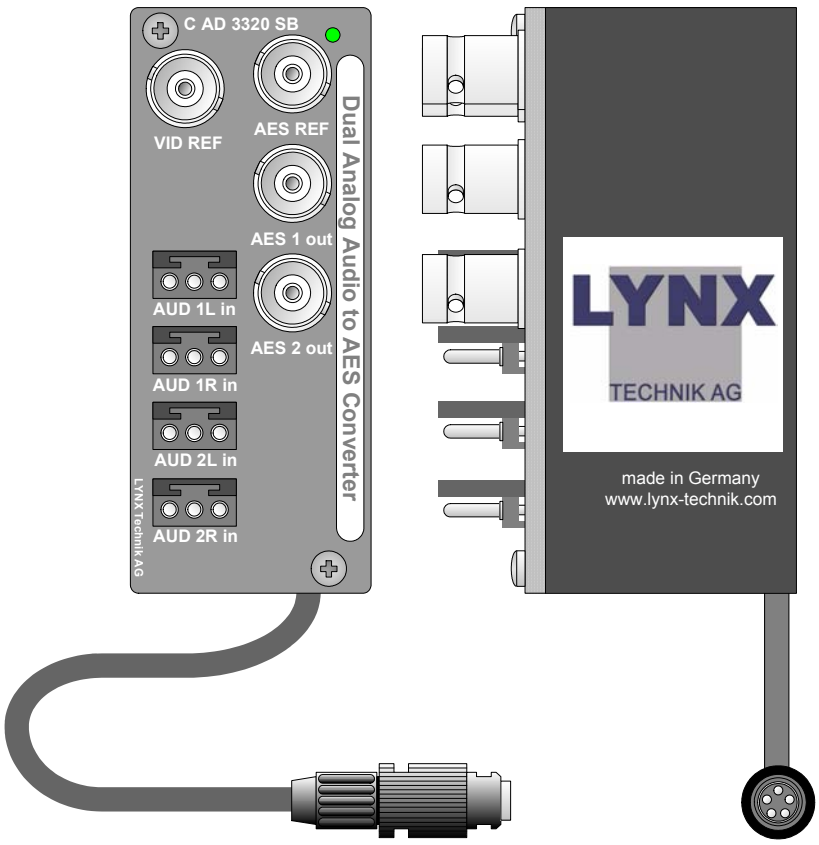
Version 1.1

Reference Manual

C AD 3320 SB / C AD 3321 SB

Dual Analog Audio to AES Converter

Series 3000 MiniModules



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Warranty

LYNX Technik AG warrants that the product will be free from defects in materials and workmanship for a period of two (2) years from the date of shipment. If this product proves defective during the warranty period, LYNX Technik AG at its option will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, customer must notify LYNX Technik of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik service center is located. Customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non LYNX Technik supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

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Regulatory information

Europe

Declaration of Conformity

We LYNX Technik AG
Brunnenweg 3
D-64331 Weiterstadt
Germany

Declare under our sole responsibility that the product

TYPE: C AD 3320 SB / C AD 3321 SB

To which this declaration relates is in conformity with the following standards (environments E1-E3):

EN 55103-1 /1996
EN 55103-2 /1996
EN 60950 /2001

Following the provisions of 89/336/EEC and 73/23/EEC directives.

Winfried Deckelmann

Bickenbach, September 2003

Place and date of issue *Legal Signature*

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the 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

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Getting Started

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case subsequent shipping of the product becomes necessary.

Product Description

The C AD 3320 SB / C AD 3321 SB is a high quality dual channel analog audio to AES converter designed primarily for broadcast and professional applications.

The Module accepts balanced analog audio inputs and converts these to 24 bit AES digital streams. Sampling rates of 32KHz, 44.1KHz, 48KHz and 96KHz are supported. The converter can be locked to external video reference, external AES reference or internal reference. Input full scale ranging is adjustable and an internal test tone generator is also provided.

The module has a built in micro-controller with local controls, status and alarm indicators and well as internal flash ram for storing setups. Remote control and remote status monitoring is possible when used with the one of the available controller options and LYNX control software.

The C AD 3320 SB / C AD 3321 SB is part of the 3000 series of MiniModules, which offer high quality, modularity and flexibility in a very small form factor ideal for applications where space is at a premium.

The modules can be used either stand alone using the optional power supply brick, or as part of a

tightly integrated space saving system where up to 10 MiniModules can be mounted utilizing the optional LYNX R FR 3005 / 3010 rack housing. This includes integrated power supply and optional remote control interfaces.

Features

- 2 stereo channels of audio AD conversion
- Balanced analog inputs
- Adjustable input full scale ranging
- Transformer coupled AES outputs
- Sample rates from 32kHz to 96kHz
- Video Black Burst reference, AES reference or Internal reference
- Integrated test tone generator
- Overload detection
- Compact size
- Remote control interface
- Microprocessor controlled
- Internal flash ram for storing setups

Functional Diagram

Figure 1 below is the basic functional diagram for the C AD 3320 SB / C AD 3321 SB MiniModule.

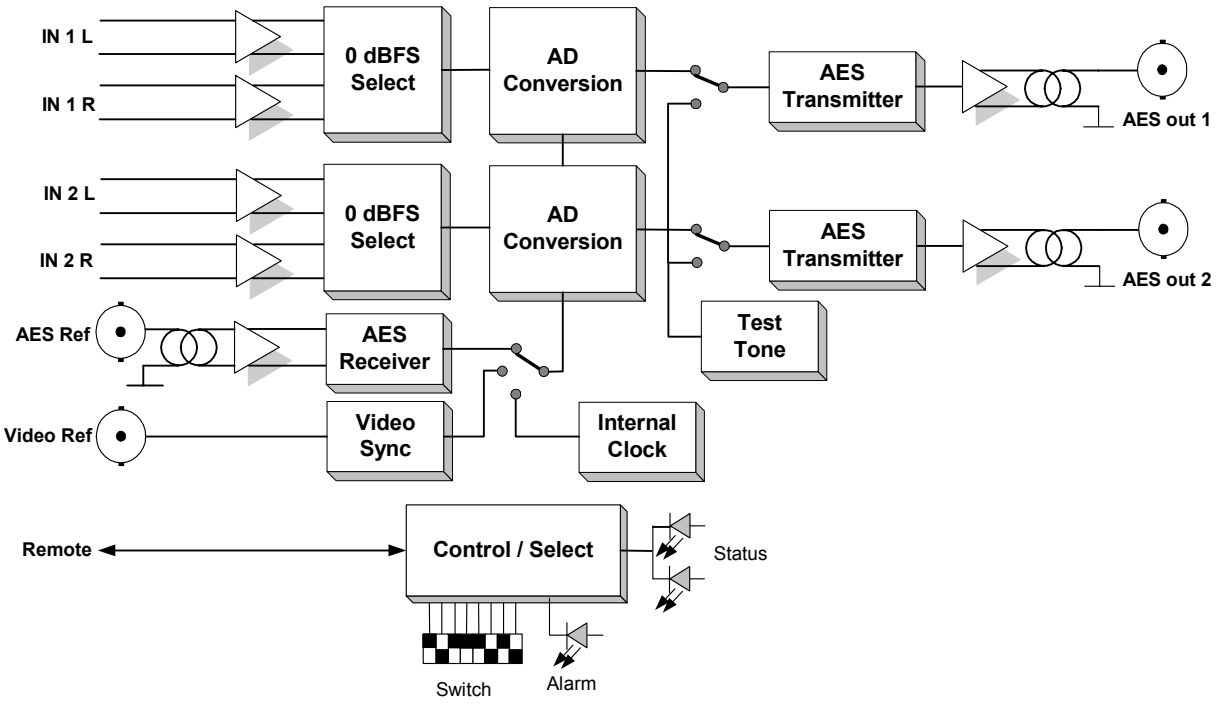


Figure 1- C AD 3320 SB / C AD 3321 SB Functional Diagram

Module Layout

Figure 2 shows the physical layout of the C AD 3320 SB / C AD 3321 SB MiniModule. This module utilizes Weco screw terminal connectors for the balanced audio inputs and BNC connectors for the unbalanced AES3id digital outputs. Please refer the connections section of this manual for wiring details for the connectors.

If the module is being used in a stand alone application then the optional power supply (R PS 3001 E, R PS 3001 U or R PS 3001-3) is required to power the module (not shown)

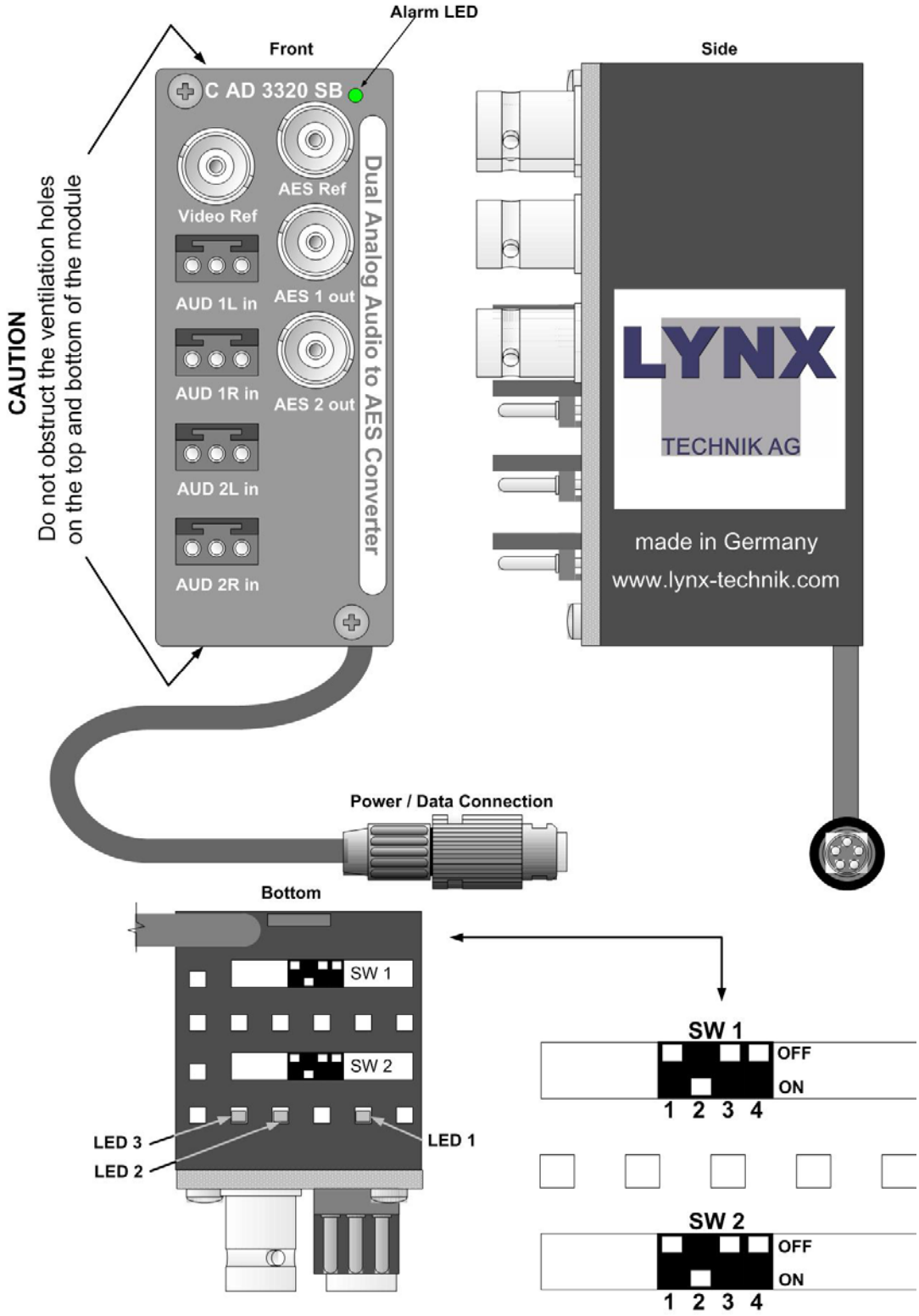


Figure 2 – Module Layout

Connections

Audio Connections

The C AD 3320 SB / C AD 3321 SB MiniModule is configured for Weco connectors for analog audio inputs and 75 Ohm BNC connectors AES3id Digital outputs. The Weco connectors should be wired as indicated below. Please use high quality screened cable to prevent the introduction of noise and interference to the audio signals (twisted pair suitable for balanced audio signals).

Audio Input Connections (balanced)

Weco 3 pin connector

Pin Number	Connection
1	Positive (+)
2	GND
3	Negative (-)

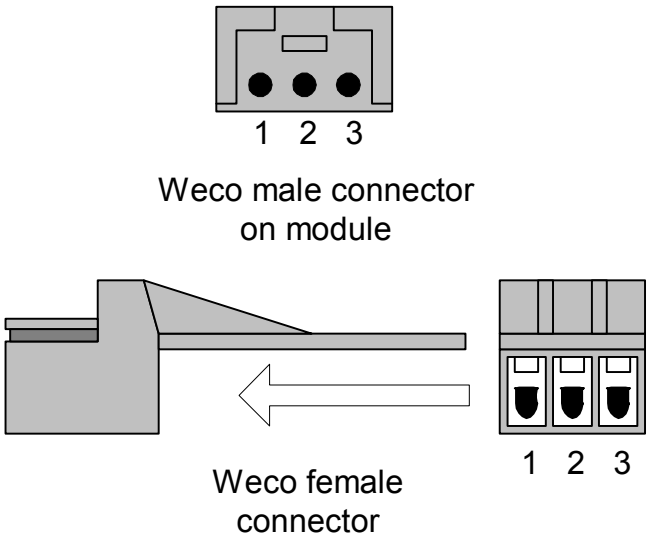


Figure 3 - Audio output connection detail

Audio Input Connections (un-balanced)

Although the module is designed primarily for balanced line audio connections it is possible to make un-balanced audio connections to the module. **NOTE**. When used in this manor certain technical specifications of the module cannot be maintained.

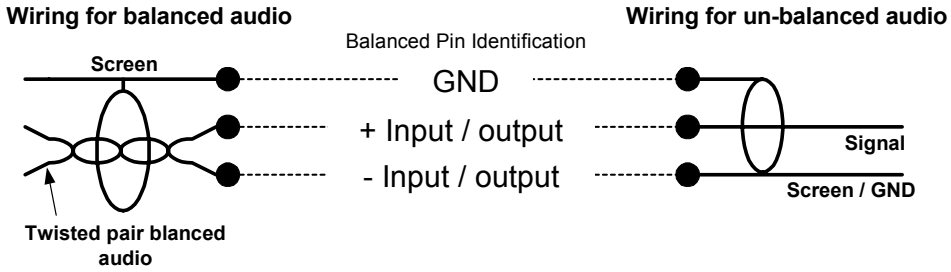


Figure 5 – Audio wiring detail

Audio Output Connections (unbalanced)

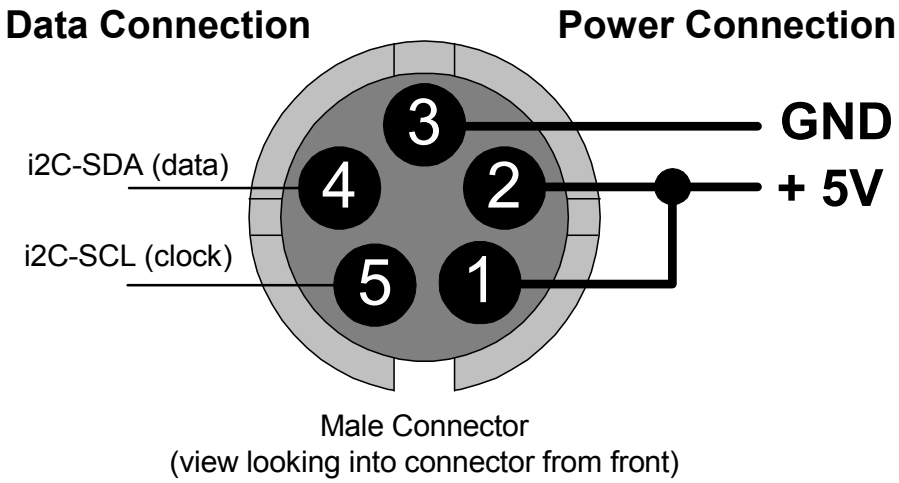
The module provides unbalanced AES3id digital audio outputs via standard 75 Ohm BNC connectors. Connection is self-explanatory. Please use high quality coaxial cable suitable for digital signals.

Power Connections

If using the module in a stand-alone application use the separate R PS 3001 E (for Europe), R PS 3001 U (USA) power brick option or R PS 3001-3 desk power supply.

DC Power Connector

The MiniModule has a captive power lead fitted to the module, with a male 5 pin locking bayonet connector. This connection provides DC power and also data connectivity to the module. Connector wiring is shown below.



Male Connector
(view looking into connector from front)

Caution

Only use the optional LYNX R PS power modules. Please make sure the brick is not connected to the main supply when making the DC power connection to the module. Ensure the 5-pin power connector is locked securely in place.

Installation

Mechanical

Stand Alone Operation

The C DA 3320 SB MiniModule can be used in a stand alone application. There are two options for the use of the module in this way.

a) Using the R FR 3005 Rack Frame 1 option. This allows up to any 10 of the MiniModules to be secured onto a rack frame assembly for 19 inch rack mounting. This keeps the modules secured, organized and out of the way. The R PS 3001 power brick option or the R FR 3010 option is required to power each module. Please refer to the reference manuals supplied with these options for more details.

b) Single Use. The MiniModule can be powered independently with the R PS 3001 option and used in any location where this functionality is required.

Caution. Care needs to be taken when using the module in this way, as it is not physically secured. Keep the module away from the floor to avoid the risk of someone stepping or tripping on the unit, and locate the unit away from excessive sources of heat and any sources or moisture.

If using more than one MiniModule in any installation, the R FR 3005/3010 Rack frame combination is highly recommended.

Multiple Units

Most applications will require more than one MiniModule, which can include any of the available Series 3000 MiniModule product range. There are two options for mounting multiple units.

a) Using the R FR 3005 Rack Frame option. This allows up to any 10 of the MiniModules to be secured onto a rack frame assembly for 19 inch rack mounting. The R PS 3001 power brick option or the R FR 3010 option is required to power each module. Please refer to the reference manuals supplied with these options for more details.

b) Using the R FR 3010 Rack frame extension option. Can be combined with the R FR 3005 Rack frame option. Each module plugs into a connection bus, which provides common power for all modules. (No R PS external power supplies are needed). Remote control and status monitoring of all modules is possible with the addition of the R CT 5020 rack controller and R CT 5030 master controller options. Please refer to the respective reference manuals for these options for details of mechanical installation.

The very small size and density of the MiniModules combined with the available rack frame options allows the addition of a complex and custom signal distribution system without taking any additional front rack space. The rack frames are designed for installation in the back of 19-inch racks where there is normally plenty of available space. Ideal for mobile truck installations and facility expansions where space is at a premium.

Electrical Installation.

Stand Alone Operation

The MiniModule requires the R PS 3001 power brick option for stand-alone operation. Three versions are available, R PS 3001 E for European markets, R PS 3001 U for the US markets and the R PS 3001-3 desk power supply. Please ensure you have the correct power option for your region. The connection to the module is made with a small 5-pin connector, which has a twist bayonet securing system. Please make sure the connection is solid and locked in place. A strain relief is included within the module to prevent excessive strain on the connection.

Signal connections should be made with care, please ensure connections are correct and compatible equipment is feeding / receiving the signals from the module or damage can result.

Caution. Only use the optional LYNX R PS 3001 power modules. Please make sure the brick is not connected to the main supply when making the DC power connection to the module. Ensure the 5-pin power connector is locked securely in place.

Caution. Care needs to be taken when using the module in this way, if it is not physically secured. Keep the module away from the floor to avoid the risk of someone stepping or tripping on the unit, and locate the unit away from excessive sources of heat and any sources or moisture.

Multiple Units

When installing multiple MiniModule units it is recommended you use the R FR 3005 Rack Frame 1 and / or R FR 3010 Rack Frame 2 options. Please refer to the documentation supplied with these options for details on electrical installation.

Settings and Control

The C AD 3320 SB / C AD 3321 SB has an integrated micro-controller, which enables the module to be configured and controlled locally via the integral dip-switch and push buttons, or from remote when using the optional RFR rack frame and control system. When remote operation is used the local controls are disabled.

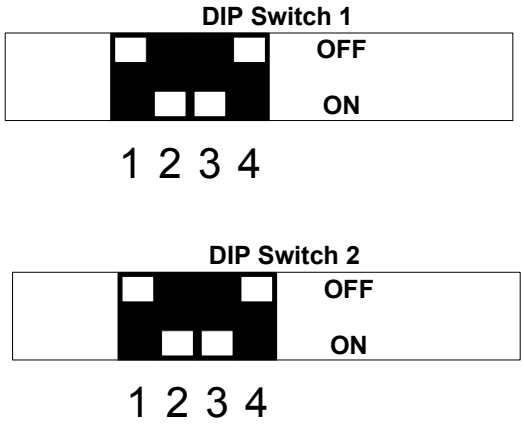
Once set, all settings are automatically saved in non-volatile internal memory. The module will always recall the settings used to prior to power off.

The module local configuration is performed from two 4-position dip-switches which are accessible through an access space in the bottom of the module.

Please refer to figure 2 for the location of these adjustments and use the procedures defined in the next section to configure the C AD 3320 SB / C AD 3321 SB module.

Switch Settings

Below the switch settings for the 8-position dip-switch are defined. Please refer to figure 2 for the location of the switch.



(Connector side)

NOTE. Settings made are applied to both input channels.

Switch 1	Setting	Function
1	ON	Local Control enabled
	OFF	Local Control disabled
2	ON	Select Sample range High (48KHz or 96KHz)
	OFF	Select Sample range Low (32KHz or 44.1KHz)
3	ON	Sample Rate = 44.1KHz or 96KHz **
	OFF	Sample Rate = 32KHz or 48KHz **
4	ON	Test tone ON
	OFF	Test tone OFF (normal)
Switch 2	**Setting**	**Function**
1	ON	Select FS 18dBu (EU - C AD 3320) Select FS 24dBu (US - C AD 3321)
	OFF	Select Low FS range (12dBu or 15dBu) (EU) Select Low FS range (15dBu or 18dBu) (US)
2	ON	FS range = 15dBu (EU) * FS range = 18dBu (US) *
	OFF	FS range = 12dBu (EU) * FS range = 15dBu (US) *
3	ON	Mute channel 1
	OFF	Normal operation
4	ON	Mute channel 2
	OFF	Normal operation

* Value selected depends on the range selected with switch 5

** Value selected depends on range selected on switch 2

Switch Function Detail

Dip Switch 1:

Switch 1. Local Control Enable. **ON** enables local control (LED 3 green) and makes selections on the DIP switches active. **OFF** disables local control (LED 3 off)

Switch 2. Sample range select. This switch is used to select either high or low sample range presets. **ON** selects the high range, which means 48KHz or 96KHz (depending on the selection of switch 6) **OFF** selects the low range 32KHz or 44.1KHz (depending on the selection of switch 3)

Switch 3. Select sample rate. Will select between the two sample rate presets defined on switch 5 **ON** =44.1KHz or 96KHz **OFF** = 32KHz or 48KHz

Note. Switch 2 and switch 3 are interactive

Switch 4. Test Tone selection. **ON** selects the internal test tone that will be on both AES outputs. **OFF** is normal operation (tone off)

Dip Switch 2:

Switch 1. Full Scale (FS) range select. This switch is used to select either high or low FS range presets **ON** selects the high range, which means 18dBu (C AD 3320) or 24dBu (C AD 3321) **OFF** selects the low range 12dBu or 15dBu (C AD 3320) or 15dBu or 18dBu (C AD 3321) (depending on the selection of switch 2)

Switch 2. Select full scale range **(Switch 1 OFF)**
ON =15dBu for C AD 3320 and 18dBu for C AD 3321
OFF =12dBu for C AD 3320 and 15dBu for C AD 3321

Note. Switch 1 and switch 2 are interactive

Switch 3. Mute channel 1. Selecting **ON** will mute the audio on channel 1 **OFF** is normal operation

Switch 4. Mute channel 2. Selecting **ON** will mute the audio on channel 2 **OFF** is normal operation

Auto Store

If no parameters are changed for 10 seconds then the current settings will be written into flash memory automatically, this can be seen by the channel condition LEDS flashing yellow four times.

Factory Preset Condition

The C DA 3320 / C AD 3321 is delivered with stored presets for the following functionality.

- Test tone OFF
- FS Range = 15 dBu (C AD 3320)
- FS Range = 18 dBu (C AD 3321)
- Sample Rate = 48 kHz
- Normal Operation, no Mute

No further adjustments are needed if this is the functionality desired.

External Reference
If no external reference is applied the module will switch automatically to internal reference.
If AES and Video reference is applied the module will switch to Video Reference.

Alarm/LED Status Indicators

The C AD 3320 SB / C AD 3321 SB module has built in LED indicators that serve as alarm and status indication for the module. Function is described below.

The Indicators are found on the bottom of the module and can be seen through the access holes provided. (Figure 2)

Channel Condition Indicators

One LED is provided for each channel

LED 1 = Channel 1
LED 2 = Channel 2

LED State	Indication
Green	Input and reference OK (normal)
Green Flashing	Mute is ON
Yellow	Invalid reference or internal reference
Yellow Flashing	Input overload
Red	Input missing

LED 3

LED 3 = ON (GREEN): Local Control enabled
LED 3 = OFF: Local Control disabled

Front Panel Alarm Indicator

There is also a single alarm LED on the front side of the module, (figure2) which is designed for quick and easy indication of a problem condition in installations where visible access to the bottom of the module is not convenient.

LED Color	Indication
Green	Both inputs and reference OK
Yellow	Invalid reference or one input lost
Red	Both inputs lost
OFF	Power supply fault

Locate Function

For large systems which have many modules in various locations we have added a utility which will help visually identify a module quickly. (When used in conjunction with the optional control system and software)

Once the module has been identified on the control system it is possible to initiate the "locate" function and flash the module LEDs yellow in the following continuous sequence.

3 short flashes…. Pause…. 3 short flashes …

This uses the alarm LED located on the front of the module as well as any module edge LEDs that may be used in the module.

Use of the locate function will not interfere with the normal operation of the module.

For more details on this feature please check the documentation supplied with the controller software

Specifications *(C AD 3320 SB / C AD 3321 SB)*

Analog Input

Signal	2 x balanced analog stereo inputs
Impedance	15 K Ohm
Connection	Weco 3 pin screw terminal
Max level	24dBu
0dB FS level	Adjustable (12dBu, 15dBu, 18dBu or 24dBu)

Reference Input

Video Reference	Black Burst, 75 Ohm on BNC connector
AES Reference	AES reference input, 75 Ohm on BNC connector

Outputs

Signal	2 x unbalanced AES3id digital outputs. Transformer coupled (isolated)
Impedance	75 Ohm
Connection	BNC
Level	1 V p-p

Performance

Sampling	Sampling rates: 32kHz, 44.1kHz, 48kHz, 96kHz
Quantization	24 bit
Noise floor	< -90dB (A-weighted)
Distortion	< 0.002% @ 20Hz to 20kHz
Frequency response	0.1dB @ 20Hz to 20kHz
Crosstalk	< -90dB @ 20Hz to 20kHz
Status Monitoring	Signal presence detection

Electrical Specifications

Operating Voltage	+ 5VDC
Power Consumption	2.5 VA
Connection	DC input via 5 pin locking bayonet connector
Safety	IEC 60950/ EN 60950/VDE 0805

Mechanical

Size	85.5mm x 35.3mm x 27mm + connectors
Weight	150g

Ambient

Temperature	5°C to 35°C Maintaining specifications -20°C to 70°C Storage
Humidity	Max 80% non condensing

Supplied Accessories

Documentation	C AD 3320 SB / C AD 3321 SB Reference Manual

Available Options

Below is a list of available options for the C AD 3320 SB / C AD 3321 SB MiniModule. Please refer to product brochures or our web site for more detailed information.

Model	Description
R PS 3001 E	**External brick power supply module for Series 3000 MiniModules. European market version. 100-240 VAC input, +5V DC output.**
R PS 3001 U	**External brick power supply module for Series 3000 MiniModules. USA market version. 110-240 VAC input, +5V DC output.**
R PS 3001 -3	**Desk power supply module for Series 3000 MiniModules. 110-240 VAC input, +5V DC output.**
R FR 3005	**Rack Frame 1. This is a basic 19 inch rack mountable frame which can accommodate 10 MiniModules with power bricks R PS 1 or can be extended with the R FR 3010.**
R FR 3010	**Rack Frame 2. This is a card cage with integrated central power supply, optional redundant power supply and optional controller, which can accommodate 10 MiniModules. Can be combined with R FR 3005**
R PS C15	**1.5m cable extension to connect one MiniModule to R FR 3010**
R PS C25	**2.5m cable extension to connect one MiniModule to R FR 3010**
R PS 5010	**Redundant power supply for the R FR 3010 card cage**
R CT 5020	**Rack controller for the R FR 3010 rack frame**
R CT 5010	**Rack Bus Extension for R FR 3010 rack frame. In combination with R CT 5020**
R CT 3000	**Service Adapter for remote configuration of one MiniModule via PC or Palm**

Parts List

Due to the very dense design and high level of integration there are no user serviceable electronic assemblies within the C AD 3320 SB / C AD 3321 SB module.

C AD 3320 SB Mini Module (complete)

Description	Dual Analog Audio A/D
Model Number	C AD 3320 SB
Part Number	6.155.002.250

C AD 3321 SB Mini Module (complete)

Description	Dual Analog Audio A/D
Model Number	C AD 3321 SB
Part Number	6.155.009.230

Service

If you are experiencing problems, or have questions concerning your C AD 3320 SB / C AD 3321 SB MiniModule please contact your local distributor for assistance.

We offer a fixed cost service exchange program for defective Series 3000 MiniModules out of Warranty. Please contact your distributor or check our web site for details on this program.

More detailed information and product updates may be available on our web site:

www.lynx-technik.com

You will also find links to contact us directly for assistance.

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

LYNX Technik can be contacted directly using the information below.

Address	LYNX Technik AG Brunnenweg 3 64331 Weiterstadt Germany
Website	www.lynx-technik.com
E-Mail	info@lynx-technik.com

LYNX Technik manufactures a complete range of high quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

Notes