DirectOut Technologies®

D.O.TEC® ANDIAMO

Manual

Version 1.6

Table of contents

About This Manual

How to Use This Manual

This manual guides you through the installation and operation of the ANDIAMO.

Use the Table of Contents at the beginning of the manual or Index Directory (*page 49)* to locate help on a particular topic.

You can access more information and latest news by visiting on the DirectOut website at www.directout.eu.

Conventions

The following symbols are used to draw your attention to:

Tips – indicate useful tips and shortcuts.

Notes – are used for important points of clarification or cross references.

Warning

Warnings – alert you when an action should always be observed.

Chapter 1: Overview

Introduction

Welcome to the ANDIAMO, D.O.TEC's s high quality AD/DA converter for MADI signals.

The ANDIAMO provides one MADI input and output and 32 channels analog inputs and outputs. With one RU height, two redundant power supplies and excellent sounding converters the device offers best and safe audio quality at a minimal need of rackspace.

ANDIAMO - SC version (optical)

ANDIAMO - BNC version (coaxial)

Feature Summary

MADI Ports	1 x MADI input and output SC multi-mode connectors (optical version) or coaxial BNC connectors (coaxial version)
MADI Formats	56/64 channel, 48k/96k Frame, S/MUX 2
Sample Rates	44.1, 48, 88.2, 96 kHz +/-12.5%
Clock Inputs	1 x Word clock coaxial BNC (75 Ω termination switchable) This input also accepts an AES3 frame (AES11).
Clock Output	1 x Word clock coaxial BNC

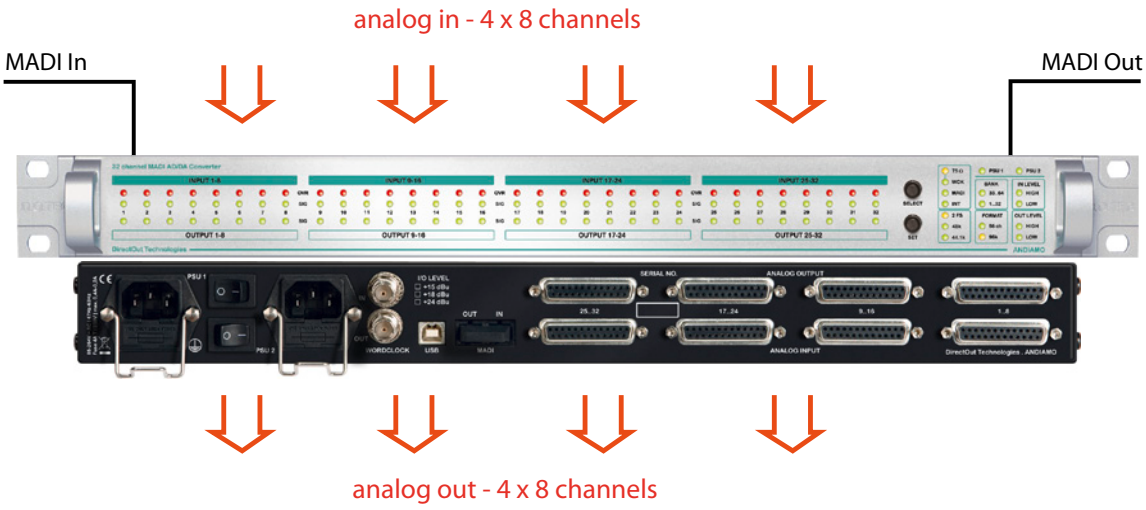
Line Inputs	4 x DSUB-25 (8 channels each)
Line Outputs	4 x DSUB-25 (8 channels each)
USB Port	USB 2.0 port for firmware updates and remote control.
Power Supply	This device is equipped with two wide range power supplies (84 V to 264 V AC / 47 Hz to 63 Hz / safety class 1).

Applications

ANDIAMO can be used for conversion, monitoring and recording of analog signals.

Typical applications include:

- monitoring digital audio
- recording line signals
- conversion of a high number of channels from analog to digital and vice versa
- cascaded use of two ANDIAMOs for conversion of all 64 channels of a MADI signal
- format conversion of MADI signals
- ...



Chapter 2: Legal issues & facts

Before Installing This Device

Warning

Please read and observe ***ALL*** of the following notes before installing this product:

- Check the hardware device for transport damage.
- Any devices showing signs of mechanical damage or damage from the spillage of liquids ***MUST NOT*** be connected to the mains supply, or disconnected from the mains immediately by pulling out the power lead.
- All devices ***MUST*** be grounded. The device is grounded through its IEC power connections.
- All devices ***MUST*** be connected to the mains using the three-cord power leads supplied with the system. Only supply electrical interfaces with the voltages and signals described in these instructions.
- Do ***NOT*** use the device at extreme temperatures. Proper operation can only be guaranteed between temperatures of 5º C and 45º C and a maximum relative humidity of 80 %, non-condensing.
- The cabinet of the device will heat up. ***DO NOT*** place the device close to heating sources (e.g. heaters). Observe the environmental conditions.

Defective Parts/Modules

Warning

This device contains no user-serviceable parts. Therefore do NOT open the device.

In the event of a hardware defect, please send the device to your D.O.TEC® representative together with a detailed description of the fault.

We would like to remind you to please check carefully whether the failure is caused by erroneous configuration, operation or connection before sending parts for repair. See *„Chapter 7: Troubleshooting and Maintenance“ on page 44* for assistance with troubleshooting.

First Aid (in case of electric shock)

Warning

- ***DO NOT*** touch the person or his/her clothing before power is turned off, otherwise you risk sustaining an electric shock yourself.
- Separate the person as quickly as possible from the electric power source as follows:
  - ✓ Switch off the equipment.
  - ✓ Unplug or disconnect the mains cable.
- Move the person away from the power source by using dry insulating material (such as wood or plastic).
- If the person is unconscious:
  - ✓ Check their pulse and reanimate if their respiration is poor.
  - ✓ Lay the body down and turn it to one side. Call for a doctor immediately.
- Having sustained an electric shock, ***ALWAYS*** consult a doctor.

Contents

The contents of your ANDIAMO package should include:

- 1 x ANDIAMO (19'', 1 RU)
- 2 x power chord
- 2 x fixing unit for power plug
- 1 x Manual

Accessories

D.O.TEC® BREAKOUT series

The BREAKOUT Series are adaptor boxes - available in different variants - to widen the application range of the D.O.TEC® ANDIAMO 2 series.

Each box is equipped with XLR or BNC connectors at the front panel and DSUB-25 connectors at the rear panel. Audio signals are carried passively between front and rear panel.

Five different models are available:

BREAKOUT.AN8 - analog input / output, 8 channels

BREAKOUT.AN16I - analog input, 16 channels

BREAKOUT.AN16O - analog output, 16 channels

BREAKOUT.AES - digital input / output, 8 AES ports (16 channels)

BREAKOUT.AESid - digital input / output, 16 AESid ports (32 channels)

Updates

D.O.TEC® products are continually in development, and therefore the information in this manual may be superseded by new releases. To access the latest documentation, please visit the DirectOut website: www.directout.eu.

This guide refers to firmware version 2.5.

Intended Operation

The ANDIAMO is designed for conversion of audio signals from analog to digital and vice versa. In this context digital audio refers to a MADI signal (AES10).

Warning

No compensation can be claimed for damages caused by operation of this unit other than for the intended use described above. Consecutive damages are also excluded explicitly. The general terms and conditions of business of DirectOut GmbH are applied.

Conditions of Warranty

This unit has been designed and examined carefully by the manufacturer and complies with actual norms and directives.

Warranty is granted by DirectOut GmbH over the period of two years for all components that are essential for proper and intended operation of the device. The date of purchase is applied for this period.

Warning

All claims of warranty will expire once the device has been opened or modified, or if instructions and warnings were ignored.

For warranty claims please contact the dealer where your device was acquired.

Conformity & Certificates

CE

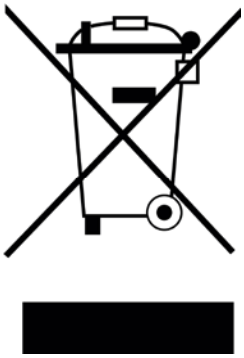
This device complies with the basic requests of applicable EU guidelines. The appropriate procedure for approval has been carried out.

RoHS

(Restriction of the use of certain Hazardous Substances)

This device was constructed fulfilling the directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC.

WEEE



(Directive on Waste Electrical and Electronic Equipment)

Due to the directive 2002/96/EC for waste disposal this device must be recycled.

For correct recycling please dispatch the device to:

IMM Elektronik GmbH,

Leipziger Strasse 32

09648 Mittweida

Germany

Only stamped parcels will be accepted!

WEEE-Reg.-No. DE 93924963

Contact

Sales:

DirectOut GmbH, Leipziger Strasse 32, 09648 Mittweida, Germany

Phone: +49 (0)3727 6205-333 // Fax: +49 (0)3727 6205-56

www.directout.eu

Manufacturer:

IMM Elektronik GmbH, Leipziger Strasse 32, 09648 Mittweida, Germany

Phone: +49 (0)3727 6205-0 // Fax: +49 (0)3727 6205-56

www.imm-gruppe.de

Chapter 3: Installation

Installing the Device

1. Open the packaging and check that the contents have been delivered complete and undamaged.

2. Fix the device in a 19'' frame with four screws, or place it on a non-slip horizontal surface.

Warning

Warning

Avoid damage from condensation by waiting for the device to adapt to the environmental temperature. Proper operation can only be guaranteed between temperatures of 5º C and 45º C and a maximum relative humidity of 80%, non-condensing.

Ensure that the unit has sufficient air circulation for cooling.

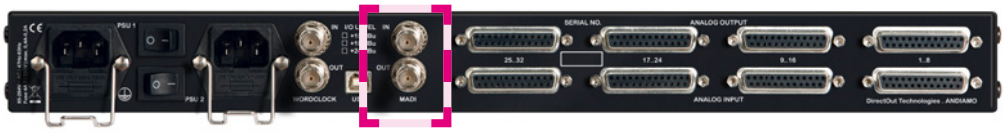
3. Remove the protective cap from the optical MADI port before use (SC version only).

Note

Retain the protective cap if an optical port is unused. This will protect against soiling which can lead to malfunction.

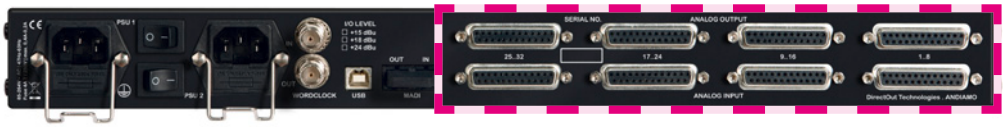
4. Connect signal cable for the MADI signals.

ANDIAMO - SC version (optical)



ANDIAMO - BNC version (coaxial)

5. Connect the signal cables[1] for the analog audio signals to the DSUB-25 connectors (TASCAM pinout).



Warning

Do **not** connect voltage sources to the analog outputs. This may cause damage at the output stages. Observe the technical specifications - see *„Chapter 8: Technical Data“ on page 45.*

6. Optional: Connect an USB cable to the USB port for remote control or firmware updates. This requires the D.O.TEC® USB driver (Windows) being installed first. The driver and the installation instructions are available at www.directout.eu.

Link: http://www.directout.eu/en/support/downloads/andiamo.html

7. Using the power cords provided connect both PSUs to a matching power supply:

Warning

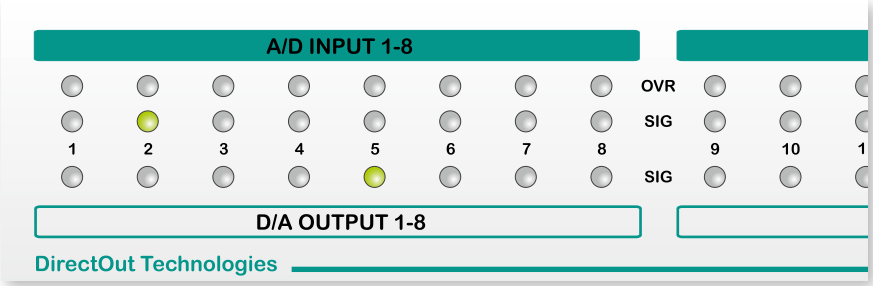
This device **MUST** be connected to the mains using the three-cord power leads supplied with the system. Only supply the voltages and signals indicated (84V – 264V).

This device may operate with only one power supply. To provide power supply redundancy, it is recommended to connect both PSU 1 and PSU 2 to independent power supplies with separate fuses.

1 signal cables are not included in delivery

8. Turn on the power switch and check the status of PSUs on the front panel:

The first seconds after switch-on the actual firmware is indicated by the lower metering panel - e.g. firmware version 2.5.



Tip

Use the D.O.TEC® Release Map to match your D.O.TEC® device with the latest firmware or software release.

Link: http://www.directout.eu/upload/dokumente/dotec_release_map.pdf

Note

To update the firmware an installed D.O.TEC® USB driver (Windows) and the D.O.TEC® Update Tool are necessary. The software and the installation instructions are available at www.directout.eu.

Link: http://www.directout.eu/en/support/downloads/andiamo.html

Tip

Keep any packaging in order to protect the device should it need to be dispatched for service.

Chapter 4: Operation

Introduction

This chapter describes the basic operation of the device. Note that throughout this manual, the abbreviation FS refers to sample rate or sample frequency. So, when dealing with scaling factors, the following sample rates can be written as:

- 44.1 kHz = 1 FS; 88.2 kHz = 2 FS

or

- 48 kHz = 1 FS; 96 kHz = 2 FS

Global Control

The control on the right of the front panel indicates the power supply. Power switches are on the back panel:

Power	**2 Switches** Enable / disable power supply.
PSU 1 & PSU 2	**2 LEDs (green): indicate the status of both power supply units** LED OFF = Power supply inactive LED ON = Power supply active

The green LEDs (PSU 1 & PSU 2) indicate that a working power supply is connected to the power supply unit. Note that an unlit LED does not guarantee that the device is free of voltage. To ensure that the device is completely disconnected from mains voltage, the power chords must be disconnected.

Note

Menu Control

The system settings of the converter can be accessed using a simple menu. Two push buttons are used for navigation and settings.

SELECT	**Button** Press longer than 2 seconds to enter the menu. Press short for navigation in menu mode.
SET	**Button** Press to adjust a setting. Only active in menu mode.

When the menu mode is active a LED will blink in one of the sections while the remaining LEDs of this section are glowing weak. This indicates:

- a setting can be adjusted in this section
- the blinking LED is the selected option in this section

After a short period of time the menu mode is exit automatically.

See also *„Chapter 5: Menu Navigation“ on page 31.*

Note

Blinking LEDs are also used to indicate an error (e.g. missing sync). Concentrate on the section where one LED is blinking and the remaining LEDs are glowing weak.

Clocking

The system clock can be set to one of three possible clock sources in the menu (see *„Chapter 5: Menu Navigation“ on page 31*). The LEDs on the front panel inform about selection and lock/sync state[1] of the selected source.

75 Ω	**LED (yellow): indicates the termination status of the word clock input** LED ON = Termination active LED OFF = Termination inactive
WCK	**LED (green): indicates use of word clock as clock source** LED ON = Clock source set to word clock LED blinking = Clock source set to word clock and no signal present LED heartbeat = Signal locked but not in sync
MADI	**LED (green): indicates use of MADI input as clock source** LED ON = Clock source set to MADI input LED blinking = Clock source set to MADI input and no signal present LED heartbeat = Signal locked but not in sync *If there is no MADI input signal present, one of the LEDs <Output level> is blinking slowly.*
INT	**LED (green): indicates use of internal clock generator as clock source** LED ON = Clock source set to internal clock generator

Note

1 Lock = a valid signal is detected but its clock does not match with the system reference

Sync = a valid signal is detected and matches with the system reference

Sample Rates

The scaling factor and the sample rate are indicated by three LEDs. With the clock set to internal (INT) the sample rate can be adjusted in the menu. All other clock sources (word clock, MADI) define the base rate automatically. When a MADI signal is used as clock source, the device will switch to 2 FS operation automatically when a 96k Frame signal has been detected. With 48k Frame signals no distinction is possible between 1 FS and 2 FS - so the scaling factor has to be set manually.

2 FS	**LED (yellow): indicates scaling factor of operation** LED ON = Scaling factor of sample rate set to 2 FS A 96k Frame signal forces to 2 FS.
48k	**LED (green): indicates the use of 48 kHz as base sample rate.** LED ON = Base sample rate set to 48 kHz
44.1k	**LED (green): indicates the use of 44.1 kHz as base sample rate.** LED ON = Base sample rate set to 44.1 kHz

Note

If the clock source is set to word clock or MADI input no adjustment of the base rate is possible - the measured frequency of the clock source is indicated then.

Level Settings

The sensitivity of the AD and DA converters can be switched between two settings (high and low) where the analog level corresponds to 0 dB_{FS}.

Depending on the model of the ANDIAMO the sensitivity levels are different.

Four LEDs inform about the sensitivity that can be adjusted for input and output separately.

IN	**LED (green): indicates the adjusted sensitivity of the converter.** LED ON = +6 dB_U (+9 dB_U / +15 dB_U) LED OFF = +15 dB_U (+18 dB_U / +24 dB_U)
OUT	**LED (green): indicates the adjusted sensitivity of the converter.** LED ON = +6 dB_U (+9 dB_U / +15 dB_U) LED OFF = +15 dB_U (+18 dB_U / +24 dB_U)

With the level setting to “low” a digital gain (input) or a digital reduction (output) is applied to adapt the lower analog level (-9 dB).

Note

If there is no MADI input signal present, one of the LEDs <Output level> is blinking slowly.

Note

The model of the ANDIAMO is a configure to order option. It is marked at the rear panel of the device.

Level Meters

All 32 channels have individual signal metering each with three LEDs. As the sensitivity of the converters may be varied the trigger threshold of each LED corresponds to the digital scale (db_{FS}).

OVR	**LED (red): indicates an analog input overload** LED ON = analog input signal equals to more than -0.5 dB_{FS}
SIG (input)	**LED (green): indicates signal level of channel input** LED ON = analog input signal equals to more than -80 dB_{FS} The light intensity of the LEDs depends on the audio level.
SIG (output)	**LED (green): indicates signal level of channel output** LED ON = analog output signal equals to more than -80 dB_{FS} The light intensity of the LEDs depends on the audio level.

Output Format

The format of the MADI output signal can be defined - allowing for format conversion of the MADI signal. The output signal status is indicated by two LEDs.

56 ch	**LED (green): indicates the channel format (64 ch or 56 ch) of the MADI output signal.** LED ON = MADI output is set to 56 (28) channel mode. LED OFF = MADI output is set to 64 (32) channel mode.
96k	**LED (yellow): indicates the frame format @2 FS (48k Frame or 96k Frame) of the MADI output signal.** LED ON = MADI output is set to 96k Frame LED OFF = MADI output is set to 48k Frame 96k Frame is available with 2 FS only.

Bank Selection / Signal Routing

At a scaling factor of 1 FS the bank selection defines the block of channels in the MADI stream that are routed to the DA converters. The outgoing MADI channels in the same block will be replaced by the audio signals from the AD converters. The remaining MADI data passes the device unchanged. The bank selection is indicated by two LEDs. At 2 FS operation a maximum of 32 channels are transmitted in a MADI signal; so there is no selection possible then.

The LEDs for the bank selection are also used to indicate the activation status of the 'Matrix Mode' (see *page 25*) and delay compensation.

33..64	**LED (green): indicates the selection of the converted audio channels.** LED ON = audio channels 33 to 64 (29 to 56 of a 56 ch signal) are converted LED heartbeat = delay compensation active, audio channels 33 to 64 are converted
1..32	**LED (green): indicates the selection of the converted audio channels.** LED ON = audio channels 1 to 32 (1 to 28 of a 56 ch signal) are converted. LED heartbeat = delay compensation active, audio channels 1 to 32 are converted

Note

See „Delay Compensation" on page 28 for more information about cascading of ANDIAMOs.

Note

If both Bank LEDs are <ON> 'Matrix Mode' is enabled.

Note

If both Bank LEDs <heartbeat> 'Matrix Mode' is enabled and delay compensation is active.

Matrix Mode

Two methods of signal routing are available:

a) ‘Standard Bank Routing’ - signal routing of analog and digital I/Os as a whole.

b) ‘Matrix Mode’ - individual signal routing of all analog and digital I/Os on a per channel basis.

To setup an individual routing the remote control software (ANDIAMO Remote) is required. The settings of the routing matrix are stored inside the device. So it is possible to toggle between both routing methods without using the remote control - see *„Chapter 5: Menu Navigation“ on page 31*.

ANDIAMO - SC version (optical)

ANDIAMO - BNC version (coaxial)

MADI / Word clock / USB

A word clock signal output provides the system clock that is either derived from word clock input, MADI input or internal clock generator. The MADI ports are used for transmission of 64 audio channels (AES10). The USB port is used for firmware updates and for remote control using a software remote application (Windows PC).

Word clock output	**BNC socket (coaxial)** System clock output - connect for word clock output signal here.
Word clock input	**BNC socket (coaxial)** Connect word clock or AES3 DARS (Digital Audio Reference Signal) here.
USB	**USB socket (Type B)** Connect for firmware updates and remote control here.
MADI IN	**SC socket (optical)** or **BNC socket (coaxial)** MADI input (64 ch), connect MADI input here
MADI OUT	**SC socket (optical)** or **BNC socket (coaxial)** MADI output (64 ch), connect MADI output here

Analog Input / Output

Eight DSUB-25 ports (4 x input / 4 x output) are used for transmission of the analog audio signals. Each port transmits eight audio channels. TASCAM[1] pinout is used - see *„Appendix A: Wiring DSUB-25“ on page 47* for wiring sketch.

Analog Input (1-8)	**DSUB-25 Port** Analog audio input - connect audio channels 1-8 here
Analog Input (9-16)	**DSUB-25 Port** Analog audio input - connect audio channels 9-16 here
Analog Input (17-24)	**DSUB-25 Port** Analog audio input - connect audio channels 17-24 here
Analog Input (25-32)	**DSUB-25 Port** Analog audio input - connect audio channels 25-32 here
Analog Output (1-8)	**DSUB-25 Port** Analog audio output - connect audio channels 1-8 here
Analog Output (9-16)	**DSUB-25 Port** Analog audio output - connect audio channels 9-16 here
Analog Output (17-24)	**DSUB-25 Port** Analog audio output - connect audio channels 17-24 here
Analog Output (25-32)	**DSUB-25 Port** Analog audio output - connect audio channels 25-32 here

Warning

Warning

Do **not** connect voltage sources to the analog outputs. This may cause damage at the output stages. Observe the technical specifications - see *„Chapter 8: Technical Data“ on page 45.*

1 TASCAM is a registered trademark of TEAC corporation.

Delay Compensation

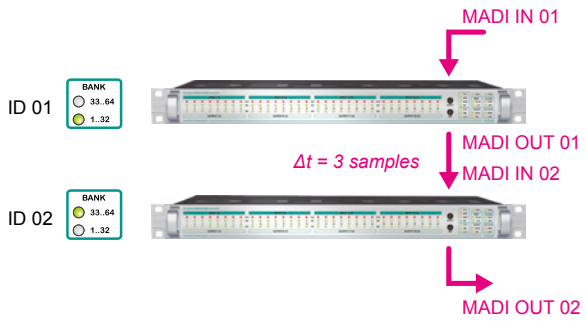
There is a delay of three samples between MADI input and output. For conversion of all 64 channels (@ 1 FS) of a MADI signal two ANDIAMOs may be cascaded. To ensure phase locked operation of all audio channels the delay between two ANDIAMOs will be compensated then.

Delay compensation becomes active, if an ANDIAMO 'sees' another ANDIAMO at its input. The 'second' ANDIAMO will switch to ID 02.

Indication of ID 2: LED <bank selection> heartbeat (*see page 24*).

Delay compensation:

	Δt A/D	Δt D/A
ID 01	0	+3 samples
ID 02	+3 samples	0



Two ANDIAMOs cascaded

Note

To ensure proper detection for delay compensation no other device must be connected in between two ANDIAMOs.

‘Digital Snake’

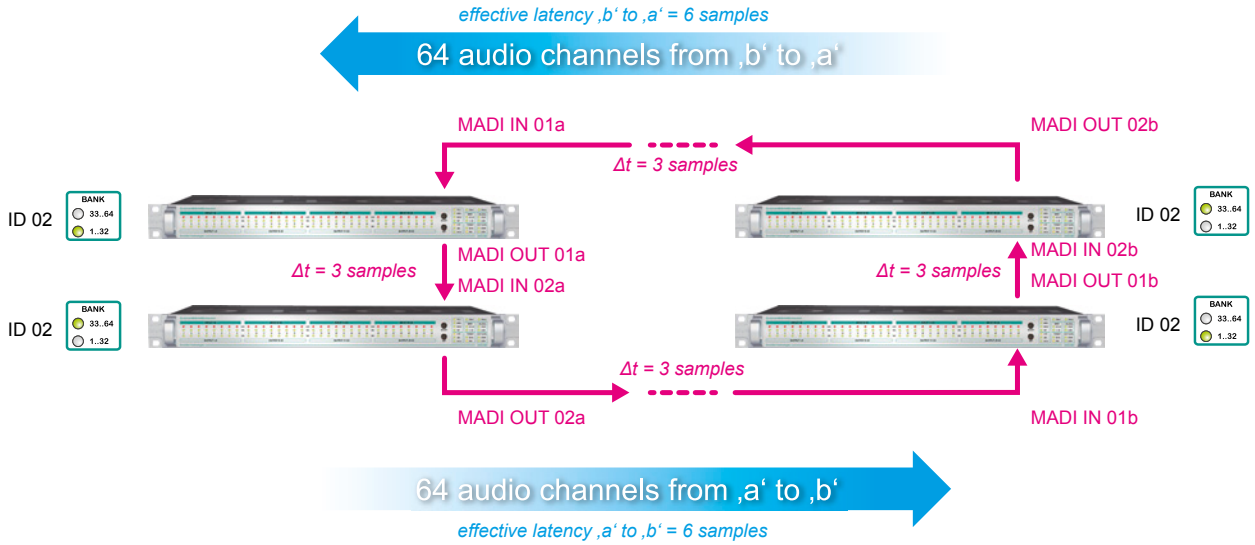
Four ANDIAMOs may be cascaded to build a ‘digital snake’; i.e. transmission of 64 audio channels from location ‘a’ to location ‘b’ and vice versa.

In this case all ANDIAMOs are set to ID 02 and **no** delay compensation is applied. The LED bank selection will heartbeat on all devices.

To achieve an equal amount of latency relative to all channels it is important to set the bank selection according the order:

‘01..32’ ⇨ ‘33..64’ ⇨ ‘01..32’ ⇨ ‘33..64’

The effective latency between location ‘a’ and location ‘b’ (and vice versa) will total in six samples.

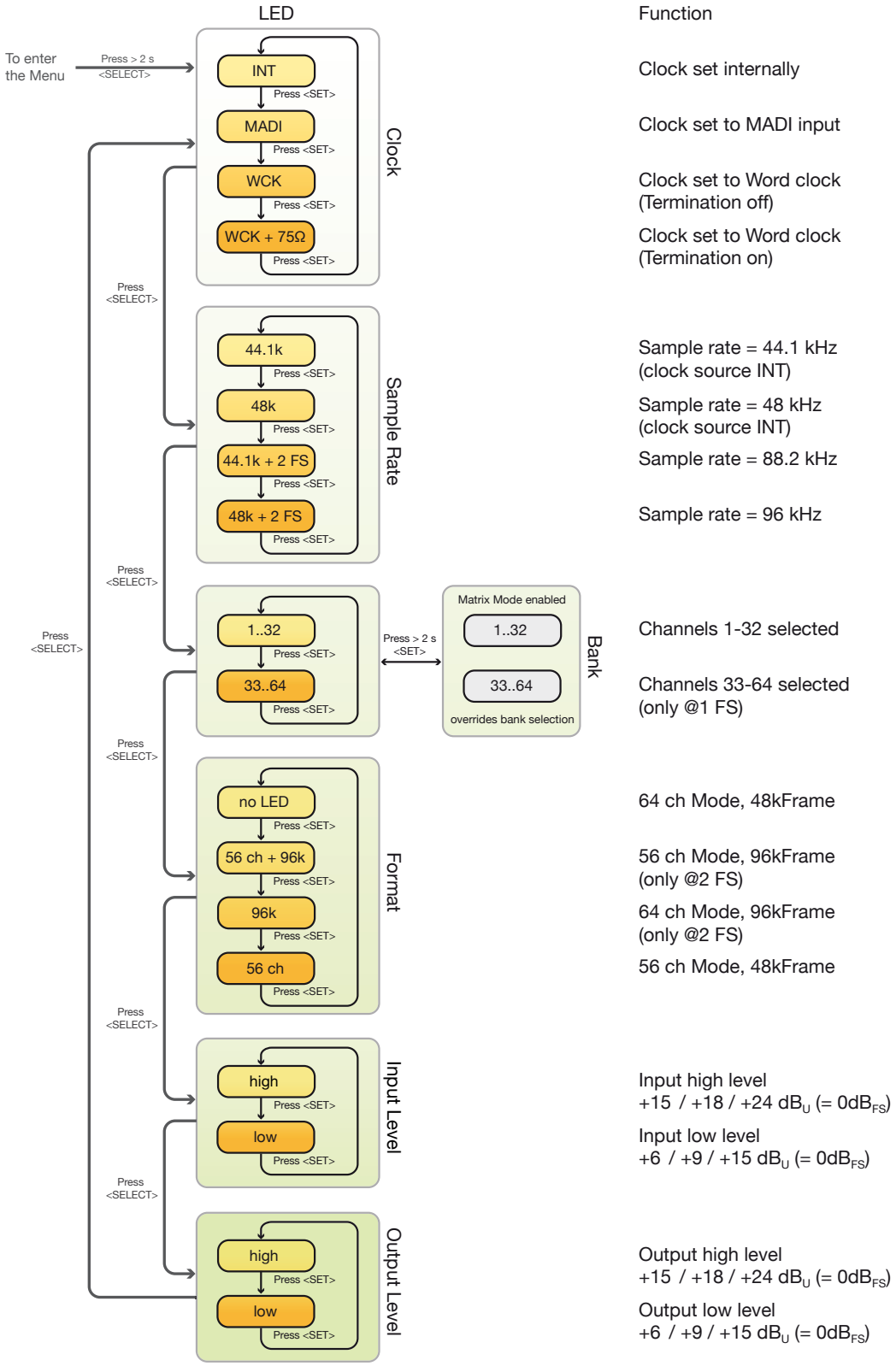


‘Digital Snake’ - four ANDIAMOs cascaded

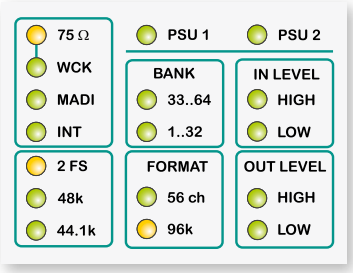
This page is left blank intentionally

Chapter 5: Menu Navigation

To setup the converter the menu mode has to be entered first. The unit will switch back to idle mode automatically after timeout.



In menu mode the active parameter for adjusting is indicated by a blinking LED. This LED reflects the setting of this parameter.



System Settings

Parameter <Clock>

Three different clock sources: word clock, MADI, internal

Internal allows for changing the base sample rate.

Parameter <Sample Rate>

Two base sample rates: 44.1 kHz and 48 kHz

Two scaling factors: 1 FS and 2 FS

The setting of the base sample rate only affects the conversion with the clock source set to INT. If the clock source is set to word clock or MADI input no adjustment is possible - the measured frequency of the clock source is indicated then.

Parameter <Bank>

Two banks allow for selection of 32 audio channels out of 64 audio channels at a scaling factor of 1 FS. At 2 FS only 32 audio channels are transmitted in a MADI signal. ‘Matrix Mode’ can be activated or disabled.

Parameter <Format>

The channel format (56 ch or 64 ch) as well as the frame format (48k Frame or 96k Frame) of the MADI output can be adjusted.

This setting does not affect the input signal.

Parameter <Input Level>

The converter offers the ability to change the sensitivity of its analog inputs corresponding to 0 dB_{FS}.

Depending on the model these levels are different:

- Model A: +15 dB_U (high) / +6 dB_U (low)
- Model B: +18 dB_U (high) / +9 dB_U (low)
- Model C: +24 dB_U (high) / +15 dB_U (low)

Parameter <Output Level>

As for the input level the output signal @at 0 dB_{FS} can also be calibrated to two different levels.

Three different models are available - see <Input Level>.

Chapter 6 - ANDIAMO Remote

Remote Control

The ANDIAMO can be remote controlled by a remote software application - ANDIAMO Remote - running on a Windows PC. Supported OS versions are Windows XP, Vista and 7.

The software may control the device using three different methods:

a) Serial control via USB

b) Serial over MADI (embedded RS-232 data)

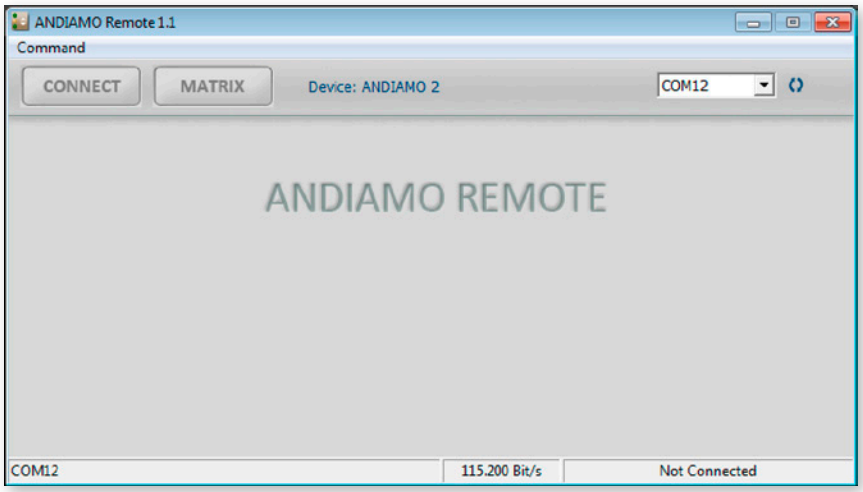
c) MIDI over MADI (embedded MIDI data)

All settings are stored inside the device. An offline mode allows to prepare settings and to store them to file for later use.

Remote control requires firmware version 2.5 or higher - see „Chapter 3: Installation“ on page 14ff.

Connecting the device

To connect with the device the method and the port must be selected.



Method a) and b) both use a COM port of the operating system.

Method a) requires:

- USB connection to the device
- installed D.O.TEC® USB driver

To connect:

- Select the COM port
- Click ‘CONNECT’

The driver and the installation instructions are available at www.directout.eu.

Method b) requires:

- installed COM port on the computer
- an embedder / de-embedder

Suitable embedder devices:

- D.O.TEC® PRODUCER.COM
- D.O.TEC® EXBOX.MIDICOM
- D.O.TEC® EXBOX.AES
- D.O.TEC® M1.k2
- D.O.TEC® MA2CHBOX
- D.O.TEC® MA2CHBOX.XT

To connect:

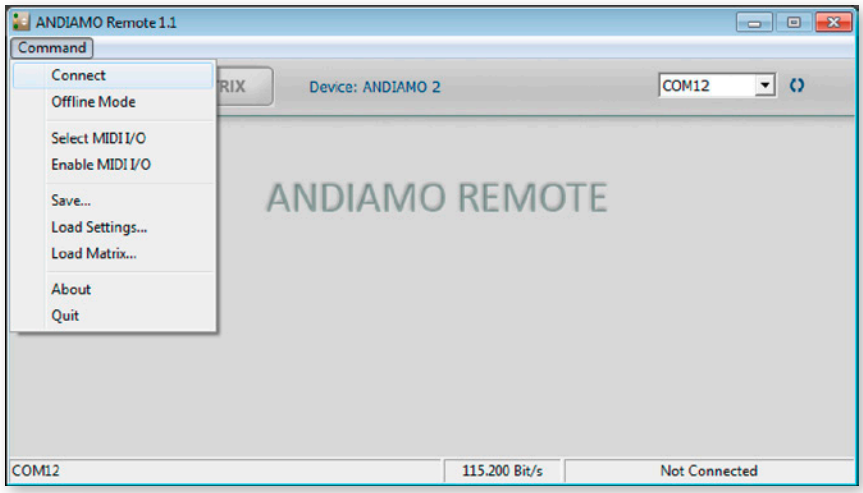
- Select the COM port
- Click ‘CONNECT’

Note

When using method b) make sure that the baud rate of the used embedder is set to 115.200 baud.

Note

To ensure proper operation using embedded serial data a bit transparent bidirectional link of the MADI signal is required.



Method c) requires:

- a MIDI device to be installed on the computer
- an embedder / de-embedder

Suitable embedder devices:

- D.O.TEC® PRODUCER.COM
- D.O.TEC® EXBOX.MIDICOM
- D.O.TEC® M1.k2
- MADI card with built in embedder / de-embedder

To connect:

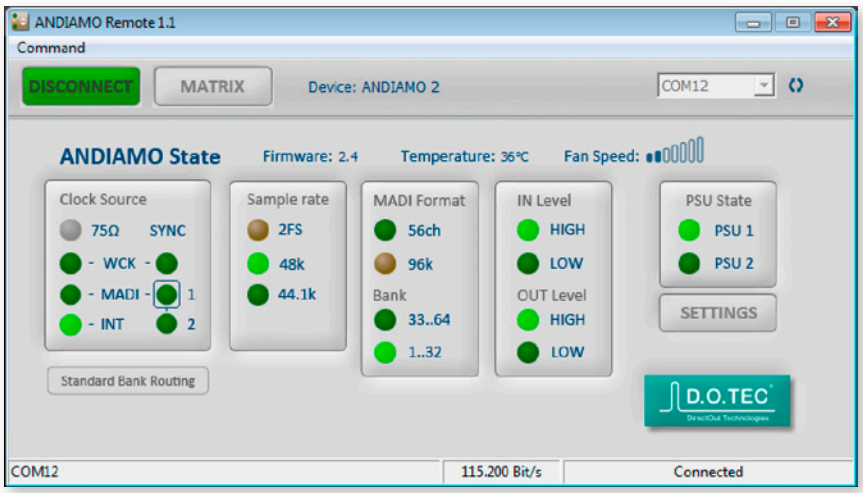
- Select MIDI I/O
- Enable MIDI I/O
- Click Connect

To ensure proper operation using embedded MIDI data a bit transparent bidirectional link of the MADI signal is required.

Note

Monitoring

The standard view monitors the system state and informs about the system settings. The bottom bar monitors the connection state with the device.



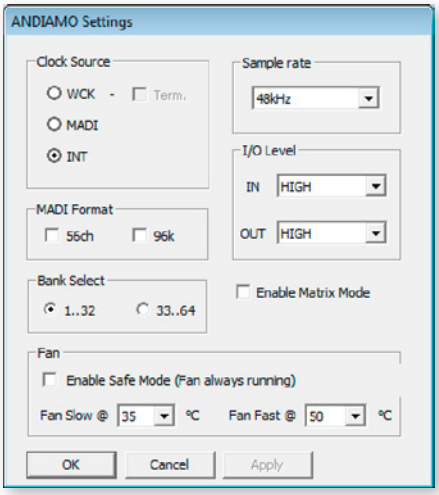
Click ‘Settings’ to open the system setup dialog.
Click ‘MATRIX’ to toggle the MATRIX view.
Click ‘DISCONNECT’ to close the connection.

Depending on the connected device the view may differ.

Note

System Setup

All system settings except the configuration of the system fan control can be adjusted either locally or via the remote application. The settings are stored inside the device. Additionally presets can be stored to a file for later use.



To adust the settings either click the radial buttons, checkboxes or use the pull down menus. See *„Chapter 4: Operation“ on page 17* for explanation of the particular settings.

Click ‘OK’ to close the dialog applying all changes.

Click ‘Cancel’ to close the dialog discarding all changes.

Click ‘Apply’ to transmit all changes without closing the dialog.

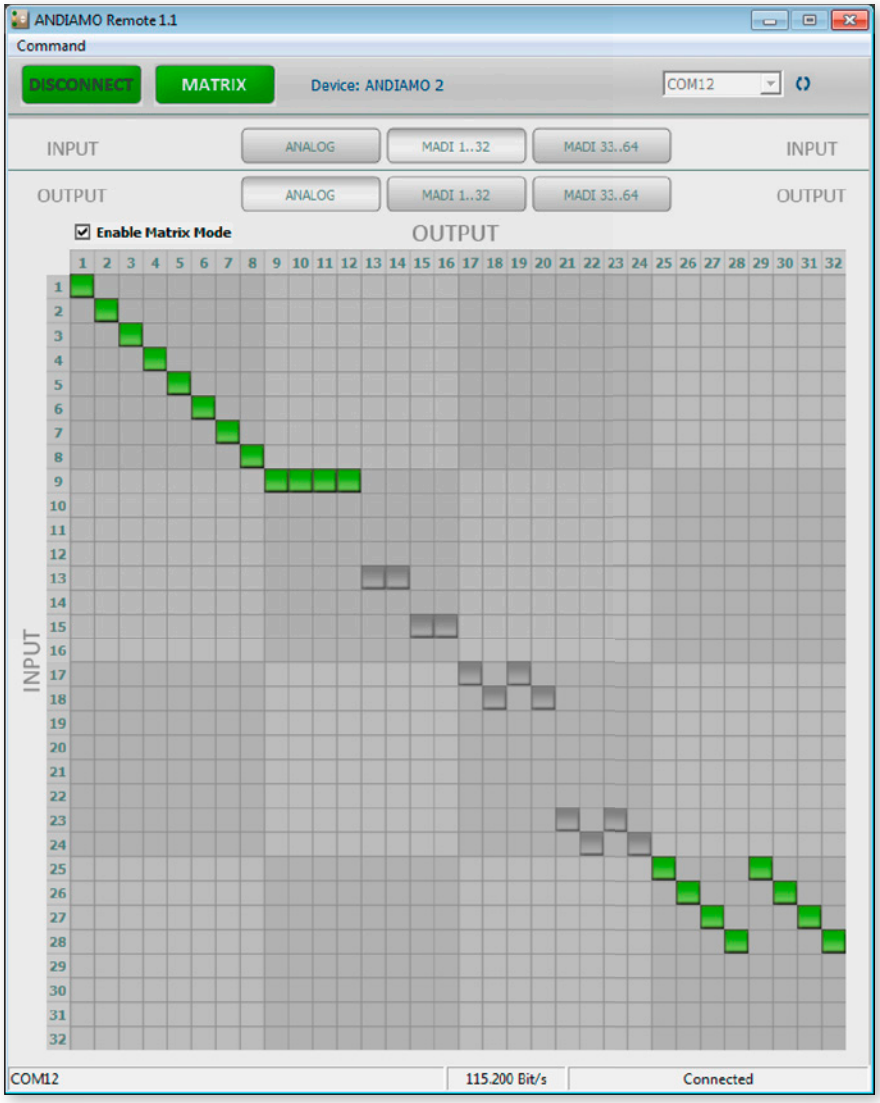
Configuration System Fan

The characteristics of the system fan inside the device may be configured individually.

Fan Slow	threshold temperature - fan starts at lowest speed
Fan Fast	threshold temperature - fan runs at highest speed
Enable Safe Mode	fan is always running - below threshold ‘slow’ the fan runs at lowest speed

The interval between ‘slow’ and ‘fast’ must amount at least to ten degrees.

Routing Matrix



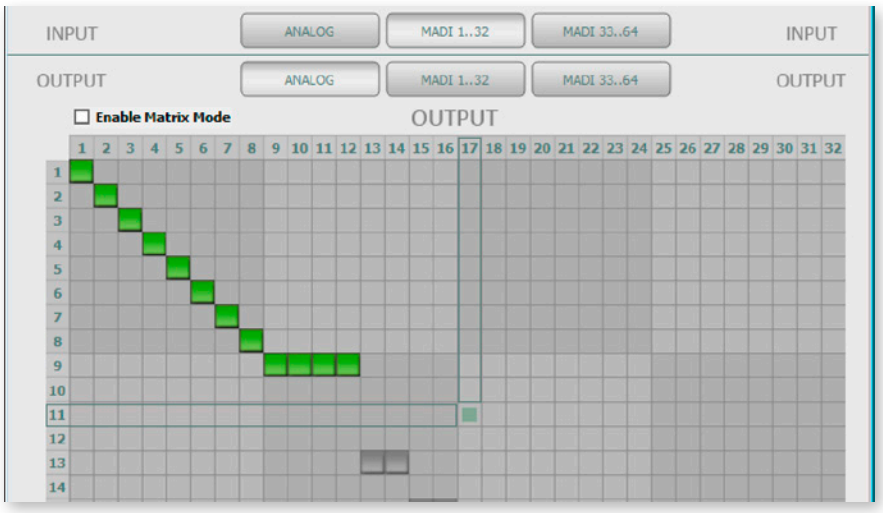
With ‘Matrix Mode’ enabled the settings of the matrix will effect the routing of the audio signals.

The matrix shows 32 inputs (horizontal) by 32 outputs (vertical).

There are three input pages (sources) and three output pages (destinations):

ANALOG	A/D input - D/A output
MADI 1..32	MADI channel 01-32 (input / output)
MADI 33..64	MADI channel 33-64 (input / output)

Click the buttons to change the view of sources / destinations.



Setting / deleting crosspoints:

- move the cursor to the desired position - a small green square and transparent bars point the active position
- click into the square to set / delete the crosspoint

To set more than one crosspoint you may click and hold the left mouse button and move the cursor. The pointed crosspoints will be set upon release of the mouse button.

	crosspoint - output is set on the selected input page.
	crosspoint - output is set on a non-selected input page.

Activating Matrix Mode

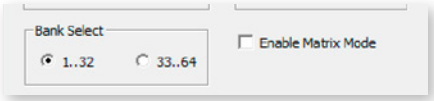
As described in *„Matrix Mode“ on page 25* there are two methods of signal routing:

a) ‘Standard Bank Routing’ - signal routing of analog and digital I/Os as a whole.

b) ‘Matrix Mode’ - individual signal routing of all analog and digital I/Os on a per channel basis.

There are three ways to toggle between both methods:

1. System Setup



use checkbox

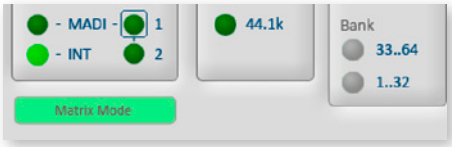
2. Matrix view

use checkbox

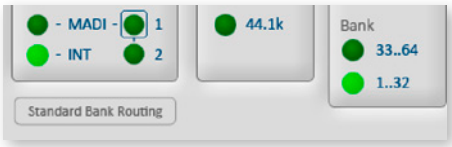
3. Front panel

- Activate the Menu Mode (press > 2 sec ‘SELECT’)
- Step through to parameter ‘Bank’
- Press > 2 sec ‘SET’ to toggle between both methods

Indication Matrix Mode



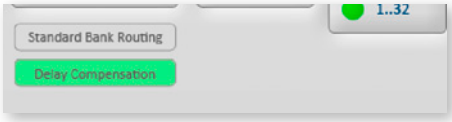
Matrix Mode ON



Matrix Mode OFF

The activation state of the ‘Matrix Mode’ is indicated in the monitoring view and on the front panel of the device.

Indication Delay Compensation



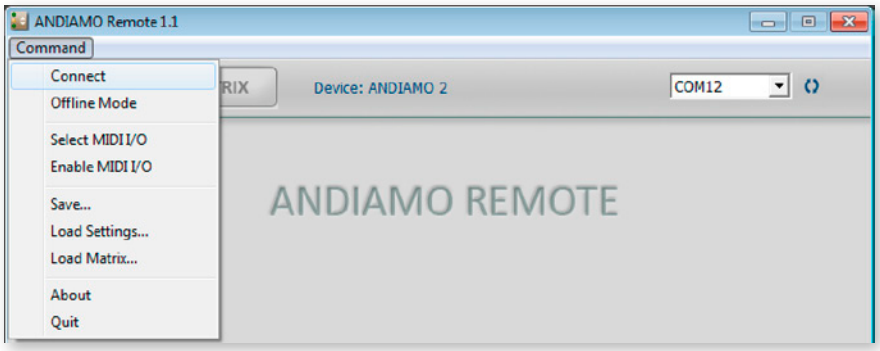
Delay compensation active

A green label indicates activated delay compensation - see *„Delay Compensation“ on page 28*.

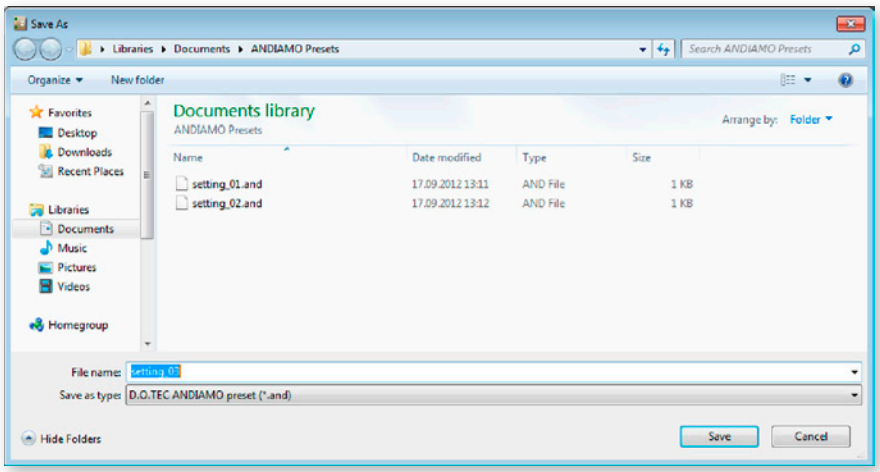
Presets

The settings of the system and routing matrix can be stored to a single file. The settings are reloaded separately from the same file . This allows to use both settings independently from each other; e.g. you may reload another routing setup without changing the clock source.

Storing a preset

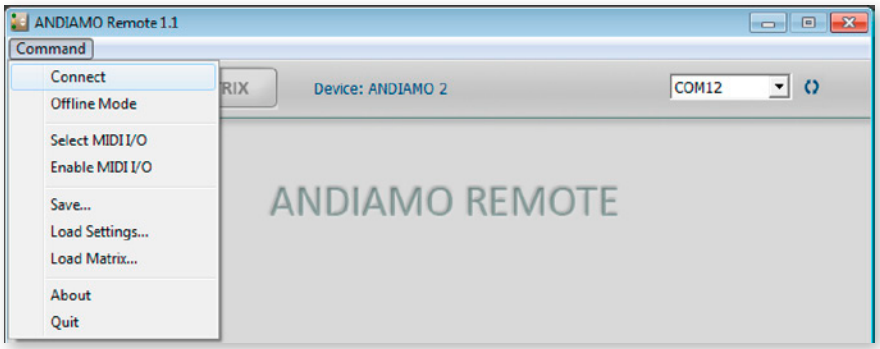


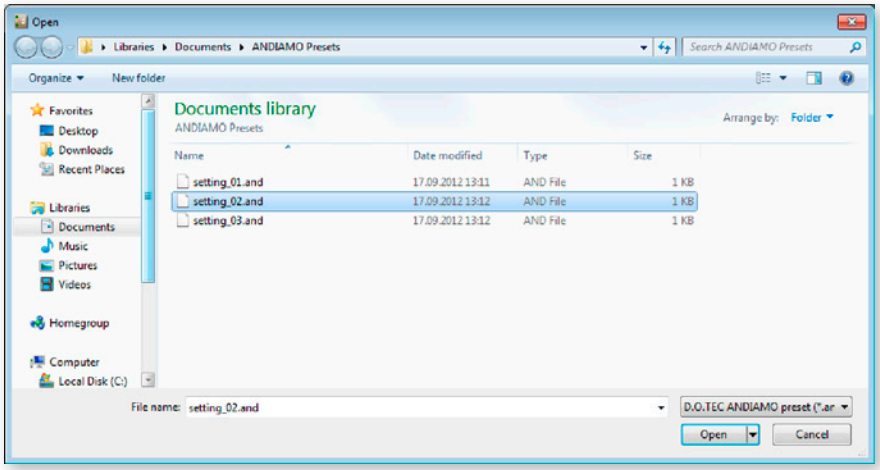
Go to ‘Command - Save’



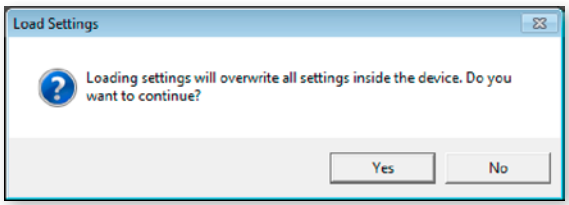
Enter name and click ‘Save’ to close the dialog.

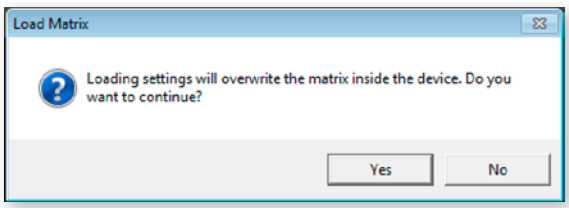
Reloading Presets





Select the file (.and) and click ‘open’ to close the dialog and proceed.





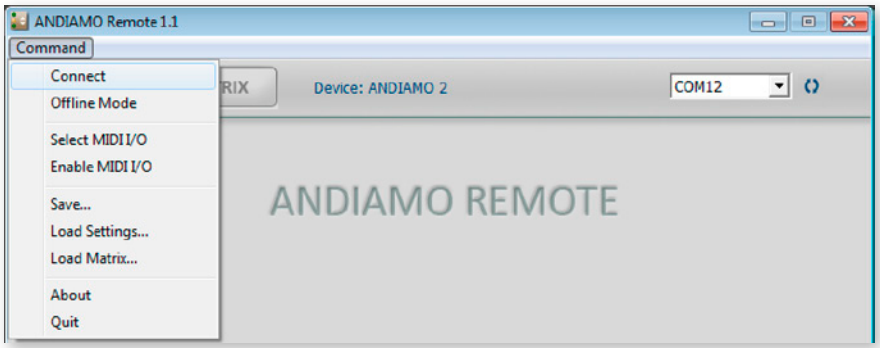
A safety dialog prompts if the connection to the device is active:

- Click ‘Yes’ to proceed with reloading.
- Click ‘No’ to abort the operation.

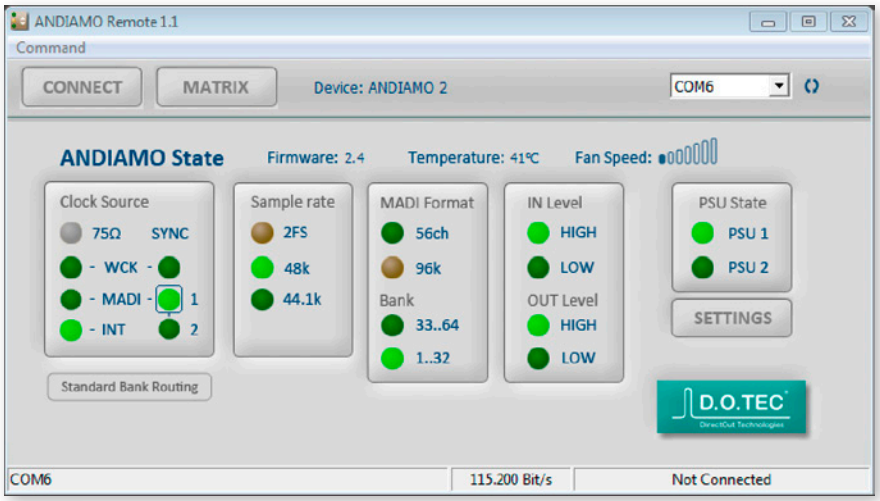
If no device is connected (*offline mode*) reloading is executed without safety dialog.

Offline Mode

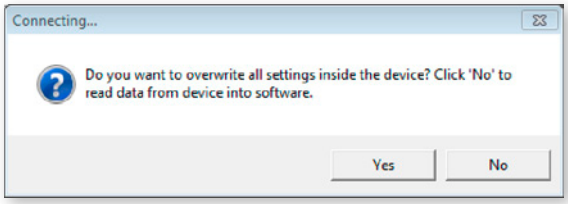
The offline mode allows to create or modify settings without an active connection to the device.



Go to ‘Command - Offline Mode’ to activate / deactivate the offline mode.



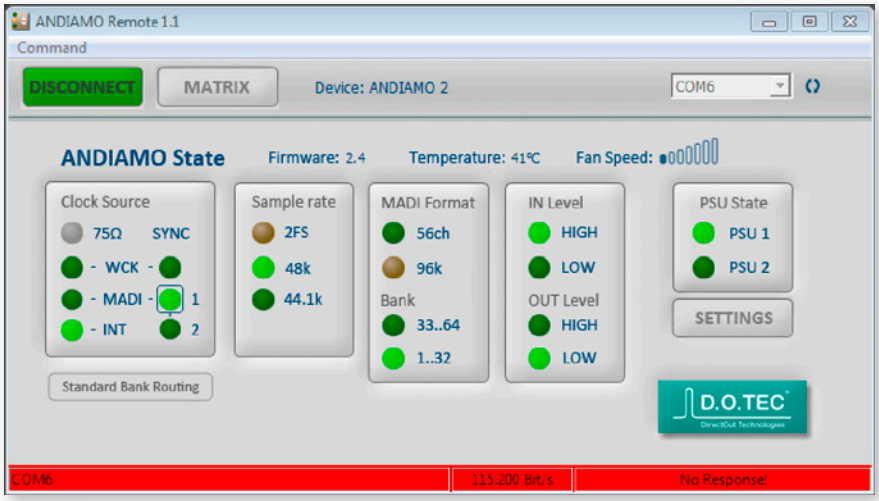
The status bar (bottom right corner) indicates ‘Not Connected’; i.e. Offline Mode is active.



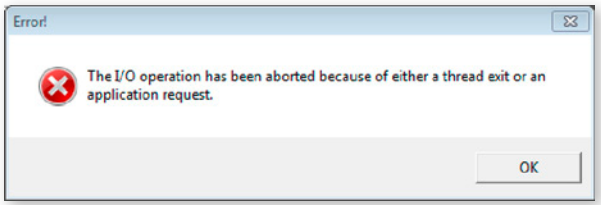
‘Connect’ will terminate the offline mode. A safety dialog prompts before connecting:

- Click ‘Yes’ to overwrite **all** settings inside the device.
- Click ‘No’ to read **all** settings from device into software.

Error Messages

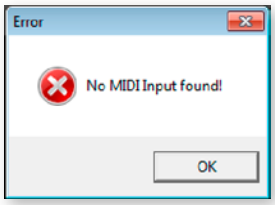


The selected COM port has no connection with the device. ‘Disconnect’ and check the connection (cabling, COM port).



Possible reason: Abnormal termination of the connection

Check the cabling or if connected device has been switched off.



No MIDI device is installed. Try to connect using USB or ‘Serial over MADI’ (needs installed D.O.TEC® USB driver).

Chapter 7: Troubleshooting and Maintenance

Troubleshooting

To identify a possible defect with the device please consult the following table.

If the fault cannot be resolved using these instructions, please contact your local D.O.TEC representative or visit support.directout.eu.

Issue	Possible reason	Solution
Device doesn't work.	Power supply is broken.	Check that the power supply switch is on, that the device is connected to the power supply and that the socket is working. Defective fuses must be exchanged by qualified service personal only.
Optical port does not work.	Optic is dirty.	Use an air supply to carefully remove any dust. Never use objects for cleaning.
No signal at the output port.	Connections (input / output) are mixed up.	Check the connections and change the cables if necessary.
No signal at the output port.	Signal cable defective.	Exchange the signal cable.
MADI signal at the input is not stable.	Signal source is defective or bad signal condition (Jitter > 1 ns) - e.g. due to exceeded length or bad screening attenuation of signal cable.	Change the source or use appropriate cables (see *„Chapter 8: Technical Data" on page 45*).
Clicks in the audiosignal.	Input source is not in sync with clock master of the device.	Check the status of input LED and check clock setting of the connected device.

Maintenance

To clean the device, use a soft, dry cloth. To protect the surface, avoid using cleaning agents.

Note

The device should be disconnected from the power supply during the cleaning process.

Chapter 8: Technical Data

Dimensions

- Width 19'' (483 mm)
- Height 1 HE (44.5 mm)
- Depth 10'' (254 mm)

Weight

- about 3 kg

Power Consumption

- typical 0.2 A (@84 V) up to max. 0.1 A (@264 V)
- max. 0.4 A (@84 V) up to max. 0.2 A (@264 V)

Power Supply

- 84 V - 264 V AC / 47 Hz - 63 Hz / Safety class 1

Fuses

- Fuse 250 V - 2 A (slow-blow) – 2 fuses per power supply

Environmental Conditions

- Operating temperature +5°C up to +45°C
- Relative humidity: 10% - 80%, non condensing

MADI Port (optical version)

- 1 x SC socket FDDI (input / output)
- ISO/IEC 9314-3
- Wave length 1310 nm
- Multi-Mode 62.5/125 or 50/125

MADI Port (coaxial version)

- 2 x BNC socket (input / output)
- Impedance: 75 Ω
- 0.3 V up to 0.6 V (peak to peak)

Sample Rate

- 30 - 50 kHz @1 FS
- 60 - 100 kHz @2 FS

MADI Format (I/O)

- 48k Frame, 96k Frame
- 56 channel, 64 channel
- S/MUX 2

Line Input

- 4 x DSUB-25 (8 analog audio channels each - balanced)

Line Output

- 4 x DSUB-25 (8 analog audio channels each - balanced)

A/D Section

- SNR: -115.5 dB RMS (20 Hz - 20 kHz) / -118 dB(A)
- THD @ -1 dB_{FS}: -113 dB
- Frequency response: -0.15 dB (10 Hz) / -0.15 dB (20 kHz)
- Input impedance: 20 kΩ (balanced) / 10 kΩ (unbalanced)
- Input level (depending on model):

Model / Level	High	Low
Model A	+15 dB_u	+6 dB_u
Model B	+18 dB_u	+9 dB_u
Model C	+24 dB_u	+15 dB_u

D/A Section

- SNR: -113.5 dB RMS (20 Hz - 20 kHz) / -116.5 dB(A)
- THD @ -1 dB_{FS}: -100 dB
- Frequency response: -0.5 dB (10 Hz) / -0.15 dB (20 kHz)
- Output impedance: < 50Ω
- Output level (depending on model):

Model / Level	High	Low	minimum load resistance
Model A	+15 dB_u	+6 dB_u	600 Ω
Model B	+18 dB_u	+9 dB_u	600 Ω
Model C	+24 dB_u	+15 dB_u	2,4 kΩ

Note

The outputs are not servo balanced.

Latency

- about 1 ms (A/D - D/A)
- 3 samples (MADI I/O)

Word Clock

- 1 x BNC socket (75 Ω impedance) - input
- 1 x BNC socket (75 Ω impedance) - output
- WCLK signal or AES3id signal
- Termination 75 Ω switchable

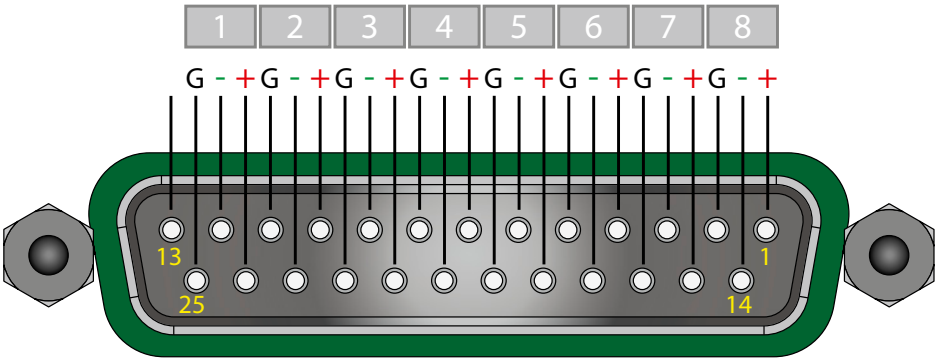
USB

- 1x USB socket (Type B)
- for firmware updates and remote control (Windows PC)

Appendix A: Wiring DSUB-25

For the transmission of the analog audio signals DSUB-25 ports are used. As the sketch shows TASCAM[1] pinout is applied.

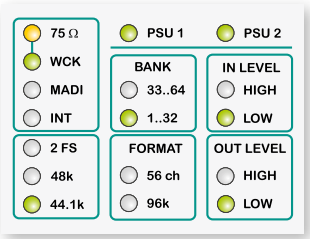
DSUB-25 - analog



1 TASCAM is a registered trademark of TEAC corporation.

Appendix B: Configuration Examples

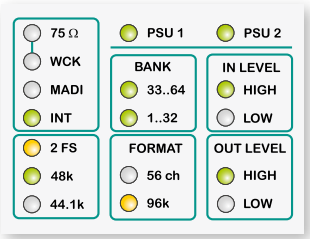
Example 1:



Clock source is 'word clock' with termination enabled. Conversion of channels 01-32.

Sample rate is 44.1 kHz and the analog reference levels are set to 'low' (-9 dB).

Example 2:



Clock source is set to internal clock generator. Conversion of channels 01-32 (i.e. all channels)*.

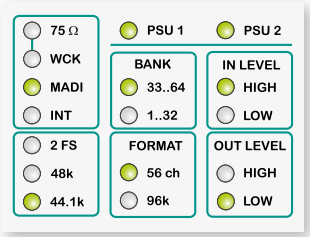
Matrix Mode is active.

Sample rate is 96 kHz and the frame mode is set to 96k Frame at the MADI output.

The analog reference levels are set to 'high'.

*) As the scaling factor is set to 2 FS, the number of available channels in the MADI signal is reduced to 32 channels.

Example 3:



Clock source is the MADI input signal.

Conversion of channels 33-64 (D/A) and channels 33-56 (A/D)*.

Sample rate is 44,1 kHz. The MADI output channel format is set to '56 ch'. So the MADI output signal feeds 56 channels only.

The analog reference levels are set to 'high' for the input and to 'low' (-9 dB) for the output.

*) The setting '56 ch' affects the MADI *output* signal only. All 32 MADI *input* channels are fed to the analog outputs.

Index