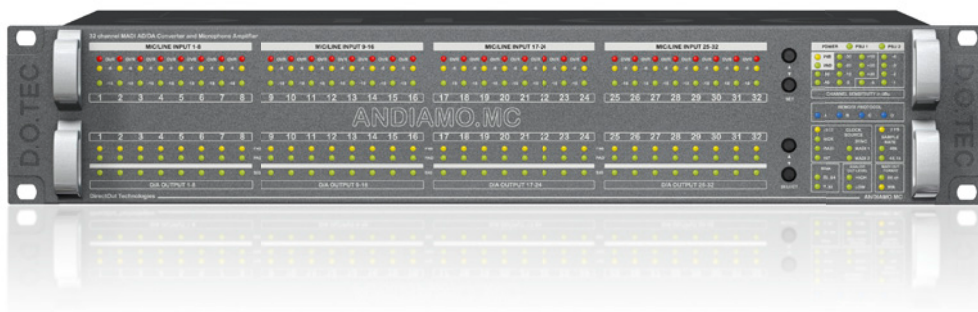




# D.O.TEC<sup>®</sup> ANDIAMO.MC

## Hardware Guide



Version 1.1

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## About This Manual

### How to Use This Manual

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

Use the Table of Contents at the beginning of the manual or Index Directory at the end of the document 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](http://www.directout.eu).

### Conventions

The following symbols are used to draw your attention to:

**Tips** – indicate useful tips and shortcuts.



**Tip**

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



**Note**

### Warning

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

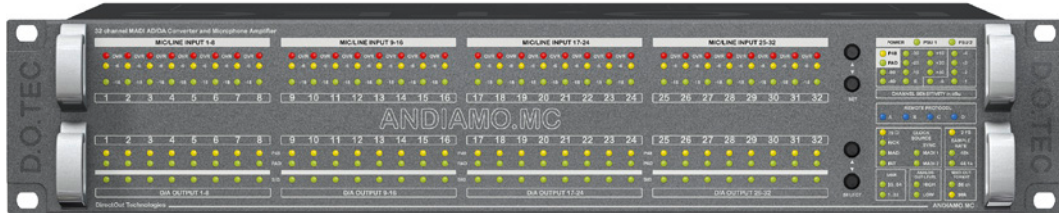


**Warning**

# CHAPTER 1: Overview

## Introduction

Welcome to the ANDIAMO.MC, D.O.TEC's 32 channel microphone amplifier with MADI I/O and remote control.



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

## Feature Summary

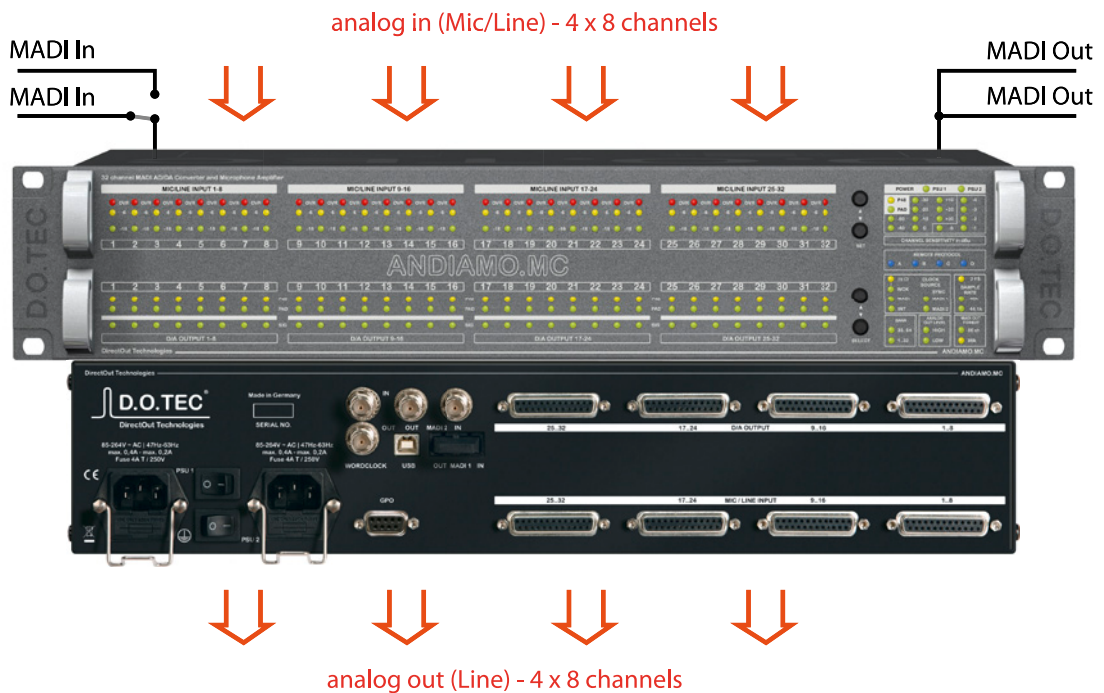
|                        |  |
|------------------------|--|
| <b>MADI Ports</b>      | 2 x MADI input and output<br>2 x SC multi-mode connectors (SC/SC)<br>or<br>1 x SC multi-mode connectors &<br>1 x coaxial BNC connectors (BNC/SC) |
| <b>MADI Formats</b>    | 56/64 channel, 48k/96k Frame, S/MUX 2  |
| <b>Sample Rates</b>    | 44.1, 48, 88.2, 96 kHz +/-12.5%  |
| <b>Clock Inputs</b>    | 1 x Word clock coaxial BNC (75 $\Omega$ termination switchable)<br>This input also accepts an AES3 frame (AES11).                                |
| <b>Clock Output</b>    | 1 x Word clock coaxial BNC   |
| <b>Mic/Line Inputs</b> | 4 x DSUB-25 (8 channels each)<br>phantom power switchable (+ 48 V)<br>PAD switchable (30 dB)   |
| <b>Line Outputs</b>    | 4 x DSUB-25 (8 channels each)  |
| <b>GPO</b>             | 2 x MOSFET switch  |
| <b>USB Port</b>        | USB 2.0 port for firmware updates and remote control.  |
| <b>Power Supply</b>    | 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.MC can be used for conversion, amplification, monitoring and recording of analog and digital signals.

Typical applications include:

- recording mic / line signals (32 inputs)
- redundant recording using both MADI I/Os
- 1:2 splitting of analog input signals (input ⇒ MADI & line out)
- monitoring a MADI signal (32 line outputs)
- signal distribution (routing matrix)
- daisy-chained use of two ANDIAMO.MCs for conversion of all 64 channels of a MADI signal
- ...



## CHAPTER 2: Legal issues & facts

### Before Installing This Device



#### Warning

#### 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 5° C and 45° 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.



#### Warning

### 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 6: Troubleshooting and Maintenance“ on page 39 for assistance with troubleshooting.



## First Aid (in case of electric shock)

### Warning

---



### 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.MC package should include:

- 1 x ANDIAMO.MC (19", 2 RU)
- 2 x power chord
- 2 x fixing unit for power plug
- 1 x Hardware Guide

To complete the delivery please download from the DirectOut website:

- Software Guide ANDIAMO Remote
- D.O.TEC<sup>®</sup> USB Serial driver
- 'ANDIAMO Remote' application

[www.directout.eu/en/support/downloads/andiamo.mc.html](http://www.directout.eu/en/support/downloads/andiamo.mc.html)

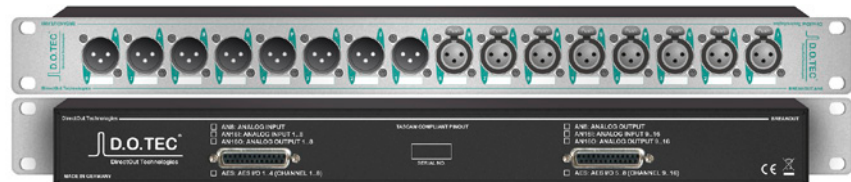
## Accessories

D.O.TEC<sup>®</sup> BREAKOUT series

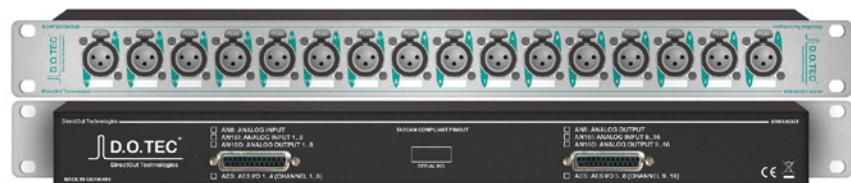
The BREAKOUT series are adaptor boxes - available in different variants - to widen the application range of the D.O.TEC<sup>®</sup> ANDIAMO series.

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

Three different models for analog signals are available:



*BREAKOUT.AN8 - analog input / output, 8 channels*



*BREAKOUT.AN16I - analog input, 16 channels*



*BREAKOUT.AN16O - analog output, 16 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](http://www.directout.eu).

This guide refers to firmware version 1.2.

## Intended Operation

The ANDIAMO.MC 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

#### 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

#### 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)

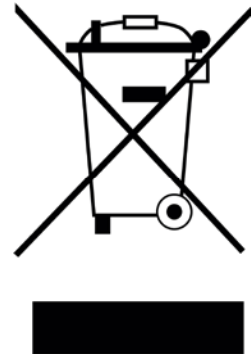
Due to the directive 2002/96/EC for waste disposal this device must be recycled.

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](http://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](http://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 5° C and 45° 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(s) before use.



### Note

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

4. Connect signal cable for the MADi signals.



ANDIAMO.MC- SC / SC version (optical / optical)



ANDIAMO.MC- SC / BNC version (optical / coaxial)

5. Connect the signal cables<sup>1</sup> for the analog audio signals to the DSUB-25 connectors (TASCAM pinout - see page 43).



**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 7: Technical Data“ on page 40.

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](http://www.directout.eu).

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

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



**Warning**



**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 (84 V – 264 V).

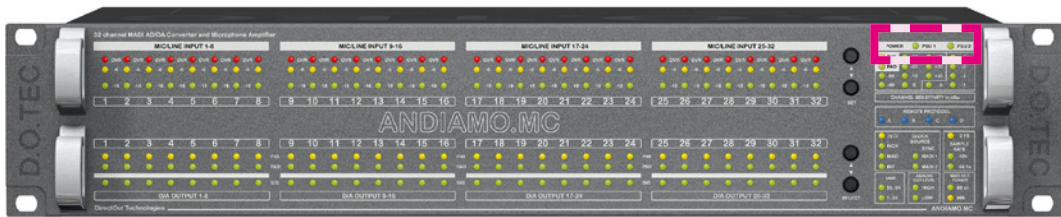
*This device may operate with only one power supply. To provide power supply redundancy, it is recommended to connect both PSU 1 and PSU 2 to independent power supplies with separate fuses.*



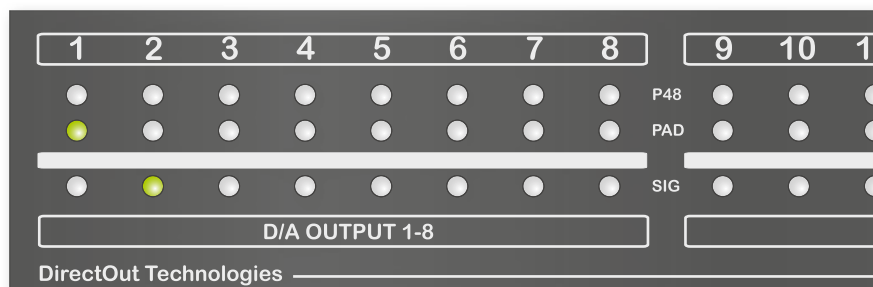
**Note**

<sup>1</sup> 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 1.2.



**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](http://www.directout.eu/upload/dokumente/dotec_release_map.pdf)



**Note**

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

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



**Tip**

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



**9. Installation of D.O.TEC® USB Serial driver**

- download the D.O.TEC® USB Serial driver
- download the 'Installation Guide for USB Control'

*Link:* <http://www.directout.eu/en/support/downloads/andiamo.mc.html>

- follow the installation instructions in the 'Installation Guide for USB Control'

**10. Installation of 'ANDIAMO Remote'**

- download the 'Software Guide ANDIAMO Remote'
- download the 'ANDIAMO Remote' application

*Link:* <http://www.directout.eu/en/support/downloads/andiamo.mc.html>

- follow the installation instructions in the 'Software Guide ANDIAMO REMOTE'

**11. Start the 'ANDIAMO Remote' application**

- Check selected COM port or MIDI I/O
- Click 'CONNECT'

# 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

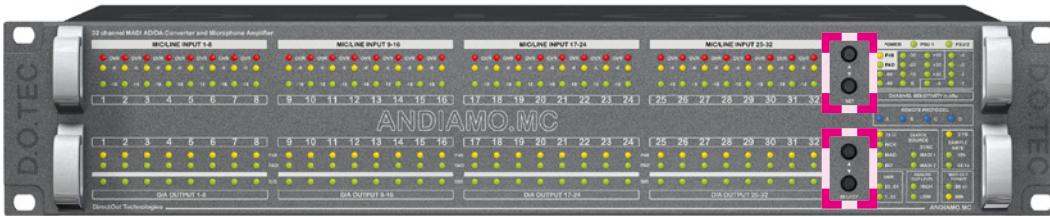
The control on the right of the front panel indicates the power supply. Power switches are on the back panel:

|                          |  |
|--------------------------|--|
| <b>Power</b>             | <b>2 Switches</b><br>Enable / disable power supply.  |
| <b>PSU 1 &amp; PSU 2</b> | <b>2 LEDs (green): indicate the status of both power supply units</b><br>LED OFF = Power supply inactive<br>LED ON = Power supply active |



**Note**

*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.*



## Menu Control

All functions of the converter can be accessed using a simple menu. Two pairs of push buttons are used for navigation and settings. The upper pair is used to modify a setting. The lower pair is used to navigate the menu.

|               |  |
|---------------|--|
| <b>SET</b>    | <b>Buttons - ▲▼</b><br>Press to adjust a setting. Only active in menu mode.                                    |
| <b>SELECT</b> | <b>Buttons - ▲▼</b><br>Press longer than 2 seconds to enter the menu. Press short for navigation 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:

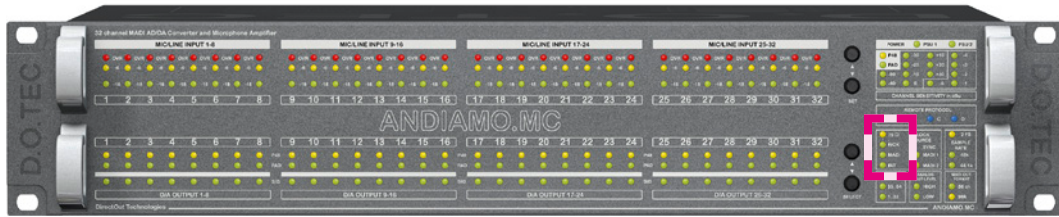
- a setting can be adjusted in this section
- the blinking LED(s) is the selected option in this section

After a short period of time the menu mode is exit automatically. See also „CHAPTER 5: Menu Navigation“ on page 34.

*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.*



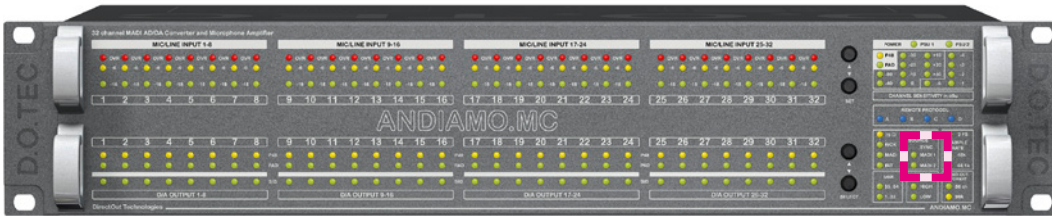
**Note**



## Clocking

The system clock can be set to one of three possible clock sources in the menu (see „CHAPTER 5: Menu Navigation“ on page 34). The LEDs on the front panel inform about selection and sync state of the selected source.

|                               |   |
|-------------------------------|---|
| <b>75 <math>\Omega</math></b> | <p><b>LED (yellow): indicates the termination status of the word clock input</b><br/>           LED ON = Termination active<br/>           LED OFF = Termination inactive</p>   |
| <b>WCK</b>                    | <p><b>LED (green): indicates use of word clock as clock source</b><br/>           LED ON = Clock source set to word clock<br/>           LED blinking = Clock source set to word clock <u>and</u> no signal present<br/>           LED blinking pattern = signal locked but not in sync</p> |
| <b>MADI</b>                   | <p><b>LED (green): indicates use of MADI input as clock source</b><br/>           LED ON = Clock source set to MADI input<br/>           LED blinking = Clock source set to MADI input <u>and</u> no signal present</p>   |
| <b>INT</b>                    | <p><b>LED (green): indicates use of internal clock generator as clock source</b><br/>           LED ON = Clock source set to internal clock generator</p>   |



## Clocking continued - MADI STATE

Lock and sync states of the two MADI inputs are indicated individually by two LEDs (SYNC MADI 1 / 2). If both MADI inputs are connected the LED of the unselected input will glow or blink with a reduced intensity (50%).

|               |   |
|---------------|---|
| <b>MADI 1</b> | <p><b>LED (yellow): indicates the selection state and lock/sync state of MADI input 1</b></p> <p>LED ON (100%) = MADI input is:<br/>locked / in sync / selected</p> <p>LED ON (50%) = MADI input is:<br/>locked / in sync / not selected</p> <p>LED blinking (100%) = MADI input is:<br/>locked / not in sync / selected</p> <p>LED blinking (50%) = MADI input is:<br/>locked / not in sync / not selected</p> <p>LED OFF = no MADI signal is detected</p> |
| <b>MADI 2</b> | <p><b>LED (yellow): indicates the selection state and lock/sync state of MADI input 2</b></p> <p>LED ON (100%) = MADI input is:<br/>locked / in sync / selected</p> <p>LED ON (50%) = MADI input is:<br/>locked / in sync / not selected</p> <p>LED blinking (100%) = MADI input is:<br/>locked / not in sync / selected</p> <p>LED blinking (50%) = MADI input is:<br/>locked / not in sync / not selected</p> <p>LED OFF = no MADI signal is detected</p> |

*The selection of the active MADI port depends on the redundancy setting of the device. See 'Software Guide ANDIAMO Remote'.*

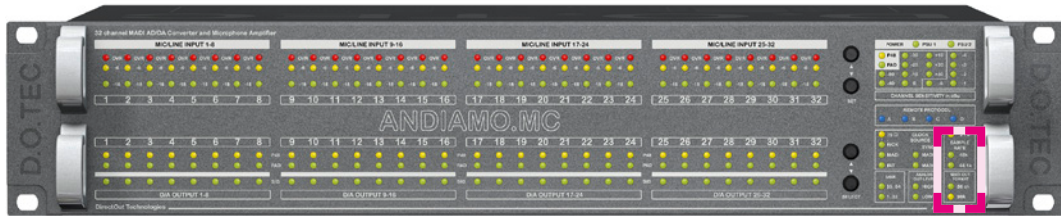
*Default setting 'Redundancy active':*

*The MADI input that locks first will be selected automatically.*

*Once the selected input loses its signal, the other input will be selected as signal source, if an input signal is detected there.*



**Note**



## Sample Rates

The scaling factor and the sample rate are indicated by three LEDs.

|                     |   |
|---------------------|---|
| <p><b>2 FS</b></p>  | <p><b>LED (yellow): indicates scaling factor of operation</b><br/>                 LED ON = Scaling factor of sample rate set to 2 FS<br/>                 LED heartbeat = A 96k Frame signal is detected at the MADI input which forces to 2 FS temporarily.</p> |
| <p><b>48k</b></p>   | <p><b>LED (green): indicates the use of 48 kHz as base sample rate.</b><br/>                 LED ON = Base sample rate set to 48 kHz</p>  |
| <p><b>44.1k</b></p> | <p><b>LED (green): indicates the use of 44.1 kHz as base sample rate.</b><br/>                 LED ON = Base sample rate set to 44.1 kHz</p>  |

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.

The scaling factor of the sample rate has to be defined manually when the clock source is set to internal or word clock.

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.

### Settings depending on clock source:

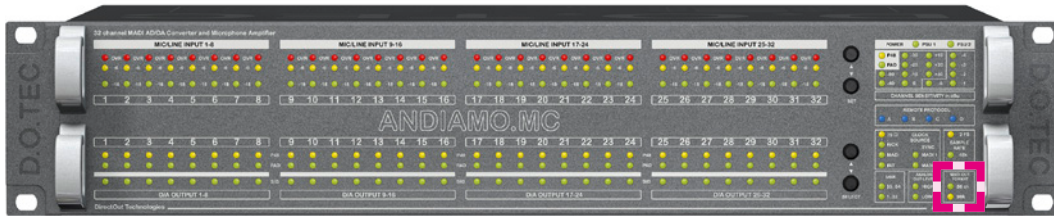
| Clock source | Base rate set | Scaling factor set |
|--------------|---------------|--------------------|
| INT          | manually      | manually           |
| WCK          | automatically | manually           |
| MADI         | automatically | manually*          |

\*) A 96k Frame signal will force scaling factor to 2 FS temporarily.



### 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.*



## Bank Selection / Signal Routing

The bank selection defines the block of channels in the MADi stream that is fed by the analog inputs. This selection also affects the signal source for the line outputs that are fed by the MADi input signal ('Standard Bank Routing').

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 „Matrix Mode“ on page 24) and delay compensation.

|                      |  |
|----------------------|--|
| <p><b>33..64</b></p> | <p><b>LED (green): indicates the selection of the converted audio channels.</b><br/>                 LED ON = audio channels 33 to 64 (29 to 56 of a 56 ch signal) are converted<br/>                 LED heartbeat = delay compensation active, audio channels 33 to 64 are converted</p> |
| <p><b>1..32</b></p>  | <p><b>LED (green): indicates the selection of the converted audio channels.</b><br/>                 LED ON = audio channels 1 to 32 (1 to 28 of a 56 ch signal) are converted.<br/>                 LED heartbeat = delay compensation active, audio channels 1 to 32 are converted</p>   |

See „Delay Compensation“ on page 33 for more information about daisy-chaining 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.



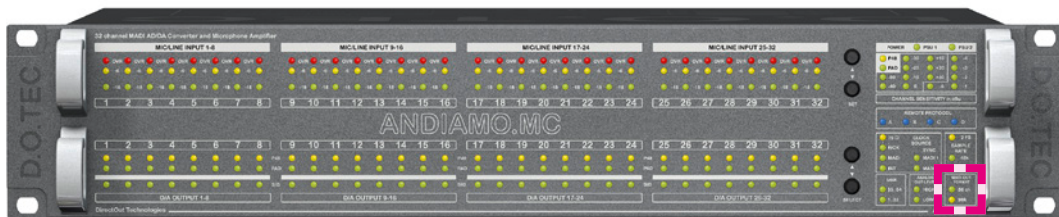
**Note**

## Matrix Mode

Two methods of signal routing are available:

- 'Standard Bank Routing' - signal routing of analog and digital I/Os as a whole.
- '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 '*Software Guide ANDIAMO Remote*'.

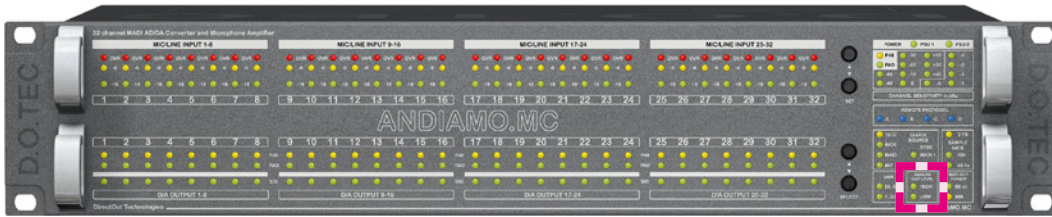


## Output Format

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.

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





## Level Settings

The sensitivity of the DA converters can be switched between two settings (high and low) where the analog level corresponds to  $0 \text{ dB}_{\text{FS}}$ . Two LEDs inform about the sensitivity:

|             |   |
|-------------|---|
| <b>HIGH</b> | <b>LED (green): indicates the adjusted sensitivity of the converter.</b><br>LED ON = $+24 \text{ dB}_U$ |
| <b>LOW</b>  | <b>LED (green): indicates the adjusted sensitivity of the converter.</b><br>LED ON = $+15 \text{ dB}_U$ |

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

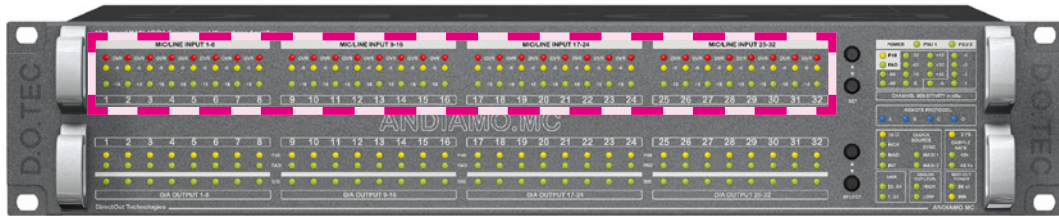


**Note**

*The level setting of the input channels is accessible using the menu - see „Input sensitivity (Gain setting)” on page 36 - or using the remote control.*



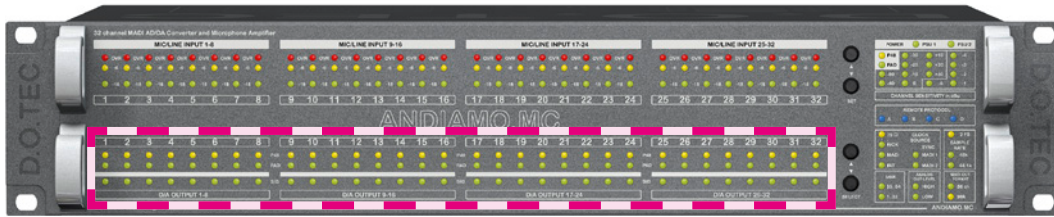
**Note**



## Level Meters - analog input

All 32 analog input channels have individual signal metering each with three LEDs. As the sensitivity of the analog inputs may be varied the trigger threshold of each LED corresponds to the digital scale ( $\text{dB}_{\text{FS}}$ ).

|            |  |
|------------|--|
| <b>OVR</b> | <p><b>LED (red): indicates an analog input overload</b></p> <p>LED ON = analog input signal equals to more than <math>-0.5 \text{ dB}_{\text{FS}}</math></p>   |
| <b>-6</b>  | <p><b>LED (yellow): indicates signal level of channel input</b></p> <p>LED ON = analog input signal equals to more than <math>-6 \text{ dB}_{\text{FS}}</math></p> <p>The LED starts to light up softly at <math>-18 \text{ dB}_{\text{FS}}</math> and reaches full brightness at <math>-6 \text{ dB}_{\text{FS}}</math>.</p>  |
| <b>-18</b> | <p><b>LED (green): indicates signal level of channel input</b></p> <p>LED ON = analog input signal equals to more than <math>-18 \text{ dB}_{\text{FS}}</math></p> <p>The LED starts to light up softly at <math>-80 \text{ dB}_{\text{FS}}</math> and reaches full brightness at <math>-18 \text{ dB}_{\text{FS}}</math>.</p> |



## Display - input channel settings

Each analog input channel provides switchable phantom power (+48 V) and switchable PAD (30 dB).

|            |   |
|------------|---|
| <b>P48</b> | <p><b>LED (yellow): indicates activation status of phantom power</b></p> <p>LED ON = phantom power active</p> <p>LED OFF = phantom power inactive</p> |
| <b>PAD</b> | <p><b>LED (green): indicates activation status of PAD</b></p> <p>LED ON = PAD active</p> <p>LED OFF = PAD inactive</p>                                |

*The level metering of the input channel is 'behind' the PAD switch. It may be useful to check PAD setting if no signal seems to be present.*



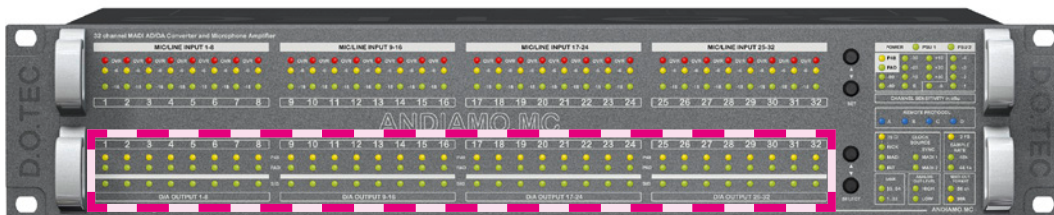
**Note**

## Warning

Switching PAD may result in abrupt changes of loudness.



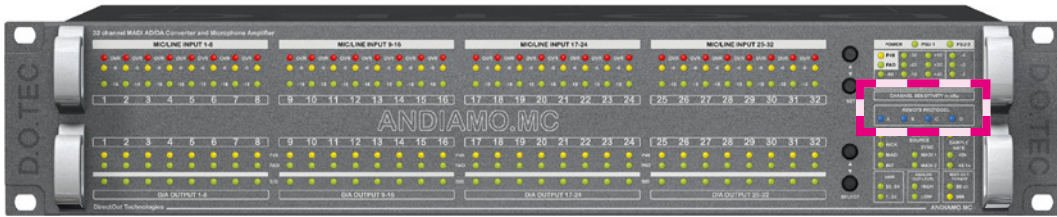
**Warning**



## Level meter - analog output

All 32 analog output channels have individual signal metering. As the sensitivity of the converters may be varied the trigger threshold of each LED corresponds to the digital scale (dB<sub>FS</sub>).

|                     |  |
|---------------------|--|
| <b>SIG (output)</b> | <p><b>LED (green): indicates signal level of channel output</b></p> <p>LED ON = digital output signal equals to more than -80 dB<sub>FS</sub></p> <p>The light intensity of the LEDs depends on the audio level.</p> |
|---------------------|--|







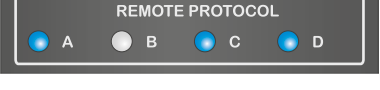
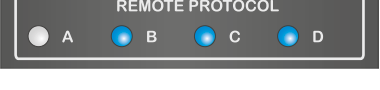
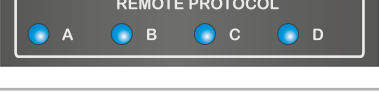
## Remote protocol

To control the device different protocols can be applied. Four LEDs at the front panel inform about the protocol that is currently applied.

This setting may be modified in the system menu - see „CHAPTER 5: Menu Navigation“ on page 34.

Mapping table:

| Code | Protocol |
|------|----------|
|      | reserved |
|      | reserved |
|      | reserved |
|      | reserved |
|      | reserved |
|      | reserved |
|      | reserved |
|      | reserved |

|   |          |
|---|----------|
|    | reserved |
|    | reserved |
|    | reserved |
|    | reserved |
|    | reserved |
|   | reserved |
|  | reserved |

See 'Software Guide ANDIAMO Remote' for a mapping of applicable protocols.

*This feature is not yet implemented and reserved for future use.*



**Note**



## 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 port is used for transmission of 64 audio channels (AES10). The USB port is used for firmware updates and for remote control.

|                          |  |
|--------------------------|--|
| <b>Word clock output</b> | <b>BNC socket (coaxial)</b><br>System clock output - connect for word clock output signal here.                  |
| <b>Word clock input</b>  | <b>BNC socket (coaxial)</b><br>Connect word clock or AES3 DARS (Digital Audio Reference Signal) here.            |
| <b>USB</b>               | <b>USB socket (Type B)</b><br>Connect for firmware updates and remote control here.                              |
| <b>MADI 1 IN</b>         | <b>SC socket (optical)</b><br>MADI input (64 ch), connect MADI input here  |
| <b>MADI 1 OUT</b>        | <b>SC socket (optical)</b><br>MADI output (64 ch), connect MADI output here                                      |
| <b>MADI 2 IN</b>         | <b>SC socket (optical)</b><br>or<br><b>BNC socket (coaxial)</b><br>MADI input (64 ch), connect MADI input here   |
| <b>MADI 2 OUT</b>        | <b>SC socket (optical)</b><br>or<br><b>BNC socket (coaxial)</b><br>MADI output (64 ch), connect MADI output here |



**Note**

*Both MADI outputs always work in parallel and carry the same signal.*



## General Purpose Output

Two MOSFET switches (2 x GPO) can be triggered by the remote control (ANDIAMO Remote); e.g. to control a recording light.

A power supply (12 V, max. 200 mA) is also provided.

See „Appendix B: Wiring GPO“ on page 43.



## 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<sup>1</sup> pinout is used - see „Appendix A: Wiring DSUB-25“ on page 43 for wiring sketch.

|                              |  |
|------------------------------|--|
| <b>Analog Input (1-8)</b>    | <b>DSUB-25 Port</b><br>Analog audio input - connect audio channels 1-8 here    |
| <b>Analog Input (9-16)</b>   | <b>DSUB-25 Port</b><br>Analog audio input - connect audio channels 9-16 here   |
| <b>Analog Input (17-24)</b>  | <b>DSUB-25 Port</b><br>Analog audio input - connect audio channels 17-24 here  |
| <b>Analog Input (25-32)</b>  | <b>DSUB-25 Port</b><br>Analog audio input - connect audio channels 25-32 here  |
| <b>Analog Output (1-8)</b>   | <b>DSUB-25 Port</b><br>Analog audio output - connect audio channels 1-8 here   |
| <b>Analog Output (9-16)</b>  | <b>DSUB-25 Port</b><br>Analog audio output - connect audio channels 9-16 here  |
| <b>Analog Output (17-24)</b> | <b>DSUB-25 Port</b><br>Analog audio output - connect audio channels 17-24 here |
| <b>Analog Output (25-32)</b> | <b>DSUB-25 Port</b><br>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 7: Technical Data“ on page 40.

<sup>1</sup> TASCAM is a registered trademark of TEAC corporation.



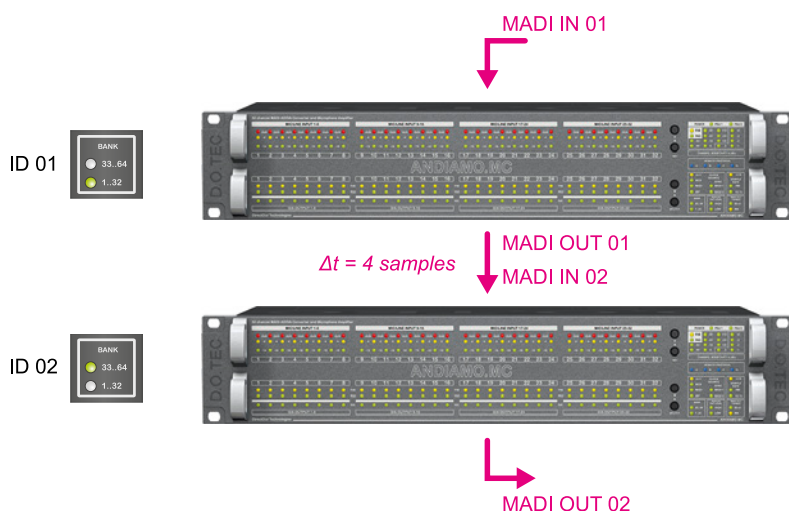
## Delay Compensation

There is a delay of four samples between MADI input and output. For conversion of all 64 channels (@ 1 FS) of a MADI signal two ANDIAMOs may be daisy-chained. 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 „Bank Selection / Signal Routing“ on page 23).

Delay compensation:

|       | $\Delta t$ A/D | $\Delta t$ D/A |
|-------|----------------|----------------|
| ID 01 | 0              | +4 samples     |
| ID 02 | +4 samples     | 0              |



Two ANDIAMO.MCs daisy-chained

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





**Note**

## CHAPTER 5: Menu Navigation

To setup the device the menu mode has to be entered first. The unit will switch back to idle mode automatically after time out.

Two pairs of push buttons are used to navigate and modify the settings:

|   |  |
|---|--|
|  | <p>modify a setting</p>                                |
|  | <p>enter menu mode<br/>navigate between parameters</p> |

Press one of the two 'SELECT' buttons longer than two seconds to enter the menu mode.

The active parameter for adjusting is indicated by a blinking LED section. The inactive settings of the parameter light with a reduced intensity. The more light LED(s) reflect the setting of this parameter.

The selection of a channel is indicated by the level display.

Each channel has an individual setting for <sensitivity>, <P48> and <PAD>.

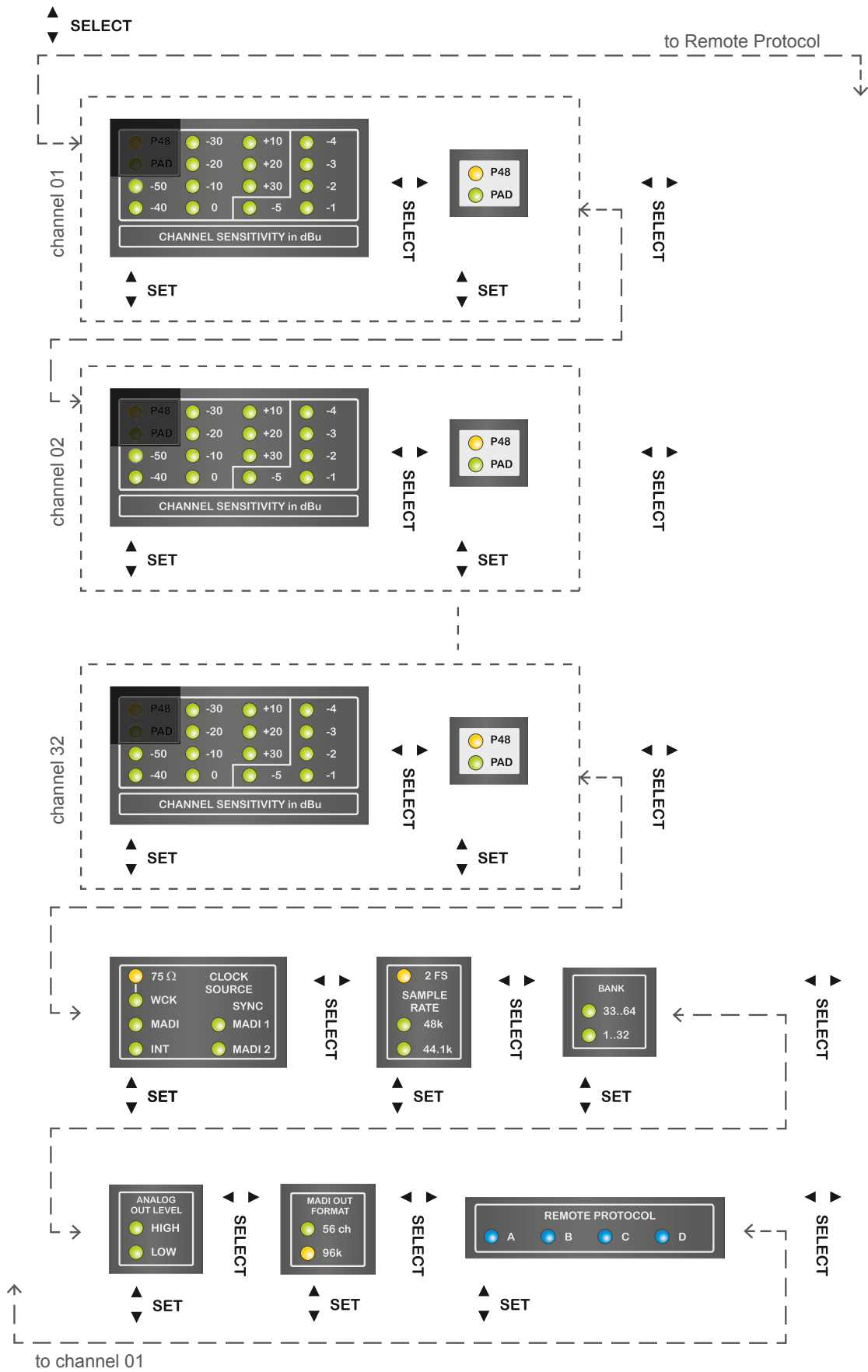
Step through all parameters in a circular course.

Use SET ▲ to modify parameter, sensitivity or <P48> on/off state.

Use SET ▼ to modify parameter, sensitivity or <PAD> on/off state.

To (de)activate the 'Matrix Mode' navigate to the parameter 'BANK' and press a SET button longer than two seconds.

# Menu Map

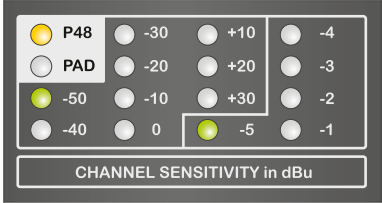
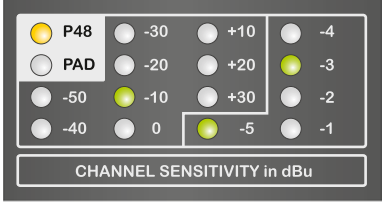
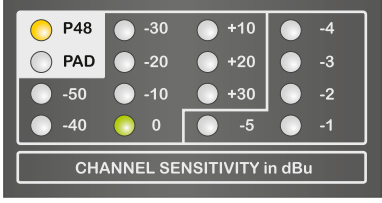
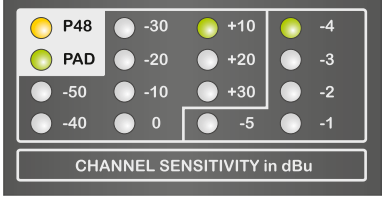
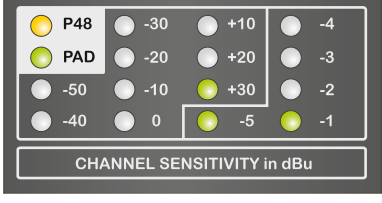


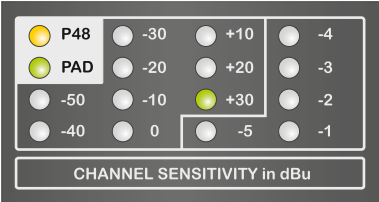
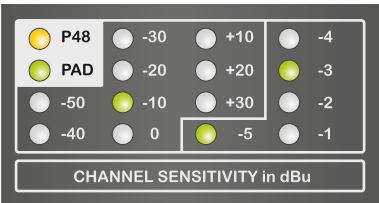
## Input sensitivity (Gain setting)

The sensitivity of the analog inputs is adjustable in 1 dB steps from  $-55 \text{ dB}_U$  to  $0 \text{ dB}_U$ . A PAD of 30 dB extends the range by another 30 dB.

The sensitivity complies with the input level that is referenced to digital full scale level ( $0 \text{ dB}_{FS}$ ).

A bunch of LEDs is used to display the actual input sensitivity of a selected channel (in menu mode).

| Display   | Sensitivity                               |
|---|---|
|    | - 55 dBu                                  |
|   | - 18 dBu                                  |
|  | 0 dBu                                     |
|  | + 6 dBu<br>(- 36 dBu with activated PAD)  |
|  | + 24 dBu<br>(- 14 dBu with activated PAD) |

| Display   | Sensitivity                                      |
|---|--|
|  | <p>+ 30 dBu<br/>(0 dBu with activated PAD)</p>   |
|  | <p>- 18 dBu<br/>(-48 dBu with activated PAD)</p> |

Positive values are displayed as calculation of a decimal minus a combination of 1 dB values.

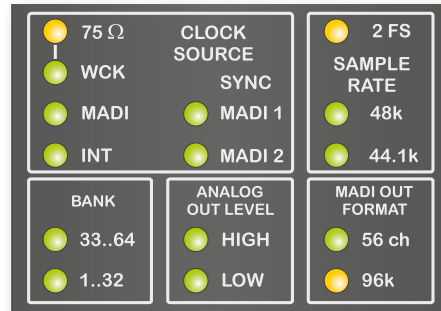
*There is a correlation between 'input sensitivity' and the commonly used term 'gain'.*

See „Appendix D: Sensitivity <> Gain“ on page 46



**Note**

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 Source>

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 <Sync MADI> (monitoring only)

Indication of selection and lock/sync state of MADI input 1 and 2.

#### 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 <Analog Out Level>

The converter offers the ability to change the sensitivity of its analog inputs corresponding to 0 dB<sub>FS</sub>.

Two level settings: +24 dB<sub>u</sub> (high) and +15 dB<sub>u</sub> (low)



#### Note

*With the level setting to "low" a digital reduction (output) is applied to adapt the lower analog level (-9 dB).*

#### Parameter <MADI Out 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.

# CHAPTER 6: 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](http://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.<br>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.<br>Check the routing matrix  |
| 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<br>or<br>bad signal condition (Jitter > 1 ns) - e.g. due to exceeded length or bad screening attenuation of signal cable. | Change the source<br>or<br>use appropriate cables (see „CHAPTER 7: Technical Data“ on page 40).  |
| Clicks in the audiosignal.              | Input source is not in sync with clock master of the box.  | 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.

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



**Note**

## CHAPTER 7: Technical Data

### Dimensions

- Width 19" (483 mm)
- Height 2 RU (89 mm)
- Depth 10" (254 mm)

### Weight

- about 7 kg

### Power Consumption

- 40 W (typical)

### 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 (Version SC/SC or BNC/SC)

- 2 x or 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 (Version BNC/SC only)

- 2 x BNC socket (input / output)
- Impedance: 75  $\Omega$
- 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



**Mic/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**

- EIN: -128 dB
- THD @ -1 dB<sub>FS</sub>: -113 dB
- Frequency response: -0.15 dB (10 Hz) / -0.15 dB (20 kHz)
- Input impedance: 20 kΩ (balanced) / 10 kΩ (unbalanced)
- Input sensitivity: -55 dB<sub>u</sub> to +30 dB<sub>u</sub>
- PAD: 30 dB switchable - each channel individually
- phantom power: +48 V, switchable - each channel individually

**D/A Section**

- SNR: -113.5 dB RMS (20 Hz - 20 kHz) / -116.5 dB(A)
- THD @ -1 dB<sub>FS</sub>: -100 dB
- Frequency response: -0.5 dB (10 Hz) / -0.15 dB (20 kHz)
- Output impedance: < 50 Ω
- Output level: + 24 dB<sub>u</sub> (digital trim)

*The outputs are not servo balanced.*

**Note****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**

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

**GPO**

- Open drain MOSFET switch - max. 30 V, max. 200 mA.
- Power supply: + 12 V, max. 200 mA (in total)

**Latency**

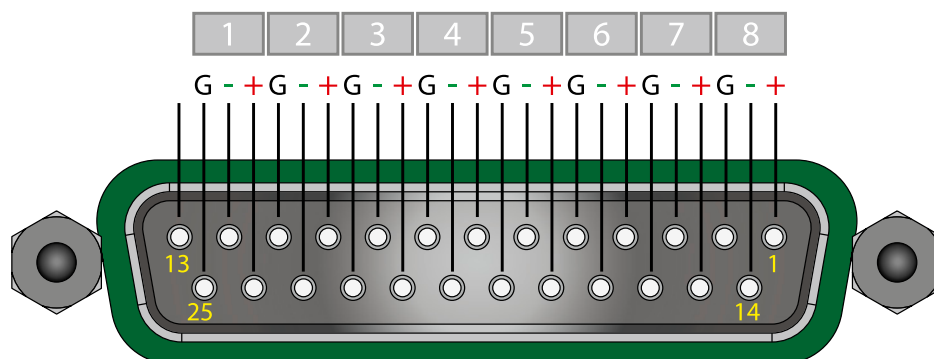
- ca. 1 ms (A/D - D/A)

*This page is left blank intentionally.*

## Appendix A: Wiring DSUB-25

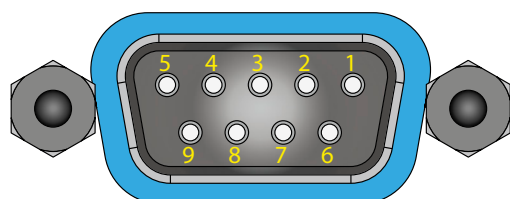
For the transmission of the analog audio signals DSUB-25 ports are used. As the sketch shows TASCAM<sup>1</sup> pinout is applied.

### DSUB-25 - analog (female)



## Appendix B: Wiring GPO

### DSUB-9 (female)



| Pin | Signal      |
|-----|-------------|
| 1   | <i>n.c.</i> |
| 2   | <i>n.c.</i> |
| 3   | GND         |
| 4   | + 12 V      |
| 5   | + 12 V      |
| 6   | <i>n.c.</i> |
| 7   | <i>n.c.</i> |
| 8   | GPO 1       |
| 9   | GPO 2       |

GPO - Open drain MOSFET switch - max. 30 V, max. 200 mA.

Power supply: + 12 V, max. 200 mA (in total)

*The pinout (3, 4, 5, 8, 9) complies with the GPO of D.O.TEC® PRODUCER.COM*

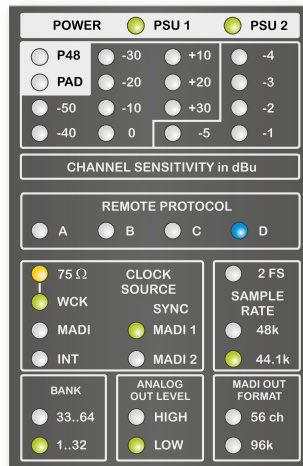


**Note**

<sup>1</sup> TASCAM is a registered trademark of TEAC corporation.

## Appendix C: Configuration Examples

### Example 1:



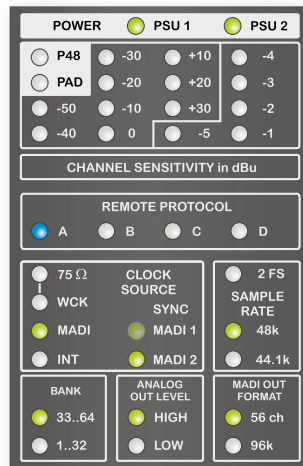
Clock source is 'word clock' with termination enabled. The MADI input signal (MADI 1) is in sync with the system clock. Sample rate is 44.1 kHz and the analog reference level is set to 'low' (-9 dB) for the analog outputs.

Standard Bank Routing to MADI channel 01 - 32 (Matrix Mode 'off').

MADI output = 64 ch mode

Remote protocol 'D' active.

### Example 2:



Clock source is the MADI input signal (MADI 2). MADI 1 is in sync with the system clock, but not selected.

Sample rate is 48 kHz and the analog reference level is set to 'high' for the analog outputs.

Standard Bank Routing to MADI channel 33 - 64 (Matrix Mode 'off').

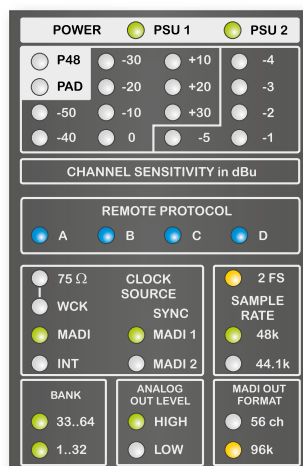
MADI output = 56 ch mode

Remote protocol 'A' active.

With the channel format set to '56 ch', the MADI output signal feeds 28 channels only\*.

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

### Example 3:



Clock source is the MADI input signal (MADI 1).

Sample rate is 96 kHz and the analog reference level is set to 'high' for the analog outputs.

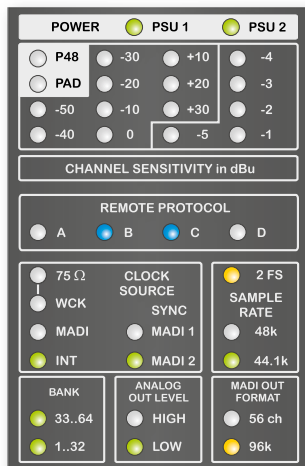
Individual signal routing (Matrix Mode 'on').

MADI output = 64 ch mode, 96k Frame mode

Remote protocol 'ABCD' active.

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

### Example 4:



The screenshot shows the ANDIAMO Remote configuration interface for Example 4. Key settings include:
 

- POWER:** PSU 1 and PSU 2 are both active.
- CHANNEL SENSITIVITY:** Set to 'low' (-9 dB).
- REMOTE PROTOCOL:** Protocol 'B' is selected.
- CLOCK SOURCE:** Set to 'INT' (Internal).
- SYNC:** Set to 'MADI 2'.
- SAMPLE RATE:** Set to '44.1k'.
- BANK:** Set to '1..32'.
- ANALOG OUT LEVEL:** Set to 'LOW'.
- MADI OUT FORMAT:** Set to '96k'.

Clock source is set to internal clock generator. The MADI input signal (MADI 2) is in sync with the system clock.

Sample rate is 88.2 kHz and the analog reference level is set to 'low' (-9 dB) for analog outputs.

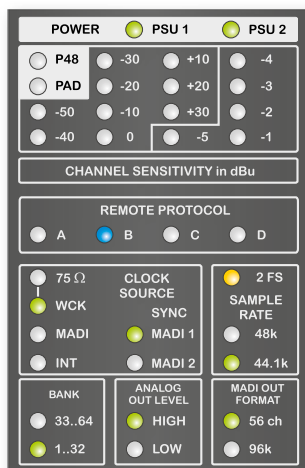
Individual signal routing (Matrix Mode 'on').

MADI output = 64 ch mode, 96k Frame mode

Remote protocol 'BC' active.

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

### Example 5:



The screenshot shows the ANDIAMO Remote configuration interface for Example 5. Key settings include:
 

- POWER:** PSU 1 and PSU 2 are both active.
- CHANNEL SENSITIVITY:** Set to 'high'.
- REMOTE PROTOCOL:** Protocol 'B' is selected.
- CLOCK SOURCE:** Set to 'WCK' (Word Clock).
- SYNC:** Set to 'MADI 1'.
- SAMPLE RATE:** Set to '48k'.
- BANK:** Set to '1..32'.
- ANALOG OUT LEVEL:** Set to 'HIGH'.
- MADI OUT FORMAT:** Set to '56 ch'.

Clock source is set to word clock with termination disabled. The MADI input signal (MADI 1) is in sync with the system clock.

Sample rate is 88.2 kHz and the analog reference level is set to high for analog outputs.

Standard Bank Routing to MADI channel 01 - 32 (Matrix Mode 'off') \*.

MADI output = 56 ch, 48k Frame

Remote protocol 'B' active.

With the channel format set to '56 ch', the MADI output signal feeds 28 channels only\*\*.

\*) As the scaling factor is set to 2 FS, the number of available channels in the MADI signal is reduced to 32 channels. Standard Bank Routing '33 - 64' is not available then.

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

See the 'Software Guide ANDIAMO Remote' for application examples.



**Note**

## Appendix D: Sensitivity <> Gain

### Explanation

So what is the difference between 'gain' and 'sensitivity'?

In the old days, it was easy to specify the amount of gain for a microphone amplifier from input to its output. The gain is measured as a relative value in dB.

When the output was connected to an AD converter, there was a reference level at which the converter would deliver 0 dB full scale (dBFS) at its digital output.

With a combined microphone amplifier / AD converter, these numbers are not really valid anymore - the internal level diagram can be quite different, as there doesn't have to be a standardized interconnect level. The reference level for digital full scale is a virtual value now.

For the Andiamo.MC, we have therefore decided to specify the 'sensitivity' of the input setting rather than the 'gain'.

With a sensitivity of 0 dBu, an input signal with 0 dBu analog level will lead to a digital output level of 0 dBFS.

We can still calculate a gain value, if we decide for our virtual reference level.

If we set it to, say +18 dBu, a sensitivity of 0 dBu would translate to a gain of 18 dB.

If we set our virtual reference at +24 dBu, the same sensitivity of 0 dBu would translate to a gain of 24 dB.

The following examples illustrate the correlation between 'input sensitivity', 'input level' and 'gain'.

Formula:

$$\langle \text{gain} \rangle = - \langle \text{sensitivity} \rangle + \langle \text{reference level} \rangle$$

Legend:

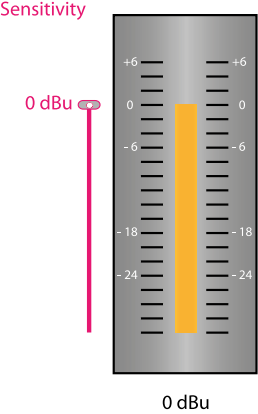
left = digital scale (dBFS)

right = analog level referring reference level (dBu)

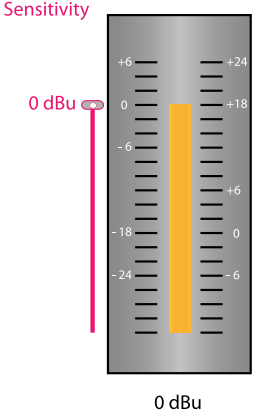
bargraph = digital level

bottom = input signal level

Examples

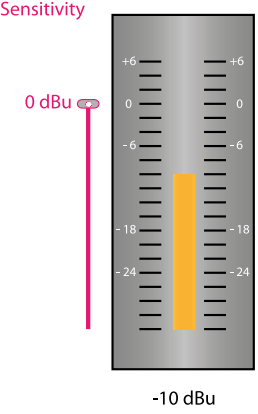


Reference level  
0 dBFS = 0 dBu  
Gain 0 dB

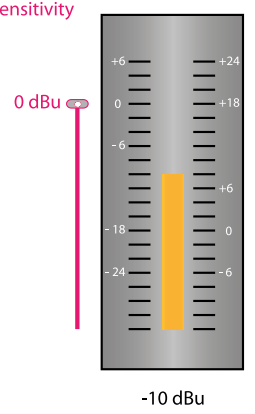


Reference level  
0 dBFS = +18 dB  
Gain +18 dB

input level = 0 dBu  
sensitivity = 0 dBu  
⇒ digital level = 0 dBFS

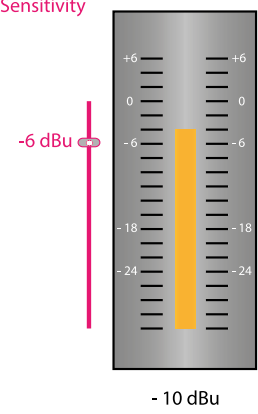


Reference level  
0 dBFS = 0 dBu  
Gain 0 dB

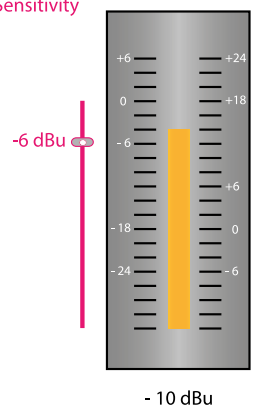


Reference level  
0 dBFS = +18 dB  
Gain +18 dB

input level = -10 dBu  
sensitivity = 0 dBu  
⇒ digital level = -10 dBFS

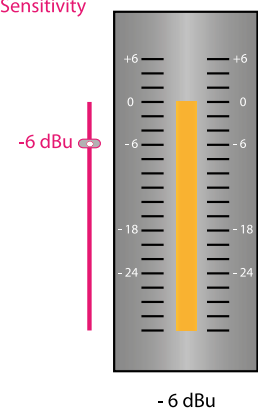


Reference level  
0 dBFS = 0 dBu  
Gain +6 dB

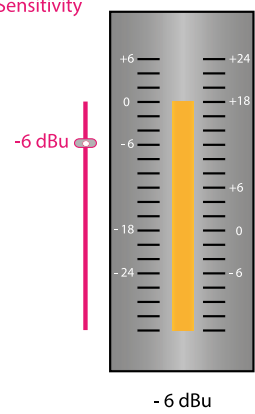


Reference level  
0 dBFS = +18 dB  
Gain +24 dB

input level = -10 dBu  
sensitivity = -6 dBu  
⇒ digital level = -4 dBFS



Reference level  
0 dBFS = 0 dBu  
Gain +6 dB



Reference level  
0 dBFS = +18 dB  
Gain +24 dB

input level = -6 dBu  
sensitivity = -6 dBu  
⇒ digital level = 0 dBFS

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