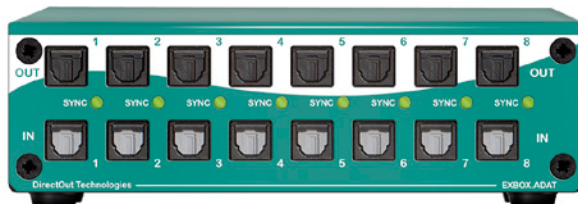


D.O.TEC® EXBOX.ADAT

Manual



Version 1.1

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Table of contents

ABOUT THIS MANUAL	7
How to Use This Manual	7
Conventions	7
CHAPTER 1: OVERVIEW	8
Introduction	8
Applications	9
How it works	9
Feature Summary	10
CHAPTER 2: LEGAL ISSUES & FACTS	11
Before Installing This Device	11
Defective Parts/Modules	12
First Aid	
(in case of electric shock)	13
Contents	14
Updates	14
Intended Operation	14
Conditions of Warranty	15
Conformity & Certificates	16
Contact	17
CHAPTER 3: INSTALLATION	18
Installing the Device	18
CHAPTER 4: OPERATION	21
Introduction	21
Rear Panel - Power supply	21
Front Panel - Input / Output	22
Rear Panel - Input / Output	23

Clocking	25
Userbits	26
Format detection	26
Routing	27
CHAPTER 5: APPLICATION EXAMPLES	29
Introduction	29
Example 1: ADAT / MADI frontend	29
Example 2: Backup recording	30
Example 3: Inserting into MADI	31
CHAPTER 6: TROUBLESHOOTING AND MAINTENANCE	32
Troubleshooting	32
Maintenance	33
TECHNICAL DATA	34
APPENDIX A - WIRING SKETCH	36
Hirose HR10 (DC PSU)	36
INDEX	37

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About This Manual

How to Use This Manual

This manual guides you through the installation and operation of the EXBOX.ADAT.

Use the Table of Contents at the beginning of the manual or Index Directory (*page 37*) 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 short cuts.



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



Warning

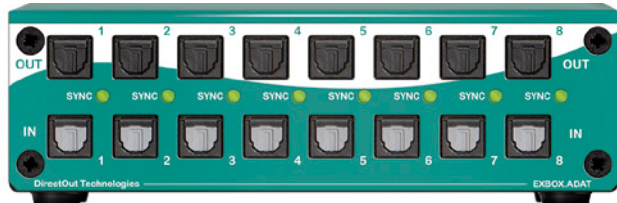
Warnings – alert you when an action should always be observed.



Chapter 1: Overview

Introduction

Welcome to the EXBOX.ADAT, D.O.TEC's MADI/ADAT converter:



The EXBOX.ADAT converts MADI signals to ADAT signals and vice versa from ADAT to MADI. It provides the following interfaces:

- Standard MADI I/O (coaxial, BNC)
- Standard MADI I/O (optical, SC)
- 8 x ADAT I/Os (TOSLink)

Applications

The EXBOX.ADAT can be used for conversion of MADI signals (AES10) to ADAT signals and vice versa. By looping one or more ADAT ports it is also possible to split / re-route a MADI signal.

Typical applications include:

- ADAT frontend for a MADI setup
- splitting / conversion of MADI signals

How it works

The MADI input signal is routed to the eight ADAT output ports. The input signal of the eight ADAT ports is output at both MADI outputs. Each direction may use its own clock source (DualSync™). The MADI input that locks first will be used as signal and sync source for conversion. The first ADAT port (in ascending order) that locks to a signal is used as sync source for the MADI output.

Feature Summary

MADI ports:	1 x MADI (coaxial, BNC 75 Ω) 1 x MADI (optical, SC multi/single mode) 8 x ADAT (TOSLink)
MADI formats	56/64 channel, 48k/96k Frame, S/MUX 2/4
Sample rates	44.1, 48, 88.2, 96, 176.4, 192 kHz +/-12.5%
Power supply	external, 2 x Hirose connector (9-24 V)

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 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 heat 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 local service 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 in for repair. See „*Chapter 6: Troubleshooting and Maintenance*“ on page 32 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 EXBOX.ADAT package should include:

- 1 x EXBOX.ADAT
- 1 x external power supply unit (9-24 V)
- 1 x Manual

Updates

D.O.TEC® products are continually under 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.

Intended Operation

The **EXBOX.ADAT** is designed for conversion between ADAT and MADI signals (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. Place the device on a non-slip horizontal surface.

The delivered pads may be affixed to the bottom of the cabinet. Watch a clean and dry surface before affixing the pads.



Warning

The synthetics of the delivered pads might cause stains on damageable surfaces. To avoid staining of furniture surfaces it is recommended to place a protective plate under the device.



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.

- Using the power cord of the external power supply provided, connect the device to a matching power supply and connect the output of the power supply to the Hirose connectors at the rear panel.



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.

The shipment includes one external power supply unit. Additional power supply units are available from your local D.O.TEC® representative.



Warning

The external power supply **MUST** be connected to the mains using the three-cord power leads supplied with the device. Only supply the voltages and signals indicated (9 - 24 V DC) to the device.



Warning

The connected power supply must provide a current limiting to a maximum of 2.5 A.



4. Remove the protective cap from the optical MADI port before use:



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

5. Connect the ADAT and MADI signals to the device:

- ADAT IN/OUT – TOSLink connectors
- MADI IN/OUT – coaxial or optical connectors



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; 176,4 kHz = 4 FS

or

- 48 kHz = 1 FS; 96 kHz = 2 FS; 192 kHz = 4 FS

Rear Panel - Power supply

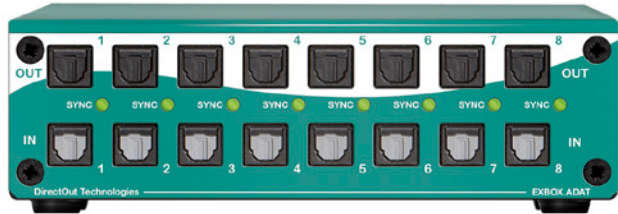


PSU 1	Hirose socket Connect the power supply here (9 V - 24 V).
PSU 2	Hirose socket Connect the power supply here (9 V - 24 V).

The device does not provide a power switch. Connecting a working power supply to the device will power up the device immediately.



Front Panel - Input / Output



ADAT IN (ports 1 to 8)	TOSLink sockets Connect here ADAT input signals. Conversion ADAT to MADI
ADAT OUT (ports 1 to 8)	TOSLink sockets Connect here ADAT output signals. Conversion MADI to ADAT
LED Sync (ports 1 to 8)	This LED indicates the use of the ADAT input and its lock status. LED OFF = no signal LED blinking = signal present (LOCK) LED ON = signal is in sync with clock source (SYNC)

The EXBOX.ADAT detects whether a valid signal is fed to the ADAT inputs. A LED indicates the status of each input discretely.

If no signal is connected to any of the ADAT inputs, the 'Sync' LEDs show a running light to indicate that the device is in operation.

Rear Panel - Input / Output



MADI 1 OUT	SC socket (optical) MADI output - connect here MADI output signal
MADI 1 IN	SC socket (optical) MADI input - connect here MADI input signal
MADI 2 OUT	BNC socket (coaxial) MADI output - connect here MADI output signal
MADI 2 IN	BNC socket (coaxial) MADI input - connect here MADI input signal



The EXBOX.ADAT detects whether a valid signal is fed to the MADI inputs. A LED indicates the status of each input discretely.

LED Sync (MADI 1)	<p>This LED indicates the use of the MADI 1 input and its lock status.</p> <p>LED OFF = no signal</p> <p>LED blinking = signal present (LOCK)</p> <p>LED ON = input is used as clock and input source (SYNC)</p>
LED Sync (MADI 2)	<p>This LED indicates the use of the MADI 2 input and its lock status.</p> <p>LED OFF = no signal</p> <p>LED blinking = signal present (LOCK)</p> <p>LED ON = input is used as clock and input source (SYNC)</p>

If both MADI inputs are connected the LED of the unused input will glow with a reduced intensity.

The MADI input that locks first will be used as signal and sync source for conversion.

Clocking

Both directions of conversion may use their own clock source - D.O.TEC® DualSync™. That means that an ADAT port is used as clock source for conversion from ADAT to MADI and a MADI port is used as clock (and input) source for conversion from MADI to ADAT.

The selection of the ADAT port as clock source uses the following pattern in ascending order:

lowest input port receiving a valid ADAT signal

If no ADAT input detects a valid input signal, the MADI input is used.

A change of the ADAT input signal condition may result in a different clock source.



The MADI input that locks first will be used as signal and sync source for conversion.

D.O.TEC® DualSync™:

Output	Clock source
MADI	lowest input port receiving a valid ADAT signal or MADI input (if no ADAT port is active)
ADAT	used MADI input

Userbits

There is no transparency of userbits between MADI input and MADI output. However, embedded serial (RS 232) and MIDI data at the MADI input is processed unchanged to the MADI outputs.

Embedded serial data:

Userbit of	Signal
Channel 1 to 9	RS 232 / 422
Channel 56	MIDI

Processing of serial data is possible even if MADI input and output use different sync sources.



The ADAT format does not provide userbits for each channel.

Format detection

The format (frame mode, channel mode) of the MADI output signal is defined by the input conditions of the used MADI input and ADAT port 8:

Frame mode follows the MADI input:

MADI input	MADI output
48k Frame	48k Frame
96k Frame	96k Frame

Channel mode follows the lock state of ADAT port 8:

ADAT port 8	MADI output
no signal present	56 ch mode
signal present (lock)	64 ch mode

Routing

The routing of the audio signals is fixed. The MADI input signal is output at the ADAT ports. The ADAT input signals are output at the MADI outputs. Both MADI outputs work in parallel.

Channel map (1 FS):

ADAT port	MADI signal
1	channel 01 to 08
2	channel 09 to 16
3	channel 17 to 24
4	channel 25 to 32
5	channel 33 to 40
6	channel 41 to 48
7	channel 49 to 56
8	channel 57 to 64

The way MADI and ADAT handle audio data at higher sample rates is quite similar. At higher sample rates (2 FS / 4 FS) the number of available audio channels is reduced (32 channels / 16 channels). The higher amount of signal data is distributed across several signal channels (S/MUX).

Channel map (2 FS):

ADAT port	MADI signal
1	channel 01 to 04
2	channel 05 to 08
3	channel 09 to 12
4	channel 13 to 16
5	channel 17 to 20
6	channel 21 to 24
7	channel 25 to 28
8	channel 29 to 32

Channel map (4 FS):

ADAT port	MADI signal
1	channel 01 to 02
2	channel 03 to 04
3	channel 05 to 06
4	channel 07 to 08
5	channel 09 to 10
6	channel 11 to 12
7	channel 13 to 14
8	channel 15 to 16



To pass through audio data from the MADI input to the MADI outputs, connect the ADAT output to the ADAT input of the respective port(s). See „Example 3: Inserting into MADI“ on page 31.

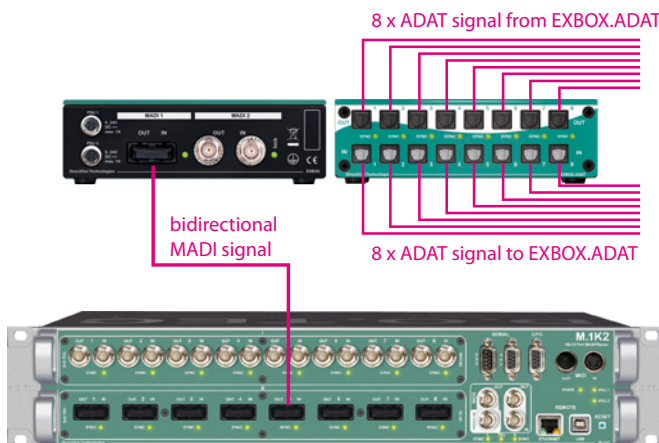
Chapter 5: Application Examples

Introduction

This chapter describes how the EXBOX.ADAT device can be used.

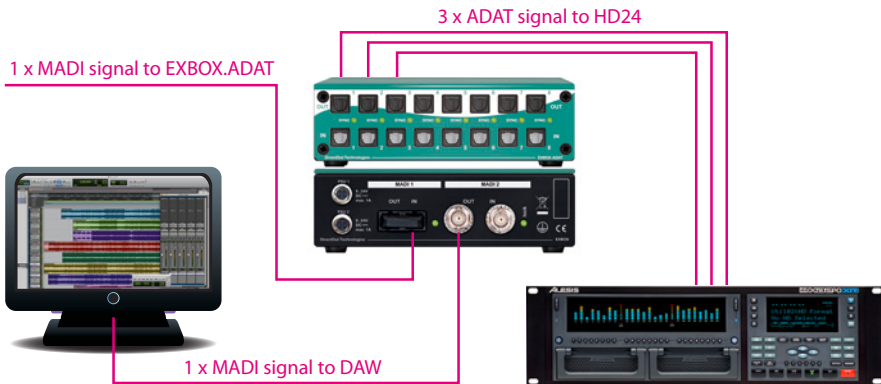
Example 1: ADAT / MADI frontend

MADI input and output of an EXBOX.ADAT are connected to the MADI router M.1k2. Devices with ADAT signals can be integrated into a MADI environment.



Example 2: Backup recording

The recording signal is fed to the optical MADI input of the EXBOX.ADAT. This signal is output at the coaxial MADI port - feeding a DAW. Additionally it is output at three of the eight ADAT ports - feeding a backup recording system; e.g. multitrack HD recorders.



The second MADI output port (optical) feeds the identical signal as the coaxial output port and could be used to connect another device.

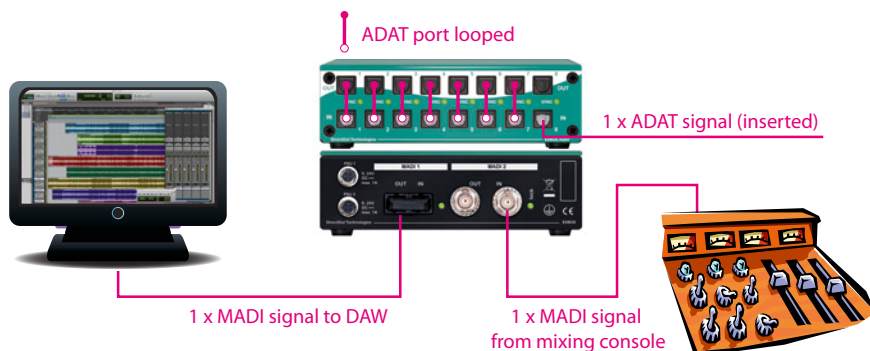


Since both MADI outputs work in parallel, the EXBOX.ADAT may be used for signal conversion between optical and coaxial MADI.

Example 3: Inserting into MAD1

The MAD1 signal from the mixing console is fed to the coaxial input of the EXBOX.ADAT. ADAT ports 1 to 7 are looped. ADAT port 8 is fed by an external ADAT signal source. Its signal is 'inserted' into the MAD1 channels 57 to 64.

The optical MAD1 output port feeds a DAW with a combined MAD1 signal containing channels 01 to 56 of the mixing console plus eight channels (57-64) of the external signal source.



*A slight delay of three samples is introduced on **each** I/O. So, in this example the latency between MAD1 input and MAD1 output adds up to six samples in total. All devices must be in sync to each other.*



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.

Issue	Possible reason	Solution
Device doesn't work.	Power supply is broken.	Check 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.
No signal at the output port.	Connectors of the signal cable are dirty.	Use an air supply to carefully remove any dust. Never use objects for cleaning. or Exchange the signal cable. Always use protecting caps.

Issue	Possible reason	Solution
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 „Technical Data“ on page 34).

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.



Technical Data

Dimensions

- Width 140 mm
- Height 42 mm
- Depth 140 mm

Weight

- 0.8 kg

Power consumption

- 5 watts, standby power < 0.5 watts (efficiency level V)

Power supply

- 2 x Hirose socket (HR10)
- 9 V - 24 V DC (external)



Warning

The connected power supply must provide a current limiting to a maximum of 2.5 A.

Environmental conditions

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

MADI Port - optical

- 1 x SC socket FDDI (input/output)
- ISO/IEC 9314-3
- Wave length 1300 nm
- Multi-Mode 62.5/125 or 50/125

MADI Port - coaxial

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

ADAT Ports - optical

- 16 x TOSLink socket (8 x input / 8 x output)

Cable Specifications

- coaxial cable (MADI coaxial) - impedance 75 Ω , screening attenuation better than 85 dB
- TOSLink - max. cable length 10 m

Appendix A - Wiring Sketch

Hirose HR10 (DC PSU)



Pin	Signal
1	DC +
2	DC +
3	DC -
4	DC -



To ensure proper operation all pins should be connected.

Index

Symbols

A

B

C

Cable Specifications _____	35
CE _____	16
Channel mapping _____	27
Clock sources _____	25
Conditions of Warranty	<i>see Warranty</i>
Conformity & Certificates	
WEEE	<i>see WEEE</i>
Contact _____	17
Contents _____	14
Conventions _____	7

D

Defective parts _____	12
Dimensions _____	34
DualSync™ _____	9, 25

E

Environmental conditions _____	34
--------------------------------	----

F

Feature summary _____	10
First Aid _____	13
FS	<i>See Scaling factor</i>

G

H

I		
	Intended operation _____	14
J		
K		
L		
M		
	MADI formats _____	10
N		
O		
P		
	Power supply _____	10
Q		
R		
	RoHS _____	16
S		
	Sample rates _____	10
	Scaling factor _____	21
	Serial data	
	embedded.....	26
	Servicing _____	12
	Sketch	
	Hirose	36
	S/MUX _____	27
T		
	Technical data _____	34
	Troubleshooting _____	32
U		

Updates _____ 14

V

W

Warnings _____ 7

Warranty _____ 15

WEEE _____ 16

X

Y

Z