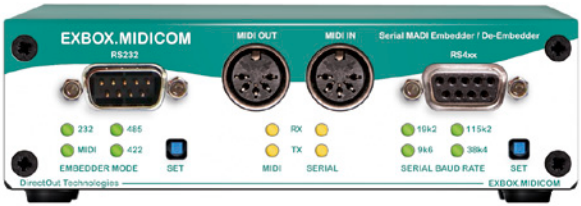
DirectOut Technologies®

D.O.TEC® EXBOX.MIDICOM

Manual



Version 1.0

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Table of contents

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About This Manual

How to Use This Manual

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

Use the Table of Contents at the beginning of the manual or Index Directory (*page 42*) 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.MIDICOM, D.O.TEC's Serial MADI Embedder / De-Embedder:

The EXBOX.MIDICOM embeds serial data into a MADI signal and de-embeds serial data from a MADI signal. Input / output of four different serial data formats is provided by local interfaces at the front panel.

Supported interface standards:

- RS-232
- RS-422
- RS-485
- MIDI

MIDI and one RS-xxx transmission may be used at the same time. Two optical MADI ports offer the posibility to establish a bidirectional link between two devices. No latency is introduced by the device's MADI I/O.

Applications

The EXBOX.MIDICOM can be used to tunnel serial data within a MADI signal or to extract already embedded serial data from a MADI signal.

Typical applications include:

- Remote control via MADI (‘MIDI over MADI’ or ‘Serial over MADI’)
- Triggering sequencers or other MIDI devices using a MADI line

How it works

The user bit of some audio channels of a MADI signal can be used to transport a serial data stream.

MIDI	user bit channel 56
RS-232 or RS-422 or RS-485	user bit channels 1-9

Depending on the setting of the embedder the serial data from a local port is embedded into the MADI signal - replacing the user bits of the incoming MADI stream at MADI output port 2.

At the same time serial data is de-embedded from the MADI input signal (MADI 2) and processed to the particular RS-xxx or MIDI port.

The MADI I/Os are cross patched (1 ⇨ 2 or 2 ⇨ 1).

The embedder / de-embedder handles four different baud rates. Further it can be switched off to preserve user bits of the MADI input signal.

MIDI over MADI - the process is compatible to the embedder used by RME.

Serial over MADI - the process is compatible to the embedder used by Studer/Soundcraft.

Feature Summary

MADI ports	2 x MADI (optical, SC multi/single mode)
MIDI ports	2 x DIN (female)
Serial ports	1 x RS-232 (DSUB-9 male) 1 x RS-422/485 (DSUB-9 female)
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%
Settings (RS-232, RS-422/485)	9.600, 19.200 , 38.400, 115.200 baud Format: 8, n, 1
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 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 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 36* 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.MIDICOM package should include:

- 1 x EXBOX.MIDICOM
- 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.MIDICOM** is designed for embedding / de-embedding of serial data into / from a MADI signal (AES10). In this context serial data refers to RS-232, RS-422 or 485 and MIDI.

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 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. 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.

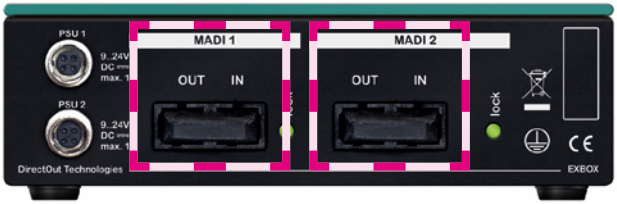
Warning

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.

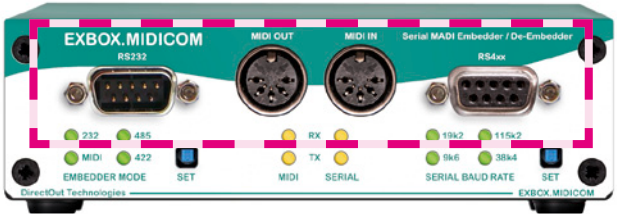
4. Remove the protective cap from the optical MADI ports before use:



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

5. Connect the serial signals[1] to the device:

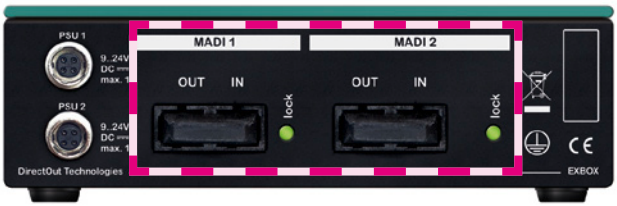
- RS-232 IN/OUT – DSUB-9 connector (male)
- RS-422/485 IN/OUT - DSUB-9 connector (female)
- MIDI IN/OUT - DIN connectors



1 Ensure to use appropriate cabling. To link two serial devices a cross patched cable (so called 'null-modem cable') may be required - *see „Appendix A - Wiring Sketches“ on page 40.*

6. Connect the MADI signals to the device:

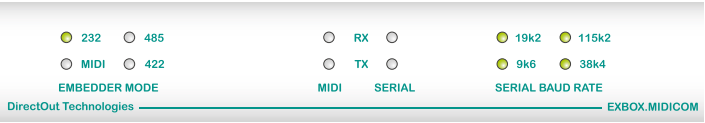
- MADI IN/OUT – optical connectors



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

Firmware check

The first seconds after switch-on the actual firmware is indicated by the LEDs on the front panel - e.g. firmware version 1.4.



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

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

Visit support.directout.eu for firmware inquiries.

Chapter 4: Operation

Introduction

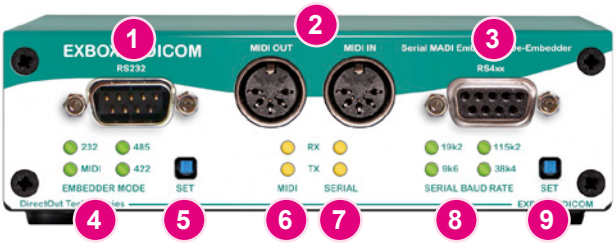
This chapter describes the basic operation of the device.

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.

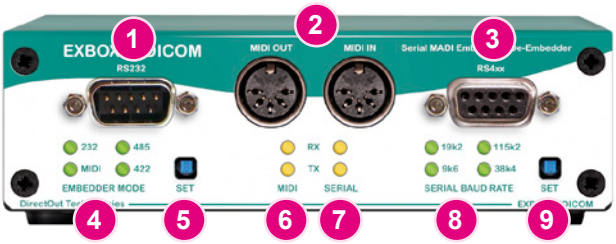
Front Panel



RS232 (1)	**DSUB-9 socket (male)** Serial data I/O - connect here for embedding or de-embedding RS-232 data.
MIDI OUT / MIDI IN (2)	**DIN sockets** Connect here for embedding (MIDI IN) or de-embedding (MIDI OUT) MIDI data.
RS4xx (3)	**DSUB-9 socket (female)** Serial data I/O - connect here for embedding or de-embedding RS-422 or RS-485 data.

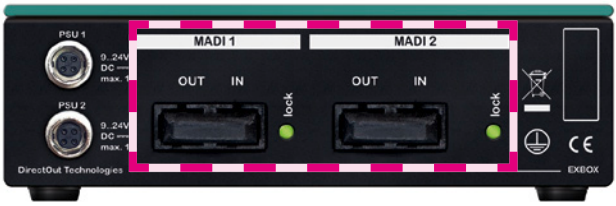
EMBEDDER MODE - LEDs (4)	**These LEDs (green) indicate the used embedder / de-embedder.** LED MIDI ON = emb. active, MIDI LED RS232 ON = emb. active, RS-232 LED RS422 ON = emb. active, RS-422 LED RS485 ON = emb. active, RS-485 all LEDs OFF = embedder inactive LED MIDI & LED RS-<xxx> ON = emb. active, MIDI and RS<xxx> *MIDI and one of the RS-xxx ports may be used concurrently.* *See „(De-)Embedder - Mode“ on page 30.*
SET (5)	**Button** Press short to adjust the setting of the (de-)embedder mode.
MIDI - LEDs RX / TX (6)	**These LEDs (orange) indicate the transport status of MIDI data.** LED RX ON = MIDI data is received LED TX ON = MIDI data is sent
SERIAL - LEDs RX / TX (7)	**These LEDs (orange) indicate the transport status of RS-xxx data.** LED RX ON = RS-xxx data is received LED TX ON = RS-xxx data is sent

Front Panel - continued

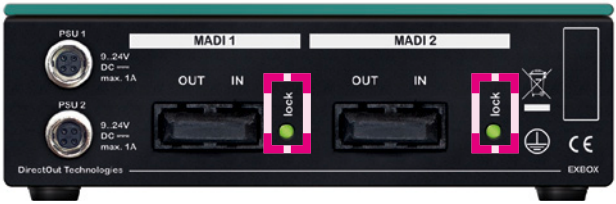


SERIAL BAUD RATE - LEDs (8)	**These LEDs (green) indicate the baud rate of the embedder / de-embedder (RS-xxx).** LED 9k6 ON = 9.600 baud LED 19k2 ON = 19.200 baud LED 38k4 ON = 38.400 baud LED 115k2 ON = 115.200 baud *See „(De-)Embedder - Baud Rate“ on page 32.*
SET (9)	**Button** Press short to adjust the setting of the baud rate for the RS-xxx ports.

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	**SC socket (optical)** MADI output - connect here MADI output signal (Embedder output)
MADI 2 IN	**SC socket (optical)** MADI input - connect here MADI input signal (De-Embedder input)



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

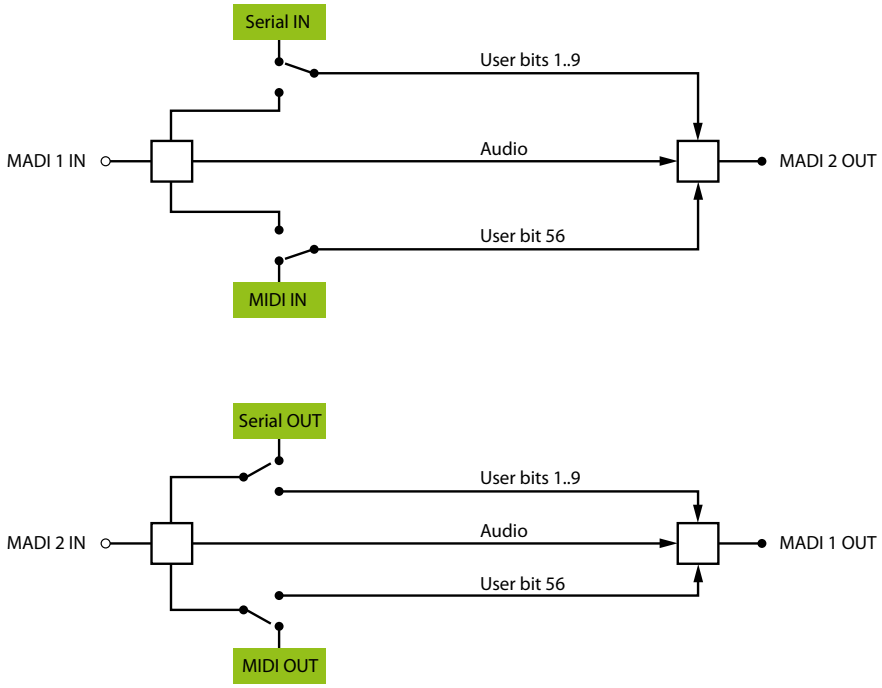
LED lock (MADI 1)	**This LED indicates the use of the MADI 1 input and its lock status.** LED OFF = no signal LED ON = valid input signal detected (LOCK)
LED lock (MADI 2)	**This LED indicates the use of the MADI 2 input and its lock status.** LED OFF = no signal LED ON = valid input signal detected (LOCK)

Both MADI inputs can be operated with different clock sources.

Different clock sources may affect a proper transmission of the audio signal.

Routing

Both MADI ports are cross patched; i.e. MADI 1 IN feeds MADI 2 OUT and MADI 2 IN feeds MADI 1 OUT. The (de-)embedder works on MADI port 2 only.



Sketch - Signal flow

(De-)Embedder 'inactive' means that the respective user bits will pass through the device unaltered.

An activated (de-)embedder will affect <u>both</u> MADI output signals; i.e. no bit transparency between MADI 2 IN and MADI 1 OUT.

(De-)Embedder - Mode

The local serial ports (RS-232, RS-422/485 and MIDI) can be used to embed serial data into the MADI output signal and to de-embed serial data from the MADI input signal.

The MIDI port and one RS-xxx port can be used concurrently.

The serial data is tunnelled by using the user bits of channel 1 to 9 (RS-xxx) and channel 56 (MIDI).

The embedder / de-embedder may be switched off for bit transparent pass-through of the MADI input signal to the MADI output.

The setting of the (de-)embedder can be adjusted by pushing the blue 'SET' button to the right of the LEDs 'EMBEDDER (MADI 2)'.

Setting	Mode Embedder / De-Embedder	LED
232	RS-232 active, MIDI inactive	● 232 ○ 485 ○ MIDI ○ 422
422	RS-422 active, MIDI inactive	○ 232 ○ 485 ○ MIDI ● 422
485	RS-485 active, MIDI inactive	○ 232 ● 485 ○ MIDI ○ 422
OFF	no local ports active - bit transparent throughput	○ 232 ○ 485 ○ MIDI ○ 422
MIDI	RS-xxx inactive, MIDI active	○ 232 ○ 485 ● MIDI ○ 422

Setting	Mode Embedder / De-Embedder	LED
MIDI & 232	RS-232 active, MIDI active	● 232 ○ 485 ● MIDI ○ 422
MIDI & 422	RS-422 active, MIDI active	○ 232 ○ 485 ● MIDI ● 422
MIDI & 485	RS-485 active, MIDI active	○ 232 ● 485 ● MIDI ○ 422

(De-)Embedder 'inactive' means that the respective user bits will pass through the device unaltered (bit transparency).

The embedder / de-embedder refers to MADI port 2 only - see „Routing" on page 29.

(De-)Embedder - Baud Rate

The setting of the baud rate can be adjusted by pushing the blue ‘SET’ button to the right of the LEDs ‘SERIAL BAUD RATE’.

Setting	Baud Rate	LED
9k6	RS-xxx active @ 9.600 baud (8, n, 1)	○ 19k2 ○ 115k2 ● 9k6 ○ 38k4
19k2	RS-xxx active @ 19.200 baud (8, n, 1)	● 19k2 ○ 115k2 ○ 9k6 ○ 38k4
38k4	RS-xxx active @ 38.400 baud (8, n, 1)	○ 19k2 ○ 115k2 ○ 9k6 ● 38k4
115k2	RS-xxx active @ 115.200 baud (8, n, 1)	○ 19k2 ● 115k2 ○ 9k6 ○ 38k4

The baud rate refers to the RS-xxx ports only. Once the embedder for RS-xxx is inactive the baud rate setting becomes inactive too; i.e. all LEDs are off.

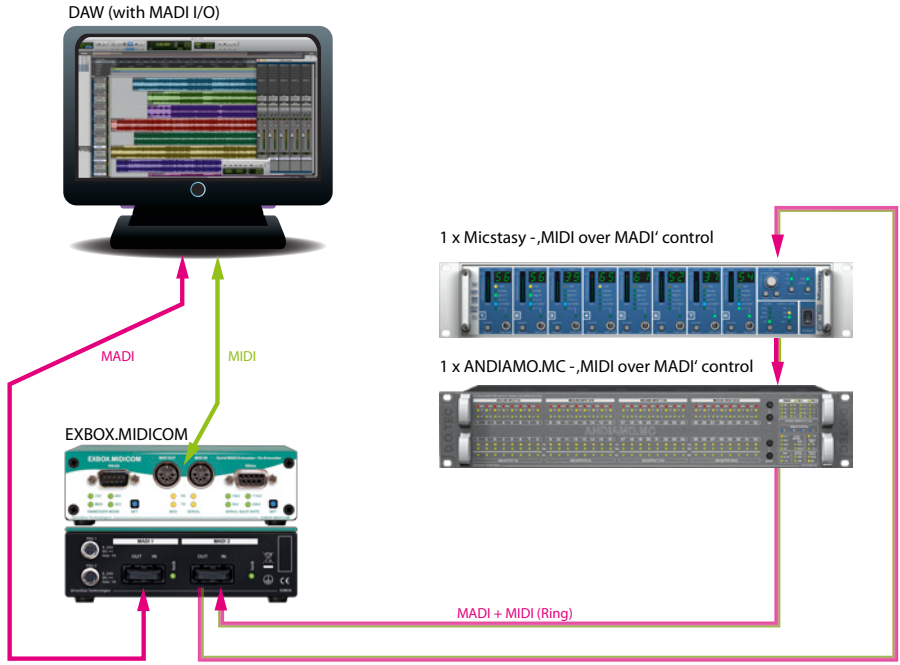
Chapter 5: Application Examples

Introduction

This chapter shows a few application examples of the EXBOX.MIDICOM.

Example 1: Recording with remote control - MIDI

Two separate signals (MADI + MIDI) from the DAW are merged by EXBOX.MIDICOM. A MADI ring with the combined signal transmits the audio signals and the MIDI data for remote control of two mic preamps (RME Micstasy and D.O.TEC® ANDIAMO.MC).



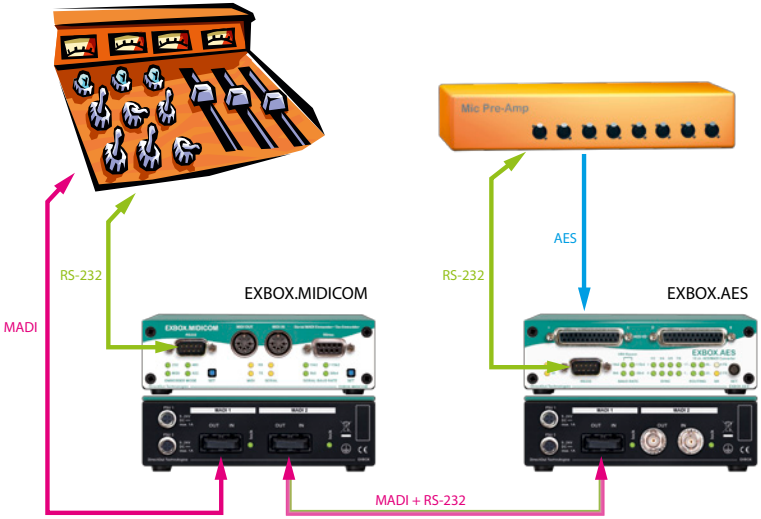
Example 2: Recording with remote control - RS-232

The mixing console receives the audio signal from a mic preamp which is remote controlled by a RS-232 signal - from the mixing console.

D.O.TEC® EXBOX.MIDICOM merges/splits the MADI and RS-232 signals.

D.O.TEC® EXBOX.AES establishes the remote connectionand provides the conversion of the AES signals from the connected mic preamp to MADI.

Embedder mode: RS232



Depending on the remote device the RS-232 connection requires an appropriate cable. Consult the operating instructions of the remote device - see „Appendix A - Wiring Sketches“ on page 40.

Example 3: Embedding without audio signal

Two devices are used for transmission of serial data using a bidirectional MADI link. The embedded serial data of device ‘A’ is output at MADI 2. Device ‘B’ receives the MADI stream at MADI 2 input where it is de-embedded.

Vice versa - device ‘B’ transmits the embedded serial data to device ‘A’.

Embedder mode (both devices): RS232 + MIDI

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. Check the LEDs 'lock' for MADI.
No signal at the output port.	Cable defective.	Exchange the 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 38*).
No transport of serial data.	Embedder not active or wrong baud rate	Adjust embedder setting and check the LEDs ‘RX’ and ‘TX’.
No transport of serial data.	wrong pin out	Use appropriate cable (see *„Appendix A - Wiring Sketches“ on page 40)* To connect two serial devices a null modem cable may be required.
Baud rate cannot be varied and all LEDs are off.	No RS-xxx (de-)embedder active	Change (de-)embedder mode to activate a RS-xxx port.

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

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

RS-232 Port (I/O)

- 1 x DSUB-9 male
- baud rates: 9.600, 19.200, 38.400, 115.200 baud
- format: 8, n, 1 (**8** data bits, **n**o parity, **1** stop bit)

RS-422/485 Port (I/O)

- 1 x DSUB-9 female
- baud rates: 9.600, 19.200, 38.400, 115.200 baud
- format: 8, n, 1 (**8** data bits, **n**o parity, **1** stop bit)

MIDI Port (I/O)

- 2 x DIN socket (input / output)

Appendix A - Wiring Sketches

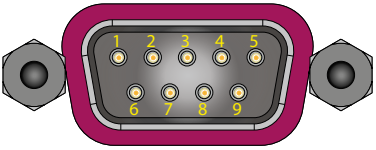
Hirose HR10 (DC PSU)

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

To ensure proper operation all pins should be connected.

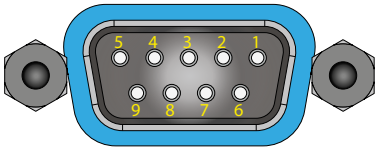
Ground is connected with the chassis of the plug (safety class 1).

DSUB-9 (male) - RS232



Pin	Signal
1	*not connected*
2	RX
3	TX
4	*not connected*
5	GND
6	*not connected*
7	*not connected*
8	*not connected*
9	*not connected*

DSUB-9 (female) - RS4xx



Pin	Signal
1	GND
2	RS422 RX+
3	RS422 TX- / RS485 RX-
4	GND
5	*not connected*
6	GND
7	RS422 RX-
8	RS422 TX+ / RS485 RX+
9	*not connected*

Ensure to use appropriate cabling. Depending on the remote device a cross patched cable (so called 'null-modem cable') may be required for linking. Consult the operating instructions of the remote device.

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