MADI.9648

User's Manual

Version 1.4

Copyright

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 device.
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.

Conventions

The following symbols are used to draw your attention to:

TIPS

indicate useful hints and shortcuts.

NOTES

are used for important points of clarification or cross references.

WARNINGS!

alert you when an action should always be observed.

CHAPTER 1: Overview

Introduction

MADI.9648 is a synchronous MADI sample rate converter with four independent SRC blocks for bidirectional conversion of 128 audio channels. Equipped with eight MADI ports it features synchronous low latency conversion in a ratio of exactly 1:2 or 2:1 to translate between 2 FS (88.2/96 kHz) and 1 FS (44.1/48 kHz).

Feature Summary

MADI Ports	2 x SC multi-mode connectors 6 x coaxial BNC connectors
MADI Formats	56/64 channel, 48k/96k Frame
Sample Rates	44.1, 48, 88.2, 96 +/-12.5%
Sample Rate Conversion	128 audio channels, bidirectional
Low Latency	8 samples (round-trip 48-96-48) 16 samples (round-trip 96-48-96)
USB Port	USB 2.0 port for firmware updates.
Power Supply	This device is equipped with two wide range power supplies (84 V to 264 V AC / 47 Hz to 63 Hz / safety class 1)

How it works

A 1 FS MADI stream with 64 audio channels is converted into two 2 FS MADI streams with 32 channels each of. Vice versa two 2 FS streams are converted and combined into a single 1 FS stream.

MADI.9648 provides:
- 2 x conversion from 1 FS to 2 FS
- 2 x conversion from 2 FS to 1 FS

No settings are required:
- Fixed signal routing
- Automatic signal detection of frame format (48k/96k Frame) and channel mode (56/64 ch).
- Frame format of 2 FS output is set following the input of the same port
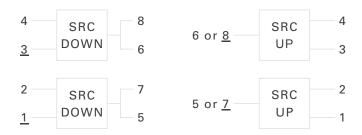- The output of each SRC block is clocked by it's corresponding MADI input.

Applications

MADI.9648 enables an easy-to-handle integration of external equipment with most recent live consoles with 96 kHz processing.

Typical applications include:

- monitoring
- external effects
- ...

Scheme

The ports underlined are used as clock (and signal source for 1 FS to 2 FS) once both input ports detect signal.

CHAPTER 2: Legal issues & facts

Before Installing This Device

WARNING!

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

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

Defective Parts/Modules

WARNING!

This device contains no user-serviceable parts. Therefore do not open the device. In the event of a hardware defect, please send the device to your DirectOut 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.

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.

Updates

DirectOut products are continually in development, and therefore the information in this manual may be superseded by new releases. To access the latest documentation, please visit the DirectOut website:
www.directout.eu.
This guide refers to firmware version 1.6.

Intended Operation

MADI.9648 is designed for sample rate conversion of digital audio signals. In this context digital audio refers to a MADI signal (AES10).

WARNING!

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

Conditions of Warranty

This unit has been designed and examined carefully by the manufacturer and complies with actual norms and directives.
Warranty is granted by DirectOut GmbH over the period of 36 months for all components that are essential for proper and intended operation of the device. The date of purchase is applied for this period.
Consumable parts (e.g. battery) are excluded from warranty claims.

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 2011/65/EU and 2015/863.

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:
DirectOut GmbH,
Leipziger Str. 32
09648 Mittweida
Germany
Only stamped parcels will be accepted!
WEEE-Reg.-No. DE 64879540

Contact
DirectOut GmbH
Leipziger Str. 32, 09648 Mittweida, Germany
Phone: +49 (0)3727 5665-100
Fax: +49 (0)3727 5665-101
Mail: sales@directout.eu
www.directout.eu

Contents

The contents of your MADI.9648 package should include:

- 1 x MADI.9648 (19'', 1 RU)
- 2 x power chord
- 1 x fixing unit for power plug
- 1 x Manual

To complete the delivery please download from the DirectOut website: www.directout.eu

- USB Serial driver

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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!

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

3. Remove the protective cap from the optical MADI port(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(s) for the MADI signals.

5. Optional: Connect an USB cable to the USB port for firmware updates.
This requires the USB Serial driver (Windows) being installed first.
The driver and the installation instructions are available at
www.directout.eu.

6. Using the power cord provided connect the PSUs to a matching power
supply:

The left socket is switched by the power supply switch. The right socket will
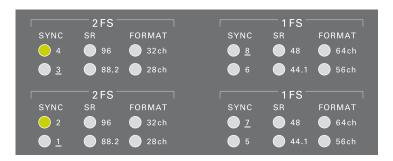power up the device immediately when connected to the mains.

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).

7. Turn on the power switch:

While the device is booting the currently installed firmware is indicated in the front panel displays - e.g. firmware version 1.1.

8. Check if the latest firmware is installed on the device. It is recommended to use the latest version that is available on the product page at www.directout.eu.

9. Optional: Connect an USB cable to the USB port for firmware updates. This requires the USB Serial driver (Windows®) being installed first. The driver and the installation instructions are available at www.directout.eu.

10. Installation of USB Serial driver

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

TIP!

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

CHAPTER 4: Operation

Introduction

This chapter describes the basic operation of the device.

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

- 44.1 kHz or 48 kHz = 1 FS
- 88.2 kHz or 96 kHz = 2 FS
- 176.4 kHz or 192 kHz = 4 FS

Global Control

An LED on the front panel indicates the power supply.

Power	**1 Switch***
	Enable / disable power supply.
ON	**LED (green) indicates state of power supply**
	ON = at least one power supply is active
Power	**2 x C13 socket***
	Connect the power supply here (84- 264 V AC).

* The left socket is switched by the power supply switch. The right socket will power up the device immediately when connected to the mains.

NOTE

The display indicates that a working power supply is connected to the power supply unit. Note that an unlit display does not guarantee that the device is free of voltage. To ensure that the device is completely disconnected from mains voltage, the power chord(s) must be disconnected.

Signal Input / Output

The device is equipped with six BNC coaxial (75 Ω) and two SC optical MADI ports.

1 OUT / IN*	**2 x BNC socket (coaxial)** OUT: MADI output (2 FS), connect for MADI output signal here. IN: MADI input (2 FS), connect MADI input signal here.
2 OUT / IN	**2 x BNC socket (coaxial)** OUT: MADI output (2 FS), connect for MADI output signal here. IN: MADI input (2 FS), connect MADI input signal here.
3 OUT / IN*	**2 x BNC socket (coaxial)** OUT: MADI output (2 FS), connect for MADI output signal here. IN: MADI input (2 FS), connect MADI input signal here.
4 OUT / IN	**2 x BNC socket (coaxial)** OUT: MADI output (2 FS), connect for MADI output signal here. IN: MADI input (2 FS), connect MADI input signal here.
5 OUT / IN	**2 x BNC socket (coaxial)** OUT: MADI output (1 FS), connect for MADI output signal here. IN: MADI input (1 FS), connect MADI input signal here.
6 OUT / IN	**2 x BNC socket (coaxial)** OUT: MADI output (1 FS), connect for MADI output signal here. IN: MADI input (1 FS), connect MADI input signal here.
7 OUT / IN**	**1 x SC socket (optical)** OUT: MADI output (1 FS), connect for MADI output signal here. IN: MADI input (1 FS), connect MADI input signal here.
8 OUT / IN**	**1 x SC socket (optical)** OUT: MADI output (1 FS), connect for MADI output signal here. IN: MADI input (1 FS), connect MADI input signal here.

* port 1 & 3 are used as clock master and define the channel mode for its particular block.

** port 7 respective port 8 is selected as clock and input source, if both inputs of the particular SRC block detect a valid signal.

NOTE

Mixed conversion of 28 ch and 32 ch is not possible. Either 2 x 28 ch or 2 x 32 ch.

The signal routing and the sample rate conversion is fixed for each signal path.
SRC mode UP means from 1 FS to 2 FS, while DOWN means from 2 FS to 1 FS.
- UP   : one stream is distributed into two streams
- DOWN : two streams are combined into one stream

Scheme

```
4 ─┐┌──────┐┌─ 8          ┌──────┐┌─ 4
   │  SRC   │             │  SRC   │
   │ DOWN   │   6 or 8 ──│  UP    │
3 ─┘└──────┘└─ 6          └──────┘└─ 3

2 ─┐┌──────┐┌─ 7          ┌──────┐┌─ 2
   │  SRC   │             │  SRC   │
   │ DOWN   │   5 or 7 ──│  UP    │
1 ─┘└──────┘└─ 5          └──────┘└─ 1
```

Sample Rate Conversion

There are two SRC Groups featuring each of an 1 FS to 2 FS block and vice versa a 2 FS to 1 FS block. Each block provides LEDs monitoring for input sync, sample rate and signal format.

2 FS SYNC (1, 2, 3, 4)	**LED (green) indicates the lock / sync state of the MADI input signal** ON = signal present, in sync blinking = signal present, not in sync* OFF = no signal detected
2 FS SR (96)	**LED (yellow) indicates the sample rate 96 kHz of the input signal** ON = 96 kHz detected blinking = 96 kHz detected, S/MUX
2 FS SR (88.2)	**LED (yellow) indicates the sample rate 88.2 kHz of the input signal** ON = 88.2 kHz detected blinking = 88.2 kHz detected, S/MUX
2 FS FORMAT (32 ch)	**LED (green) indicates the use of channel mode 32 ch in the input signal** ON = 32 ch detected blinking = 32 ch detected, S/MUX
2 FS FORMAT (28 ch)	**LED (green) indicates the use of channel mode 28 ch in the input signal** ON = 28 ch detected blinking = 28 ch detected, S/MUX

*   port 1 & 3 are used as clock master and define the channel mode for its particular block.

NOTE

The output of each SRC block is clocked by it's corresponding MADI input.

Synchronous conversion in a ratio of exactly 1:2 or 2:1 to translate between 2 FS (88.2/96 kHz) and 1 FS (44.1/48 kHz).

1 FS SYNC (5, 6, 7, 8)	**LED (green) indicates the lock / sync state of the MADI input signal **** ON = signal present, in sync OFF = no signal detected
1 FS SR (48)	**LED (yellow) indicates the sample rate 48 kHz of the input signal** ON = 48 kHz detected
1 FS SR (44.1)	**LED (yellow) indicates the sample rate 44.1 kHz of the input signal** ON = 44.1 kHz detected
1 FS FORMAT (64 ch)	**LED (green) indicates the use of channel mode 64 ch in the input signal** ON = 64 ch detected
1 FS FORMAT (56 ch)	**LED (green) indicates the use of channel mode 56 ch in the input signal** ON = 56 ch detected

** port 7 respective port 8 is selected as clock and input source, if both inputs of
   the particular SRC block detect a valid signal.

Frame Formats at the 2 FS output (ports 1 to 4)

The 2 FS inputs accept both 96k Frame and 48k Frame (S/MUX). For the frame format of the 2 FS output there are two options:
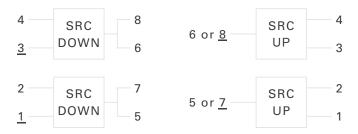
  1. Automatic (default)
   Output frame format follows the input frame format.
   S/MUX => S/MUX or 96k Frame => 96k Frame

  2. Force to 96k Frame
   Output frame format is forced to 96kFrame
   S/MUX => 96k Frame or 96k Frame => 96k Frame

To switch between the two modes please contact support@directout.eu.

Channel Mapping 2 FS to 1 FS

Channel	Input Port	Output Port	Channel
01 to 32	1	5 & 7 parallel	01 to 64
33 to 64	2		
65 to 96	3	6 & 8 parallel	65 to 128
97 to 128	4		

```
4 ──┐┌──────┐┌── 8              ┌──────┐┌── 4
    │  SRC   │                6 or 8 │  SRC   │
3 ──┘│ DOWN  │── 6                   │  UP   │── 3
     └──────┘                        └──────┘

2 ──┐┌──────┐┌── 7              ┌──────┐┌── 2
    │  SRC   │                5 or 7 │  SRC   │
1 ──┘│ DOWN  │── 5                   │  UP   │── 1
     └──────┘                        └──────┘
```

Channel Mapping 1 FS to 2 FS

Channel	Input Port	Output Port	Channel
01 to 64	5 or 7	1	01 to 32
		2	33 to 64
65 to 128	6 or 8	3	65 to 96
		4	97 to 128

Servicing

USB

The USB port is used for firmware updates of the device.

USB	USB 2.0 socket (Type B)
	Connect here for firmware updates and remote control.

MIDI

The MIDI I/O is not used.

CHAPTER 5: 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 DirectOut representative or visit support.directout.eu.

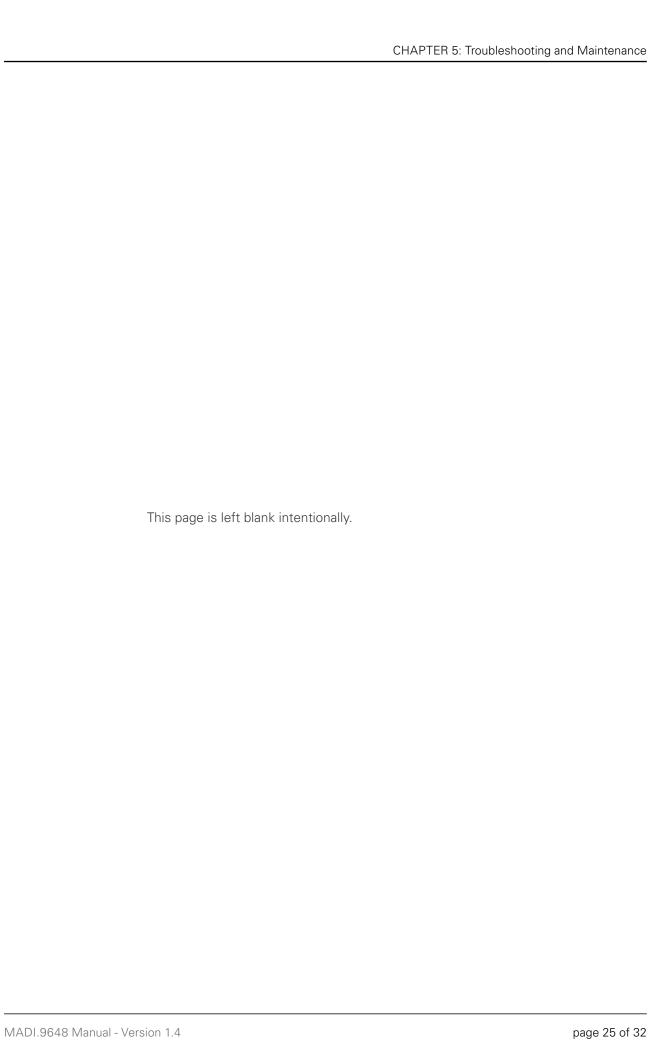| Issue	Possible reason	Solution
Device doesn't work.	Power supply is broken.	Check that the power supply switch is on, that the device is connected to the power supply and that the socket is working. Defective fuses must be exchanged by qualified service personal only.
Optical port does not work.	Optic is dirty.	Use an air supply to carefully remove any dust. Never use objects for cleaning.
No signal at the output port.	Connections (input / output) are mixed up.	Check the connections and change the cables if necessary. 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 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.

Maintenance

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

NOTE!

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

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CHAPTER 6: Technical Data

Dimensions
- Width 19'' (483 mm)
- Height 1 RU (44.5 mm)
- Depth 7.8'' (200 mm)
- Weight about 2 kg

Power Consumption
- 15 W

Power Supply
- 2 x C13 sockets
- 84 V- 264 V AC / 47 Hz- 63 Hz / Safety class 1

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

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

MADI Ports BNC coaxial
- 12 x BNC socket (input / output)
- Impedance: 75 Ω
- 0.3 V up to 0.6 V (peak to peak)

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

MADI Format (I/O)
- 48k Frame, 96k Frame
- 56 channel, 64 channel

Latency
- 8 samples   @ 1 FS- 2 FS- 1 FS (round-trip)
- 16 samples @ 2 FS- 1 FS- 2 FS (round-trip)

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

Index