DirectOut Technologies®

EXBOX.GPIO

Manual

Version 1.0

Copyright

DirectOut Technologies®

Table of contents

This page is left blank intentionally.

EXBOX.GPIO Manual Version 1.0

About This Manual

How to Use This Manual

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

Use the Table of Contents at the beginning of the manual or Index Directory (*page 40*) to locate help on a particular topic.

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

Conventions

The following symbols are used to draw your attention to:

Tips – indicate useful tips and shortcuts.

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

Warning

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

Chapter 1: Overview

Introduction

Thanks for using EXBOX.GPIO, DirectOuts MADI GPIO Embedder / De-Embedder.

The EXBOX.GPIO is a frontend for trigger signals that are processed within MADI streams.

Applications

The EXBOX.GPIO can be used to embed an input trigger (GPI) into a MADI signal and to output an incoming trigger from a MADI signal (GPO).

Typical applications include:

- Remote Control
- Monitoring of remote devices
- Transport of trigger signals over long distances

EXBOX.GPIO Manual Version 1.0 © 2015 DirectOut GmbH

How it works

The two MADI ports provide a bidirectional link into an existing MADI connection. Via port selection the position of the Embedder and De-Embedder can be assigned to one of the two MADI ports.

Up to four input triggers (GPI) can be connected at the frontpanel of the device. Their signal state is embedded into the MADI output.

Up to four output triggers (GPO) can be monitored by four FET switches at the frontpanel of the device. Their signal state is de-embedded from the MADI input.

Two transport methods can be used:

- user bits of audio channels 11 to 14
- proprietary method

The MADI ports are cross-connected; i.e. input port 1 feeds output port 2 and vice versa.

Scheme

DirectOut Technologies®
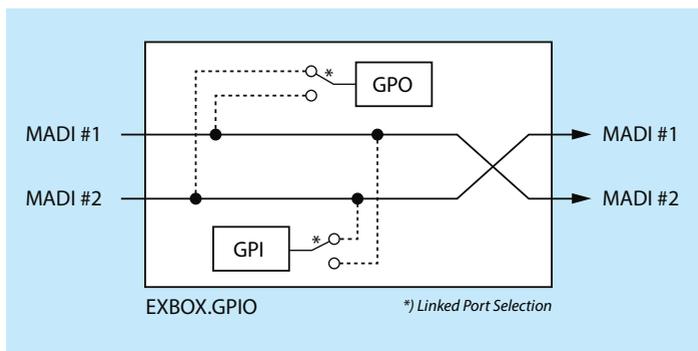
Feature Summary

MADI ports	2 x MADI (optical, SC multi/single mode)
GPI	4 x Voltage Input for external control
GPO	4 x FET switch for external monitoring
USB port	for firmware updates
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)

EXBOX.GPIO Manual Version 1.0   © 2015 DirectOut GmbH

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 34* 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.

DirectOut Technologies®

Contents

The contents of your EXBOX.GPIO package should include:

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

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.

Intended Operation

The **EXBOX.GPIO** is designed for processing trigger signals with 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.

DirectOut Technologies®

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 Str. 32

09648 Mittweida

Germany

Only stamped parcels will be accepted!

WEEE-Reg.-No. DE 93924963

Contact

Sales:

DirectOut GmbH, Leipziger Str. 32, 09648 Mittweida, Germany

Phone: +49 (0)3727 5665-100 // Fax: +49 (0)3727 5665-101

www.directout.eu

Manufacturer:

IMM Elektronik GmbH, Leipziger Str. 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 DirectOut 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.

5. Connect the MADI signals to the device:

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

6. Check the LED display on the front panel.

| GPI ACTIVITY | | PORT | | PORT | MODE | | GPO ACTIVITY | | MODE |

○ 2   ○ 4   [■]   MADI 2 ○   ○ UBIT   ○ 2   ○ 4   [■]
○ 1   ○ 3   MADI 1 ○   ○ PROP   ○ 1   ○ 3

GPI ACTIVITY   PORT   PORT   MODE   GPO ACTIVITY   MODE

The first seconds after switch-on the actual firmware is indicated by the front panel - e.g. firmware version 1.2.

To update the firmware an installed USB serial driver (Windows) and the Update Tool are necessary. The software and the installation instructions are available at www.directout.eu.
Link:

http://www.directout.eu/en/support/downloads/exbox_gpio.html

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

DirectOut Technologies®

This page is left blank intentionally.

DirectOut Technologies®

Chapter 4: Operation

Introduction

This chapter describes the basic operation of the device.

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.

USB

USB	**USB socket (2.0, type Mini B)**
	USB port - connect here for firmware updates and remote control

Needs D.O.TEC® USB Serial driver to be installed.

Input / Output

The EXBOX.GPIO detects the signal status of each MADI input. A LED indicates the lock status of each input discretely.

MADI 1 OUT	**SC socket (optical)** MADI output 1- connect here for MADI output signal
MADI 1 IN	**SC socket (optical)** MADI input 1- connect the MADI input signal here
MADI 2 OUT	**SC socket (optical)** MADI output 2- connect here for MADI output signal
MADI 2 IN	**SC socket (optical)** MADI input 2- connect the MADI input signal here

DirectOut Technologies®

LED SYNC (MADI)	**This LED indicates the use of the MADI input and its signal status.** LED OFF = no signal LED ON = valid MADI signal

Each MADI output is clocked by its corresponding MADI input.

The MADI output is muted once no input signal has been detected.

Port Selection

The blue push button [PORT] on the left side is used to select the MADI port that is used for embedding and de-embedding. The port selection is linked for GPI and GPO.

Push the button to cycle three settings:

- MADI 1 selected
- MADI 2 selected
- Embedder / De-Embedder not active

Two LEDs monitor the selection state.

LED MADI 1	**This LED indicates the selection of MADI 1 port for de-embedding and embedding of trigger signals.** LED OFF = MADI input 1 is not selected. LED ON = MADI input 1 is selected.
LED MADI 2	**This LED indicates the selection of MADI 1 port for de-embedding and embedding of trigger signals.** LED OFF = MADI input 2 is not selected. LED ON = MADI input 2 is selected.

Transmission Mode

The blue push button [MODE] on the right side is used to adjust the method how the control signals are transmitted.

Push the button two cycle the settings:

- UBIT - transmission via user bits of audio channels 11 to 14

- PROP - proprietary method for use with DirectOut devices (PRODUCER.COM, ANDIAMO.MC).

Two LEDs monitor the selection state.

LED UBIT	**This LED indicates the use of UBIT as transmission method.** LED OFF = UBIT not used LED ON = UBIT used
LED PROP	**This LED indicates the use of PROP as transmission method.** LED OFF = PROP not used LED ON = PROP used

This page is left blank intentionally.

DirectOut Technologies®

GPI

Four General Purpose Inputs are available via a DSUB-9 socket at the front panel.

Each GPI can be triggered by connecting the input pin with ground (GND) or by a voltage source between input pin and ground. The high level of the voltage may range between 2 V and 24 V due to a safety limiter in the input.

The trigger state of each GPI is indicated by individual LEDs - *see „GPI Activity" on page 31.*

See „DSUB-9 - GPI / GPO" on page 39 for wiring details.

GPI Activity

Four LEDs each inform about the signal state of the GPI (voltage input) that is embedded into the MADI output signal.

LED 1	**This LED indicates the trigger state of GPI 1.** LED OFF = trigger off LED ON = trigger on
LED 2	**This LED indicates the trigger state of GPI 2.** LED OFF = trigger off LED ON = trigger on
LED 3	**This LED indicates the trigger state of GPI 3.** LED OFF = trigger off LED ON = trigger on
LED 4	**This LED indicates the trigger state of GPI 4.** LED OFF = trigger off LED ON = trigger on

DirectOut Technologies®

GPO

Four General Purpose Outputs are available via a DSUB-9 socket at the front panel.

The control signal enables or disables a low resistance switch to GND. It can handle an external voltage of up to 24 V and a current of up to 200 mA.

In addition to the four GPO outputs, the device provides a voltage source of 5 V for signalling purposes. This output is current-limited to 200 mA and it can be used e.g. for signal lights together with the FET switches.

The trigger state of each GPO is indicated by individual LEDs - see *„GPO Activity" on page 33*.

See „DSUB-9 - GPI / GPO" on page 39 for wiring details.

GPO Activity
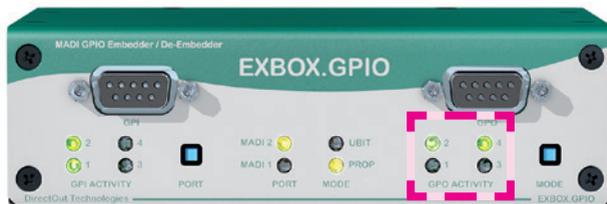
Four LEDs each inform about the signal state of the GPO (FET switch):

- trigger off = switch disabled
- trigger on = switch enabled

LED 1	**This LED indicates the trigger state of GPO 1.** LED OFF = trigger off LED ON = trigger on
LED 2	**This LED indicates the trigger state of GPO 2.** LED OFF = trigger off LED ON = trigger on
LED 3	**This LED indicates the trigger state of GPO 3.** LED OFF = trigger off LED ON = trigger on
LED 4	**This LED indicates the trigger state of GPO 4.** LED OFF = trigger off LED ON = trigger on

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 DirectOut 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 36*).

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 146 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

USB Port

- USB 2.0, type Mini B

GPI

- 1 x DSUB-9 socket female
- 4 x Voltage input 2 V - 24

GPO

- 1 x DSUB-9 socket female
- 4 x FET Switch (0 V - 24 V)
- 1 x Voltage Source (5 V, max 200 mA)

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 - GPI / GPO
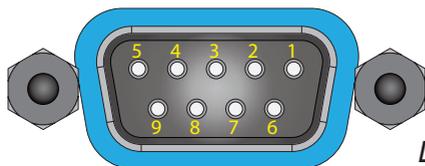
DSUB-9 female

GPI - General Purpose Input

Pin	Signal	Effect
1	N/C	
2	N/C	
3	GND	
4	GND	
5	GND	
6	Voltage 1	GPI 1
7	Voltage 2	GPI 2
8	Voltage 3	GPI 3
9	Voltage 4	GPI 4

GPO - General Purpose Output

Pin	Signal	Effect
1	N/C	
2	N/C	
3	GND	
4	5P (+5 V)	
5	5P (+5 V)	
6	GND (FET)	GPO 1
7	GND (FET)	GPO 2
8	GND (FET)	GPO 3
9	GND (FET)	GPO 4

Index

DirectOut Technologies®

Y

Z