

EXBOX.BLDS

User's Manual



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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

Welcome to EXBOX.BLDS, DirectOuts MADI Redundancy Switch with Buffer Loop Detection System™.



The EXBOX.BLDS switches- automated or manually triggered - between two MADI inputs. For enhanced observation with automated switching the Buffer Loop Detection System™ (BLDS) can be used.



Interfaces:

- 2 MADI I/Os
- 4 GPIs / 4 GPOs
- USB Port for firmware updates

Feature Summary

MADI Ports*	2 x I/O ports - individually configurable with BNC coaxial, SC optical or SFP
BLDS	Buffer Loop Detection System for enhanced observation of signal status.
Pilote Tone	Auto Pilote Tone Detection - 'Silence Detection'
GPI	4 x Voltage Input for external control
GPO	4 x FET switch for external monitoring
USB Port	USB 2.0 port for firmware updates supported OS: Windows XP, Vista, 7, 8, 10
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)

* see "MADI IO-Modules" on page 30

Applications

EXBOX.BLDS can be used as a plain signal switch or for sophisticated observation of MADl signals with automated switch-over and revert.

Typical applications include:

- Signal distribution
- Playback applications, e.g. live performances
- Observing MADl transmission with external reporting

How it works

One of the two MADl input signals is routed to both MADl outputs. Depending on the settings the input selection is triggered manually (by a push button or by a GPI contact) or automatically (by a trigger condition).

Trigger conditions are:

- loss of carrier (no input lock)
- loss of BLDS signal
- loss of Audio Pilote Tone

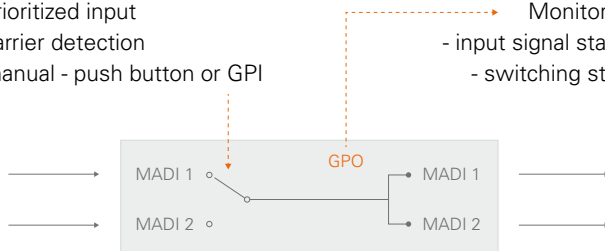
The inputs can be prioritized for revert when the signal is regained after a loss. Additionally the selection of an input may be forced by a GPI contact. External control is offered by four GPIs and the output signal state is monitored by four LEDs and four GPOs.

Input Switching

- automated (BLDS, Audio Pilote Tone)
- prioritized input
- carrier detection
- manual - push button or GPI

Parallel Output

- Monitoring
- input signal status
- switching state



The BLDS signal for enhanced signal observation is generated by a BLDS Generator and inserted into the MADI stream by a DAW. The artificial design of the control signal enables detection of signal loss or corruption. An automated and inaudible switch-over is executed within one sample.

Audio Pilote Tone means the presence of an audio signal with a level > -42 dBFS in channel 56 @ 1 FS (28 @ 2 FS). Trigger after downtime > 10 ms.

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 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.

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.



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.

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 4.1.

Intended Operation

EXBOX.BLDS is designed for switching 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 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 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:

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 EXBOX.BLDS package include:

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

To complete the delivery, download the USB serial driver and the BLDS Generator application from the website.

Link: <http://www.directout.eu>

Accessory

BOX.MOUNT XL- for optimal rack mount of up to three devices in a 19" frame (No: DOAPA0886):



Two different optical SFP transceiver are available from DirectOut GmbH:

- Multimode SFP transceiver with LC connectors (No: DOICT0129)
- Singlemode SFP transceiver with LC connectors (No: DOICT0130)

Specification of the optical SFP modules:

SFP	Multimode	Singlemode
Wavelength TX	1310 nm	1310 nm
Wavelength RX	1310 nm	1310 nm
Distance	2 km	10 km
Powerbudget (dB)	11 dB	12 dB

Protocols	Fast Ethernet OC3/STM1	Gigabit Ethernet, Gigabit Fibre Channel
Bandwidth from	100 Mbit/s	1.050 Gbit/s
Bandwidth	155 Mbit/s	1.250 Gbit/s
Laser	FP	FP
Receiver Type	PIN	PIN
Connector	LC	LC
Wavelength TX min	1260 nm	1260 nm
Wavelength TX max	1360 nm	1360 nm
Wavelength RX min	1260 nm	1260 nm
Wavelength RX max	1620 nm	1600 nm
Transmit min	- 19.00 dBm	- 9.00 dBm
Transmit max	- 14.00 dBm	- 3.00 dBm
Receive min	- 30 dBm	- 21.00 dBm
Receive max (Receiver overload)	- 5.00 dBm	- 3.00 dBm
Temperature (min)	0° Celsius	0° Celsius
Temperature (max)	70° Celsius	70° Celsius
Type of DDM/DOM	internal	internal
Extinction Ratio	8.20 dB	9 dB

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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. Place the device on a non-slip horizontal surface. The delivered pads may be affixed to the bottom of the cabinet. Ensure 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.

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. 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.

NOTE



The shipment includes one external power supply unit. Additional power supply units are available from your local DirectOut representative.

WARNING

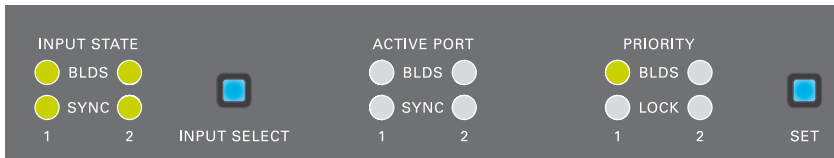
The external power supply must be connected to the mains using the three-cord power leads supplied with the device. Only supply the voltages and signals indicated (9 - 24 V DC) to the device.



WARNING

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

6. Check the LED display on the front panel.



While the device is booting the currently installed firmware is indicated in the display- e.g. firmware version 4.1.

7. 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.

NOTE



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.

9. 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.

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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



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



NOTE

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

MADI Signals

The device is equipped with two slots. Each of them can house one of three different i/o-modules.

Available are:

- SC optical multi-mode or single-mode
- BNC coaxial, 75 Ω
- SFP (without module - see "Accessory" on page 18)



MADI 1 OUT / IN	<p>2 x SC socket (optical)*</p> <p>OUT: MADI output, connect for MADI output signal here.</p> <p>IN: MADI input, connect MADI input signal here.</p>
MADI 2 OUT / IN	<p>2 x BNC socket (coaxial)*</p> <p>OUT: MADI output, connect for MADI output signal here.</p> <p>IN: MADI input, connect MADI input signal here.</p>

* configuration example

MADI IO-Modules

SC module



BNC module



SFP module

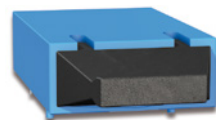


Single-Mode / Multi-Mode

The SC ports are multi-mode as default. It is possible to equip the device with single-mode SC ports. The housing of single-mode ports is colored blue.



multi-mode



single-mode

The modules can be changed by the user himself. It's not necessary to send the device to factory. However it is strongly recommended to follow the instructions on page 64.

WARNING



Changing the modules ignoring the instructions may damage the modules and the device and may cause health damage.

WARNING!



All module slots must be fitted with a module each. Otherwise live parts become accessible which may cause serious harm to your health. An open housing may also cause inappropriate operation conditions due to an insufficient electromagnetic shielding.



A LED indicates the status (lock, sync, BLDS) of each MADI input discretely.

<p>SYNC (1 & 2)</p>	<p>LED (green) - indicates the use and signal status of the MADI input.</p> <p>LED OFF = no signal LED ON = valid MADI signal, but not in sync with internal reference.</p> <p>LED blink slow (steady period) = in sync, MADI input selected as audio and clock source LED blink fast (steady period) = in sync, MADI input selected, valid BLDS present</p> <p>LED blink slow / off / blink slow = in sync, MADI input not selected as audio and clock source LED blink fast / off / blink fast = in sync, valid BLDS present, MADI input not selected</p>
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NOTE



The input signal status is also monitored at the front panel by four LEDs- see „Input State“ on page 34.

USB



USB

USB socket (2.0, type Mini B)

Connect here for firmware updates

NOTE



Needs DirectOut USB Serial driver to be installed. The driver is available at www.directout.eu.

Input State

Two LEDs each inform about the signal state of both MADI inputs. For detection of the BLDS signal MADI channels 8, 16, 24, 32, 40, 48, 56, 64 are observed.



BLDS 1	<p>LED (green) indicates the presence of a BLDS signal at MADI input 1.</p> <p>LED OFF = no BLDS signal detected</p> <p>LED ON = BLDS signal detected</p> <p>LED heartbeat = watchdog active*</p>
BLDS 2	<p>LED (green) indicates the presence of a BLDS signal at MADI input 2.</p> <p>LED OFF = no BLDS signal detected</p> <p>LED ON = BLDS signal detected</p> <p>LED heartbeat = watchdog active*</p>

* See „Watchdog“ on page 45.

SYNC 1	LED (green) indicates the lock / sync state at MADI input 1. LED OFF = no signal or no lock or not in sync with internal reference LED ON = signal is in sync with internal reference
SYNC 2	LED (green) indicates the lock / sync state at MADI input 2. LED OFF = no signal or no lock or not in sync with internal reference LED ON = signal is in sync with internal reference

NOTE



The synchronization of the BLDS signal takes a few seconds. During this period the BLDS LEDs are flashing.

Input Selection

The blue push button on the left side is used to select the input signal manually. Depending on the priority setting the input is selected automatically - see „Priority Setting“ on page 40.

Three GPIs may be used to select or to force an input - see „Control via GPI“ on page 44.



INPUT SELECT

Push button to select the MADI input.

Press to alter the selection.

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Output State

Two LEDs each monitor the selection of the MADI input for the two MADI outputs (SYNC) and the presence of a BLDS signal at the output (BLDS).



BLDS 1	<p>LED (yellow) indicates the presence of a BLDS signal (MADI input 1) in the output signal.</p> <p>LED OFF = no BLDS signal present or MADI input 1 is not selected for the output</p> <p>LED ON = BLDS signal is present and MADI input 1 is selected for the output</p> <p>LED heartbeat = watchdog active*</p>
BLDS 2	<p>LED (yellow) indicates the presence of a BLDS signal (MADI input 2) in the output signal.</p> <p>LED OFF = no BLDS signal present or MADI input 2 is not selected for the output</p> <p>LED ON = BLDS signal is present and MADI input 2 is selected for the output</p> <p>LED heartbeat = watchdog active*</p>

SYNC 1	<p>LED (yellow) indicates the selection of MADI input 1 for the output signal.</p> <p>LED OFF = MADI input 1 is not selected for the output.</p> <p>LED blinking = MADI input 1 is selected for the output but no valid signal is detected.</p> <p>LED ON = MADI input 1 is selected for the output.</p>
SYNC 2	<p>LED (yellow) indicates the selection of MADI input 2 for the output signal.</p> <p>LED OFF = MADI input 2 is not selected for the output.</p> <p>LED blinking = MADI input 2 is selected for the output but no valid signal is detected.</p> <p>LED ON = MADI input 2 is selected for the output.</p>

* See „Watchdog“ on page 45.

The activation state of each port and the presence of the BLDS signal is also monitored by four GPOs- see „Monitoring via GPO“ on page 48.





Priority Setting

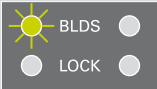
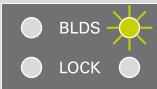
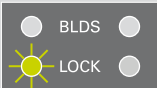
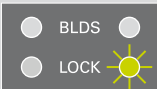
Different characteristics of the MADI switch allow to adapt varying scenarios. It ranges from manual input selection to automated switching with prioritized inputs with watchdog control or detection of either BLDS or Audio Pilote Tone. Depending on the priority setting the input can be selected manually.

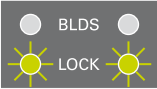
The priority setting is adjusted by the blue push button on the right side or alternatively by a GPI - see „Control via GPI“ on page 44.



LED Code	Characteristic	Input Selection
	manual switching	yes
	Priority condition: lock on input #1 – revert to #1, when lock is regained	no
	Priority condition: lock on input #2 – revert to #2, when lock is regained	no

LED Code	Characteristic	Input Selection
	No priority – standard redundancy > switchover at signal loss, no revert when signal is regained.	yes, if both inputs are locked
	Priority condition: BLDS and lock on input #1 – revert to #1, when BLDS is regained.	no
	Priority condition: BLDS and lock on input #2 – revert to #2, when BLDS is regained.	no
	No priority – standard redundancy requiring BLDS at both inputs – switchover at loss of BLDS, no revert	yes, if both inputs detect BLDS

LED Code	Characteristic	Input Selection
	<p>Watchdog active Priority conditions:</p> <ul style="list-style-type: none"> - lock on input #1 - state change at GPI #1 <p>> switchover at loss and revert to #1 when both conditions are complied with.</p>	no
	<p>Watchdog active Priority conditions:</p> <ul style="list-style-type: none"> - lock on input #2 - state change at GPI #2 <p>> switchover at loss and revert to #2 when both conditions are complied with.</p>	no
	<p>Priority condition: Audio Pilote Tone and lock on input #1 – revert to #1, when Audio Pilote Tone is regained.</p>	no
	<p>Priority condition: Audio Pilote Tone and lock on input #2 – revert to #2, when Audio Pilote Tone is regained.</p>	no

LED Code	Characteristic	Input Selection
	No priority – standard redundancy requiring Audio Pilote Tone at both inputs – switchover at loss of Audio Pilote Tone for longer than 10 ms, no revert	yes, if both inputs detect Audio Pilote Tone

Characteristics

Three switching modes are possible:

- manual switch
- automated switch without revert
- automated switch with revert

Automated switching follows to one or two of the defined conditions:

- input signal lock
- BLDS present
- Audio Pilote Tone present
- watchdog at GPI

See „Watchdog“ on page 45.

Audio Pilote Tone

- any audio signal with a level > - 42 dBFS
- present in channel 56 @ 1 FS (ch 28 @ 2 FS)
- trigger at loss > 10 ms
- revert immediately at detection

Control via GPI

Four GPIs offer full control of the device via remote or external equipment.

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.



Button	GPI	Effect	Method
-	1	Force Input 1 or trigger watchdog	switch*
-	2	Force Input 2 or trigger watchdog	switch*
INPUT SELECT	3	Selection Input	push button
SET	4	Selection Priority	push button

* See „DSUB-9 (female)- GPI“ on page 61 for wiring details.

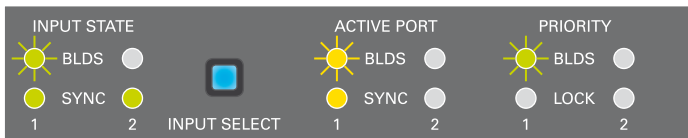
Watchdog

A state change on GPI 1 (or 2) is needed to maintain the adjusted priority setting to the prioritized input. The minimum alternation frequency of the GPI state amounts to less than 0.5 Hz (i.e. every two seconds).

- GPI 1 is used for watchdog on input 1.
- GPI 2 is used for watchdog on input 2.

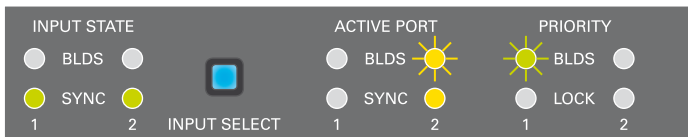
Active watchdog is indicated by blinking codes of the LEDs in all three sections.

Example:



Input Priority set to input 1 and watchdog active on GPI 1.

Watchdog condition is **true**.



Input Priority set to input 1 and watchdog active on GPI 1.

Watchdog condition is **false**.

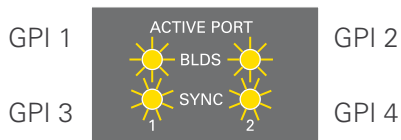
GPI self test

To check each GPI for proper functionality:

- connect each input with ground
- switch on the device



The LEDs in the mid-section (ACTIVE PORT) indicate the result of the self test for a short moment at power up - for each connected input accordingly.



Result:

- LED blinking = GPI contact is closed
- LED OFF = GPI contact is not closed

The self test helps to trace a possible issue with the installation; i.e. if open contact is expected and the led is blinking (e.g. short-circuit) or if a closed contact is expected but the led is not blinking (e.g. broken link).

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Monitoring via GPO

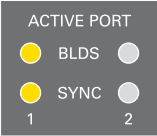
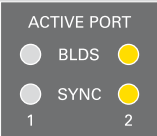
Four GPOs enable reporting of the output state (active input and BLDS presence) by external equipment.

Each GPO uses a low resistance (FET) switch to ground (GND). It can handle an external voltage source between 0 V and 24 V.

A 5 V local voltage source can also be used for signalling purposes. Its output is current-limited to 200 mA.



LED Code	GPO	Monitor	Comment
<p>ACTIVE PORT</p> <p>○ BLDS ○</p> <p>● SYNC ○</p> <p>1 2</p>	1	Input 1 is used for output – Sync Input 1	blinking, when input is forced but no signal lock
<p>ACTIVE PORT</p> <p>○ BLDS ○</p> <p>○ SYNC ●</p> <p>1 2</p>	2	Input 2 is used for output – Sync Input 2	blinking, when input is forced but no signal lock

LED Code	GPO	Monitor
 <p>ACTIVE PORT ● BLDS ● ● SYNC ● 1 2</p>	3	Input 1 is used for output – BLDS present at output 1 or watchdog active*
 <p>ACTIVE PORT ● BLDS ● ● SYNC ● 1 2</p>	4	Input 2 is used for output – BLDS present at output 2 or watchdog active*

* See „Watchdog“ on page 45

See „DSUB-9 (female)- GPO“ on page 62 for wiring details.

Chapter 5: Working with BLDS™

Introduction

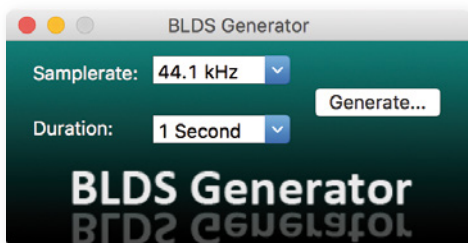
The Buffer Loop Detection System™ is used to detect silence or a corrupted input signal- e.g. caused by an application hang of the playout system (repeating buffers) or stuttered playback due to system overload.

A BLDS generator creates a .wav file containing a low levelled signal which is inserted into the MAD1 stream. The artificial design of the BLDS signal enables reliable and inaudible switch-over within one sample.

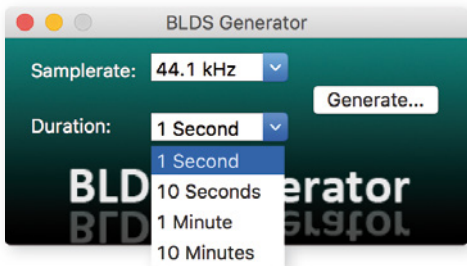
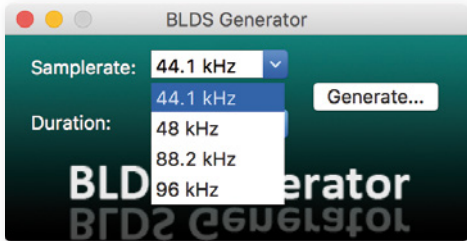
BLDS Generator

The application is available for Windows® and macOS®.

1. Download the application at www.directout.eu
2. Unpack the zip archive and open the 'BLDS_Generator.exe' (Windows®) or 'BLDS Generator.app' (macOS®).



3. Define sample rate and duration using the drop down menus.



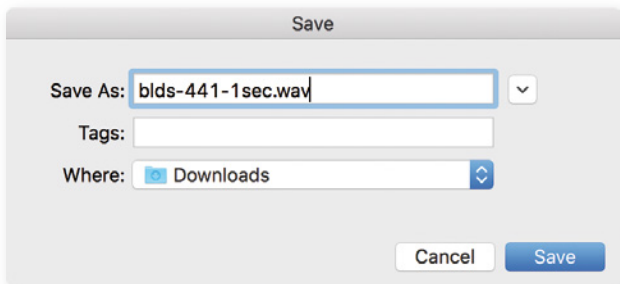
4. Click 'Generate' to save the a 24 bit mono .wav file with the settings specified.

NOTE



The BLDS signal is designed so that it is 16 bit safe and the level is below- 60 dBFS.

5. A 'Save as' dialogue appears. Store the file to your preferred location.



6. Import the .wav file into an audio session of your DAW. The BLDS signal needs to be present in one of the following audio channels:

channel 8 / 16 / 24 / 32 / 40 / 48 / 56 / 64



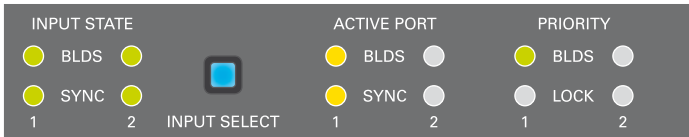
NOTE

When duplicating the signal in the timeline carefully check that there are no gaps, crossfades or overlaps at the boundaries. This violates the BLDS condition resulting in possibly unwanted behaviour.

7. Adjust the priority setting to trigger the switch according to BLDS detection - see „Priority Setting“ on page 40.

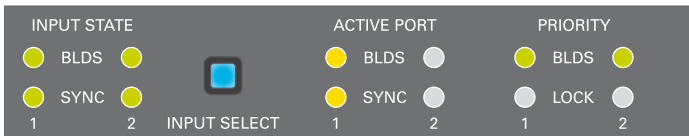
Examples

Example 1 - BLDS, priority input 1



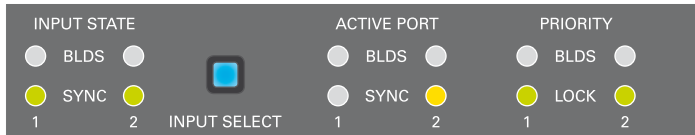
Both MAD1 inputs detect a valid input signal containing a BLDS signal. Input 1 is prioritized and active. If input 1 fails (BLDS error), input 2 is used. Once input 1 regains signal the switch will revert to input 1.

Example 2 - BLDS, no priority



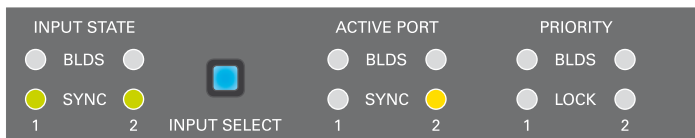
Both MAD1 inputs detect a valid input signal containing a BLDS signal. Input 1 is prioritized and active. If input 1 fails (BLDS error), input 2 is used. Once input 1 regains signal the switch will revert to input 1.

Example 3 - Lock, no priority



Both MAD1 inputs detect a valid input signal without valid BLDS signal. No input is prioritized and input 2 is active. If input 2 fails (Loss of carrier), input 1 is used. Once input 2 regains signal the switch will remain at input 1.

Example 4 - Manual switching



Both MAD1 inputs detect a valid input signal without valid BLDS signal. No input is prioritized and input 2 is active. No automatic switch-over will occur at signal loss.

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 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.

Issue	Possible reason	Solution
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.
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.

CHAPTER 7: Technical Data

Dimensions

- Width 140 mm
- Height 42 mm
- Depth 146 mm

Weight

- 0.8 kg

Power Consumption

- 5 W (typical)

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 Ports SC optical

- 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

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

MADI Ports SFP

- empty cage without module

USB Port

- USB 2.0, type Mini B

GPI

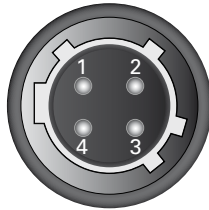
- 1 x DSUB-9 socket female
- 4 x Voltage input 2 V- 24

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 -



NOTE

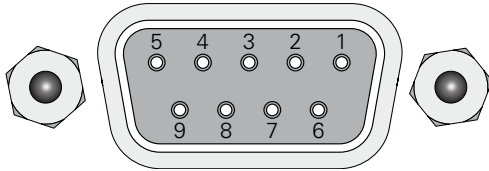
To ensure proper operation all pins should be connected.



NOTE

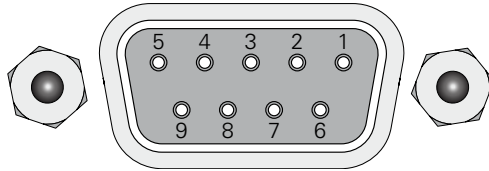
Ground is connected with the chassis of the plug (safety class 1).

DSUB-9 (female) - GPI



Pin	Signal	Effect
1	N/C	
2	N/C	
3	GND	
4	GND	
5	GND	
6	Voltage 1	GPI 1 (force input 1, watchdog)
7	Voltage 2	GPI 2 (force input 2, watchdog)
8	Voltage 3	GPI 3 (selection input)
9	Voltage 4	GPI 4 (selection priority)

DSUB-9 (female) - GPO



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

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Appendix B - Changing Modules

It is not required to open the device. The module is inserted at the rear side of the device.

Requirements

- screwdriver- torx (star) T10
- spudger

Instructions

1. Remove all cables from the device.



WARNING

The device must be free of voltage before opening to prevent damage of your health or the components.



2. Loose both torx screws at the upper left and right side of the plate using the screwdriver.



NOTE

Do not loosen the screws at the bottom of the plate (SC and SFP modules only).

3. Remove the module at the back side of the device. You may pull softly at the plug, if necessary use a spudger carefully for assistance.
4. Insert the module with the pins ahead centered and horizontally to catch proper seat of the pins and the socket. At an overhang distance of 3-4 mm smart pressure is needed to connect the pins of the module with the backplane of the device.

WARNING



Avoid electrostatic charge. Electrostatic discharge of the body may damage the module. Do not touch the module's pcb.

5. Fix the metal plate of the module screwing both screws in the rear panel.

WARNING!



All module slots must be fitted with a module each. Otherwise live parts become accessible which may cause serious harm to your health. An open housing may also cause inappropriate operation conditions due to an insufficient electromagnetic shielding.

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