RMF-BLC MADI I/O Board

1 to 64-channel MADI Digital I/O Board

- MADI-Format I/O Board
- Extended number of channels compared to the standard MADI format (up to 64 channels per port)
- 4 identical ports per board
- Automatic channel-number detection (1 to 64)
- Adjustable I/O gain
- Synchronisation to the input-signal wordclock
- Optical and electrical ports
- Dolby E signal transmission officially certified by Dolby®

MADI-Format I/O Board

The Router MADI Format board connects to the serial MADI interface (**M**ultichannel **A**udio **D**igital **I**nterface) and includes four 64-channel MADI ports. The board provides 256 inputs and 256 outputs on just 4 HP.

This NEXUS STAR interface board enables, for example, multichannel audio recorders or external mixing consoles to be connected.

In addition to the operating modes required by the MADI standard (AES 10-2003, AES 10id-1995 1995, AES 10-1991/ANSI S4.43-1991), the RMF-BLC board provides the following extra features:

- The number of transmitted I/O channels is extended to 64. When receiving data, the number of channels is detected automatically. The number of output-channels is user-configurable.
- The input signal can serve as sync source on the NEXUS audio network.
- Adjustable gain per transmit and receive channel.
- Supports legacy and double-frequency mode at 96 KHz.

Inputs and Outputs

The bidirectional board features BNC ports (75 ohm, coaxial) and optical ports (LC, 1,300 nm, 62.5/125 µm). The optical ports implement the SFP system supporting various optical-port modules.

There are optical and electrical ports for each of the four MADI interfaces, so both formats are available at the same time. Output signals are transmitted in parallel (i.e. on both port types) while the input type is selected using the NEXUS control software. There is also an auto-select mode.

The BNC interface comprises balanced input and output ports that are galvanically isolated from the system. (This feature exceeds the MADI standard.)

Input Data

The RMF-BLC receives audio on all 56 channels as specified by the standard. In theory, the structure of the MADI data format supports transmitting a maximum of 64 channels (which is not standard-compliant). This allows for transferring 64 channels from one NEXUS RMF-BLC/XMF to another using just a single MADI port. The number of input channels is automatically detected.

All inputs are equipped with gain controls allowing for adjusting the input signal by ±20 dB. User data is transparently forwarded on the NEXUS system, for example, to AES/EBU or other MADI-interface boards.

The RMF-BLC board detects the following information and ancillary data in the data stream:

- Number of input channels.
- Sample rate.
- The first four channel-status bytes containing the following information: multichannel descriptor, format, emphasis, lock, sampling frequency, channel mode, aux use, and audio-sample word length.
- Channel parameters (ON/OFF, A/B, validity).

Output Data

The RMF-BLC board sends all audio channels in MADI standard (a maximum of 64 channels can be achieved). In transparent mode, all ancillary information is adopted from the signal source (MADI, AES/EBU).

The User and Validity data can either be fixed to static values or are copied from the signal source (MADI, AES/EBU) in transparent mode.

The number of channels to be transferred can be set to either 56 or 64. In addition, the ON/OFF and A/B information can be configured per channel. In 96-KHz use, legacy and or double-frequency modes are available. While the sender is in 96-KHz mode, the receiver of the same port automatically interprets an incoming signal with more than 32 channels as legacy format.

Loop Mode

In practice, loops are sometimes created for testing purposes or to form dedicated signal-processing flows; in such set-ups, the output signal of a board such as a MADI board is connected to the input of the same or another board using a short patch cable. With the RMF-BLC, such loops can be created internally, so no patch cable is required. This loop mode applies to all channels of the respective MADI port – the individual inputs are directly routed to the respective outputs.

Legacy Mode

To use external legacy 48-KHz machines for 96-KHz productions, the RMF-BLC supports a legacy mode on both the input and the output side. This mode allows for playing or recording 96-KHz audio from/to 48-KHz systems.

Metering

The RMF-BLC board features two signal processors that determine the levels of all received and transmitted channels in a cumulative manner and transfer the values to the RCX controller board. These DSPs are monitored by watchdogs.

Error Detection

Failure of ingoing MADI signals is detected and reported to the RCX. The RMF-BLC also features a bus selector for use in redundant NEXUS STARs.

Versions

All versions of the RMF-BLC incorporate optical and electrical I/O ports. Both port types can be used at the same time.

The pinout of the BNC electrical ports is MADI compliant. Thanks to the implementation of SFP modules, the optical ports can be custom-populated. User-configurable LC duplex ports are typically used.

RMF-BLC Specifications		
	All relevant specifications comply with the following standards: AES 10-2003, AES 10id-1995, AES 10-1991 (ANSI S4.43-1991).	
Data formats	MADI: 24-bit audio	
RMF -BLC inputs	4 independent ports, optical (LC) and electrical (BNC) formats	
	1 to 64 channels per port @ 48 KHz (1 to 32 channels @ 96 KHz)	
	Legacy mode supported, auto-switchover	
RMF-BLC outputs	4 independent ports, optical (LC) and electrical (BNC) formats	
	1 to 64 channels per port @ 48 KHz (1 to 32 channels @ 96 KHz)	
	Legacy mode supported (enabled using the control software)	
Cabling recommendations	Coaxial	Cable length: 50 m (max.)
		Impedance: 73 to 77 ohm
		Attenuation: 0.1 dB/m @ 1 to 100 MHz
	Optical (IEC-793 and FDDI compliant)	Cable length: 2 km / 1.2 miles (max.)
		Bandwidth: 500 MHzkm @ 1,300 nm (max.)
		Attenuation: 0.9 db/km (max.) @ 1,300 nm (only cabling)
Data rate	125 Mbps (typ.)	
Sample rates	44.1, 48, 88.2, and 96 KHz	
Power supply	Voltage	+4.75 to 5.25 V
	Current intake	• approx. 1 A (board with no optical module installed) • approx. 150 to 300 mA for each optical module, version-specific
Operating conditions	Temperature range	0 to 50 °C/32 to 122 °F
	Humidity	90 % (max.), non-condensing
Storage conditions	Temperature range	–35 to +70 °C/-31 to 158 °F
	Humidity	90 % (max.), non-condensing
Physical properties	Overall	Board for 19" mainframe, 4 HP/6 U
	Front panel	6 U × 4 HP (approx. 20 mm × 262 mm)
	Weight	0.54 kg

Versions	
RMF-BLC	BNC/LC combo I/O board, MADI compliant, without SFP modules, see below
available SFP modules:	
SFPM-MF-01	LC multimode version 1,310 nm, 1,500 metres (50/125 µm)
SFPM-MF-02	LC single-mode 1,310 nm, 2 km (9/125 µm)
SFPM-MF-04	LC single-mode 1,310 nm, 30 km (9/125 µm)