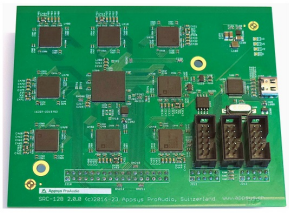
Appsys
SRC-128 Sample Rate Converter Add On Module



appsys SRC-128 Sample Rate Converter Add On Module User Manual

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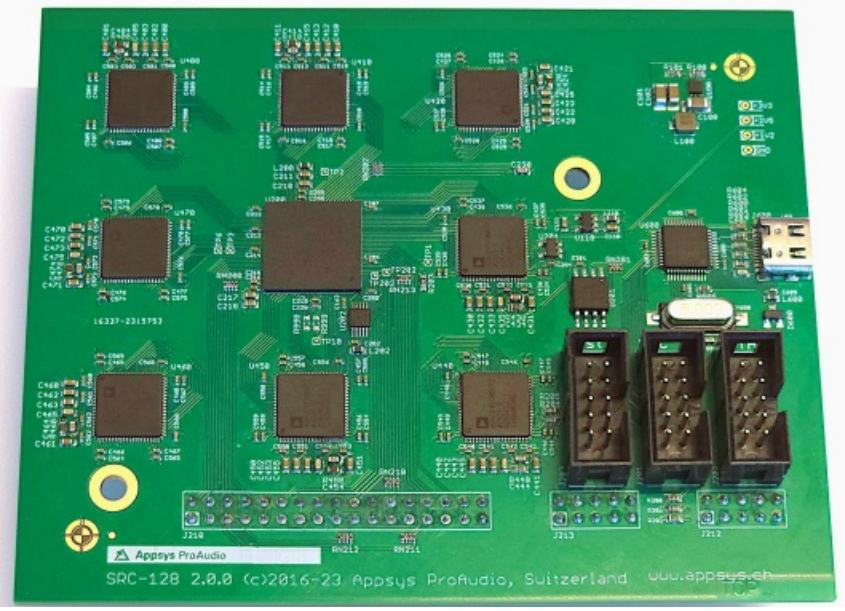


Frequently Asked Questions

Q: What is the purpose of the SRC-128 add-on module?

A: The SRC-128 module adds asynchronous sample rate conversion capabilities to the multiverter, allowing for seamless integration of signals from different clock domains.

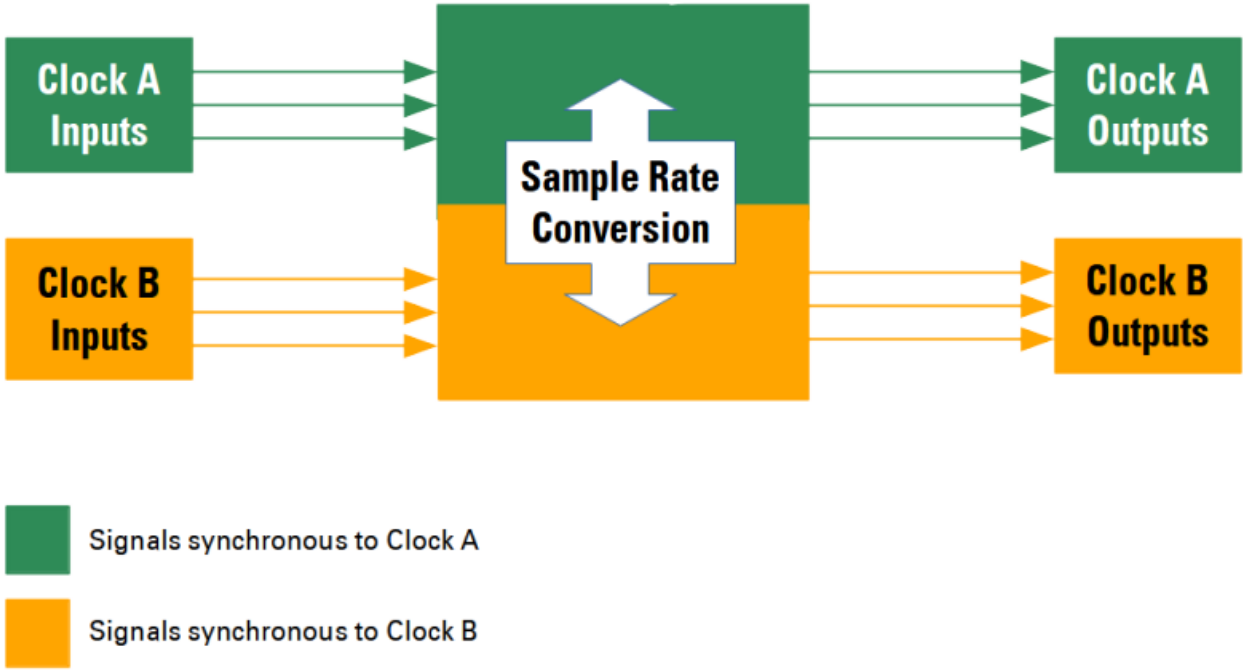
Q: How many channels does the SRC-128 support?

A: The SRC-128 supports up to 128 channels, enabling configurations such as 128×0 uni-directional or 64×64 bidirectional conversions.

GENERAL

Features

- The SRC-128 add-on module adds the capability of asynchronous sample rate conversion to your multiverter. Designed as internal add-on module, it leaves the “Extension” port available to other break-out boxes. (Note: The module is called “SRC” in this manual for clarity).
- It features highest analog performance (THD+N -134dB typ.), bi-directional conversion for total up to 128 channels (e.g. 128×0 uni-directional, or 64×64 bi-directional) between any interfaces supported by the multiverter.
- With the SRC installed, the multiverter accepts signals from two different clock domains (A and B). Each input and/or output can be assigned to run either on clock A or clock B. When routings are established between inputs and outputs on different clocks, the signals are automatically routed through the SRC to match the sample rate of the target.



- Existing multiverter routing capabilities are fully preserved, SRC appears in the background and is fully transparent to the user.
- Special presets allow the use of two MADI or AES50 ports together, to send and receive all 64 channels at 96 kHz (48ch for AES50) and to convert to 48kHz (and vice versa).

Box Contents

- 1 SRC-128 Module
- 2 Screws M3x6
- 2 Hex standoffs M3x11mm (use with older MVR-64 model)
- This manual

Conventions used in this manual

- A button on the front of the device is shown like this: Set
- The encoder can be pushed. This is shown as OK
- A particular LED on the front of the device is shown like this: WCLK
- Text indicated on the seven-segment display is shown as 02
- Operations in a particular control method are indicated by a diamond:
  - Front panel,
  - Web or
  - Command line

A section marked with a warning sign mark tells you that the information is particularly important to avoid damage or malfunction.

Filled circles with an exclamation mark indicates an action that must be performed (“Required”)

A section marked with a prohibited sign tells you that the action indicated is prohibited (“Prohibited”)

A section marked with a “information” icon indicates a useful tip. ("Information").

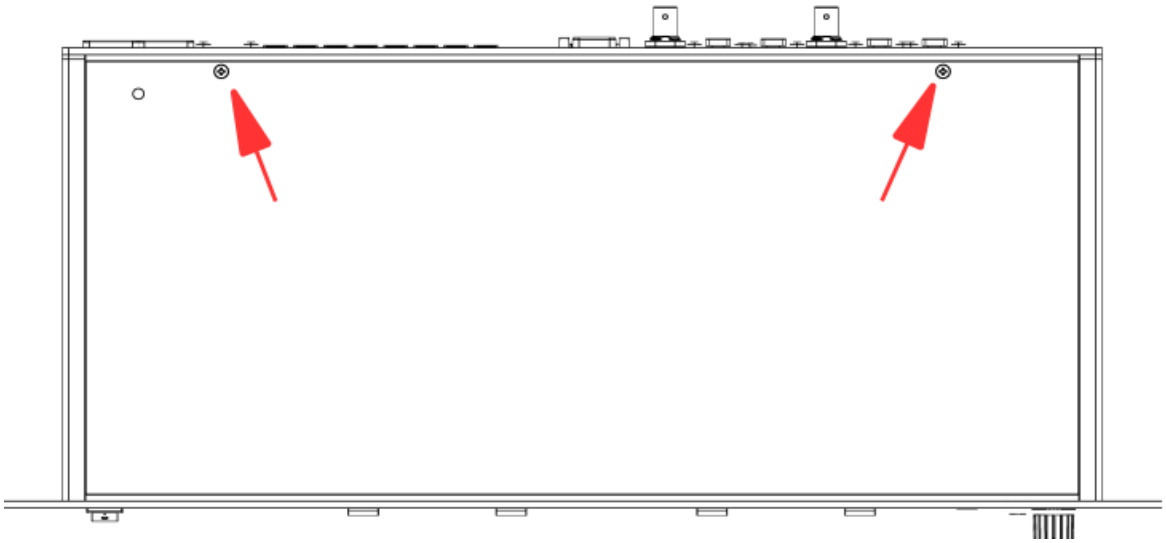
INSTALLATION

Hardware Installation

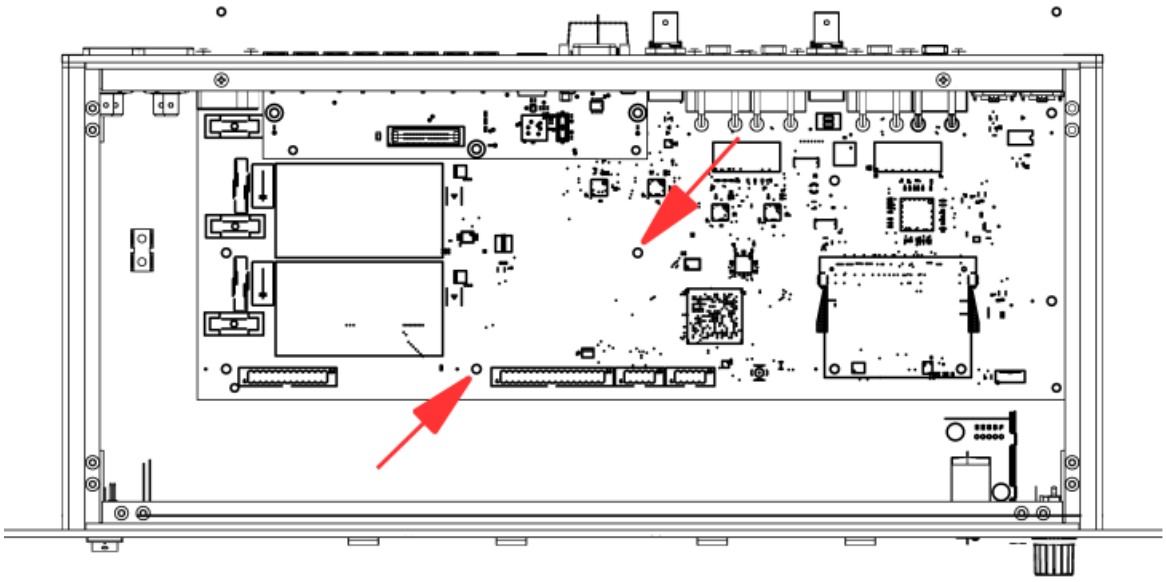
CAUTION: To prevent electric shock, remove all mains power plugs from the multiverter before opening!

ATTENTION: Static Sensitive Devices Observe Precautions for Handling!

- Remove the two screws at the rear of the multiverter’s top cover (Torx T10):



- Flip the multiverter to detach the top cover. Disconnect the cover’s ground connection at the base.
  Note: Due to tolerances, the lid does sometimes not open easily. In this case, loosen the back panel screws (the four black ones on the back panel edges) a few turns. Don’t forget to fasten them again after installation!
- **Locate the two hex studs .**
  MVR-64 only: Remove the indicated two screws from the multiverter’s main board, replace them by the supplied hex studs.



- Carefully plug the SRC into the main board.

  Make sure the SRC is plugged in correctly (mounting holes align perfectly). Some SRCs are lacking index keys on the connectors, making it possible to insert them with one row offset right or left. In this case, the MVR won't turn on

  (but it will not get damaged).
- Fasten the SRC with the supplied M3x6 screws.
- Re-connect the cover's ground connection to the base.
- Slide the top cover into the front panel slit, then close the lid and mount the cover using the two black screws.

CONFIGURATION

Methods

The SRC-128 can be configured by different methods below. We recommend configuration by the web interface because it's most obvious and allows you to do channel-wise routing, but basic configuration is also available via the front panel. For automation purposes, the SRC can also be configured on the command line (telnet or serial).

Front panel

Clock source selection and interface-wise routing is available through the front panel:

- MVR-mkII: Use the **Source** and **Domain A/B** buttons in the "Clock/SRC" group.
- MVR-64: Enter the "Clock" menu, move the cursor to **ASRC** and push **OK** to enter SRC configuration.

Web control

Configuration via the web interface is the recommended method. This enables you to route arbitrary channels through the SRC up to its full capacity.

Command line

The SRC can be fully configured via the command line. Refer to the MVRs command line description, or type "help" at the command prompt.

Configuration steps

Without SRC, all interfaces run on the same shared "Clock A". With SRC installed, one or more interfaces can be set to run at an alternative clock "Clock B". Whenever a translation between clock domains A and B is needed,

audio is automatically sample-rate converted by routing it through the SRC module. This process happens transparently in the background.

The configuration process involves the follwing steps which can be carried out in any order:

1. Clock source selection for Clock A and Clock B
2. Assignment of inputs and/or outputs to either clock domain A or B
3. Routing

Front panel
The method for configuring the SRC-128 depends on the multiverter model:

MVR-mkII
Clock source selection for A/B:

- In the “Clock/SRC” menu, push the Source button.
- Move the cursor to the desired clock source under the respective “A” or “B” column.
- Push the encoder OK or press the Source button to select the clock source, or press Back to cancel.
- Depending on the selection, you will be asked to provide additional settings (Samplerate/SMUX…)

Assignment of inputs/outputs to clock domain A or B:

- In the “Clock/SRC” menu, push the Domain A/B button.
- Move the blinking bar to the desired input (horizontal) or output (vertical) and push the encoder to set “Clock B” for the selection. This is indicated by a white bar and SRC Status LEDs “A>B”/”B>A” lighting up.
- Repeat above step until all your assignments have been done. Then press Back to exit the menu.

Routing
Perform the routing as usual. When the SRC is configured, all routings that use the SRC will show up as white when working.
The SRC Status A>B and/or B>A LEDs indicate white when the SRC is active.

MVR-64
Assignments of inputs/outputs to clock domain, and Clock B source selection:

- Push the Set button in the “Clock” menu.
- Navigate the cursor to the SRC LED and push OK to confirm. The seven-segment display shows In to indicate the input interface selection mode. You can now select the row (input) which should run on clock B. Selecting “X” disables SRC for the input. Note: Some modes show two rows at once. This is used if you want to concatenate the channels from two inputs for 64ch at 96kHz.Push OK to confirm.
- The seven-segment display shows Ou to indicate the output selection mode. Select the column (output)

which should run on clock B. Selecting “X” disables the SRC for the output.Push OK to confirm.

- The seven-segment display shows AS to indicate the “ASRC” clock selection mode, and the SRC LED shows orange. Navigate the cursor to the desired clock source and push OK to confirm.
- Depending on the selection, you will be asked to provide additional settings (SMUX…)

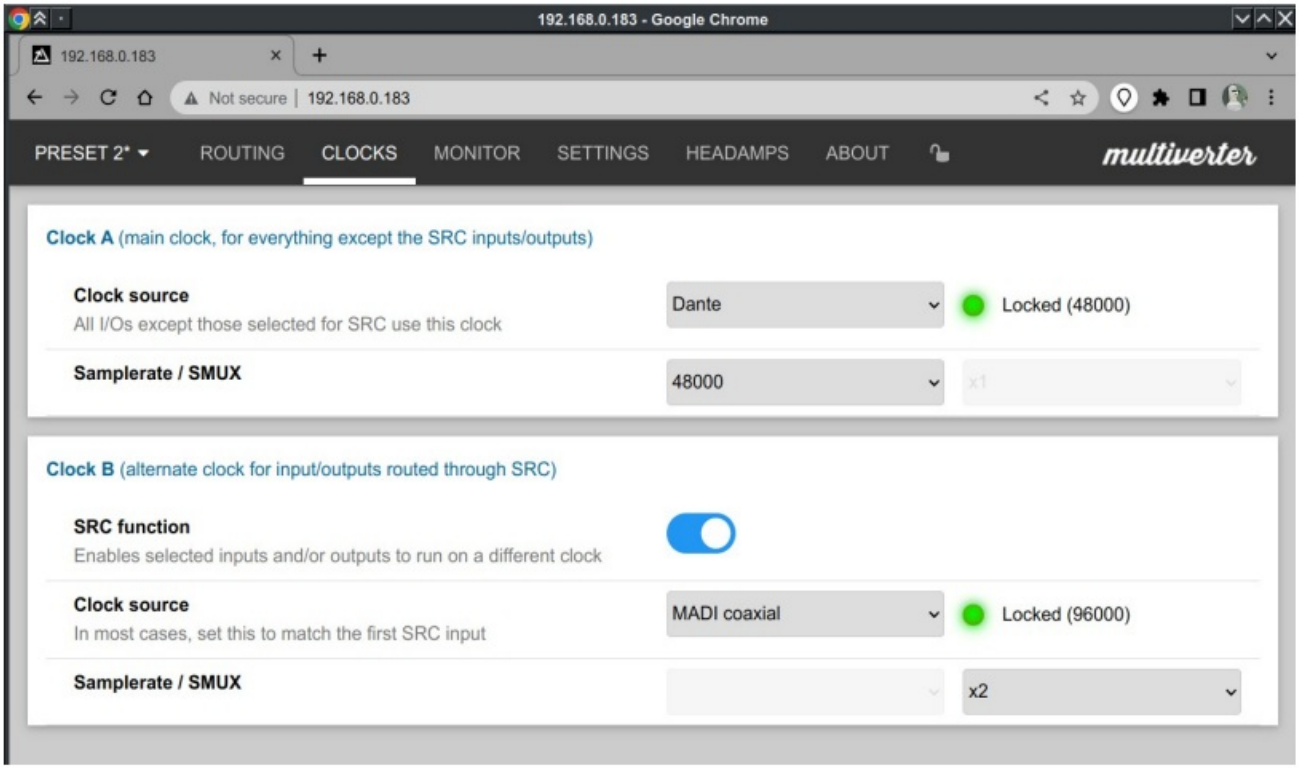
Routing

Perform the routing as usual.When the SRC is configured, all routings that use the SRC will show up as orange when working. The clock LEDs in orange indicate the setting for clock B.

Only AES3, ADAT, and MADI support different sample rates for input and output. For these interfaces, you can choose clock domains for input and output independently.
For AES50, Dante and FlexLink, the input and output clock domains are coupled together, which means that both input and output use always the same sample rate.

Web

The settings for the clock sources can be found under the “CLOCKS” tab. When using the SRC, make sure to switch “SRC function” to on.



When the SRC module is installed and enabled, its behavior can be selected in the SRC section on the bottom. The settings above show a typical configuration for converting MADI 96k to Dante 48k.

To select which inputs and outputs use clock A or B, use the A/B switches in the matrix view. The SRC is automatically inserted when any routing from clock A to B (or clock B to A) is made.

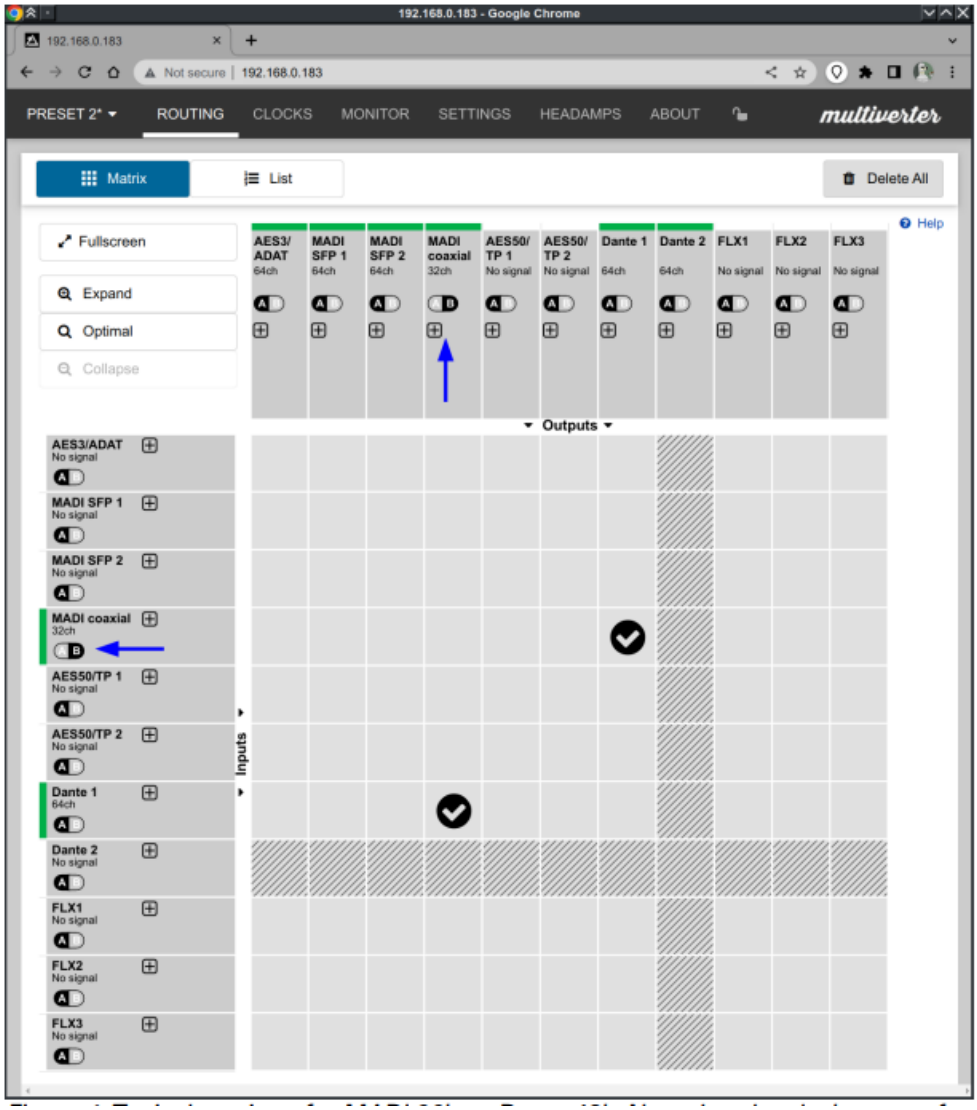


Figure 1: Typical routings for MADI 96k <> Dante 48k. Note that the clock source for MADI coaxial inputs and outputs set to clock “B”. The black check marks indicate that the conversion is active with SRC involved (=white LEDs on the front panel).

Command line

Clock source selection:

`clock A|B [<source> [<srate>|<smux>]]`

- Available Sources: **AES3,ADAT,MADISFP1,MADISFP2,MADICOAX,DANTE,FLEXLINK (*)**
- Samplerate (only required for **DANTE** or **INTERNAL**): **44100,48000,88200,96000,176400,192000**
- SMUX (only required for **AES3,ADAT,MADI*,AES50TP* in TP mode,WCLK**): **1,2,4**

SRC configuration / Clock assignment:

`asrc enable|disable [<in> <out>]: Configures the ASRC.`

disable	Turn off ASRC
enable	Turn on ASRC, using previously set parameters or those specified below:
<in> <out>	Turn on ASRC, using previously set parameters or those specified below:Interfaces which should run on the alternate clock B. Possible Values: **AES3ADAT,MADISFP1,MADISFP2,MADICOAX, AES50TP1,AES50TP2,DANTE1,DANTE2, FLEXLINK1,FLEXLINK2,FLEXLINK3 (*)** Multiple values may be combined with comma, e.g. '**MADISFP1,MADISFP2**' If '**NONE**' is specified, the ASRC is turned off for the respective direction. If both <in> and <out> are set to '**NONE**' the ASRC is turned off. Alternatively, **<in>** and **<out>** can be specified as combined hex bit-mask, e.g. (**0x0001=AES3ADAT** ... **0x0400=FLEXLINK3**) **(*)***

SRC capacity
Any combination of inputs and/or outputs can be assigned to either clock domain, and channels routed between different clock domains are routed through the SRC until its the maximum capacity is reached. The available SRC channels will be split between directions A>B and B>A according to the following table:

- Automatically optimized for A>B and B>A (in blocks of 16 channels) until 128 channels total are reached, when both sides run at x1 (44.1 / 48 kHz)1
- Up to 64×64 when either side is running at x2 speed (88.2 / 96 kHz)
- Up to 32×32 when either side is running at x4 speed (176.4 / 192 kHz)

Channels routed within the same clock domain (A>A or B>B) are not routed through the SRC and therefore require no SRC channel capacity.
Channels routed between different clock domains (A>B or B>A) which have multiple destinations occupy only one channel on the SRC.

MAINTENANCE

SRC selftest
To verify correct operation of the SRC, perform an SRC selftest. During selftest, an internally generated sine wave is passed forward and then backwards through all 64×64 channels of the SRC (running two conversions, from

96kHz => 88.2kHz => 96kHz)

- To enter SRC selftest mode: Press Recall, move to ✲ Function, move to ✲ 11, press OK, turn the encoder until the seven-segment display shows 03 (“SRC selftest”) and press OK.
- The resulting data is output on the headphones where it can be verified by listening to it. The SRC works correctly if a clean, non-distorted 1000Hz sine tone can be heard on all channels.Use ✲ Ch to listen to the appropriate channel. The output volume can be adjusted using ✲ Vol..
- The resulting data is also output on MADI optical (channels 1-32) and MADI coaxial (channels 33-64) as two 96kHz/32ch streams, clocked by the internal clock of the multiverter. You can use any signal meter to check the result; the output level should be -20dB on all channels.
- To exit SRC selftest mode, press the ⮌ Back button

Determining SRC Firmware/Hardware version

To check the firmware and hardware version of the SRC module:

Web
Go to the “ABOUT” Tab. The SRC firmware and hardware version are displayed on the bottom.

Front panel

Press Recall, move to ✲ Function, press OK, move to ✲ 12, press OK

Move the cursor to

- ✲ EX to show the SRC Firmware Major Version number
- ✲ Ch to show the SRC Firmware Minor Version number
- ✲ Vol to show the SRC Hardware Version in the seven-segment display.

SRC Firmware Upgrade
Although seldom required, the SRC firmware itself can be upgraded.
This is done similar to the multiverter upgrade, with the difference that the USB plug has to be connected directly to the SRC (not on the multiverter).

RISK OF ELECTRIC SHOCK:
It is strongly advised to power the Multiverter from the DC source (9..24V) during upgrade. When powering via AC mains, it is possible to touch live parts inside during the upgrade! Only qualified personnel must do this, obeying the safety rules when working with live mains voltage.

1. Switch the multiverter OFF.
2. REMOVE MAINS POWER TO AVOID ELECTRIC SHOCK!
3. Open the multiverter’s top cover (see SRC manual how to do this)
4. Connect the USB jack on the SRC module to your PC (anything from Windows 7 on should work). This is NOT the USB jack of the back on multiverse!

5. Re-connect mains power to the multiverter, and switch it ON.
6. DON'T TOUCH ANYTHING INSIDE THE MULTIVERTER – LIVE 230V WIRES INSIDE!
7. Run "SRC-128-Updater.bat" and confirm with "U". The update process takes about 1 minute. Check the screen output for any error messages. If an error occurred. try again or refer to the "Troubleshooting" section below.
8. Switch the multiverter OFF
9. REMOVE THE MAINS POWER TO AVOID ELECTRIC SHOCK!
10. Re-mount the cover
11. Check if the update was successful by verifying the SRC's firmware version (see 4.2, Determining SRC Firmware/Hardware version)

SPECIFICATIONS

Parameter	Value
Dimensions	**1**5x94x27mm (BxHxD)
Weight	60 g
Operating temperature	0..+70°C, non-condensing
Storage temperature	-40..+85°C, non-condensing
Power consumption	4W max., depending on the channel count used
Channel count	Flexible from 128×0 to 0x128 (in blocks of 16) when both sides run at x1 (44.1 / 48 kHz). Requires at least SRC firmware 2.0 and MVR firmware 5.0. Up to 64×64 when either side is running at x2 speed (88.2 / 96 kHz) Up to 32×32 when either side is running at x4 speed (176.4 / 192 kHz)
Sample rates	Arbitrary sample rates between 32kHz and 192kHz
Analog performance	THD+N: -133 dB typ. / -120dB max. Dynamic range (A-weighted, 20 Hz to 20 kHz): 139 dB
Audio latency	For up-sampling conversions: t/s = 16/fs_in + 32/fs_in fs_in / kHz t / ms 44.1 1.09 48 1.03 88.2 0.54 96 0.5 176.2 0.27 For down-sampling conversions: t/s = 16/fs_in + (32/fs_in)*(fs_in/fs_out)

APPENDIX

Warranty

We offer a full two (2) year warranty from the date of purchase. Within this period, we repair or exchange your device free of charge in case of any defect*. If you experience any problems, please contact us first. We try hard to solve your problem as soon as possible, even after the warranty period.* Not covered by the warranty are any damages resulting out of improper use, willful damage, normal wear-out (especially of the connectors) or connection with incompatible devices.

Manufacturer contact

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Recycling

According to EU directive 2002/96/EU, electronic devices with a crossed-out dustbin may not be disposed into normal domestic waste. Please return the products back for environment-friendly recycling, we'll refund you the shipping fees.

Document Revision History

Initial release

About this document

Document Revision: 1 · 2024-05-20

Documents / Resources

	appsys SRC-128 Sample Rate Converter Add On Module [pdf] User Manual SRC-128, MVR-64, MVR-mkII, SRC-128 Sample Rate Converter Add On Module, SRC-128, Sample Rate Converter Add On Module, Rate Converter Add On Module, Converter Add On Module, Module

References

- User Manual