User's Guide

AI4S-192 AIO

Analog Expansion Board
for HDSPe AIO
4 Channels 24 Bit 192 kHz

Contents

1. Introduction

Thank you for choosing the AI4S-192. This analog expansion board adds 4 analog inputs in professional quality to RME's HDSPe AIO. Level adjustment, balanced circuit design, 116 dBA SNR and highest suppression of PC-noise guarantee perfect sound quality.

2. Package Contents

Please ensure that all the following parts are included in the AI4S-192 AIO's packaging box:

- Analog Expansion Board
- 1 flat ribbon cable, 26 pins
- 1 set of nuts
- Manual, drill template

3. Hardware Requirements

The AI4S-192 AIO can be used with the HDSPe AIO and the HDSP 9632. No more than one AI4S-192 AIO can be connected to each card.

4. Technical Specifications

- Resolution AD: 24 Bit
- Supported sample rates: 32 / 44.1 / 48 / 64 / 88.2 / 96 / 128 / 176.4 / 192 kHz
- Signal to Noise ratio (SNR): 113 dB RMS unweighted, 116 dBA @ 44.1 kHz
- THD: < -110 dB, < 0.00032 %
- THD+N: < -104 dB, < 0.00063 %
- Crosstalk: > 110 dB
- Frequency response AD @ 44.1 kHz, -0.5 dB: 5 Hz - 21.5 kHz
- Frequency response AD @ 96 kHz, -0.5 dB: 5 Hz – 45.5 kHz
- Frequency response AD @ 192 kHz, -1 dB: 5 Hz – 66.5 kHz
- Input: 4 x 1/4" TRS jack, servo balanced
- Input impedance: 10 kOhm
- Input sensitivity: Lo Gain, +4 dBu, -10 dBV
- Input level for 0 dBFS @ Lo Gain: +19 dBu
- Input level for 0 dBFS @ +4 dBu: +13 dBu
- Input level for 0 dBFS @ -10 dBV: +2 dBV
- Power supply via flat ribbon cable
- Standard bracket, board dimensions 90 x 95 mm

5. Hardware Installation

Important: Switch off the computer and remove the power cable from the power supply before fitting the AI4S-192 AIO.

1. Disconnect the power cable and all other cables from the computer.
2. Remove the PC housing; further information on how to do this can be obtained from your computer´s instruction manual.
3. Neutralize the static build up by touching the PC metal-chassis before unpacking the AI from the protective bag.
4. Connect AI and the card using the supplied 26-pin flat cable.
5. Insert the AI into a free slot, press and fasten the screw. The AI needs no slot on the motherboard, but includes a stabilizing edge, which fits in both PCI and PCIe slots.
6. Re-insert the PCIe card in a PCIe slot and fasten the screw.
7. Re-place the PC housing and tighten the screws.
8. Re-connect the power cable and all other cables/connections.
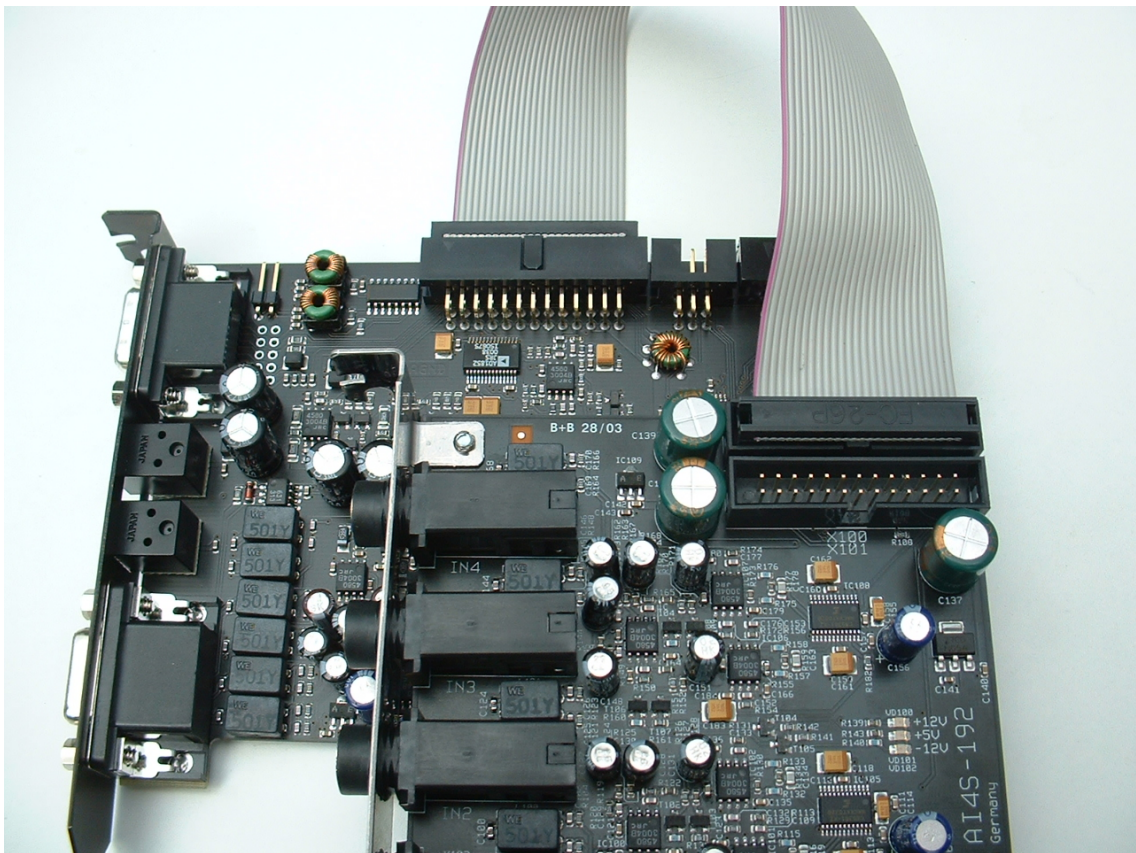
Connecting an AI4S-192 to a HDSP 9632

Both AI4S-192 and AO4S-192 have two flat cable connectors. The second connector allows for a usage of an AI4S-192 AIO together with an AO4S-192 AIO.

6. Alternative Installation

Installation is done comfortably as described using the attached bracket. Alternatively it is possible to mount the AI at a different place inside the computer using the supplied nuts. This requires to drill 4 holes into the housing.

RME does not accept claims for damages of any kind when installing the AI in this way! Modifications to the housing should be done by qualified technicians only, and only after having removed all components from the housing (danger of short circuit by metal splinter etc).

1. Remove the bracket from the AI (2 screws).
2. Carefully check that the desired location offers a flat plane, is free from any voltage carrying devices or cables, and that the AI does not get in contact with other devices even when the housing is closed.
3. Please note that the lenght of the supplied cables does not allow any distance to the main card.*
4. Drill 4 holes, diameter 0.5" (13 mm), distance of 0.75" (19.05 mm) each, at the desired place (see drill template).
5. Fit the AI into the holes and fix it with the supplied nuts.

*The supplied 26-pin flat ribbon cable is a common component, available in any electronics shop. A cable of up to 1 meter length can be used without a problem.

7. Operation and Usage

Switch on the computer and boot the OS. 4 additional inputs should now be available within any audio software.

Note: the AI carries three SMD LEDs, indicating the presence of the power supplies +5V, +12V and −12 V.

8. Analog Inputs

The analog inputs are accessible through stereo ¼" TRS jacks.

The **AI4S-192 AIO** is fitted with electronically balanced, single channel inputs (+ = tip). The servo balanced input circuit allows to use monaural TS jacks (unbalanced) with no loss in level.

When using unbalanced cables with stereo TRS jacks: be sure to connect the 'ring' contact of the stereo TRS jack (pin 3 of a XLR jack) to ground. Otherwise noise may occur, caused by the unconnected negative input of the balanced input.

One of the main issues when working with an AD-converter is to maintain the full dynamic range within the best operating level. Therefore the HDSPe AIO, the HDSP 9632 and the AI/AO4S-192 AIO use hi-quality electronic switches, which allow for a perfect adaptation of all inputs to the three most often used studio levels.

The 'standardized' studio levels do not result in a (often desired) full scale level, but take some additional digital headroom into consideration. The amount of headroom is different in different standards, and again differently implemented by different manufacturers. Because of this we decided to define the levels in a most compatible way.

Reference	0 dBFS @	Headroom
Lo Gain	+19 dBu	15 dB
+4 dBu	+13 dBu	9 dB
-10 dBV	+2 dBV	12 dB

With +4 dBu selected, the according headroom is 9 dB. At -10 dBV 12 to 15 dB headroom are common practice, each mixing desk operating at -10 dBV is able to send and receive much higher levels. Lo Gain allows to work with high levels, best suited for professional users who prefer to work balanced and at highest levels.

The above levels are also found in our ADI-8 series of AD/DA converters, the Multiface, and even our Mic-Preamps QuadMic and OctaMic. Therefore all RME devices are fully compatible to each other.

9. Warranty

Each individual AI4S-192 AIO undergoes comprehensive quality control and a complete test in a PC environment at IMM before shipping. The usage of high grade components allows us to offer a full two year warranty. We accept a copy of the sales receipt as valid warranty legitimation.

If you suspect that your card is faulty, please contact your local retailer. The warranty does not cover damage caused by improper installation or maltreatment - replacement or repair in such cases can only be carried out at the owner's expense.

RME does not accept claims for damages of any kind, especially consequential damage. Liability is limited to the value of the AI4S-192 AIO. The general terms of business drawn up by Audio AG applies at all times.

10. Appendix

RME news, driver updates and further product information are available on our website:

http://www.rme-audio.com

Distributor: Audio AG, Am Pfanderling 60, D-85778 Haimhausen, Tel.: (49) 08133 / 91810

Manufacturer:
IMM Elektronik GmbH, Leipziger Strasse 32, D-09648 Mittweida

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CE / FCC Compliance

CE
This device has been tested and found to comply with the limits of the European Council Directive on the approximation of the laws of the member states relating to electromagnetic compatibility according to RL2004/108/EG, and European Low Voltage Directive RL2006/95/EG.

FCC
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

RoHS
This product has been soldered lead-free and fulfils the requirements of the RoHS directive.

ISO 9001
This product has been manufactured under ISO 9001 quality management. The manufacturer, IMM Elektronik GmbH, is also certified for ISO 14001 (Environment) and ISO 13485 (medical devices).

Note on Disposal

According to the guide line RL2002/96/EG (WEEE – Directive on Waste Electrical and Electronic Equipment), valid for all european countries, this product has to be recycled at the end of its lifetime.

In case a disposal of electronic waste is not possible, the recycling can also be done by IMM Elektronik GmbH, the manufacturer of the AI4S-192 AIO.

For this the device has to be sent **free to the door** to:

> IMM Elektronik GmbH
> Leipziger Straße 32
> D-09648 Mittweida
> Germany

Shipments not prepaid will be rejected and returned on the original sender's costs.