

# NSA-002A

User Manual

A00



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by Riedel may void the FCC authorization to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



The device conforms to the following EU guidelines as attested by the CE mark.

- EMV (EMC) 2014/30/EU
- NSR (LVD) 2014/35/EU

Industry Canada: CAN ICES-3 (A)/NMB-3(A)  
CAN ICES-3 (B)/NMB-3(B)

- Standards:
- EN 55032:2016-02
  - EN 55103-2:2010-07
  - EN 60950-1:2014-08
  - EN 62368-1:2016-05



**04-371HB01EG-A00**  
**NSA-002A User Manual**

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# 1 Preface

Thank you for choosing a Riedel product.

This PDF document provides detailed information about the NSA-002A, pin outs, mechanical and electrical data.

This manual is available in additional formats:

CHM "Compiled HTML Help" is the standard format for Windows online help and .Net applications  
EPUB "Electronic Publishing format" is a cross-platform e-book standard

For further information, please refer to the [Riedel Website](#) or contact your local distributor or the Riedel headquarters in Wuppertal.

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## 1.1 Information


### Symbols

The following tables are used to indicate hazards and provide cautionary information in relation to the handling and use of the equipment.

<b>Danger</b>	
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	<b>The highlighted line indicates the activity to prevent the danger.</b>

<b>Warning</b>	
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	<b>The highlighted line indicates the activity to prevent the danger.</b>


<b>Caution</b>	
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
	<b>The highlighted line indicates the activity to prevent the danger.</b>


	This text is for generally information. It indicates the activity for ease of work or for better understanding.
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## 1.2 Safety Instructions

### Voltage

- The power cable should only be connected to a correctly grounded source.
- Do not use any adapters.
- Never bypass a ground contact.


Caution	
	<ul style="list-style-type: none"> <li>• To shut down the unit completely, remove the power cord and both Ethernet cables.</li> <li>• Pour éteindre complètement l'appareil, débranchez le cordon d'alimentation et les deux câbles Ethernet.</li> </ul>

Warning	
	<ul style="list-style-type: none"> <li>• Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.</li> <li>• Apparatet må tilkoples jordet stikkontakt.</li> <li>• Apparaten skall anslutas till jordat uttag.</li> <li>• Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.</li> </ul>

Danger	
	<p><b>To reduce the risk of electric shock do not remove cover or expose the products to rain or moisture.</b></p>

### Service

- All service has to be undertaken **only** by qualified Riedel service personnel.
- Do not plug in, turn on or attempt to operate an obviously damaged device.
- Never attempt to modify the equipment components for any reason.


Caution	
	<p><b>All adjustments have been done at the factory before the shipment of the devices. No maintenance is required and no user serviceable parts are inside the module.</b></p>

### Environment

- Never place the devices in areas of high dust particles or humidity.
- Be aware of the operating temperature of the systems (0°C - +50°C).
- Never place containers with any liquids on top of the devices.
- If the equipment has been exposed to a cold environment and transferred to a warm environment, condensation may form inside the housing. Wait at least 6 hours before applying any power to the equipment.

**Disposal**

Disposal of old Electrical & Electric Equipment (Applicable throughout the European Union and other European countries with separate collection programs).

	<p>This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product please contact your local city office.</p>
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## 2 About NSA-002A

The NSA-002A (**N**etwork-**S**tream-**A**dapter) is a device to convert analog audio signals to AES67 and vice versa. That means analog audio sources can be integrated into AES67 networks.

The power can be supplied by mains and via the AES67 network if it supports PoE functionality.

### 2.1 Product Elements

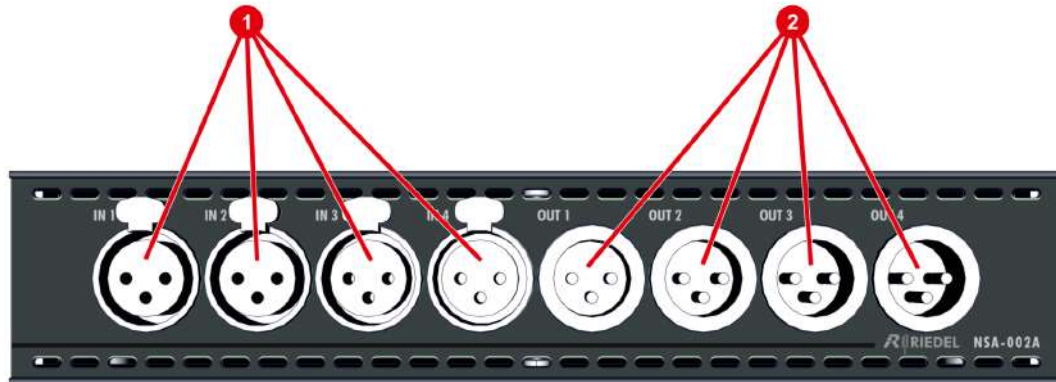


figure 1: NSA-002A (front)

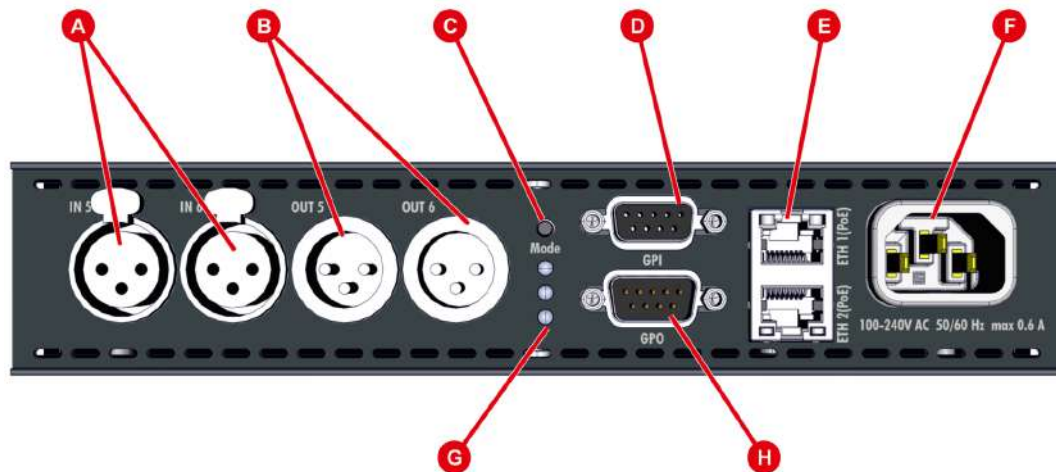


figure 2: NSA-002A (back)

<b>1 A</b>	Analog 4-wire inputs (XLR3)	6x
<b>2 B</b>	Analog 4-wire outputs (XLR3)	6x
<b>C</b>	Mode button	1x
<b>D</b>	GPI - inputs (D-Sub-9, female)	3x
<b>E</b>	Ethernet connectors (RJ45, PoE)	2x
<b>F</b>	Power supply (mains input)	1x
<b>G</b>	Status LEDs	3x
<b>H</b>	GPO - outputs (D-Sub-9, male)	3x



## 2.2 Status LEDs

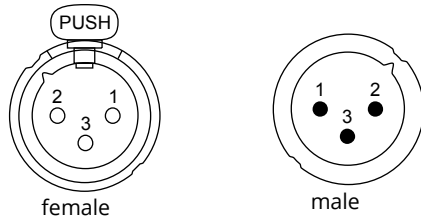
<b>G</b>	<b>Device mode (top)</b>	<b>blue</b>	Bolero mode (plug-and-play mode for Bolero wireless intercom systems)	
		<b>violet</b>	Manual mode	
	<b>State (middle)</b>	<b>Bolero plug &amp; play mode</b>	<b>green</b>	Connection OK
			<b>green blinking</b>	<ul style="list-style-type: none"> <li>Synchronization errors. (This may happen during the first 5 min.)</li> <li>Check PTP settings.</li> <li>Audio glitches may happen.</li> </ul>
			<b>red</b>	Antenna not connected or not configured in Bolero web server.
			<b>orange</b>	All other cases.
		<b>Manual mode</b>	<b>green</b>	Connection OK or idle (not configured).
			<b>green blinking</b>	Connection configured but no data communication.
			<b>red</b>	Connection configured but mismatch between sender and receiver.
			<b>orange</b>	<ul style="list-style-type: none"> <li>Synchronization errors. (This may happen during the first 5 min.)</li> <li>Check PTP settings.</li> <li>Audio glitches may happen.</li> </ul>
	<b>PTP Status (bottom)</b>	<b>green</b>	PTP slave, PTP offset <1 $\mu$ s	
		<b>green blinking</b>	PTP master	
		<b>orange</b>	PTP slave, PTP offset 1 ... 100 $\mu$ s	
<b>orange blinking</b>		PTP listening, Slave mode only		
<b>red</b>		<ul style="list-style-type: none"> <li>Error</li> <li>PTP offset &gt;100 <math>\mu</math>s</li> </ul>		
<b>E</b>	<b>Network (left)</b>	<b>off</b>	no connection	
		<b>green</b>	Ethernet connection ok	
<b>Activity (right)</b>	<b>off</b>	no data transmission		
	<b>green / yellow</b>	blinking while data transmission		

## 2.3 Ports / Pinouts

In this chapter all Ports / Pinouts of the NSA-002A are shown.

### Analog IN & Analog OUT Port

The analog inputs and outputs have following pinouts.



Pin	Signal
1	GND
2	Hot (+)
3	Cold (-)

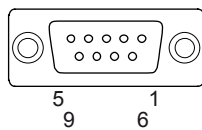
female = inputs  
male = outputs

figure 3: Analog in/out port XLR-3 pinout

- Nom. input/output level: +6 dBu
- Max. input/output level: +24 dBu

### GPI port

The GPI input connector contains 3 single ports.



Pin	Signal
1	GP-IN1-P
2	GP-IN2-P
3	GP-IN3-P
4	GPIO +5V
5	Chassis

Pin	Signal
6	GP-IN1-N
7	GP-IN2-N
8	GP-IN3-N
9	GND
Chassis	Chassis

Figure 4: GPI IN connector Sub-D-9 female pinout

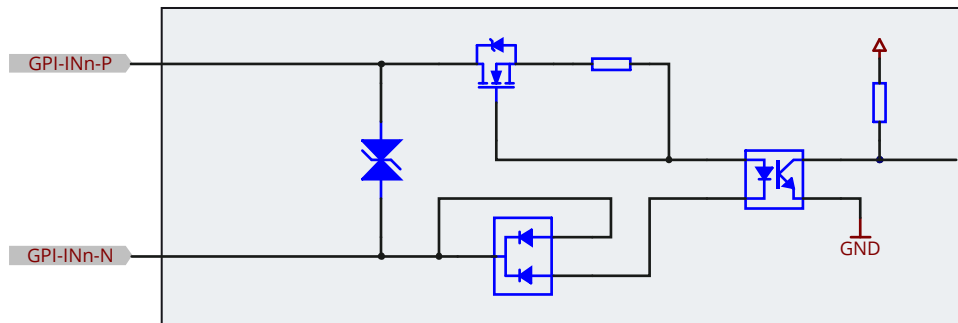
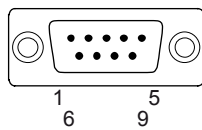


Figure 5: GPI IN connector schematic

- The input voltage range of the GPI inputs is +5 to +30 VDC (~5 mA current draw, internal optocouplers).
- The polarity of the inputs is important. The higher potential must be connected to "P" of each channel.
- The inputs are galvanically isolated.
- The "GPIO +5V" output voltage drops when increasing the: 5V @ 0mA / 3.3V @ 50mA.
- The switching threshold is between 0.8 VDC and 2.0 VDC.

## GPO port

The GPO output connector contains 3 single ports.



Pin	Signal	Pin	Signal
1	GP-OUT1-P	6	GP-OUT1-N
2	GP-OUT2-P	7	GP-OUT2-N
3	GP-OUT3-P	8	GP-OUT3-N
4	GPIO +5V	9	GND
5	Chassis	Chassis	Chassis

Figure 6: GPI OUT connector Sub-D-9 male pinout

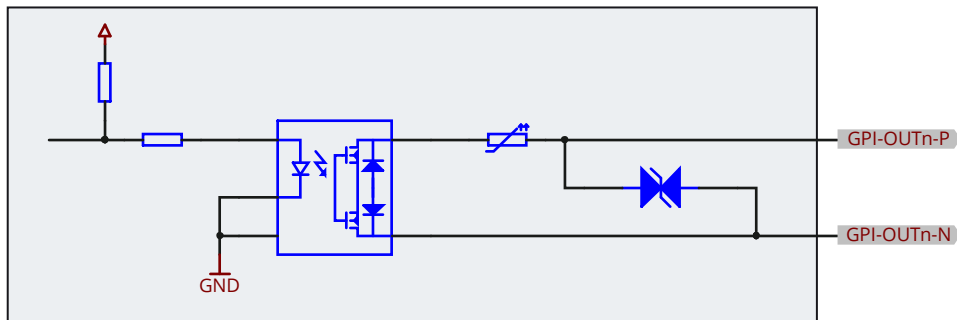


Figure 7: GPI OUT connector schematic

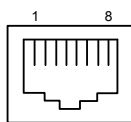
- The GPO output contact rating is 100 mA, 30 VDC maximum (protected by self-healing fuse).
- The polarity of the output has no preference.
- The outputs are galvanically isolated.
- The "GPIO +5V" output voltage drops when increasing the load: 5V @ 0mA / 3.3V @ 50mA.

## ETH / PoE – ports

The AES67 ports are used to connect the AES67 network to the NSA-002A.

The AES67 ports are 1000Base-T compatible only.

Furthermore these ports can be used to power (PoE IEEE 802.3af) the NSA-002A.



Pin	Signal	PoE	Standard color
1	TxRx A +	DC +	orange/white
2	TxRx A -	DC +	orange
3	TxRx B +	DC -	green/white
4	TxRx C +	--	blue
5	TxRx C -	--	blue/white
6	TxRx B -	DC -	green
7	TxRx D +	--	brown/white
8	TxRx D -	--	brown

figure 8: ETH / PoE RJ-45 pinout (8P8C)

### 3 Getting started

#### 3.1 Mounting Options

Two mounting options are available for the NSA-002A:

**Bumper SPK-001**  
(Stagebox Protection Kit)

Rugged rubber corners to place or stack single devices.



*figure 9: bumper-assembly*

**Rack-Mount RMK-001**  
(19" Rack Mount Kit)

Rack mount kit for rack installation of one or two devices combined together.



*figure 10: 19" rack assembly*

#### 3.2 Connecting Interfaces

- Connect your AES67 network with one of the two 'ETH' ports of the NSA-002A.



*figure 11: connecting AES67 network*

- Connect your analog audio inputs and outputs with the corresponding interface of the NSA-002A.




*figure 12: connecting analog audio*

### 3.3 Powering the Unit

The NSA can be powered in two ways:

- Via PoE, that is attached to one 'ETH' port.
- Via mains, that is attached to the mains input.

	Both power sources can be attached simultaneously for redundancy reasons.
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<b>Caution</b>	
	To shut down the unit completely, remove the power cord and both Ethernet cables.



figure 13: powering via PoE



figure 14: powering via mains

### 3.4 Operation Mode

The NSA-002A supports two operating modes:

- Bolero (plug-and-play mode for Bolero wireless intercom systems)
- Manual

The operation modes can be switched by pushing the mode button for more than 5 seconds. The active mode is indicated by the upper device mode LED (blue: Bolero, violet: Manual).

**i** NSA-002A currently does not support the PTP hybrid mode offered by Director for panels. This could cause PTP traffic overload in networks with many PTP slaves. Riedel has successfully tested connecting NSA-002A into networks with up to 32 slaves, so this should be your maximum number of Artist AES67-108 cards, RSPs, NSAs or other 3rd party AES67 devices. To overcome this value, implementation of boundary clock switches is recommended.

**Bolero-Mode**

The Bolero mode is used to easily adapt analog audio signals into Bolero networks.

- Connect a NSA-002A direct or via switch to the AES67/Config port of the Bolero Antenna.
- One additional NSA-002A may daisy chained via the internal switch if the NSA-002A is directly connected to a Bolero Antenna.
- Max. twice as many NSA-002A as Bolero Antennas in a network.
- PC may connected to the second Ethernet port of the NSA-002A.
- Plug-and-play connection (no IP configuration required).
- Each NSA has six 4-wires and three GPIOs:
  - 6 Line in
  - 6 Line out
  - 3 GPIs
  - 3 GPOs
- The signals are available on each antenna.
- The Beltpacks can trigger GPIOs.
- Configuration via Bolero web interface.

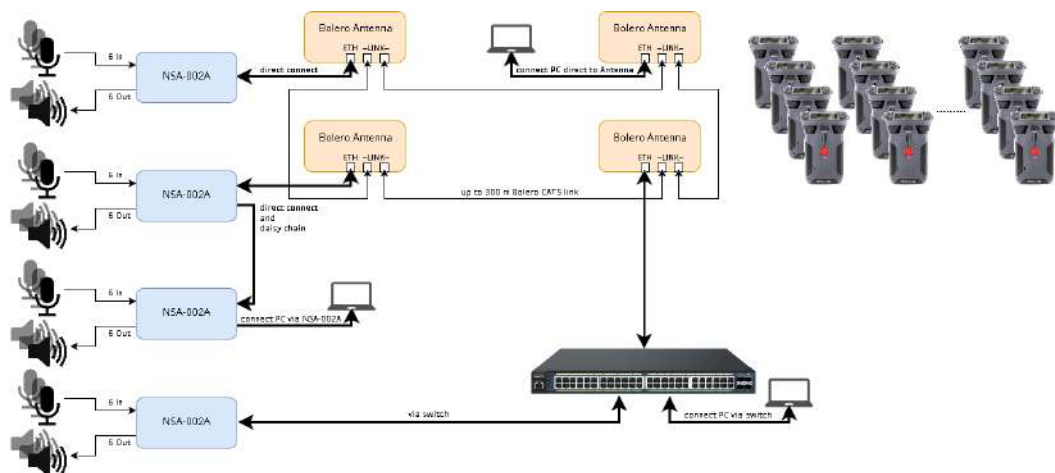


figure 15: Bolero-Mode

## Manual-Mode

The Manual mode is used to easily adapt analog audio signals into any AES67 networks.

- Standalone operation as AES67 to analog converter
- Configuration via web interface
- Internal switch for daisy chaining
- Stream setup: 1 stream, 6 channels

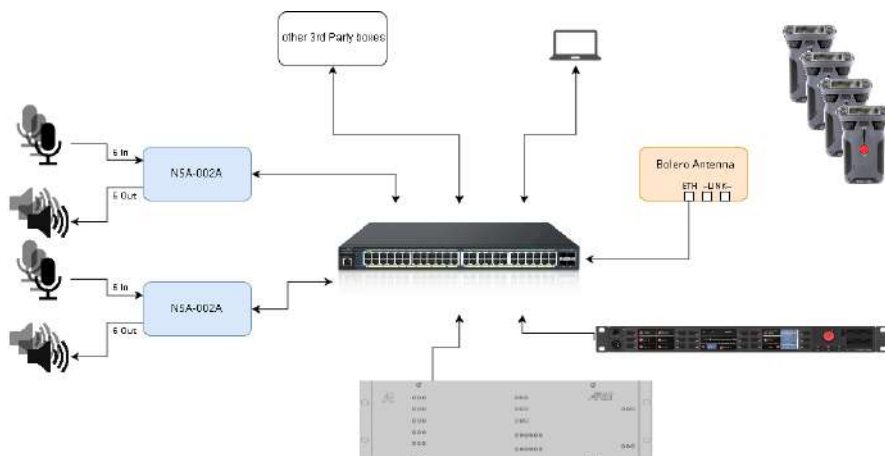


figure 16: Manual-Mode

## 4 Web Interface

The NSA-002A has no static IP address. The IP address can be determined by a Zeroconf browser (i.e. Riedel-NMOS-Explorer, see chapter [Riedel-NMOS-Explorer](#) in the appendix).

To access the NSA-002As web interface, open a web browser on your computer and point it to the IP address of the NSA-002A. The NSA-002A web interface appears:

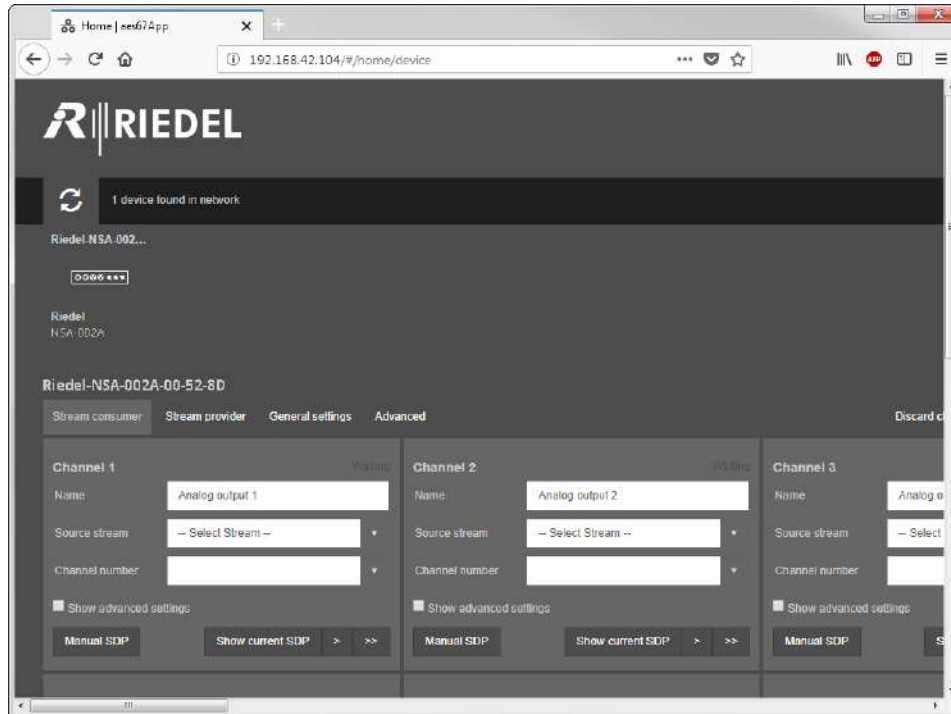


figure 17: NSA-002A web interface

When the user changed a parameter, the 'Apply all' button becomes active. After changing all desired parameters, the user can press this button to apply all changes. The 'Clear all' or 'Discard changes' button discards all changes and reloads the page.



## 4.1 Stream consumer

The tab **Stream consumer** allows configuring up to six streams to be received at the NSA-002A. Accepted are Ravenna streams, Dante-AES67 streams and manual configured streams via SDP. Each of the six XLR audio channels are configured in one "Channel". Hence, each interface is able to receive six different streams or a stream consisting of six channels is distributed to the six interfaces.

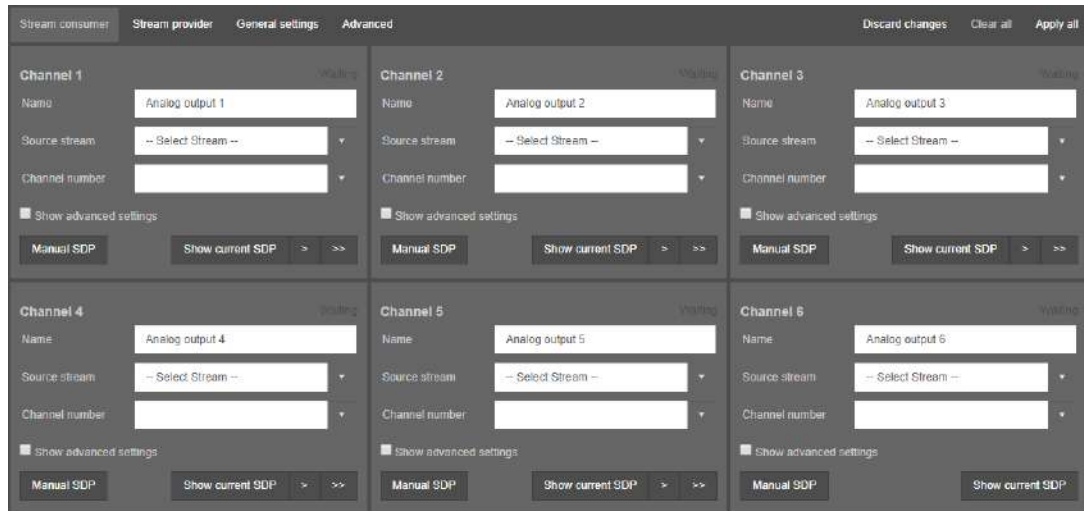


figure 18: NSA-002A web interface "Stream consumer"

<b>Name</b>	The name is entered if a Ravenna- or Dante-Stream is selected by discovery. The name can be assigned freely.
<b>Source Stream</b>	Table of all available Ravenna- or Dante-AES67-Streams.
<b>Channel number</b>	If a stream consists of multiple channels, this selection determines the channel that is output on the respective XLR output.
<b>Show Advanced settings</b>	Manuel path of the Bonjour streams.
<b>Manual SDP</b>	Opens a dialog to import a SDP of a 3rd-Party-Sender (i.e. Artist).
<b>Status</b>	Each channel shows its status next to the channel number:
<b>IDLE</b>	No stream is configured.
<b>WAITING</b>	Stream configured but not received.
<b>RECEIVING MULTICAST SYNTONIZED</b>	Configured multicast stream is received (without PTP synchronization).
<b>RECEIVING UNICAST SYNTONIZED</b>	Configured unicast stream is received (without PTP synchronization).
<b>RECEIVING MULTICAST</b>	Configured multicast stream is received.
<b>RECEIVING UNICAST</b>	Configured unicast stream is received.
<b>RECEIVING NO_SYNC</b>	Configured stream is received but the PTP synchronization is not valid.
<b>RECEIVING TIME STAMP WARNING</b>	Configured stream is received but the received packets differ more than one ms from the expected time.
<b>DISABLED</b>	The receiver is disabled to save resources.

## 4.2 Stream provider

The tab **Stream provide** allows configuring the stream to be transmitted.  
The stream contains six channels with the signals of the analog XLR inputs 1-6.



figure 19: NSA-002A web interface "Stream provider"

<b>Stream name</b>	Name of the streams.
<b>Activate</b>	Activates the respective stream (after clicking the "Apply all" button).
<b>SDP</b>	Shows the session descriptions.
<b>Status</b>	Shows the state of the respective channel (see Status in chapter ' <a href="#">Stream consumer</a> ').
<b>Multicast Address, Port</b>	Fields for manual configuration of the multicast addresses and ports.
<b>Use automatic configuration</b>	If enabled, the multicast addresses of the streams are numbered consecutively in the the NSAs ZeroConf address range.

## 4.3 General settings

The tab **General settings** allows setting and reading of IP parameters and general device configurations.



figure 20: NSA-002A web interface "General settings"

<b>Network configuration</b>	<b>Device name</b>		Name of the device.
	<b>IP address</b>	<b>DHCP</b>	The IP configuration is obtained from a DHCP server.
		<b>Static</b>	The user can provide the IP configuration manually.
<b>Audio mode</b>	<b>Manual / Bolero</b>		Toggles between Manual- and Bolero-Mode. Use the devices key to change the mode.
	<b>Audio configuration</b>	<b>Sampling Rate</b>	Fixed sample rate of 48 kHz.
		<b>Resolution</b>	
<b>Receiver delay</b>	<b>Samples</b>	Number of samples in the audio buffer.	
	<b>Syntonized mode</b>	In Synton mode audio packets without or with invalid PTP timestamps are processed and output, hence this mode can be used in networks without PTP synchronization.	
<b>Firmware-Update</b>	The NSA firmware can be updated through the web interface. To update the firmware press the start button and follow the instructions on the screen.		

## 4.4 Advanced

The tab **Advanced** allows configuring PTP, SIP and SAP configurations.

figure 21: NSA-002A web interface "Advanced"

<b>PTP</b>	<b>State</b>	Shows the PTP-state, grandmaster and the current clock offset.
	<b>Domain</b>	Allows entering a PTP-domain.
	<b>Preferred master</b>	Sets the PTP-priority 1 and 2 to "20".
	<b>Slave only</b>	Blocks the device to be used as synchronization master.
<b>SIP configuration</b>	Allows setting the SIP username if SIP connections are desired.	
<b>SAP configuration</b>	<b>SAP browsing enabled</b>	Shows also Dante-AES67-Streams in the <b>Stream consumer</b> tab.
	<b>Multicast Address, Port, Session Timeout</b>	Specific configuration of the SAP-announcements.

## 5 Appendix

### 5.1 Technical Drawing

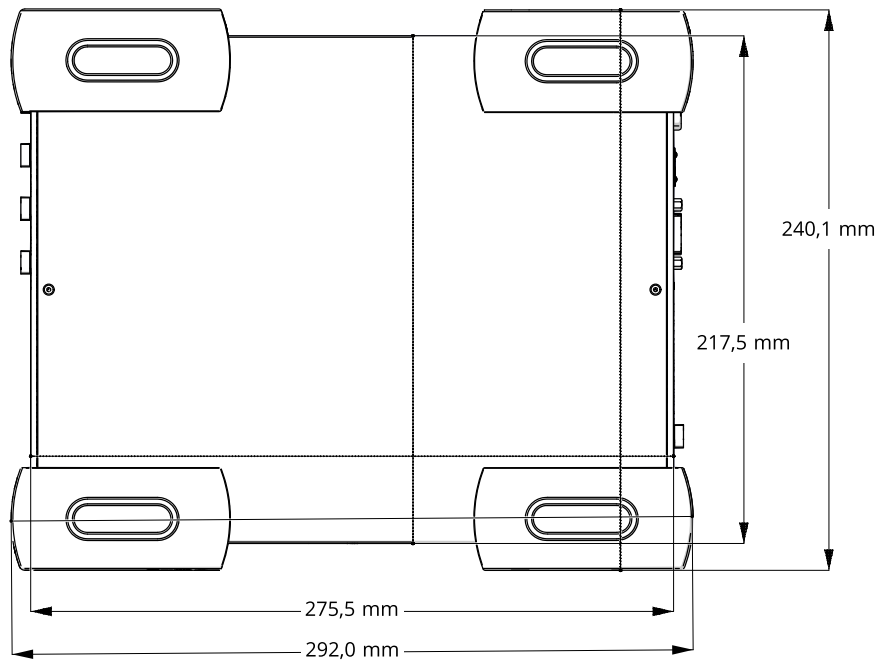


figure 22: NSA-002A (top)

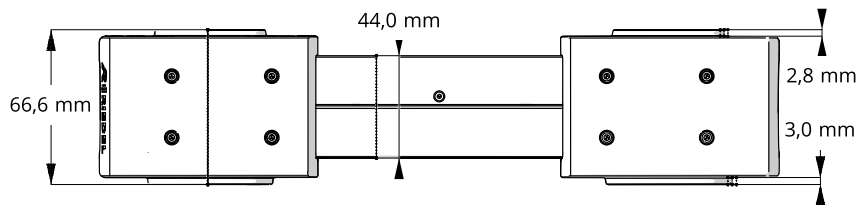


figure 23: NSA-002A (side)

## 5.2 Technical Specifications

<b>Type</b>	NSA-002A (Network Stream Adapter)		
<b>Amount of analog breakouts</b>	6x input, 6x output		
<b>Analog audio line input/output</b>	balanced		
<b>Nom. input/output level</b>	+6 dBu		
<b>Max. input/output level</b>	+24 dBu		
<b>Input impedance</b>	10 k $\Omega$		
<b>Output impedance</b>	<200 $\Omega$		
<b>Min. load Impedance</b>	2 k $\Omega$		
<b>Frequency response</b>	20 Hz ... 20 kHz	-0.5 dB	
<b>Signal to noise ratio (SNR)</b>	>100 dB	@ +24 dBu	
<b>Crosstalk</b>	<-110 dB	@ 1 kHz	adjacent channels
<b>Total harmonic distortion (THD&amp;N)</b>	typ. 0.008 %	@ +6 dBu	
<b>Resolution</b>	24 bit		
<b>GPI input</b>	3x Galvanically isolated opto-coupler inputs		
	<b>Isolation voltage</b>	100 VDC	
	<b>Max. voltage</b>	30 VDC	
	<b>Input current</b>	5 mA @ 5 VDC	
	<b>Switching threshold</b>	off: <0.8 VDC, on: >2.0 VDC	
<b>GPO output</b>	3x Galvanically isolated solid-state relay outputs		
	<b>Isolation voltage</b>	100 VDC	
	<b>Max. voltage</b>	30 VDC	
	<b>Max. current</b>	100 mA	
<b>Power supply</b>	<b>Mains</b>	100 ... 240 V, 50/60 Hz, max. 0.6 A inrush current	
	<b>PoE IEEE 802.3af type 1</b>	42 ... 57 V	
<b>Power consumption</b>	<b>Mains</b>	<25 W / <85 BTU/hr	
	<b>PoE class 3</b>	<12.95 W / <44.19 BTU/hr	
<b>Dimensions (with bumpers)</b>	<b>Width</b>	218 mm / 8.6" (242 mm / 9.5")	
	<b>Height</b>	45 mm / 1.8" (65 mm / 2.6")	
	<b>Depth</b>	276 mm / 10.9" (293 mm / 11.5")	
<b>Weight (with bumpers)</b>	1770 g (2250 g)		
<b>Operating Environment</b>	<b>Temperature</b>	0° ... +50°C	
	<b>Humidity</b>	20 % ... 90 % rel. (non-condensing)	

## 5.3 Riedel-NMOS-Explorer

The NMOS Explorer is a tool to discover, manage and connect IP Media devices following AMWA IS-04 and IS-05. It allows IS-04 discovery in registered mode (default) and peer to peer discovery, when no registry is available. IS-05 parameters can be read and set individually, so it can also be used to connect senders and receivers. By offering an import/export SDP option, the NMOS Explorer can also be used to connect devices that do not support IS-04/05, but can exchange SDP objects.

Download the NMOS-Explorer from the [Riedel website](#) and install it on your windows PC.

➤ After starting the NMOS-Explorer:

1. Select the index '**Bonjour**'.
2. If necessary, select your network adaptor in the field '**Network Interface**' that is attached to the NSAs network. Limit the amount of results by entering 'http' in the field '**Service Type**' and 'NSA' in the field '**Service Name**'.
3. Click on the magnifier. All found devices will be listed. The NSAs announce themselves with the name "Riedel-NSA-002A-xx-xx-xx". The last three places represents the NSA's MAC address.
4. Double-clicking a device will open the web interface. The devices IP address is displayed by opening the respective tree structure.

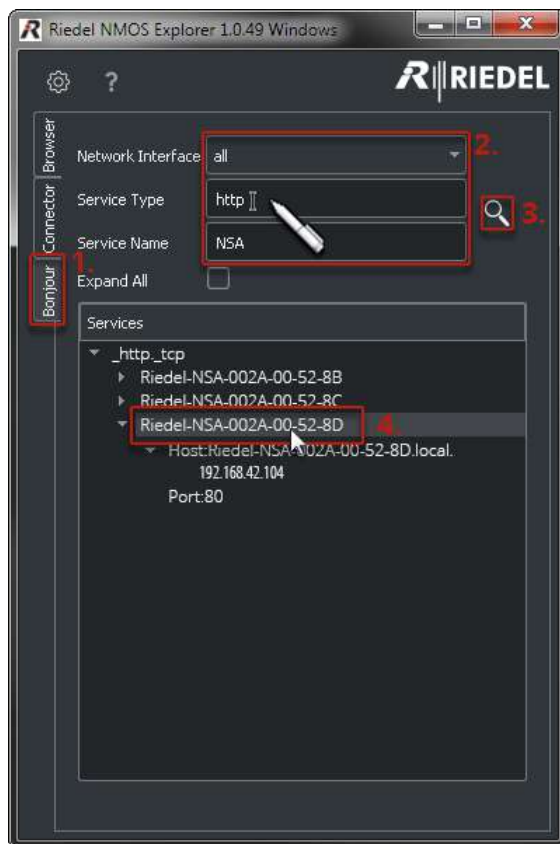


figure 24: NMOS-Explorer

## 5.4 Service

If you have any further questions, we offer comprehensive customer service options for this product including:

- Telephone Service
- Email Service
- Fax Service
- Configuration Support
- Trainings
- Repair

Your primary point of contact for any service issues is your local dealer.

In addition, Riedel Customer Service in Wuppertal, Germany is also available to assist you.

Telephone: +49 (0) 202 292 9400  
(Monday - Friday, 8am – 5pm, Central European Time)

Fax: +49 (0) 202 292 9419

Or use the contact form on our website:

[www.riedel.net](http://www.riedel.net) > [Company](#) > [Contact](#) > [Wuppertal \(Headquarters\)](#)

For repairs, please contact your local dealer. Your dealer will be able to help process your repair as fast as possible and/or arrange for the delivery of spare parts.

The address for repairs sent directly to Riedel Communications GmbH is:

Riedel Communications GmbH & Co. KG  
- Repairs -  
Uellendahler Str. 353  
D-42109 Wuppertal  
Germany

Please add a completed repair form to all your repairs.

The form can be found at the Riedel website:

[www.riedel.net](http://www.riedel.net) > [Services](#) > [Repairs](#)



## 5.5 Notes

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