IP-8m
User Manual

Professional multi-format multi-channel
audio encoder · decoder

IP-8m User Manual V1.02

Screenshots: App Version 1.32

May 2021

Your audio. Our solution.

2wcom

Manufacturer

Contents

1   About This Manual

This user manual is available in PDF format to download and on request by paper.

You can download the latest version of this user manual here:

http://download.2wcom.com/products/IP-8m_LUDB

1.1   References and Hyperlinks in This PDF File

If you are reading this manual as a non-print version, please note that this PDF file contains bookmarks. You can navigate through the document via the content overview in your PDF viewing software if you enable "bookmarks view".

All references to pages, sections, figures, and tables in the text identify a location within this PDF file. Click on the reference to jump to the referred passage in the text.

1.2   Tags and Their Meanings

The following signal words and signs warn you about risks and dangers:

⚠ **DANGER**	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Describes precautions necessary to protect the equipment.
ⓘ **NOTE**	Contains useful information for the user.
⚠	Warning of general danger situation
⚡	Warning of electric shock
♨	Warning of hot surface
🔥	Warning of fire hazard

2 For Your Safety

The device conforms to the relevant European directives and is safely constructed. Nevertheless, some residual dangers remain. 2wcom accepts no liability for any damage caused by non-observance of the safety instructions.

- Read through this user manual carefully before using the device. If you sell or pass on the device, be sure to also include this user manual.
- Any improper use of the device and all actions on the device not described in this user manual are considered as misuse outside the statutory limits for liability of the manufacturer.
- Only operate the device if it is in a technically perfect condition. If the device or a part of it is defective, take the device out of operation. Do not repair the device yourself. In case of any damages, send the device to 2wcom immediately for inspection or dispose of it properly according to the regional disposal regulations.
- Keep the device away from unauthorized persons.

⚠ DANGER	
⚠	**DANGER from electric current!** - Plug the device into a grounded power socket only. Never remove the grounding wire/contact. - Do not open the housing of the device by yourself. Do not touch open electrical parts. - Dangerously high voltages are present inside the housing. Even after disconnecting the mains supply, dangerously high voltage levels may be present for a certain time. - Do not touch the device when your hands are wet. - Never expose the device to liquids. If any liquid gets inside the housing, immediately disconnect the device completely from the power supply. Do not continue operating the device.

⚠	**FIRE HAZARD due to overheating or electric current!**
	- Ensure sufficient heat dissipation during operation. Avoid the following when installing the device:
	  - Non-ventilated environment, e.g. a narrow shelf or built-in cabinet
	  - Extremely warm or cold place
	  - Direct exposure to sunlight
	  - Too high or too low temperatures
	  - Extremely wet or dusty environment
	- Do not cover the ventilation openings of the device to avoid heat accumulation.
	- Do not operate the device in the presence of flammable gases.
	- Do not place objects with open flames, such as burning candles, on the device.
	- Do not place any heavy objects on the supply cord. A damaged cord can lead to fire or electric shock hazards.
	- When disconnecting the supply cord, always pull on the plug and never the cable to avoid cord damage.

⚠	**DANGER from explosive atmosphere!** - Do not use the device in an explosive environment.

⚠ CAUTION

⚠	**WARNING of hot surface!** The device may heat up greatly during normal operation despite an active cooling system. — Do not touch the surfaces of the device during or shortly after operation.

NOTICE

Risk of equipment damage!

— Before each use, check the housing, the front panel, the cable and the power plug for visible damage and defects (e.g. scratches, cracks, wear and tear, damaged insulation, improper plug connections or extension cables).

— If the power cord is damaged, immediately disconnect the power plug. Never use the device with a damaged power cord.

— All damaged components must be replaced immediately.

— Only use a grounded three-wire power supply cord and -plug that complies with the national regulations.

— Make sure that the power socket is next to the device and readily accessible to the user.

— External devices which are connected to the device could be damaged by the device or damage the device itself if the output levels exceed the specified limits.

— Do not use corrosive detergents on the device such as benzene, thinner, alcohol or acetone. Clean the surface of the device with a soft, dry cloth only.

3 Product Overview

3.1 About the IP-8m

The **IP-8m** is an eight-channel AoIP codec that allows the transmission of eight digital mono-channels in phase-locked mode (8.0, 7.1, 6.0 and 2.0, 5.1 and 2.0 or 4.0 and 4.0). Radio stations can provide their listeners live content in both stereo and surround sound quality. The multi-channel codec enables you to feed live contributions into large or international broadcast networks via surround routers.

Multi-format audio coding: Suitable for audio broadcast applications like live concerts and studio-to-studio connections, you can select from audio algorithms, including Dolby Digital (DD or AC-3), Dolby Digital Plus (DD+ or E-AC-3), PCM, E-aptX, and AAC.

High compatibility: The IP-8m is compliant with standards such as EBU Tech 3326, AES67, Ravenna, Livewire+ or SMPTE 2110 to ensure compatibility with third party products.

Transmission robustness: Features like two internal or external power supplies, error correction mechanisms such as Pro-MPEG FEC or SRT Secure Reliable Transport, streaming redundancy by Dual Streaming and backup by alternative audio sources, ensure 24/7 operation.

Smart management: Users can configure all parameters via a web interface or remotely via SNMP, Ember+, JSON, HTTP, FTP, Telnet or NMS. The Easy2connect SIP phonebook simplifies intercommunication for remote connections by negotiating protocols and codec algorithms with just one click. The protocols for synchronization NTP, PTPv2, or 1PPS allow a synchronized playout down to 1 µs.

3.2 Rights Options

The following table displays an overview of the rights options that are available for your IP-8m:

Right	Description
n Channels	Number of channels
Ravenna	Option to transcode SIP calls to RAVENNA/AES67 streams
EBU Tech 3226	Option to use stream over IP using SIP
Livewire	Option to use IP streaming over Livewire
Stream4Sure	Option that allows for simultaneous reception of up to 4 IP streams of different coding and quality and seamless exchange of audio samples in case of failure.
TS Decoder	Option to use transport stream over IP using UDP/RTP, unicast/multicast for decoders
TS Encoder	Option to use transport stream over IP using UDP/RTP, unicast/multicast for encoders
SRT Decoder	Option to use transport stream over IP using SRT for decoders
SRT Encoder	Option to use transport stream over IP using SRT for encoders
Live Listening	Option to monitor input sources of the encoder and decoder as well as audio outputs via Live Listening
SFN	Option to use SFN (single-frequency network) for synchronous playout over the same frequency channel

3.3   Front Panel

1	Headphones	6.3 mm / 1/4" socket for the connection of headphones
2	LCD screen	Illuminated LCD screen, graphical, 264x64 pixels
3	[Warning] LED	LED indicator; will be red if alarm is triggered
4	[Input] LED	LED indicator; will correspond to the sum of the alarm status for the inputs: – off if no input alarms are enabled – green if input alarms are enabled and all inputs are OK – yellow if one or more inputs are bad but at least one is good – red if all inputs are bad
5	[Output] LED	LED indicator; will correspond to the sum of the alarm status for the outputs. – off if no output alarms are enabled – green if output alarms output alarms are enabled and all outputs are OK – yellow if one or more outputs are bad, but at least one is good – red if all outputs are bad
6	[Power] LED	LED indicator: – green if all power supply cords are connected and the power supply is OK. – flashes (green/red) if only one power supply cord is connected and the power supply is OK (only when there is more than one power supply)
7	Reset pin hole	Recessed button for resetting the device (warm start and recovery mode)
8	Jog wheel	Jog wheel for the device operation via the LCD screen on the device

3.4 Back Panel

1-2	Left/right power supply unit	Mains supply voltage IEC socket.
		Fuse ratings depend on mains supply voltage. 100-120 V, 47-63 Hz: T1,6 A; 5x20 mm; IEC; 250 V 220-240 V, 47-63 Hz: T1,0 A; 5x20 mm; IEC; 250 V
		Optional redundant power supply through a second power supply unit:
		– Option: 2x redundant standardized IEC hot-swappable power supply connector; 90-260 V, 47-63 Hz; automatic switchover. – Option: redundant power supply 48 V DC.
		Combination of power supply 230 V AC and 48 V DC is possible.
3	[Grounding stud]	The stud can be used to connect a grounding system if necessary.
4	[Ctrl]	RJ-45 connector, 10/100/1000 Base-T interface for controlling and monitoring the device via Ethernet. The device can communicate with the IP network and can be configured via the integrated web interface using an internet browser.
		The LEDs show the link status (green, active if a physical network connection exists) and the activity status (yellow, active if data communication is active).
5	[USB]	USB 2.0 interface for service, configuration and firmware.
6-7	[Data 1/2]	2x RJ-45 connectors; 10/100/1000 Base-T interface for two redundant outputs for data, audio and GPIO transmission via gigabit Ethernet.
8	[DTE 1-8]	15 pole D-Sub male connector for serial RS-232C data communication, e.g. private data, MPEG ancillary data, UECP/RDS (acc. to TR 101 154). Use a serial breakout cable to provide each input with a serial interface.
9	[GPIO]	26-pole D-Sub male connector; combined connector for inputs (GPI) and outputs (GPO).
10-13	[D OUT 1-4]	4x AES/EBU male interface for the output of digital audio
14-17	[D IN 1-4]	4x AES/EBU female interface for input of digital audio
18	[RF 1/2]	(optional) antenna input for SAT or FM tuner
19	[SYNC/AUX 1]	(optional) connector for SFN synchronization (GPS input)
20	[AUX 2]	(optional) signal output depending on built in hardware component

4   First Steps

4.1   Checking the Delivery Contents

Use the following list to check the completeness of delivery. The delivery contents may vary in exceptional cases.
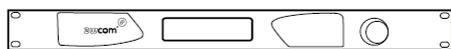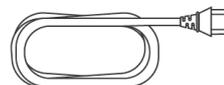
IP-8m   Power cord

User manual in PDF format   Network patch cable

4.2   Installing the Device

Note the following regarding the location:

▶   Mount the device securely and stable in a 19-inch rack designed for this purpose.

▶   Avoid direct sunlight, direct proximity to radiators and air conditioners, dust, water and chemicals

▶   When setting up the device, make sure that it is placed at a suitable viewing angle to the displays and that the device has sufficient heat dissipation.

4.3   Connecting the Device

Before connecting the device to the power supply, first connect the inputs and outputs of the device to the corresponding connectors:

1.   For encoding, connect the signal inputs to [D IN 1-4].

2.   For decoding, connect the signal outputs to [D OUT 1-4].

3.   Connect a network patch cable to [Ctrl] and to your existing network.

4.   Connect network patch cables to [Data 1/2] and to your existing network.

5.   Optionally, connect the interfaces [DTE 1-8], [GPIO], [RF 1/2], [SYNC/AUX 1], and [AUX 2] if needed.

⇒   You have connected the device. Continue with connecting the power supply.

4.4   Connecting the Power Supply

NOTICE
Risk of equipment damage! Make sure that the device and the contained cords are compatible to the domestic line voltage and frequency!

The device optionally has two exchangeable plug-in power supply units which can be equipped with different redundant power supply connectors:
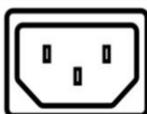
	IEC socket: 230 V AC, 90-260 V AC, 47-63 Hz

	– 48 V DC Neutrik powerCON socket, aut. switchover (NAC3MPA-1) – Neutrik powerCON connector (NAC3FCA) **NOTE:** Power cords are not part of the delivery contents!

IEC socket

▶ Connect the power supply cord fully to the IEC socket at the back panel of the device and to an independent mains power outlet.

Neutrick powerCON socket

The PowerCON device connector system is used to transmit supply voltages of 48 V DC to a device or between individual devices.

To connect the cable connector to the cable:

1. Slide the clamping sleeve (1) and collet (2) onto the cable.
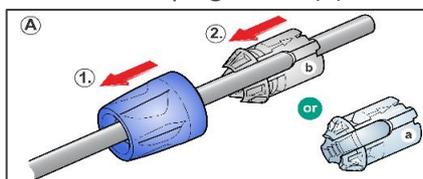
2. Remove part of the insulation as shown in the figure below:
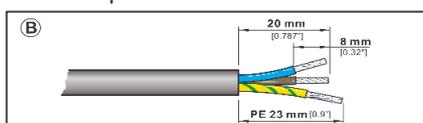
3. Insert the wires into the clamping holes on the inset and fasten them with screw and clamping plate using a screwdriver with a maximum torque of 0.5 Nm.
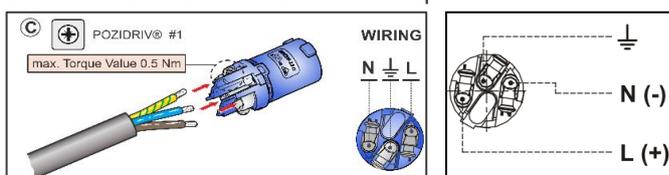
   NOTE: If you use the voltage of 48+ V and 0 V, fasten the +48 V wire to "L" in the connector.
   If you use the voltage 0 V and -48 V, fasten the 0 V wire to "L" in the connector.

4. Push the inset and collet into the housing (observe guide ribs and guide slot!).
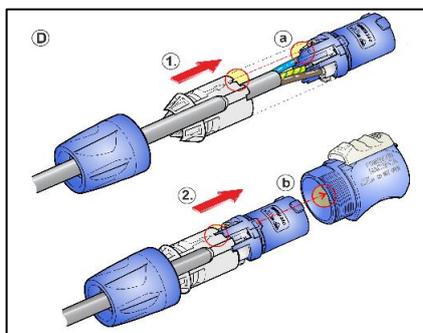
5. Tighten the clamping sleeve with a wrench (SW22), min. torque 2.5 Nm.
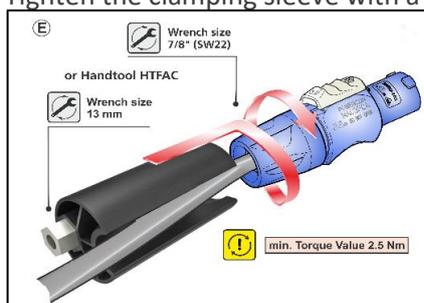
6. Connect the power supply cord fully to the powerCON socket at the back panel of the device and to an independent mains power outlet.

⇒ You have connected the power supply to the device. The "Power" LED is green if both power supply cords are connected. The "Power" LED flashes green/red if only one power supply cord is connected.

4.5 Configuring the Network

To transfer data over IP and access the device via the web interface, you must connect the device to your IP network.

For the [Ctrl] interface, DHCP is enabled by default. When you connect the device to your DHCP-enabled network, it will automatically get the IP configuration for the [Ctrl] interface. To view the obtained IP address, turn the jog wheel to the left to see the "System Info" display. Here you will find the obtained IP address and further system information.

> **NOTICE**
>
> **False connection of the Ethernet interfaces will lead to incorrect operation**
> Use the [Data 1/Data 2] interfaces only for the data transfer.
> Use the [Ctrl] interface only for the access to the device via the web interface and for SNMP.

To connect the device to your IP network and change the IP setup via the LCD menu:

1. Push the jog wheel to enter the configuration menu.

2. Turn the jog wheel to focus the "Network" tab and push the jog wheel.

3. Push the jog wheel to enter the menu for the [Ctrl] interface.

4. Configure the settings for your existing IP network (IP address, netmask, gateway etc. Consult the responsible network administrator if applicable).

5. Turn the jog wheel until the "Save" menu item is selected and push the jog wheel.

6. When asked if the settings should be saved and the device restarted, select "Yes".

⇒ The device is now connected to the IP network.

4.6 Accessing the Web Interface

The device can be fully operated via the integrated web interface using an internet browser. For this purpose, use a computer that is connected to the same IP network that the device is connected to.

✔ You have already connected the [Ctrl] interface to the network.

To access the web interface:

1. Access the web interface by entering the IP address of the device into a web browser.
   ➢ A login screen appears.

2. Enter the username and password. The default login data are (case sensitive):
   - For read-only access: "user"/"user"
   - For full access: "manager"/"manager" or "admin"/"admin"

   NOTE: Change the login data as soon as possible to avoid unauthorized access to the IP-8m and document the login data in a safe place. To change the login data, see 12.9.1 "Changing Login Data".

⇒ After entering the correct login data, the main page of the web interface appears.

5   General Operation

5.1   Operation via the Web Interface

The IP-8m has an integrated web interface. You can make all configurations and operations using a web browser.

▶   Access the web interface by entering the IP address of the IP-8m into a web browser.

NOTICE

To maintain security, you can enable the session timeout function. This causes the current user to be automatically logged out after the configured period of inactivity (see 12.2 "Setting up Session Timeout").

Note the following when operating the device via the web interface:

▶   The main menu for navigation in the web interface of the device is located on the left side. You can reduce and expand the menu entries by clicking on the symbol "^" or "v" respectively.

▶   If you want to keep any changes made in the configuration of the device, click the corresponding "Save" button.
   NOTE: The changes in each block must be saved individually. If you changed data in several blocks or tabs, click the "Save" button under each block to save all changed data. Otherwise, any unsaved block will be reset to the previously saved status.

▶   If you do not want to keep the changes, leave the page without saving. In some cases, you need to click "Cancel".

▶   Use a decimal point as the decimal separator in numbers in the input fields (i.e. "6.5" for "six and a half").

5.2   Operation via the LCD Menu

Some basic functions of the device can also be operated via the LCD menu and jog wheel on the device.

The display has 2 main menus:
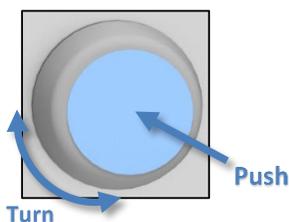
- Status menu (turn jog wheel left or right)
- Configuration menu (push jog wheel)

After a warm or cold start of the device, the display shows the default screen of the status menu. If you navigate in the LCD menu, the display returns to the "Status Overview" after some minutes of inactivity.

Note the following when operating the device in the web interface:

▶   To switch from the status menu to the configuration menu, push jog wheel.

▶   To move the focus in the menu structure, turn jog wheel.

▶   To open a menu tab, focus the tab and push jog wheel.

▶   To select a configurable menu entry, focus the entry and push jog wheel.

▶   To configure the selected menu entry, turn jog wheel.

▶   To confirm a change in a menu entry, push jog wheel.

▶   To return to the previous menu level, select "≪".

Navigation Structure

Status menu
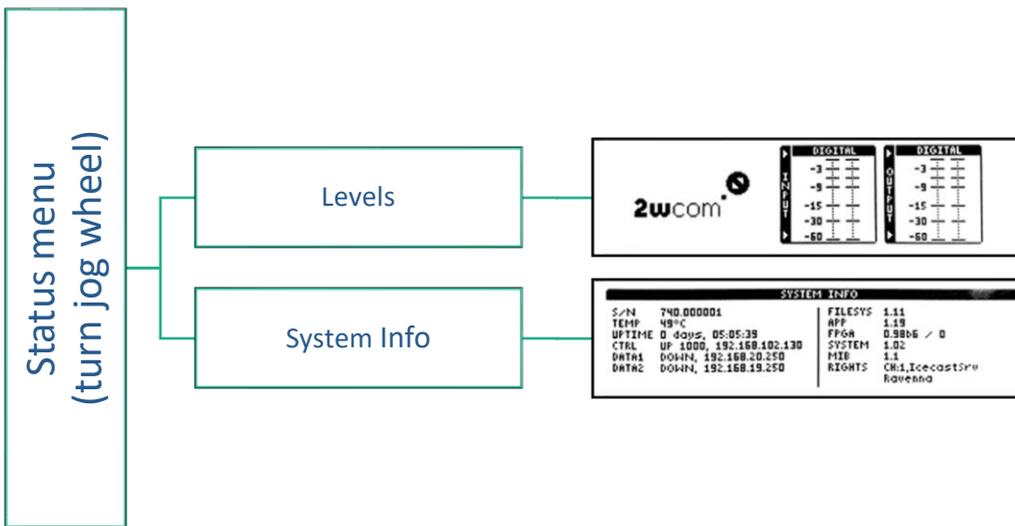
Configuration menu
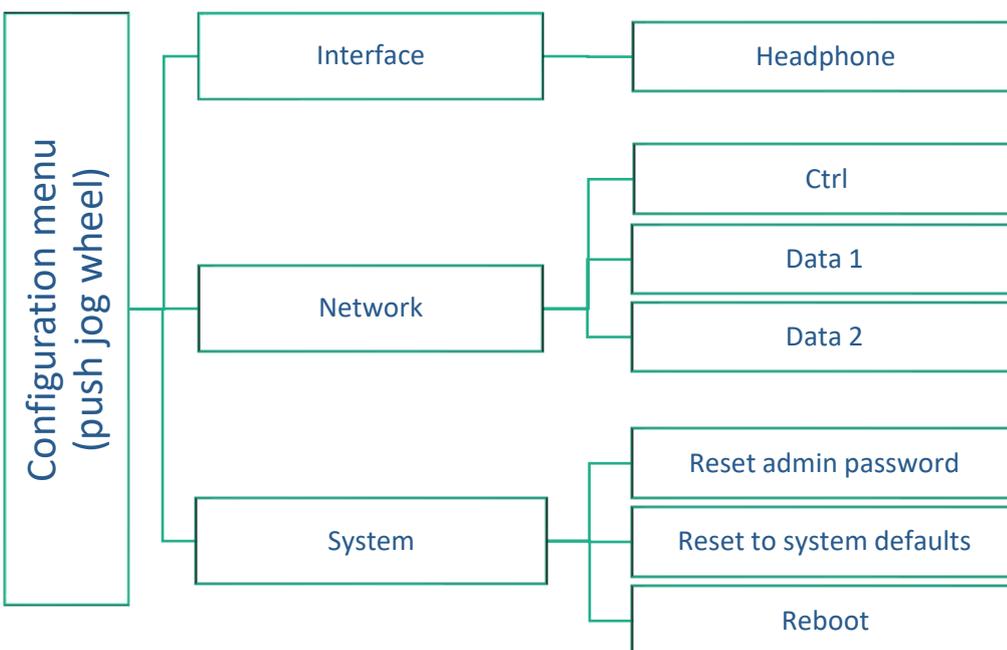
6 Network Settings

6.1 TCP/IP: Configuring the Ethernet Interfaces

The device has 3 Ethernet interfaces: 1 for configuration and 2 for data exchange. Configure the interfaces for data transmission.

NOTICE
False connection of the Ethernet interfaces will lead to incorrect operation!
➢ Use the [Data] interfaces only for data transfer.
➢ Use the [Ctrl] interface only for the access to the device via the web interface and for SNMP

1. Navigate to the page **TCP/IP**.
2. Configure the parameters for the DNS Server, Ctrl and Data interfaces.

> **NOTE:** The necessary address settings depend on the individual network and should be assigned by the responsible network administrator, if applicable.

3. Click **Save**.

Parameters

Primary	Enter the IP address of the primary domain name server (DNS).
Secondary	Enter the IP address of the secondary domain name server (DNS).
Routing	Enable the Routing, which enables the DNS server to send and answer the requests over different [Data] interfaces.
VLAN	Enable the switch and enter the VLAN ID (1-4095).
Priority	Assign a priority (1-7) to this stream to add a priority code point (PCP) according to the IEEE 802.1Q specification. Select 0 to disable the priority and use best-effort delivery.
DHCP	Enable dynamic host configuration protocol (DHCP) which enables the device to get an IP address automatically.
IP Address	Assign an IP address to the interface.
Subnetmask	Enter the subnetmask for the IP address.
Gateway	Enter the address of the local system that is used for the internet access (e.g. the router).
Speed	The speed is set to auto.
Mode	The mode is set to full duplex.

6.2 Configuring SNMP Trap Managers for Monitoring Function

As part of the monitoring function, the device is capable to send SNMP traps to the defined IP addresses of the SNMP managers. It is also possible to readout device settings via SNMP Get.

ⓘ NOTE
For the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files need to be compiled by the SNMP manager tool. You can save the active MIB files in the block "MIB File".

To set up the IP addresses of the SNMP managers:

1. Navigate to **Network Settings→SNMP**.

2. In the block "Trap Manager", configure the following settings:

Figure 1: Network Settings/SNMP/Trap Manager

Enable	Enable or disable a trap receiver.
Version	Select the format version of the SNMP traps.
IP address or Domain Name	Enter the IP address or domain name of the trap receiver.
Port	Enter the port number.

3. To keep the changed settings, click "Save".

You have set up IP addresses for SNMP managers. Each activated trap will be sent once at startup for initialization. For more information on alarm settings, see 11 "Monitoring and Alarm Settings".

6.3 Configuring Access Data for External SNMP Requests

You can configure access data (read community/write community) that is necessary for external SNMP requests to the IP-8m.

To configure the access data:

1. Navigate to **Network Settings→SNMP**.

2. In the block "Read/Write Community", configure the following settings:

Figure 2: Network Settings/SNMP/ Read/Write Community

Read Community	SNMP access data for the external read-only SNMP access to the device
Write Community	SNMP access data for the external write SNMP access to the device

3. To keep the changed settings, click "Save".

⇒ You have configured the access data for external SNMP requests.

6.4 Configuring Ember+ Access for Monitoring Function

As part of the monitoring and remote-control function, the device is capable to be controlled via the Ember+ protocol (optional on request).

To configure the Ember+ access to the IP-8m:

1. Navigate to **Network Settings→EMBER+**.

2. In the block "Settings", configure the following settings:
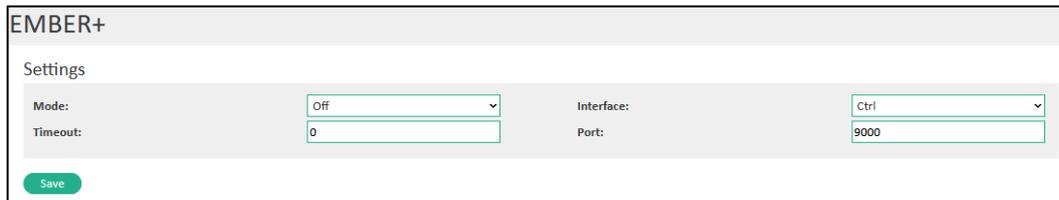
EMBER+

Settings

| Mode: | Off | Interface: | Ctrl |
| Timeout: | 0 | Port: | 9000 |

Save

Figure 3: Network Settings/EMBER+/Settings

Mode	Dropdown menu options: *OFF, UDP, TCP, UDP/TCP*
Timeout	Enter the value for interval in seconds for a timeout.
Interface	Dropdown menu options for the Ethernet connector: *Ctrl, Data 1, Data 2*
Port	Enter the port number for the connection.

3. To keep the changed settings, click "Save".

⟹ You have configured the Ember+ access.

6.5 NTP: Synchronizing Date and Time

The IP-8m can automatically synchronize its date and time with an external NTP server.

To synchronize the date and time settings:

1. Navigate to **System Settings→NTP**.

2. Configure the following settings:

Figure 4: System Settings/NTP

1. NTP Server	Enter the IP address or network name of the first NTP server to be used.
2. NTP Server	Enter the IP address or network name of the second NTP server to be used.
Synchronization	Start or stop the synchronization with the NTP server.
Upsate interval	Enter the time interval for synchronization in seconds.

3. To keep the changes, click "Save".

⟹ You have synchronized the date and time with an external NTP server.

7 Input Source Settings

You can use the following input sources for the encoders and decoders and create up to 16 configuration profiles for each input source.

Input Source	Description	Source Interface
TS/IP	TS/IP – Transport stream over IP using UDP/RTP, Unicast/Multicast (optional: "TS Decoder" right)	[Data 1/Data 2]
TS/SRT	TS/SRT – Transport stream over IP using SRT (Secure Reliable Transport) (optional: "TS Decoder" and "SRT Decoder" rights)	[Data 1/Data 2]
Elementary Streams	RTP Elementary audio stream over IP using Unicast/Multicast	[Data 1/Data 2]
Livewire	IP Streaming over Livewire (optional: "Livewire" right)	[Data 1/Data 2]
SRT	Elementary stream over IP using SRT (optional: "SRT Decoder" right)	[Data 1/Data 2]
SIP	Stream over IP using SIP – Session Initiation Protocol (optional: "EBU Tech 3326" right)	[Audio In 1-n] [Data 1/Data 2]
Icecast	Stream over IP using TCP (Icecast/Shoutcast)	[Data 1/Data 2]
File	Files from internal storage	Internal storage (eMMC, optional SSD)
XLR	Digital (AES/EBU) audio over XLR connector	[D IN 1-4]
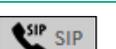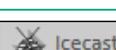
To create a new configuration profile for an input source:

1. Navigate to **Codec Settings→Codec**.

2. Click on the tab "Input Sources".

3. Select the tab of the input source for which you want to create a configuration profile.

4. To create a new configuration profile, click "⊕".
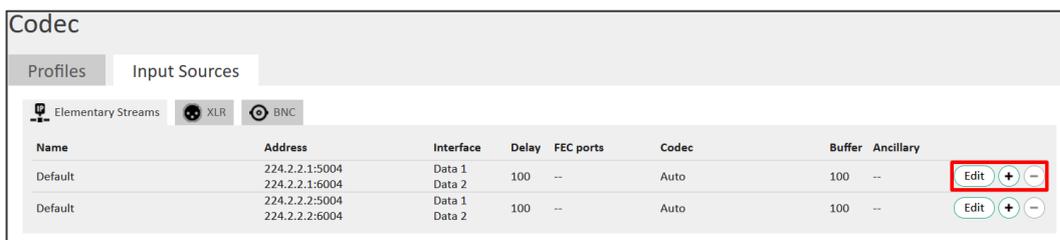
Table 1: Codec Settings/Codec/ Input Sources/Profiles

5. To set up the new configuration profile, click "Edit".
   ➢ A dialog window opens.

6. Edit the settings of the configuration profile.
   NOTE: A description of the individual settings for each input source is given in the following sections.

7. To keep the changes, click "Save"
   ➢ The dialog window closes.

8. To delete a configuration profile, click "⊖".

⇒ You have created and edited a configuration profile.

7.1 Creating Configuration Profiles for TS/IP

> **(!) NOTE**
>
> This option is only available if the right "TS Decoder" is activated.

To configure a configuration profile for the input source Transport Stream (tab "TS/IP"):

1. Create and edit a new configuration profile for the input source "TS/IP" as described in 7 "Input Source Settings".

2. In the dialog window "TS/IP settings", configure the following settings:

Figure 5: Codec Settings/Codec/ TS/IP Settings

Name	Enter the name of the stream for better reference.
IP type	Unicast/Multicast
Multicast IP	IP for Multicast, if selected in the field "Type"
Port	Sender UDP port (the same as set in the encoder settings for output streaming)
IP Interface	Choose the interface for the input signal: [Data 1] or [Data 2].
Protocol	MPEG2 transport stream encapsulation, either UDP only or UDP/RTP
Packet reorder/ dejitter delay	The dejitter buffer for IP transforms the variable delay into a fixed delay. It holds the first packet received for a period of time before it sends it out to the decoder. This time period is necessary for reordering the packets as well as to compensate the jitter and optionally to apply FEC correction and/or to combine it with the second, dual streaming input. Enter the value for this holding period in ms. **NOTE**: The delay time of the input source must not exceed 200 ms if the sample rate is 192 kHz.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values, see 8.10 „Setting up Buffers".
FEC column (L)/ FEC row (D) port offset	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	Enable or disable dual streaming for this input. When dual streaming is enabled, configure the IP parameters. For the Ethernet input, you can set up the same or different sources Data 1/Data 2. (for more information, see 8.8 "Setting up Dual Streaming")

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

4. In the block "Input Sources/Profiles", below the heading "Demux Configurations", create up to 16 demultiplexer configuration profiles for the TS/IP source by clicking "⊕".

5. Click "Edit".

   ➢ The dialog window "Demux configuration" opens.

6. In the dialog window, configure the following settings:

Figure 6:Codec Settings/Codec/ TS/IP /Demux configuration

TS Source	Select the source for the demultiplexer configuration profile in the dropdown menu: TS/IP or TS/SRT.
Name	Enter the name of the stream for better reference.
Configuration mode	Select the configuration mode: "Manual/PID" ("Automatic/Service" not available yet).
Audio PID	If "Manual/PID" is selected, enter the audio PID.
Encapsulation mode	Select an encapsulation mode: Multiprotocol Encapsulation or Packetized Elementary Stream.
Audio sync mode	Select the audio sync mode: Buffer level: synchronization with the rate of the incoming data PCR: synchronization with the PCR PID. This is more precise. (not yet available)
Decoder type	Predefine the codec type for the decoder by choosing the audio codec or selecting "Automatic" from the dropdown menu.
Buffer [ms]	Enter a value for audio buffer. (For more information on buffers, see 8.10 „Setting up Buffers")
Data destination (Ancillary data)	If the input stream of the decoder contains ancillary data, the IP-8m can forward them to the serial outputs [DTE 1-4]. In this case, choose the serial output DTE or UDP in the dropdown menu.
GPIO Tunneling	Enable or disable GPIO Tunneling for GPIO switch between encoder and decoder.
Private data enabled	Enable or disable private data.
Data PID	Enter the data PID.
Data destination (Private data)	Select the data destination: DTE/UDP.

7. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source TS/IP.

7.2 Creating Configuration Profiles for TS/IP

> **! NOTE**
>
> This option is only available if the rights "TS Decoder" and "SRT Decoder" are activated.

To configure a configuration profile for the input source Transport Stream SRT (tab "TS/SRT"):

1. Create and edit a new configuration profile for the input source "TS/SRT" as described in 7 "Input Source Settings".

2. In the dialog window "TS/SRT settings", configure the following settings:

Figure 7: Codec Settings/Codec/ TS/SRT settings

Name	Enter the name of the stream for better reference.
Mode	Select whether you want to use SRT in listener or caller mode.
Port	Specify the port number for SRT connection.
IP interface	Choose the interface for the input signal Data 1 or Data 2.
Latency [ms]	Define the time interval for the latency before the IP-8m starts to decode the signal distributed via SRT protocol.
Use Encryption	If the input stream is protected by AES encryption, activate end-to-end encryption by switching "ON".
Passphrase	Enter a (defined) password used to secure the SRT stream.

3. To keep the changes, click "Save".
   - ➢ The dialog window closes.

4. In the block "Input Sources/Profiles", below the heading "Demux Configurations", create up to 16 demultiplexer configuration profiles for the TS/SRT source by clicking "⊕".

5. Click "Edit".
   - ➢ The dialog window "Demux configuration" opens.

6. In the dialog window, configure the following settings:
   NOTE: For the description of these settings, see 7.1 "Creating Configuration Profiles for TS/IP" step 6.

Figure 8: Codec Settings/Codec/ TS/SRT /Demux configuration

7. To keep the changes, click "Save".

> ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source TS/SRT.

7.3 Creating Configuration Profiles for Elementary Streams

To create a configuration profile for the input source elementary streams:

1. Create and edit a new configuration profile for the input source elementary streams as described in 7 "Input Source Settings".

2. In the dialog window "RTP Elementary stream settings", configure the following settings:

Name	Enter the name of the stream for better reference.
IP Type	Choose between unicast and multicast.
Multicast	If you use multicast, enter the multicast IP.
Port	Sender UDP port (the same as configured in the encoder settings for output streaming).
IP interface	Choose the Ethernet interface for the input signal: Data 1 or Data 2.
Packet recorder/ dejitter delay	The dejitter buffer for IP stores a configurable number of packets before passing them on to the decoder. This buffer is necessary for possibly reordering packets, as well as to compensate jitter. Optionally, it is also used to apply FEC correction and/or to combine one stream with the second, dual streaming input. Enter the size for this buffer in milliseconds (ms).
Pro-MPEG FEC	Enable or disable FEC processing.
FEC column (L)/ FEC row (D) port offset	Enter the offsets used by the encoder, based on the main destination port, that row and column ports are being expected on. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). The default settings for FEC is 2 (column) and 4 (row)7. If you do not want to use this offset, enter "0".
Dual streaming	Enable or disable dual streaming for this input. When dual streaming is enabled, configure the IP parameters. For the Ethernet input, you can set up the same or different sources Data 1/Data 2. (for more information, see 8.8 "Setting up Dual Streaming")
Decoder type	Predefine the codec type for the decoder by choosing the audio codec or selecting "Automatic" from the dropdown menu.
Synchonous Playout / SFN	Enable Synchronous Playout using SFN or enter a buffer size [ms].

Clock Source	Select the clock source: internal or external.
Data destination (Ancillary Data)	If the input stream of the decoder contains ancillary data, the IP-8m can forward them to the serial outputs [DTE]. In this case, choose the serial output DTE or UDP in the dropdown menu.
GPIO Tunneling	Enable or disable GPIO tunneling for GPIO switch between encoder and decoder.

3. To keep the changes, click "Save".

    ➢   The dialog window closes.

⇒   You have created and edited a configuration profile for the input source elementary streams.

If the right "Ravenna" is activated, you can configure the settings automatically by using the Ravenna protocol. For this function, first configure the SAP service. Available streams will then be displayed in the dropdown menu "available streams". By clicking "Copy/use selected stream settings", you can copy the settings into the input fields.

7.4   Creating Configuration Profiles for Livewire

> **(!) NOTE**
>
> This option is only available if the right "Livewire" is activated.

To configure a configuration profile for the input source Livewire (tab "Livewire"):

1. Create and edit a new configuration profile for the input source "Livewire" as described in 7 "Input Source Settings".

2. In the dialog window "Livewire source settings", configure the following settings:

Figure 9: Codec Settings/Codec/Livewire source settings

Livewire Source (SRC)	Manual: Enter the Livewire settings manually. In this menu, available advertised Livewire streams will be displayed and can be selected for automatic configuration.
Source (SRC) Channel	Enter a number (16 bit, in the range of 0…65535) describing a stream/channel.
Source (SRC) Port	Specify the port number for Livewire connection.
Source (SRC) Interface	Select the interface for Livewire connection: Data 1/Data 2.
Gain	Specify gain for the Livewire source (-12.0...6.0 dB)

3. To keep the changes, click "Save".

    ➢   The dialog window closes.

⇒   You have created and edited a configuration profile for the input source Livewire.

7.5 Creating Configuration Profiles for SRT

> **(!) NOTE**
>
> This option is only available if the right "SRT Decoder" is activated.

To configure a configuration profile for the input source SRT (tab "SRT"):

1. Create and edit a new configuration profile for the input source "SRT" as described in 7 "Input Source Settings".

2. In the dialog window "SRT settings", configure the following settings:

Figure 10: Codec Settings/Codec/ SRT settings

Name	Enter the name of the stream for better reference.
Mode	Select whether you want to use SRT in listener or caller mode.
Port	Specify the port number for the SRT connection.
IP interface	Choose the interface for the input signal Data 1 or Data 2.
Latency [ms]	Define the time interval for the latency before the IP-8m starts to decode the signal distributed via SRT protocol.
Use Encryption	If the input stream is protected by AES encryption, activate end-to-end encryption by switching "ON".
Passphrase	Enter a (defined) password used to secure the SRT stream.

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source SRT.

7.6 Creating Configuration Profiles for SIP

The IP-8m supports Audio IP streaming using SIP (Session Initiation Protocol). You can use an SIP connection for bidirectional data flows between encoder and decoder: either directly or via the Data 1/Data 2 interfaces or over a server (registrar).

> **(!) NOTE**
>
> The option "IP streaming over SIP" is only available if the right "EBU Tech 3326" is activated.

To register with a SIP server and configure a configuration profile for the input source SIP:

1. Create and edit a new configuration profile for the input source "SIP" as described in 7 "Input Source Settings".

2. In the dialog window "SIP registrar settings", configure the following settings:

Figure 11: Codec Settings/Codec/SIP registrar settings

Registrar	Enter the Internet domain name of a SIP server if you want the connection to be established over a SIP server.
Proxy	If you have enabled the switch "Use proxy", specify the IP address.
Phone number	Enter your phone number for registration with a SIP server.
Display name	Assign a name to the SIP server for better reference.
Username	Enter your username for registration with a SIP server.
Password	Enter your password for registration with a SIP server.
Interface	For different accounts, you can use different interfaces (Data 1/Data 2) or the same interface to set up the connection.
Packet reorder/ dejitter delay	The dejitter buffer for IP transforms the variable delay into a fixed delay. It holds the first packet received for a period of time before it sends it out to the decoder. This time period is necessary for reordering the packets as well as to compensate the jitter and optionally to apply FEC correction and/or to combine it with the second, dual streaming input. Enter the value for this holding period in ms.
Expires	Enter the interval in seconds for the registration renewal
Connection timeout	Enter the interval in seconds for disconnection if there is no incoming audio signal
Mono mix mode	Choose Left, Right or Downmix (send audio stream).
RTP port	If you have disabled the switch "Auto-configure RTP port", specify the port number.
Buffer	Enter a value for audio buffer. (For more information on buffer, see 8.10 „Setting up Buffers")

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source SIP.

7.7 Creating Configuration Profiles for Icecast

To configure a configuration profile for input source Icecast server (audio over IP):

1. Create and edit a new configuration profile for the input source "Icecast" as described in 7 "Input Source Settings".

2. In the dialog window "Icecast settings", configure the following settings:

Figure 12: Codec Settings/Codec/Icecast settings

Name	Assign a name to the Icecast server for better reference.
URL	Enter the URL of an Icecast server in the local network or the internet, i.e. "192.168.99.131" or "www.backup-audio.com".
IP interface	Choose the Ethernet connector for the audio stream input Data 1 or Data 2.
Buffer	Enter a value for audio buffer. (For more information on buffers, see 8.10 „Setting up Buffers")

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source Icecast server.

7.8 Creating Configuration Profiles for Internal Storage

The IP-8m can use the audio files uploaded to the internal storage as a source for the audio stream. You can upload audio files to the internal storage from the local storage of your Computer.

To configure a configuration profile for input source internal storage (tab "File"):

1. Navigate to **Status→Storage**.

2. In the block "Upload", click "Browse/Drop file".

3. Select the audio file that you want to upload to the internal storage.

   ➢ The file is now listed in the block "Audio files".

4. Create and edit a new configuration profile for the input source "File" as described in 7 "Input Source Settings".

5. In the dialog window "File settings", configure the following settings:

Figure 13: Codec Settings/Codec/File settings

Name	Assign a name to the file configuration profile for better reference.
File	Select the audio file in the dropdown menu.
Buffer	Enter a value for audio buffer. (For more information on buffers, see 8.10 „Setting up Buffers").

6. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source "File".

7.9 Creating Configuration Profiles for XLR

To create a configuration profile for the input source XLR:

1. Create and edit a new configuration profile for the input source XLR as described in 7 "Input Source Settings".

2. In the dialog window "XLR Audio input settings", configure the following settings:

Figure 14: Codec Settings/Codec/XLR Audio input source settings

Name	Assign a name to the audio input configuration profile for better reference.
Ancillary Data Source	Select the source for ancillary data in the dropdown menu: none, DTE or UDP.
Clock Source	Select a clock source: internal or external.

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have created and edited a configuration profile for the input source XLR.

8 Codec Settings

8.1 Configuring Audio Channels

You can configure the audio channels for surround sound. Surround sound is a technique for enriching the fidelity and depth of sound reproduction by using multiple audio channels from speakers that surround the listener.

To change the audio channel configuration of the inputs and outputs:

1. Navigate to **Codec Settings→Channel Config**.

2. In the dropdown menu "Channel configuration", select the allocation of the channels to one or more audio inputs/outputs.

3. Click "Apply".

4. In the field "Name", enter the name of the channel configuration for better reference.

5. Using the remaining dropdown menus, configure the desired channel setup.

6. The keep the changes, click "Save".

⇒ You have changed the channel configuration of the inputs and outputs.

8.2 Creating Codec Profiles

You can create codec profiles to assign to the different encoders of the IP-8m.

To define codec profiles:

1. Navigate to **Codec Settings→Codec**.

2. Click on the tab "Profiles".

Figure 15: Interface Settings/Codec/Profiles

3. To create a new codec profile, click "⊕".
   ➢ A new preset appears below the already existing one(s).

4. To set up the new codec profile, click "Edit".
   ➢ A dialog window opens.

5. Configure the settings of the codec profile:
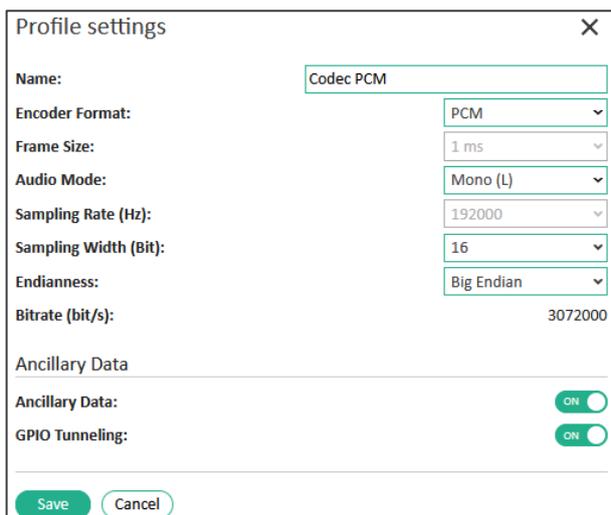
Figure 16: Interface Settings/Codec/Profile settings

Name	Assign a name to the codec profile for better reference.
Encoder Format	Select the encoder format. Different settings are configurable, depending on the selected encoder format.
Frame Size	Select the required frame size.
Audio Mode	Select the audio mode in the dropdown menu.
Sampling Rate [Hz]	Set up sampling rate in the dropdown menu. NOTE: The sampling rate for Livewire can only be configured for 48 kHz. NOTE: The delay time of the input source must not exceed 200 ms if the sample rate is 192 kHz. The sampling width is set to 192,000 Hz.
Sampling Width [Bit]	Set up sampling width in the dropdown menu in the range of 16-24 bits depending on the selected encoder format.
Endianness	Select the endianness (order of bytes).
Bitrate [kbit/s]	Select the bit rate in the dropdown menu depending on the chosen audio mode. For some encoder formats, this field just shows the calculated bitrate depending on the selected settings.
Ancillary Data	To add the ancillary serial data to the stream, activate the switch.
GPIO Tunneling	For GPIO switch between encoder and decoder activate the function "GPIO Tunneling".

6. To keep the changes, click "Save".

➢ The dialog window closes.

⇒ You have created and edited a codec profile.

8.3 Assigning Input Source and Codec Profile to an Encoder

The IP-8m is equipped with parallel encoders that can operate at the same time. One input can be the source for several encoders.

✔ You have already created configuration profiles for the input sources you want to use (see 7 "Input Source Settings").

To activate and configure the encoder(s):

1. Navigate to **Codec Settings→Codec**.

2. Click on the tab "Encoder".
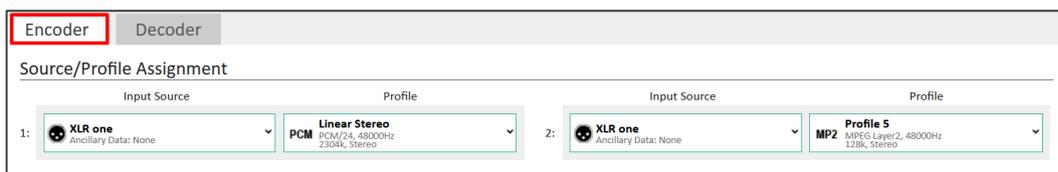
Figure 17: Codec Settings/Codec/Encoder

3. In the block "Source/Profile Assignment", assign an input source profile to each encoder by selecting it in the dropdown menu "Input source". Alternatively, drag/drop the input source profile into this field.

4. Assign a codec profile to each encoder by selecting it in the dropdown menu "Profile". Alternatively, drag/drop the codec profile into this field.

5. To keep the changes, click "Save".

⇒ You have activated and configured the encoder(s).

> ### (!) NOTE
>
> The IP-8m can also operate as a **transcoder** and change the codec format of an input audio stream.
> For transcoding, assign the corresponding input stream to the encoder and configure the format of the output stream.

8.4 Setting up Encoder Outputs

You can activate and configure several output streams for each encoder.

To set up an encoder output:

1. Navigate to **Codec Settings→Codec**.

2. Click on the tab "Encoder".

3. In the block "Encoder Outputs", select the tab of the output you want to set up.
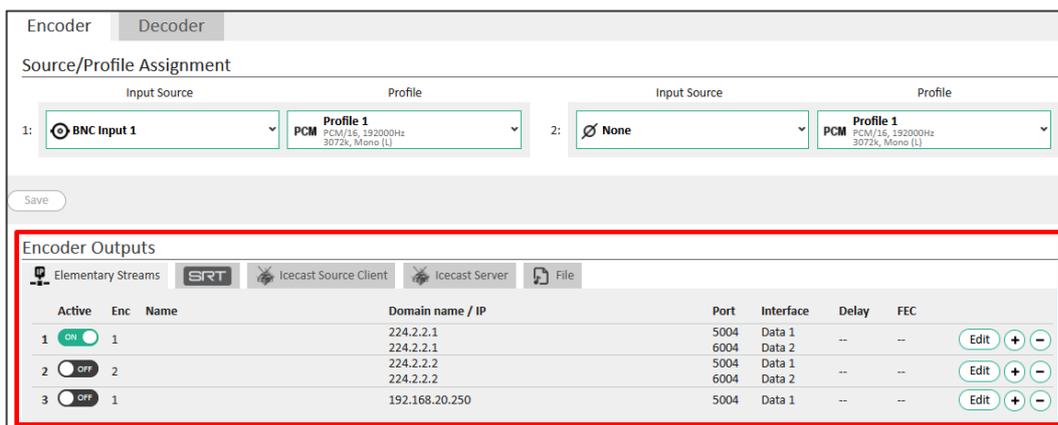
Figure 18: Codec Settings/Codec/ Encoder Outputs

4. Click "⊕" to create a new configuration profile for an encoder output.

5. To set up the new profile, click "Edit".
   ➢ A dialog window opens.

6. Edit the output settings.
   NOTE: A description of the individual settings for each output is given in the following sections.

7. To keep the changes, click "Save"

   ➢ The dialog window closes.

8. If you want to delete a configuration profile, click "⊖".

⟹ You have set up an encoder output.

8.4.1 Setting up Elementary Streams Output

For the output Elementary Streams, you can predefine several output streams (destinations) over [Data 1/Data 2] interfaces. You can assign each Elementary Stream output to one preconfigured encoder (see 8.3 "Assigning Input Source and Codec Profile to an Encoder") and to the Ethernet outputs [Data 1/Data 2].

To set up the output Elementary Streams and its destinations:

1. Create and edit a new configuration profile for this output as described in 8.4 "Setting up Encoder Outputs".

2. In the dialog window "Elementary streams output settings", configure the following settings:

Figure 19: Interface Settings/Codec/Elementary stream output settings

Activation	Enable or disable this output stream.
Encoder	Select an encoder profile for the output stream in the dropdown menu.
Name	Enter the name of the stream for better reference.
Domain Name/IP	Define the domain name or IP address of the destination.
Port	Specify the port number of the destination.
Multicast TTL	TTL (Time to Live) for multicast packets.
IP interface	Select the interface for the output: Data 1/Data 2.
Mode	Select the mode of the output stream in the dropdown menu: RTP or UDP. **NOTE**: Besides the UDP/RTP, the RTCP packets are also generated for the encoder output and are sent in 5 s intervals. UDP/RTP allows reordering packets by means of sequence numbers.
Send delay [ms]	Set up the send delay, which the encoder should wait in order to send Audio over IP as an offset stream for redundancy (for more information, see 8.10 "Setting up Buffers").

Synchronous Playout / SFN	Enable SFN for synchronous playout.
Pro-MPEG FEC	Enable and configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values, see 8.10 "Setting up Buffers".
FEC column (L)/ FEC row (D) port offset	Enter the offsets for row and column FEC streams that the encoder should use based on the main destination port. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). The FEC default is 2 (column) and 4 (row). If you do not want to use this offset, enter "0".
Dual streaming	Enable or disable dual streaming. When dual streaming is enabled, configure the IP parameters. For the Ethernet input, you can set up the same or different sources Data 1/Data 2. (for more information, see 8.8 "Setting up Dual Streaming")

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have set up the output Elementary Streams and its destination.

8.4.2 Setting up SRT Output

For the output SRT (Secure Reliable Transport), you can predefine several output streams (destinations) over [Data 1/Data 2] interfaces. You can assign each SRT output to one preconfigured encoder (see 8.3 "Assigning Input Source and Codec Profile to an Encoder") and to the Ethernet outputs [Data 1/Data 2].

To set up the SRT output:

1. Create and edit a new configuration profile for this output as described in 8.4 "Setting up Encoder Outputs".

2. In the dialog window "SRT output settings", configure the following settings:
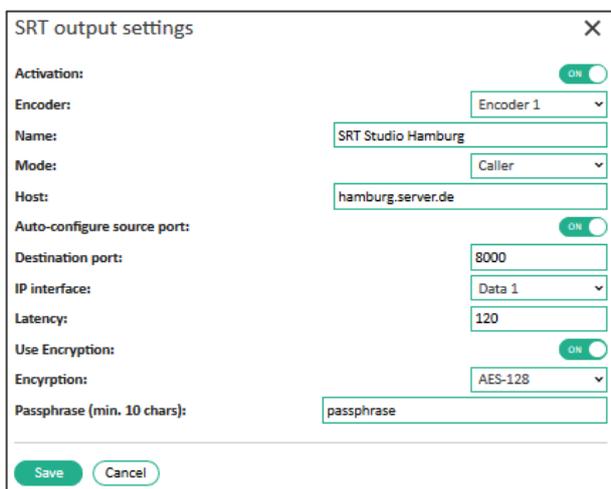
Figure 20: Codec Settings/Codec/SRT output settings

Activation	Enable or disable this output stream.
Encoder	Select an encoder profile for the output stream in the dropdown menu.
Name	Enter the name of the stream for better reference.
Mode	Choose between "Caller" and "Listener" mode.
Host	Enter the host domain of the SRT destination.
Auto-configure source port	Activate automatic configuration of the source port.
Source port	If auto-configuration is disabled, enter the source port number manually (relevant for e.g. firewall)
Destination port	Enter the port number of the destination.

IP interface	Select the interface for the output: Data 1/Data 2
Latency	Define the time interval for the latency before the IP-8m starts to output the SRT stream.
Encryption	Disable or enable encryption.
	The type of AES encryption determines the length of the key (passphrase). AES-128 uses a 16-character (128-bit) passphrase, AES-192 uses a 24-character (192-bit) and AES-256 uses a 32-character (256-bit) passphrase.
Passphrase	Define a password used to secure the SRT stream.

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have set up the SRT output.

8.4.3 Setting up Icecast Source Client Output

To send the output stream to an Icecast server:

1. Create and edit a new configuration profile for this output as described in 8.4 "Setting up Encoder Outputs".

2. In the dialog window "Icecast source client settings", configure the following settings:
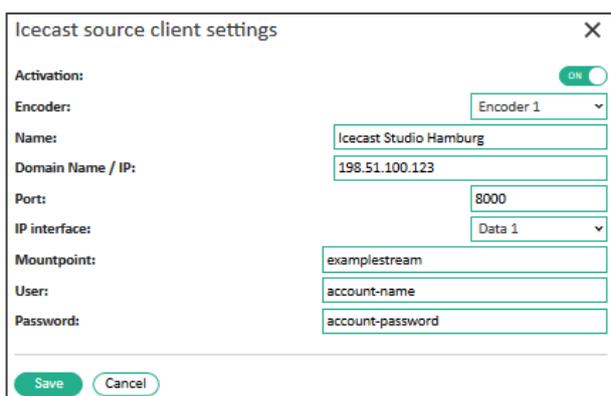
Figure 21: Interface Settings/Codec/Icecast source client settings

Activation	Enable or disable this output stream.
Encoder	Select an encoder profile for the output stream in the dropdown menu.
Name	Enter the name of the stream for better reference.
Domain Name/IP	Define the IP for the destination.
Port	Specify the port number of the destination
IP interface	Select the interface for the output: Data 1/Data 2
Mountpoint	Specify the mountpoint of the stream in the domain.
User	Enter the username for using the domain.
Password	Enter the password for using the domain.

3. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have set up the output for Icecast Source Client.

8.4.4 Setting up Icecast Output

This feature is not yet available .

8.4.5   Setting up Internal Storage Output

This feature is not yet available .

8.5   Outputting TS Multiplexer

The IP-8m is able to output several multiplexed streams over IP. One multiplexed stream can contain several programs and to each program, you can add several payload contents. You can use one [Data] interface as the output for the same stream content and the same destination as a redundancy, or send different stream contents to the same or different destinations.

It is also possible to use the same PIDs with different encoders for one program. If the multiplexer is configured like that, it will always transmit the encoder with a valid signal and the smallest number in the MPEGTS. The device continuously checks whether the individual encoders have a valid signal.

✔   You have already defined and preconfigured input sources (see 7 "Input Source Settings").
✔   You have already assigned input source configuration profiles and coder profiles to the encoders (see 8.3 "Assigning Input Source and Codec Profile to an Encoder").

8.5.1   Configuring TS Multiplexer

To configure and to activate multiplexer output streams:

1. Navigate to **Codec Settings→TS Multiplexer**.

    In the block "Payload sources, you can see the available encoder profiles in the tab "Encoder audio". In the tab "Data", you can see the available DTE input sources for private data.

2. To create a new Multiplex, click the tab "+" below block "Payload sources"

    ➢   A new tab "Multiplex 1-8" appears.

3. In the block "TS Payload content", add a new service by clicking "Add Service".

4. To add encoder audio to the stream, select an available encoder in the dropdown menu "Payload". Alternatively, drag/drop the corresponding encoder from the tab "Encoder audio".

5. To add another payload to the content, click "Add Payload".

6. To add private data to the stream, select an available DTE input source in the dropdown menu "Payload". Alternatively, drag/drop the corresponding DTE input from the tab "Data".

7. Specify the service ID, service name, service provider name, PMT PID, PCR PID,PID and language for the corresponding program.

8. In the block "General", configure the following settings:

Figure 22: Codec Settings/Codec/General

Packetizing format	Select the packetizing format: TS/RTP or TS/UDP.
DVB tables	Choose the DVB tables to be used: All, None, PAT/PMT or PAT/PMT/SDT.
Bit rate	If auto-calculated TS bit rate is disabled, enter the bit rate manually.
Audio bitrate priority	Select a priority for the audio bitrate: low latency or low bitrate overhead.
Private data mode	Select the private data mode: Elementary stream (ES) or TS adaption.
Network ID	Enter the network ID.
Original Network ID	Enter the original network ID.
Transport Stream ID	Enter the transport stream ID.
Network name	Enter the network name.

9. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have configured the TS Multiplexer. You can continue with outputting TS Multiplex.

8.5.2   Outputting TS Multiplex over IP

The IP-8m can output Transport Stream over the two IP interfaces [Data 1/Data 2]. For each TS Multiplex, you can create and save up to 32 output destination streams. Possible streams for IP outputs are TS/IP and TS/SRT:

TS/IP	Transport stream over IP using UDP/RTP, Unicast/Multicast (optional: "TS Encoder" right required)
TS/SRT	Transport stream over IP using SRT (Secure Reliable Transport) (optional: "TS Encoder" and "SRT Encoder" rights required)

To configure multiplex outputs for TS over IP interfaces:

1. Navigate to **Codec Settings→TS Multiplexer**.

2. In the block "Multiplexer Outputs", either click on the tab "TS/IP" or "TS/SRT, depending on which transport stream you want to configure.

3. To create a new TS/IP or TS/SRT destination stream for the selected Multiplexer, click "⊕".

4. To set up the new destination stream, click "Edit".

   ➢ The dialog window "IP/SRT transport stream output settings" opens.

5. In the corresponding dialog window, configure the following settings:
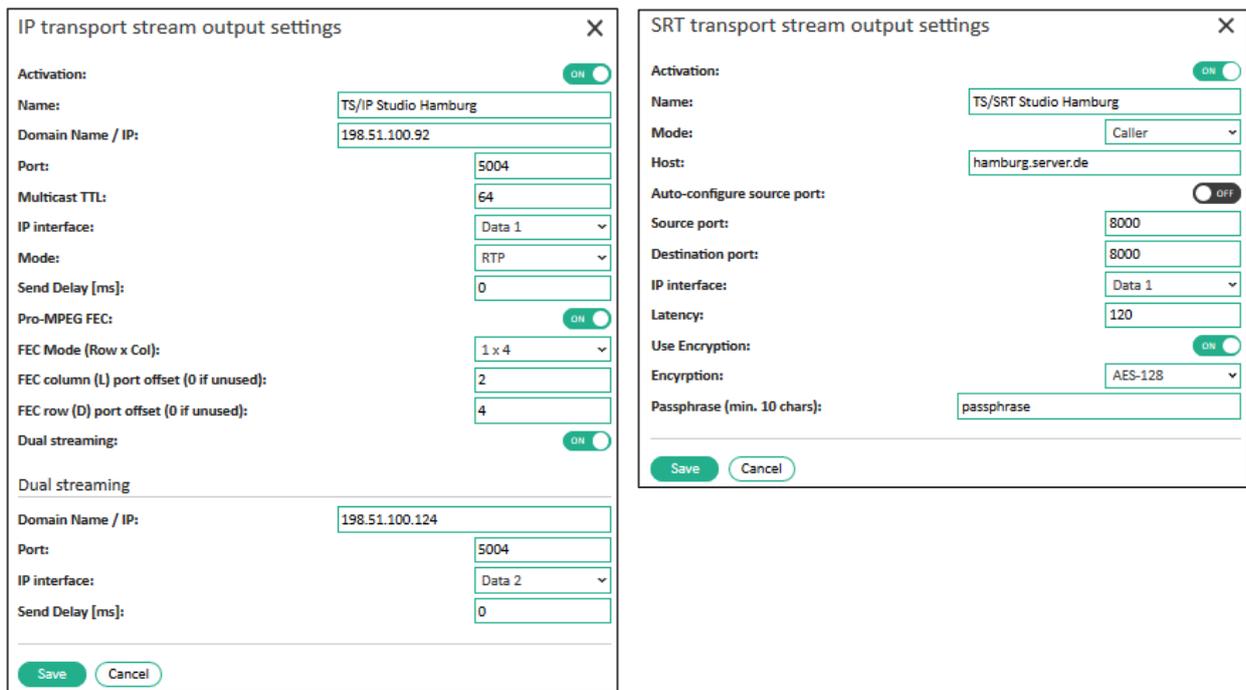
Figure 23: Codec Settings/TS Multiplexer/Transport stream output settings

For TS/IP:

Activation	Enable or disable this output stream.
Name	Enter the name of the stream for better reference.
Domain Name/IP	Define the IP for a destination.
Port	Specify the port number of the destination.
Multicast TTL	TTL (Time to Live) for multicast packets
IP interface	Select the interface for the output: Data 1/Data 2.
Mode	Select the mode of the output stream in the dropdown menu: RTP or UDP. **NOTE**: Besides the RTP, the RTCP packets are also generated for the encoder output and are sent in 5 s intervals. RTP allows reordering packets by means of sequence numbers.
Send Delay	Set up the send delay, that the encoder should wait in order to send Audio over IP as an offset stream for redundancy (for more information, see 8.10 "Setting up Buffers").
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values, see 8.10 "Setting up Buffers". **NOTE**: Enable Pro-MPEG FEC in the corresponding decoder.
FEC column (L)/ FEC row (D) port offset	Enter the <u>offset</u> to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual Streaming	Enable or disable dual streaming. If dual streaming is enabled, the menu will expand. Set up the connection for dual streaming in the expanded menu. For the Ethernet input, you can select the same or a different source. **NOTE**: Enable dual streaming in the corresponding decoder.

For TS/SRT:

Activation	Enable or disable this output stream.
Name	Enter the name of the stream for better reference.
Mode	Choose between "Caller" and "Listener" mode.
Host	Enter the host domain of the SRT destination.
Auto-configure source port	Activate automatic configuration of the source port.
Source port	If auto-configuration is disabled, enter the source port number manually (relevant for e.g. firewall)
Destination port	Enter the port number of the destination.
IP interface	Select the interface for the output: Data 1/Data 2
Latency	Define the time interval for the latency before the IP-8m starts to output the SRT stream.
Encryption	Disable or enable encryption.
	The type of AES encryption determines the length of the key (passphrase). AES-128 uses a 16-character (128-bit) passphrase, AES-192 uses a 24-character (192-bit) and AES-256 uses a 32-character (256-bit) passphrase.
Passphrase	Define a password used to secure the SRT stream. **NOTE**: The same encryption key should be set for this input TS in the corresponding decoder.

6. To keep the changes, click "Save".

   ➢ The dialog window closes.

⇒ You have configured an output stream for TS Multiplexer.

8.6 Assigning And Activating Source Streams for the Decoder

For each audio output, you can activate up to 4 input streams for decoding and assign one of them to the "Main Source". The remaining streams are alternative backups for decoding. The decoder receives and processes all enabled input sources from the encoder but only outputs the audio signal of the highest priority (main source – backup 1/2/3) that is error-free.

✓ You have already defined configuration profiles for input sources (see 7 "Input Source Settings").

To assign the predefined source streams for decoding:

1. Navigate to **Codec Settings→Codec**.

2. Click on the tab "Decoder".
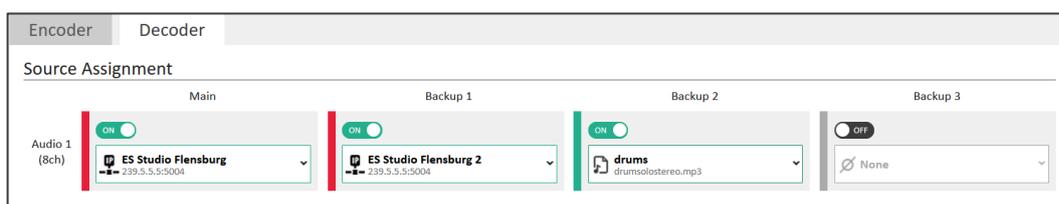
Figure 24: Codec Settings/Codec/Decoder

3. In the block "Source Assignment", activate an input signal in the "Main" column by setting the switch to "ON".

4. To configure the main source, assign an input source profile by selecting it in the dropdown menu. Alternatively, drag/drop the input source profile into the field.

   NOTE: You can use XLR audio inputs as a backup source fed from an external device or for a loop-back test.

   NOTE: You can decode and play files from an internal storage. This option is recommended as an advanced redundancy for backup sources in case of input failure.

5. Configure up to 3 backup sources following the same principle in the columns "Backup 1-3".

6. To keep the changes, click "Save".

⇒ You have assigned source streams for decoding. Continue with defining switch criteria for the main and backup sources.

8.7 Defining Switch Criteria

The IP-8m decoder can automatically switch between alternative sources as a redundancy solution in case of failure. The decoder receives and processes all enabled input sources from the encoder but only outputs the audio signal of the highest priority (main source – backup 1/2/3) that is error-free. The IP-8m is able to automatically switch between the main and backup sources for each audio output, if one of the signals should fail.

You can enable the following switch criteria for input sources in the decoder:

No input data	The decoder will switch to the next input source if no signal is available in the activated IP input Data 1/Data 2.
Packet jitter	The decoder will switch to the next input source if the period of packet jitter in the enabled input stream is above of the minimal threshold value of this delay.
Packet loss	The decoder will switch to the next input source if packet errors are detected in the input signal over the activated IP input Data 1/Data 2. You can set up the minimal threshold value for the PER (packet error rate).
No decoder audio output	The decoder will switch to the next input source if it does not detect audio in the activated input stream or cannot decode audio.
Audio silence detection	The decoder will switch to the next input source if it detects silence in the decoded audio signal (L/R) in the input stream. You can set the threshold value to define the silence level.

To define switch criteria for each streaming source and audio input:

1. Navigate to **Codec Settings→Switch Criteria**.

2. Click on the tab of the streaming source or audio input you want to define switch criteria for.

3. If any of the listed criteria in this tab should be monitored, set the corresponding switch to "ON".

4. In the field value, enter the threshold value to define:
   - Minimal delay period for "Packet jitter"
   - Minimal percentage value for "Packet loss"
   - Silence level in dBFS for "Silence detection"

5. For each enabled criterion, define the delay time "T1" for switching release. After this delay time, the input source switches to the configured backup source.

6. For each enabled criterion, define the delay time "T2" for switching end. After this delay time, the input source switches back to the previous source, if its signal is good.

7. To keep the changes, click "Save".

⇒ You have defined the switch criteria for streaming sources and audio outputs. The IP-8m now automatically switches to the next good input source.

⇒ In the tab "Decoder" (**Codec Settings→Codec**), the virtual LED for each input source now lights either green or red.

⇒ For some switch criteria, you can set an alarm (see 8.7 "Defining Switch Criteria").

8.8   Setting up Dual Streaming

The IP-8m is equipped with 2 IP interfaces that serve for dual streaming redundancy. It can receive the same audio signal over dual IP inputs from different IP addresses and in different qualities as redundancy, and to decode it to one output.

In case of an alarm, the IP-8m can automatically switch to a configured backup stream. The main stream and backup sources can use different stream types and different IP inputs. The decoder can receive and process one or two streams over the same IP input or one dual stream split over two IP inputs as a redundancy.

To set up dual streaming:

1.   Enable and configure dual streaming in the source stream configuration (see 7 "Input Source Settings").

Figure 25: Dual streaming settings

2.   Select the input stream profile in the block "Source Assignment" (see 8.3 "Assigning Input Source and Codec Profile to an Encoder").

⇒   You have set up dual streaming.

8.9   Setting up FEC

The IP-8m coder implements Pro-MPEG FEC (Practice #3 release 2) to reduce packet loss and burst errors in the outcoming and incoming IP data streams. You can enable and configure the Pro MPEG Forward Error Correction in the dialog window when editing the output stream settings (see 8.4.1 "Setting up Elementary Streams Output").

To configure the Pro MPEG FEC for encoder outputs:

1.   In the dialog window for editing the output stream settings, enable "Pro-MPEG FEC".
   ➢   The menu expands.

Figure 26: Pro-MPEG FEC settings

2. Set up the FEC parameters for the IP output:

Pro-MPEG FEC	Configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values, see 8.10 "Setting up Buffers".
FEC column (L)/ FEC row (D) port offset	Enter the offsets for row and column FEC streams that the encoder should use based on the main destination port. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). The FEC default is 2 (column) and 4 (row). If you do not want to use this offset, enter "0".

3. To keep the changes, click "Save".

➢ The dialog window closes.

⇒ You have set up FEC for the corresponding output. Via **Information➔Overview**, you can view the current status of FEC in the block "Decoder Details".

8.10 Setting up Buffers

The IP-8m is equipped with an audio buffer and a dejitter delay for IP.

The audio buffer is a delay buffer for decoded audio. It saves decoded audio to output it in case of failure. The IP-8m can use this time buffer, for example, to switch to the backup source or external source.

The dejitter buffer for IP stores a configurable number of packets before passing them on to the decoder. This buffer is necessary for possibly reordering packets, as well as to compensate jitter. Optionally it is also used to apply FEC correction and/or to combine one stream with the second, dual streaming input.

When using the IP-8m, there are different stages where delay is introduced during processing for security (i.e. FEC or dejitter delay). For uninhibited operation, make sure that delay settings are in a save range.

For a basic setup, delay is calculated in the following matter:

Encoder processing delay + transmission delay on IP network + decoder processing delay

Encoder delay is typically < 5 ms. Transmission delay on the IP network can vary by a large degree, depending on the network. Decoder processing delay needs to be broken down into multiple stages:

Dejitter/Reorder or FEC output delay + additional delay + decoder processing delay

If no FEC is used, you can use a dejitter/reorder buffer which will add delay in the length it is set up to.
If FEC is used, there is a minimum delay that is required for safe operation (in the length of two full FEC matrices). Any delay on top of that is used for additional dejittering reordering of the input stream, as the FEC also includes this task as well. If the user setting is too small, it is overwritten internally to ensure safe operation. The current active setting to each decoder can always be viewed via **Information→Overview** in the block "Details – Decoder". You can use the additional delay setting to further delay the output up to 1000 ms. The decoder will also have a small delay of < 5 ms.

Recommended default buffer configuration: Packet reorder delay: 100 ms, Audio delay: 100 ms

The minimal needed additional buffer sizes depend on the selected FEC Mode (Row x Col):

FEC Mode (2 x matrix size)	1x4	4x4	5x5	10x10
Codec (Packets/s)	(8)	(32)	(50)	(200)
PCM (250)	0.03	0.13	0.20	0.80
MPEG1 Layer-2 (42)	0.19	0.76	1.19	4.76
MP3 (42)	0.19	0.76	1.19	4.76
AAC LC (47)	0.17	0.68	1.06	4.25
AAC HE v1 (24)	0.33	1.33	2.08	8.33
AAC HE v2 (24)	0.33	1.33	2.08	8.33

9   Interface Settings

9.1   Set up Inputs and Output Gain

To set up gain for audio inputs and outputs:

1. Navigate to **Interface Settings→Audio XLR**.

2. Set the gain for audio inputs and outputs in a range from -9.0 dB to 6.0 dB.

3. To keep the changes, click "Save".

9.2   Enabling the Sample Rate Converter

The IP-8m is equipped with an internal sample rate converter that converts stereo audio from one sample frequency to another. The IP-8m sample rate converter allows different rates at the digital AES/EBU inputs and outputs.

1. Navigate to **Interface Settings→Audio XLR**.

2. Set the switch "Sample Rate Converter" to "ON".

3. Select a sample rate in the dropdown menu.

4. To keep the changes, click "Save".

⇒ The sample rate converter generates an exact sampling rate in the input/output audio.

Sample processing <u>with</u> enabled Sample Rate Converter:

– The IP-8m transports the decoded audio samples (PCM) through the sample rate converter (SRC) to the output.
– The sample rate converter generates the exact sampling rate for the output, which was configured in the web interface.
– In the input of the SRC, the jitter of sampling rate is converted into a constant determined sampling rate for the output.

Sample processing <u>without</u> enabled "Sample Rate Converter":

– The IP-8m transports the decoded audio samples (PCM) without converting the sample rate directly to the output interface.

According to the AES-3 standard, data jitter varies between max +/- 20 ns. Depending on the bit depth, the signal-to-noise ratio has a better quality if the SRC is <u>enabled</u>.

The sample rate of the decoder follows the sample rate of the encoder by using a PLL. The PLL is a software block in the decoder that determines the encoder speed. It does that by evaluating the Speed/Timing Interval of the incoming IP Packets matching against the resulting buffer level. The PLL has some phases. At startup the control has an init phase until the encoder speed is found. Here the sampling frequency can vary up to +/- 20 ns according to the AES/EBU standard. After the init phase the PLL is locked and does only vary less.

NOTE: The configured sample rate and sample width must be correct and correspond to the real values of the signal.

9.3 Setting the Critical Level Marker

The audio level of the inputs and outputs is displayed on the overview page. You can set the critical level marker to specify when the bar should turn orange.

To set the critical level marker:

1. Navigate to **Interface Settings→Audio XLR**.

2. In the block "Critical Level Marker", define the threshold above which the bar should turn orange.

3. To keep the changes, click "Save".

⇒ You have set the critical level marker.

9.4 Configuring the Headphone Output

You can monitor the audio signal over headphone.

To configure the headphone output:

1. Navigate to **Interface Settings→Headphone**.

2. Select the audio input or output for monitoring in the dropdown menu "Source".

3. Set the volume of the headphone output [-40.0 … 0.0 dB].

4. To keep the changes, click "Save".

⇒ You can now listen to the audio via the headphone interface.

9.5 Configuring the DTE Interface

The IP-8m is equipped with a 15-pole male D-Sub connector for data communication. To connect the serial interfaces, use a serial breakout cable.

The pin assignment of the DTE interface is defined as follows:
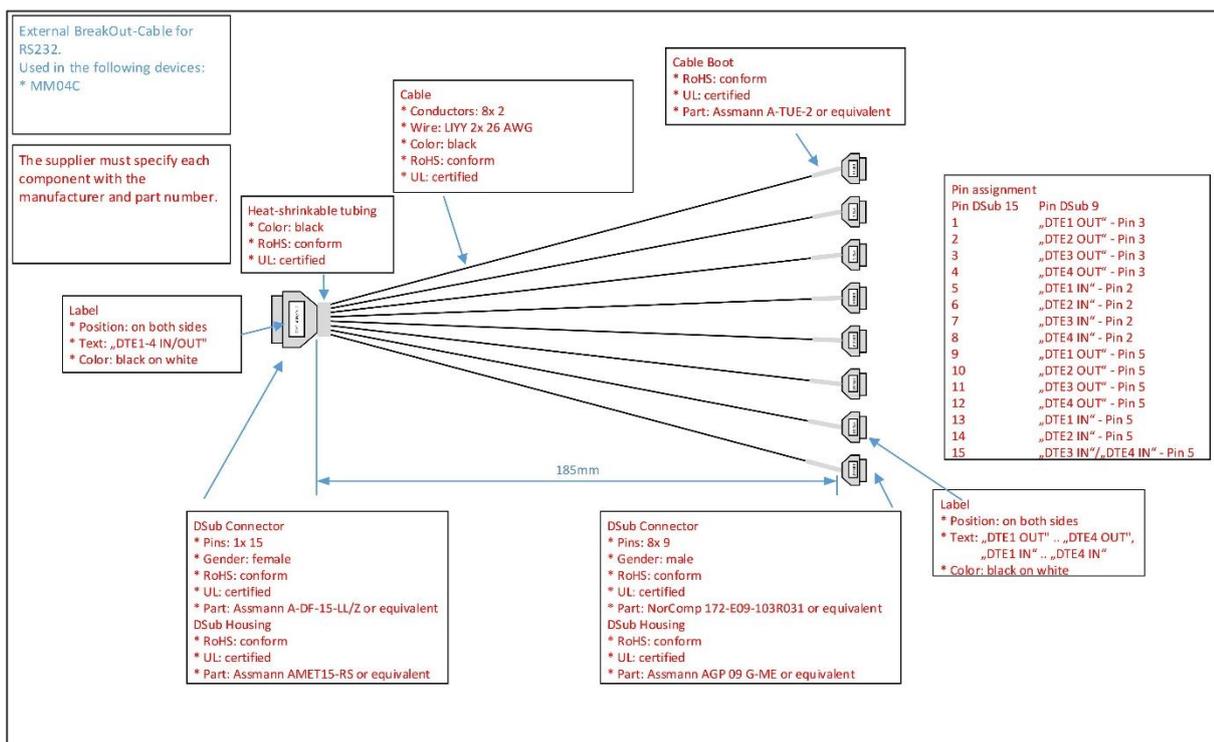
To configure the DTE interface:

1. Navigate to **Interface Settings→DTE**.

2. For each DTE input and output, configure the baud rate.

3. To keep the changes, click "Save".

⇒ You can now view the status of the DTE interfaces via **Status→DTE Data**.

9.6 Viewing the GPI Status

The IP-8m is equipped with 8 GPI contacts housed in the same 26-pole D-sub male connector as the GPOs. The inputs can be used for remote control (in combination with remote control software).
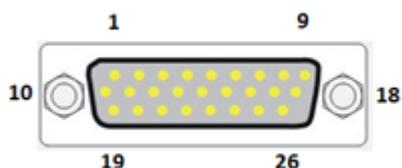
NOTICE
Risk of equipment damage! The voltage on GPI contact must not be negative or exceed +0.7 V.

The table below displays the scheme of the possible GPI contacts:

GPI No.	Control Pin No.	
1	IN0	
2	IN1	
3	IN2	
4	IN3	
5	IN4	
6	IN5	
7	IN6	
8	IN7	

▶ To actuate a GPI, pull the corresponding control pin electrically to ground (pin 9). The resulting control current is less than 5 mA.

▶ To view the status of the GPIs, navigate to **Interface Settings→GPI**.

9.7   Configuring GPO Settings

The IP-8m features 8 GPOs: 7 SPST relays (form A) and 1 SPDT relay (form C). The GPOs are housed in the same 26-pole D-sub male connector as the GPIs. You can use the relays for alarms of the monitoring function. To configure the alarm signalization via GPOs, see 11 "Monitoring and Alarm Settings".

GPO Nr.	Switch contacts	Switch type	
1	RELA0, RELB0	SPST, NO	
2	RELA1, RELB1	SPST, NO	
3	RELA2, RELB2	SPST, NO	
4	RELA3, RELB3	SPST, NO	
5	RELA4, RELB4	SPST, NO	
6	RELA5, RELB5	SPST, NO	
7	RELA6, RELB6	SPST, NO	
8	RELA7 — RELB7 / RELC7	SPDT	
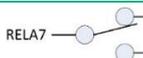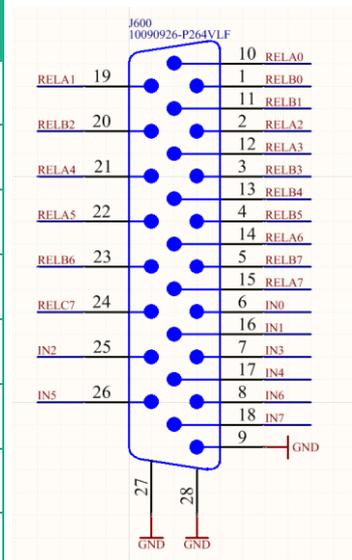
SPST: a simple on/off switch: single pole, single throw
SPDT: single pole, double throw
NO: normally open

NOTICE

Risk of equipment damage!
The relay contacts have a maximum load of 0.5 A at 30 V DC. Do not exceed these values.

To configure the GPO settings and view the status of the GPOs:

1. Navigate to **Interface Settings→GPO**.
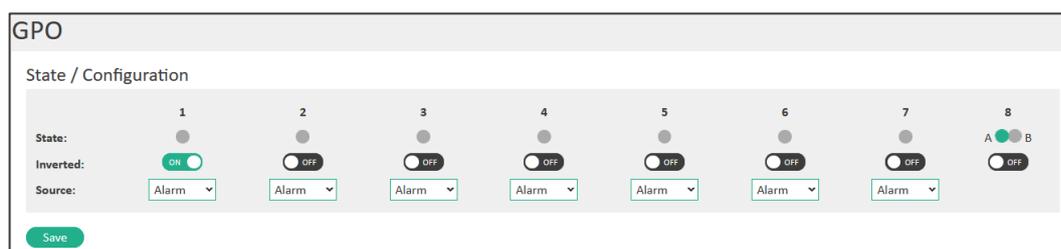
Figure 27: Interface Settings/GPO

The virtual LED "state" indicated the status of the GPOs (green: ON, grey: OFF). The state of a relay is ON if the alarm which is assigned to this relay is triggered. The GPOs 1-7 are normal switches, whereas GPO 8 is a changeover switch (position A/B).

2. To invert a GPO, enable the corresponding switch.

3. Select the source for the GPO switch in the field "Source". Only GPOs that are selected for the source "Alarm" can be used to indicate a triggered alarm.

4. To keep the changes, click "Save".

⟹ You have configured the GPO settings.

10 Audio over IP Settings

10.1 Setting up SIP

The IP-8m supports audio IP streaming using SIP (Session Initiation Protocol). You can use a SIP connection for the encoder output and decoder input directly over the [Data 1/Data 2] interfaces or over server (registrar). For a direct SIP connection, no registrar entry is necessary.

> **(!) NOTE**
>
> The option "IP streaming over SIP" is only available if the right "EBU Tech 3326" is activated.
>
> The IP-8m is compliant with the mandatory directives N/ACIP EBU Tech 3326.

10.1.1 Setting up a SIP Connection

✓ You have already created configuration profiles for the input source SIP (see 7.6 "Creating Configuration Profiles for SIP").

To set up a SIP connection:

1. Navigate to **Codec Settings→Codec**.

2. Create a codec profile that is supposed to send from the encoder to the decoder (see 8.2 "Creating Codec Profiles").

3. Assign the codec profile to an encoder (see 8.3 "Assigning Input Source and Codec Profile to an Encoder").

4. Assign a SIP configuration profile to an audio output in the decoder (see 8.6 "Assigning And Activating Source Streams for the Decoder").

   ➢ As soon as a SIP configuration profile is assigned to one of the audio outputs (decoder), the system is reachable by calls.

5. To keep the changes, click "Save".

6. Navigate to **AoIP Settings→SIP**.

7. In the field "Port", enter the local SIP port number for the IP-8m. Enter "0" for a direct SIP connection.

8. In the field "Call acceptance mode per audio channel", choose a mode for the behavior of the system in case more than one SIP account is assigned to one of the four possible audio channel input priorities (Main – Backup1/2/3):

   - **Multiple**: Multiple calls will be accepted. The highest priority call will feed the audio output.
   - **First Call, First Serve**: Multiple calls will be accepted. The first accepted call will feed the audio output, even if a higher priority call is coming in. Once the first call hangs up, the active call with the highest priority will feed the audio output.
   - **Single**: Only one active call per audio channel is accepted. Other incoming calls will be rejected.

   NOTE: In the modes "Multiple" and "First Call, First Serve", all incoming calls will get back the same audio from the corresponding audio input. For example, if a SIP account is assigned to one of the four input priorities of audio output 2, it will answer with the audio of audio input 2.

9. To keep the changes, click "Save".

⇒ You have set up a SIP connection.

10.1.2   Adding and Configuring SIP Phonebook Entries

You can preconfigure up to 60 entries in the SIP phonebook. You can use these phonebook entries to quickly establish connections via SIP dial.

To add and configure a new SIP phonebook entry:

1. Navigate to **AoIP Settings→SIP Phonebook**.

2. To create the first entry, click "Create first entry".
   If there already are one or more entries available, click "⊕".

3. To edit the new entry, click "Edit".
   ➢ The dialog window "SIP Contact Settings" opens.

4. Configure the following settings:

Figure 28: AoIP Settings/SIP Phonebook/ SIP Contact Settings

Name	Enter the name of the contact.
Connect	Enter the username/address of the connecting device (registered second user agent). For direct connections to different SIP ports, add ":" and the corresponding SIP destination port number.
Encoder/Decoder Profile	Select the codec profile in the dropdown menu. To select different profiles for encoder and decoder, click on the arrow next to the field to expand the menu. "Profile Encoder" defines the audio format that the IP-8m (encoder) sends. "Profile Decoder" defines the audio format that the external encoder device sends.
Delay	Set up the send delay which the encoder should wait in order to send audio over SIP (for more information, see 8.10 "Setting up Buffers").
Port	Applicable only if you connect a remote encoder directly via the IP address. Enter the UDP/RTP port of the sender/destination. Enter "0" for an automatic port.
Reconnect Count	Set the number of reconnections.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values, see 8.10 "Setting up Buffers".
FEC column (L) port offset **FEC row (D) port offset**	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). If you do not want to use this offset, enter "0".

5. To keep the changes, click "Save".
   ➢ The dialog window closes.

⟹ You have added and configured a new SIP phonebook entry.

10.1.3 Establishing Connections via SIP Dial (Easy2Connect)

✓ You have already assigned and activated a SIP input source profile to a decoder audio output (see 8.6 "Assigning And Activating Source Streams for the Decoder").

✓ You have already defined SIP contacts and assigned codec profiles to the SIP phonebook entries (see 10.1.2 "Adding and Configuring SIP Phonebook Entries").

To establish a connection and start data transmission:

1. Navigate to **AoIP Settings→Easy2Connect**.

2. In the block "Phonebook", you can see the contacts from the SIP phonebook. Select an entry for data transfer and click on the ⬤ button next to it.

   ➢ The selected contact appears in the block "Call" and is now ready for connection.

3. To establish the connection, click on the ⬤ button in the block "Call".

4. To hang up the connection, click on the ⬤ button in the block "Call".

5. For a **quick dial**, manually change the encoder configuration in the field "Encoder/Decoder Profile and enter the dial number into the field "Connect". For manual access to the connection setting for the decoder, disable the switch "Use default settings".

6. To see the details of the currently active SIP connection for the decoder and of the current data transfer, click on the tab "Details/Overview".
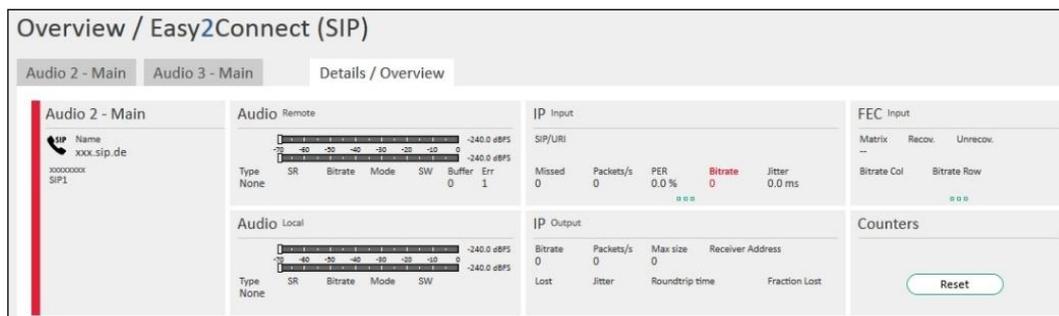

Figure 29: AoIP Settings/Easy2Connect/Details

Green: the SIP connection is active
Orange: the SIP connection is not active; SIP registration is successful
Red: the SIP connection is not active; SIP registration has failed

7. To reset the counters, click "Reset" in the block "Counters".

⇒ You have established a connection via SIP dial.

10.2 Setting up SAP Service

The IP-8m supports SAP (Session Announcement Protocol) for stream announcement.

✔ You are logged in as an admin.

To set up the SAP connection:

1. Navigate to **AoIP Settings→SAP**.

2. Configure the following settings:

Figure 30: AoIP Settings/SAP

Mode	To enable SAP, select the service mode. "Client/Server" is recommended.
Announce interval	Enter the time interval between sending SAP announcements.
Multicast loop	Enable multicast loop to make the IP-8m receive its own SAP announcements. The default setting is "OFF".
Receive address and port	Set the multicast address and port to receive SAP announcements.
Ethernet port	Select the Ethernet interface for transmission of SAP announcements in the dropdown menu: Data 1/Data 2.
Bandwidth limit	Enter the maximal value for bandwidth for SAP messages to avoid overhead.
Destination address and port	Set the destination multicast address and port for SAP announcements.

3. To keep the changes, click "Save".

⟹ You have set up the SAP connection.

10.3 Using an External Clock for Synchronization

To synchronize the IP-8m with an external clock:

1. Navigate to **AoIP Settings→External Clock**.

2. Cofnigure the following settings:

Figure 31: AoIP Settings/External Clock

External Clock Source	Select the source of the external clock: 1PPS or PTP.
Domain Number	Enter the PTP clock's domain number
PTP Interface	Select the Ethernet interface to use for PTP

3. To keep the changes, click "Save".

⟹ You have synchronized the IP-8m with an external clock.

10.4 Configuring Global Livewire Settings

Livewire is an audio-over-IP system used for routing and distributing broadcast-quality audio.

> ⓘ **NOTE**
>
> This option is only available if the right "Livewire" is activated.

✓ You are logged in as an admin.

To configure the livewire settings:

1. Navigate to **AoIP Settings→Livewire**.

Figure 32: AoIP Settings/Livewire

2. Enable "Routing Protocol".

3. To keep the change, click "Save".

⇒ You have configured the livewire settings.

10.5 Setting up Audio Monitoring via Live Listening

> ⓘ **NOTE**
>
> This option is only available if the right "Live Listening" is activated.

Activated input sources of the encoder and decoder as well as audio outputs can be monitored via "Live listening". Live Listening enables you to listen "live" to any of the audio input sources as well as the audio outputs directly over the IP-8m web interface.

The IP-8m is equipped with an adjustable bit rate encoder that can encode the input audio signal in different formats. You can manually set up the parameters for audio encoding depending on the bandwidth available for data distribution.

✓ The input sources are configured and assigned to the encoder and decoder.

To set up audio monitoring via live listening:

1. Navigate to **AoIP Settings→Live Listening**.

2. Configure the following settings:

Figure 33: AoIP Settings/Live Listening

Activation	Enable the live listening by setting the switch to "ON".
Port	Enter the port number for streaming. **NOTE:** The URL for Icecast streaming "`IP address of the device:streaming port`" (standard port for live streaming is 8000, e.g. `http://192.168.12.23:8000`).
Encoder Format	Select an audio format for streaming.
Audio Mode	Select a stereo or mono audio mode.
Sampling Rate	Select a sampling rate for streaming.
Bitrate	Select a bit rate for the selected audio format quality.

3. To keep the changes, click "Save".

4. In the banner, select an available audio source for streaming from the dropdown menu "Live Source".

Figure 34: Banner/Live Source

5. To start or stop streaming, click the play/pause button.

6. To change the playback volume, click the green volume levels.

7. Alternatively, you can start/stop live streaming for each audio input by clicking "🔊" in the corresponding source field.

*Figure 35: Codec Settings/Codec/Loudspeaker icon*

⟹ You have set up audio monitoring via live listening.

11 Monitoring and Alarm Settings

The IP-8m can trigger alarms for various failures. An alarm can be signaled by SNMP traps, by switching a set GPO and by the "Warning" LED on the web interface and on the front panel of the device.

11.1 Status LEDs

The IP-8m is equipped with 4 status LEDs on the banner of the web interface that display the status of the inputs, outputs, power supply and alarms.
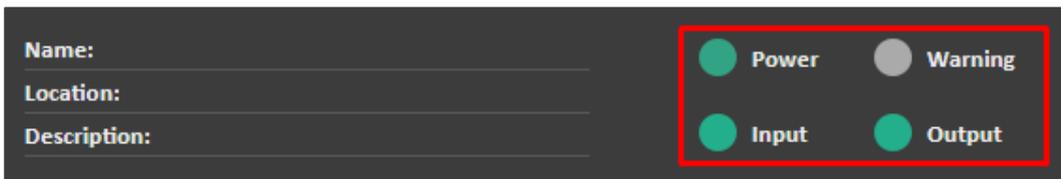
The table below displays the meaning of each LED.

LED	Color	Meaning
Power	🟢	all supply cords are connected and the power supply is OK
	🔴🟢	toggles (green/red) if only one is connected or OK
Warning	⚪	LED is off if no alarms are triggered
	🔴	at least one alarm is triggered
Input	⚪	no input monitoring alarms are enabled
	🟢	input monitoring alarms are enabled and all inputs are OK
	🟠	one or more inputs are bad, but at least one is good
	🔴	all inputs are bad
Output	⚪	no decoder output monitoring alarms are enabled
	🟢	output monitoring alarms are enabled and all outputs are OK
	🟠	one or more outputs are bad, but at least one is good,
	🔴	all outputs are bad

11.2 Priority of Alarm Messages

For each monitored parameter, you can set the priority of the alarm message. The priorities are as follows:

Priority	ID/Code	Definition
Emergency	0	System is unusable
Alert	1	Actions must be taken immediately
Critical	2	Critical condition
Error	3	Error condition
Warning	4	Warning condition
Notice	5	Normal but significant condition
Informational	6	Informative message
Debug	7	Debug-level message

In case of an alarm, an error report with the priority of the error will be sent to the Network Operations Center (NOC). The responsible second-level support will decide by means of this information how urgent the alarming case is and what measures are necessary.

11.3 Monitoring the Device Operation

You can enable the following parameters for device monitoring:

Temperature	Alarm is triggered if the device temperature exceeds the configured value.
LAN Link	Alarm is triggered in case of an error in Ethernet data communication.

An alarm can be signaled by SNMP traps/events, by switching a set GPO, and by the LEDs on the web interface and on the front panel of the device. The alarm messages are also listed in the log.

To set alarms for device operation:

1. Navigate to **System Settings→Alarm**.

2. In the block "Device", configure the following settings:

Figure 36: System Settings/Alarm/Device

Enable	Enable or disable the monitoring of this parameter. **NOTE:** Enabled alarm messages are saved in a log entry.
Priority	Select the priority of the alarm message.
Values	Temperature: Enter the temperature threshold above which an alarm will be triggered.
T1	Set the delay time for alarm trigger.
T2	Set the delay time for alarm end.
SNMP, LED, GPO	Enable the corresponding switch if the alarm should be signaled by SNMP traps, an LED or GPO switch. **NOTE:** The corresponding GPO must be activated for the source "Alarm" (see 9.7 "Configuring GPO Settings").

3. To keep the changes, klick "Save".

⇒ You have set alarms for device operation.

11.4 Monitoring the External Clock

You can enable the following parameters for monitoring of the external clock:

PTP clock status	Alarm is triggered if PTP signal is not present.
1 PPS clock status	Alarm is triggered if 1 PPS signal is not present.

To set alarms for external clock monitoring:

1. Navigate to **System Settings→Alarm**.

2. In the block "External clock", configure the following settings:

Figure 37: System Settings/Alarm/External clock

Enable	Enable or disable the monitoring of this parameter. **NOTE:** Enabled alarm messages are saved in a log entry.
Priority	Select the priority of the alarm message.
T1	Set the delay time for alarm trigger.
T2	Set the delay time for alarm end.
SNMP, LED, GPO	Enable the corresponding switch if the alarm should be signaled by SNMP traps, an LED or GPO switch. **NOTE:** The corresponding GPO must be activated for the source "Alarm" (see 9.7 "Configuring GPO Settings").

11.5 Monitoring the Audio Inputs

The IP-8m can monitor the audio inputs and recognize errors. You can enable the following parameters for audio input monitoring:

Silence detection	Alarm is triggered if the device detects silence in the left and/or right channel of the analog audio input. You can set up the minimum audio level below which the alarm should be triggered.
AES/EBU no signal	Alarm is triggered if no decoded digital audio is available in the audio input.

To set alarms for the audio inputs:

1. Navigate to **System Settings→Alarm**.

2. In the block "Inputs", configure the following settings:

Figure 38: System Settings/Alarm/Inputs

Enable	Enable or disable the monitoring of this parameter. **NOTE:** Enabled alarm messages are saved in a log entry.
Priority	Select the priority of the alarm message.
Values	Enter the value below which the alarm should be triggered.
T1	Set the delay time for alarm trigger.
T2	Set the delay time for alarm end.
SNMP, LED, GPO	Enable the corresponding switch if the alarm should be signaled by SNMP traps, an LED or GPO switch. **NOTE:** The corresponding GPO must be activated for the source "Alarm" (see 9.7 "Configuring GPO Settings").

3. To keep the changes, klick "Save".

⇒ You have set alarms for the audio inputs.

11.6   Monitoring the Audio Outputs

The IP-8m can monitor the audio outputs and recognize errors. You can enable the following parameters for audio output monitoring:

Silence detection	Alarm is triggered if the device detects silence in the left and/or right channel of the audio output. You can set up the minimum audio level below which the alarm should be triggered.

To set alarms for the audio outputs:

1. Navigate to **System Settings→Alarm**.

2. In the block "Outputs", configure the following settings:

Figure 39: System Settings/Alarm/Outputs

Enable	Enable or disable the monitoring of this parameter. **NOTE:** Enabled alarm messages are saved in a log entry.
Priority	Select the priority of the alarm message.
Values	Enter the value below which the alarm should be triggered.
T1	Set the delay time for alarm trigger.
T2	Set the delay time for alarm end.
SNMP, LED, GPO	Enable the corresponding switch if the alarm should be signaled by SNMP traps, an LED or GPO switch. **NOTE:** The corresponding GPO must be activated for the source "Alarm" (see 9.7 "Configuring GPO Settings").

3. To keep the changes, klick "Save".

⇒ You have set alarms for the audio inputs.

12 System Settings

12.1 Entering Device Information

For better identification of the IP-8m, you can enter device-specific data.

To enter device information:

1. Navigate to **System Setting→Global**.

2. In the block "System info", enter the following data:

Figure 40: System Settings/Global/System Info

Name	Enter the name of the device for better reference.
Location	Enter the location of the device.
Description	Enter further important information on the device.

3. To keep the changes, click "Save".

⇒ The saved information is now displayed in the banner.

Figure 41: Banner/System Info

12.2 Setting up Session Timeout

Session timeout is a security feature that automatically logs out the user after a period of inactivity. You can define the period of inactivity or disable session timeout.

To set up session timeout for the web interface:

1. Navigate to **System Settings→Global**.

2. In the field "Session timeout, enter the value in minutes for the period of inactivity necessary to automatically log out the user. Enter "0" to disable the function.

3. To keep the changes, click "Save".

⇒ You have set up session timeout for the web interface.

12.3 Changing the Title of the Browser Tab

You can change the title of the browser tab to display the information you need for better reference.

To change the title of the browser tab:

1. Navigate to **System Settings→Global**.

2. In the field "Browser Tab Title", enter the information you want to display. You can use variables for specific information. Variables will update automatically if the corresponding information changes. View the possible variables by hovering over the input filed.

Figure 42: System Settings/Global/Browser Tab Title

3. To keep the changes, click "Save".

⇒ You have changed the title of the browser tab.

12.4 Uploading and Activating Firmware

You can upload ARM firmware stored locally or from a TFTP server to the device

To upload and activate new firmware:

1. Navigate to **System Settings→Global**.

2. In the block "Firmware update", click "Browse/Drop file".
   ➢ The "Open file" dialog of your system opens.

3. Select the firmware file you want to upload.

4. Click "Upload" to upload the firmware file. The upload may take a while. Do not interrupt this process.

5. After a successful upload, follow the prompt to restart the device.

⇒ After the restart of the device, the new firmware will be active.

12.5 Setting up Rights

Some functions of the IP-8m are optional. To use these functions, you must activate additional rights by uploading a rights file. To receive rights files, please contact your 2wcom sales representative.

To upload and activate a rights file:

1. Navigate to **System Settings→Global**.

2. In the block "Rights", click "Browse/Drop file".

   ➢ The "Open file" dialog of your system opens.

3. Select the rights file (*.2wcom_key) you want to upload.

4. Click "Upload" to upload the rights file. The upload may take a while. Do not interrupt this process.

5. After a successful upload, follow the prompt to restart the device.

⇒ The new rights will be active after restart. You can view the current rights in the block "System information".

12.6 Saving Settings to a Local File

You can download the current settings and save them as a file. You can upload this file later to restore the settings or upload it to another device to copy the settings.

To save settings to a local file:

1. Navigate to **System Settings→Global**.

2. In the block "Settings download", click "Generate".

   ➢ A file is being created. This may take a few seconds.
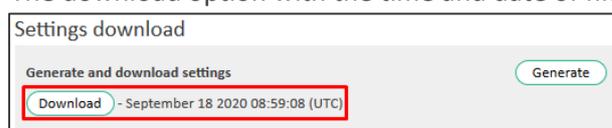   The download option with the time and date of file creation appears.

Figure 43:System Settings/Global/Settings download

3. Click "Download".

   ➢ The "Save file" dialog of your system opens.

4. Save the file to a location of your choice.

⇒ You have saved settings to a local file. To upload and activate settings stored locally, see 12.7 "Uploading and Activating Settings from a File".

12.7 Uploading and Activating Settings from a File

You can upload a settings file to restore previous settings or copy the settings from another device. For information on how to generate settings file, see 12.6 "Saving Settings to a Local File".

To upload a settings file stored locally:

1. Navigate to **System Settings→Global**.

2. In the block "Settings update", click "Browse/Drop file".

   ➢ The "Open file" dialog of your system opens.

3. Select the settings file you want to upload.

4. Click "Upload" to upload the settings file. The file upload may take a while. Do not interrupt this process.

5. After a successful upload, follow the prompt to restart the device.

⇒ After the restart of the device, the new settings will be active.

12.8 Setting the Time and Date

You can set the time, time zone and date of the internal clock.

To set the internal clock of the device:

1. Navigate to **System Settings→Time**.

2. In the block "Local Time", select the present time zone in the dropdown menus.

3. To keep the changes, click "Save".

4. In the block "Time and date settings", anter the current date and time.

5. To keep the changes, click "Save".

⇒ You have set the time and date. The current time and date of the internal clock is shown in the field "Present local date and time".

⇒ Alternatively, you can automatically synchronize the device clock with an NTP server (6.5 "NTP: Synchronizing Date and Time").

12.9 Configuring User Accounts

The default accounts are a read-only access (Guest account), a full access without a permission to manage the user accounts (Manager account), and a full access (Admin account). The user account "SFTP service" is used only for the access from an external SFTP client for uploading audio files and saving them in the internal storage.

NOTE: Certain settings are <u>not</u> available in the "Manager" account. The access to some menus can be adapted by the "admin" only.

12.9.1 Changing Login Data

Change the login data for the access after the first login to the web interface.

The default login data for the first login are (case sensitive):

- Guest account: **"guest"/ "guest"**
- Manager account: **"manager"/ "manager"**
- Admin account: **"admin"/ "admin"**
- SFTP service: **"sftpuser"/ "sftpuser"**

✓ You are logged in as an admin.

To change the login data:

1. Navigate to **System Settings→User**.

2. Change the login data in the corresponding block and repeat the new password.
   NOTE: Write down the password in a secure location.

3. To keep the changes, click "Save".

⇒ You have changed the login data.

12.9.2   Adapting the Access for User Accounts

You can configure the access to certain web interface pages for the manager and guest accounts.

✓   You are logged in as an admin.

To adapt the access for manager and guest accounts to the individual IP-8m menus:

1. Navigate to **System Settings→User**.

2. In the blocks "Manager-" and "Guest adapted menu access", enable or disable the access to the separate menus by setting the corresponding switch to either "ON" or "OFF".

3. To keep the changes, click "Save".

⇒   You have adapted the access for user accounts.

12.10 Rebooting the Device

To reboot the device:

1. Navigate to **System Settings→Global**.

2. In the block "Control", click "Now" in the field "Reboot Device".

⇒   The device restarts. After the restart, you will have to log in again.

Alternatively, you can reboot the device via the reset pin hole.

12.11 Restoring Factory Settings

NOTICE
If you restore factory settings, all saved configurations made by a user will be deleted except for the IP address of the control interface! This also applies for the access accounts!

To reset the device to factory settings:

1. Navigate to **System Settings→Global**.

2. In the block "Control", click "Now" in the field "Load Factory Settings".

3. Follow the prompt to restart the device.

⇒   You have restored the factory settings.

12.12 Accessing the Recovery Mode via Reset Pin Hole

If you cannot access the IP-8m via the web interface, you can reboot the device using the reset pin hole. You can also use the reset pin hole to access the recovery mode in which you can flash the device or restore factory settings.

▶   To restart the device, press the reset button for a second.

1. To access the recovery mode, press the reset button for a few seconds until all LEDs on the front panel turn off and only power LED starts flashing quickly.

➢   The device starts in recovery mode.

2. Access the recovery web interface by entering the IP address of the device into a web browser.

In recovery mode, you can upload and activate firmware, reset the system to factory settings or reboot the device.

Figure 44: Web interface in recovery mode

3. After flashing or resetting the device, reboot the device by clicking "Reboot".

⟹ After a few seconds, the device will be ready for operation.

13 Status Information

13.1 Viewing System Information

To get a quick and detailed overview, you can view general system settings and current system information such as uptime, serial number and more.

▶ To view general system information, navigate to **System Settings→Global**.

In the block "System information", you can view all important data about the IP-8m.
NOTE: The current version of the IP-8m is the "App version".
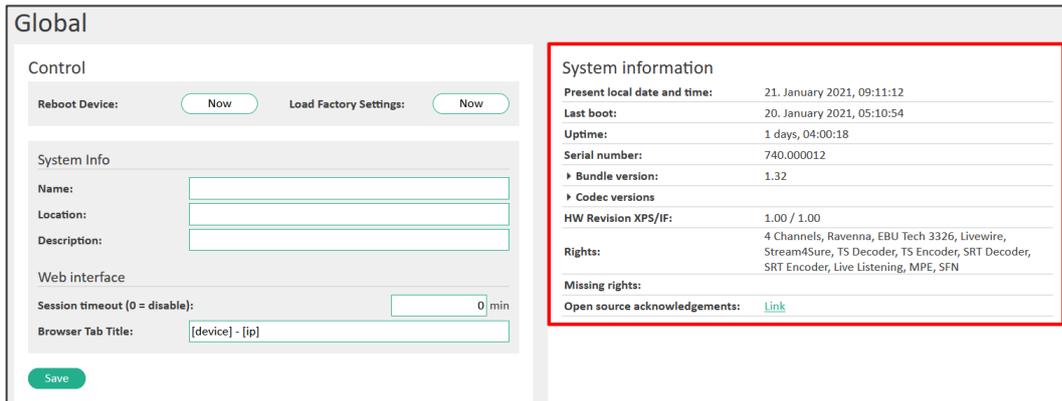

Figure 45: System Settings/Global/System information

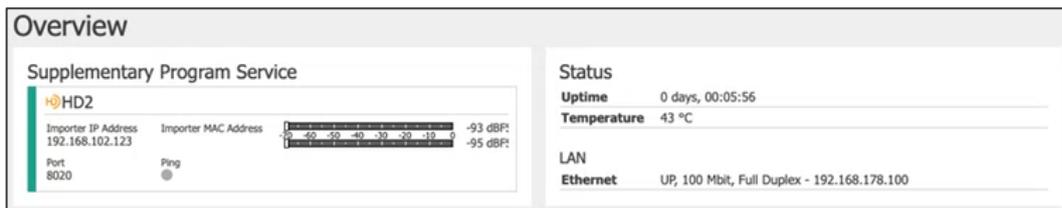▶ To view general information on the interfaces, navigate to **Information→Overview**.

Figure 46: Information/Overview/Interfaces+Status

The audio levels of the inputs and outputs are displayed in the block "Interfaces".

⇒ You have viewed the general and current system information.

13.2 Viewing Device Status

You can view the current status of the hardware such as voltages on the main board, temperature, fan speed and power supply.

To view to device status:
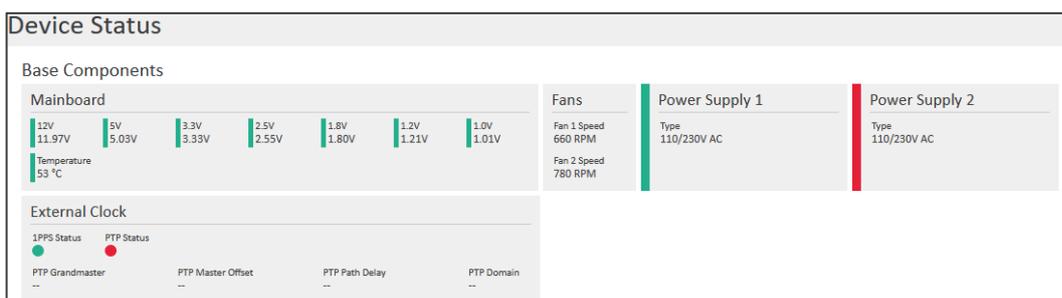
▶ Navigate to **Status→Device**.

Figure 47: Status/Device

The following Information is displayed on this page:

Mainboard	Information on the voltages on the main board and its temperature
Fans	Information on the fan speeds
Power supply 1/2	Information on the type of power supply and its status (green: ok; red: no power)
External Clock	Information on the synchronization with the external clock

⟹ You have viewed the device status.

13.3 Viewing Active DTE Data

To view the status of the DTE data in the inputs and outputs:

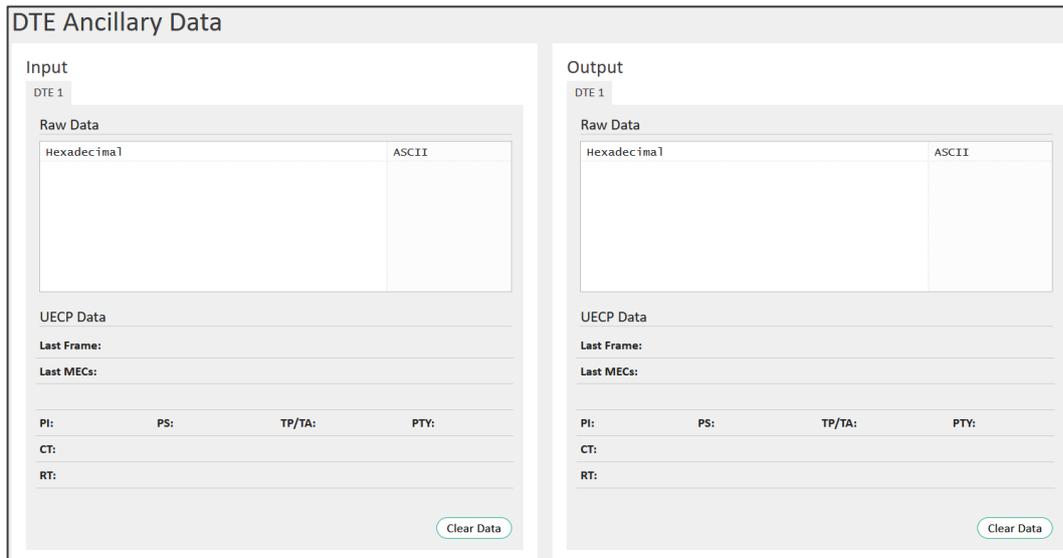1. Navigate to **Status→DTE Data**.

Figure 48: Status/DTE Data

The block "Raw Data" displays the DTE data in hexadecimal and ASCII code. The block "UECP Data" displays information on the active UECP Data.

2. To empty the list, click "Clear Data".

⟹ You have viewed the active DTE data.

13.4 Viewing Storage Status and Uploading Files to Internal Storage

You can upload audio files to the internal storage to use them e.g. as a backup input source.

To upload an audio file to internal storage:

1. Navigate to **Status➔Storage**.

2. In the block "Upload", click "Browse/Drop file".
   ➢ The "Open file" dialog of your system opens.

3. Select the audio file (*.mp2, *.mp3, *.wav, *.aac*) you want to upload.

4. Click "Upload" to upload the audio file. The upload may take a while. Do not interrupt this process.
   ➢ The uploaded file is now displayed in the block "Audio files".

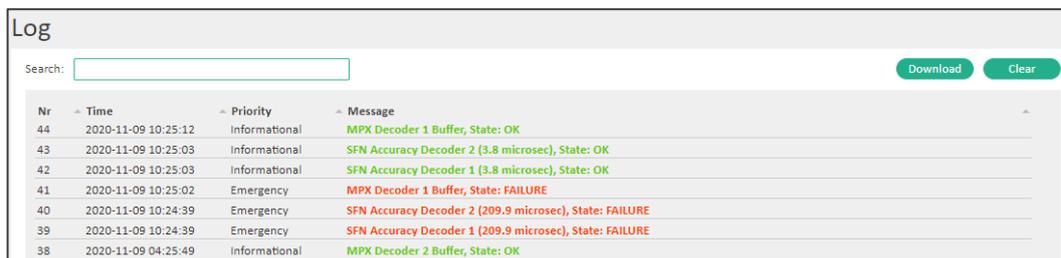5. To delete an audio file, click "Delete" in the block "Audio files".

⇒ You have uploaded an audio file to the internal storage. The percentage of used storage is displayed in the block "Data storage".

13.5 Viewing the Log

The IP-8m records all important system events, such as restart and error messages in a log. You can view the log, sort the entries, search for a specific entry, save the list as a log file, and clear the log.

To view the log:

1. Navigate to **Status➔Log**.

Figure 49: Status/Log

For more information on the priorities of the messages, see 11.2 "Priority of Alarm Messages".

2. To sort the entries, click on the column header of the parameter by which you want to sort the entries. To reverse the order, click on that header again.

3. To search for a specific entry, enter a term into the field "Search".

4. To save the list to a log file, click "Download".

5. To clear the log, click "Clear". Confirm your choice in the dialog window.

14 Troubleshooting and Support

More often than not, it is only a small detail that has been overlooked and leads to a problem. Therefore, read the entire user manual carefully, as this will help you to understand, prevent and eliminate typical problems. Use the following table to self-check common error sources prior to contacting our support.

Report failures by email to _support@2wcom.com_. For a support request to 2wcom, please have the serial number of the device ready. The sticker with the serial number is usually located on the rear side of the device: "S/N xxx.xxxxxx".

Problem	Possible Causes	Solution
Device does not turn on	- Power cable is connected improperly - Mains supply failure - Blown fuse	- Check supply cord - Make sure that the power plug at the device is fully inserted - Check mains supply - Replace fuse by same type
Device is not accessible via Ethernet	- Network cable is not connected - IP address/TCP port is unknown - A device with the same IP address was connected a few minutes before. Then the ARP table still assigns the old MAC address to the IP address.	- Connect the network cable - Check IP address obtained from DHCP via LCD menu. - Usually, the ARP table is refreshed automatically by the operation system after a few minutes. For an instant access to the device, reset the ARP table of your computer, e. g. by entering "arp –d" in the Windows Command Prompt.
Device does not respond		- Reboot the device or update the software.

15 Technical Data

Audio (encoder / decoder)

Codecs

Standard	MPEG 1/2 Layer 2, 3
	Linear PCM
	G.711, G.722
	Opus
	MPEG 2/4 AAC LC
	MPEG 4 AAC LD/ELD/ELD v2
	MPEG 4 HE-AAC v1&v2
	Extended HE-AAC (xHE-AAC)
	Enhanced aptX (E-aptX)
On request / roadmap	Dolby Digital (AC3)
	Dolby Digital Plus (E-AC3)
	Ask for other codecs
On request	Bit transparent transmission of AES/EBU input
Sample rates	kHz: 48 (On request: up to 192 kHz)

Interfaces

Performance

Digital (in/out)	4x AES/EBU, 110 Ω bal., integrated XLR
Analog (in)	2x L/R, > 10 Ω bal., integrated XLR
Analog (out)	2x L/R, < 20 Ω bal., integrated XLR
Headphone (out)	L/R, < 10 Ω, 6,3 mm
Digital reference input	No dedicated input, selectable by user
Digital reference level	9 dBFS (adjustable)
Gain	-9....+6 dB

Dynamic range	16 Bit, > 89 dB
	24 Bit, > 130 dB
Frequency response	Depends on sample rate – e.g. 48 kHz: 0,1 dB; 20 Hz ... 22,5 kHz
Phase locking	2-8 Mono channels can be phase locked to provide up to 7.1 surround sound

Ethernet

Data	Audio, serial data and GPIO transmission, controlling and setup functions
Connector	3x RJ45
Type	Auto switching 10/100/1000 BASE-T
Protocol	RTP/RTCP/UDP, SRT Secure Reliable Transport, IGMP, ICMP, DHCP, HTTPS, SFTP, SNMP, NTP, TCP (Icecast), HLS, PTPv2, SMTP ST 2110

Serial

Interface	8x RS-232C Sub D-15
Data	Private data, MPEG ancillary data, UECP/RDS (acc.to TR 101 154)
Transmission rate	1200 to 115200 baud, asynchronous
USB	1x USB 2.0 interface for service

Interfaces

Contact closure

Inputs	8x 26 pole sub-D female
Outputs	7+1 floating relays
	7 relays SPST (from A)
	2 relays SPDT (from C)
	DC: max. 30 V, 1 A, 10 W
	26 pole sub-D male

Internal storage

Data	internal audio files
Size	7 GB (optional 1000 GB)
Type	eMMC (optional SSD)

Time synchronization (optional)

PTPv2	Network synchronization according to IEEE 1588-2008
1PPS	SMA connector

Control & monitor

Ethernet

User interface	Integrated WebGUI, LCD display
Data	Control and setup functions
USB	USB 2.0 interface for service, configuration and firmware updates
Protocol	2wcom NMS, Telnet, HTTPS, SNMP, UDP, RTCP, SRT Secure Reliable Transport, SFTP IGMP, ICMP, NTP, DHCP, SNMP, SSH, PTPv2, TCP (Icecast)

Front panel

LCDisplay	Graphical, 264x64 pixel
Jog wheel	Impulse, enter button
4 Duo LEDs	Power, input, output, warning

General data

Power consumption	<20W
Case dimensions	19", 1 HU, Depth: 310 mm, Width: 424 mm, Front panel: 484 mm
Weight	< 5 kg
Material	Steel plate (aluminium-zinc coated)
Operating temp. range	0...+45°C
Storage temp. range	-40...+70°C
Languages	English

Power supply

Standard	1x internal, 90...260 VAC, 47...63 Hz, 1x power port (rubber connector)
Optional version 1	Two internal redundant power supplies (230 VAC or 48 VDC), aut. switchover
Optional version 2	Two external hot swappable redundant power supplies (230 VAC or 48 VDC), aut. switchover

Datasheet Version 01.12.2020
These data are subject to modifications and amendments. Errors excepted.

Your audio. Our solution.