

RF-10e

User Manual



Professional 10-channel FM/DAB+ receiver

RF-10e User Manual V1.1

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Contents

1	About this manual	4
1.1	References and hyperlinks in this PDF file	4
1.2	Tags and their meanings	4
2	For your safety	5
3	Product overview	7
3.1	About the RF-10e	7
3.2	Rights options.....	8
3.3	Front panel.....	9
3.4	Back panel	10
4	First steps	11
4.1	Checking the delivery contents.....	11
4.2	Installing the device	11
4.3	Connecting the device.....	11
4.4	Connecting the power supply	12
4.5	Configuring the network	13
4.6	Accessing the web interface	14
4.7	General operation	14
4.7.1	Operation via web interface.....	14
4.7.2	Operation via LCD menu	15
5	Network settings	17
5.1	Configuring the interface services	17
5.2	TCP/IP: Configuring the ethernet interfaces.....	17
5.3	Monitoring the device via syslog	18
5.4	SNMP: Configuring access data for external requests.....	19
5.5	SNMP: Configuring trap managers.....	20
5.6	Ember+: Configuring access for monitoring	21
5.7	NTP: Synchronizing date and time	21
6	Encoder settings	23
6.1	Input source settings.....	23
6.1.1	Configuring input source profiles for Elementary Streams (UDP/RTP)	23
6.1.2	Creating input source profiles for Livewire	24
6.1.3	Creating input source profiles for SRT	25
6.1.4	Creating input source profiles for SIP.....	25
6.1.5	Creating input source profiles for Icecast	26

6.1.6	Creating input source profiles for Radio	27
6.1.7	Creating input source profiles for internal storage (File).....	28
6.2	Creating codec profiles	28
6.3	Assigning input source and codec profile to an encoder.....	29
6.4	Setting up encoder outputs	29
6.4.1	Setting up an Elementary Stream output	29
6.4.2	Setting up an SRT output.....	30
6.4.3	Setting up an Icecast Source Client output	31
6.4.4	Setting up an Icecast Server output	31
6.5	Generating an AES67 stream	32
6.6	Configuring the TS Multiplexer	33
6.6.1	Setting up a Multiplex with payload content	33
6.6.2	Adding a still image video as payload content.....	34
6.6.3	Setting up Multiplex outputs.....	34
6.7	Generating an HLS stream	36
6.8	Defining check criteria	37
6.9	Setting up a Dolby® encoder.....	37
7	Interface settings.....	39
7.1	Changing the headphone volume	39
7.2	Viewing the GPI status	39
7.3	Configuring GPO settings	40
7.4	Enabling the ASI output	41
8	Audio over IP settings.....	42
8.1	Setting up SAP	42
8.2	Configuring Livewire settings	42
8.3	Monitoring audio via Live Listening	43
9	System settings	45
9.1	Setting up alarms	45
9.2	Entering device information	46
9.3	Setting up session timeout.....	46
9.4	Changing the title of the browser tab.....	46
9.5	Checking for updates	46
9.6	Updating the firmware with a file.....	47
9.7	Setting up rights	47
9.8	Uploading and activating an SSL certificate.....	48
9.9	Saving settings to a local file	48
9.10	Loading settings from a file.....	48
9.11	Generating and downloading a diagnostic report	49

9.12	Uploading a debug script	49
9.13	Rebooting the device	50
9.14	Restoring factory settings	50
9.15	Accessing the recovery mode via reset pin hole.....	50
9.16	Setting the time and date	51
9.17	Changing login data.....	51
9.18	Adapting the access for user accounts	51
10	Status information.....	52
10.1	Status LEDs	52
10.2	General overview	53
10.3	Device status	55
10.4	NTP Status	55
10.5	Log	57
10.6	Priority of alarm messages.....	57
11	Further information.....	58
11.1	Maintenance and disposal	58
11.2	Troubleshooting, support and warranty.....	58
11.3	Manufacturer	58
12	Technical details.....	59
13	Certificates and declarations.....	62

1 About this manual

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

https://download.2wcom.com/products/RF-10e_LEET



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.
	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 Systems GmbH 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 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 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, never on the cable, to avoid cord damage.



Danger from explosive atmosphere!

- Do not use the device in an explosive environment.

**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.

**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 RF-10e

The RF-10e is a 10-channel receiver for FM and DAB+. It receives the audio signals and encodes them for distribution as Audio over IP, MPEG-2 TS or DVB-ASI. As a re-distribution encoder, the RF-10e can serve a number of applications, such as audio transcoding cable networks, re-encoding for Audio over IP (AoIP) and streaming.

Powerful transport stream gateway: The receiver is designed for a number of audio re-encoding and transcoding applications, providing multiple MPEG-2 transport streams via IP or ASI. It supports MPEG-1 Layer 2, MPEG-4 HE-AACv2 and Dolby Digital (optional) for distribution in DVB-C environments. Typical application areas are cable head-ends, but also in-house distribution and hospitality.

Multi-format audio streaming: The RF-10e is the perfect fit for streaming re-distribution and supports miscellaneous streaming protocols and transport formats for web streaming as well as for secure and reliable AoIP applications. Audio streams can be re-encoded in a variety of formats. Consequently, the RF-10e supports the well-known feature set of audio coding formats such as MPEG-1 Layer 2, MPEG-2 Layer 3, most AAC profiles including xHE-AAC and AAC-ELDv2, OPUS, Ogg Vorbis, PCM, Enhanced aptX, Dolby Digital plus and more.

Smart management: Configuration set-up via an easy-to-use web interface for general settings as well as for backup or fall back. For remote control, the codec offers various possibilities – HTTP, HTTPS, SFTP, Ember+, NMOS, NMS, and SNMP. Real-time monitoring is possible by the "Icecast Live Listening feature". Perfect synchronization can be achieved by PTPv2 and latency control.

3.2 Rights options

The following table displays an overview of the rights options that are available for your RF-10e:

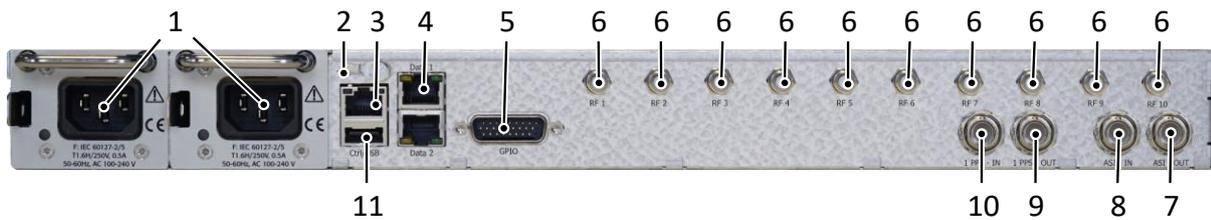
Right	Description
n tuners	Number of tuners
Additional encoder	Option to activate additional encoders, beyond the initial allocation of one encoder per tuner. This is useful, for example, to encode additional Icecast streams.
Ravenna	Option to unlock SAP stream announcement and discovery, and PTP support
Livewire	Option to use IP streaming over Livewire
n HLS connections	Option to encode HTTP Live Streaming (HLS). Giving the number of supported HLS connections.
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 SRT or RIST for decoders
SRT Encoder	Option to use SRT or RIST for encoders
Live Listening	Option to monitor input sources of the encoder and decoder as well as audio outputs via the web interface or Icecast.
n Dolby Encoder	Number of Dolby encoders

3.3 Front panel



- 1 **Headphone:** 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

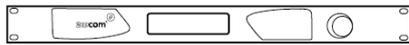


- 1 **Power supply unit:** Mains supply voltage IEC socket.
Optional redundant power supply through a second power supply unit:
 - Option 1: standardized IEC hot-swappable power supply connector; 90-260 V, 47-63 Hz; automatic switchover.
 - Option 2: power supply 48 V DC.
 Combination of power supply 230 V AC and 48 V DC is possible
- 2 **Grounding stud:** This stud can be used to connect a grounding system if necessary.
- 3 **[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).
- 4 **[Data]:** 2x RJ-45 connector – 10/100/1000 Base-T interface for two redundant outputs for data, audio and GPIO transmission via Ethernet.
- 5 **[GPIO]:** 26-pole D-Sub male connector; combined connector for inputs (GPI) and outputs (GPO).
- 6 **[RF]:** 10x antenna input for FM tuner – female F-connector – 50 Ω
- 7 **[ASI OUT]:** ASI output – BNC – 75 Ω
- 8 **[ASI IN]:** ASI input – BNC – 75 Ω
- 9 **[1PPS OUT]:** 1PPS output for time synchronization – BNC – 75 Ω
- 10 **[1PPS IN]:** 1PPS input for time synchronization – BNC – 75 Ω
- 11 **[USB]:** USB 2.0 interface for service, configuration, and firmware.

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.



RF-10e



Link to product data



Power cord



Network patch cable

4.2 Installing the device

For the device to operate safely, 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 input of the FM audio signal, connect the signal inputs to [RF 1-10].
 2. For input of TS via ASI, connect the signal input to [ASI IN]
 3. For output of TS via ASI, connect the signal output [ASI OUT].
 4. Connect a network patch cable to [Ctrl] and to your existing network.
 5. Connect network patch cables to [Data 1-2] and to your existing network.
 6. For time synchronization via external 1PPS signal, connect a 1PPS signal to [1PPS IN].
 7. Optionally, connect the [GPIO] interface.
 8. Use the headphone output for monitoring the input/output audio signals.
- ✓ 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!

Optionally, the device comes with 2 exchangeable plug-in power supply units which can be equipped with different redundant power supply connectors: either IEC sockets or Neutrik powerCON sockets.



If the device is equipped with a primary and a secondary power supply, then the primary power supply is used. If the primary power supply fails, then the device promptly switches to the secondary power supply and the status changes immediately on the **Device** status page. If the secondary power supply fails, then the device does not need to switch the power supply source and it takes at least 1 minute for the status to update on the **Device** status page.

IEC socket



IEC socket: 230 V AC, 90-260 V AC, 47-63 Hz

- Connect the power supply cord fully to the IEC 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.

Neutrik powerCON socket

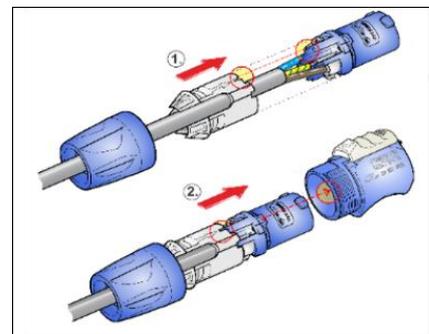
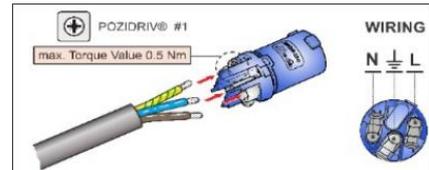
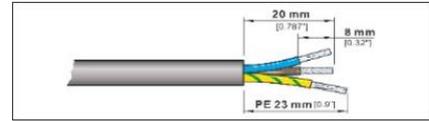
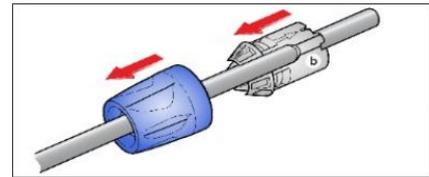


48 V DC Neutrik powerCON socket with aut. switchover (NAC3MPA 1) and Neutrik powerCON connector (NAC3FCA)

NOTE: The corresponding power cords are not part of the delivery contents!

To prepare and connect the Neutrick powercon connector:

1. Slide the clamping sleeve and collet onto the cable.
2. Remove part of the insulation.
3. Insert the wires into the clamping holes on the inset and fasten them with screw and clamping plate using a screwdriver.
 - ! 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.
 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

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.

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.

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. In the dialog window, select **Yes** to save the settings and restart the device.
- ✓ 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.

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

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 main page of the web interface appears.

The default login data (case sensitive) are:

- For read-only access: **user / user**
- For full access: **manager / manager** or **admin / admin**



Change the login data as soon as possible to avoid unauthorized access to the RF-10e and document the login data in a safe place.

4.7 General operation

4.7.1 Operation via web interface

The RF-10e has an integrated web interface. You can make all configurations and operations using a web browser.

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

- If you want to keep any changes made in the configuration of the device, click the corresponding **Save** button.

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 when leaving the page.
- If you do not want to keep the changes, leave the page without saving or reload the page.
- Use a decimal point as the decimal separator in numbers in the input fields (i.e. “6.5” for “six and a half”).

4.7.2 Operation via LCD menu

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

The display has 2 main menus:

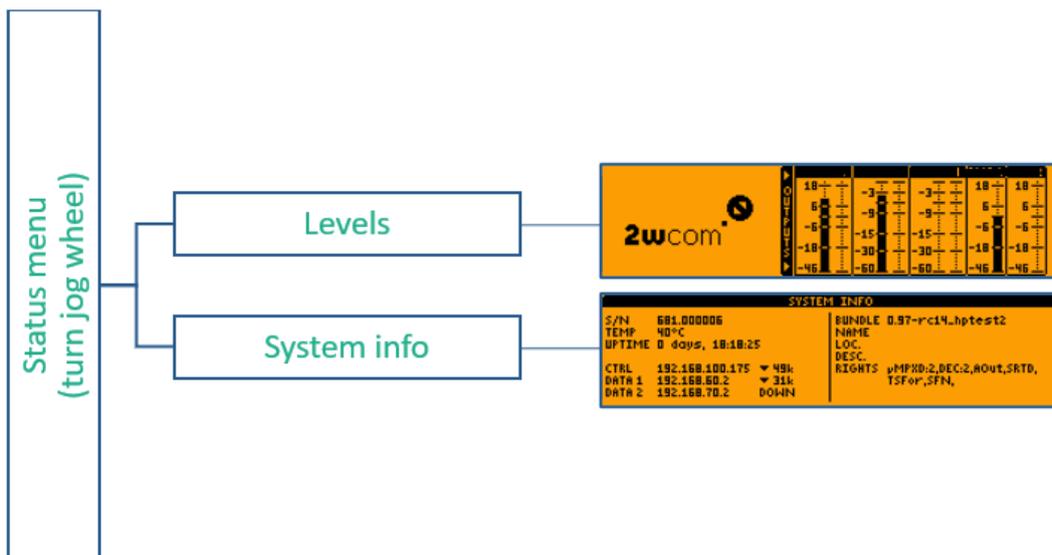
- Status menu (turn jog wheel left or right)
- Configuration menu (push jog wheel)

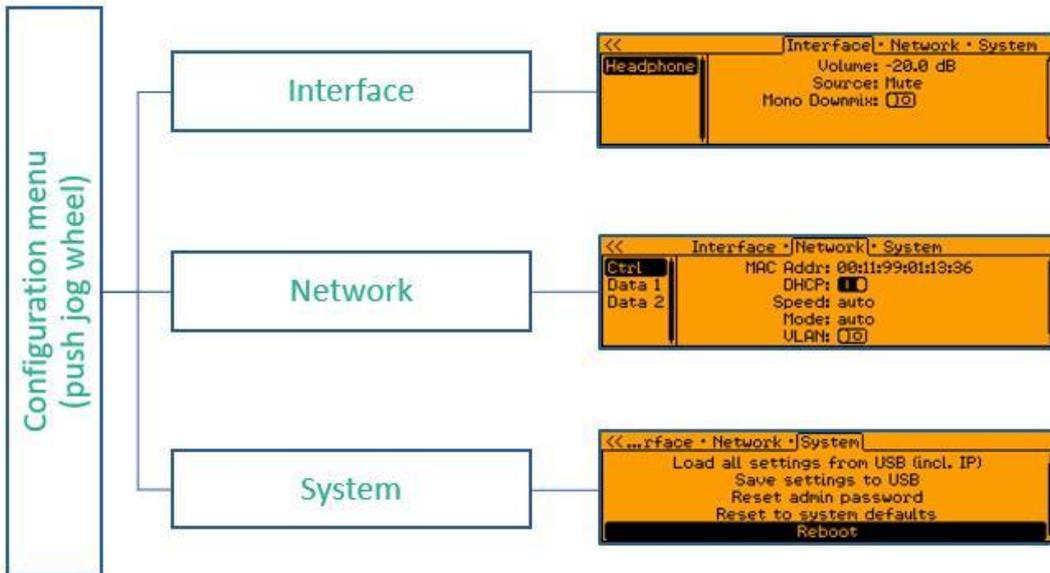
After a warm or cold start of the device, the display shows the default screen of the status menu. When you navigate in the LCD menu, the display returns to the Status Overview after few minutes of inactivity.

Note the following when operating the device via the LCD menu:

- 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 changes in a menu entry, push jog wheel.
- To return to the previous menu level, select <<.

Navigation structure





5 Network settings

5.1 Configuring the interface services

For each ethernet interface, you can select the services by which the interface can receive and send data.

Services

Interface services

	HTTP (Web)	HTTPS (Web)	SSH (SFTP)	SNMP	Ember+	Streaming Data
Ctrl:	<input checked="" type="checkbox"/>					
Data 1:	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
Data 2:	<input type="checkbox"/>	<input checked="" type="checkbox"/>				

SNMP: Only affects get and set commands, traps are not affected

Save

To select the supported services.

1. Navigate to the page **Services**.
 2. For each individual interface, define which data can be received and sent.
 3. Click **Save**.
- ✓ The interfaces now only support the selected services.

5.2 TCP/IP: Configuring the ethernet interfaces

The RF-10e has several Ethernet interfaces: 1 for configuration and the others 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.

TCP/IP

DNS Server

Primary: Routing: OFF

Secondary: Routing Interface:

Proxy Server

Enable proxy: ON

Host: Port:

Note: The Proxy server will only be used for Iccast input streams

Save

Interface settings

Link	Interface name	Mac address	VLAN	DHCP	IP address	Subnetmask	Gateway	Speed:	Mode:
<input checked="" type="radio"/>	Ctrl	00:11:99:00:94:1E	<input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON	<input type="text" value="192.168.100.238"/>	<input type="text" value="255.255.240.0"/>	<input type="text" value="192.168.96.1"/>	auto	full duplex
<input checked="" type="radio"/>	Data 1	00:11:99:00:94:1F	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input type="text" value="192.168.100.250"/>	<input type="text" value="255.255.240.0"/>	<input type="text" value="192.168.96.1"/>	auto	full duplex
<input type="radio"/>	Data 2	00:11:99:00:94:20	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF	<input type="text" value="10.80.118.173"/>	<input type="text" value="255.255.255.0"/>	<input type="text" value="10.80.118.177"/>	auto	full duplex

ID: Priority:

Save

To configure the ethernet interfaces:

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



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

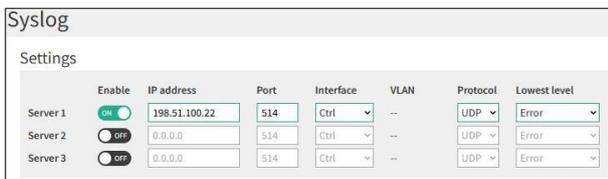
3. Click **Save**.
- ✓ The ethernet interfaces are now configured.

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 VLAN and enter a 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	If DHCP is disabled, then 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).
DNS Server	Enter the IP address of the DNS server used.
Speed	Set the network connection speed in Mbps or select Auto .

5.3 Monitoring the device via syslog

In addition to saving information about events in the log, you can also send them to a syslog server. Syslog eases monitoring the RF-10e.



To send event information to a syslog server:

1. Navigate to the page **Syslog**.
 2. Enable at least one of the servers.
 3. Configure the parameters.
 4. Click **Save**.
- ✓ The RF-10e now sends event information to the syslog server(s).

Parameters

IP address	Enter the IP address of the syslog server.
-------------------	--

- Port** Enter the port number.
- Protocol** Select the protocol to be used.
- Lowest level** Select the lowest level of a message that will be sent to the syslog server. For more information, see 10.6 Priority of alarm messages.
- Interface** Select the [Data] interface to be used.
- VLAN** If the selected [Data] interface is an interface with VLAN, then select the VLAN to be used.

5.4 SNMP: Configuring access data for external requests

You can configure access data (read community/write community) that is necessary for external SNMP requests to the RF-10e.

SNMP (Simple Network Management Protocol) is a protocol used for managing and monitoring network devices. SNMP requests can be used to retrieve information such as the RF-10e's current settings and performance metrics. This information can be used to diagnose problems and optimize network performance. SNMP requests can also be used to configure the RF-10e remotely, allowing administrators to adjust settings.

The screenshot shows the SNMP configuration page with the following sections:

- Settings:** Protocol version: SNMPv2c
- Trap Configuration:** Location of table indices (reboot needed): OID (default)
- Read/Write Community:**
 - 1. Read community: public
 - 2. Read community: public
 - 1. Write community: private
 - 2. Write community: private
- Trap Manager:**

	Enable	Version	IP / Domain Name	Interface	VLAN	Port
1	<input type="radio"/> OFF	V2		ctrl	--	162
2	<input type="radio"/> OFF	V2		ctrl	--	162
3	<input type="radio"/> OFF	V2		ctrl	--	162
4	<input type="radio"/> OFF	V2		ctrl	--	162
- MIB File:** Version: Download: [SNMP.MIB](#)



For the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files must be compiled by your SNMP manager tool. You can save the MIB files in the block **MIB File**.

1. Navigate to the page **External APIs**.
 2. Click on the tab **SNMP**.
 3. Select the protocol version in the block **SNMP Protocol**.
 4. Configure the parameters in the block **Read/Write Community** or **SNMP3 / Security**. The parameters differ depending on the selected protocol version.
 5. Click **Save**.
- ✓ You have configured the access data for external SNMP requests.

Parameters

- Read Community** Enter SNMP access data for the external read-only SNMP access to the device.
- Write Community** Enter SNMP access data for the external write SNMP access to the device.
- Read/Write user** Enter user name and password for the external write SNMP access to the device.
- Read/Write user** Enter user name and password for the external read-only SNMP access to the device.
- Security protocols** Select an authentication protocol and a privacy protocol.

5.5 SNMP: Configuring trap managers

As part of the monitoring function, the device can send SNMP traps to the defined IP addresses of the SNMP managers. SNMP traps are messages that are sent from a network device to a central management system when a specific event or condition occurs. SNMP traps are used as a means of notifying network administrators of important events, such as errors or performance issues, allowing them to take corrective action as needed. You can also readout the settings via SNMP Get.

The screenshot shows the SNMP configuration page with the following sections:

- Settings:** Protocol version: SNMPv2c
- Trap Configuration:** Location of table indices (reboot needed): OID (default)
- Read/Write Community:**
 - 1. Read community: public
 - 2. Read community: public
 - 1. Write community: private
 - 2. Write community: private
- Trap Manager:**

	Enable	Version	IP / Domain Name	Interface	VLAN	Port
1	<input type="radio"/> OFF	V2		ctrl	--	162
2	<input type="radio"/> OFF	V2		ctrl	--	162
3	<input type="radio"/> OFF	V2		ctrl	--	162
4	<input type="radio"/> OFF	V2		ctrl	--	162
- MIB File:**
 - Version:
 - Download: [SNMP MIB](#)



For the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files must be compiled by your SNMP manager tool. You can save the MIB files in the block **MIB File**.

1. Navigate to the page **External APIs**.
 2. Click on the tab **SNMP**.
 3. Select the protocol version in the block **SNMP Protocol**.
 4. Select the location of the table indices in the block **Trap Configuration**: OID or OID plus additional index.
 5. Configure the parameters in the block **Trap Manager**.
 6. Click **Save**.
- ✓ You have configured the trap managers. If you changed the location of table indices, the RF-10e must reboot. Each enabled trap is sent once at startup for initialization.

Parameters

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

5.6 Ember+: Configuring access for monitoring

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

EMBER+

Settings

Mode: UDP & TCP

Timeout (0 = disabled): 0 SEC

Interface: Ctrl

Port: 9000

Save

1. Navigate to the page **External APIs**.
 2. Click on the tab **Ember+**.
 3. Configure the parameters in the block **Settings**.
 4. Click **Save**.
- ✓ You have configured the Ember+ access.

Parameters

- Mode** Select the mode from the dropdown menu.
- Timeout** Enter the value for interval in seconds for a timeout.
- Interface** Select an Ethernet interface from the dropdown menu.
- Port** Enter the port number for the connection.

5.7 NTP: Synchronizing date and time

The RF-10e can automatically synchronize its date and time with an external NTP (Network Time Protocol) server. The configurable parameters on this page may differ depending on the activated rights.

NTP

Settings

Synchronization: ON

Bind to Interface: ON

IP interface: Data 1

QoS DSCP (Differentiated Services Code Point): Best effort (0)

Enable expert settings: ON

NTP Server

1. NTP Server: 192.168.101.143

2. NTP Server: de.pool.ntp.org

3. NTP Server:

4. NTP Server:

Expert Settings

Burst on start: ON

Minimum polling interval: 64 s

Maximum polling interval: 512 s

Maximum allowed jitter: Not Used ms

Modify poll behaviour (polltarget): Not Used

Modify sample filter (maxdelaydevratio): Not Used

Median filter sample count: Not Used

Modify source selection (combinelimit): Not Used

Enable logging: (measurements, statistics, tracking) ON

NTP Quality Settings

RMS Offset: 500 µs

Skew: 500 PPB

Save

1. Navigate to the page **NTP**.
 2. Configure the parameters.
 3. Click **Save**.
- ✓ You have synchronized the date and time with an external NTP server.

Parameters

Synchronization	Start or stop the synchronization with the NTP server.
Bind to interface	To bind the NTP synchronization to a specific IP interface, set the switch to ON . Select the [data] interface and VLAN.
QoS DSCP	Select the quality of service (QoS). The selected packet will be prioritized.
NTP Quality Rating	Select the quality of the NTP server. Low: Event logging, device time synchronization. Medium: For NTP servers that are accessed through the Internet and are used as External Clock source. High: For Stratum 1 NTP servers that are connected locally and are used as External Clock source. (SPN) For Medium and High settings, NTP will be rated as valid once the clock discipline algorithm has converged to acceptable RMS offset and skew values. For the Low setting, NTP becomes valid much quicker with reduced accuracy, however it will increase over time.
Enable expert settings	Set the switch to ON to show further parameters.
1. NTP Server	Enter the IP address or network name of the first NTP server to be used.
2.-4. NTP Server	Enter the IP addresses or network names of the 2nd, 3rd and 4th NTP servers to be used.

6 Encoder settings

6.1 Input source settings

6.1.1 Configuring input source profiles for Elementary Streams (UDP/RTP)

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
 Elementary Streams	RTP Elementary stream over IP using Unicast/Multicast	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

Name	Enter the name of the stream for better reference.
IP type	Select Unicast/Multicast.
Multicast IP	Enter the IP for Multicast, if selected as IP type.
Port	Sender UDP port (the same as set in the encoder settings for output streaming)
IP interface	Select the interface for the input signal.
Protocol	Select the MPEG2 transport stream encapsulation.
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.
RIST	Enable RIST to recover lost packets by resending them.
Decoder type	Predefine the codec type for the decoder by choosing the audio codec or selecting "Automatic" from the dropdown menu.
Synchronous Playout/SFN	Enable Synchronous Playout using SFN or enter a buffer size [ms].
Buffer [ms]	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).
Ancillary data decoding	If the input stream of the decoder contains ancillary data, the RF-10e can forward them to the [DTE] outputs.

GPIO tunneling	Enable GPIO Tunneling for GPIO switch between encoder and decoder.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay.
FEC column/row 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 5006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.

If the right *Ravenna* is activated, then 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**. Copy the settings into the input fields by clicking **Copy/use selected stream settings**.

6.1.2 Creating input source profiles for Livewire



This option is only available if the right *Livewire* is enabled.

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
 Livewire	IP Streaming over Livewire (optional: "Livewire" right)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

Livewire Source	In this menu, available advertised Livewire streams will be displayed and can be selected for automatic configuration. To enter the Livewire settings manually, select Manual .
Source Channel	Enter a number (16 bit, in the range of 0...65535) describing a stream/channel.
Source Port	Specify the port number for Livewire connection.
Source Interface	Select the [Data] interface for Livewire connection.
Gain	Specify gain for the Livewire source.

6.1.3 Creating input source profiles for SRT

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
	Elementary stream over IP using SRT (optional: "SRT Decoder" right)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

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	Select the interface for the input signal.
Latency	Define the time interval for the latency before the RF-10e starts to decode the signal distributed via SRT protocol.
Maximum reorder tolerance	Enter the maximum number of packets that should be reordered.
Encryption	If the input stream is protected by AES encryption, enable end-to-end encryption.
Passphrase	Enter the password used to secure the SRT stream.
Decoder profile	Select the codec profile from the dropdown menu.
Buffer [ms]	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).
Ancillary data output	If the input stream of the decoder contains ancillary data, the RF-10e can forward them to the [DTE] outputs.

6.1.4 Creating input source profiles for SIP



This option is only available if the right *EBU Tech 3326* is enabled.

The RF-10e 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] interfaces or over a server (registrar).

Input Source	Description	Source Interface
	Stream over IP using SIP – Session Initiation Protocol (optional: "EBU Tech 3326" right)	[Audio IN] [Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

Registrar	Enter the Internet domain name of a SIP server if you want the connection to be established over a SIP server.
Proxy	If Use proxy is enabled, 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 [Data] interfaces 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 Auto-configure RTP port is disabled, specify the port number.
RIST	Enable RIST to recover lost packets by resending them. You can enter a limit for the bandwidth used by the stream including re-sent packets.
Buffer	Enter a value for audio buffer.

6.1.5 Creating input source profiles for Icecast

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
 Icecast	Stream over IP using TCP (Icecast/Shoutcast)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click .

4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

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, e.g. "192.168.99.131" or "www.backup-audio.com".
IP Interface	Select the [Data] interface for the audio stream input.
Buffer	Enter a value for audio buffer.
Ancillary data	To add ancillary serial data to the stream, activate the switch.
GPIO tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

6.1.6 Creating input source profiles for Radio

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
 Radio	Audio over FM or DAB tuner.	[RF]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

Name	Assign a name to the configuration profile for better reference.
RF Input	Select the RF input to be used.
Tuner type	Select the tuner type.
FM Frequency	Enter the frequency of the input signal.
FM Mode	Select the FM mode. Auto switches between stereo and mono depending on the signal quality.
FM Deemphasis	Select the deemphasis to reverse previously added emphasis on the signal.

6.1.7 Creating input source profiles for internal storage (File)

You can create an input source profile and use it for encoding and decoding.

Input Source	Description	Source Interface
 File	Files from internal storage	Internal storage (eMMC, optional SSD)

To create a new configuration profile for an input source:

1. Navigate to the page **Codec**.
 2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
 3. To create a configuration profile, click .
 4. To set up the new configuration profile, click **Edit**.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created an input source profile. Continue with 6.3 Assigning input source and codec profile to an encoder.

Parameters

Name	Assign a name to the configuration profile for better reference.
File	Select an audio file in the dropdown menu.
Buffer	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).

6.2 Creating codec profiles

You can create codec profiles to assign to the different encoders of the RF-10e.

1. Navigate to the page **Codec**.
 2. Click on the tab **Profiles**.
 3. To create a new codec profile, click .
 4. To set up the new codec profile, click **Edit**.
 - A dialog window opens.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ You have created and edited a codec profile.

Parameters

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	Set up sampling rate in the dropdown menu. The sampling rate for Livewire can only be configured for 48 kHz. For some 2wcom devices, the sampling rate is set to 192,000 Hz.

Sampling width	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	Select the bit rate in the dropdown menu depending on the chosen audio mode. For some encoder formats, this field shows the calculated bitrate depending on the selected settings.
GPIO Tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

6.3 Assigning input source and codec profile to an encoder

The RF-10e is equipped with parallel encoders that can operate at the same time. One input can be the source for several encoders.

Prerequisite: You have already created configuration profiles for the input sources you want to use.

1. Navigate to the page **Codec**.
 2. Click on the tab **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. Select the source for ancillary data from the dropdown menu **Ancillary Source**.
 5. Assign a codec profile to each encoder by selecting it from the dropdown menu **Profile**. Alternatively, drag/drop the codec profile into this field.
 6. Click **Save**.
- ✓ You have activated and configured the encoders.



The RF-10e 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. This function is currently limited to PCM only.

6.4 Setting up encoder outputs

6.4.1 Setting up an Elementary Stream output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
 2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
 3. Click  to create a new encoder output.
 4. To set up the new output, click **Edit**.
 5. Edit the parameters of the output settings.
 6. Click **Save**.
- ✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to ON .
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
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.
QoS DSCP	Select the quality of service (QoS). The selected packet will be prioritized.
Multicast TTL	TTL (Time to Live) for multicast packets.
IP interface	Select the interface for the output.
Mode	Select the mode of the output stream in the dropdown menu: RTP or UDP. NOTE: Besides UDP/RTP, RTCP packets are also generated for the encoder output and are sent in intervals of 5 s. UDP/RTP allows reordering packets by means of sequence numbers.
RTCP output	Enable or disable the Real-Time Control Protocol (RTCP) output for monitoring and control of the stream.
Maximum payload size	Select the size limit for the payload. To set no limit, select Maximum .
Send Delay	Set up the send delay, which the encoder should wait in order to send Audio over IP as an offset stream for redundancy
RIST	Enable RIST to recover lost packets by resending them. You can enter a limit for the bandwidth used by the stream including re-sent packets.
Synchronous Playout / SFN	Enable SFN and enter the global delay to ensure synchronous playout.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay.
FEC column/row 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 5006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.

6.4.2 Setting up an SRT output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
 2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
 3. Click  to create a new encoder output.
 4. To set up the new output, click **Edit**.
 5. Edit the parameters of the output settings.
 6. Click **Save**.
- ✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to ON .
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
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.
Destination port	Enter the port number of the destination.
IP interface	Select the [data] interface for the output.
Latency	Define the time interval for the latency before the RF-10e starts to output the SRT stream.
Encryption	The type of AES encryption determines the length of the key (passphrase). AES-182 uses a 16-character passphrase (128 bit), AES-192 uses a 14-character (192 bit) and AES-256 uses a 32-character (256 bit) passphrase.
Passphrase	Define a password used to secure the SRT stream.

6.4.3 Setting up an Icecast Source Client output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
 2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
 3. Click  to create a new encoder output.
 4. To set up the new output, click **Edit**.
 5. Edit the parameters of the output settings.
 6. Click **Save**.
- ✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to ON .
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
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.
IP interface	Select the [data] interface for the output.
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.

6.4.4 Setting up an Icecast Server output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click  to create a new encoder output.

4. To set up the new output, click **Edit**.
 5. Edit the parameters of the output settings.
 6. Click **Save**.
- ✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to ON .
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
Name	Enter the name of the stream for better reference. This name will be used as the icy name as well.
Port	Specify the port number of the destination.
IP interface	Select the [Data] interface to be used for the output.
TLS/SSL encryption	Enable TLS/SSL encryption.
Burst on connect	Enable burst on connect and enter the number of burst frames to load the buffer and ensure error-free connection.
Ancillary data	To add ancillary serial data to the stream, activate the switch.
GPIO tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

6.5 Generating an AES67 stream

To generate an AES67 stream:

1. Navigate to the page **Codec**.
 2. Create a codec profile for Elementary Streams using exactly the following parameters:
 - **Encoder Format:** PCM
 - **Audio Mode:** Stereo
 - **Sampling Rate:** 48 kHz
 - **Sampling Width:** 24 Bit
 - **Endianness:** Big Endian
 3. Configure the remaining parameters with individual settings.
 4. Assign the codec profile to an encoder.
 5. Select the input source for the encoder.
 6. Click **Save**.
 7. Configure the encoder outputs (see 6.4 Setting up encoder outputs).
- ✓ The encoder now generates an AES67 stream.

6.6 Configuring the TS Multiplexer

The RF-10e can output up to 8 multiplexed streams over IP at the same time. One multiplexed stream can contain up to 16 programs. To each program, you can add up to 16 payload contents. You can use the IP interfaces [Data] redundantly for the same stream content and the same destination or send different stream contents to the same or different destinations.

6.6.1 Setting up a Multiplex with payload content

Prerequisite: You have already configured the input sources.

Prerequisite: You have already assigned input sources and codec profiles to the encoders.

To set up a multiplexed stream with payload:

1. Navigate to the page **TS Multiplexer**.
 2. To create a new Multiplex, click **+**.
 - A new tab with TS settings appears.
 3. To add a new service to the TS payload content, click **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 the corresponding input source in the dropdown menu **Payload**. Alternatively, drag/drop the input from the tab **Data**.
 7. Specify the service ID, service name, service provider name, PMT PID, PCR PID, and PID for the corresponding program.
 8. Select between the modes PES (program elementary stream) and MPE (multiprotocol encapsulation). If MPE is selected, enter the destination PID, destination port and the protocol.
 9. In the block **General**, configure the parameters.
 10. Click **Save**.
- ✓ You have set up a multiplexed stream. Continue with 6.6.3 Setting up Multiplex outputs.

Parameters

Encoding standard	Select the encoding format: DVB or ATSC.
MPEG TS tables	Select MPEG TS tables as needed for the multiplexing process.
Auto-calculate required TS bit rate	Enable this option to automatically calculate the required Transport stream bit rate based on the selected settings.
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	Set the mode for handling private data within the multiplexed stream: Elementary stream (ES) or TS adaption.
Network ID	Enter the network ID to identify the network where the multiplexed data will be transmitted.
Original Network ID	Enter the original network ID to indicates the network in which the TS stream was originally created.
Transport Stream ID	Assign a Transport Stream ID to identify the specific Transport Stream being used.
Network name	Enter the name of the network where the multiplexed data will be transmitted.
Audio PID removal on bad input	Enable or disable the removal of PIDs in case the input is bad.

6.6.2 Adding a still image video as payload content

You can upload an image file to the RF-10e and add it to the multiplexed stream as a still image video. This image can be displayed on the screen of the listener's radio. You can add as many still image sources as there are available encoders.

To add a still image video as payload content:

1. Navigate to the **Storage** page.
 2. In the **Upload** tab, upload the image file (*.bmp, *.jpg, *.jpeg, *.png).
 - The uploaded images are displayed in the **Image files** tab.
 3. Navigate to the **TS Multiplexer** page.
 4. In the **Payload Sources** block, select the **Still image** tab.
 5. Add a new source and select **Edit**.
 - The window **Still Image Video Settings** opens.
 6. Select the still image file, the image solution, and the average bit rate. The encoder format is always H.264.
 7. Select the tab of the multiplex to which you want to add the still image.
 8. In the **TS Payload Content** block, select **Add Payload**.
 9. Select the still image source from the dropdown menu. Alternatively, drag and drop the still image source into this field.
 10. Select **Save**.
- ✓ You have added a still image video to the stream.

6.6.3 Setting up Multiplex outputs

For each TS Multiplex, you can create and save up to 32 destination streams.

To set up Multiplex outputs:

1. Navigate to the page **TS Multiplexer**.
 2. In the block Multiplexer Outputs, click on the tab of the output you want to set up.
 3. To create a new output, click **+**.
 4. To configure the output, click **Edit**.
 - A dialog window opens.
 5. Configure the parameters.
 6. Click **Save**.
- ✓ The RF-10e now outputs multiplexed streams.

TS/IP output parameters



This option is only available if the right *TS Encoder* is activated.

Activation	Enable this output stream.
Name	Enter the name of the stream for better reference.
Domain name/IP	Enter the IP of the destination.
Port	Specify the port number of the destination.
Multicast TTL	TTL (Time to Live) for multicast packets.

IP interface	Select the [Data] interface for the output.
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.
RTCP output	Enable or disable Real-Time Control Protocol (RTCP) output, which is used for monitoring and controlling the stream.
Send delay	Enter the send delay, that the encoder should wait in order to send Audio over IP as an offset stream for redundancy.
RIST	Enable RIST to recover lost packets by resending them.
Bandwidth limiting	If RIST is enabled, set a bandwidth limit to control the data rate of the TS stream.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay. NOTE: Enable Pro-MPEG FEC in the corresponding decoder.
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. 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.

TS/SRT output parameters



This option is only available if the rights *TS Encoder* and *SRT Encoder* are activated.

Activation	Enable this output stream.
Name	Enter the name of the stream for better reference.
Mode	Select either caller or 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 [Data] interface for the output
Latency	Define the time interval for the latency before the RF-10e starts to output the SRT stream.
Encryption	Enable SRT 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.

ASI output parameters



This option is only available if an ASI output is built in as a hardware option.

Active Enable this output stream. This change will be saved directly. It is not necessary to click **Save**.

Configuration To configure the ASI output signal, see 7.4 Enabling the ASI output.

6.7 Generating an HLS stream



This option is only available if the right *HLS Connections* is enabled.

The RF-10e can encode the same signal multiple times in different qualities and create an HLS stream that automatically changes its audio quality depending on the circumstances.

To create an HLS stream:

1. Assign input sources and profiles to the encoders. The same source must be encoded in different qualities.

The screenshot shows the 'Codec' configuration page. At the top, there are tabs for 'Input Sources / Profiles' and 'Encoder Source/Profile Assignment'. The 'Input Sources / Profiles' section contains a table with the following data:

Name	Format	Mode	SR	SW	DR	Auxiliary	GPIO
High Quality	MPEG Layer2	Stereo	48000	16	384k	--	--
Medium Quality	MPEG Layer2	Stereo	48000	16	192k	--	--
Low Quality	MPEG Layer2	Stereo	48000	16	64k	--	--

The 'Encoder Source/Profile Assignment' section shows a grid of input sources and profiles. The first three rows are highlighted with a red box:

Input Source	Profile
1: Default	High Quality
2: Default	Medium Quality
3: Default	Low Quality

2. Navigate to the page **HLS**.
 3. To create a new tab for the HLS stream, click **+**.
 4. Configure the parameters of the HLS stream.
 5. Click **Save**.
- ✓ The encoder now generates a HLS stream. Information on active HLS streams are displayed on the page **Overview**.

Parameters

HLS stream name Enter the name of the stream for better reference.

Input source Select the input source in the dropdown menu. Alternatively, drag/drop the input source from the block **Input sources** into this field.

Playlist name	Enter the playlist name that will appear in the playlist url.
Playlist url	Use this URL to listen to the stream. Some web browsers need a plug-in to listen to the stream.
Enable stream	Activate the HLS stream.
HLS encoder	Activate the encoders that should feed into the HLS stream. Only the encoders that use the selected input source are listed in this block.

The screenshot shows the configuration interface for HLS encoders. It is divided into two main sections: 'General' and 'HLS Encoder'.

General Section:

- HLS stream name:** Stream1
- Input source:** Testfile
- Playlist name:** Example
- Enable stream:**
- Playlist url:** http://192.168.97.154/main-name:8080/Example.m3u8

HLS Encoder Section:

Active	Profile name	Encoder
<input checked="" type="checkbox"/>	High Quality	MPEG Layer2, 48000Hz - 384k, Stereo (1)
<input checked="" type="checkbox"/>	Medium Quality	MPEG Layer2, 48000Hz - 160k, Stereo (2)
<input checked="" type="checkbox"/>	Low Quality	MPEG Layer2, 48000Hz - 64k, Stereo (3)

A 'Save' button is located at the bottom left of the encoder section.

6.8 Defining check criteria

The RF-10e can check the input sources and mark them as either good (green) or bad (red) on the page **Overview**. You can enable check criteria to and define the circumstances under which a source should be marked as bad.

To define check criteria for each audio input:

1. Navigate to the page **Check Criteria**.
 2. Click on the tab of the input source for which you want to define check criteria.
 3. If any of the listed check criteria should be monitored, enable the corresponding switch.
 4. In the field **Value**, enter the threshold above or below which the input source should be marked as bad.
 5. For each enabled criterion, define the delay time **T1**. After this delay time, the input source is marked as bad.
 6. For each enabled criterion, define the delay time **T2**. After this delay time, the input source is marked as good again, if its signal is good.
 7. Click **Save**.
- ✓ The RF-10e now automatically input sources as good or bad depending on the check criteria. For some check criteria, you can set an alarm (see 9.1 Setting up alarms).

6.9 Setting up a Dolby® encoder



This option is only available if the right *Dolby encoder* is enabled.

The Dolby encoder allows different signals to be encoded so that speech is always equally loud regardless of the content—even though different kinds of content (such as sporting events, news, and commercials) all have different dynamic ranges. You can choose between "Dolby Digital" and "Dolby Digital Plus" as the encoder format.

To set up a Dolby encoder

1. Navigate to the page **Codec**.
 2. Create and configure a codec profile.
 3. Set Dolby Digital as the **Encoder Format**.
 - Dolby settings appear.
 4. Configure the Dolby-related parameters.
 5. Click **Save**.
 6. Assign the codec profile and an input source to an encoder.
 7. Configure and activate an encoder output for this encoder.
- ✓ You have set up a Dolby encoder.

Parameters

Encoder Mode	Choose between "Dolby Digital" and "Dolby Digital Plus".
Dialog Normalization	Select a value between -1 and -31 dB to set the average audio output of the decoder to a preset level. This aids in matching audio volume between program sources. Dialog Normalization is only used if Leveler Bypass is enabled.
Line Mode Profile / RF Mode Profile	Set the profiles to affect the DRC (Dynamic Range Control). This information is essential to allow decoders to decode the signal individually.
Dolby Surround Mode	Indicate whether the input signal is Dolby surround encoded or not. Alternatively, select "Not indicated".
Leveler Bypass	Disable Leveler Bypass to use real-time loudness leveling.
Loudness Target Regulation	Select a preset for loudness target regulation, or configure target loudness, peak limit and dialog intelligence manually. <ul style="list-style-type: none">• ATSC: -24LKFS, -2.0dBTP, on. Typically used in North America.• EBU: -23LKFS, -3.0dBTP, off. Typically used in Europe.

7 Interface settings

7.1 Changing the headphone volume

The input signal can be monitored via the headphone interface.

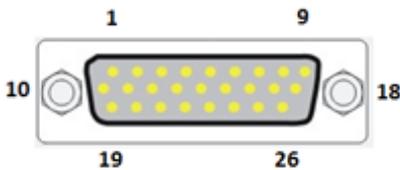


To change the volume of the headphone output:

1. Navigate to the page **Headphone**.
 2. In the block **Headphone**, select the source for the headphone output.
 3. Set the volume for the headphone output in a range from -40.0 to 0.0 dB.
- ✓ The volume of the headphone output is now adjusted.

7.2 Viewing the GPI status

The RF-10e 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 contacts must not be negative or exceed +0.7 V

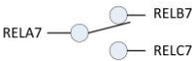
The table below displays the scheme of possible GPI contacts:

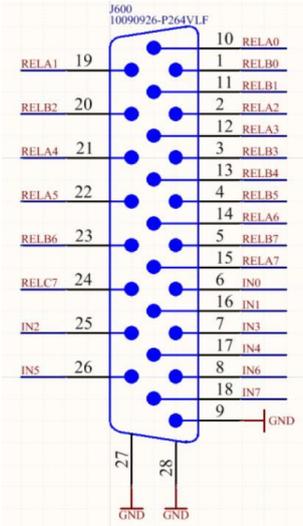
GPI No.	Control Pin No.
1	IN0
2	IN1
3	IN2
4	IN3
5	IN4
6	IN5
7	IN6
8	IN7

- 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 the page **GPI**.

7.3 Configuring GPO settings

The RF-10e features 8 GPOs: 7 SPST relays (form A) and 1 SPDT relay (form C). You can use the relays for alarms of the monitoring function. For more information, see 9.1 Setting up alarms.

GPO No.	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		SPST



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 the page **GPO**.
 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. If you set GPIO Tunneling as the source, then select the audio to be used for this function.
 5. Click **Save**.
- ✓ You have configured the GPO settings.



The virtual LED **State** indicates 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.

7.4 Enabling the ASI output

Optionally, the RF-10e is equipped with an ASI interface (BNC 75 Ω) for TS output.

To enable the ASI output:

1. Navigate to the page **ASI Output**.
 2. Enable an ASI output by setting the switch to **ON**.
 3. In the dropdown menu **Output signal**, assign to each ASI output one TS Multiplex that is to be sent over ASI output.
 4. Click **Save**.
- ✓ The TS is now sent over the ASI output. For more information on TS Multiplex configuration, see 6.6 Configuring the TS Multiplexer.

8 Audio over IP settings

8.1 Setting up SAP

The RF-10e supports SAP (Session Announcement Protocol) for stream announcement.

Prerequisite: You are logged in as an admin.

To set up the SAP connection:

1. Navigate to the page **SAP**.
 2. Configure the parameters.
 3. Click **Save**.
- ✓ You have set up the SAP connection.

Parameters

Mode	To enable SAP, select the service mode. "Client/Server" is recommended.
Announce interval	Enter the time interval between sending SAP announcement.
Multicast loop	Multicast loop to makes the RF-10e 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 [Data] interface for transmission of SAP announcements in the dropdown menu.
Bandwidth limit	To avoid overhead, set a bandwidth limit for SAP announcements.
Destination address and port	Set the destination multicast address and port for SAP announcements.

8.2 Configuring Livewire settings



This option is only available if the right *Livewire* is enabled.

Livewire is an audio-over-IP system used for routing and distributing broadcast-quality audio. The livewire routing protocol is used to route audio as well as GPIO ports.

Livewire

<p>General</p> <p>Routing Protocol: <input checked="" type="checkbox"/></p> <p>Hardware identification: <input type="text" value="0"/></p> <p>Ethernet: <input type="text" value="Data 1"/></p>	<p>GPIO</p> <p>Enable: <input checked="" type="checkbox"/></p> <p>Ethernet: <input type="text" value="Data 1"/></p> <p>Name (GPIO 1-5): <input type="text" value="GPO 1"/></p> <p>Name (GPIO 6-8): <input type="text" value="GPO 2"/></p>	<p>Advertisement</p> <p>Enable: <input checked="" type="checkbox"/></p> <p>Address: <input type="text" value="239.192.255.3"/></p> <p>Ethernet: <input type="text" value="Data 1"/></p> <p>Advertising port: <input type="text" value="4001"/></p> <p>Configuration port: <input type="text" value="4000"/></p>
--	--	--

Prerequisite: You are logged in as an admin.

To configure livewire settings:

1. Navigate to the page **Livewire**.
 2. Enable **Routing Protocol**.
 3. Configure the parameters.
 4. Click **Save**.
- ✓ You have configured the livewire settings.

Parameters

Hardware identification	Enter the hardware ID.
Ethernet	Select the [Data] interface to be used.
GPIO	Assign names to [GPO 1-5] and [GPO 6-8].
Advertisement	Enter the ports for Livewire Advertising and for its configuration.

8.3 Monitoring audio via Live Listening

This option is only available if the right *Live Listening* is enabled.

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 RF-10e web interface. The RF-10e is equipped with an adjustable bit rate encoder that can encode the input audio signal in five different formats. You can manually set up the parameters for audio encoding depending on the bandwidth available for data distribution.

Prerequisite: You have already configured the input sources and assigned them to the encoder and decoder.

To set up audio monitoring via Live Listening:

1. Navigate to the page **Live Listening**.
2. Configure the parameters.
3. Set the switch **Activation** to **ON**.
4. Click **Save**.
5. In the banner, select an available audio source from the dropdown menu **Live Source**.



6. To change the playback volume, click the green volume levels.
 7. To start streaming, click the play button.
- ✓ The RF-10e now plays the audio over the web interface.

Parameters

Port	Enter the port number for streaming. The URL for Icecast streaming is "IP address of the device:streaming port". The standard port for live streaming is 8000. Example: <code>http://192.168.12.23:8000</code> .
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.

9 System settings

9.1 Setting up alarms

You can set several alarms that trigger in case of defined events. You can monitor the following:

Temperature	Alarm is triggered if the device temperature exceeds the configured value.
Power failure	Alarm is triggered in case of an error in a power supply unit.
LAN Link	Alarm is triggered in case of an error in Ethernet data communication.
RF Level	Alarm is triggered if the RF level of the internal source falls below or exceeds the configured values
SNR	Alarm is triggered if the SNR (signal noise ratio) falls below the configured value.
Pilot	Alarm is triggered if no pilot tone is available in the input source
Audio Level Left/Right	Alarm is triggered if the audio level in the left or right channel of the audio output falls below the configured value. This alarm can be used for silence detection.
No RDS Sync	Alarm is triggered if no RDS synchronization can be established.
PI	Alarm is triggered if the entered hexadecimal number is not received. You can enter 2 different PI values and use a ? as a wildcard character.
PS	Alarm is triggered if the ASCII characters for the program station are not received.
Block Error Rate	Alarm is triggered if the number of faulty blocks in the last 100 blocks exceeds the configured value.
Radio Text	Alarm is triggered if the dynamic radio text remains unchanged for longer than the configured period of time.
FIC Quality	Alarm is triggered if the quality of the FIC (fast information channel) falls below the specified percentage value.
Radio Text	Alarm is triggered if the dynamic label remains unchanged for longer than the configured period of time.

To set up alarms:

1. Navigate to the page **Alarm**.
 2. For each alarm, configure the corresponding parameters.
 3. Click **Save**.
- ✓ Enabled alarms will now be saved in a log entry and signaled over SNMP, LED or GPO if triggered.

Parameters

Enable	Enable or disable an alarm.
Priority	Select the priority of the alarm message.
Values	Enter the value below or above which the alarm triggers.
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. The corresponding GPO must be activated for the source "Alarm" (see 7.3 Configuring GPO settings).

9.2 Entering device information

For better identification of the RF-10e, you can enter device-specific data.

1. Navigate to the page **Global**.
 2. Configure the parameters in the block **System info**.
 3. Click **Save**.
- ✓ The saved information is now displayed in the banner.

Parameters

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.

9.3 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.

1. Navigate to the page **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 this function.
 3. Click **Save**.
- ✓ You will now be automatically logged out after the set period of inactivity.

9.4 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.

1. Navigate to the page **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 field.
 3. Click **Save**.
- ✓ The title of the browser now displays the configured information.

9.5 Checking for updates

You can check for updates and install them, if available. You can also view the release notes and details about the available updates. Additionally, it is possible to download the firmware file to install at a later point of time.

To install an available update:

1. In the menu **Support**, click **Check for updates**.
 - The window **Available Firmware Versions** opens.
 2. Select the update you want to install.
 - The dialog window **Firmware Update** opens.
 3. Click **Yes, update now**. The update may take a while. Do not interrupt this process. Since the device reboots during this process, you will be logged out.
- ✓ The firmware is now updated.



In the window **Available Firmware Versions**, firmware bundles that are newer than the currently installed one are marked with ★. Important updates are marked with !. Click **Open** to view the change notes and details about a bundle version. To download a firmware bundle for later installation, click



In the window **Available Firmware Versions**, you can enable an **automatic update check** every 24 hours. If a new update is available, it will be indicated by the ★ icon next to the **Check for Updates** menu item. You can also enable a notification dialog that informs you of any new updates.

9.6 Updating the firmware with a file

You can upload ARM firmware stored locally and activate it via the web interface. Alternatively, you can load a firmware file from a USB stick – either manually or automatically.

To load a firmware file via the web interface:

1. Navigate to the page **Global**.
 2. In the block **Firmware** update, click **Browse/Drop file**.
 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 reboot, the new firmware is active.

To manually install firmware from a USB stick via the LCD menu:

1. Insert a USB stick with the firmware file into the [USB] port.
 2. Use the jog wheel to select **Config menu** → **System** → **Global** → **Update firmware from USB**.
 3. Select the firmware file you want to upload.
 4. Select **Update**. The installation may take a while. Do not interrupt this process.
 5. Select **OK** to reboot the device.
 6. Remove the USB stick from the device.
- ✓ After the reboot, the new firmware is active.

To automatically install firmware from a USB stick:

1. Create a folder named "autoupdate" on the USB stick.
 2. Place the firmware file in the "autoupdate" folder. Make sure that the folder only contains one firmware file.
 3. Insert the USB stick into the [USB] port.
 - The device automatically finds the firmware file on the USB stick. If the firmware version of the file differs from the currently installed one, the device automatically installs the new firmware. The installation may take a while. Do not interrupt this process.
 4. Select **OK** to reboot the device.
 5. Remove the USB stick from the device.
- ✓ After the reboot, the new firmware is active.

9.7 Setting up rights

Some functions of the RF-10e 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.

1. Navigate to the page **Global**.
 2. In the block **Rights**, click **Browse/Drop file**.
 3. Select the rights file (*.2wcom_key) you want to upload.
 4. Click **Upload**. The upload may take a few minutes. 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**.

9.8 Uploading and activating an SSL certificate

An SSL certificate is a digital certificate that provides authentication for a website and enables an encrypted connection.

To upload and activate an SSL certificate:

1. Navigate to the page **Global**.
 2. In the block **SSL-Certificate**, click **Browse/Drop file**.
 3. Select the SSL certificate file (*.pem) you want to upload.
 4. Click **Upload**. The upload may take a while. Do not interrupt this process.
- ✓ You have uploaded an SSL certificate.

9.9 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.

1. Navigate to the page **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.
 3. Click **Download**.
 4. Save the file to a location of your choice.
 5. Click **Save**.
- ✓ You have saved settings to a local file. To upload and activate the settings stored locally, see 9.10 Loading settings from a file.

9.10 Loading settings from a file

You can upload a settings file to restore previous settings or copy the settings from another device. You can do this either via the web interface or the LCD menu. You can load the settings either without or including IP settings such as IP addresses and VLANs. This enables you to easily swap out a device. Note that if you load settings including IP via the web interface, you will lose the connection to the device due to the new IP address. For information on how to generate a settings file, see 9.9 Saving settings to a local file.

To load a settings file via the web interface:

1. Navigate to the page **Global**.
 2. In the block **Settings update**, click **Browse/Drop file**.
 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.
- ✓ The new settings are now active. If you chose to also load the IP settings, the device now has a new IP address.

To load a settings file via the LCD menu:

1. Insert a USB stick with the settings file into the [USB] port.
 2. Use the jog wheel to select **Config menu** → **System** → **Settings** → **Load from USB** or **Load from USB (incl. IP)**.
 3. Select the settings file you want to upload.
 4. Select **Upload**. The file upload may take a while. Do not interrupt this process.
- ✓ The new settings are now active. If you chose to also load the IP settings, the device now has a new IP address.

9.11 Generating and downloading a diagnostic report

In case of any problems or failures, you can generate and download a diagnostic report to send to 2wcom.

To generate and download a diagnostic report:

1. Navigate to the page **Global**.
 2. In the block **Diagnostic Report**, select the time period for which the device captures all activities.
 3. Click **Generate**. A file is being created. This may take a while. Do not interrupt this process.
 - The download option with the time and date of file creation appears.
 4. Click **Download**.
 5. Save the file to a location of your choice.
- ✓ You have generated and downloaded a diagnostic report.

9.12 Uploading a debug script

To identify a specific error, you can upload a debug script that you have received from 2wcom. Depending on the expected error, the debug script monitors extra status information and records the incoming data. When the error occurs, the recording stops and a debug.log file is generated which contains all information that 2wcom needs to fix it.

To upload a debug script:

1. Navigate to the page **Global**.
2. In the block **Debug Report**, click **Browse/Drop file**.
3. Select the debug script file (*.upd) you want to upload.
4. Click **Upload**. The upload may take a while. Do not interrupt this process.
5. To start the debugging process, click **Start**. This may take a while. Do not interrupt this process.

- When an error occurs, the script is automatically stopped. A download link for the debug.log file appears.
- 6. To download the debug.log file, click on the link.
- 7. Send the file to your 2wcom contact person.
- ✓ 2wcom can now identify the error and determine further action.

9.13 Rebooting the device

To reboot the device:

1. Navigate to the page **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.

9.14 Restoring factory settings

Restoring the factory settings will delete all configurations that were made by a user except for the IP address of the CTRL interface. This also applies to the access accounts.

To reset the device to factory settings:

1. Navigate to the page **Global**.
 2. In the block **Control**, click **Now** in the field **Load Factory Settings**.
- ✓ You have restored the factory settings.



9.15 Accessing the recovery mode via reset pin hole

If you cannot access the RF-10e 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.



3. After flashing or resetting the device, reboot the device by clicking **Reboot**.
- ✓ After a few seconds, the device will be ready for operation.

9.16 Setting the time and date

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

1. Navigate to the page **Time**.
 2. In the block **Local time**, select the present time zone in the dropdown menus.
 3. Click **Save**.
 4. In the block **Time and date settings**, enter the current date and time.
 5. 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**.

9.17 Changing login data

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.

Change the login data 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"
- FTP service: "sftpuser" / "sftpuser"

To change the login data:

1. Log in as an admin.
 2. Change the login data for an account in the corresponding block and repeat the new password.
 3. Click **Save**.
- ✓ You have changed the login data.

9.18 Adapting the access for user accounts

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

Prerequisite: You are logged in as an admin.

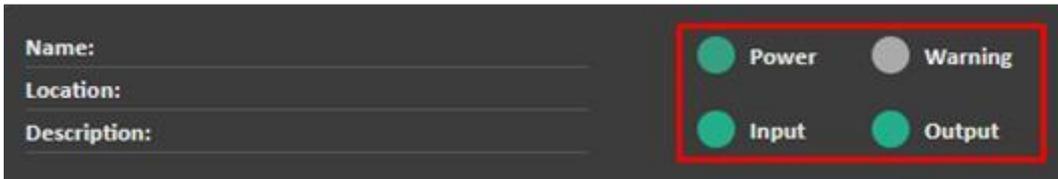
To adapt the access for manager and guest accounts each individual RF-10e menu:

1. Navigate to the page **User**.
 2. Click on the tab **Menu Access**.
 3. Enable or disable the access to the separate menus by setting the corresponding switch to either **ON** or **OFF**.
 4. Click **Save**.
- ✓ The new access configuration is now active.

10 Status information

10.1 Status LEDs

The RF-10e 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 following table 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 power supply 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.

10.2 General overview

Overview page

The page **Overview** gives you general information on the status of your RF-10e. The appearance of this page might differ depending on the activated rights, built-in modules and settings.



The audio levels of the tuner inputs are displayed in the left block.

The block **Status** gives general device-specific information as well as information on the ethernet interfaces.

Encoder Status

To get a quick and detailed overview, you can view the current status of the encoder and the incoming audio data. To view the encoder status, navigate to the page **Overview** and click on the tab **Codec**.

In the block **Encoder**, you can see the status of the currently active encoders.

- To view more details of an encoder, click on the corresponding panel.
 - The **Details** view below the block **Encoder** now displays the status of the input source, codec profile, and the assigned audio outputs.
- To reset the counters in the status fields, click **Reset Counters**.
- Details of the assigned outputs are displayed in the table. To view the status of an assigned output, select the corresponding tab.
- To change the order of the table columns, drag/drop the column headings.
- To change the column width, hover over the frame line until the cursor changes into a two-headed arrow. Click and move the frame line.

The encoder output displays the following counters:

Lost	Lost indicates the number of lost packets.
RIST/Requested	This indicates the number of packets that the receiver requested for retransmission by the sender.
RIST/Retransmitted	This indicates the number of packets that were retransmitted by the sender. Some requests may not answered due to timing and jitter.

TS Multiplexer status

The Tab **TS Multiplexer** on the page **Overview** gives a detailed overview on the status of the enabled multiplex outputs.

- To see more details on the configured programs in one multiplex, click on the corresponding Multiplex.
- To see more details on the payload of a program, click on the corresponding program.

The screenshot displays the 'TS Multiplexer' configuration page. At the top, there are two tabs: 'Multiplex 1' (selected) and 'Multiplex 2'. Under 'Multiplex 1', a summary shows 8 services with a total bitrate of 1.560 Mbit/s. Below this, 'Details - Multiplex 1' lists two programs. Program 1 (Service ID 1000, PMT PID 101, PCR PID 6769, PID 6769) is highlighted with a red box. Its details include audio input/output levels (PCM and AAC) and file information for PID 6769 (Audiophile test file, 03-12 Guitars, 1 Double-Bass.wav). Program 2 (Service ID 2000, PMT PID 201, PCR PID 6770, PID 6770) is also shown. Below Program 2, 'Details - Program 1' (for PID 6770) shows raw data and UECP data.

System Information

The page **Global** gives specific information on the device, such as the uptime and time of the last boot, serial number, activated rights and software version. The current version of your RF-10e is the **Bundle Version**.

System information	
Present local date and time:	17. May 2023, 12:15:30
Last boot:	14. March 2023, 10:58:42
Uptime:	64 days, 01:17:44
Serial number:	701.000003
▼ Bundle version:	1.00-rc2
File/Recovery system version:	2.35 / 2.01
App version:	1.00.3
Webinterface version:	1.00
FPGA version:	1.01b0 / 0
System Controller version:	1.06
SNMP MIB version:	1.0 (SNMP MIB)
Kernel version:	2wcom-01.17-rt60
▶ Codec versions	
HW Revision XPS/IF:	1.02 / 0.20
Rights:	10 Tuner, Live Listening, TS Encoder, Ravenna, Livewire, SRT Decoder, SRT Encoder, 10 Dolby Encoder, 5 HLS connections
Missing rights:	TS Decoder
Open source acknowledgements:	Link

10.3 Device status

The page **Device** gives information on the current status of the hardware.

- The block **Mainboard** displays the voltages on the mainboard and the device temperature.
- The block **Fans** displays the speed of the fans.
- The blocks **Power Supply** display the status and type of the left and right power supplies. The colored bar indicates the status: green - ok, red - no power. If only one power supply module is built in, the only one block is displayed on this page.
- The block **Expansion Modules** displays built-in hardware options. If no expansion modules are built in, this block is not shown.

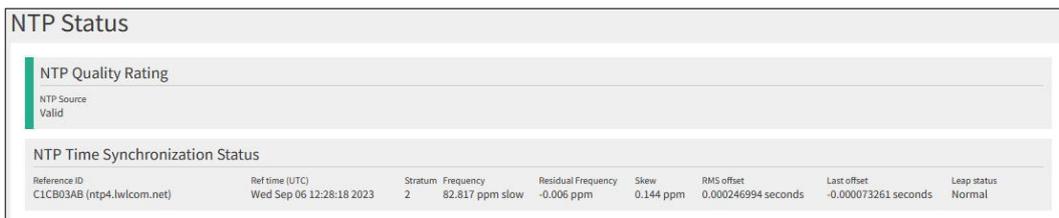


10.4 NTP Status

Navigate to the page **NTP Status** to view the status of the NTP servers used for time synchronization.

The first block gives information on the quality of the current synchronization. The RF-10e always uses the best available source. The quality status of the current NTP server synchronization is displayed via a color-coded bar:

- green = the quality is good
- red = at least one of the listed data is bad



The list below explains the data that is displayed in this block:

- NTP Source** States whether an NTP source is available.
- Reference ID** The reference ID and IP address of the server to which the computer is currently synchronized.
- Ref time (UTC)** The time (UTC) at which the last measurement from the reference source was processed.
- Stratum** The stratum value indicates how many levels away the NTP server is from the primary reference source. Lower stratum values indicate a closer and more accurate clock source.
- Frequency** The rate by which the clock would be wrong if it were not corrected.
- Residual Frequency** Difference between what should be frequency according to the measurements from the reference source and the frequency that is currently used.
- Skew** The frequency offset to the clock standard.

- RMS Offset** The root-mean-square offset is a long-term average offset to the currently estimated time.
- Last offset** The time (UTC) at which the last measurement from the reference source was processed.
- Leap status**
- Normal: no leap second.
 - Insert second: leap second will be inserted at the end of the month.
 - Delete second: leap second will be deleted at the end of the month.
 - Not synchronized: unknown status (no valid measurement was made).

The block **NTP Server Status** lists all NTP servers and gives detailed information on them. The status of the NTP server source is displayed via a color-coded bar:

- green = current best
- orange = combined
- red = not combined

NTP Server Status											
NTP Server 1											
Source State	Name/IP address	Stratum	Poll	Reach	LastRx	Measured Offset	Adjusted Offset	Estimated Error	Frequency	Freq. Skew	Standard Deviation
Current best	ntp4.lwllcom.net	1	100 s	377	578	-201us	-275us	+/- 2921us	-0.068	0.162	218us
NTP Server 2											
Source State	Name/IP address	Stratum	Poll	Reach	LastRx	Measured Offset	Adjusted Offset	Estimated Error	Frequency	Freq. Skew	Standard Deviation
Not combined	mail.sebi.org	2	100 s	377	577	-792us	-792us	+/- 34ms	-0.180	0.281	141us
NTP Server 3											
Source State	Name/IP address	Stratum	Poll	Reach	LastRx	Measured Offset	Adjusted Offset	Estimated Error	Frequency	Freq. Skew	Standard Deviation
Combined	time.cloudflare.com	3	100 s	377	532	-276us	-276us	+/- 5891us	-0.039	0.255	206us
NTP Server 4											
Source State	Name/IP address	Stratum	Poll	Reach	LastRx	Measured Offset	Adjusted Offset	Estimated Error	Frequency	Freq. Skew	Standard Deviation
Not combined	217.160.114.150	2	100 s	377	171	-2939us	-2939us	+/- 86ms	+0.265	0.448	560us

The list below explains the data that is displayed in this block. For more information, visit chrony.tuxfamily.org/doc/4.1/chronyc.html

- Source State** Current best: the best source which is currently selected for synchronization
 Combined: other sources selected for synchronization which are combined with the best source.
 Not combined: any other source.
- Name/IP address** The name or the IP address of the source
- Stratum** The stratum value indicates how many levels away the NTP server is from the primary reference source. Lower stratum values indicate a closer and more accurate clock source.
- Poll** Polling interval, which is the frequency at which the device queries the NTP server for time updates.
- Reach** Indicates the reachability of the NTP server. This is a bitmask value that shows how successfully the device has been able to reach and communicate with the server.
- LastRx (Last Receive)** Shows how long ago the last good sample was received from the source.
- Measured Offset** The measured time difference between the local clock and the NTP server's clock at the time of synchronization.
- Adjusted Offset** This value represents the measured offset after any corrections or adjustments have been applied to align the local clock with the NTP server's time.
- Estimated Error** The total worst-case timing error accumulated between the stratum 1 server and the client.
- Frequency** This is the estimated residual frequency for the server.
- Frequency Skew** The frequency offset to the clock standard.
- Standard Deviation** This is the estimated sample standard deviation.

10.5 Log

The **event log** is a record of significant system events, such as system restarts and error messages, which are crucial for monitoring the performance of the device. These events have an alarm priority and may require immediate attention or action to resolve issues or ensure proper operation. See also: 9.1 Setting up alarms.

No	Time	Priority	State	Message
887	2023-09-07 11:06:03	Informational		Successful login as Admin from 192.168.96.90
886	2023-09-06 13:15:14	Informational		Successful login as Admin from 192.168.99.120
885	2023-09-06 08:16:55	Informational		Successful login as Admin from 192.168.99.120
884	2023-09-05 14:07:24	Informational		Successful login as Admin from 192.168.96.90
883	2023-09-05 12:40:30	Informational	●	BNC Input 1: Silence Detection (Ref: 0.0, Level: 5.0 [dBu])
882	2023-09-05 12:40:02	Emergency	●	BNC Input 1: Silence Detection (Ref: 0.0, Level: -11.9 [dBu])

The **extended log** contains less critical information compared to the event log and is primarily intended to provide insights into general events. The log entries in the extended log are informational and do not carry alarm priorities, they are volatile and do not persist over restarts.

No	Time	Source	Type	Message
54	2023-09-05 16:33:50	Default	RtpRxTimedOut	RTP Rx stream timed out from IP 192.168.101.72:52238, SSRC:0x00000000
53	2023-09-05 16:00:09	Default	RtpUnrecoveredPkt	RTP Rx 1 packet(s) unrecovered (eq. 3ms), 1st missed SEQ:36339
52	2023-09-05 16:00:09	Default	RtpMissedPkt	RTP Rx 1 packet(s) missed, 1st missed SEQ:36339 (from 192.168.101.72:52238)
51	2023-09-05 15:21:27	Default	RtpRxStart	Start RTP Rx from IP 192.168.101.72:52238, SSRC:0x00000000
50	2023-09-05 15:21:27	Default	RtpRxStart	Start RTP Rx from IP, SSRC:0x65ebd7cc
49	2023-09-05 15:21:11	Default	RtpRxTimedOut	RTP Rx stream timed out from IP 192.168.101.72:52238, SSRC:0x00000000
48	2023-09-05 15:21:00	Default	RtpRxStart	Start RTP Rx from IP 192.168.101.72:52238, SSRC:0x00000000

- To automatically refresh the page and immediately see new entries, toggle the switch **Auto Refresh**.
- To sort the log entries, click on the column header of the parameter by which you want to sort the entries. To reverse the order, click that header again.
- To search for a specific entry, enter a term into the search bar.
- To save the list to a log file, click **Download**.
- To delete all log entries, click **Clear**. Confirm your choice in the dialog window.

10.6 Priority of alarm messages

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. The event will be recorded in a log entry.

11 Further information

11.1 Maintenance and disposal

No special maintenance is necessary on the device. Do not use corrosive detergents on the device such as benzene, thinner, alcohol or acetone.

Remove dust on the housing of the device with a soft, dry cloth.

Electrical appliances do not belong in domestic waste. Dispose of the device in an environmentally friendly manner via suitable collection systems in accordance to the local regulations.

11.2 Troubleshooting, support and warranty

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. You can find the serial number of your device on the page **Global** and on the sticker on the rear side of the device: "S/N xxx.xxxxxx".

For information on the warranty of 2wcom products, visit <https://www.2wcom.com/terms-and-conditions/>.

Problem	Possible Causes	Solution
Device does not turn on	<ul style="list-style-type: none"> Power cable is connected improperly Mains supply failure Blown fuse 	<ul style="list-style-type: none"> Check power supply cord. Make sure that the power plug is fully inserted. Check mains supply. Replace fuse by same type.
Device is not accessible via Ethernet	<ul style="list-style-type: none"> Network cable is not connected IP address/TCP port is unknown A device with the same IP address was connected a few minutes before. Thus, the ARP table still assigns the old MAC address to the IP address. 	<ul style="list-style-type: none"> Connect the network cable. Check IP address obtained from DHCP via LCD menu. The operation system refreshes the ARP table every few minutes. For an instant access to the device, reset the ARP table of your computer, e.g. by entering <code>arp-d</code> in the Windows command prompt.
Device does not respond		<ul style="list-style-type: none"> Reboot the device. Update the software.

11.3 Manufacturer

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 Web www.2wcom.com

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12 Technical details



Technical details (1/3)

Input

RF

Connector	10 x F connector female
Impedance	50 Ω
Frequency range (FM)	87.5 – 108.0 MHz 76.0 – 90.0 MHz (Japan) 50/100 kHz steps
RF sensitivity (FM) (S/N 40 dB, stereo)	35 dBμV
Max. RF input (FM)	120 dBμV
Frequency range (DAB)	168 – 240 MHz (Band III)
RF sensitivity (DAB)	10 dBμV
Max. RF input (DAB)	100 dBμV

Audio (encoder)

Codecs

Standard	Linear PCM, G.711, G.722 Opus, Ogg Vorbis MPEG 1/2 Layer 2, 3 MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D xHE-AAC MPEG-4 AAC-LD/ELD/ELDV2 Enhanced aptX (E-aptX) Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3), Dolby E on request. (optional) MPX (optional)
Sample rates	8, 16, 32, 44.1, 48 kHz



Technical details (2/3)

Interfaces

Audio

Headphone (out)	L/R, < 10 Ω, 6,3 mm
-----------------	---------------------

Ethernet

Data	Audio, controlling and setup functions
Connector	3x RJ45
Type	Auto switching 10/100/1000 BASE-T
Protocol	RTP/RTCP/UDP, IGMP, ICMP, DHCP, HTTP, SFTP, SNMPv2c, SNMPv3, NTP, TCP (Iccast), HLS

Transport stream

ASI IN	BNC – 75 Ω
ASI OUT	BNC – 75 Ω

Contact closure

Inputs	8 inputs
Outputs	8 floating relays (7x SPST, 1x SPDT) (for DC: max. 30 V, 0.5 A) 26 pole sub-D male

Time synchronization (optional)

PTPv2	Network synchronization according to IEEE 1588-2008
SYNC IN	BNC – 75 Ω - 1PPS
SYNC OUT	BNC – 75 Ω - 1PPS

Control & monitor

Ethernet

Data	Control and setup functions
Protocol	2wcom NMS, Telnet, HTTP/HTTPS, UDP, IGMP, ICMP, DHCP, SFTP, SNMPv2c, SNMPv3

Front Panel

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



Technical details (3/3)

General data

Power consumption	< 20 W
Case dimensions	19", 1 RU, depth: 310 mm, width: 424 mm, front panel: 484 mm
Weight	< 5 kg
Material	Steel plate (aluminum-zinc coated)
Operating temp. range	0 – +45°C
Storage temp. range	-40 – +70°C
Languages	English

Power Supply

Standard AC	1 internal IEC power connector voltage range 90 – 260 VAC (nominal 100 – 240 VAC) frequency range 47 – 63 Hz (nominal 50 – 60 Hz)
Dual internal (optional)	Two internal redundant power supplies (AC or DC) automatic switchover and prioritization AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz)
Dual hot-plug (optional)	Two hot-swappable redundant power supplies (AC or DC) automatic switchover and prioritization AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz)

Internal storage

Data	internal audio files
Size	7 GB (optional 1000 GB)

13 Certificates and declarations



EC declaration of conformity

The manufacturer

2wcom Systems GmbH
Am Sophienhof 8
24941 Flensburg
Germany

hereby confirms that the product:

RF-10e

in its conception, construction and form put into circulation is in accordance with all the relevant essential health and safety requirements of the following EC/EU directives as amended and the national laws and regulations adopting these directives:

- | | |
|---|---------------------|
| • Audio/video, information and communication technology equipment - Part 1: Safety requirements | EN IEC 62368-1:2018 |
| • Electromagnetic Compatibility (EMC) Directive | 2014/30/EU |
| • Low Voltage (LVD) Directive | 2014/35/EU |
| • Radio Equipment Directive (RED) | 2014/53/EU |
| • Restriction of Hazardous Substances (RoHS 2) Directive | 2011/65/EU |

This EC-declaration of conformity is the result of a test, which was accomplished in accordance with the standards EN 301489-1:2020-06, EN 300422-1:2022-05, EN 300422-2:2017-07, EN 55011:2022-05, EN 55032:2022-08, EN 55035/A11:2022-06, EN 61000-3-2:2019-12, EN 61000-3-3:2023-02, EN 61000-4-2:2009-12, EN 61000-4-3:2021-11, EN 61000-4-4:2013-04, EN 61000-4-5:2019-03, EN 61000-4-6:2014-08, EN 61000-4-11:2020, EN 61000-4-16:2016-10, EN IEC 63000:2018.

This declaration is no longer valid if the machine is modified without our consent.

2wcom Systems GmbH

January 25, 2024

A handwritten signature in black ink, appearing to be 'D. D...' with a long, sweeping underline.