GOING FUTURE TODAY.

U 159

IP to QAM Converter

Operating Manual

Version 10-2018A

Contents

Before starting operation of the device

HINWEIS: Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version). The ASTRO company confirms that the information in this manual was correct at the time of printing, but it reserves the right to make changes, without prior notice, to the specifications, the operation of the device and the operating manual.

Symbols and conventions used

Symbols used in these instructions

Pictograms are visual symbols with specific meanings. You will encounter the following pictograms in this installation and operating manual:

Warning about situations in which electrical voltage and non-observance of the instructions in this manual pose a risk of fatal injuries.

Warning about various dangers to health, the environment and material.

Recycling symbol: indicates components or packaging materials which can be recycled (cardboard, inserts, plastic film and bags). Used batteries must be disposed of at approved recycling points. Batteries must be completely discharged before being disposed of.

This symbol indicates components which must not be disposed of with household rubbish.

Copyright information

Parts of the software used with this product originate from third-party vendors and were developed under a variety of licensing conditions. Detailed information on the licences can be found on the device's web user interface. If you select the menu item “Licensing” on the web browser interface of the device, you will find a link to a page with detailed information.
You can obtain the source code for licence-free parts of the software upon request and against payment of a processing fee.
Please contact us at:

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Phone: (+49) 2204 405-0

Proper use

The devices of the U 1xx- and U 2xx series are only used for converting signals of different modulation to / from IP data streams in multimedia cable networks. The power supply unit U 100 SNT eco / U 100 SNT eco+ may only be used for the power supply of the U 1xx- and U 2xx units within the base unit U 100-230. Modification of the devices or use for any other purpose is not permitted, and will immediately void any guarantee provided by the manufacturer.

Target group of this manual

Installation and starting operation

The target group for installation and starting operation of the ASTRO headend technology are qualified experts who have training enabling them to perform the work required in accordance with EN 60728-11 and EN 60065. Unqualified persons are not allowed to install and start operation of the device.

Device configuration

Target group for the configuration of the ASTRO headend are persons who have received instructions and have training enabling them to perform a configuration. Knowledge of EN 60728-11 and EN 60065 is not necessary for configuration.

Device description

The delivery is comprised of the following parts:

- ☐ U 159 Edge QAM module and backplane
- ☐ Operating manual

The U 159 plug-in module and the U 100 base unit feature a CE marking. This confirms that the products comply with the relevant EC directives and adhere to the requirements specified therein.

Figure 1, top:
U 159, installed in the U 100 base unit (fitted with three plug-in modules)

Figure 1, middle:
U 159, front panel
[1] Display for management IP addresses, data IP addresses, status messages, etc.
[2] Status display
[3] Control and data knob, menu switch

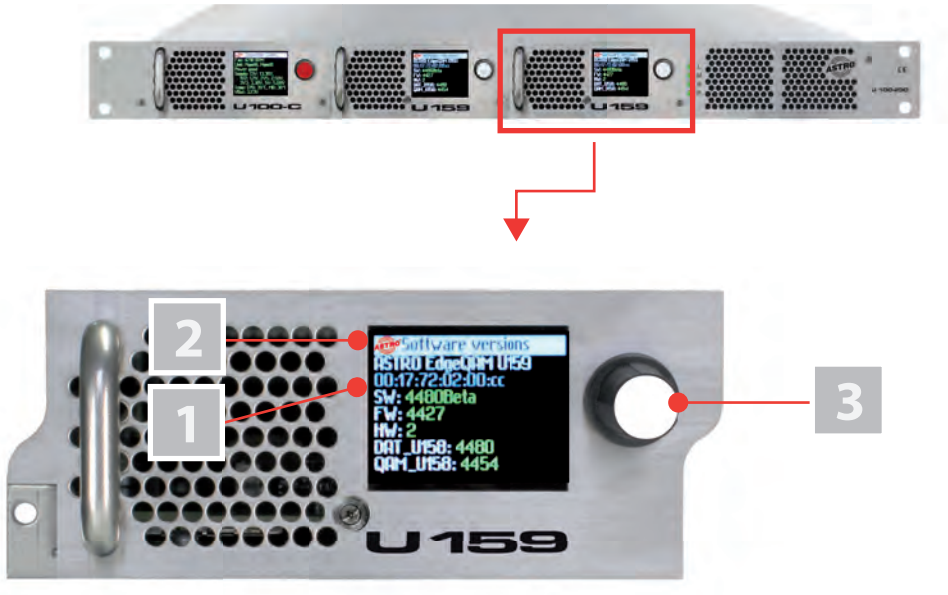
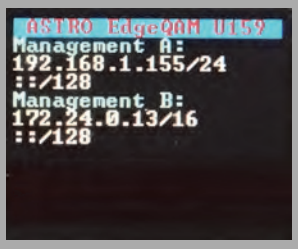
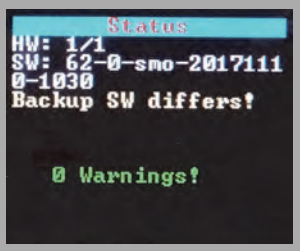
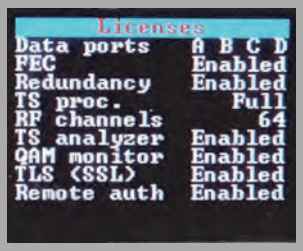


Figure 1: U 159







HINWEIS: *Turning the data knob [3] (fig. 2, above) allows you to navigate through the individual menu items in the U 159 display. Press the data knob to switch on the display.*

The ASTRO logo will be the first display to appear following activation.

Turning the data knob clockwise allows to you access the individual displays:

- Management A / B: The data for both management ports is displayed.
- Status: The current hardware status and software status are both displayed.
- Active alarms: The current error messages are displayed.
- Licences: The licences currently installed are displayed.

Important safety information

To avoid any potential risks to the greatest extent possible, you must adhere to the following safety information:

ACHTUNG: ***Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!***

Proper use

- ☐ Only use the device at the approved operating sites and in the ambient conditions allowed (as described in the following), and only for the purpose described in the section “Proper use”.

Before starting operation of the device

HINWEIS: *Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version).*

- ☐ Check the packaging and the device for transport damage immediately. Do not start operation of a device that has been damaged.
- ☐ Transporting the device by the power cable may damage the mains cable or the strain relief, and is therefore not permitted.

Installation and operation

- ☐ The device may only be installed and operated by qualified persons (in accordance with EN 60065) or by persons who have been instructed by qualified persons. Maintenance work may only be carried out by qualified service personnel.
- ☐ The module can only be installed in U 100-230 and U 100-48 base units. The safety information in the operating manuals of the base units must be obeyed in addition to the safety information described in this manual.
- ☐ The installation site must be planned in a way that prevents children from playing with the device and its connections.
- ☐ In order to prevent inadmissible operating statuses from occurring, only the components described in this manual, or components approved by the manufacturer for the base unit, may be used.
- ☐ The ambient temperatures specified in the technical data must be complied with, even when climatic conditions change (e.g. due to sunlight). If the device overheats, the insulation used to isolate the mains voltage may be damaged.
- ☐ The device and its cable may only be operated away from radiant heat and other sources of heat.
- ☐ To avoid trapped heat, ensure there is good ventilation on all sides (minimum interval of 20 cm to other objects). Installing the device in a niche or covering the ventilation openings is not permitted.
- ☐ The device does not feature protection against water and may therefore only be operated and connected in dry rooms. It must not be exposed to splash water or drip water, condensation or similar effects of water, as this may impair the isolation from the mains voltage.
- ☐ Do not install the unit in locations with excessive dust formation, as this may impair the isolation from the mains voltage.

Electromagnetic compatibility (EMC)
In order to avoid malfunctions from occurring when operating radio and telecommunications equipment, as well as other operating units or broadcasting services, the following points must be observed:

- ☐ Before installation, the device must be checked for mechanical damage. Damaged or bent covers or housings may not be used.
- ☐ During operation, the device must always be covered by the components provided for this purpose. Operation with an opened cover is not permitted.
- ☐ The braided line or the contact springs may not be damaged or removed.

Maintenance

- The operating display only shows whether the DC current, which supplies the device components, has been disconnected. However, operating displays (on the power supply unit or the device) that are not lit up in no way indicate that the device is completely disconnected from the mains. There may still be voltages in the device that are dangerous to touch. You may therefore not open the device.
- Read carefully: EN 60728-11 – Part 1, Safety requirements / No service tasks during electrical storms!

Repair

- Repairs may only be performed by the manufacturer. Improperly performed repairs may result in considerable dangers for the user.
- If malfunctions occur, the device must be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

General information

- Store or use the device in a safe location, well out of reach of small children. It may contain small parts that can be swallowed or inhaled. Dispose of any small parts that are not needed.
- Plastic bags may have been used for packaging the device. Keep these plastic bags away from babies and children in order to avoid any danger of suffocation. Plastic bags are not toys.
- Do not store the device near chemicals or in places in which a leakage of chemicals may occur. Organic solvents or fluids in particular may cause the housing and/or cables to melt or disintegrate, presenting a danger of fire or electric shock. They may also cause device malfunctions.

Warranty conditions

The general terms and conditions of ASTRO Strobel GmbH apply. You will find these in the current catalogue or on the Internet under “www.astro-kom.de”.

Disposal

All our packaging materials (cardboard boxes, insert sheets, plastic films and bags) are fully recyclable. After use, this device must be disposed of as electronic waste in an orderly manner according to the current disposal regulations of your district / country / state.

ASTRO Strobel is a member of the Elektro system solution for the disposal of packaging materials. Our contract number is 80395.

Performance description

The U 159 is a plug-in module that is only intended for use in the base units U 100-230 and U 100-48. It can receive up to 1024 MPEG data streams encapsulated in accordance with Internet Protocol (IP). These are converted in up to 64 QAM channels and are output using the two HF outputs in the U 159.

To use the devices properly, read the following safety and operating instructions attentively.

The U 159 plug-in module features the following performance characteristics:

- Conversion of up to 1,024 IP gigabit Ethernet multicast groups
- QAM signals are fed out in 64 channels
- Outstanding output parameters provided by Direct Digital Technology

Connecting and installing the module

HINWEIS: The instructions for the base unit U 100 include a description of how to prepare the base unit for installation.
Observe that you need to insert an SD memory card into the module prior to installation in the base unit (see figure at left)

Coding and installing the backplane

A backplane is included with every U 1xx signal converter. This is used to establish a mechanical connection between the signal converter and the base unit. Both the mains HF connections and the network connections are connected to this
backplane.
To ensure the position of the backplane, and therefore the position of the respective signal converter in the U 100 base unit, is correct, you must plug a corresponding control dial onto the circuit board on the backplane. Proceed as described in the following.

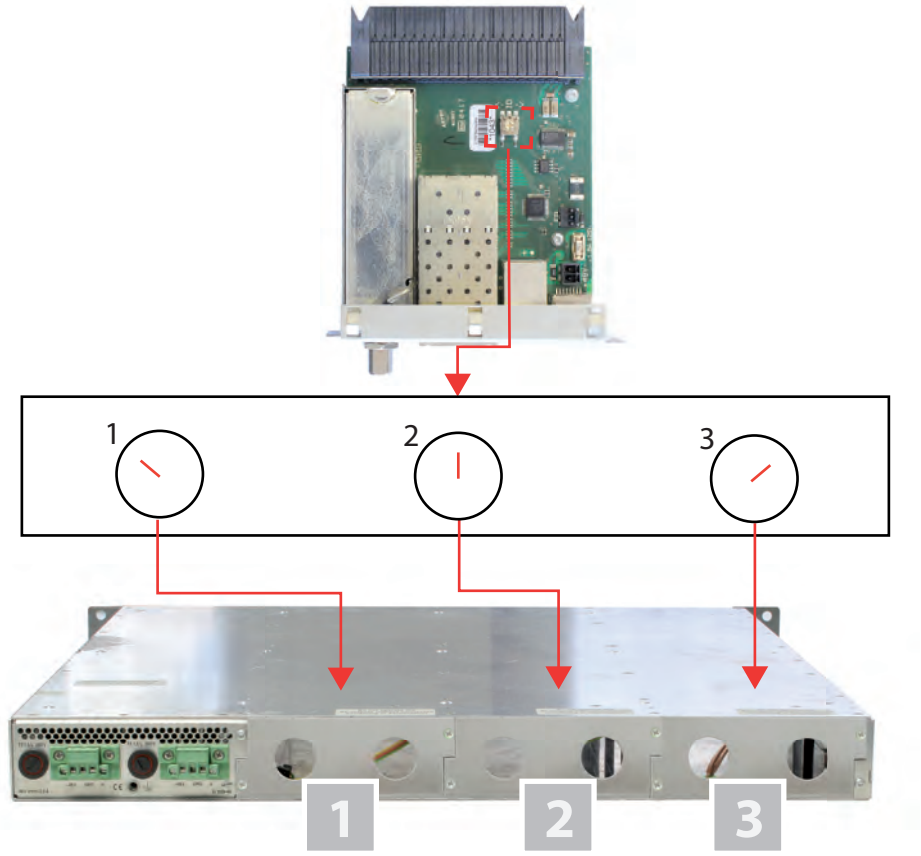


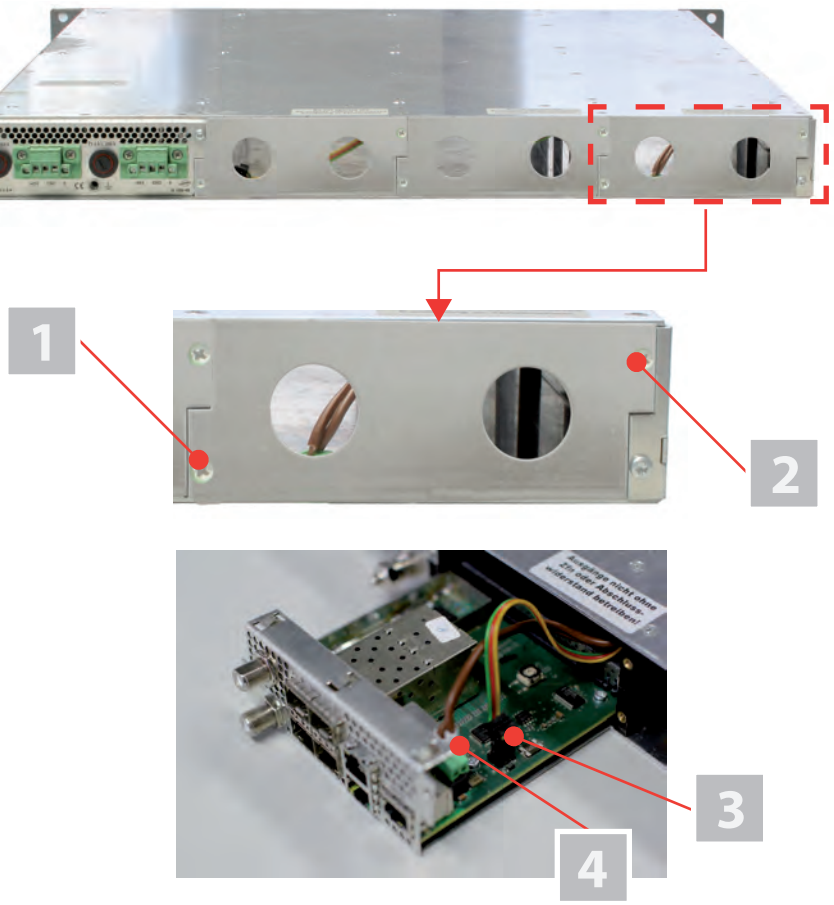
Figure 2: Coding the backplane

[1] Left slot
[2] Middle slot
[3] Right slot

To prepare the backplane for installation, proceed as follows:
Turn the control dial to the position required for the intended installation position in the way it is shown in figure 2.

HINWEIS: A control dial that has not been correctly set to correspond to the installation position will result in incorrect LED displays on the front of the U 100 base unit (see section "Device description"). Furthermore, the correct position cannot be displayed on the web browser user interface.

You can now install the backplane in the base unit. To do so, proceed as follows:



[1, 2] Phillips-head screws
[3] Cable for signal supply
[4] Cable for power supply

Figure 3: Installing the backplane in the base unit

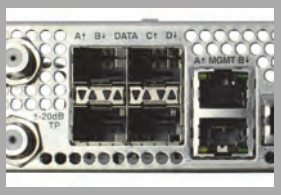
AUFGABE

1. When the U 100 base unit is in its delivery state, the three installation slots for the backplanes are covered by dummy plates (see figure 3, above). Start by removing the Phillips-head screws [1] and [2] from the dummy plate at the required installation position (left, middle or right) and remove the dummy plate.
2. You can now see the two connection cables for the selected slot (power supply and signal cable). Connect the cables to the backplane as shown in figure 3 (above).
3. Now carefully insert the backplane into the slot of the U 100. Make sure the cables are not jammed. You can push the backplane into the housing by applying light pressure.

ERGEBNIS:

The backplane is now connected and installed. Once installed, it should correspond to the figure at the left.

Quick start – starting operation of the U 159



Connecting the U 159 to a PC or laptop

To be able to configure the U 159, you now need to connect the network sockets (Management A or Management B) on the backplane of the device (see figure at left) to your PC or laptop using a network cable.

Once you have connected the base unit to the power supply, the U 159 will switch on automatically. Once it has booted (approx. 90 seconds), the ASTRO logo initially appears in the display.
Turn the knob to the right of the display clockwise until the menu item “Interface settings” is displayed. The two management IP addresses (Management A and Management B) for the device now appear in the upper lines.
Make a note of the address of the management connection which you are using for your PC or laptop to ensure you can enter this in the address line of your web browser later on.

HINWEIS: Please note that your PC or laptop must be in the same sub-network as the U 159! The sub-network mask of the U 159 is set to 255.255.205.0 upon delivery. The PC or laptop which is connected must therefore be assigned an IP address with the following structure: 172.23.xx.yy (whereby the digits for xx and yy depend on the MAC address)
Net mask: /16

You can now start the configuration using the web browser user interface.

General information on the structure of the web browser interface

The configuration interface is divided into the following sub-areas:

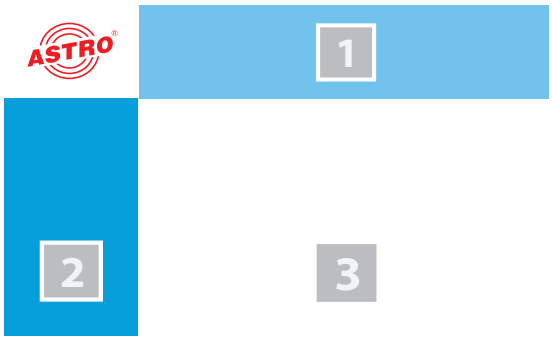


Figure 4: Structure of the web browser interface

- **Status line (header) [1]:** Displays general information on the module.
  SW: Software status
  FW: Current version of the software installed
  HW: Hardware version
  Up: Runtime since the system was booted
  Time: Date and time
  Name, location, contact: corresponds to the settings which were made in the configuration area
- **Navigation menu [2]:** Displays the individual configuration areas which you can select by clicking the mouse. A detailed description of these areas can be found on the following pages of this chapter.
- **Content area [3]:** The respective configuration form – depending on the menu item selected – is displayed here.

HINWEIS: The browser display is not updated automatically. Use the corresponding button in the menu of your browser to update the display.

Logging in

To log in, enter the IP address of the U 159, which appears in the device display, in the address line of the browser. The menu page “Status” will then appear. Select the item “Log in” from the navigation menu at the left. The input mask for the log in should then appear (see figure 6, below). In delivery state, you must use the following log-in data:

- **User name:** “user” or “admin” (input without inverted commas)
- **Password:** astro

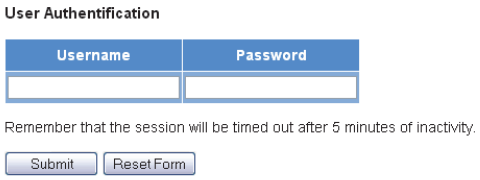


Figure 5: Log in

After logging in, the start page of the U 159 with all relevant system information will appear. The navigation menu and the log-in status display will appear at the left.

Only one user can be logged into the user interface of the U 159 at a time. The current user is displayed in the column at the left, below the menu.

The device status is indicated by a green or red circle. If a green circle is displayed, the device is operational. If the circle is red, then a fault has occurred.

A list of current errors is available under the menu item “Active alarms”.

HINWEIS: For security reasons, you should change the access data valid upon delivery (user name and password) to prevent unauthorised access!
The procedure is described in the section “Changing user data”.

Changing the IP address

HINWEIS: If you wish to change the IP address, then the settings on the PC must be changed accordingly. IP addresses can only be changed by the administrator!

Start by changing the IP addresses for the data port and the management. To do so, click on the item “IP Interfaces” in the menu at the left. You will now see the following table in the content area:

Data Interfaces

Property	Data A (eth0)	Data B (eth1)	Data C (eth2)	Data D (eth3)
MAC	00:17:72:09:00:05	00:17:72:0a:00:05	00:17:72:0b:00:05	00:17:72:0c:00:05
Active	on off	on off	on off	on off
Status	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
IPv4-Addr./Net	172.25.0.6 / 16	172.26.0.6 / 16	172.27.0.6 / 16	172.28.0.6 / 16
IGMP version	auto 2 3	auto 2 3	auto 2 3	auto 2 3
IPv6-Addr./Net	:: / 128	:: / 128	:: / 128	:: / 128
MLD version	auto 1 2	auto 1 2	auto 1 2	auto 1 2

Figure 6: “Data Interfaces” table

You can enter the IP addresses for the data ports A, B, C and D in the “IPv4 Address/Subnet” line. Make sure that you activate the ports being used by activating the corresponding radio button in the “Active” line. You can also enter IP addresses in the “IPv6 Address/Subnet” line. Entering values for IPv4 or IPv6 only is also possible.

You can enter the IP addresses for both management ports in the “Management Interfaces” table further down. Make sure that you activate the ports being used in this case as well by activating the corresponding radio button in the line “Active”.

Management Interfaces

Property	Management A (eth4)	Management B (eth5)
MAC	00:17:72:07:00:05	00:17:72:08:00:05
Active	on off	on off
Status	1 Gbit/s, full duplex	Off
IPv4-Addr./Net	192.168.1.22 / 24	192.168.5.22 / 24
IPv6-Addr./Net	fde4:1::217:72ff:fe07:6 / 64	fde4:5::217:72ff:fe08:6 / 64

Figure 6: Changing the IP address

To save your changes, click on the “Apply” button at the top in the header.

Apply Discard

The signal flow in the U 159

The overview on page 15 shows the possible signal paths for the U 159. The specific signal flow can be divided into the following sub-areas:

- The IP receivers receive a signal via data port A, B, C or D (each can be activated).

U159

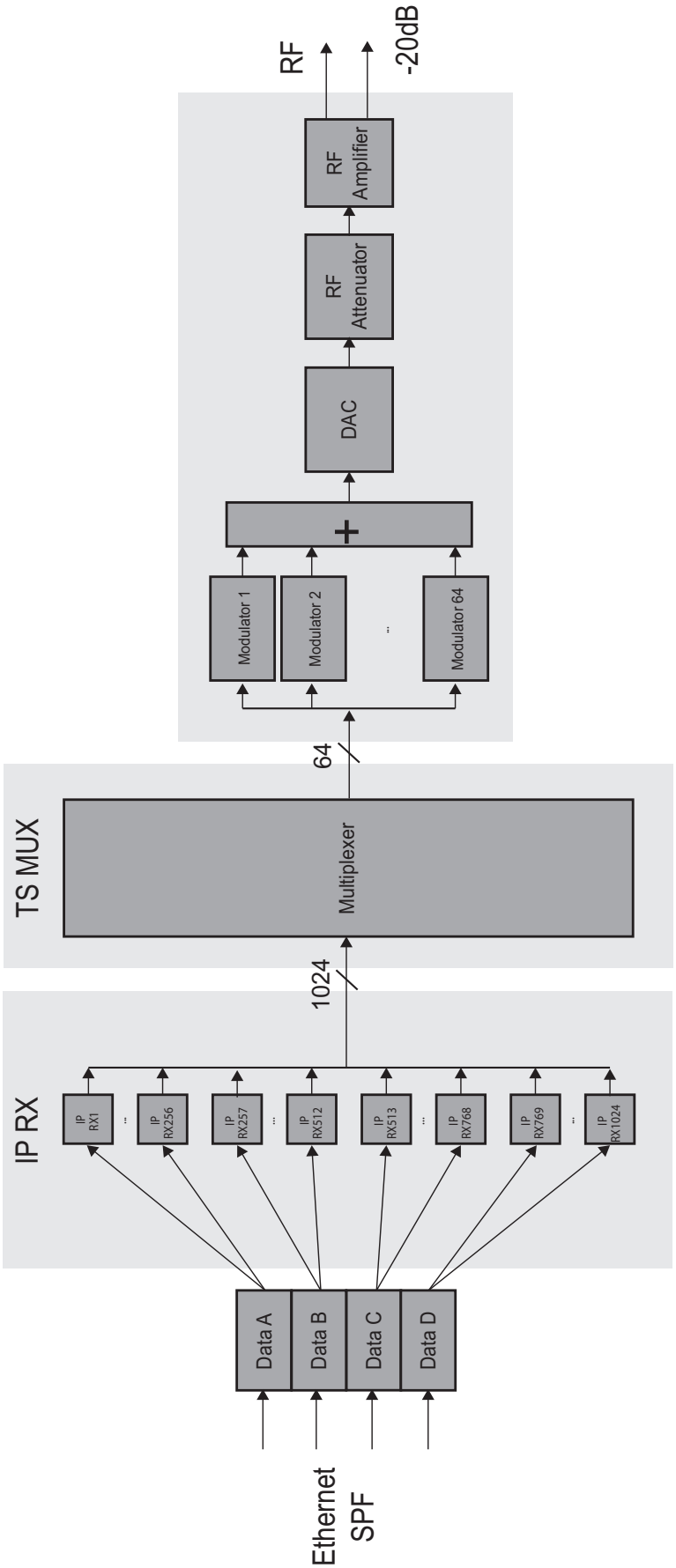

RF
-20dB
RF Amplifier
RF Attenuator
DAC
+
Modulator 1
Modulator 2
Modulator 64
64
TS MUX
Multiplexer
1024
IP RX
IP RX1
IP RX256
IP RX257
IP RX512
IP RX513
IP RX768
IP RX769
IP RX1024
Data A
Data B
Data C
Data D
Ethernet SPF

Figure 7: The signal flow in the U 159

Configuring the IP receiver

Now start configuring a signal path in the U 159. Start by clicking on the item “IP RX Channels” in the web browser interface menu. You will now see the following tables:

Adding / Deleting of IP RX Channels

	Selection	State	Address	Port	FEC	Data Port	Source Address	TS Multiplexer	Action
Adding	Number: 1	off	0.0.0.0	10000	☑	☑A ☐B ☐C ☐D	0.0.0.0	☐add channel	
Deleting		(Use e.g. "9 14-22" to delete multiple channels number of the lower table)							

IP RX Settings - (9 Channels)

No.	State	Address	Port	FEC	Data Port	Source Address	TS-ID	ON-ID	TS-Info	Alias	Action
1.	hot	230.144.1.1	10000	☑	◉A ○B ○C ○D	0.0.0.0	1101	1		Das Erste ☐manual	
2.	hot	230.144.1.2	10000	☑	◉A ○B ○C ○D	0.0.0.0	1011	1		ZDF HD ☐manual	
3.	hot	230.144.1.3	10000	☑	◉A ○B ○C ○D	0.0.0.0	1035	1		SES UHD Demo Channe ☐manual	
4.	hot	230.144.1.4	10000	☑	◉A ○B ○C ○D	0.0.0.0	1	1		INSIGHT TV UHD ☐manual	
5.	hot	230.144.2.1	10000	☑	○A ◉B ○C ○D	0.0.0.0	1101	1		Das Erste ☐manual	
6.	hot	230.144.2.2	10000	☑	○A ◉B ○C ○D	0.0.0.0	1011	1		ZDF HD ☐manual	

Figure 8: Setting the source for the data stream and activating the connection to the data port

Enter the IP address and the port for the data stream in the “Adding/Deleting of IP RX Channels” table. Optionally, you can also enter a source select address in the“Source Address” input field.
Important: Activate the checkbox in the “Add TS Channel” column.
Activate the “add channel” checkbox in the TS Multiplexer column.
Please keep in mind that you must create an output in order to route any other signals (see section “Configuring output channels”, page 17).

Now click on the plus symbol to activate the reception channel. The channel should now appear in the “IP RX Settings” table.

Checking the data reception rate

Now click on the menu item “Status” in the menu at the left. You will then see the following overview:

IP Interfaces

Property	Data A (eth0)	Data B (eth1)	Data C (eth2)	Data D (eth3)	Management A (eth4)	Management B (eth5)
MAC	00:17:72:09:00:05	00:17:72:0a:00:05	00:17:72:0b:00:05	00:17:72:0c:00:05	00:17:72:07:00:05	00:17:72:08:00:05
IPv4-Addr./Net	172.25.0.6/16	172.26.0.6/16	172.27.0.6/16	172.28.0.6/16	192.168.1.22/24	0.0.0.0/32
IPv6-Addr./Net	::/128	::/128	::/128	::/128	fde4:1::217:72ff:fe07:6/64	::/128
Status	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	Off
OS Transmit	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.06 Mbit/s	0.00 Mbit/s
OS Receive	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.01 Mbit/s	0.00 Mbit/s
Total Receive	245.94 Mbit/s	201.39 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		
Payload Receive	237.65 Mbit/s	195.07 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		

Figure 9: Displaying reception statistics

A data reception rate > 0 at data ports A, B, C or D should now appear in the “Payload Receive” line in the “IP Interfaces” table.

Configuring HF output channels

Start by defining the required number of output channels, the maximum overall level and the channel spacing. To do so, click on the item “RF Settings” in the menu at the left. You will now see the following table:

RF Main Settings

Property	Value	Description
Used RF Channels	up to 16 Channels	max. Channel Power: **114.0 dBµV**
Channel Power	100.0 dBµV	min. Channel Power: **80.0 dBµV**
RF Output	on off standby	
Current Channel Grid	D114-D874	Channel spacing: 8 MHz (114,0 - 874,0 MHz)

Figure 10: “RF Main Settings” table

You can select the required value from the drop-down list in the “Value” column in the “Used RF channels” line.
You can enter the required level in the input field in the “Channel Power” line.
You can select the required channel spacing from the drop-down list in the “Current Channel Grid” line.

Apply Discard

To save your changes, click on the “Apply” button at the top in the header.

To complete the process, you should configure and activate the HF output channels. To do so, click on the menu item “RF Channels” in the web browser interface menu. You will now see the following table:

Adding / Deleting of RF Channels

	Selection	Enable	Modulation	Channel	Attenuator	Action
Adding	Number: 1	☑	Grid defined	D266	0.0 dBµV	⊕
Deleting		(Use e.g. "9 14-22" to delete multiple channels number of the lower table)				⊖

RF Channel Settings - (19 Channels)

No.	Enable	Transport Stream	Modulation	Channel [Freq]	Attenuator	Details	Action
1.	☐	Service_Mux	256 QAM	D114	0.0 => 100.0 dBµV	⚙	⊖
2.	☑	TEST_MUX	256 QAM	D122	0.0 => 100.0 dBµV	⚙	⊖
3.	☑	Das Erste HD	256 QAM	D130	0.0 => 100.0 dBµV	⚙	⊖
4.	☑	Das Erste	256 QAM	D138	0.0 => 100.0 dBµV	⚙	⊖
5.	☐	Please select	256 QAM	D146	0.0 => 100.0 dBµV	⚙	⊖
6.	☐	Please select	256 QAM	D154	0.0 => 100.0 dBµV	⚙	⊖
7.	☐	Please select	256 QAM	D162	0.0 => 100.0 dBµV	⚙	⊖
8.	☐	Please select	256 QAM	D170	0.0 => 100.0 dBµV	⚙	⊖
9.	☐	Please select	256 QAM	D178	0.0 => 100.0 dBµV	⚙	⊖
10.	☐	Please select	256 QAM	D186	0.0 => 100.0 dBµV	⚙	⊖
11.	☐	Please select	256 QAM	D194	0.0 => 100.0 dBµV	⚙	⊖
12.	☐	Please select	256 QAM	D202	0.0 => 100.0 dBµV	⚙	⊖
13.	☐	Please select	256 QAM	D210	0.0 => 100.0 dBµV	⚙	⊖

Figure 11: Configuring HF output channels

Add a channel as an example by selecting a value for the QAM modulation from the drop-down list “Modulation” in the “Adding/Deleting of RF Channels” table, and then selecting a channel frequency from the drop-down list “Channel”. Now activate the “Enable” checkbox and click on the plus symbol. The channel should now be listed in the “RF Channel Settings” table. You then still need to select the required transport stream.

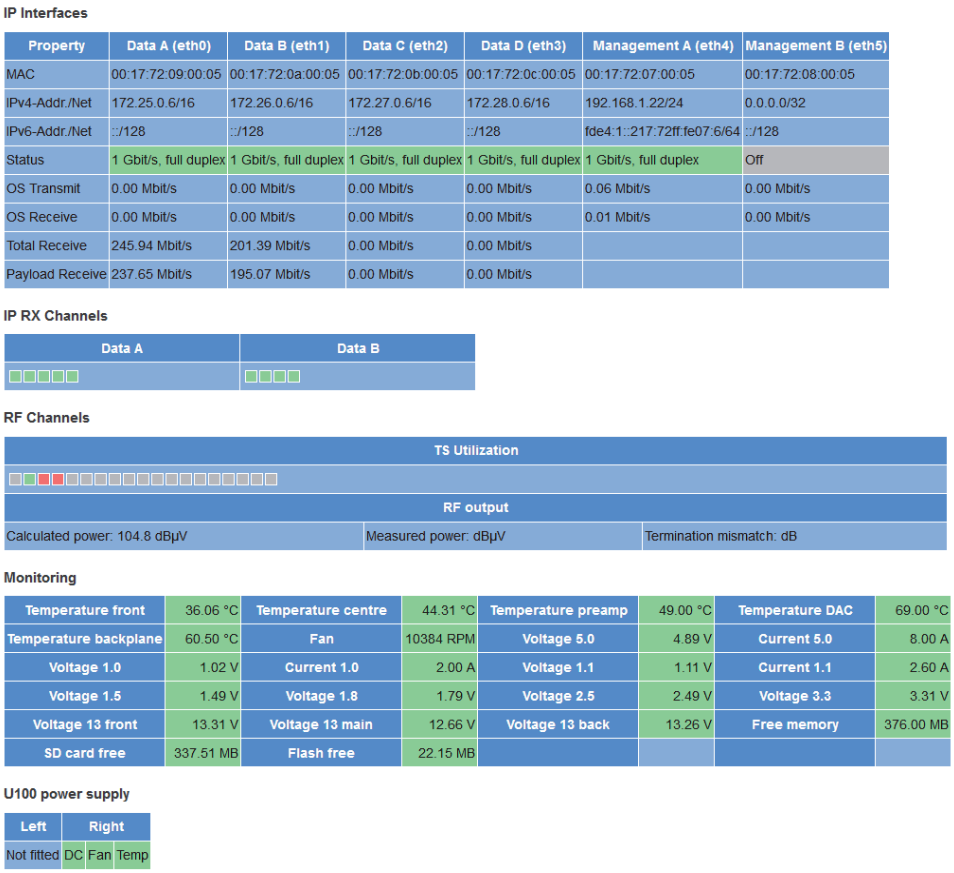
Apply Discard

To save your changes, click on the “Apply” button at the top in the header.

HINWEIS: More information on setting the HF modulators can be found in the sections “RF Settings” menu and “RF Channels” menu.

"Status" menu

To have the current settings for the U 159 displayed, click on the item `Status` in the menu at the left. You can now see the overview shown in figure 12:



IP Interfaces

Property	Data A (eth0)	Data B (eth1)	Data C (eth2)	Data D (eth3)	Management A (eth4)	Management B (eth5)
MAC	00:17:72:09:00:05	00:17:72:0a:00:05	00:17:72:0b:00:05	00:17:72:0c:00:05	00:17:72:07:00:05	00:17:72:08:00:05
IPv4-Addr./Net	172.25.0.6/16	172.26.0.6/16	172.27.0.6/16	172.28.0.6/16	192.168.1.22/24	0.0.0.0/32
IPv6-Addr./Net	::/128	::/128	::/128	::/128	fde4:1::217:72ff:fe07:6/64	::/128
Status	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	Off
OS Transmit	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.06 Mbit/s	0.00 Mbit/s
OS Receive	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.01 Mbit/s	0.00 Mbit/s
Total Receive	245.94 Mbit/s	201.39 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		
Payload Receive	237.65 Mbit/s	195.07 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		

IP RX Channels

Data A	Data B

RF Channels

TS Utilization		
RF output		
Calculated power: 104.8 dBµV	Measured power: dBµV	Termination mismatch: dB

Monitoring

Temperature front	36.06 °C	Temperature centre	44.31 °C	Temperature preamp	49.00 °C	Temperature DAC	69.00 °C
Temperature backplane	60.50 °C	Fan	10384 RPM	Voltage 5.0	4.89 V	Current 5.0	8.00 A
Voltage 1.0	1.02 V	Current 1.0	2.00 A	Voltage 1.1	1.11 V	Current 1.1	2.60 A
Voltage 1.5	1.49 V	Voltage 1.8	1.79 V	Voltage 2.5	2.49 V	Voltage 3.3	3.31 V
Voltage 13 front	13.31 V	Voltage 13 main	12.66 V	Voltage 13 back	13.26 V	Free memory	376.00 MB
SD card free	337.51 MB	Flash free	22.15 MB				

U100 power supply

Left	Right		
Not fitted	DC	Fan	Temp

Figure 12: Status display

The following tables are displayed:

Set data and status of the IP interfaces:

IP Interfaces

Property	Data A (eth0)	Data B (eth1)	Data C (eth2)	Data D (eth3)	Management A (eth4)	Management B (eth5)
MAC	00:17:72:09:00:05	00:17:72:0a:00:05	00:17:72:0b:00:05	00:17:72:0c:00:05	00:17:72:07:00:05	00:17:72:08:00:05
IPv4-Addr./Net	172.25.0.6/16	172.26.0.6/16	172.27.0.6/16	172.28.0.6/16	192.168.1.22/24	0.0.0.0/32
IPv6-Addr./Net	::/128	::/128	::/128	::/128	fde4:1::217:72ff:fe07:6/64	::/128
Status	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	Off
OS Transmit	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.06 Mbit/s	0.00 Mbit/s
OS Receive	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.00 Mbit/s	0.01 Mbit/s	0.00 Mbit/s
Total Receive	245.94 Mbit/s	201.39 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		
Payload Receive	237.65 Mbit/s	195.07 Mbit/s	0.00 Mbit/s	0.00 Mbit/s		

Figure 13: Status display – IP interfaces

The values for the following parameters are displayed and configured here respectively in accordance with the six connections on the backplane of the U 159 (Data A, Data B, Data C, Data D, Management A and Management B, see section "Device description"):

- `MAC:` MAC address of the respective interface
- `IPv4-Addr./Net:` IPv4 address (left field) / sub-network (right field)
- `IPv6-Addr./Net:` also supports: IPv6 address (left field) / network (right field)
- `Status:` switched off (off) or active (transmission rate is displayed); when using 1000base-x SFP modules, this is only the link to the module
- `OS Transmit:` Data rate in transmit direction, generated by the operating system
- `OS Receive:` Data rate in receive direction, generated by the operating system
- `Total Receive:` Total data rate in receive direction, gross (OS + payload)
- `Payload Receive:` User data rate in receive direction, net

Status display of the IP reception channels:

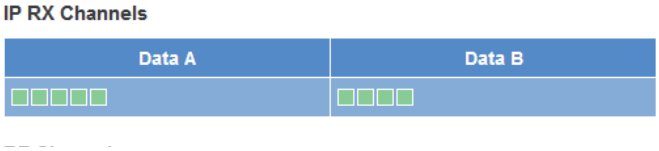


Figure 14: Status display – IP RX channels

The up to 32 reception channels routed to a data port are each represented by a square in the "IP RX Channels" table. Depending on the status of a channel, the square either appears in green (no errors) or in red (error has occurred). If the cursor is held over one of the squares, a pop-up window with information about the respective channel appears. In the event of an error, several parameters can also be shown.

Status display of the HF output channels:

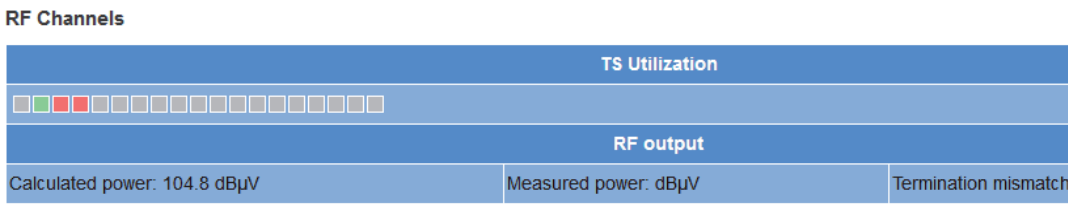


Figure 15: Status display – RF channels

The up to 64 QAM output channels are each represented by a square in the "RF Channels" table. Depending on the status of a channel, the square either appears in green (no errors) or in red (error has occurred). If the cursor is held over one of the squares, a pop-up window with information about the respective channel appears. These are specifically:

- `RF Channel:` Channel frequency
- `Max. data rate:` Maximum transmission rate (used + null)
- `Used data rate:` Effective load
- `Null data rate:` Null packets
- `Utilization:` Used data rate / max. data rate (in %)

HINWEIS: Inactive channels are marked in grey!

The following information can also be found in the lower line:

- `Calculated power:` Calculated output power (specified in dBµV)
- `Measured power:` Output power measured at the HF socket (specified in dBµV)
- `Termination mismatch:` Power difference due to a fault in the output end of the cable (specified in dB)

Status messages on monitoring:

Monitoring

Temperature front	36.06 °C	Temperature centre	44.31 °C	Temperature preamp	49.00 °C	Temperature DAC	69.00 °C
Temperature backplane	60.50 °C	Fan	10384 RPM	Voltage 5.0	4.89 V	Current 5.0	8.00 A
Voltage 1.0	1.02 V	Current 1.0	2.00 A	Voltage 1.1	1.11 V	Current 1.1	2.60 A
Voltage 1.5	1.49 V	Voltage 1.8	1.79 V	Voltage 2.5	2.49 V	Voltage 3.3	3.31 V
Voltage 13 front	13.31 V	Voltage 13 main	12.66 V	Voltage 13 back	13.26 V	Free memory	376.00 MB
SD card free	337.51 MB	Flash free	22.15 MB				

Figure 16: Status display – monitoring

The "Monitoring" table allows a series of hardware functions to be monitored; specifically, these are:

- `Temperature front:` Temperature displayed in °C for the mainboard
- `Temperature center:` Temperature displayed in °C for the mainboard
- `Temperature preamp:` Temperature displayed in °C for the preamplifier
- `Temperature DAC:` Temperature displayed in °C for the converter
- `Temperature backplane:` Temperature displayed in °C for the HF output stage
- `Fan:` Fan rotation speed
- `Voltage XX:` Supply voltage XX in volts
- `Current XX:` Current in A for the corresponding supply voltage

U 100 voltage supply:

U100 power supply

Left	Right		
Not fitted	DC	Fan	Temp

Figure 17: Status display – U 100 power supply

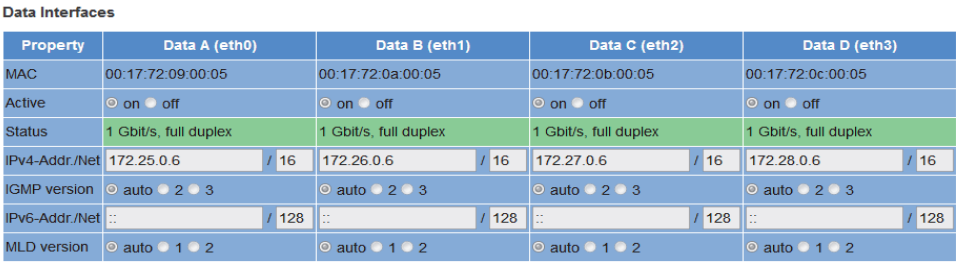
The respective values for the power supply, fan and temperature of the two U 100 power modules is displayed in the "U 100 power supply" table. If only one power module is installed, then the information "not fitted" appears for the second power module.

"IP Interfaces" menu

This section explains how to make general settings for the interfaces of the U 159.
Click on the item "IP Interfaces" in the menu at the left.

Setting IP interfaces (administrator only)

You can configure and activate or deactivate the four IP interfaces (Data A, B, C, D) in the upper table ("Data Interfaces"). The connection type is automatically identified and displayed by the U 159 (in this case: 1 GBit/s, full duplex).



Data Interfaces

Property	Data A (eth0)	Data B (eth1)	Data C (eth2)	Data D (eth3)
MAC	00:17:72:09:00:05	00:17:72:0a:00:05	00:17:72:0b:00:05	00:17:72:0c:00:05
Active	on off	on off	on off	on off
Status	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
IPv4-Addr./Net	172.25.0.6 / 16	172.26.0.6 / 16	172.27.0.6 / 16	172.28.0.6 / 16
IGMP version	auto 2 3	auto 2 3	auto 2 3	auto 2 3
IPv6-Addr./Net	:: / 128	:: / 128	:: / 128	:: / 128
MLD version	auto 1 2	auto 1 2	auto 1 2	auto 1 2

Figure 18: Configuring IP interfaces

HINWEIS: An additional licence is required to use the IP interfaces B, C and D (see section "Licensing").

The following parameters are displayed, and can be configured:

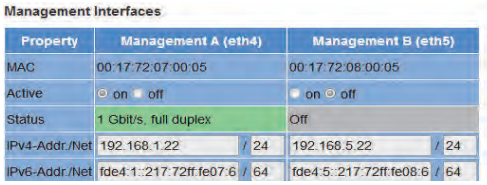
- `MAC:` MAC address of the respective interface
- `Active:` Activate the radio button "on" to activate the interface. Activate the radio button "off" to deactivate the interface.
- `Status:` deactivated (off) or active (transmission rate is shown)
- `IPv4-Addr./Net:` IPv4 address (left field) / network (right field)
- `IPv6-Addr./Net:` also supports: IPv6 address (left field) / network (right field)
- `MLD versions:` MLO + IGMP protocol versions

HINWEIS: When programming the IP addresses, make sure the addresses have not already been allocated within your network. Address conflicts result in network malfunctions. (Please set unused parameters to 0.0.0.0.)

To save your changes, click on the "Apply" button at the top in the header.

Configuring management settings

You can configure the following management settings for both management interfaces (A, B) in the second table ("IP Management Interfaces"):



Management Interfaces

Property	Management A (eth4)	Management B (eth5)
MAC	00:17:72:07:00:05	00:17:72:08:00:05
Active	on off	on off
Status	1 Gbit/s, full duplex	Off
IPv4-Addr./Net	192.168.1.22 / 24	192.168.5.22 / 24
IPv6-Addr./Net	fde4:1::217:72ff:fe07:6 / 64	fde4:5::217:72ff:fe08:6 / 64

Figure 19: Configuring management settings

The parameters that can be set correspond to those in the "IP Interfaces" table.
To save your changes, click on the "Apply" button at the top in the header.

"Network" menu

This section tells you how to enter the network settings for the device.
Click on the item "Network" in the menu on the left.

Entering network settings

The following tables will then appear in the content area at the left:

Routing

Protocol	Gateway	Routed IP-Network	Action
IPv4	192.168.1.100	default	
IPv6	::	default	

Note: Use 0.0.0.0 for unused IPv4-Addresses and :: for unused IPv6-Addresses.

DNS

Property	Value	Action
Search suffix	labor.astro	
DNS-Server (IPv4 or IPv6)	0.0.0.0	

NTP

Property	Host Name	Action
NTP-Server	192.168.1.70	
NTP-Server		

System Log

Property	Host Name	Action
System Log-Server		
System Log-Server		

SNMP Trap Receiver

Property	Host Name	Port	Community	Version	Inform Msg.	Security	Action
Trap Receiver		162	public	v2c			

SNMP User

Property	User / Community	Version	Access	Security	Action
User		v2c	read		

SNMP Access

Property	Value	Action
Name	U159	
Location	Bensberg	
Contact	ASTRO Team	
MIB	AstroStrobel-EdgeQAM64.mib	

Figure 20: Configuring management settings

- `Routing:` Enter the gateway for IPv4 and IPv6 for the default routing here. To add a specific route, start by clicking on the + symbol and entering the required values in the input fields.
- `DNS:` Click on the plus symbol to add a (or several) DNS server(s). Enter the IP address of the DNS server in the "DNS Server" input field.
- `NTP:` Click on the plus symbol to add a (or several) NTP server(s). Enter the address of an NTP server in the input field. To remove the server, click on the minus symbol.

- `System Log:` Click on the plus symbol to add a (or several) system log server(s). Enter the address of the system log server in the input field. To remove the server, click on the minus symbol.
- `SNMP Trap Receiver:` Click on the plus symbol to add a (or several) SNMP trap receiver(s). Enter the address of the SNMP trap receiver in the “Host Name” input field and the port in the “Port” input field. You can enter a string with a password character in the “Community” input field. Select the required version (“V2c” or “V3c”) from the drop-down list. Activate the “Inform Msg” checkbox if you wish to select the inform function for SNMP version 3. To remove the trap receiver, click on the minus symbol.
- `SNMP User:` Click on the plus symbol to add a (or several) SNMP user(s). Enter the respective name of the user in the input field. Select the required version (“V2c” or “V3c”) from the “Version” drop-down list. Select the access right (“read” or “read/write”) from the drop-down list “Access”. To remove the user, click on the minus symbol.
- `SNMP Access:` Enter the device information here (name, location, contact person). Click on the eye symbol to view the mib file, or on the arrow symbol to download the mib file.

To save your changes, click on the “Apply” button at the top in the header.

"IP RX Channels" menu

To configure the up to 1,024 IP inputs, start by clicking on the item "IP RX Channels" in the menu at the left. The following table will then appear in the content area at the top:

Adding / Deleting of IP RX Channels

	Selection	State	Address	Port	FEC	Data Port	Source Address	TS Multiplexer	Actior
Adding	Number: 1	off	0.0.0.0	10000	☑	☑A ☐B ☐C ☐D	0.0.0.0	☐add channel	⊕
Deleting		(Use e.g. "9 14-22" to delete multiple channels number of the lower table)							⊖

Figure 21: Table 1 "Adding/Deleting of IP RX Channels"

You can add IP reception channels using the upper "Adding/Deleting of IP RX Channels" table by clicking on the plus symbol. If you wish to delete one or several reception channel(s), then enter its numbers in the input field ("Deleting" line) and then click on the minus symbol. You can enter a range "from–to" (e.g. "3–7" or similar).
"Address" and "Port" form a socket on which the incoming data stream is received. This also allows the Receive IP address to be a multicast address or unicast addresses of its own.
To request an IP multicast, the IGMP for IPv4 or MLD for IPv6 must be used. If version 3 of this protocol is used, then you can select a specific source using "Source Address". If this function is to remain unused, please enter four zeroes in the input field. (This is, for example, the case when IGMP version 2 or IGMP version 3 from any source is being used as the protocol).

Activate or deactivate Forward Error Correction (FEC) by activating or deactivating the corresponding radio button.
You can activate or deactivate the data ports A, B, C and D for the reception channel respectively in the "Data Ports" column by selecting or deselecting the corresponding checkbox.
Activate the "Add TS Channel" checkbox when you wish to define the reception channel concerned as the transport steam. If more than one data port (A, B, C, D) is selected, a redundancy is generated.

You can make a priority setting for the primary, secondary and tertiary IP address / port respectively using a drop-down list.
The priorities are divided into three levels:

- Hot standby: Data streams are requested continuously
- Cold standby
- "Off"

As a rule – providing there are no network provider problems – the data stream with the highest priority is received and used for processing. In the event of a fault – failure of the incoming signal – a switch-over is made to the data stream with the next-highest priority.

The prioritisation is based on the order selected for the transport stream channels only.

Activate the "add channel" checkbox in the column "TS Multiplexer" if you wish to create an output channel. Please keep in mind that you will then need to configure it using the "RF Settings" menu.

Another table follows in which you view an overview of the reception channels. You can sort the list of channels according to different criteria (see below).

IP RX Settings - (9 Channels)

No.	State	Address	Port	FEC	Data Port	Source Address	TS-ID	ON-ID	TS-Info	Alias	Action
1.	hot	230.144.1.1	10000	☑	◉A ○B ○C ○D	0.0.0.0	1101	1		Das Erste ☐manual	
2.	hot	230.144.1.2	10000	☑	◉A ○B ○C ○D	0.0.0.0	1011	1		ZDF HD ☐manual	
3.	hot	230.144.1.3	10000	☑	◉A ○B ○C ○D	0.0.0.0	1035	1		SES UHD Demo Channe ☐manual	
4.	hot	230.144.1.4	10000	☑	◉A ○B ○C ○D	0.0.0.0	1	1		INSIGHT TV UHD ☐manual	
5.	hot	230.144.2.1	10000	☑	○A ◉B ○C ○D	0.0.0.0	1101	1		Das Erste ☐manual	
6.	hot	230.144.2.2	10000	☑	○A ◉B ○C ○D	0.0.0.0	1011	1		ZDF HD ☐manual	
7.	hot	230.144.2.3	10000	☑	○A ◉B ○C ○D	0.0.0.0	1035	1		SES UHD Demo Channe ☐manual	
8.	hot	230.144.2.4	10000	☑	○A ◉B ○C ○D	0.0.0.0	1	1		INSIGHT TV UHD ☐manual	
9.	hot	230.148.1.1	10000	☑	◉A ○B ○C ○D	0.0.0.0	1019	1		Das Erste HD ☐manual	

Figure 22: Table 2 "IP RX Settings"

- `State:` Click on the arrow symbol to have the reception channels displayed in the order of the priority (this means e.g. channels with the status "hot" will appear first).
- `Address:` Click on the arrow symbol to sort the list according to the IP addresses of the reception channels. Click on the symbol next to the arrows to make a search field appear. If you enter an IP address in the search field, the matching channel will appear at the top of the list.
- `Port:` Click on the arrow symbol to sort the list according to the port of the reception channels. Click on the symbol next to the arrows to make a search field appear. When you enter a port in the search field, filtering is performed.
- `FEC:` Click on the arrow symbol to sort the list according to the status of the FEC. This allows channels with an activated FEC e.g. to be displayed first.
- `Data Port:` Click on the arrow symbol to sort the list according to activation of the data ports, e.g. to have channels with an activated port A shown first. Click on the symbol next to the arrows to have a selection option for the data ports displayed. Activate the respective checkbox for a port to display the channel that is activated for the port concerned.
- `Source Address:` Click on the arrow symbol to sort the list according to the sources of the reception channels. Click on the symbol next to the arrows to make a search field appear. When you enter a source in the search field, filtering is performed.
- `TSID / ONID:` Information about the data stream (e.g. alias) is shown here. The value cannot, however, be changed.
- `TS-Info:` The respective stations included in the transport stream are displayed in the corresponding line by using the mouseover function.
- `Alias:` You can enter an alias name for the data stream in the input field. If you do not assign a name manually, the first service in the data stream will be used.
  Click on the arrow symbol to sort the list according to the alias names. Click on the symbol next to the arrows to make a search field appear. If you enter an alias name in the search field, the matching channel will appear in the list.

Apply Discard

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"TS Multiplexer" menu

You can, when required, compile new transport streams from different sources (IP interfaces), and create redundancies for them. To do this, start by clicking on the item "TS Multiplexer" in the main menu at the left. The following table will then appear in the content area at the top:

Adding of TS Multiplexer

	Selection	Alias	Auto Redundancy	Switch Time	Switch Back Time	Action
Adding	Number: 1		☐	0 sec.	60 sec.	⊕
Deleting		(Use e.g. "9 14-22" to delete multiple multiplexer number of the lower table)				⊖

Figure 23: Table "Adding a TS Multiplexer"

You can use this table as an aid for creating new transport streams and/or redundancies. Each newly added TS multiplexer is then shown as a diagram, as indicated in figure 24. Within each respective redundancy, you can add any services from transport streams to a previously created priority level using "Service Drop" or "Service Pass". The content of other priority levels created is then shown from left to right. You can then carry out multiplexing by adding additional redundancies. They can be configured in the same way as described above.

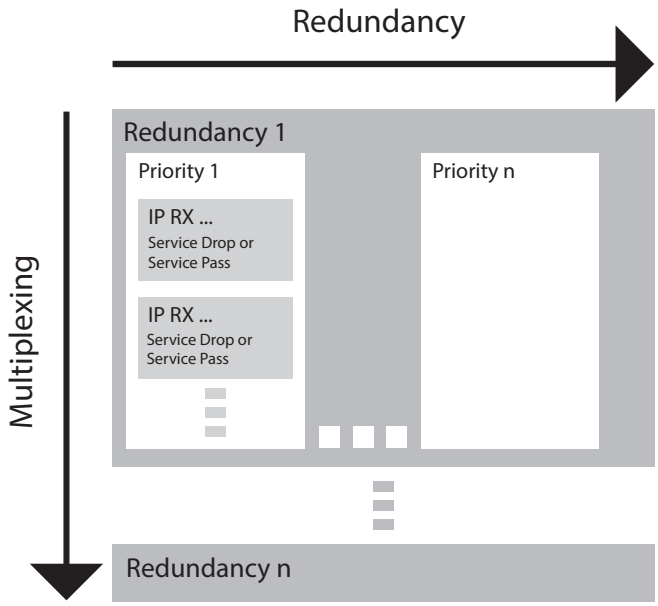


Figure 24: Structure of multiplexing/redundancy diagram

Adding or deleting a new Multiplexer transport stream

Use the "Adding a TS Multiplexer" table to create one, or several, new multiplexers. Start by entering the number of multiplexers to be created in the "Number" input field in the "Selection" column. Activate the "Auto Redundancy" checkbox if you would like automatic redundancy for the multiplexer. You can enter a time value in the "Switch Time" input fields after redundancy switchover was activated in the event of an error. You can also specify a time value in the "Switch Back Time" input field after which it switches back to a higher priority.
Once you have made these inputs, click on the plus symbol in the "Action" column to add the multiplexers. They then appear in the list in the following table, "TS Multiplexer Settings".

You can delete previously created multiplexers using the "Deleting" line. To do so, you must enter the respective number of the multiplexer in the input field, which is allocated to this multiplexer in the "TS Multiplexer Settings" table (first column). You can enter a range, e.g. "9–22" or similar. To delete a multiplexer, click on the minus symbol in the "Action"
column.

HINWEIS: You can also delete individual multiplexers by clicking on the minus symbol in the "Action" column in the "TS Multiplexer Settings" table.

Configuring multiplexers

In order to enter detailed settings for the individual multiplexers, use the "TS Multiplexer Settings" table. You can see an overview of the previously entered parameters for the respective multiplexer.

TS Multiplexer Settings - (5 Channels)

No.	Alias	Auto Redundancy	Switch Time	Switch Back Time	TS-ID	ON-ID	Action
1.	3sat	Yes	5 sec.	300 sec.	1011	1	
2.	Das Erste	Yes	5 sec.	300 sec.	1101	1	
3.	Das Erste HD	Yes	5 sec.	300 sec.	1019	1	
4.	TEST_MUX	No	3 sec.	60 sec.	65535	65535	
5.	ZDF HD	Yes	5 sec.	300 sec.	1	1	

Figure 25: Table "TS Multiplexer Settings"

In order to open the detailed view of a TS multiplexer, click on its alias name. A window then opens with the following header:

Figure 26: Detailed settings for the TS multiplexer – header

Important: Click on the "Apply" button above the content area to save your inputs for the multiplexer configuration. Click on "Discard" to restore the original settings.

HINWEIS: You can return to the overview of multiplexers from the detailed settings view by clicking on the "Return to output overview" link.

HINWEIS: An overview of the current output is displayed in the content area at the right:

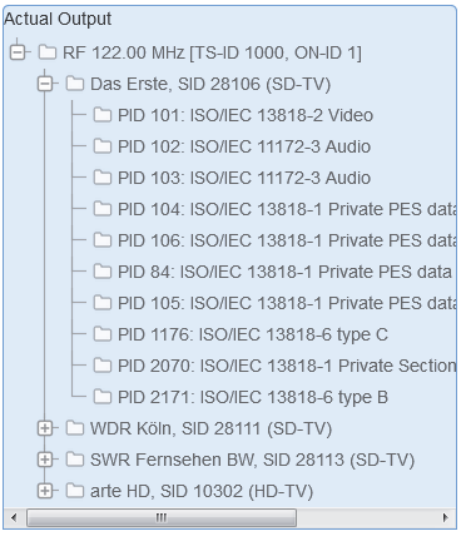


Figure 27: Display of the current output

Defining output parameters for the multiplexer

The multiplexer parameters that you have defined so far are summarised in the header.
When you click on the gear symbol at the top right, a window opens in which you can define the TS-ID and ON-ID for the multiplexer. Enter the preferred values in the corresponding input fields.

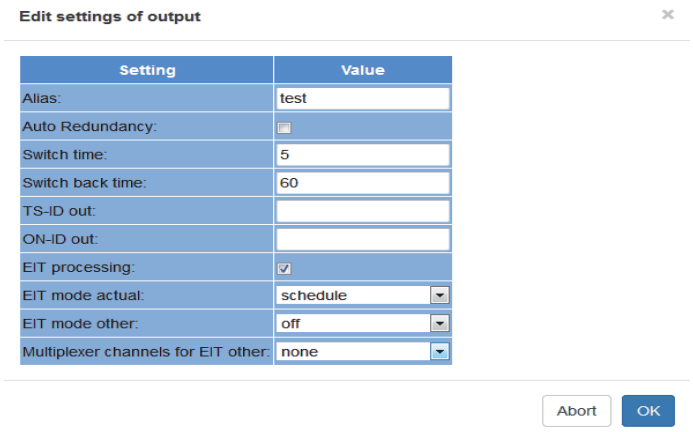


Figure 28: Defining the TS-ID and ON-ID

If required, you can also activate EIT processing by clicking the checkbox in the lower line. If you activate EIT processing, you can use a drop-down list to set the following respective parameters:

- `EIT mode actual:` Select either "off" to deactivate the function, "present_following" for the current and following station, or "schedule" to create a service schedule for this transport stream.
- `EIT mode other:` Select either "off" to deactivate the function, or "present_following" for the current and following station for other transport streams.
- `Multiplexer channels for EIT other:` Enter the multiplexer channels for the other transport streams.

Then click on "OK" to save your inputs, or on "Abort" if you wish to discard the inputs. When you save the inputs, they will also appear in the header.

HINWEIS: If you have activated EIT processing, an additional icon indicating this appears in the header.

Creating redundancy

In order to create a redundancy, click on the plus symbol in the header. You will then see the following entry below the header:

Figure 29: New redundancy

This is the header for the redundancy. Click on the gear symbol here to open the properties window for the redundancy:

Figure 30: Properties window for the redundancy

Enter an alias name for the redundancy in the input field, and click on "OK" to save your input, or on "Abort" to discard your inputs.
You can delete a redundancy by clicking on the trashcan symbol.

Adding a redundancy group

Now click on the plus symbol in the header to create a new redundancy group. Then adds a new group within the redundancy. You will now see the following entry below the redundancy header:

Figure 31: New redundancy group

HINWEIS: *The active redundancy group (with the highest priority) is marked by a dotted line.*

You can delete a redundancy group by clicking on the trashcan symbol.
Click on the gear symbol here to open the properties window for the redundancy group:

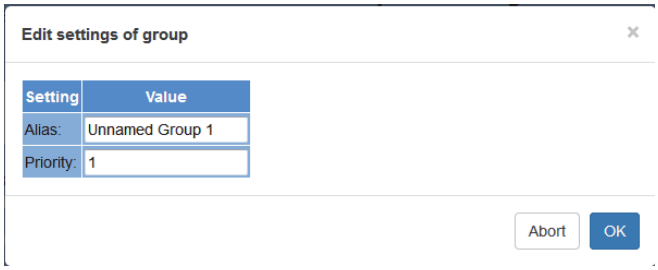


Figure 32: Properties window for the redundancy group

Enter an alias name for the redundancy group in the upper input field, and a numerical value for the priority of the group in the lower input field ("1" is equivalent to the highest priority, etc.).
Then click on "OK" to save your input, or on "Abort" in order to discard the inputs.

Adding a transport stream

You can now add a preferred transport stream within the group by clicking on the plus symbol in the header of the redundancy group.
(You can delete a transport stream by clicking on the trashcan symbol.)
The following window opens:

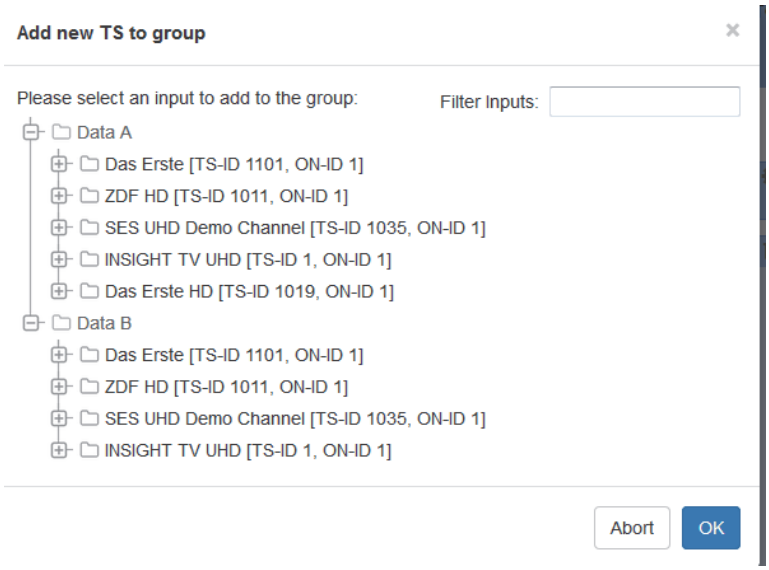


Figure 33: Window "Add new TS to group"

Select the transport steam from one of the four IP interfaces (Data A, Data B, etc.) by first clicking on the plus symbol for the respective interface. The transport streams then appear in a list. Mark the transport stream and then click on "OK" to confirm your selection, or on "Abort" to discard your selection.

Once you have selected a transport stream, this is displayed below the header for the redundancy group:

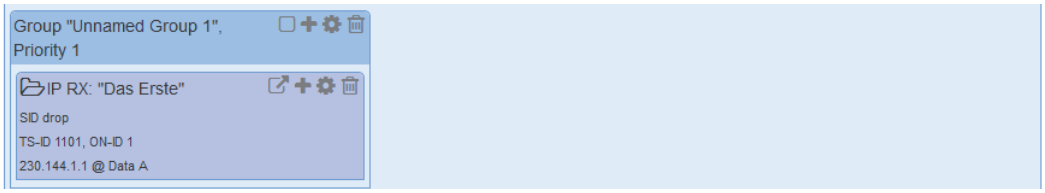
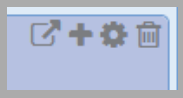


Figure 34: New transport stream in the redundancy group

HINWEIS: A link symbol can be found to the right of the plus symbol in the header for the redundancy group. Click on this symbol to access the IPRX menu.



Click on the gear symbol for the stream to enter detailed settings for the transport stream. The following window will then appear:

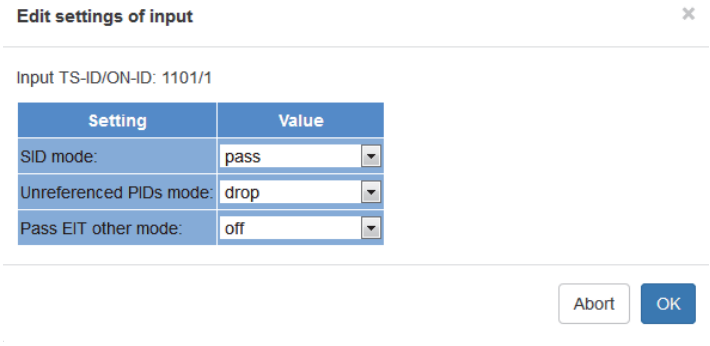


Figure 35: Window "Edit settings of input"

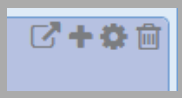
You can modify the following settings here:

- `SID mode:` Select the entry "pass" from the drop-down list if you wish to use individual services in the transport stream. Select the entry "drop" from the drop-down list if you wish to remove individual services in the transport stream.
- `Unreferenced PIDs mode:` Select the entry "pass" from the drop-down list if you wish to use individual, unreferenced PIDs. Select the entry "drop" from the drop-down list if you wish to remove individual PIDs.
- `Pass EIT other mode:` Select "present_following" from the drop-down list if you wish to activate the mode for the current and following stations. Select the entry "schedule" if you wish to create a service schedule. Select "off" if you wish to switch off EIT processing.

Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.

Filtering services and PIDs

You can now filter individual services or PIDs from the transport stream. Start by clicking on the plus



symbol. The following window will now appear:

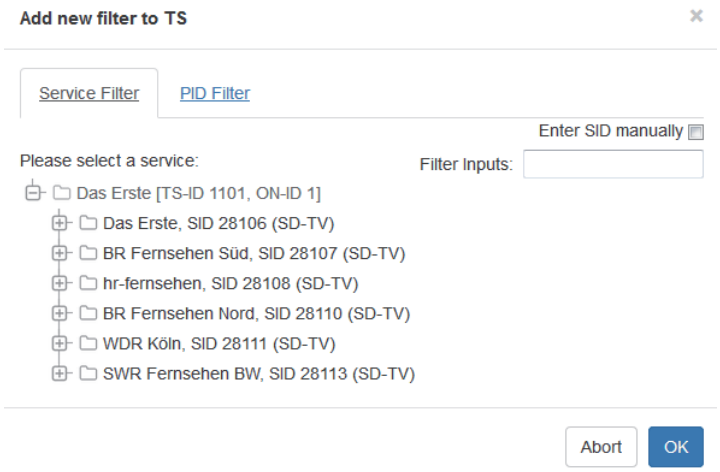


Figure 36: Window "Add new filter to TS"

You can start by selecting individual services from the transport stream here. These are then – according to the settings that you previously entered in the "Edit settings for input" table – selected or removed from the stream.
You can also select individual SIDs manually by activating the checkbox at the top right and then entering the service in the input field.
You can then, if required, filter individual PIDs by clicking on the "PID Filter" tab first. The following view will then appear:

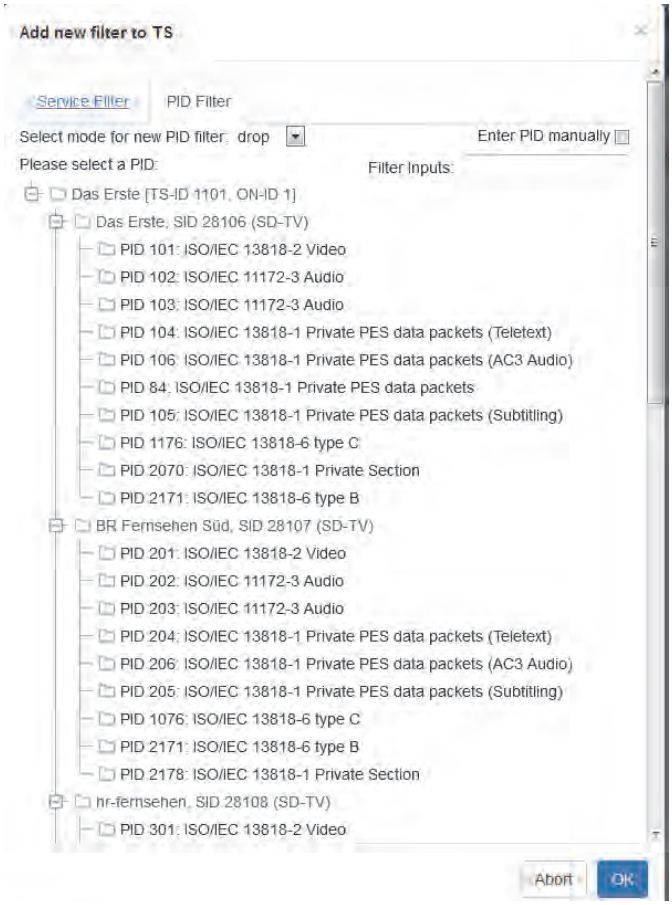


Figure 37: Window "Add new filter to TS – PID filter tab"

You can select individual PIDs here. These are then – according to the settings that you previously en-

tered in the "Edit settings for input" table – selected or removed from the stream.
You can also select individual PIDs manually by activating the checkbox at the top right and then entering this in the input field.
Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.

HINWEIS: If you click on the arrow symbol in the service header, the "IP RX Channels" menu is displayed, and the corresponding service is highlighted by a contour line.

HINWEIS: To create additional redundancy groups, start by clicking on the plus symbol in the header, and then proceed in the same way as described above. Please remember to set the priority level for the respective group.
In order to delete a redundancy group, click on the trashcan symbol.

Adding service redundancies

Instead of setting up a redundancy for a transport stream, you can alternatively create a redundancy for individual services as well. To do so, start by clicking on the symbol to the left of the plus symbol in the multiplexer header. The following window will now appear:

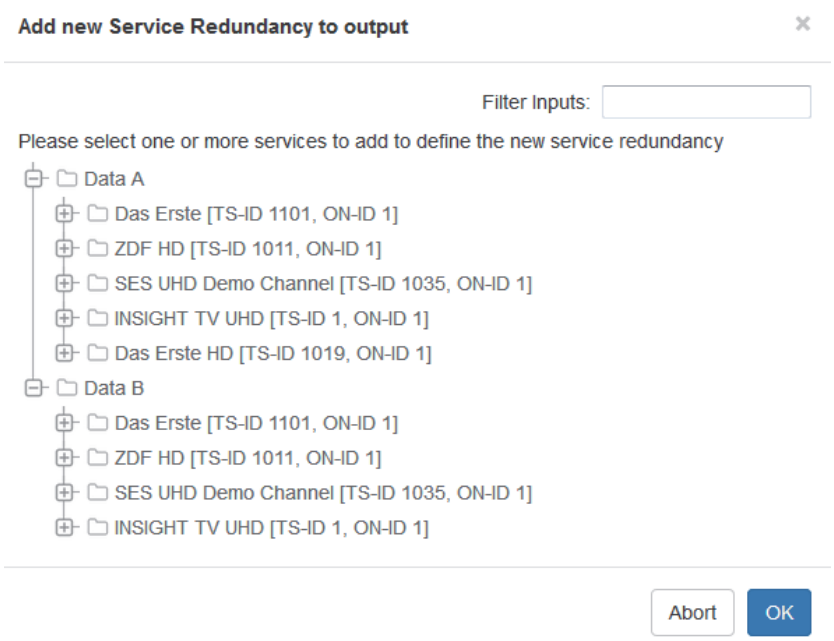


Figure 38: Window "Add new service redundancy to output"

You can start by selecting individual services from the transport stream here. These are then – according to the settings that you previously entered in the "Edit settings for input" table – selected or removed from the stream.
You can also select individual SIDs manually by activating the checkbox at the top right and then entering the service in the input field.
.
Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.
You will now see the following entry in the content area:

Figure 39: Service redundancy

Click on the gear symbol to have the properties window for the service redundancy displayed:

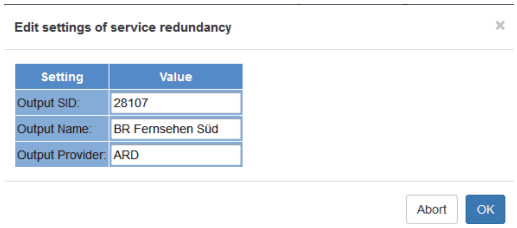
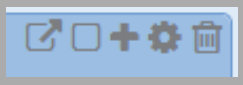


Figure 40: Window "Edit settings for service redundancy"



You can enter the following settings here:

- `Output SID:` Enter the preferred service ID in the input field.
- `Output name:` Enter the preferred name in the input field.
- `Output provider:` Enter the preferred provider name in the input field.

Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.
When you save your inputs, then they will also appear in the header for the service redundancy.

Selecting the service source

In order to enter settings for the service source, start by clicking on the gear symbol in the "Service Source" section. The following window will now appear:

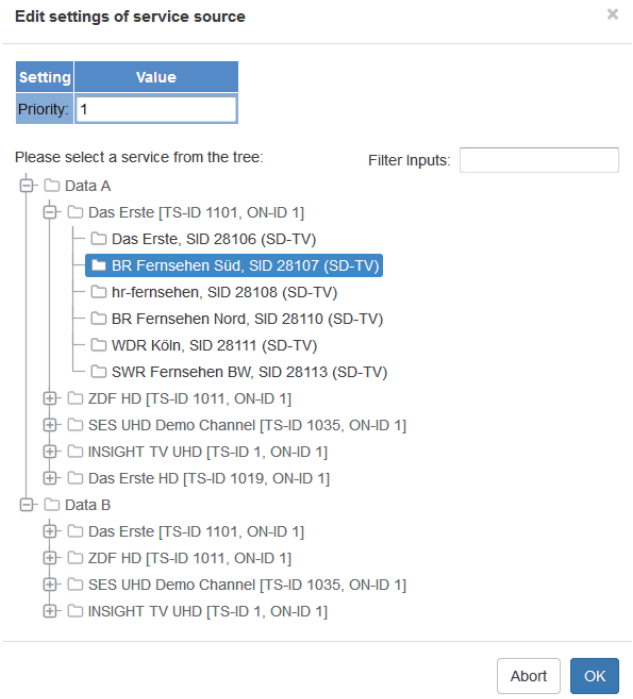


Figure 41: Window "Edit settings for service source"

Start by entering a numerical value for the priority of the source in the input field at the top ("1" for maximum priority, etc.).
You can then change the required service in the list, if preferred.
Alternatively, you can also enter a service in the corresponding input field ("filter inputs") manually.
Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.

Filtering PIDs

In order to filter individual PIDs out of the service, start by clicking on the plus symbol. The following window will now appear:

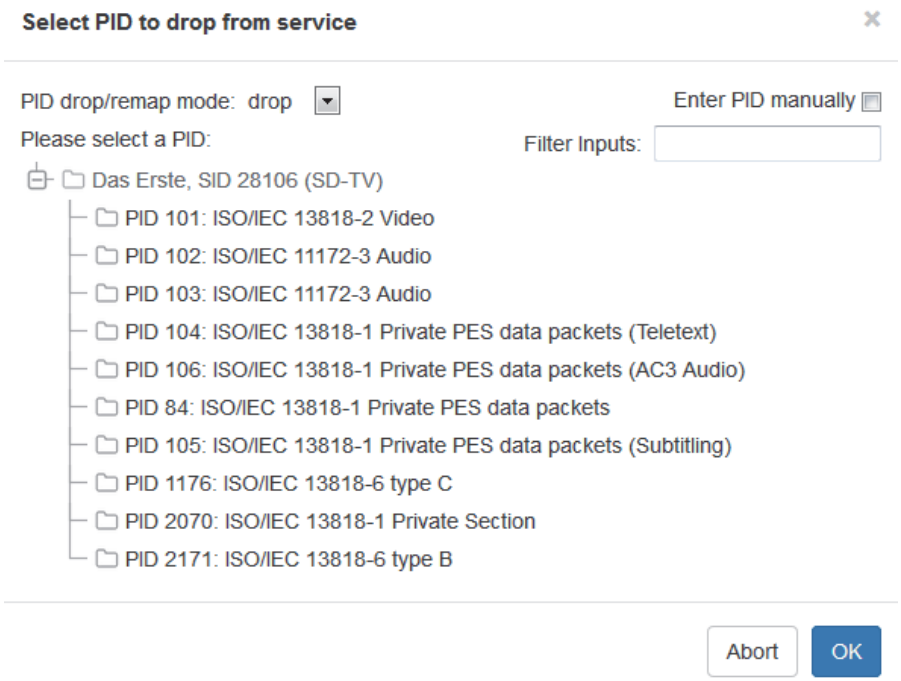


Figure 42: Window "Select PID to drop from service"

Now select the entry "drop" or "remap" from the drop-down list at the top. If you select "drop", the PID selected will be removed from the service. If, in contrast, "remap" was selected, the values of the PID will be changed.
You can then select the preferred PID from the list, or specify a PID manually. To do so, activate the "Enter PID manually" checkbox and enter the preferred PID in the "Filter Inputs" input field.

Then click on "OK" to save your selection, or on "Abort" in order to discard your selection.

Click on the "Apply" button above the content area to save your inputs.
Click on "Discard" to restore the original settings.

"RF Settings" menu

To configure the general settings for the QAM outputs, start by clicking on the item "RF Settings" in the menu at the left. The following table will then appear in the content area at the top, in which the most important settings for all output channels can be entered.

RF Main Settings

Property	Value	Description
Used RF Channels	up to 16 Channels	max. Channel Power: **114.0 dBµV**
Channel Power	100.0 dBµV	min. Channel Power: **80.0 dBµV**
RF Output	on off standby	
Current Channel Grid	D114-D874	Channel spacing: 8 MHz (114,0 - 874,0 MHz)

Figure 43: Table 1 "RF Main Settings"

- `Used RF Channels:` Select the number of HF channels in use from the drop-down list (either 16, 32 or 64).
- `System Level:` Enter the required overall level in dBµV in the input field to attenuate an overall level that is too high.
  Important: Start by changing the required overall level first. Do not use the individual levels on the outputs for setting the overall level.
- `RF Output:` You can activate or deactivate the HF output or set it to standby here by clicking the corresponding radio button. If you select the option "Standby", this means that while the signal is activated, it is not routed to the output.
- `Current Channel Grid:` Select the required channel grid (e.g. D114-D874, D73-D834 or D242-D1002) from the drop-down list.

Apply Discard

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

You will find the "Available Channel Grids" table further down.

Available Channel Grids

Name	Description	Action
D114-D874	Channel spacing: 8 MHz (114,0 - 874,0 MHz)	[used]
D242-D1002	Channel spacing: 8 MHz (242,0 - 1002,0 MHz)	Delete
D113-Grid	Channel spacing: 8 MHz (113,0 - 874,0 MHz)	Delete
Add Grid	Durchsuchen... Keine Datei ausgewählt.	Upload

Figure 44: Table 2 "Available Channel Grids"

You can add additional channel grids here by clicking on the "Search" button in the "Add Grid" line, and then selecting a corresponding file. Please consult the ASTRO Customer Service to obtain the required channel grid.

As soon as you have selected a file, click on "Upload" to add the selected spacing.
You can remove a grid from the list by clicking on the respective "Delete" button.

"RF Channels" menu

In order to add and configure individual output channels, start by clicking on the item "RF Channels" in the main menu at the left. You will now see the "Adding/Deleting of RF Channels" table in the upper section:

Adding / Deleting of RF Channels

	Selection	Enable	Modulation	Channel	Attenuator	Action
Adding	Number: 1	☑	Grid defined	D266	0.0 dBµV	⊕
Deleting		(Use e.g. "9 14-22" to delete multiple channels number of the lower table)				⊖

Figure 45: Table 1 "Adding/Deleting of RF Channels"

You can add or remove QAM channels here by clicking the respective plus or minus symbol. You can also enter a range "from–to" in the input field to delete several channels at the same time (e.g. 3–7 or similar).
You can enter a number for a newly added channel in the input field in the "Selection" column. Activate or deactivate the channel by activating or deactivating the corresponding checkbox in the "Enable" column.
Select the required modulation from the "Modulation" drop-down list (16 QAM, 32 QAM, 64 QAM, 128 QAM, 264 QAM or a setting to be defined).
Now select the channel frequency from the "Channel" drop-down list.
You can, if necessary, enter an attenuation value in dBµV in the "Attenuator" input field.
Add the channel by clicking on the + symbol.

Another table, "RF Channel Settings" follows, in which you can view an overview of the HF channels currently available.
You can also activate or deactivate the respective channel, select the modulation, change the channel frequency and enter any attenuation value required here in the same way as described above. Furthermore, you can select the required transport stream with which the output channel should be modulated in the "Transport Stream" column.
You can use the arrow buttons to have the channel list sorted by one parameter (having e.g. activated channels, or ones which a specific modulation, displayed first). Click on the symbol next to the arrow buttons in the "Transport Stream" column to open the input field. You can enter a transport stream address here to use it for filtering.

RF Channel Settings - (19 Channels)

No.	Enable	Transport Stream	Modulation	Channel [Freq]	Attenuator	Details	Action
1.	☐	Service_Mux	256 QAM	D114	0.0 => 100.0 dBµV	⚙	⊖
2.	☑	TEST_MUX	256 QAM	D122	0.0 => 100.0 dBµV	⚙	⊖
3.	☑	Das Erste HD	256 QAM	D130	0.0 => 100.0 dBµV	⚙	⊖
4.	☑	Das Erste	256 QAM	D138	0.0 => 100.0 dBµV	⚙	⊖
5.	☐	Please select	256 QAM	D146	0.0 => 100.0 dBµV	⚙	⊖
6.	☐	Please select	256 QAM	D154	0.0 => 100.0 dBµV	⚙	⊖
7.	☐	Please select	256 QAM	D162	0.0 => 100.0 dBµV	⚙	⊖
8.	☐	Please select	256 QAM	D170	0.0 => 100.0 dBµV	⚙	⊖
9.	☐	Please select	256 QAM	D178	0.0 => 100.0 dBµV	⚙	⊖
10.	☐	Please select	256 QAM	D186	0.0 => 100.0 dBµV	⚙	⊖

Figure 46: Table 2 "RF Channel Settings"

HINWEIS: *Channels that are inactivate are marked in grey in the left column. Channels marked in red exhibit faults!*
If you move the mouse over the respective number of the channel in the "No." column, then the parameters "Max. data rate", "Used data rate", "Null data rate" and "Utilisation" appear in a pop-up window.

Apply Discard

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

Click on the respective gear symbol in the "Details" column to access the detailed settings for an output channel. You will now see the "Detailed RF Channel Settings" table.

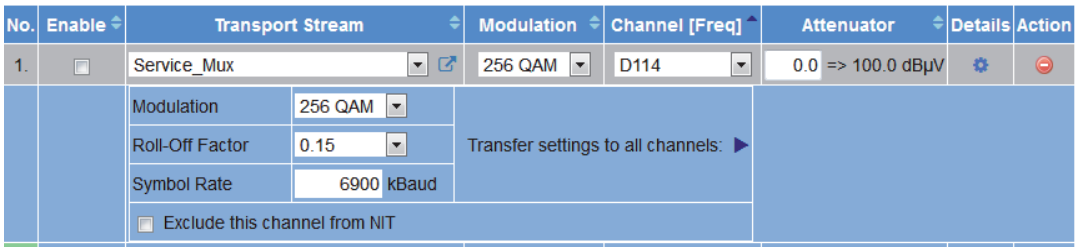


Figure 47: "RF Channel Settings – Details"

Along with modulation, you can also enter the symbol rate in MBaud in the "Symbol Rate" input field, along with the roll-OFF factor.
Activate the checkbox in the last line to remove the channel from the NIT.

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"TS Processing" menu

To enter settings for TS processing, start by clicking on the item "TS Processing" in the main menu at the left. The following tables now appear in the upper part of the content area:

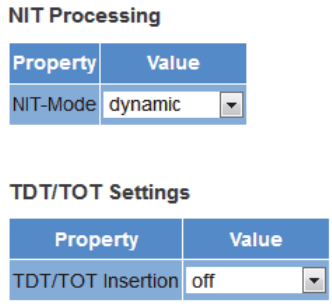


Figure 48: Settings for transport stream processing

You can select the required NIT mode from the drop-down list in the "NIT Processing" table here:

- `OFF:` No NIT is generated (transparent from the input).
- `Static NIT:` If you select this mode, a static NIT is generated.
- `Dynamic NIT:` If you select this mode, a dynamic NIT is generated.
- `Remap NIT:` If you select this mode, you can have an NIT output from the PIDs available.

You can select the following options from the drop-down list in the following table, "TDT/TOT Settings":

- `OFF:` transparent from the input
- `TDT:` TDT only
- `TDT/TOT:` TDT + TOT

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"NIT" menu

If you wish to change the settings for NIT processing, click on the item "NIT" in the main menu at the left. The following table now appears in the upper part of the content area:

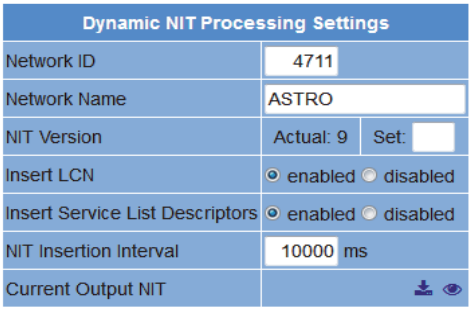


Figure 49: "Dynamic NIT Processing Settings" table

The following parameters can be changed here:

- `Network-ID:` Enter a network ID in the input field.
- `Network Name:` Enter the network name in the input field.
- `NIT Version:` The current version is displayed. Enter the required version in the "Set" input field.
- `Insert LCN:` Activate the "enabled" radio button to add an LCN. If you do not want to, activate the "disabled" radio button.
- `Insert Service List Descriptors:` Activate the "enabled" radio button to add service list descriptors. If you do not want to, activate the "disabled" radio button.
- `NIT Insertion Interval:` Enter a time interval in ms for NIT insertion in the input field.
- `Current Output NIT:` Click on the eye symbol to have the XML file for the NIT displayed. Click on the symbol to the left of it to download the XML file.

The table "Add External Transport Streams" follows. You can add an external transport stream here, which is modulated by an external device.

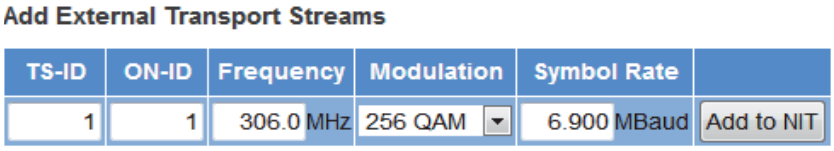


Figure 50: "Add External Transport Streams" table

The following parameters can be configured individually:

- `TS-ID:` Enter the transport stream in the input field.
- `ON-ID:` Enter the ON ID in the input field.
- `Frequency:` Select the preferred output frequency from the drop-down menu. If you select the "manual" option, you can enter the frequency in MHz in the input field manually.
- `Modulation:` Select the preferred modulation type from the drop-down menu.
- `Symbol Rate:` Enter the symbol rate in MS/s in the input field.

Once you have configured all the parameters, click on the "Add to NIT" button to add the transport stream.

Another table follows in which the transport streams added are listed:

External Transport Streams

No.	TS-ID	ON-ID	Channel - Frequency	Modulation	Symbol Rate	Remove
1.	1	1	306.0 MHz	256QAM	6.900 MBaud	⊖

Figure 51: "External Transport Streams" table

If you wish to remove a transport stream, click on the minus symbol.

Apply Discard

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"LCN" menu

If you wish to create an LCN table, start by clicking on the menu item "LCN" in the main menu at the left. The following table now appears in the upper part of the content area:

Adding services to LCN Table

LCN	SD Service name	HD Service name	Radio Service name
1	Please select for adding service	Please select for adding service	Please select for adding service

Figure 52: "Adding services to LCN Table" table

You can enter an LCN in the left column and select the preferred service (for SD, HD and radio respectively) in the drop-down list in the right column respectively.
Click on the "Add selected services to LCN table" button to add your selection to the LCN table.
Keep in mind that the entries added will only be saved after you have clicked the "Apply" button below the table which follows, the "LCN Table".

The "LCN Table" table follows. You will see a list of the currently selected services and the parameters for "Service Name" (station name), "Type" (SD, HD or radio), "Serv-ID", "TS-ID" and "ON-ID". To remove an entry from the list, click on the minus symbol for the respective service in the "Remove" column. You can move list entries up or down using the arrow buttons in the "Action" column.

LCN Table - (total number: 4)

LCN	Service name	Type	Serv-ID	TS-ID	ON-ID	Remove	Action
1	*** not present ***	unknown	10301	1019	1	⊖	↓
2	*** not present ***	unknown	11110	1011	1	⊖	↓↑
3	*** not present ***	unknown	10302	1019	1	⊖	↓↑
4	*** not present ***	unknown	11130	1011	1	⊖	↑

Property	Value
Descriptor Type	NorDig(V1)

Deleting LCNs		(Use e.g. "9 14-22" to delete LCNs off the upper table)	⊖

Figure 53: "LCN table" table

To the right of the LCN table, you can select the type of description for the table from a drop-down list ("NorDig (V1)" or "IEC 62216"). The descriptor corresponding to this standard is then generated in the NIT.

You can delete LCNs in the last line by entering the corresponding numbers in the input field and then clicking on the minus symbol.

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"User Settings" menu

Click on the menu item "User Administration" in the main menu at the left to have the corresponding input mask displayed. You will now see the "User Settings" table.

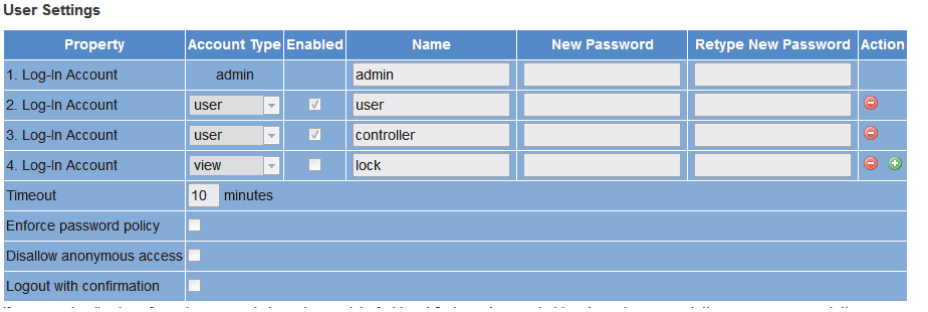


Figure 54: User administration

You can create up to four users for the user interface of the device. The following three users have been created as the default setting:

- user
- admin
- controller

You can select a respective user status from the drop-down list ("view", "user" or "admin") in the "Account Type" column.

The "view" status only allows you to look at the settings, and not to make any changes.

Users logged in as administrator can change all of the settings in the user interface. A number of settings are not accessible for the user of the "user" status.

The password set at the factory for all three users is "astro".

To change the access data for a user account, or to create a new one, enter the preferred user name in the input field `User name`. Then enter the preferred password in the input field `New Password`, and confirm it by typing it in the input field `Retype New password` again.

HINWEIS: A password must contain at least 5 characters. You can increase the minimum requirements for passwords using the "Enforced Password Policy" option (see below).

To delete a user account, click on the respective minus symbol in the "Action" column. To add an account, click on the plus symbol.

The following settings can also be entered:

- `Timeout:` You can enter a time for the automatic logout, in minutes, in this input field. If no more inputs are made in the user interface, then automatic logout will occur once the time entered here has elapsed.
  The time remaining until automatic logout is displayed under the main menu, in the left column of the user interface.
- `Enforced Password Policy:` Activate the checkbox when a password should have a minimum of 8 characters, and include at least one lower-case letter, one upper-case letter, one number and one special character.
- `Disallow anonymous access:` Activate the checkbox when access to the content area should only be possible after logging in.
- `Logout with confirmation:` Confirmation dialogue when logging out

WICHTIG: All changes will only be applied after you have clicked the "Apply" button below the input screen! Click on the "Discard" button to delete the values which have been entered.

"TLS Settings" menu

HINWEIS: *A licence is required to use the TLS functions.*
Only having TLS settings entered by correspondingly qualified personnel is recommended.
In the event of questions on this, please consult the ASTRO Customer Service.

"Licensing" menu

A number of functions of the device can only be used after being enabled by means of a licence key.

The licence key with the respective function can be purchased from ASTRO. You will receive a licence key with which you can activate the functions using the web browser interface.
The format of the licence key is a text document (e.g. 001772000222.lic).
To activate the functions, start by clicking on the item "Licensing" in the menu at the left. You will now see an overview of functions requiring licences, and their status, in the upper section:

Licensing

Property	Value
Enabled Data Ports	A
Max. RF Channels	16
Redundancy	Enabled
FEC	Disabled
TLS (SSL)	Disabled
Radius	Disabled
TS Processing	no multiplexer
TS Analyzer	Disabled
QAM Monitoring	Disabled

Figure 55: "Licensing" table

To order additional licences, the MAC address for Management A of the device must be specified. After the MAC address has been submitted, the licence keys are generated by ASTRO are sent by e-mail or on a CD.

Another table, "Upload license file", can be found below the "Licensing" table.

Upload license file

Filename	Action
Durchsuchen... Keine Datei ausgewählt.	

Figure 56: "Upload license file" table

You can upload licence data here. To do so, click on "Search" and select the required file. Then click on the symbol in the "Action" column to upload the file.

"Configuration" menu

You can upload or download a range of configuration files, or have them displayed, under the menu item "Configuration".

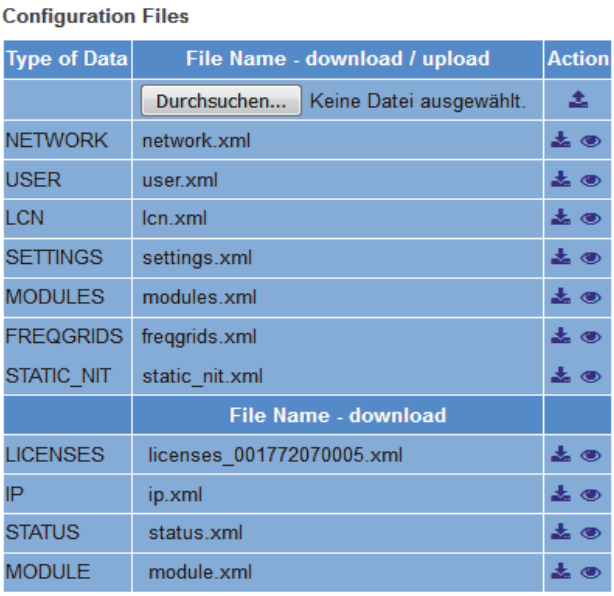


Figure 57: Uploading and downloading or displaying configuration files

To upload files, use the "Search" button to select the preferred file.
Then click on the "Upload" button to start the uploading process.

There are a range of files ready for download (see the screenshot shown above).

Click on the eye symbol in the "Action" column to open a file. Click on the symbol to the left of it to download the file.

Furthermore, you can upload or download a range of configuration backups:

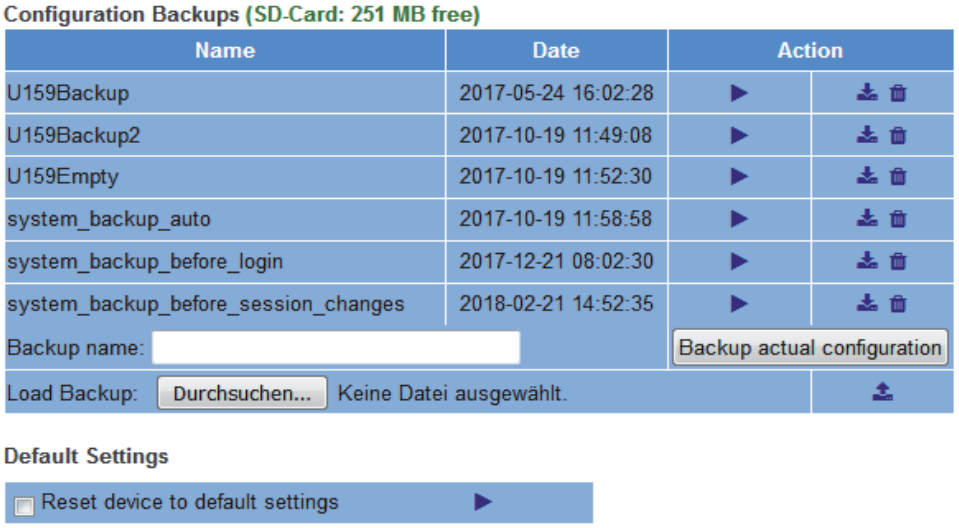


Figure 58: Uploading and downloading or displaying configuration backups

Click on the trashcan symbol to remove a backup.

Activate the "Reset device to default settings" checkbox" to restore the standard settings.

Click on the "Apply" button at the top in the header to save the changes.
Click on "Discard" to restore the original settings.

"Update" menu

You can update the firmware version of your device under the menu item "Update".

You can see an overview of the most recently performed updates in the "Last log" listing:

Last log:

```
2017-11-15 12:35:41,531 - INFO - update: File rtp_rx.bin copied to boot filesystem.
2017-11-15 12:35:41,642 - INFO - update: File u159_fec.rbf is already up to date.
2017-11-15 12:35:41,750 - INFO - update: Files u159_ip.rbf and /boot/u159_ip.rbf differ
2017-11-15 12:35:41,815 - INFO - update: File u159_ip.rbf copied to boot filesystem.
2017-11-15 12:35:42,465 - INFO - update: Files ramdisk and /boot/ramdisk differ
2017-11-15 12:35:42,810 - INFO - update: File ramdisk copied to boot filesystem.
2017-11-15 12:35:42,817 - INFO - update: Files socfpga.dtb and /boot/socfpga.dtb differ
2017-11-15 12:35:42,826 - INFO - update: File socfpga.dtb copied to boot filesystem.
2017-11-15 12:35:42,882 - INFO - update: Files zImage and /boot/zImage differ
2017-11-15 12:35:42,921 - INFO - update: File zImage copied to boot filesystem.
```

Figure 59: Overview "Last log"

Firmware update from a local storage location

You will require an update archive for updating the device firmware. This can be downloaded from the ASTRO firmware server (address: "http://astro-firmware.de/Headend-Firmware/u1xx"). The file name of the archive required ends in ".up". The name is comprised of the type designation of the device and a four-digit version number.
Once the update archive has been downloaded, start by selecting the item "Update" in the user interface menu. The "Software Update/Reboot" table then appears in the content area at the top.

Software Update / Reboot

Property	Value
Update archive (u159xxxx.up)	Durchsuchen... Keine Datei ausgewählt. Upload
Update mode	Upload only
Backup software	Replace backup software with current software
System reboot	Reboot

Figure 60: Firmware update

Now click on the "Search" button and select the path to the memory location of the update archive downloaded beforehand.
If only the update archive is to be uploaded to the module, then select the item "Upload only" in the "Update Mode" line. Then click on the "Upload" button to start the update process. If you wish to both upload and install the update, then select the item "Upload, update and reboot" in the "Update Mode" line. Then click on the "Upload, update and reboot" button.
If you wish to replace the current software with a backup version, click on the "Replace backup software with current software" button.
If you only wish to reboot, then click on the "Reboot" button.

Available update archives

The "Available Update Archives" table shows an overview of the update archives already saved on the module (up to ten). As administrator, you have the option of accessing other software versions (install or delete).

Available Update Archives

Filename	Size	Version	Install	Delete
u1596140.up	38.76 MiB	6140	▶	🗑
u15962-0.up	40.58 MiB	62-0-smo-20171114-1648	▶	🗑

Figure 61: Firmware update

Loading/saving firmware and configurations using (T)FTP

You can update firmware using a (T)FTP server using the "Firmware update and configuration via server" table and load or save configuration files.

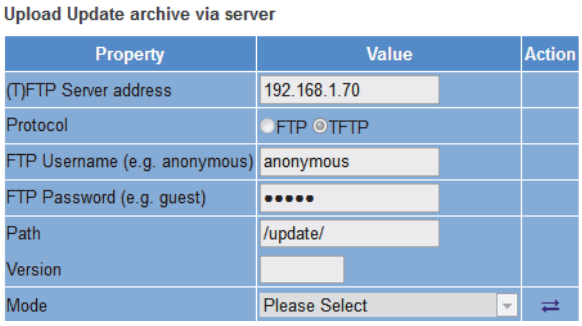


Figure 62: Loading/saving firmware updates and configurations using (T)FTP

To carry out the preferred action, start by selecting an action from the drop-down menu in the "Mode" line. The action can only be carried out when the server path specified does actually exist. Furthermore, any firewalls that have been installed must be configured in a way that allows (T)FTP communication.

The following actions can be selected individually:

- "**Load config from server**" action: A configuration stored on the (T)FTP server is transmitted to the U 168 and can be activated immediately. The IP settings for the data and management interfaces on the device are not changed. The file "settings.xml" are written onto the device.
- "**Save config to server**" action: The current configuration of the device is written to the (T)FTP server. The configuration includes the following files:
  - "ip.xml" (IP settings for the data and management interfaces)
  - "settings.xml" (all other settings, e.g. IP receiver and modulator settings)
  - "user.xml" (user data)
- "**Update firmware from server**" action: If you select this action, you must specify the preferred software version under `Version` (a 4-character maximum applies). One the update is successful, the message "Firmware update OK. Please reboot to use the new firmware version" appears.

Once you have selected an action, you can add any information still missing from the remaining lines of the table:

- `(T)FTP Server address:` Address of the server
- `Protocol:` Activate the radio button "FTP" if you wish to use the more comprehensive FTP protocol. Activate the radio button "TFTP" if you wish to use the more basic TFTP protocol.
- `FTP User name:` This depends on the settings for the FTP server used (for astro-firmware.de e.g. "anonymous").
- `FTP Password:` This depends on the settings for the FTP server used (for astro-firmware.de e.g. "guest").
- `Path:` Path to the location where data are saved, or from where the data can be loaded. The path must be specified in relation to the root directory of the FTP server, and must always begin with a "/" and end with a "/" as well (enter without quotation marks).
- `Version:` Enter the version number of the software which you wish to download or save here.

HINWEIS: If the update is carried out using the TFTP protocol, then filling in the input fields "FTP User name" and "FTP Password" is not necessary.

"Logging" menu

In order to enter settings for logging, or to have a log file displayed, click on "Logging" in the menu at the left. You will then see the following overview:

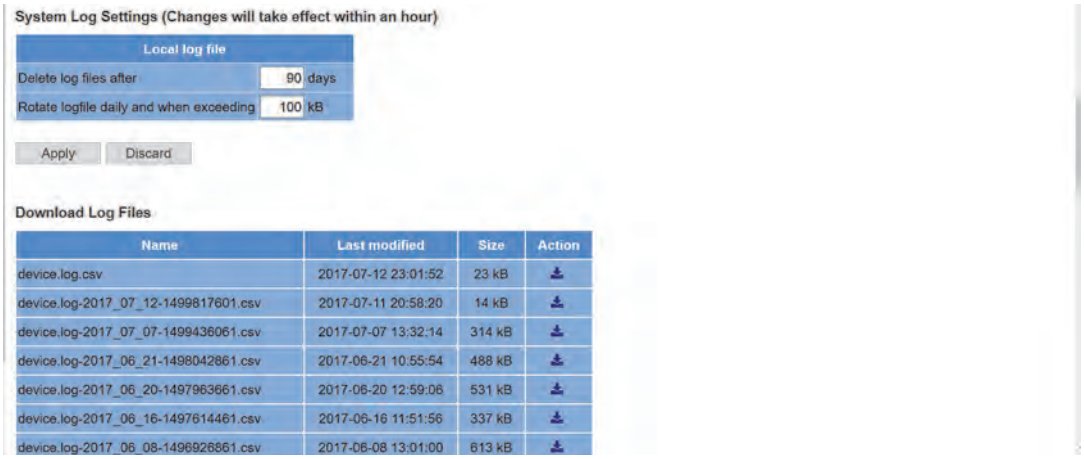


Figure 63: "Logging" menu

You can enter the number of days after which the log files are to be deleted, as well as a limit for the file size of the log files in the "System Log Settings" table. If this is exceeded, then a new file is created.

To have a log file displayed, click on the required item in the "Download Log Files" table.

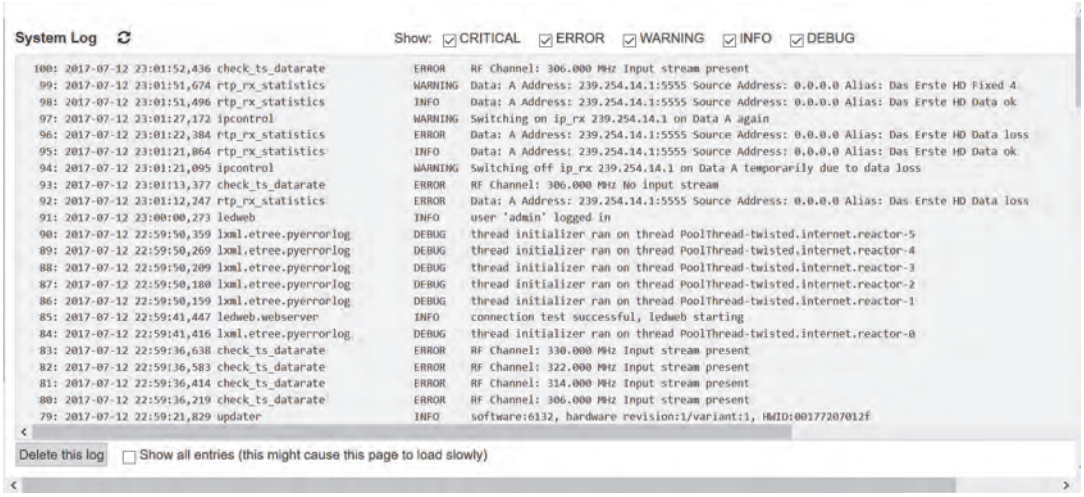


Figure 64: Log file

"Active Alarms" menu

To have the "Active Alarm" table displayed, click on the corresponding item in the menu at the left. The following table will then appear:

Active Alarm Table

Time (UTC)	Component	Severity	Message
2017-11-23 12:34:46	Modulator	error	RF Channel: 130.0 MHz no input stream
2017-11-15 12:38:45	Modulator	warning	Mainboard calibration EEPROM invalid
2017-11-15 12:38:45	Modulator	warning	Backplane calibration EEPROM invalid
2017-11-15 12:39:06	Update	notice	Backup software differs

Figure 65: Active alarm table

The table provides information about error messages currently active. The "Message" column shows the error message in plain text.

HINWEIS: *You can also access the "Active Alarm Table" by clicking the red point in the status line in the upper section of the user interface.*

"Statistics" menu

To retrieve statistics on the internal data of the U 159, click on the item "Statistics" in the menu at the left. You will now see the following table in the content area at the right:

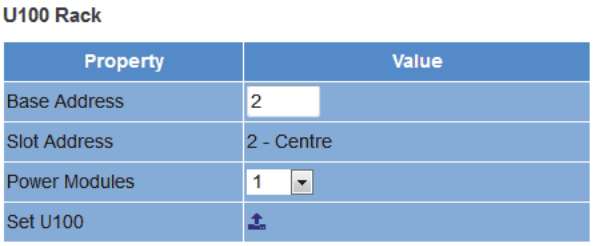
Figure 66: Statistics

In order to create a new file, click on the arrow symbol in the "Create statistics file" line in the "Action" column.
If you wish to examine a statistics file, click on the eye symbol in the "Statistics file" line; if you wish to download the file, click on the symbol to the left of it.

"U 100" menu

Configuring the base unit

To configure the base unit, start by clicking the item "U 100" in the main menu at the left. You will now see the following table:


U100 Rack

Property	Value
Base Address	2
Slot Address	2 - Centre
Power Modules	1
Set U100	

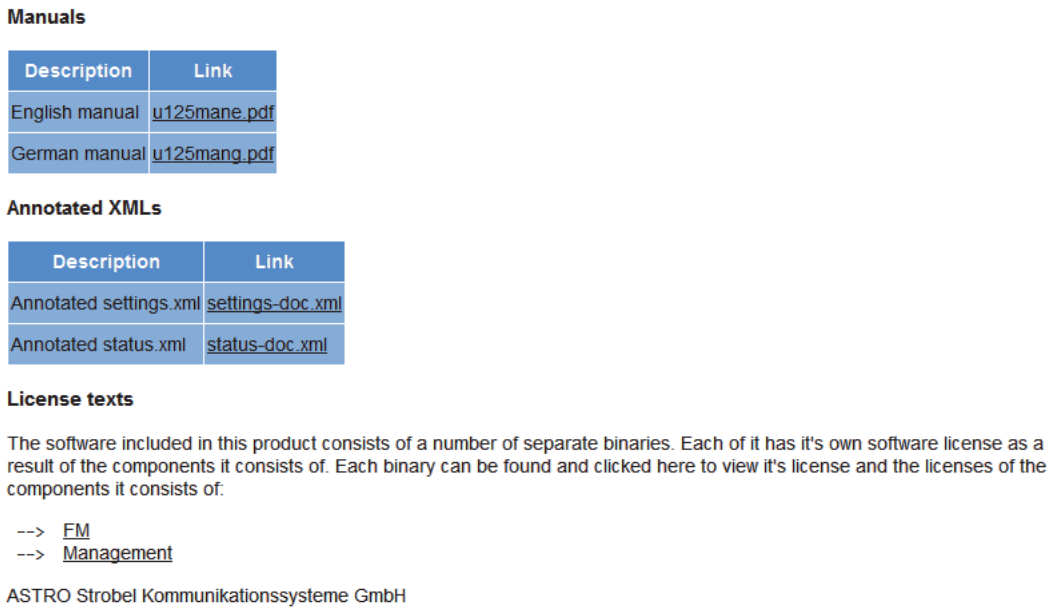
Figure 67: Configuring the U 100 base unit

The following parameters are displayed, and can be configured:

- `Base Address:` Enter an address for the base unit being used here. If the U 158 is managed using the U 100-C controller and several U 100 base units are being used, then each base unit must be allocated an address of its own.
  This setting only has to be entered for one module per base unit.
- `Slot Address:` In accordance with the coding of the backplane of the U 158 performed previously (see section "Installing and connecting"), the address corresponding to the slot in the base unit is displayed here.
- `Power Modules:` Select the number of power modules used from the drop-down menu ("0" for 48 V operation, "1" or "2" for 230 V power modules).
- `Set U 100:` Click on the symbol to save your inputs in the U 100 base unit.

„Documentation" menu

To hsve a list of operating manuals, XML-Files and license texts displayed, click on „Documentation". in the menu at the left. The following overview will now appear:


Manuals

Description	Link
English manual	u125mane.pdf
German manual	u125mang.pdf

Annotated XMLs

Description	Link
Annotated settings.xml	settings-doc.xml
Annotated status.xml	status-doc.xml

License texts

The software included in this product consists of a number of separate binaries. Each of it has it's own software license as a result of the components it consists of. Each binary can be found and clicked here to view it's license and the licenses of the components it consists of:

--> FM
--> Management

ASTRO Strobel Kommunikationssysteme GmbH

Figure 68: Menu „Documentation"

To open a file, just click on the desired item.

Troubleshooting

If the device is not functioning correctly, please perform the following checks:

- ☐ Check whether the device is connected to the required grid voltage (230 V~, 50 Hz for the U 100 base unit, and 48 V for the U 100-48 base unit).
- ☐ Check whether the signal cable is connected correctly, and that there are no breaks or short circuits in the connectors.

If the problem cannot be resolved, please contact the ASTRO customer service.

Maintenance and repair

The device must not be opened other than for repair purposes. Repairs may only be carried out at the factory or at workshops, or by persons, authorised by ASTRO Strobel GmbH.
Read carefully: EN 60728-11 Safety requirements: No service work during thunderstorms.

*HINWEIS: In the event of repairs, **DIN VDE regulations 0701 - 0702**, where applicable, must be adhered to, and these are secondary to the relevant data specifications in DIN EN 60950-1. **You must disconnect the power plug before opening the base unit!***

Service tasks

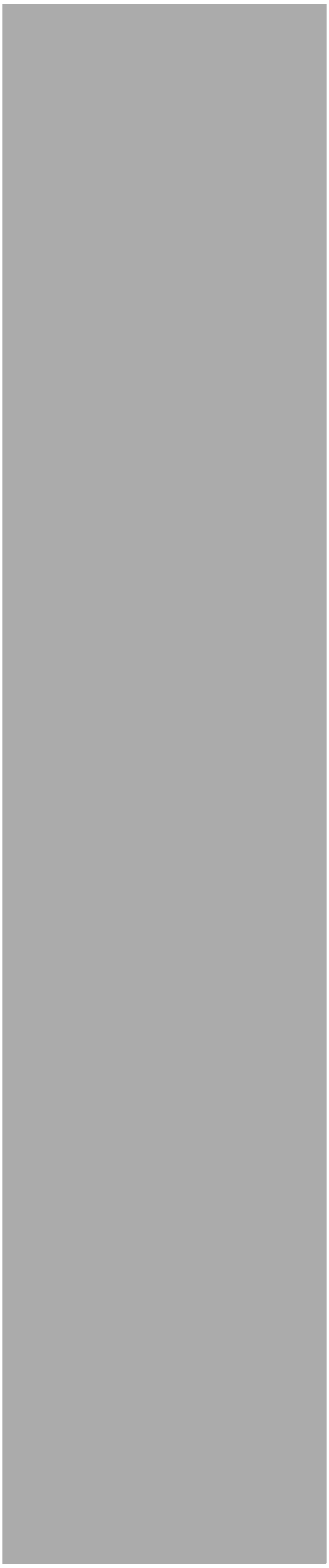
The following tasks, which involve the removal of screw connections, can be performed by appropriately instructed service personnel: Removal and installation of signal converters (e.g. U 116) and power modules, even when the U 100 is operating.

Replacing converter modules

Converter modules can be pulled out to the front after removing the safety screw in the front covers (see section “Connecting and installing the module”)

Technical data

Type		U 159
Order Number		380 159
EAN-Code		4026187193270
Network interfaces (passive routing to U 1xx)		
Management		2 x 1000 Base-T Ethernet (RJ 45)
Data		4 x SFP (1000 Base-X or SGMII)
Input Bitrate per Data Port	[Mbit/s]	1000/1000/900/750 @1/2/3/4 Ports
Protocol		Ethernet, ARP, IPv4, IPv6, UDP, RTP, TCP, HTTP(S), SNTP, SNMP v2c/v3, Syslog, IGMP v2/v3, MLD v1/v2
Serial		1x RJ 45, 115200 kbit/s, 8N1
Transport Stream Processing		
TS Decapsulation		UDP, UDP/RTP, 1-7 packets, FEC (SMPTE 2022-1, -2)
Packet Length	[Bytes]	188
Data rate adjustment		☑
PCR-Correction (< 500 ns acc. DVB)		☑
NIT Handling		static, NIT from PID, dynamic
QAM-Modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM
Signal processing		DVB EN 300 429, ITU J.83 Annex A/C
Spektrum shape cos-roll-off	[%]	12, 13, 15, 18
FEC		Reed-Solomon (204, 188) Code
Symbol rate	[Msymb/s]	1 - 7,14
Channel Bandwidth	[MHz]	1,12 - 8 (depends on symbol rate)
Maximum number of channels		64
Maximum bitrate per output channel	[Mbit/s]	52,64
Phase error dynamic	[°]	0,3
MER (Equalizer)	[dB]	≥ 44
Shoulder attenuation	[dB]	> 56
RF-Modulator		
Connectors	[Ω]	75, 2 x F-jack (1 x RF, 1 x Test point -20 dB)
Frequency range	[MHz]	47 - 1006, digital modulation
Frequency drift	[kHz]	< 10
Output level	[dBµV]	114/111/108 @16/32/64 Channels
Intermodulation distance	[dB]	> 60
Return loss	[dB]	> 14
Spurious frequency distance	[dB]	> 60
Intercarrier Signal-to-Noise ratio	[dB]	> 60
Common data		
Current consumption at 48 VDC	mA	830
Power consuption	W	45
Input voltage	V	36 - 60 VDC or 230 VAC
Dimensions		1 RU, 19 inch
Ambient temperature	[°C]	0...+45



ASTRO Strobel Kommunikationssysteme GmbH

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