GOING FUTURE TODAY.

U 160

IP to DVB-C2 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. 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.

Warning about thermal dangers (risk of burns).

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.
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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 person 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 160 Edge DVB-C2 module and backplane
- ☐ Operating manual

The U 160 plug-in module and the U 100 base unit feature a CE marking. This confirms that the products conform to the relevant EC directives and adhere to the requirements specified therein.

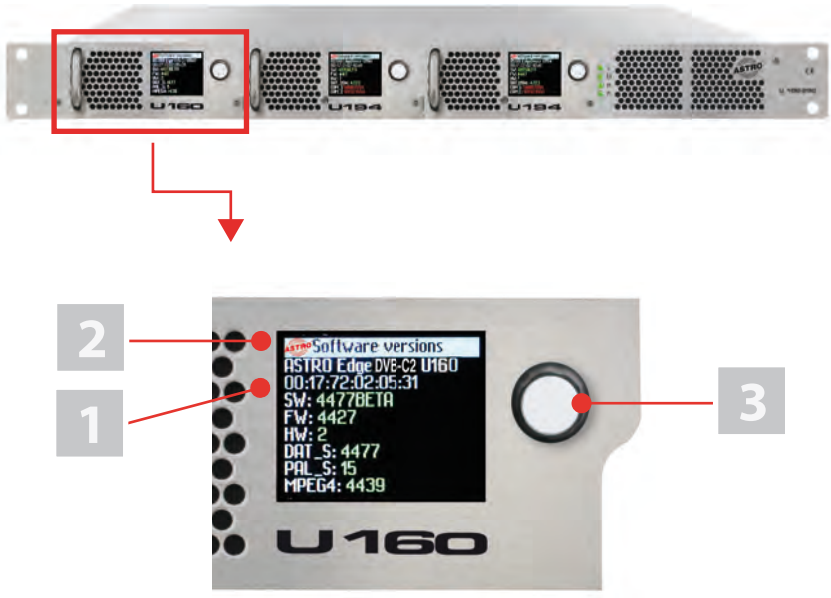
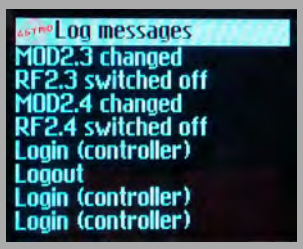
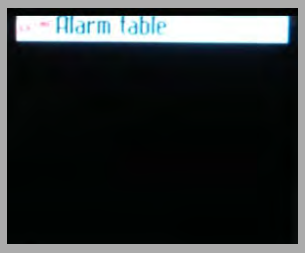


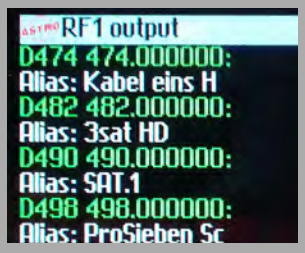
Figure 1: U 160

Figure 1, top:
U 160, installed in the U 100 base unit (fitted with three plug-in modules)

Figure 1, middle:
U 160, front panel
[1] Display for management IP addresses, data IP addresses, status messages, etc.
[2] Status display
[3] Control and data knob, menu switch







HINWEIS: Turning the data knob [3] (fig. 2, above) allows you to navigate through the individual menu items in the U 160 display. Press the data knob to activate 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:

- Log messages: The last messages entered in the log book are displayed.
- Interface settings: IP addresses of the network interface.
- Software versions: The version of the plug-in module software currently installed is displayed.
- Alarm table: The current error messages are displayed.
- RF output: The programs currently selected are displayed.

The different text colours refer to:

- Red: Error (the corresponding display in the web interface log book is: “error”)
- Yellow: Warning (the corresponding display in the web interface log book is: “warning”)
- Purple: Critical error (the corresponding display in the web interface log book is: “critical / alert / emergency”)
- Light blue: Info (the corresponding display in the web interface log book is: “info”)
- Light green: Notice (the corresponding display in the web interface log book is: “notice”)

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 160 is a plug-in module, which is only intended for use in the base units U 100-230 and U 100-48. It can receive up to 8 MPEG data streams and channels encapsulated in accordance with Internet Protocol (IP). These are converted in up to 2 x 4 QAM adjacent channels and are output using the two HF outputs in the U 160.

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

The U 160 plug-in module features the following performance characteristics:

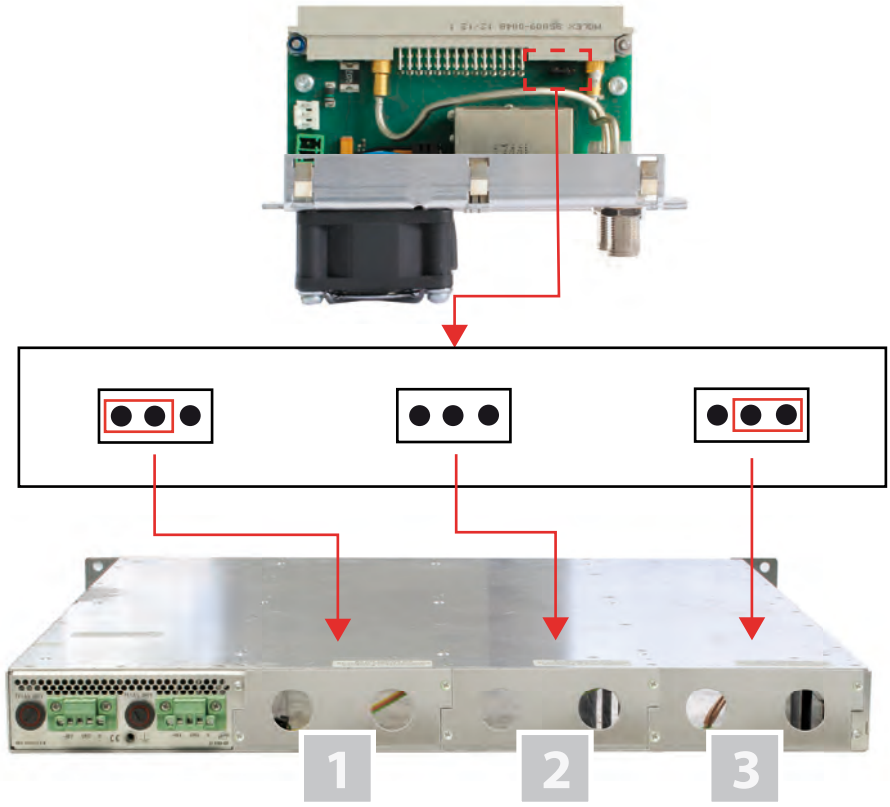
- Conversion of up to 8 IP gigabit Ethernet multicast groups
- QAM channels are output in 2 x 4 adjacent channels
- Outstanding output parameters provided by Direct Digital Technology

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. There is usually a temperature-controlled fan for cooling the signal converter on the backplane. This can be replaced while the device is operating.
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 jumper into the circuit board on the backplane. Proceed as described in the following.



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

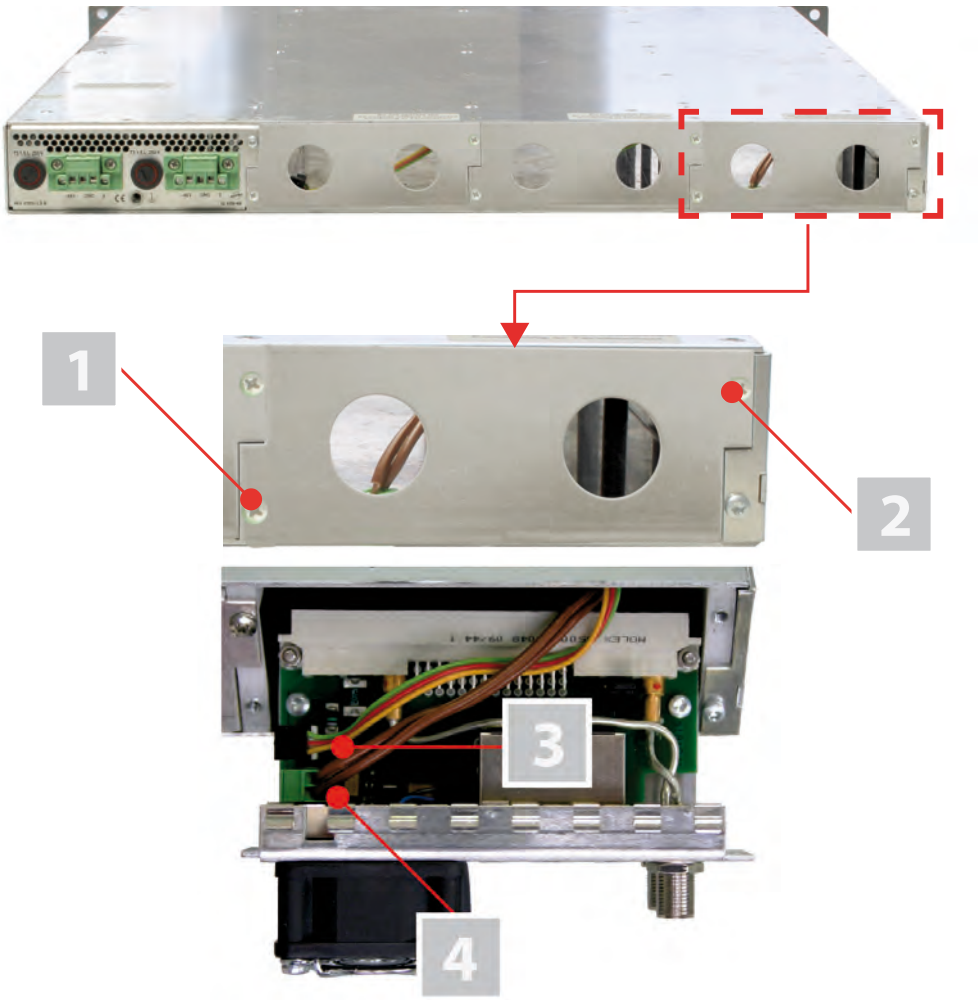
Figure 2: Coding the backplane by plugging in the jumper

To prepare the backplane for installation, proceed as follows:

Plug the jumper into the installation position provided in accordance with figure 2 (page 7).

HINWEIS: A jumper which has not been correctly plugged into the corresponding 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

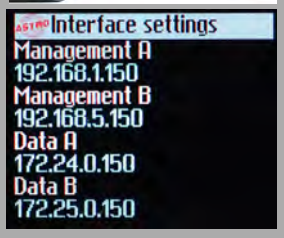
AUFGABE

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 160



Connecting the U 160 to a PC or laptop

To be able to configure the U 160, 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 160 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 160! The sub-network mask of the U 160 is set to 255.255.255.0 upon delivery. The PC or laptop which is connected must therefore be assigned an IP address 192.168.1.x.

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:

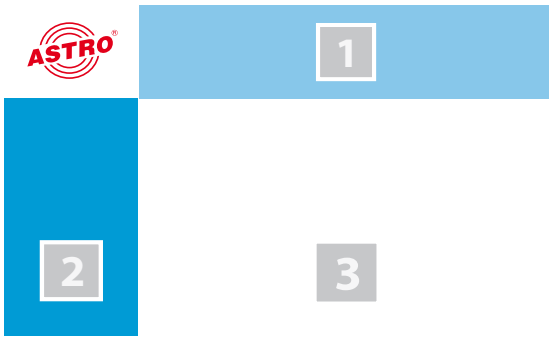


Figure 4: Structure of the web browser interface

- **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 “User settings” configuration area
- **Navigation menu [2]:** displays the individual configuration areas which can be selected 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 160, which appears in the device display, into 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

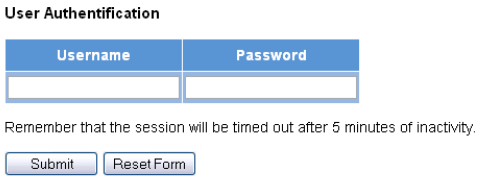


Figure 5: Log in

After logging in, the start page of the U 160 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 160 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 reasons of security, 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 management and the data port. To do so, click on the item “Main” in the menu at the left. You will now see the following table in the content area:

IP Interface Settings

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:02:00:d0	00:17:72:03:00:d0	00:17:72:04:00:d0	00:17:72:05:00:d0
Active	on off	on off	on off	on off
Mode	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Address	192 . 168 . 1 . 150	192 . 168 . 5 . 150	172 . 24 . 0 . 150	172 . 25 . 0 . 150
Subnet	255 . 255 . 255 . 0	255 . 255 . 255 . 0	255 . 255 . 0 . 0	255 . 255 . 0 . 0
Broadcast	192.168.1.255	192.168.5.255	172.24.255.255	172.25.255.255
Gateway	192 . 168 . 1 . 100	0 . 0 . 0 . 0	0 . 0 . 0 . 0	0 . 0 . 0 . 0

Figure 6: Changing the IP address

You can enter the IP addresses for management ports A and B as well as for data ports A and B in the “Address” line. Make sure that you activate the ports being used by activating the corresponding radio button in the line “Active”.

Submit Reset Form

To save your changes, click on the “Submit” button below the last table.

More information on configuring the IP address can be found in the section “Configuring IP interfaces, IP management and base unit”.

The signal flow in the U 160

The overview on page 10 shows the possible signal paths for the U 160. The specific signal flow can be divided into the following sub-areas:

- The IP receivers (1 to 8) receive a signal via data port A or B (each can be switched).
- There are two QAM modulators, each of which features a transport stream selector for selecting a transport stream for each QAM channel.
- The level of the output signals from the two QAM modulators (each with 4 QAM channels) are each adapted, filtered and amplified, and are conveyed to an HF output on the backplane.

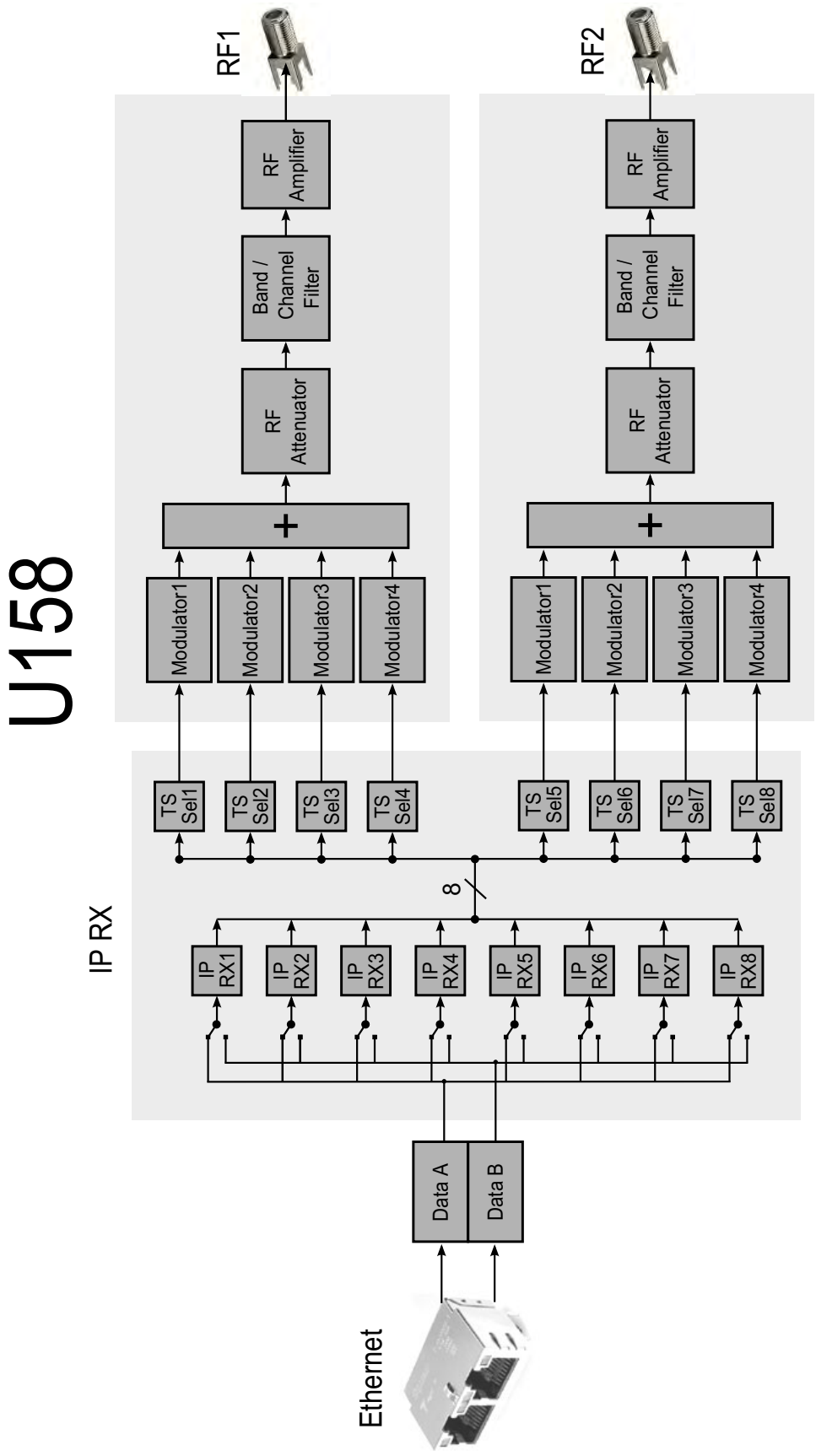


Figure 7: The signal flow in the U 160

Configuring the IP receiver

Now start configuring a signal path in the U 160. Start by clicking on the item “IP RX 1” in the web browser interface menu. You will now see the following table:

IP RX1 Channel Settings

Property	Data A (eth2) 1G	
Primary Receive IP:Port	232 . 19 . 100 . 136 : 10000	Priority
Primary Source Select	0 . 0 . 0 . 0	12 Highest/Hot

Figure 8: Setting the source for the data stream

Enter the IP address and port for the data source in the first line. Optionally, you can also enter a source select address in the second line.
Further information about configuring the receiver can be found in the section “Configuring IP inputs”.
There is another table below the “IP RX 1 Channel Settings” table. Activate the radio button “on” to enable the receiver.

Property	Data A (eth2) + Data B (eth3)	
Enable	on off	
Port	Data B Primary automatic	
Timeouts	in case of failure switch after 0 seconds, switch back to higher priority after 300 seconds.	
Encapsulation	RTP/UDP/IP UDP/IP	automatic manual
Bitrate	Single PCR (SPTS) Mult. PCR (MPTS) No PCR (SI-Stream)	automatic manual
FEC	on off	
TSID / ONID	1093	1
Alias manual / automatic		Bayern 1, ARD BR

Figure 9: Activating the connection to the data port

Checking the data reception rate

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

Ethernet

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:02:00:d0	00:17:72:03:00:d0	00:17:72:04:00:d0	00:17:72:05:00:d0
Address	192.168.1.150	192.168.5.150	172.24.0.150	172.25.0.150
Netmask	255.255.255.0	255.255.255.0	255.255.0.0	255.255.0.0
Gateway	192.168.1.100	0.0.0.0	0.0.0.0	0.0.0.0
Mode	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Transmit	0.0 Mbit/s	0.0 Mbit/s	76.6 Mbit/s	76.6 Mbit/s
Receive	0.0 Mbit/s	0.0 Mbit/s	70.9 Mbit/s	70.9 Mbit/s

Figure 10: Displaying reception statistics

A data reception rate > 0 at data ports A or B should now appear in the line “Receive” in the “Ethernet” table.

Now click on the menu item “Statistics” in the menu at the left. Details about the transport stream received are provided in the “Ethernet RX” table. A TS rate of > 0 should be displayed. If this is not the case, check the receiver settings.

Ethernet RX

Channel	Encap	TS Rate	Buffer depth	FEC	Valid	Missing	Fixed	Duplicate	Reordered	Out of range
IP RX1	1328 bytes 7 packets RTP/UDP/IP	33.8 Mbit/s Mult. PCR	255 Frames 49.8 % 79.5 ms	none	4410949	0	0	0	0	0

Figure 11: IP receiver statistics

Configuring HF output channels

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

Modulator	Enable	Stream	Symbol Rate	Standard Bandwidth Constellation TS Rate	Channel Frequency	Level	Channel Filter	Reference	Status
RF1.1	on / standby / off	IP_RX1 TSID:1093 ONID:1 **Alias:** Bayern 1, ARD BR	6.90000 MBaud	J.83 Annex A/C 7.93 MHz 256 QAM 50.871 Mbit/s	D370 370.0 MHz 0.000 kHz	0.0 dB	on / off not fitted	Set Δ 0.1 dB	ok
RF1.2	on / standby / off	IP_RX2 TSID:1051 ONID:1 **Alias:** tagesschau24, ARD		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D378 378.0 MHz 0.000 kHz	0.0 dB			ok
RF1.3	on / standby / off	IP_RX3 TSID:1078 ONID:1 **Alias:** DATA SYSTEM TR 78, MTV Networks Europe		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D386 386.0 MHz 0.000 kHz	0.0 dB			ok
RF1.4	on / standby / off	IP_RX4 TSID:1024 ONID:1 **Alias:** TELE MELODY, CSAT		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D394 394.0 MHz 0.000 kHz	0.0 dB			ok
RF2.1	on / standby / off	IP_RX1 TSID:1093 ONID:1 **Alias:** Bayern 1, ARD BR	6.90000 MBaud	J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D706 706.0 MHz 0.000 kHz	0.0 dB	on / off not fitted	Set Δ 0.1 dB	ok
RF2.2	on / standby / off	IP_RX2 TSID:1051 ONID:1 **Alias:** tagesschau24, ARD		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D714 714.0 MHz 0.000 kHz	0.0 dB			ok **(standby)**
RF2.3	on / standby / off	IP_RX3 TSID:1078 ONID:1 **Alias:** DATA SYSTEM TR 78, MTV Networks Europe		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D722 722.0 MHz 0.000 kHz	0.0 dB			ok
RF2.4	on / standby / off	IP_RX5 TSID:1079 ONID:1 **Alias:** ZDF, ZDFvision		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D730 730.0 MHz 0.000 kHz	0.0 dB			ok

Submit | Reset Form

Channel list selection

	Localisation	Available on SD Card
Channel list		de ru

RF Detector

	Mode	Level
warnings	on / off	±2.5 dB
security switch off	on / off	+3.0 dB
Lock RF relevant settings	on / off	

Figure 12: Configuring HF output channels

For an example of this, select one of the modulators by clicking on the “On” radio button in the “Enable” column.

Select the incoming data stream for conversion from the drop-down menu. The drop-down menu shows all data available streams with reception using the eight IP receivers. Enter the preferred values for the frequency and the level in the corresponding input field in the “Channel Frequency” and “Level” columns respectively.

To save your changes, click on the “Submit” button below the table.

More information on setting the HF modulators can be found in the section “RF menu”.

Submit | Reset Form

"Status" menu

To have the current settings for the U 160 displayed, click on the `Status` item in the menu at the left. You can now see the overview shown in figure 13:

Ethernet

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:02:0d:18	00:17:72:03:0d:18	00:17:72:04:0d:18	00:17:72:05:0d:18
Address	192.168.1.144	192.168.5.144	172.24.0.144	172.25.0.144
Netmask	255.255.255.0	255.255.255.0	255.255.0.0	255.255.0.0
Gateway	192.168.1.100	0.0.0.0	0.0.0.0	0.0.0.0
Mode	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Transmit	0.4 Mbit/s	0.0 Mbit/s	0.0 Mbit/s	0.0 Mbit/s
Receive	0.1 Mbit/s	0.0 Mbit/s	368.2 Mbit/s	368.3 Mbit/s

IP RX Channels

Channel	Interface	Prim. RX IP socket source	Sec. RX IP socket source	Ter. RX IP socket source	Encapsulation	FEC	TS Rate	TSID ONID	Alias
IP RX1	Data A	232.20.100.128:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.8 Mbit/s Mult. PCR	1093 1	Bayern 1, ARD BR
	Data B	232.19.100.128:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX2	Data A	232.20.100.129:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	none	33.6 Mbit/s Mult. PCR	1051 1	tagesschau24, ARD
	Data B	232.19.100.129:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX3	Data A	232.20.100.130:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.8 Mbit/s Single PCR PCR-PID 8190	1078 1	DATA SYSTEM TR 78, MTV Networks Europe
	Data B	232.19.100.130:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX4	Data A	232.20.100.131:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	33.6 Mbit/s Mult. PCR	1024 1	TELE MELODY, CSAT
	Data B	232.19.100.131:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX5	Data A	232.20.100.132:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.9 Mbit/s Mult. PCR	1079 1	ZDF, ZDFvision
	Data B	232.19.100.132:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX6	Data A	232.20.100.133:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.9 Mbit/s Mult. PCR	1101 1	Das Erste, ARD
	Data B	232.19.100.133:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX7	Data A	232.20.100.134:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	none	37.8 Mbit/s Mult. PCR	1201 1	WDR Bielefeld, ARD
	Data B	232.19.100.134:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					
IP RX8	Data A	232.20.100.135:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	33.6 Mbit/s Mult. PCR	1107 1	SAT.1, ProSiebenSat.1
	Data B	232.19.100.135:10000 0.0.0.0	0.0.0.0 0.0.0.0	0.0.0.0 0.0.0.0					

Figure 13: Status display

The following tables are displayed:

Ethernet status:

Configuration data and status of the Ethernet port

Ethernet

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:02:00:d0	00:17:72:03:00:d0	00:17:72:04:00:d0	00:17:72:05:00:d0
Address	192.168.1.150	192.168.5.150	172.24.0.150	172.25.0.150
Netmask	255.255.255.0	255.255.255.0	255.255.0.0	255.255.0.0
Gateway	192.168.1.100	0.0.0.0	0.0.0.0	0.0.0.0
Mode	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Transmit	0.0 Mbit/s	0.0 Mbit/s	76.6 Mbit/s	76.6 Mbit/s
Receive	0.0 Mbit/s	0.0 Mbit/s	70.9 Mbit/s	70.9 Mbit/s

Figure 14: Status display - Ethernet

The values for the following parameters are displayed and configured here respectively in accordance with the four connections on the backplane of the U 160 (Data A, Data B, Management A and Management B, see section "Device description").

- `MAC:` MAC address (display value)
- `Address:` IP address (configurable)
- `Netmask:` Net mask (configurable)
- `Gateway:` Gateway IP address (configurable)
- `Mode:` Ethernet mode (display value)
- `Transmit:` Data transmission rate (display value)
- `Receive:` Data reception rate (display value)

Status display of the IP receiver:

P RX Channels

Channel	Interface	Prim. RX IP socket source	Sec. RX IP socket source	Ter. RX IP socket source	Encapsulation	FEC	TS Rate	TSID ONID	Alias
P RX1	Data A	232.20.100.128:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.8 Mbit/s Mult. PCR	1093 1	Bayern 1, ARD BR
	Data B	232.19.100.128:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX2	Data A	232.20.100.129:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	none	33.6 Mbit/s Mult. PCR	1051 1	tagesschau24, ARD
	Data B	232.19.100.129:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX3	Data A	232.20.100.130:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.8 Mbit/s Single PCR PCR-PID 8190	1078 1	DATA SYSTEM TR 78, MTV Networks Europe
	Data B	232.19.100.130:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX4	Data A	232.20.100.131:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	33.6 Mbit/s Mult. PCR	1024 1	TELE MELODY, CSAT
	Data B	232.19.100.131:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX5	Data A	232.20.100.132:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.9 Mbit/s Mult. PCR	1079 1	ZDF, ZDFvision
	Data B	232.19.100.132:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX6	Data A	232.20.100.133:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	37.9 Mbit/s Mult. PCR	1101 1	Das Erste, ARD
	Data B	232.19.100.133:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX7	Data A	232.20.100.134:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	none	37.8 Mbit/s Mult. PCR	1201 1	WDR Bielefeld, ARD
	Data B	232.19.100.134:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					
P RX8	Data A	232.20.100.135:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	1328 bytes 7 packets RTP/UDP/IP	L(Cols) 20 D(Rows) 5 Col only	33.6 Mbit/s Mult. PCR	1107 1	SAT.1, ProSiebenSat.1
	Data B	232.19.100.135:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0					

Figure 15: Status display - IP RX channels

The different text formats refer to:

- Green: active
- Grey: inactive ("off")
- Black (bold): priority "hot", no errors
- Red (bold): priority "hot", errors
- Black (standard): priority "cold", no errors
- Red (standard): priority "cold", errors

The values set for the following parameters are displayed in the table "IP RX channels" for the 8 IP receivers – for outputs Data A and B respectively:

- `Prim. RX IP socket source:` Primary source
- `Sec. RX IP socket source:` Secondary source
- `Ter. RX IP socket source:` Tertiary source
- `Encapsulation:` Data encapsulation
- `FEC:` Forward error correction
- `TS Rate:` Data rate
- `TSID ONID:` Transport stream ID / original network ID
- `Alias:` Alias name

For details on the parameters: see the section "IP RX menu"

Status display of the QAM output programs:

RF Channels

Modulator	Stream	Symbol Rate	Standard Bandwidth Constellation TS Rate	QAM Buffer	Channel Frequency Level	Reference	Status
RF1.1		6.90000 MBaud	J.83 Annex A/C 7.93 MHz 256 QAM 50.871 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 0.000 Mbit/s	D370 370.000000 MHz 0.0 dB	Δ -6.2 dB	off
RF1.2	**IP_RX2** TSID:5700 ONID:156 Alias:Kabel eins HD, BASIS 1		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 99.80 % Average: 0.10 % Stuffing: 9.171 Mbit/s	D378 378.000000 MHz 0.0 dB		ok
RF1.3			J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 0.000 Mbit/s	D386 386.000000 MHz 0.0 dB		off
RF1.4	**IP_RX4** TSID:1024 ONID:1 Alias:MELODY, CSAT		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 31.736 Mbit/s	D394 394.000000 MHz 0.0 dB		ok
RF2.1		6.90000 MBaud	J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 0.000 Mbit/s	D706 706.000000 MHz 0.0 dB	Δ -4.3 dB	off
RF2.2			J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 0.000 Mbit/s	D714 714.000000 MHz 0.0 dB		off
RF2.3			J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.00 % Stuffing: 0.000 Mbit/s	D722 722.000000 MHz 0.0 dB		off
RF2.4	**IP_RX5** TSID:1079 ONID:1 Alias:ZDF, ZDFvision		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	Max: 0.10 % Average: 0.10 % Stuffing: 0.000 Mbit/s	D730 730.000000 MHz 0.0 dB		ok

Figure 16: Status display - RF channels

The values set for the following parameters are displayed in the table "RF channels" for the 2 x 4 QAM output channels:

- `Modulator:` Output program
- `Stream:` Transport stream received
- `Symbol Rate:` Symbol rate for the QAM modulators 1 and 2
- `Standard Bandwidth Constellation TS Rate:` Modulation standard, required channel bandwidth, BAM constellation, output bit rate
- `Standard Bandwidth Constellation TS Rate:` Modulationsstandard, benötigte Kanalbandbreite, BAM Konstellation, Ausgangsbitrate
- `QAM Buffer:` Maximum and mean value in % and stuffing in Mbit/s
- `Channel Frequency/Level:` selected frequency/slected level
- `Reference:` Deviation from the calibrated value
- `Status:` Status of each channel (OK or OFF)

Details on the parameters can be found in the section "Menu RF".

Status messages on temperature, internal voltages and the power module:

Miscellaneous

Property	Mainboard
Temperature 1 (center)	39.5 °C
Temperature 2 (front)	46.0 °C
Temperature 3 (rear)	53.5 °C
Temperature 4 (PA)	31.5 °C
Supply 1.2 V	1.19 V
Supply 1.5 V	1.50 V
Supply 1.8 V	1.79 V
Supply 2.5 V	2.49 V
Supply 3.3 V	3.31 V
Supply 5.5 V	5.43 V
Supply 9 V	8.89 V
Fan	9926 RPM
Power Module	OK

Figure 17: Status display - Miscellaneous

The following, general parameters are displayed in the "Miscellaneous" table:

- `Temperature 1 (center):` Temperature displayed in °C for the mainboard
- `Temperature 2 (front):` Temperature displayed in °C for the mainboard
- `Temperature 3 (rear):` Temperature displayed in °C for the mainboard
- `Temperature 4 (PA):` Temperature displayed in °C for the HF output stage
- `Supply 1.2 V:` 1.2 V supply voltage
- `Supply 1.5 V:` 1.5 V supply voltage
- `Supply 1.8 V:` 1.8 V supply voltage
- `Supply 2.5 V:` 2.5 V supply voltage
- `Supply 3.3 V:` 3.3 V supply voltage
- `Supply 5.5 V:` 5.5 V supply voltage
- `Supply 9 V:` 9 V supply voltage
- `Fan:` Fan rotation speed
- `Power Module:` Functional status (OK or error message)

Memory status:

System resources

Property	Value
Total size of memory arena	58450240
Number of ordinary memory blocks	839
Space used by ordinary memory blocks	2360944
Space free for ordinary blocks	56089276
Size of largest free block	52035236
Number of left files FOPEN_MAX	37
Number of left files NFILE	19
Number of free file descriptors NFD	19
CPU load 0.1s	100 %
CPU load 1s	91 %
CPU load 10s	30 %

Figure 18: Status display - System resources

Information on the internal resources of the operating system can be viewed in the “System resources” table. No settings can be made here.

File resources:

- ☐ `Number of left files FOPEN_MAX`
- ☐ `Number of left files NFILE`
- ☐ `Number of free descriptors NFD`

CPU load, averaged over XXs:

- ☐ `CPU load 0.1 s`
- ☐ `CPU load 1 s`
- ☐ `CPU load 10 s`

"Main" menu

This section explains how to make general settings for the interfaces and the management of the U 160, as well as for the U 100 base unit.
Click on the item "Main" in the menu at the left.

Setting IP interfaces (administrator only)

You can configure IP interfaces and activate or deactivate them using the table shown above ("IP interface settings"). The connection type is automatically identified and displayed by the U 160 (in this case: 1 GBit/s, full duplex).

IP Interface Settings

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:02:00:d0	00:17:72:03:00:d0	00:17:72:04:00:d0	00:17:72:05:00:d0
Active	on off	on off	on off	on off
Mode	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Address	192 . 168 . 1 . 150	192 . 168 . 5 . 150	172 . 24 . 0 . 150	172 . 25 . 0 . 150
Subnet	255 . 255 . 255 . 0	255 . 255 . 255 . 0	255 . 255 . 0 . 0	255 . 255 . 0 . 0
Broadcast	192.168.1.255	192.168.5.255	172.24.255.255	172.25.255.255
Gateway	192 . 168 . 1 . 100	0 . 0 . 0 . 0	0 . 0 . 0 . 0	0 . 0 . 0 . 0

Figure 19: Configuring IP interfaces

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.
- `Mode:` Connection type (identified automatically)
- `Address:` IP address
- `Subnet:` Netmask
- `Broadcast:` Broadcast address
- `Gateway:` Gateway IP (if required)

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.)

Submit Reset Form

To save your changes, click on the "Submit" button below the last table.

Configuring management settings

You can configure the following management settings in the second table ("IP management settings"):

IP Management Settings

Property	Value
DNS	0 . 0 . 0 . 0
SNTP server	0.0.0.0 0.0.0.0
Time Source	SNTP Server

Figure 20: Configuring management settings

- DNS: Enter a DNS server, if required, in the input fields.
- SNTP server: You can enter one or two time servers here (SNTP protocol).
- Time Source: Select the preferred time reference from the drop-down menu. The following options are available for selection: "SNTP server" and "IP RX 1 - 16".

To save your changes, click on the "Submit" button below the last table.

Configuring the base unit

You can enter settings for the U 100 base unit in the third table ("U 100 Rack settings").

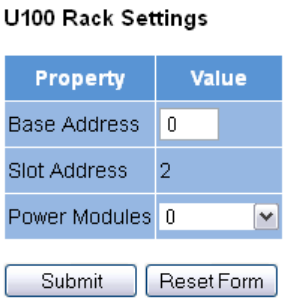


Figure 21: Configuring the U 100 base unit

The following parameters are displayed, and can be configured:

- Base Address: Enter an address for the base unit being used here. If the U 160 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 160 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).

To save your changes, click on the "Submit" button below the last table.

Saving and loading configurations / default and reboot

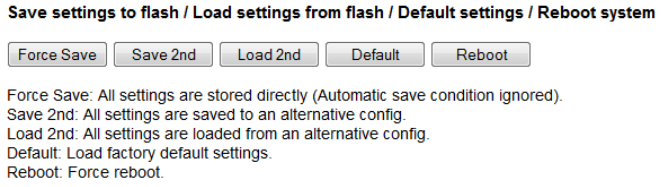


Figure 22: Saving and loading configurations

Changes to the configuration of the U 160 are written to the device by clicking the "Submit" button, and are activated immediately. If you wish to save the current status to a separate memory, click on the "Save 2nd" button (below the tables). This current status is then saved to the SD card in the U 160. (Please note that prior to installing the module, an SD memory card must be plugged in; see figure at left.)

Click on the "Default" button if you wish to restore the default settings.

You can retrieve this status again by clicking on the "Load 2nd" button. How to save the configuration onto the local computer or FTP server is explained in the section "Software update and configuration files".

Clicking the "Force Save" button saves the configuration with immediate effect. The configuration will otherwise only be saved after 10 seconds if no further change is made; and after 30 seconds at the latest.

ACHTUNG: If you click the "Default" button, all settings except for the user and network settings for the data and management ports are reset to the delivery state.

Click on the "Reboot" button to restart the unit with the last settings saved.

"Test generator" menu

The U 160 features an integrated test generator for a functional test when an input signal is not yet available. Null packets are generated with a preset packet ID. The maximum data rate that can be set totals 67 MBit/s.

Test Generator Settings

Property	Value
Date rate	1.000000 Mbit/s (40420)
Packet ID	0
Packet length	188

Figure 23: Test generator

The following settings are displayed, and can be configured:

- `Data rate:` Enter the preferred data rate in MBit/s in the input field.
- `Packet ID:` Enter the packet ID here.
- `Packet length:` Packet length is displayed.

To save your changes, click on the "Submit" button below the table.

Submit Reset Form

"IP Channel" menu

To have the input masks for configuring the input and output channels displayed, click on the item "IP Channels" in the menu at the left.

You can check the settings for the input channels in the table at the bottom, "IP RX channel settings".

IP RX Channel Settings

Channel	Enable	Interface	Prim. RX IP socket source	Sec. RX IP socket source	Ter. RX IP socket source	Encapsulation	TSID ONID	Alias
IP RX1	on / off	Data A	232.19.100.136:10000 0.0.0.0	232.20.100.136:10000 0.0.0.0	0.0.0.0:10000 0.0.0.0	RTP/UDP/IP Mult. PCR	1117 1	ORF1, ORF
		Data B	232.19.100.136:10000 0.0.0.0	232.20.100.136:10000 0.0.0.0	0.0.0.0:10000 0.0.0.0			
IP RX2	on / off	Data A	232.19.100.129:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	UDP/IP Mult. PCR		
		Data B	232.19.100.129:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0			
IP RX3	on / off	Data A	232.19.100.130:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	RTP/UDP/IP Single PCR		
		Data B	232.19.100.130:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0			
IP RX4	on / off	Data A	232.19.100.132:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0	RTP/UDP/IP Mult. PCR		
		Data B	232.19.100.132:10000 0.0.0.0	0.0.0.0:0 0.0.0.0	0.0.0.0:0 0.0.0.0			

Figure 24: IP RX channel settings table

You can activate or deactivate the respective IP inputs here by clicking on the corresponding radio button. The following parameters are displayed for ports A and B respectively for the four IP input channels:

- Prim. RX IP socket source
- Sec. RX IP socket source
- Ter. RX IP socket source
- Encapsulation TSID / ONID
- Alias

HINWEIS: These parameters are explained in more detail in the section "IP RX menu".

Submit Reset Form

If you change the activation or deactivation status of inputs or outputs in one of the two tables, then click on the "Submit" button below the last table to save your changes. Click on "Reset form" to restore the original settings.

"IP RX" menu

To configure the 8 IP inputs, start by clicking on the item "IP RX 1", "IP RX2", "IP RX3", "IP RX4", "IP RX5", "IP RX6", "IP RX7" or "IP RX8" in the menu at the left. The following table will then appear in the content area at the top:

IP RX1 Channel Settings

Property	Data A (eth2) 1G	
Primary Receive IP:Port	232 . 19 . 100 . 136 : 10000	Priority
Primary Source Select	0 . 0 . 0 . 0	12 Highest/Hot
Secondary Receive IP:Port	232 . 20 . 100 . 136 : 10000	Priority
Secondary Source Select	0 . 0 . 0 . 0	11 Higher/Hot
Tertiary Receive IP:Port	0 . 0 . 0 . 0 : 10000	Priority
Tertiary Source Select	0 . 0 . 0 . 0	0 Off

Figure 25: Table 1 "IP RX1 channel settings"

"Receive IP" and "Port" (see lines 1, 3 and 5 in the table) form a socket on which the incoming data stream is received. This also allows the Receive IP address to be a multicast address or a unicast address of its own.
The IGMP protocol is used to request an IP multicast. If version 3 of this protocol is used, then you can select a specific source using the Source Select IP address (see lines 2, 4 and 6 in the table). 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).

You can make a priority setting for the primary, secondary and tertiary IP address / port respectively using a drop-down menu. There are 13 options (from "off" to "highest/hot") available for selection. The priorities are divided into three groups:

- Hot standby (higher priorities) Levels 7 - 12: data streams are requested permanently
- Cold standby (medium priorities): Levels 1 - 6
- "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.

If a priority level from the "Hot standby" group is allocated to a data stream, then this will continue to be requested even during network provider problems. As soon as the problem has been rectified, it switches back to this data stream.

Another table is shown in the following in which settings valid for Data Port A and B can be entered.

Property	Data A (eth2) + Data B (eth3)	
Enable	on / off	
Port	Data B / Primary / automatic	
Timeouts	in case of failure switch after 0 seconds, switch back to higher priority after 300 seconds.	
Encapsulation	RTP/UDP/IP / UDP/IP	automatic / manual
Bitrate	Single PCR (SPTS) / Mult. PCR (MPTS) / No PCR (SI-Stream)	automatic / manual
FEC	on / off	
TSID / ONID	1093	1
Alias manual / automatic		Bayern 1, ARD BR

Figure 26: Table 2 "IP RX1 channel settings"

- `Enable:` Activate or deactivate the IP input by clicking on the corresponding radio button.
- `Port:` Configure the reception source for the IP channel here.
  Select either Data A or Data B as the port from the first drop-down menu.
  Select either the "Primary", "Secondary" or "Tertiary" option from the second drop-down menu.
  Select the "static" option from the third drop-down menu if you do not wish to use an automatic replacement circuit for the data streams. Select the "automatic" option when the replacement circuit should be used as described above.
- `Timeouts:` Enter a time frame, in seconds, in the first input field after which a switch-over to the data stream with the next-lowest priority should occur in the event of a fault.
  Enter a time frame, in seconds, in the second input field after which it should switch back to the data stream with the higher priority after the problem has been rectified. (This is only the case when a priority level from the "Hot standby" group was allocated to the data stream - see explanation above).
- `Error condition:` If the data rate should be the only factor considered in the event of a fault, activate the radio button "data rate only". Otherwise, select the radio button "data rate, continuity count, service".
- `Encapsulation:` When the radio button "RTP / UDP / IP" has been activated, the corresponding RTP / UDP / IP data streams are received. If you activate the radio button "on" in the line "FEC", then the additional receive IP ports +2 and +4 will be received (example: apart from 10000, also 10002 and 10004). This also includes additional redundancy information for fault correction.
  When the radio button "UDP / IP" has been activated, either UDP / IP data streams or RTP / UDP / IP data streams without an evaluation from RTP are received.
  Select either "automatic" or "manual" for the data encapsulation by clicking the corresponding radio button.
- `Bitrate:` Select either "automatic" or "manual" by clicking the corresponding radio button. If "manual" is selected and the radio button "Single PCR" has been selected at the same time, then the receive data stream is regulated using a single PCR. This is not suitable for transport streams with several PCRs.
  If you activate the radio button "Multi PCR", then the data rate is used for regulation. This is not possible for data streams with a variable bit rate.
  When the "SI Stream" button has been activated, the U 160 expects "Service Information Stream"-only reception, without PCR, on this receiver and adapts the minimum bit rate.
- `FEC:` Activate or deactivate FEC by clicking the radio button "on" or "off". (See "Encapsulation" above.)
- `TSID / ONID:` The respective value is displayed but cannot be changed.
- `Alias manual / automatic:` You can enter an alias name for the data stream in the input field at the left. The automatically generated alias name is displayed at the bottom right. This is the name of the first transmitter in the data stream. This is used if no name is entered manually.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.

"RF" menu

To configure the QAM outputs, start by clicking on the "RF" item 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.

Modulator	Enable	Stream	Symbol Rate	Standard Bandwidth Constellation TS Rate	Channel Frequency	Level	Channel Filter	Reference	Status
RF1.1	on / standby / off	IP_RX1 TSID:1093 ONID:1 **Alias:** Bayern 1, ARD BR	6.90000 MBaud	J.83 Annex A/C 7.93 MHz 256 QAM 50.871 Mbit/s	D370 370.0 MHz 0.000 kHz	0.0 dB	on / off not fitted	Set Δ 0.1 dB	ok
RF1.2	on / standby / off	IP_RX2 TSID:1051 ONID:1 **Alias:** tagesschau24, ARD		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D378 378.0 MHz 0.000 kHz	0.0 dB			ok
RF1.3	on / standby / off	IP_RX3 TSID:1078 ONID:1 **Alias:** DATA SYSTEM TR 78, MTV Networks Europe		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D386 386.0 MHz 0.000 kHz	0.0 dB			ok
RF1.4	on / standby / off	IP_RX4 TSID:1024 ONID:1 **Alias:** TELE MELODY, CSAT		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D394 394.0 MHz 0.000 kHz	0.0 dB			ok
RF2.1	on / standby / off	IP_RX1 TSID:1093 ONID:1 **Alias:** Bayern 1, ARD BR	6.90000 MBaud	J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D706 706.0 MHz 0.000 kHz	0.0 dB	on / off not fitted	Set Δ 0.1 dB	ok
RF2.2	on / standby / off	IP_RX2 TSID:1051 ONID:1 **Alias:** tagesschau24, ARD		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D714 714.0 MHz 0.000 kHz	0.0 dB			ok (standby)
RF2.3	on / standby / off	IP_RX3 TSID:1078 ONID:1 **Alias:** DATA SYSTEM TR 78, MTV Networks Europe		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D722 722.0 MHz 0.000 kHz	0.0 dB			ok
RF2.4	on / standby / off	IP_RX5 TSID:1079 ONID:1 **Alias:** ZDF, ZDFvision		J.83 Annex A/C 7.93 MHz 64 QAM 38.153 Mbit/s	D730 730.0 MHz 0.000 kHz	0.0 dB			ok

Submit | Reset Form

Channel list selection

	Localisation	Available on SD Card
Channel list		de ru

RF Detector

	Mode	Level
warnings	on / off	±2.5 dB
security switch off	on / off	+3.0 dB
Lock RF relevant settings	on / off	

Figure 27: Table 2 "RF channels"

- `Enable:` To activate or deactivate an output channel, click the corresponding radio button. If you select the "Standby" option, the decoder will run, but the corresponding output will be switched off. This may be practical when, for example, the module is being used as a replacement module in a redundant circuit.
- `Stream:` Select the incoming data stream for conversion from the drop-down menu. The drop-down menu shows all available data streams received using the eight IP receivers. The last item in the drop-down menu is the ASTRO test generator, which generates a digital radio program with a 1 kHz tone in the output channel which has been set.
- `Symbol Rate:` This displays the symbol rate currently configured for the output channel.
- `Standard Bandwidth Constellation TS Rate:` The QAM standard, the bandwidth of the output channel, the modulation type and the output data rate are displayed here.

- `Channel Frequency:` Select an item from the drop-down menu for the channel. Once a value has been selected from the list, the input field for the output frequency remains inactive, and the corresponding channel centre frequency is displayed. If you select the "manual" option, you can enter the channel centre frequency manually.
  There may be a 32 MHz interval between the start frequency of the RF X.1 and the end frequency of the RF X.2 within a channel pair (RF 1.1 / 1.2 / 1.3 / 1.4 or RF 2.1 / 2.2 / 2.3 / 2.4); e.g. RF 1.1 = S06 and RF 1.2 = S 09 when there is a channel width of 8 MHz. If the interval set is too large, then an error message will appear. The output channel affected will then be set to "Standby" and must be reactivated when a new, and correct, configuration is set. If no adjacent channel assignment has been configured, then a channel filter cannot be used for the respective pair of channels.
- `Level:` The level of the output signal is equalised here. You can set the relative level in increments of 0.1 dB by entering the corresponding value in the input field. The range which can be set depends on the type of modulation set (QAM 64 to +10 dB, QAM 256 to +4 dB). If you set a value which is excessively high, an error message appears. Once this message has been acknowledged, the maximum value is entered.
  If you change the type of QAM modulation of a pair of output channels, the level will be adjusted automatically.
- `Channel Filter:` If you wish to activate a channel filter, select an item from the "min." or "max." drop-down menus and activate the radio button "on".
  Note that the channel filter for the corresponding output channel must be connected (see figure at left).
  In order to be able to activate the channel filter, the limits configured in the "Channel Filter" column must exhibit the same values as the output channels entered under "Channel Frequency". Filter limits which deviate from the output channel can, of course, also be used, however in this case, this filter will not be able to be activated.
- `Reference:` Click on the "Set" button to select the value entered within the modulation parameters as the reference. A 2.5 dB deviation from the output signal will result in a warning message being issued.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.

The table "Channel List Selection" is found below the table "RF Channels".

	Localisation	Available on SD Card
Channel list		de ru

Figure 28: "Channel list selection" table

The language version of the channel list can be selected in the input field "Localisation". "us" (USA), "de" (German), "fr" (French), "ru" (Russian) and "be" (Belgium) are available.

If stored on the SD memory card, you can use the country code (e.g. "ru") to activate a different channel list.

The table "RF Detector" can be found further down.

RF Detector

	Mode	Level
warnings	◉ on ○ off	±2.5 dB
security switch off	○ on ◉ off	+3.0 dB
Lock RF relevant settings	○ on ○ off	

Figure 29: "RF Detector" table

The U 160 features a level detector in the output. This level detector consistently measures the output level. When you click the "Set" button in the "Reference" column in the table "RF Channels" (further up), then the value entered in the modulation parameters is saved as a reference. The deviation from this value is measured on an ongoing basis.
The consequences of any deviations which may occur can be configured in the table "RF Detector". You can, for example, activate or deactivate the warning message for the level deviation by clicking on the corresponding radio button. When the warning message is activated and the level deviation totals +/- 2.5%, then the warning message is recorded in the log file and, depending on the configuration of the SNMP properties, a trap occurs. Furthermore, you can activate or deactivate a security switch-off in the event of a deviation of +/- 3%.
Activating or deactivating the "Lock RF relevant settings" option remains possible. If the option has been activated, only the service for conversion can be changed in the table "RF Channels". All other settings in this table are locked. All configuration options relating to the HF output channel in the modulator settings (menus RF 1.1 to RF 2.4) are also locked.

Submit Reset Form

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.

"RF 1.X" and "RF 2.X" menu

To enter detailed settings for the individual output channels, start by clicking on the item "RF 1" or "RF 2" in the main menu at the left, and then clicking on one of the submenu items "RF 1.1 to RF 1.2" or "RF 2.1 to RF 2.2". The "Input Selection" table now appears in the upper part of the content area:

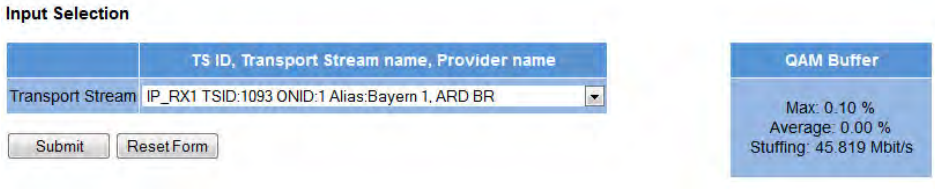


Figure 30: "Input selection" table

You can select the program to be converted to QAM here. This program can be converted from any of the 8 IP receivers.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.

Another table follows in which you can complete all the settings relating to the QAM output signal.

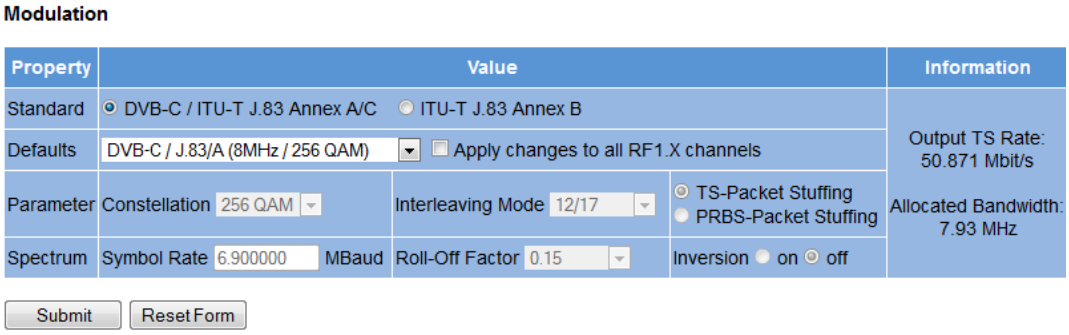


Figure 31: "Modulation" table

The following settings can be entered individually.

- `Standard:` The U 160 is able to generate QAM channels in accordance with the DVB-C standard Annex A/C or in accordance with ITU-T J.83 Annex B. Depending on the standard selected, the selection options in the "Defaults" line, in which the modulation type and the channel bandwidth are selected, will change.
  When you...
- `Defaults:` The modulation type and the channel bandwidth are set here by selecting them from the drop-down menu. Activate the checkbox "Apply changes to all RF X.X channels" if the selection made should be applied to all output channels of the U 160.

- `Parameter:` When you have selected the option "Manual" from the drop-down menu in the "Defaults" line, you can select the modulation type and the spectrum inversion from a drop-down menu manually, allowing it to be set manually. The settings selected here apply to both channels of the respective pair of output channels.
  If the option "ITU-T J.83 Annex B" has been selected in the "Standard" line, then a selection can also be made for "Interleaving Mode". Interleaving mode determines the degree of reference data interleaving during transmission via the QAM channel. The first number determines the number of paths used for transmission, while the second number specifies the basic delay within a path. The interleaver makes a higher level of transmission reliability possible on a transmission channel affected by burst errors.
  When you have selected the option "Manual" from the drop-down menu in the "Defaults" line, then you also have the option of configuring the stuffing unit. When you select the option "TS-Packet Stuffing", then zero packets are generated with a useful content comprised of zeroes. If, in contrast, you select the option "PRBS-Packet Stuffing", then the useful content of the zero packets generated is comprised of a random sequence.
- `Spectrum:` When you have selected the option "Manual" from the drop-down menu in the "Defaults" line, then you can enter the symbol rate in the corresponding input field manually and select a value for the roll-off factor from the drop-down menu.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.
If you click on the "Refresh" button, all information in the table is updated.

Another table follows in which you can edit the transport stream.

Transport Stream Processing

Property	Value		
SID/PID-Filter	on off	Drop-Filter / Pass-Filter	Pass-SID Please select SID Add
	SID-List:		
			Pass-PID Please select PID Add
	PID-List:		PID:0000 (PAT-Table) PID:0001 (CAT-Table) PID:0002 (TSDT-Table) PID:0017 (SDT-Table) PID:0018 (EIT-Table) PID:0019 (RST-Table) PID:0020 (TDT-Table) Remove all Remove
PID-Remapping	on off		Input-PID Please select PID => Output-PID Add
	Remapping-List:		

Figure 32: "Transport stream processing" table

The following settings can be entered individually.

- `SID/PID-Filter:` You can activate or deactivate the transport stream filter here by clicking on the corresponding radio button. The option of configuring drop filters or pass filters is also provided. Click on the corresponding radio button here. The drop filter removes the selected IDs from the transport stream, while the pass filter transmits the selected IDs only and discards all others.
  If you select a service filter using an SID filter, all subordinate PIDs which belong to the service are also removed from the transport stream, or are transmitted. When a PID filter is used, only the PID selected is removed or transmitted respectively. The respective PIDs selected are displayed in the SID or PID list once selected. The PIDs for filtering can be activated by clicking the Add button. Clicking the "Remove" button deletes entries with a marked checkbox again.
- `PID Remapping:` The U 160 provides a PID remapping function, which means that PIDs active on the input side can be renamed, and be added to the output data stream with a new PID. To set this type of filter, select a PID from the drop-down menu and then enter the new PID in the input field "Output-PID" and confirm it by clicking the "Add" button. Renamed PIDs appear in the "Remapping List". If you wish to remove a remap filter again, then mark the checkbox for the entry in the remapping list, and then click the "Remove" button.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.
If you click on the "Refresh" button, all information in the table is updated.

"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:

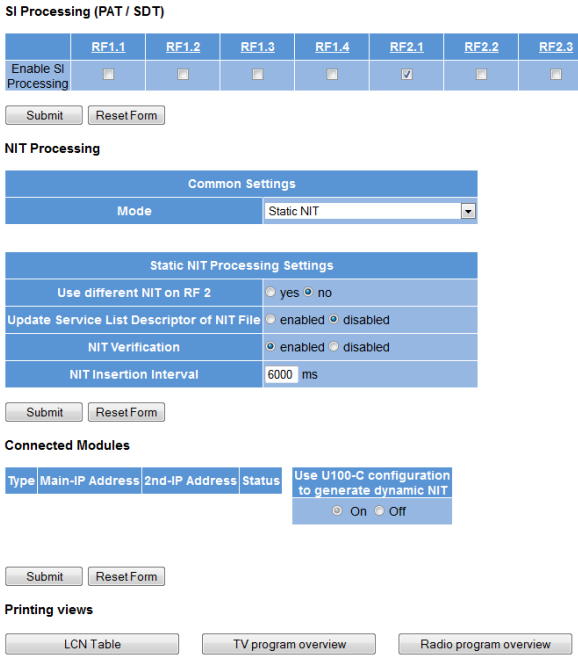


Figure 33: Settings for transport stream processing

You can make settings for the PAT processing, NIT processing and the NIT upload here.

You can activate and deactivate PAT processing for the individual output channels in the "PAT Processing" table by clicking the corresponding checkbox (see below).
If a service filter has been applied, then the PAT is adapted accordingly.

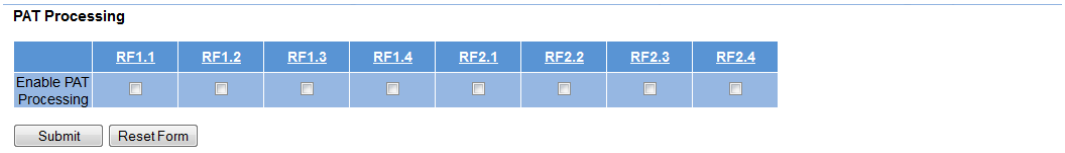


Figure 34: "PAT processing" table

Click on the "Submit" button below the table to save the changes.
Click on "Reset form" to restore the original settings.

You can complete the settings for the NIT processing in the table which follows.

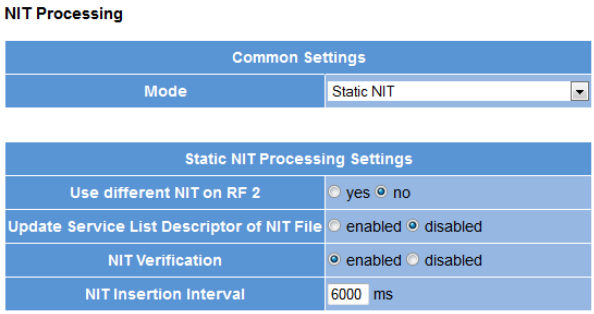


Figure 35: "NIT Processing" table

In the „Mode" drop down list you can choose from the following options (depending on the chosen mode there are different options available):

- `OFF:` No NIT will be generated.
- `Static NIT:` If you choose this mode a static NIT will be generated. In line „Use different NIT on RF2" you can generate a second NIT for the second output by activating the radio button „Yes". When the radio button „enabled" is activated in line „Update Service List Descriptors of NIT file", the static NIT-file will be updated dynamically with information, that describes the services of each transport stream. Therefore it is reasonable to link the modules in this part of the net via the file „Modules.xml". This enables writing of the service list descriptors of all transport streams.
  Whn the radio button 2enabled" is activated in line „NIT Verification", an external NIT is used. In this case the module can adjust the actual configuration to the configuration specified in the NIT and alarm in case of any deviation. You can find these information in the „NIT" menu.
  In line „NIT Insertion Interval" you can type in the output rate of the NIT in milliseconds. 8000 ms for example means that every 8 seconds a complete NIT is generated.
- `Dynamic NIT:` If you choose this mode a dynamic NIT will be generated.
  Every NIT has a version number. In line „Set Version of NIT" you can define a specific value for this number. That value will then be incremented with every change of the NIT. This is useful for synchronisation of different facilities. In case of redundancy switching from one facility to the other would not change the NIT.
  In line „NIT Insertion Interval" you can type in the output rate of the NIT in milliseconds. 8000 ms for example means that every 8 seconds a complete NIT is generated.
- `Remap NIT from PID:` If a NIT should be existant in the data stream under a PID other than 0x0010, it can be used via remap filter in the output data stream. To do so you must choose the desired input channel from the drop down list in line „Source NIT" and type in the input PID for the output channel into the input field.
  When the radio button „enabled" is activated in line „NIT Verification", an external NIT will be used. In tis case the module can adjust the actual configuration to the configuration specified in the NIT and alarm in case of any deviation. You can find these information in the „NIT" menu.
  In line „NIT Insertion Interval" you can type in the output rate of the NIT in milliseconds. 8000 ms for example means that every 8 seconds a complete NIT is generated.
- `Remap PID from PID Slave:` This mode can not be selected and is displayed only for information purposes on the modules. It belongs to the mode „Remap NIT from PID". A module that is operated in this mode acts as a master if other modules are synchronised via the „Modules.xml" file. In this operating mode the master stes every module into the „Remap NIT from PID Slave" mode. It transmits a NIT, tt can be found on the chosen IP-RX channel and the chosen PID.
  When the radio button „enabled" is activated in line „NIT Verification", an external NIT will be used. In tis case the module can adjust the actual configuration to the configuration specified in the NIT and alarm in case of any deviation. You can find these information in the „NIT" menu.
  In line „NIT Insertion Interval" you can type in the output rate of the NIT in milliseconds. 8000 ms for example means that every 8 seconds a complete NIT is generated.

Click on the "Submit" button below the table to save the changes.
Click on "Reset form" to restore the original settings.

The "Connected Modules" table follows. This allows you to select whether the configuration of the U 100-C Management Controller should be used for generating a dynamic NIT.
Click on the corresponding radio button to do so. This will update the file "nit.xml", with the "Generate from local NIT; use NIT 1" mode having to be set on all RF ports.

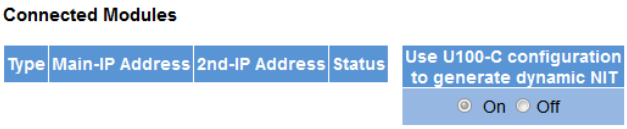


Figure 36: "Connected modules" table

Click on the "Submit" button below the table to save the changes.
Click on "Reset form" to restore the original settings.

"NIT" menu

If you wish to create a static NIT, start by clicking on the one of the corresponding menu items, "NIT 1" or "NIT 2" in the main menu at the left. The following table now appears in the upper part of the content area:

Change Network Information

Network ID	Network Name
12345	Astro

Submit | Reset Form

Figure 38: "Change network information" table

You can enter the network ID and the network name in the respective input fields here.
Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.
If you click on the "Refresh" button, all information in the table is updated.

The table "Add External Transport Streams" follows. You can add an external transport stream here.

Add External Transport Streams

TS-ID	ON-ID	Channel Frequency	Constellation	Symbol Rate	
		manual / MHz	64 QAM	MS/s	Add

Figure 39: "Change network information" 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.
- `Channel 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.
- `Constellation:` 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 button to add the transport stream.

Another table follows in which the NIT is listed with all entries.

NIT

Sort	Alias	TS-ID	ON-ID	Channel - Frequency	Constellation	Symbol Rate	Info	Remove (external TS)	Status
		1011	1	D306 - 306.0000 MHz	256 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1201	1	D314 - 314.0000 MHz	256 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1107	1	D322 - 322.0000 MHz	64 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1078	1	D330 - 330.0000 MHz	256 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1101	1	D338 - 338.0000 MHz	256 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1093	1	D346 - 346.0000 MHz	64 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
		1024	1	D354 - 354.0000 MHz	256 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry
	Kabel eins HD, BASIS 1	5700	156	D378 - 378.0000 MHz	64 QAM	6.9000 MSym/s	local		Ok
	MELODY, CSAT	1024	1	D394 - 394.0000 MHz	64 QAM	6.9000 MSym/s	local		Ok
	ZDF, ZDFvision	1079	1	D730 - 730.0000 MHz	64 QAM	6.9000 MSym/s	local		Ok
		1101	1	D370 - 370.0000 MHz	64 QAM	6.9000 MSym/s	external		No QAM Channel is configured for this entry

Figure 40: "NIT" table

Sort the entries by clicking on the corresponding arrow button in the "Sort" column. To delete an entry, activate the respective checkbox in the "Remove" column.

Submit Reset Form

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.
If you click on the "Refresh" button, all information in the table is updated.

"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:

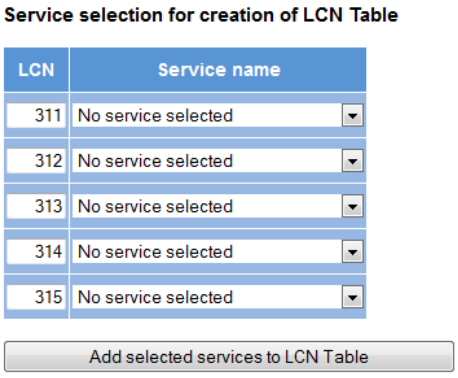


Figure 41: "Service selection for creation of LCN table" table

You can enter an LCN in the left column and select the preferred service from the drop-down menu 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 "Submit" button below the table which follows, the "LCN Table".

The "LCN Table" table follows. A list of all the services currently selected appears here. To delete an entry from the list, activate the checkbox for the respective service in the "Remove" column.

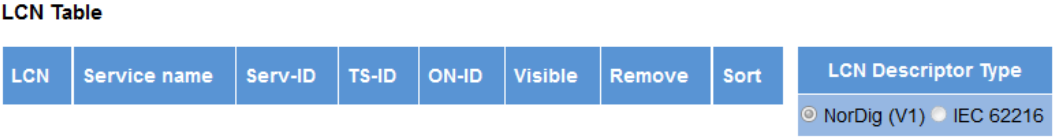


Figure 42: "LCN table" table

You can select the type of description for the table ("NorDig (V1)" or "IEC 62216") to the right of the LCN table. The descriptor corresponding to this standard is then generated in the NIT.
Activate the radio button which corresponds to your selection.

Click on the "Submit" button below the last table to save the changes.
Click on "Reset form" to restore the original settings.
If you click on the "Refresh" button, all information in the table is updated.

A selection of print views for the LCN table, the TV program overview and the radio program overview follows further down. Click on the respective button to have the print view displayed.

"SSL Settings" menu

HINWEIS: A licence is required to use the SSL functions.

To enter SSL settings, click on the item "SSL Settings" in the main menu at the left.

There is a checkbox in the upper table "SSL Settings" which displays the rerouting of HTTP requests to the secured version HTTPS. After input of the licence, the checkbox is activated.

Setting	Value
Redirect HTTP requests to HTTPS	☐

Figure 43: "SSL Settings" table

In the following table, "Generate a CSR for this device", individual items of information about the device can be entered ("Certificate Signing Request": address, organisation, etc.).

Generate a CSR for this device

CSR Attribute	Value
Private key in use	generated by device
Country (C)	DE
State (ST)	
Locality (L)	
Organization (O)	
Organizational Unit (OU)	
Common Name (CN)	192.168.1.153
Generate CSR with above data	Download CSR

Figure 44: "Generate a CSR for this device" table

By clicking the "Download CSR" button, you can create a "Certificate Signing Request" with which your CA can issue a certificate for the device. The input field "Private key use" shows you whether the device's own key, or the key which was entered and saved, is being used.

There is a third table, "Key and certificate settings", below this.

Key and certificate settings

Upload device key in PEM format	Durchsuchen... Keine Datei ausgewählt.	Upload key
Clear supplied key	Clear key	
Upload device certificate in PEM format	Durchsuchen... Keine Datei ausgewählt.	Upload certificate
Clear supplied certificate	Clear certificate	
Regenerate device key and certificate	Regenerate	

Submit Reset Form

Figure 45: "Key and certificate settings" table

"

Submit Reset Form

This table allows you to:

- Upload a device key (click on the "Search" button and select the preferred file; then click on the "Upload key" button)
- Delete an existing device key (click the "Clear key" button)
- Upload a device certificate (click on the "Search" button and select the preferred file; then click on the "Upload certificate" button)
- Delete an existing device certificate (click the "Clear certificate" button)
- Regenerate a device key and device certificate (click the "Regenerate" button)

If you change the activation or deactivation status of inputs or outputs in one of the two tables, then click on the "Submit" button below the last table to save your changes. Click on "Reset form" to restore the original settings.

The device administers two keys/pairs of certificates: "generated" and "user". The following figure shows which certificate and which key are used.

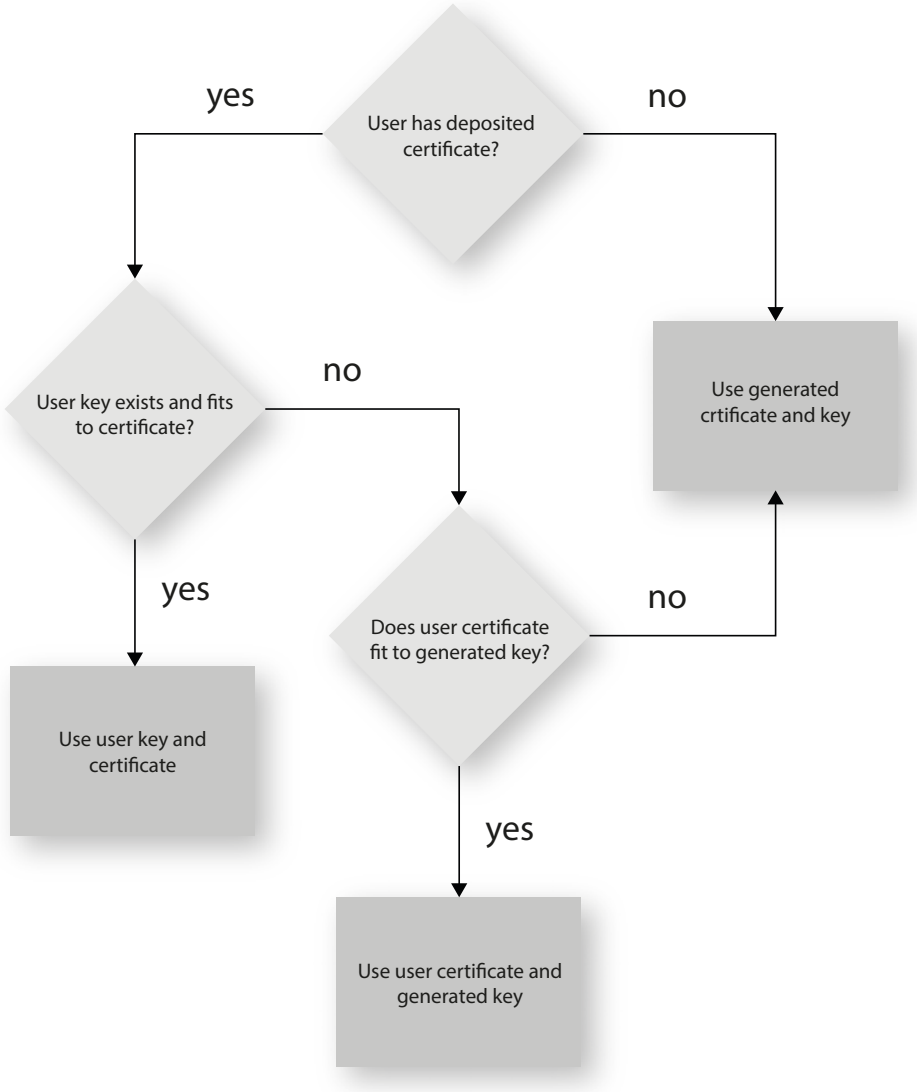


Figure 46: Using the certificates/keys

"User Settings" menu

Click on the menu item "User Administration" in the main menu at the left to have the corresponding input mask displayed. The input mask shown in figure 38 now appears.

Property	Username	New Password	Retype New Password	Delete
Admin account	admin			
User account 1	user			☐
User account 2	controller			☐
User account 3				☐
Timeout	5 minutes			
Name	ASTRO EdgeDecrpt U194			
Location	Headend in Cablecity			
Contact	John Doe, admin@example.com			

Figure 47: User administration

You can create up to four users for the user interface of the U 118. The following three users have been created as the default setting:

- ☐ user
- ☐ admin
- ☐ controller

The password 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. If the checkbox „Enforce password policy" is activated, a password must contain at least 8 characters and special types of characters.

To delete a user account, activate the corresponding checkbox `Delete` for the respective account in the right column of the table.

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.
- ☐ `Name, Location, Contact:` You can save a name for the system, the location and the contact data for a person in these input fields. They are displayed in the status line.
- ☐ `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 (tables) should only be possible after logging in.

Submit Reset Form

WICHTIG: All changes will only become effective after you have clicked on the "Submit" button below the input mask. Click on the "Reset Form" button to delete the input values again.

Another table follows in which you can enter information for a RADIUS server. A licence is also required for the RADIUS server function.

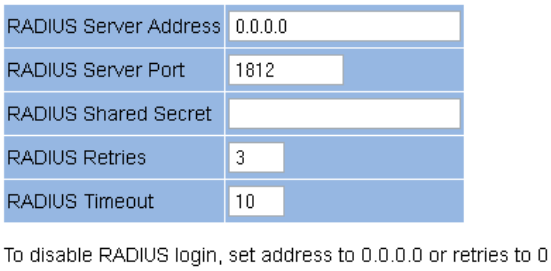


Figure 48: RADIUS administration

The following individual items of information can be entered:

- RADIUS Server Address
- RADIUS Server Port
- RADIUS Shared Secret
- RADIUS Server Retries
- RADIUS Server Timeout

HINWEIS: *Users that are configurated on the device will be deactivated when a RADIUS server is configurated!*
The RADIUS server must be configurated. Users with service type „Administrative" are administrators of the device.
When the checkbox „Enable Radius Login" is clicked, the RADIUS function is activated, if the RADIUS Server is accessible. If this is not the case,, the RADIUS function remains inactive and the following message appears: „RADIUS logins have not been enabled because the connection check failed".

You can create a white list for all incoming IP data in a further table. In this case, only IP data will be processed which come from a source entered in the white list.

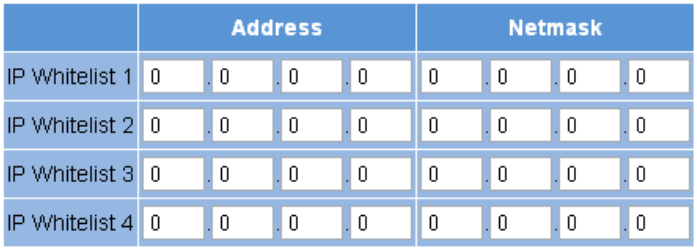


Figure 49: White list administration

The following parameters can be specified for four IP sources respectively:

- IP address
- Netmask

"TS Analyzer" menu

The U 118 can be equipped with a Transport Stream Analyzer by purchasing a licence. This Analyzer displays the structure of the MPEG2 TS, from the tables to the individual PID and its service. Click on the "TS Analyzer" submenu to access the selection of the transport stream for analysis. The following input mask now appears:

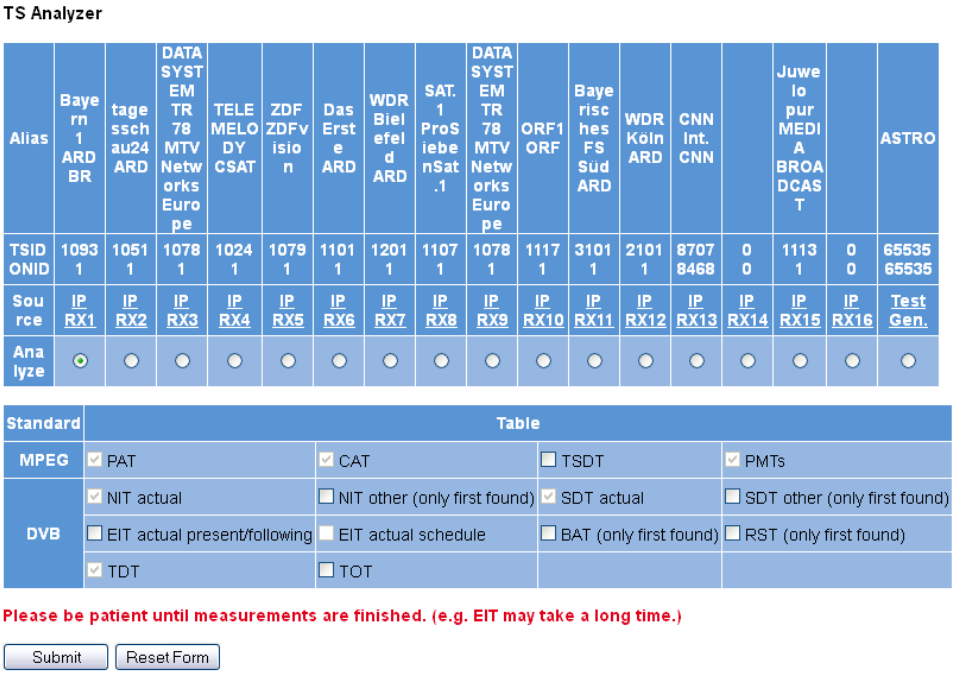


Figure 50: Transport stream analyzer

To analyse a transport stream, click on the corresponding radio button in the "Analyze" line and then click on the "Submit" button. If you wish to reset your inputs, click on the "Reset" button.

HINWEIS: The two buttons "Submit" and "Reset" are only visible when this module has been licensed. If this is not the case, the link "No licence" will appear instead. Click on this, or the item "Licence" in the menu at the left to access the "Licensing" input mask (more detailed explanation of this is found in the section "Licensing").

"Licensing" menu

A number of functions of the U 118 (e.g. the TS Analyzer) 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. Lic001772000222.txt).
To activate the functions, start by clicking on the "Licensing" item in the menu at the left. The following input mask now appears:

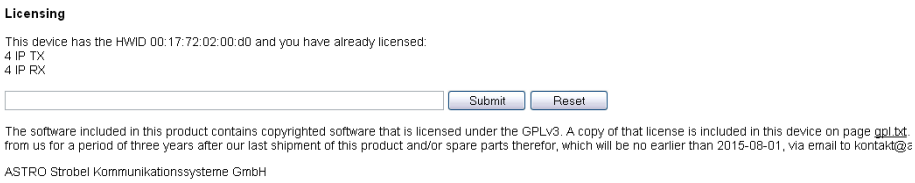


Figure 51: Enabling licences using the licence key

Now enter the licence key sent to you in the input field. The key or keys can be entered in the input mask using "Copy & Paste". Then click on the "Submit" button to transmit the text to the device. If the licence is valid, this is confirmed with the message "License is valid". An error message is displayed for an invalid licence.

To order additional licences, the MAC address of the device must be specified.
You will find the MAC address on the web browser interface in the "Licensing" submenu (HWID). After the MAC address has been submitted, the licence keys are generated by ASTRO are sent by e-mail or on a CD.

"Update/config." menu

The menu item "Update/config." allows you to update the firmware version of your device and upload and download a variety of configuration data.

Firmware update from a local memory 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 (U 118) and a four-digit version number.
Once the update archive has been downloaded, start by selecting the item "Update/Config." in the menu of the user interface. The "Software update" table then appears in the content area at the top.

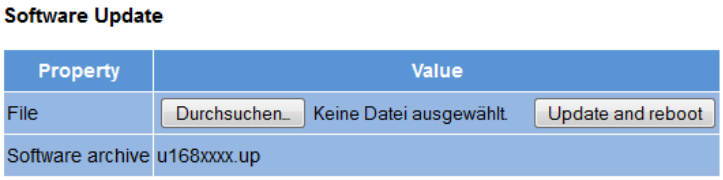


Figure 52: Firmware update

Now click on the "Search" button and select the path to the memory location of the update archive downloaded beforehand.
Then click on the "Update and Reboot" button to start the update process. Please wait for the process to be completed, and for the device to reboot.

Available Update Archives

The table tabelle „Available Update Archives" shows an overview update-archives already stored in the module (up to ten). Users can have access to older software versions (Installation or deleting).

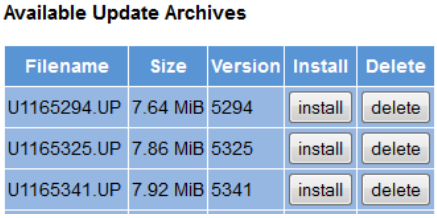


Bild 53: Firmware Update

Uploading and downloading configuration files

Figure 54: Loading/saving configuration files

Configuration files can be uploaded and downloaded.
To upload files, use the "Search" button to select the preferred file.
Then click on the "Upload" button to start the uploading process.
The following files are available for download:

- `System settings` (XML format)

Simply click on the corresponding file link to download the file.

Downloading configuration/status files

Config/status files (read only)

Property	Value
Module info	module.xml
IP configuration	ip.xml
System status	status.xml
System measurements	measure.xml

Figure 55: Loading status files

The following files are available for download:

- `Module info` (XML format)
- `IP configuration` (XML format)
- `System status` (XML format)
- `System measurements` (XML format)

Simply click on the corresponding file link to download the file.

Loading/saving firmware and configurations using (T)FTP

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

Firmware update and configuration via server

Property	Value
(T)FTP Server address	astro-firmware.de
Protocol	FTP TFTP
FTP Username (e.g. anonymous)	anonymous
FTP Password (e.g. guest)	•••••
Path	/Headend-Firmware/u1xx/
Version	
Mode	Please select

Figure 56: 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 individual actions are available for selection:

- "**Load config from server**" action: A configuration stored on the (T)FTP server is transmitted to the U 118 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 U 118.
- "**Save config to server**" action: The current configuration of the U 118 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.
- "**Load firmware from server**" action: If you select this action, you must specify the preferred software version under `Version` (a 4 character maximum applies). The software selected is written to the SD memory card, but will not be unpacked.
- "**Unpack *.up archive**" action: If you select this action, the update archive is unpacked and saved to the SD memory card (specify the version number).
- "**Update firmware from SD card**" action: If you select this action, the update archive is unpacked, saved to an SD memory card and programmed into the module (enter the version number).
- "**Overwrite backup firmware**" action: The device software is saved in two partitions. The software saved in the first partition is used for operating the module, while the second partition is used to keep a backup copy ready for the event that the update process fails. As long as both partitions are different, the information "Backup differs" will be displayed in the menu "Active Alarm Table". The current software is copied to the backup partition when this action is carried out.

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. "astro").
- `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.

"System Log" menu

To have the system log displayed, click on "System log" in the menu at the left. The following overview will now appear:

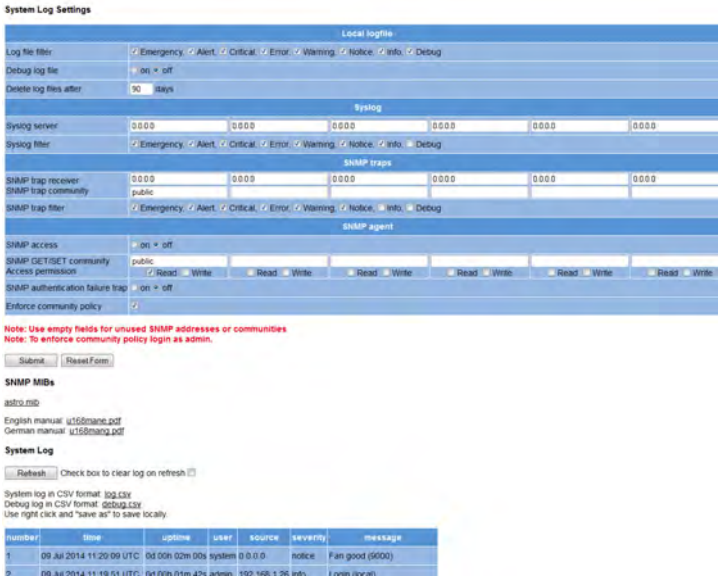


Figure 57: System log

You can check or configure the following parameters individually:

System log settings

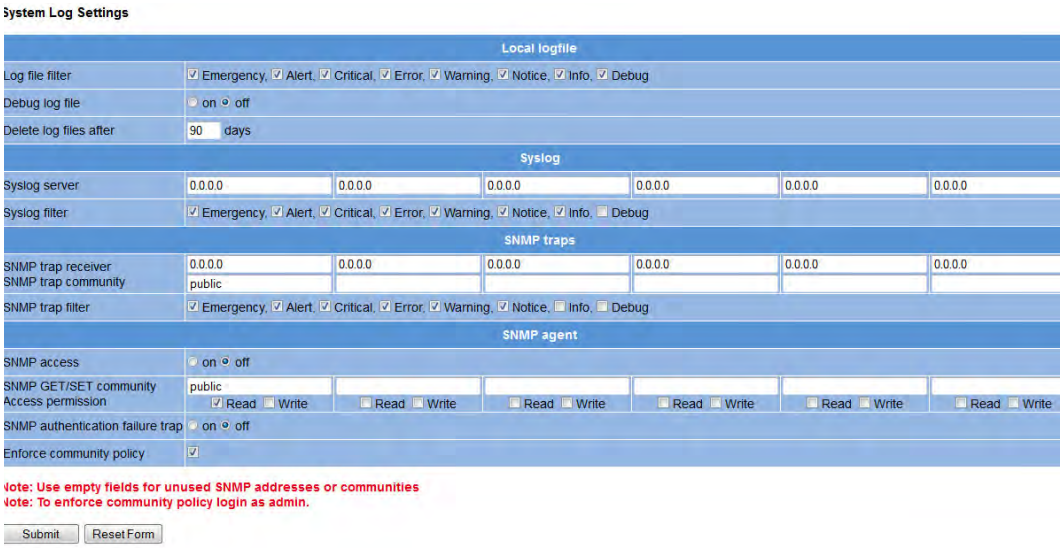


Figure 58: Filter settings for the system log display

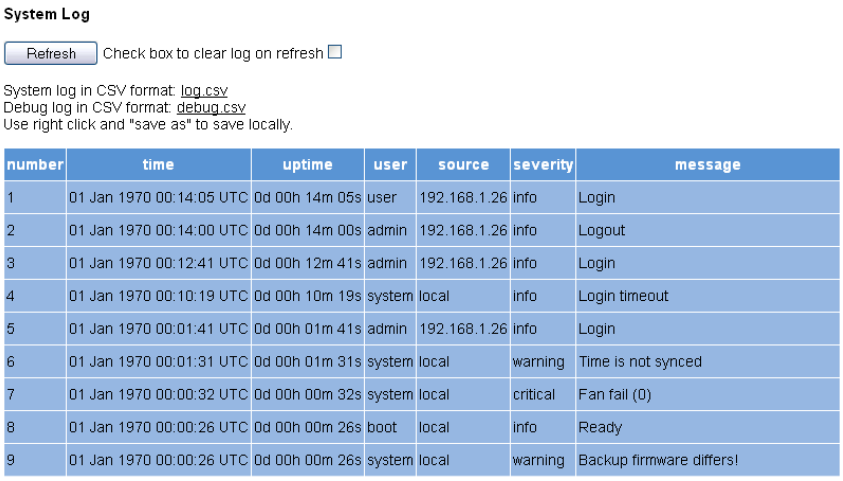
You can activate or deactivate filters for displaying the log entries here. To have messages from the corresponding category displayed, activate the checkbox allocated to the category.

HINWEIS: You can connect to higher-level management systems using the "Syslog" and "SNMP" parameters.

Management Information Base (MIB)

The NSMP MIBs available are stored on the device and can be downloaded by using the download link below the table "System Log Settings".

System log



System Log

Refresh Check box to clear log on refresh ☐

System log in CSV format: log.csv
Debug log in CSV format: debug.csv
Use right click and "save as" to save locally.

number	time	uptime	user	source	severity	message
1	01 Jan 1970 00:14:05 UTC	0d 00h 14m 05s	user	192.168.1.26	info	Login
2	01 Jan 1970 00:14:00 UTC	0d 00h 14m 00s	admin	192.168.1.26	info	Logout
3	01 Jan 1970 00:12:41 UTC	0d 00h 12m 41s	admin	192.168.1.26	info	Login
4	01 Jan 1970 00:10:19 UTC	0d 00h 10m 19s	system	local	info	Login timeout
5	01 Jan 1970 00:01:41 UTC	0d 00h 01m 41s	admin	192.168.1.26	info	Login
6	01 Jan 1970 00:01:31 UTC	0d 00h 01m 31s	system	local	warning	Time is not synced
7	01 Jan 1970 00:00:32 UTC	0d 00h 00m 32s	system	local	critical	Fan fail (0)
8	01 Jan 1970 00:00:26 UTC	0d 00h 00m 26s	boot	local	info	Ready
9	01 Jan 1970 00:00:26 UTC	0d 00h 00m 26s	system	local	warning	Backup firmware differs!

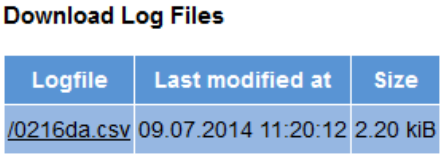
Figure 59: Logfiles

Click on the "Refresh" button to update the system log display. The entries in the system log are sorted chronologically according to the time at which the event occurred.
If you do not wish for the existing entries to be displayed after a refresh, activate the checkbox "Checkbox to clear log on refresh". Once the checkbox has been activated, after a refresh, the process of deleting the old log entries is listed as the first entry (specified the user account and the current time upon deletion).

You can also download the following logfiles:

- `System log` (CSV format)
- `Debug log` (CSV format)

Downloading log files



Download Log Files

Logfile	Last modified at	Size
/0216da.csv	09.07.2014 11:20:12	2.20 kiB

Figure 60: Downloading log files

A maximum of 2,500 lines is displayed in the "Log files" table. The complete log file can be downloaded from the "Download Log Files" table by clicking on the file name XX.csv.

"Alarm severities" menu

You can change the alarm settings for diverse parameters or deactivate the alarm display for a parameter, when preferred. To do so, click on the item "Alarm Severities" in the menu at the left. A set of tables for different parameter groups then appears:

Status of power supply, temperature, fan

Code	Message	emergency	alert	critical	error	warning	notice	info	debug	off
0x1000002	Temp 1 fail (%.1f)	○	○	◉	○	○	○	○	○	○
0x1000002	Temp 1 good (%.1f)	○	○	○	○	○	◉	○	○	○
0x1000003	Temp 2 fail (%.1f)	○	○	◉	○	○	○	○	○	○
0x1000003	Temp 2 good (%.1f)	○	○	○	○	○	◉	○	○	○
0x1000004	Temp 3 fail (%.1f)	○	○	◉	○	○	○	○	○	○
0x1000004	Temp 3 good (%.1f)	○	○	○	○	○	◉	○	○	○
0x1000005	Temp 4 fail (%.1f)	○	○	◉	○	○	○	○	○	○
0x1000005	Temp 4 good (%.1f)	○	○	○	○	○	◉	○	○	○
0x1000006	Fan fail (0)	○	○	◉	○	○	○	○	○	○
0x1000006	Fan good (%.0f)	○	○	○	○	○	◉	○	○	○
0x1000007	Supp 1.2 fail (%.2f)	○	○	◉	○	○	○	○	○	○
0x1000007	Supp 1.2 good (%.2f)	○	○	○	○	○	◉	○	○	○
0x1000008	Supp 1.5 fail (%.2f)	○	○	◉	○	○	○	○	○	○
0x1000008	Supp 1.5 good (%.2f)	○	○	○	○	○	◉	○	○	○
0x1000009	Supp 1.8 fail (%.2f)	○	○	◉	○	○	○	○	○	○
0x1000009	Supp 1.8 good (%.2f)	○	○	○	○	○	◉	○	○	○
0x100000a	Supp 2.5 fail (%.2f)	○	○	◉	○	○	○	○	○	○
0x100000a	Supp 2.5 good (%.2f)	○	○	○	○	○	◉	○	○	○
0x100000b	Supp 3.3 fail (%.2f)	○	○	◉	○	○	○	○	○	○
0x100000b	Supp 3.3 good (%.2f)	○	○	○	○	○	◉	○	○	○
0x1000010	Supp 5.2 fail (%.2f)	○	○	◉	○	○	○	○	○	○

Figure 61: Alarm Severities

The preset options for the alarm messages are identified by a green frame. Retaining these settings is recommended.

“Active alarms” menu

To have the “Active Alarm” table displayed, click on the corresponding item in the menu at the left. The following table now appears:

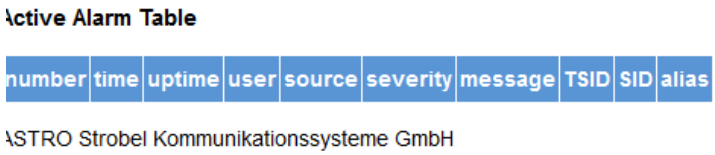


Figure 62: Active alarm table

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 have data transmission statistics for the U 118 displayed, click on the "Statistics" item in the menu at the left. All statistics relevant to the operation of the device and which can be used for analysis are displayed here. The following individual tables are displayed:

Ethernet bandwidth

Ethernet bandwidth

Property	Management A (eth0) 1G full	Management B (eth1) 1G full	Data A (eth2) 1G full	Data B (eth3) 1G full
Transmit	0.8 Mbit/s	0.0 Mbit/s	76.6 Mbit/s	76.6 Mbit/s
Receive	0.0 Mbit/s	0.0 Mbit/s	71.0 Mbit/s	70.9 Mbit/s

Figure 63: Ethernet bandwidth

The transmission rates for sending (transmit) and reception (receive) are specified for the respective interfaces Management A, Management B, Data A and Data B.

Ethernet frames

Property	Data A (eth2) 1G	Data B (eth3) 1G
Total frames sent by host	19	19
Total frames sent to host	284	272
Total exception frames sent to host	87	0
Total errored frames received	0	0
Total frames discarded by deencapsulator	108776	130563
Total frames discarded because of lack of buffers	0	0
Total transmit frames generated from IP TX 1 / per sec.	2792023 / 3214	2792023 / 3214
Total transmit frames generated from IP TX 2 / per sec.	3071235 / 3535	3071235 / 3535
Total transmit frames generated from IP TX 3 / per sec.	91130 / 103	91130 / 103
Total transmit frames generated from IP TX 4 / per sec.	91130 / 103	91130 / 103
Total receive frames forwarded to IP RX 1 / per sec.	2814153 / 3214 2814152 / 3214 0 / 0	2814150 / 3214 2814149 / 3214 0 / 0

Figure 64: Ethernet frames

The following parameters are displayed for the interfaces Data A and Data B, in this order:

- The number of IP frames transmitted to the processor is specified in the first three lines of the table.
- Number of defective frames.
- Number of frames which could not be allocated.
- Number of frames which could not be allocated due to exceeding the total buffer depth.
- The number of frames transmitted per transport stream in total or per second is displayed in lines 7 to 10 for each IP transmitter.
- The number of frames forwarded to the IP receiver (primary, secondary and tertiary respectively) are displayed in the last line.

Ethernet RX

Channel	Encap	TS Rate	Buffer depth	FEC	Valid	Missing	Fixed	Duplicate	Reordered	Out of range
IP RX1	1328 bytes 7 packets RTP/UDP/IP	33.8 Mbit/s Mult. PCR	0 Frames 0.0 % 0.0 ms	none	2744031	0	0	0	0	0

Refresh Check box to clear statistics on refresh ☐

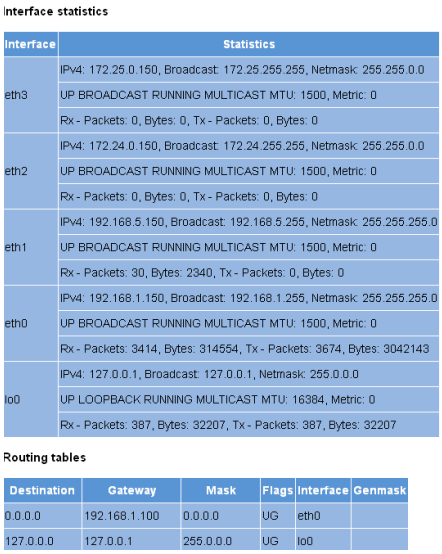
Figure 65: Ethernet RX

The following parameters are displayed for the individual IP receivers:

- `Encap:` The number of bytes in the IP payload for each frame is specified in the upper line; below this, the number of TS packets per frame is displayed. The lower line specifies whether the transmission occurs by UDP / IP or TRP / UDP / IP. The transmission protocol is selected under the menu item "IP RX" in the table line "Encapsulation".
- `TS Rate:` The net data rate is specified in the upper line; the lower line displays whether the transport stream includes one, or a multiple, PCR. This setting can be made under the menu item "IP RX" in the table "Channel settings", line "Bit rate".
- `Buffer depth:` The absolute buffer depth is displayed in the upper line (number of frames); below this, the relative buffer depth (in %) is displayed. The buffer depth is displayed in relation to the transport stream rate in the third line.
- `FEC:` If an RTP data stream is being used, the FEC configuration detected is displayed here. Prerequisite for this is that FEC has been activated in the "IP RX" menu (radio button "ON").
- `Valid:` Total number of valid IP frames.
- `Missing:` Total number of IP frames not received (is only measured when RTP is used).
- `Fixed:` When Forward Error Correction (FEC) is activated, missing or defective frames can be restored. The number of frames which were restored is displayed.
- `Duplicate:` The number of IP frames received several times (is only displayed when RTP is used).
- `Reordered:` The number of IP frames arriving in the wrong order, but which were able to be switched back due to a sufficient buffer depth (is only displayed when RTP is used).
- `Out of range:` The number of IP frames arriving in the wrong order and which could not be switched back due to an insufficient buffer depth.

"Network" menu

To have the network settings displayed, click on "Network" in the menu at the left. The following overview will now appear:



Interface statistics

Interface	Statistics
eth3	IPv4: 172.25.0.150, Broadcast: 172.25.255.255, Netmask: 255.255.0.0
	UP BROADCAST RUNNING MULTICAST MTU: 1500, Metric: 0
	Rx - Packets: 0, Bytes: 0, Tx - Packets: 0, Bytes: 0
eth2	IPv4: 172.24.0.150, Broadcast: 172.24.255.255, Netmask: 255.255.0.0
	UP BROADCAST RUNNING MULTICAST MTU: 1500, Metric: 0
	Rx - Packets: 0, Bytes: 0, Tx - Packets: 0, Bytes: 0
eth1	IPv4: 192.168.5.150, Broadcast: 192.168.5.255, Netmask: 255.255.255.0
	UP BROADCAST RUNNING MULTICAST MTU: 1500, Metric: 0
	Rx - Packets: 30, Bytes: 2340, Tx - Packets: 0, Bytes: 0
eth0	IPv4: 192.168.1.150, Broadcast: 192.168.1.255, Netmask: 255.255.255.0
	UP BROADCAST RUNNING MULTICAST MTU: 1500, Metric: 0
	Rx - Packets: 3414, Bytes: 314554, Tx - Packets: 3674, Bytes: 3042143
lo0	IPv4: 127.0.0.1, Broadcast: 127.0.0.1, Netmask: 255.0.0.0
	UP LOOPBACK RUNNING MULTICAST MTU: 16384, Metric: 0
	Rx - Packets: 387, Bytes: 32207, Tx - Packets: 387, Bytes: 32207

Routing tables

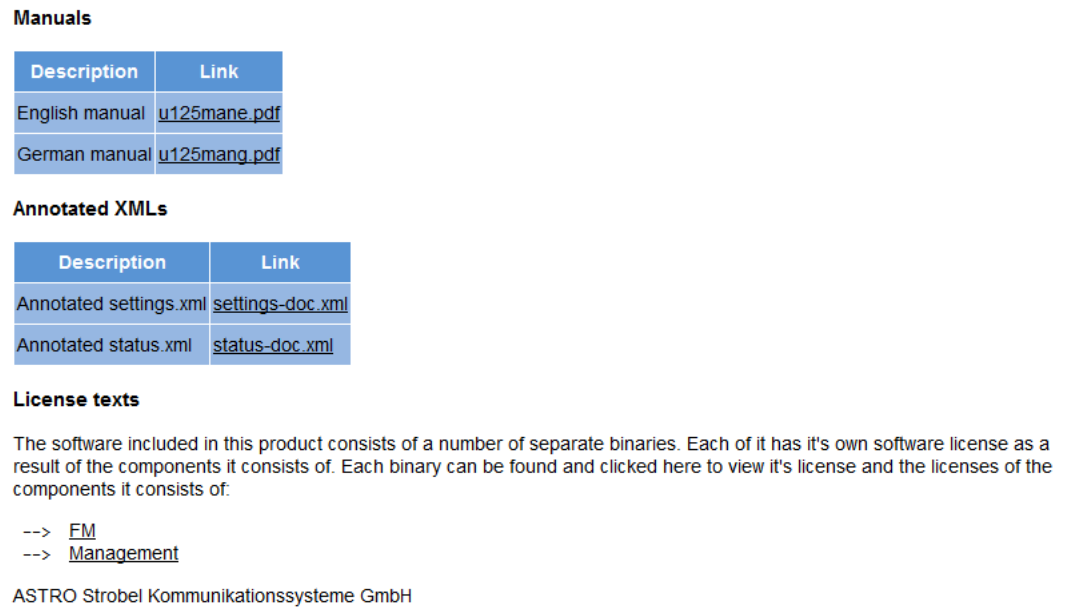
Destination	Gateway	Mask	Flags	Interface	Genmask
0.0.0.0	192.168.1.100	0.0.0.0	UG	eth0	
127.0.0.0	127.0.0.1	255.0.0.0	UG	lo0	

Figure 66: Network settings

The detailed interface statistic properties which are displayed are for information purposes only, and are used to describe the network. They could be useful for customer service in the event of a fault.

„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 66: 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 160
Order number		380 160
EAN-Code		4026187161088
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-C2 demodulator		
Input interface		Transportstream
Coding Modes		static
FEC		LDPC, BCH
Interleaving		Bit, time and frequency
Modulation		OFDM
Bandwidth	[MHz]	16
Guard interval		1/64 or 1/128
Modulation schemes		16 QAM to 4096 QAM
FEC Frame		64 800 bits or 16 200 bits
Data Slices		1-3
Physical Layer Pipes		Single PLP per Data Slice
Narrowband Notches		☑
Broadband Notches		☑
RF modulator		
Connectors	[Ω]	75, 2 x F-jack
Frequency range	[MHz]	47 - 862
RF output level	[dBµV]	114
Return loss	[dB]	> 14
Spurious frequency distance	[dB]	> 60
Common data		
Current consumption at 48 V	[mA]	680
Power consumption at 36 - 60 V	[W]	28 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

ASTRO Strobel Kommunikationssysteme GmbH

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