



Part of **axing** group

CHP – Compact High Performance Headends

**MK-800H | MK-806H | MK-1600H |
MK-1606H**

DVB Headend

Operation instructions



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WARNING

- Please observe the safety instructions supplied with the device! These are also available at the following web address: https://download.axing.com/BAs/Sicherheitshinweise_9sprachig.pdf
- Use the device exclusively as described in this operating manual and, in particular, in accordance with the state of the art. No warranty is provided if the device is used for other purposes!



AXING AG hereby declares that the products marked comply with the applicable directives.



WEEE No. DE26869279 | Dispose of electrical and electronic components separately, not with general waste.

1. Product description

1.1. Field of application

The devices are only suitable for in-house distribution of RF signals. No warranty is provided if the devices are used for other purposes.

1.2. General

1.2.1. DVB/IPTV hybrid headend

MK 16-00H	16 independent multi-tuner inputs Transmodulates 16 × DVB-S/S2/S2X/T/T2/C to 16 × DVB-C/-T and 512 × SPTS
MK 16-06H	Same as MK 16-00H, but with 6 CI slots
MK 8-00H	8 independent multi-tuner inputs Transmodulates 16 × DVB-S/S2/S2X/T/T2/C to 8 × DVB-C/-T and 512 × SPTS
MK 8-06H	Same as MK 8-00H, but with 6 CI slots

1.2.2. Common features:

- Output modulation configurable
- Remux | Cross-multiplex
- NIT editing capability
- PID filtering
- Interface for CASimulcrypt Server¹
- Class A in accordance with EN 50083-2
- Web-based configuration, compatible with AXING SMARTPortal
- Supports SNMPv1 and SNMPv2c
- Suitable for wall mounting or as a 19" unit

1.3. Contents

1 × compact headend
1 × power cable
1 × Quick Start Guide
1 × Safety instructions

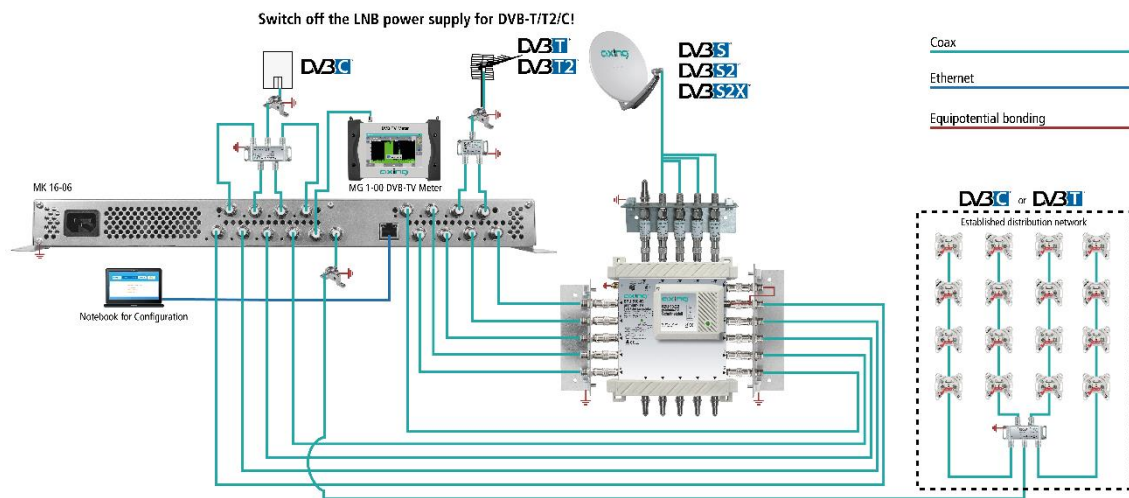
1.4. Available accessories

MKS 1-02	Software extension for CASimulcrypt
MKS 8-16	Software extension for 16 muxes output for MK-80xH.

¹ Software extension MKS 1-02 is required

1.5. Inputs

The MK 16/8-0xH with multituners can receive DVB-S/S2/S2X, DVB-T/T2 or DVB-C. The multituner inputs can also receive signals from a single-cable LNB or multiswitch.



⚠ CAUTION

To receive DVB- T/T2 or DVB-C, you must switch off the LNB power supply before connecting an aerial cable to the RF inputs (see page19).

1.6. Demodulation of the data stream

The tuners select the reception frequency and demodulate the data stream.

Using the remux method, the channels can be filtered from the data stream as required.

Using the cross-multiplexing method, FTA (Free-to-Air) channels can be filtered from the data streams of multiple tuners and rebundled into a single output channel.

The processed data stream is passed on to the modulators.

1.7. Output/Modulators

The **MK-160xH** has 16 output modulators. The MK-80xH has 8 output modulators and 16 output modulators with license option MKS 8-16.

All output modulators can be set to any output channel (DVB-C = S2...K87 | DVB-T = S2...K69). The ability to set a frequency offset allows any centre frequency within the output frequency range to be configured, beyond the stored channel table.

Up to 512 SPTS can be selected as the output transport stream. With SPTS, a programme is assigned to each transport stream.

1.8. Graphical user interface

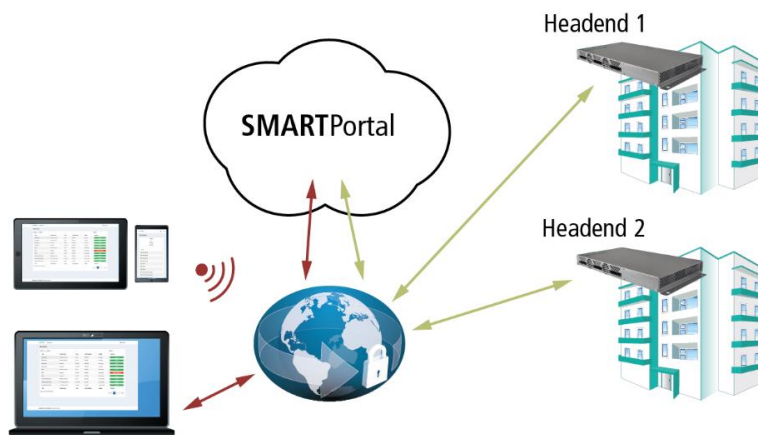
Settings are configured via a graphical user interface. To access the user interface, you will need a standard PC or laptop with a network interface and the latest version of a web browser installed (left).



The configuration interface is 'Mobile Ready' and can therefore also be used from a smartphone or tablet (right).

1.9. SMARTPortal

The AXING SMARTPortal connects every AXING headend to a cloud-based portal, thereby providing worldwide access to the devices. The connection is password-protected and encrypted. The only on-site requirement is an internet connection for the headend, e.g. via LAN, EoC, 3G/LTE router (e.g. on 2.6, page 12).

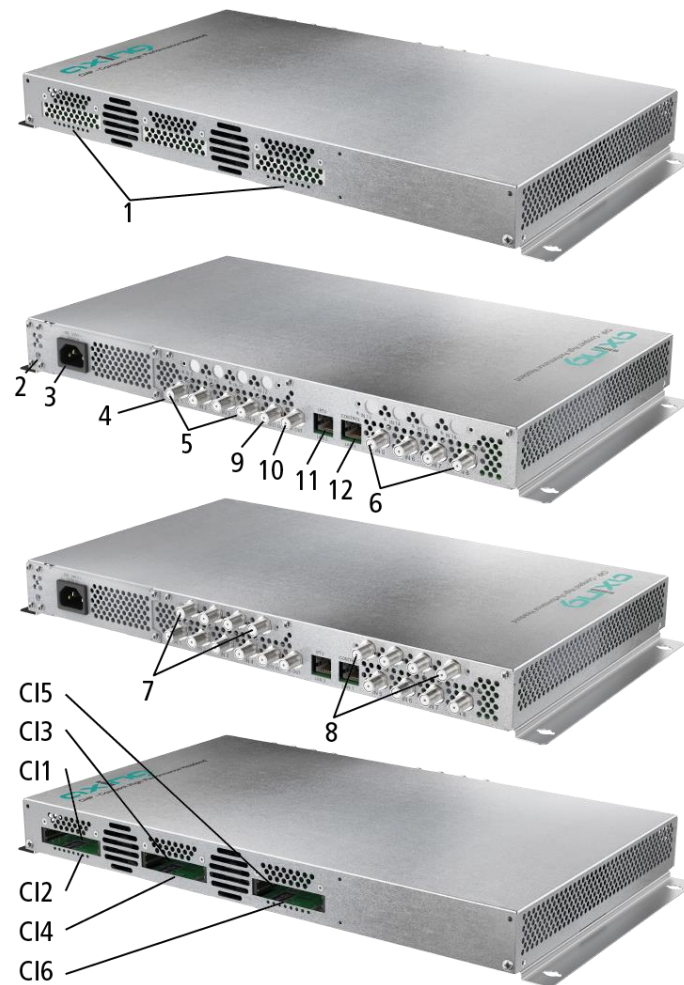


The SMARTPortal allows settings to be configured or software updates to be carried out from anywhere. In the event of problems or at the customer's request, support and fault analysis can also be provided by AXING Support.

In addition, the SMARTPortal also sends error messages to a configured email address. This makes monitoring the devices simple and secure. Error messages occur, for example, in the following cases:

- Power failure
- Processor temperature > 90 °C
- Fan temperature > 50 °C
- Power supply temperature > 85 °C
- Loss of input signal
- CAM error (only devices with CI)
- Modulator overflow
- RF output level does not match the settings

1.10. Display elements and connections



- 1 16 LEDs for output modulators
 - Green = Modulation OK
 - Flashing green = No data stream at the output (no input signal, tuner not configured, no programme configured for output)
 - Red = Modulator level too high
- 2 Equipotential bonding terminals
- 3 Mains connection
- 4 16 HF input LEDs:
 - Yellow = MPEG data stream present,
 - Off = MPEG data stream not present
- 5 RF inputs 1 to 4
- 6 RF inputs 5 to 8
- 7 RF inputs 9 to 12
- 8 RF inputs 13 to 16
- 9 Test port (-30 dB)
- 10 RF output
- 11 IPTV output
- 12 Control interface for configuration and CAS server

The MK 16-06H has 6 CI slots (CI1...CI6). The settings for the CA modules can be configured in the CI menus on the home screen of the user interface.

1.11. Application Notes

You can find application notes on the installation and configuration of RF/AXING headends on the AXING website. <https://axing.com/service/application-notes/>

2. Installation and connection

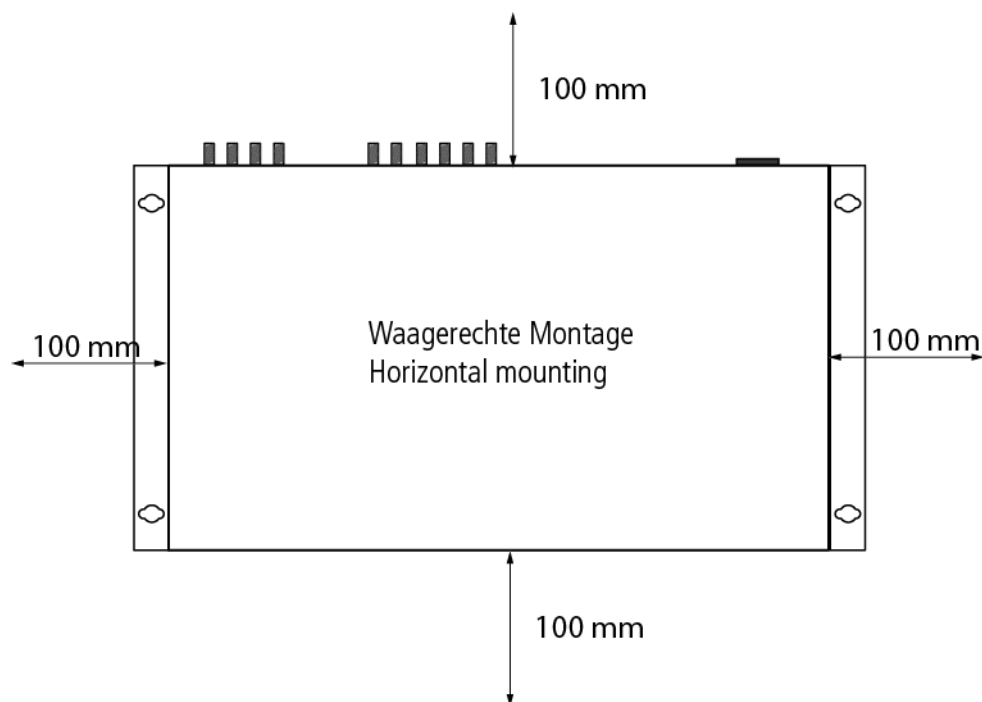
The compact headends can either be wall-mounted or installed in a 19" rack.

- ➔ Installation and connection must only be carried out by authorised electricians.
- ➔ Disconnect the mains plug before installation and connection (1)!
- ➔ The antenna system must be installed in accordance with EN 60728-11 and earthed accordingly.
- ➔ The device must only be operated indoors.
- ➔ Install the device in accordance with the safety regulations of standard EN 60728-11.

2.1. Wall mounting

The compact headends are fitted with wall brackets as standard.

Notes: For thermal reasons, it is strongly recommended that the unit be mounted horizontally with the connections facing upwards. The headend must be mounted with at least 10 cm of clearance on all 4 sides.

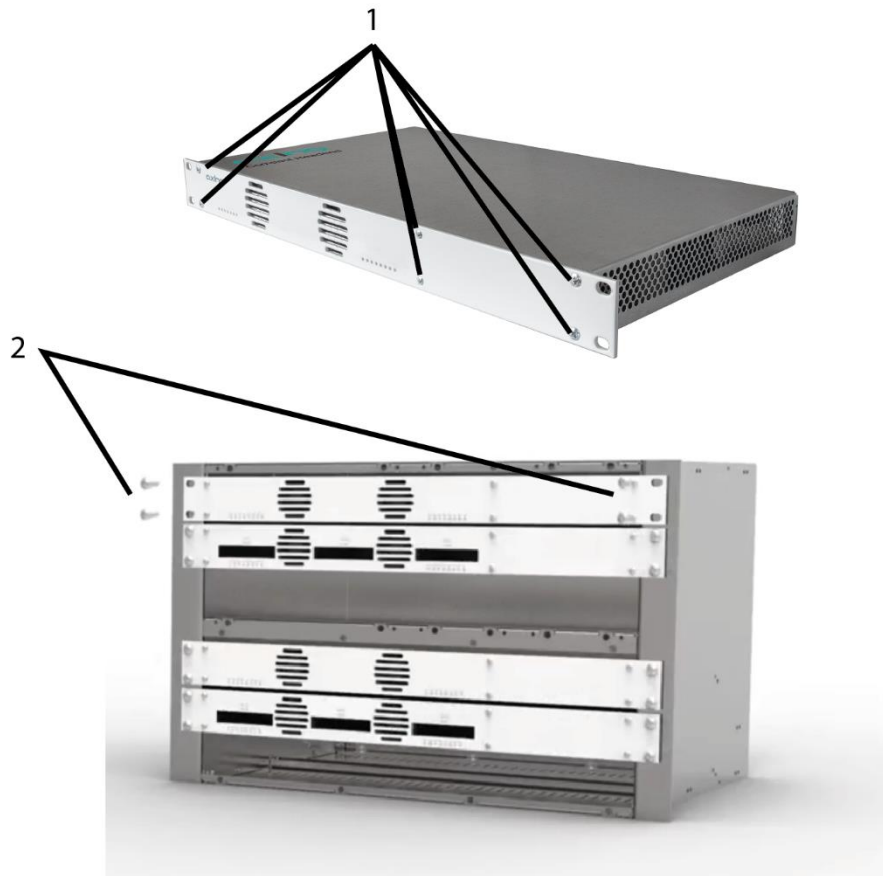


- ➔ Install compact headends on a vertical, flat surface (any unevenness must be levelled out if necessary).
- ➔ Secure the headend to the wall using at least four 4 × 30 mm screws.

2.2. Installation in a 19-inch rack

Note: For 19-inch rack mounting, there must be at least 5 cm of clearance in front of and behind the unit.

- ➔ Remove the wall bracket from the headend housing
- ➔ Fit the MKZ 1-0x front panel to the headend (1).



- ➔ Slide the headend into the 19" rack.
- ➔ Secure the headend with four screws (2).
- ➔ Install the unit in accordance with the safety regulations of standard EN 60728-11.

2.3. Equipotential bonding

The headend must be connected to the equipotential bonding in accordance with EN 60728-11.

- ➔ Use the equipotential bonding terminal on the unit.
- ➔ To connect the outer conductor of the coaxial cables to the equipotential bonding, use, for example, QEW earthing brackets or CFA 7-01 earthing blocks at the input and output.

2.4. Power supply

The headend has a built-in power supply.

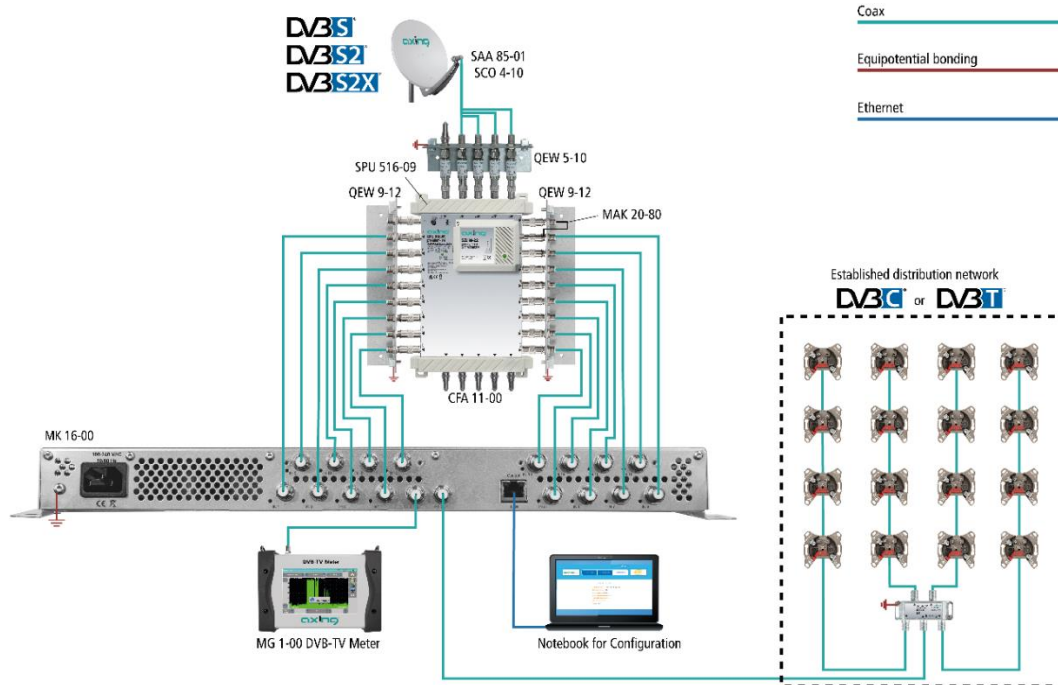
- ➔ Connect the headend to a mains socket using the supplied mains cable.

2.5. RF connection

The input levels for the DVB standards must be observed (see chapter 8 on page 65).

2.5.1. Connection to DVB-S/S2/S2X

Via multiswitch (recommended)



Multiswitches can be used as input splitters. The advantage of this solution is that both the satellite IF level and the satellite itself can be configured via the user interface. Changes to the channel list can be made on-site without the need to modify or reconfigure the input distribution.

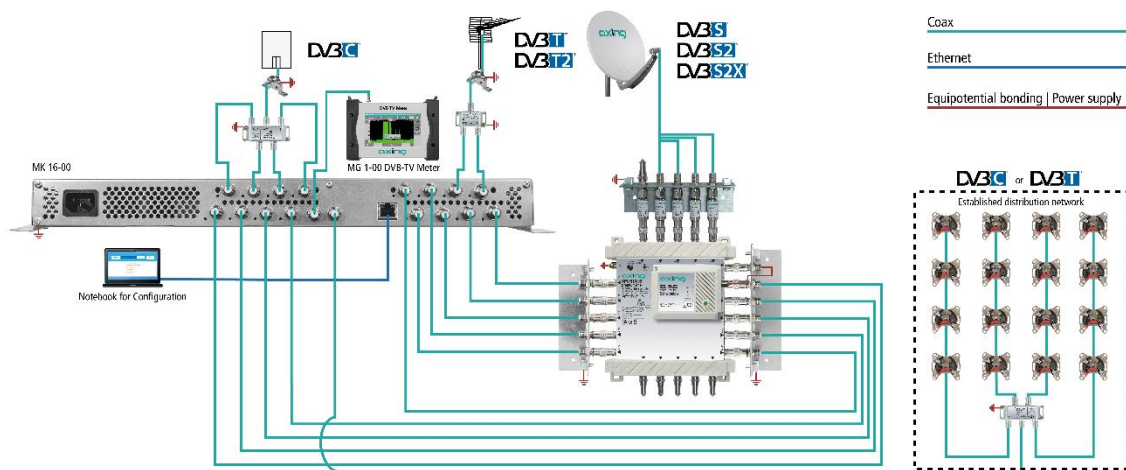
Direct connection to the LNBs

The devices feature a remote power supply for the LNB at the inputs, as well as DiSEqC 1.0 functionality. The inputs can be connected directly to the LNB.

2.5.2. Connection to DVB-T/T2 or DVB-C



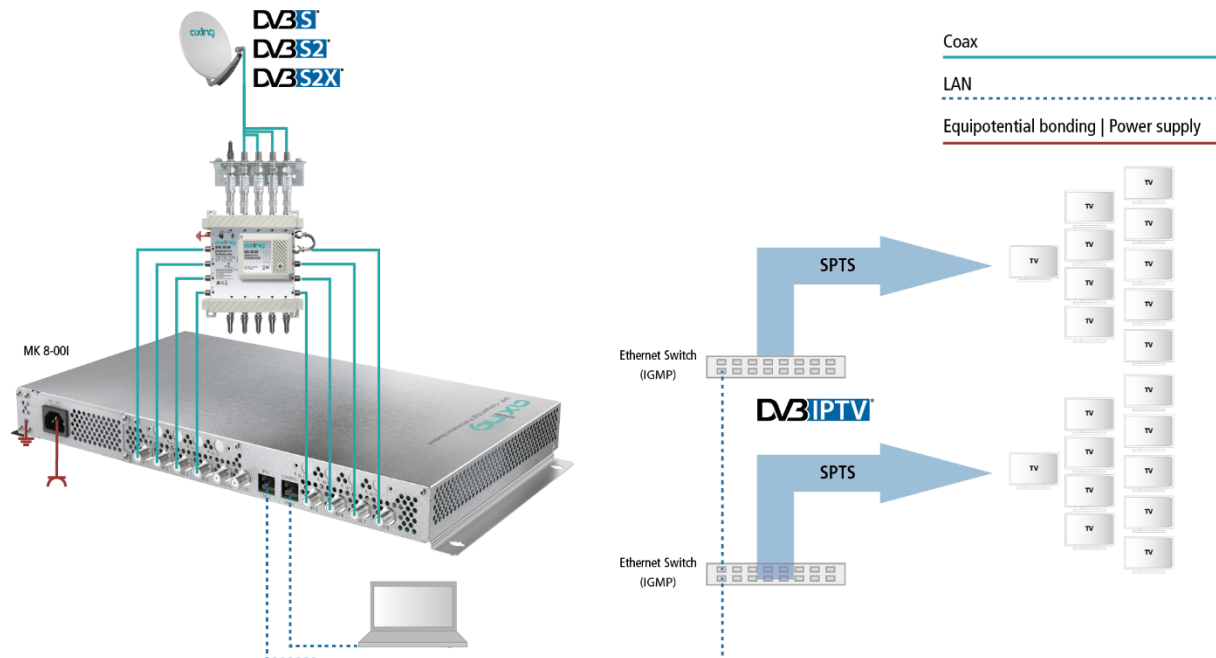
Before connecting an aerial cable, you must switch off the LNB power supply (see section '0' on page19). Active DVB-T aerials must be supplied with DC power externally.



2.5.3. RF output

- ➔ Connect the (RF OUT) output to the existing distribution network. Use a highly shielded coaxial cable with an F-type connector for this.
- ➔ If you are using multiple headends, the outputs must be connected to suitable combiners.

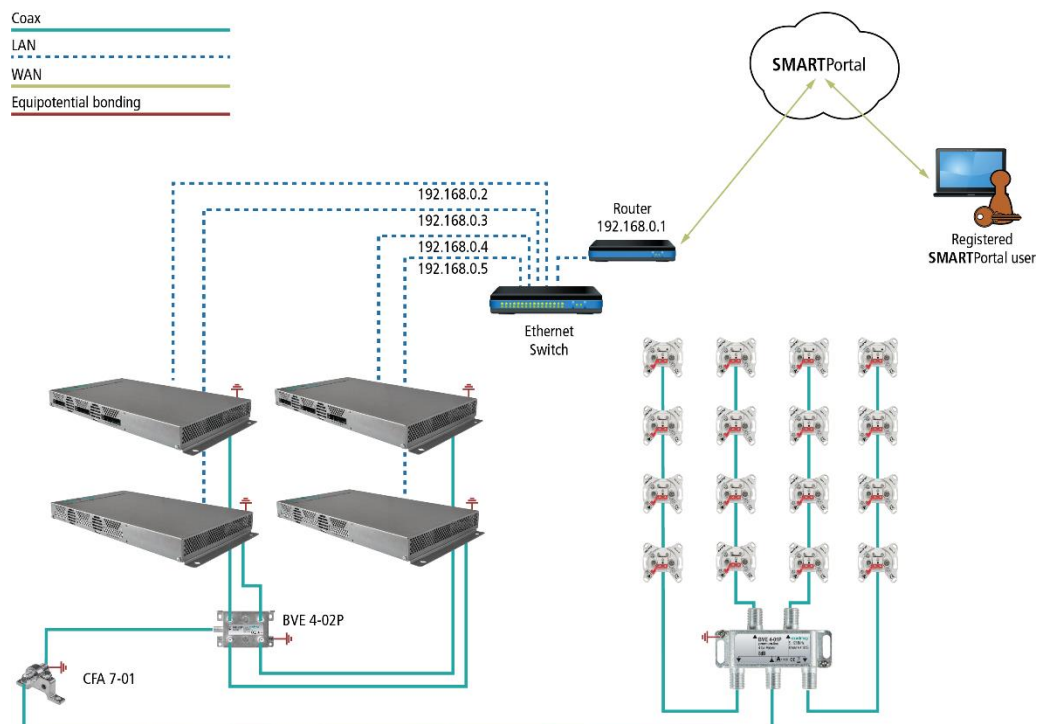
2.6. Connection to an IPTV network



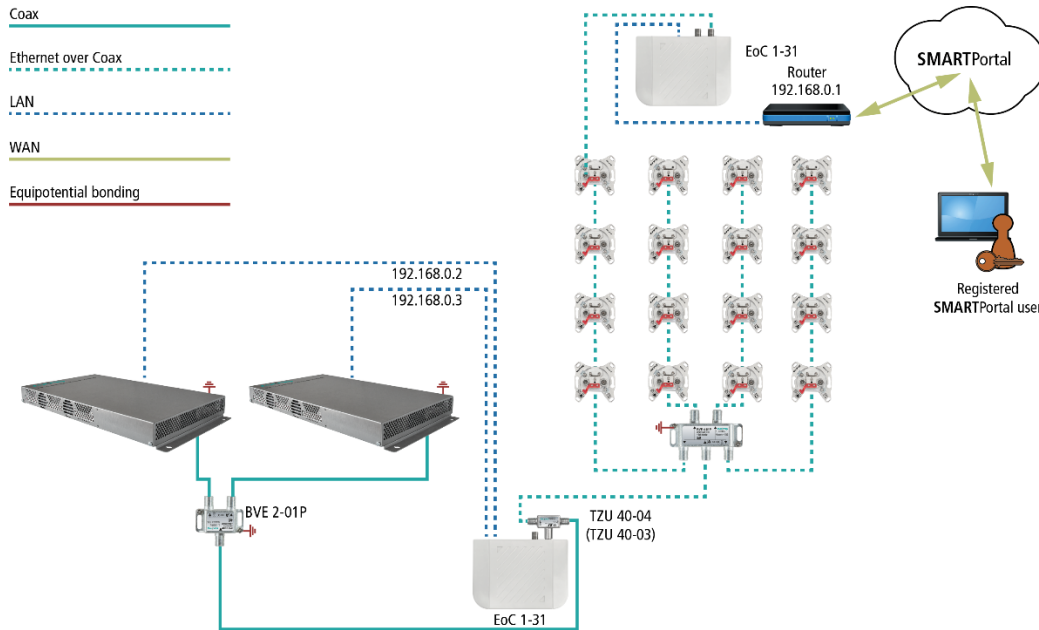
- ➔ Connect the device's IPTV output to an IGMP-enabled Ethernet switch.
- ➔ Use Cat 7 cable or higher.

2.7. Internet connection options

2.7.1. Connection to a router via an Ethernet switch



2.7.2. Connection to a router via Ethernet over Coax

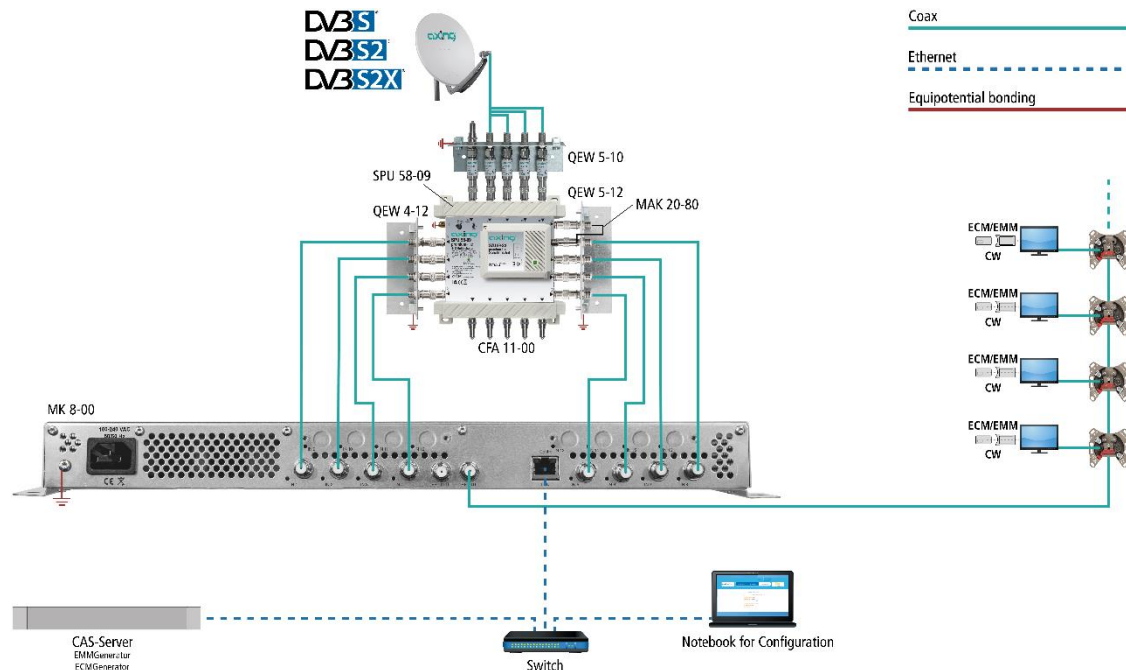


2.8. Connection to a CAS server (with MKS 1-02)

The headend can be connected to a CAS server. The connection can be established via the Control interface.

Prerequisites:

- A suitably configured CAS server must be available.
This is not part of the headend, nor is the CAS server described in this document.
- A valid licence must be installed for the headend (see 6.12 on page 56).
- The headend must be configured accordingly (see 6.13 on page 58).



Once the headend is connected to the CAS server and correctly configured, it can encrypt programmes. The encrypted programmes can be decrypted by connected subscribers with the appropriate CA modules/smartcards.

3. Configuration

The devices are configured via the graphical user interface of the integrated web interface.

To access the user interface, you will need a standard PC or laptop with a network interface and the latest version of a web browser installed. To connect the headend's network interface to the computer, you will need a standard network cable.

Communication takes place via the HTTP protocol, which enables remote maintenance of the systems via the internet from various locations worldwide. Access is protected by a password prompt.

IP address:	192.168.0.145
Subnet mask:	255.255.255.0

The computer and the headend must be on the same subnet. The network portion of the computer's IP address must be set to 192.168.0. and the subnet mask must be set to 255.255.255.0.

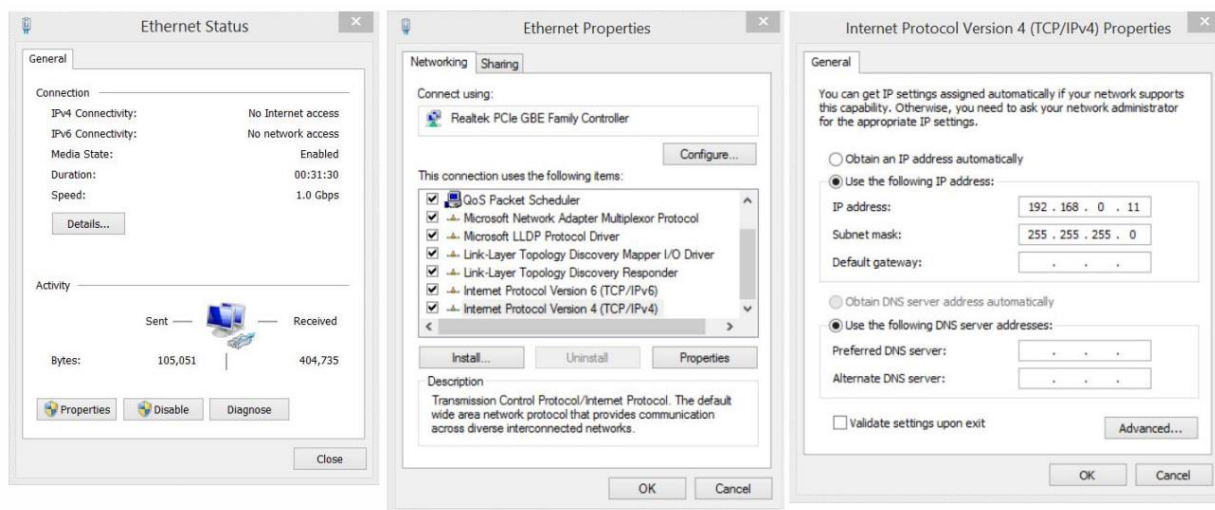
The host portion of the network address is responsible for identifying the devices and can only be assigned once within the subnet. For the computer, you can assign a host address between 1 and 254 that has not yet been assigned.

Tip

Change your computer's IP address and subnet mask accordingly (e.g.: IP address: 192.168.0.11 and subnet mask: 255.255.255.0).

Control Panel > Network Connections > LAN Connection > Properties >

Internet Protocol Version 4 (TCP/IPv4) > Properties > Use the following IP address:

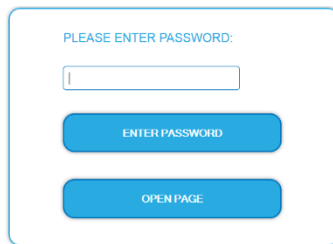


➔ Click OK to save.

➔ Launch your web browser and enter the headend's IP address: e.g. 192.168.0.145.

3.1. Login and logout

The user interface is protected against unauthorised access. When accessing the user interface, you will first be prompted for a password.



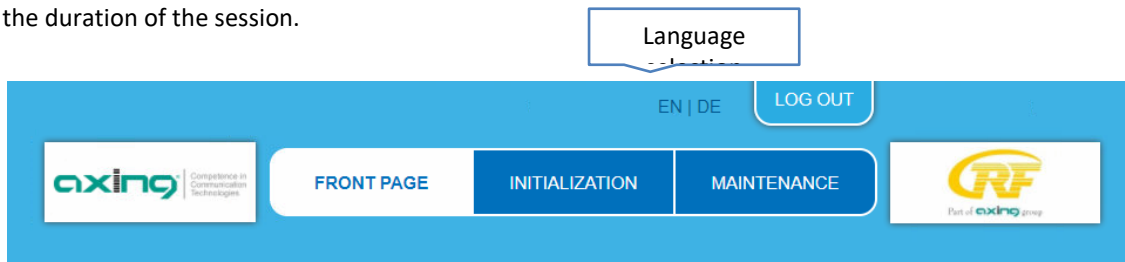
PLEASE ENTER PASSWORD:

ENTER PASSWORD

OPEN PAGE

- ➔ Enter the factory-set password: *Ramsen8262*
- ➔ Click on ENTER PASSWORD.
- ➔ If you are not automatically redirected to the home page, click OPEN PAGE.

The default language for the user interface is English. The language of the user interface can be changed in the header of the page. You can choose between German (DE) and English (EN). The language selected here applies for the duration of the session.



- ➔ To log out, click on LOG OUT (or LOG OUT if you have not switched to German).

Notes:

- If the browser is closed without first logging out, you will be automatically logged out after approximately 2.5 minutes.
- If the browser window remains open, you will not be automatically logged out. This allows you to monitor the system via the web browser.

Change password:

- ➔ Change your password immediately after initial commissioning and ensure it is sufficiently secure. Keep this password in a safe place.
- ➔ Menu item: MAINTENANCE > SET NEW PASSWORD (see 6.3.2 on page 44).

Change IP address:

The headends can be integrated into a network if required. For this application, changes must be made to the network configuration.

Menu item MAINTENANCE > SYSTEM OPTIONS.

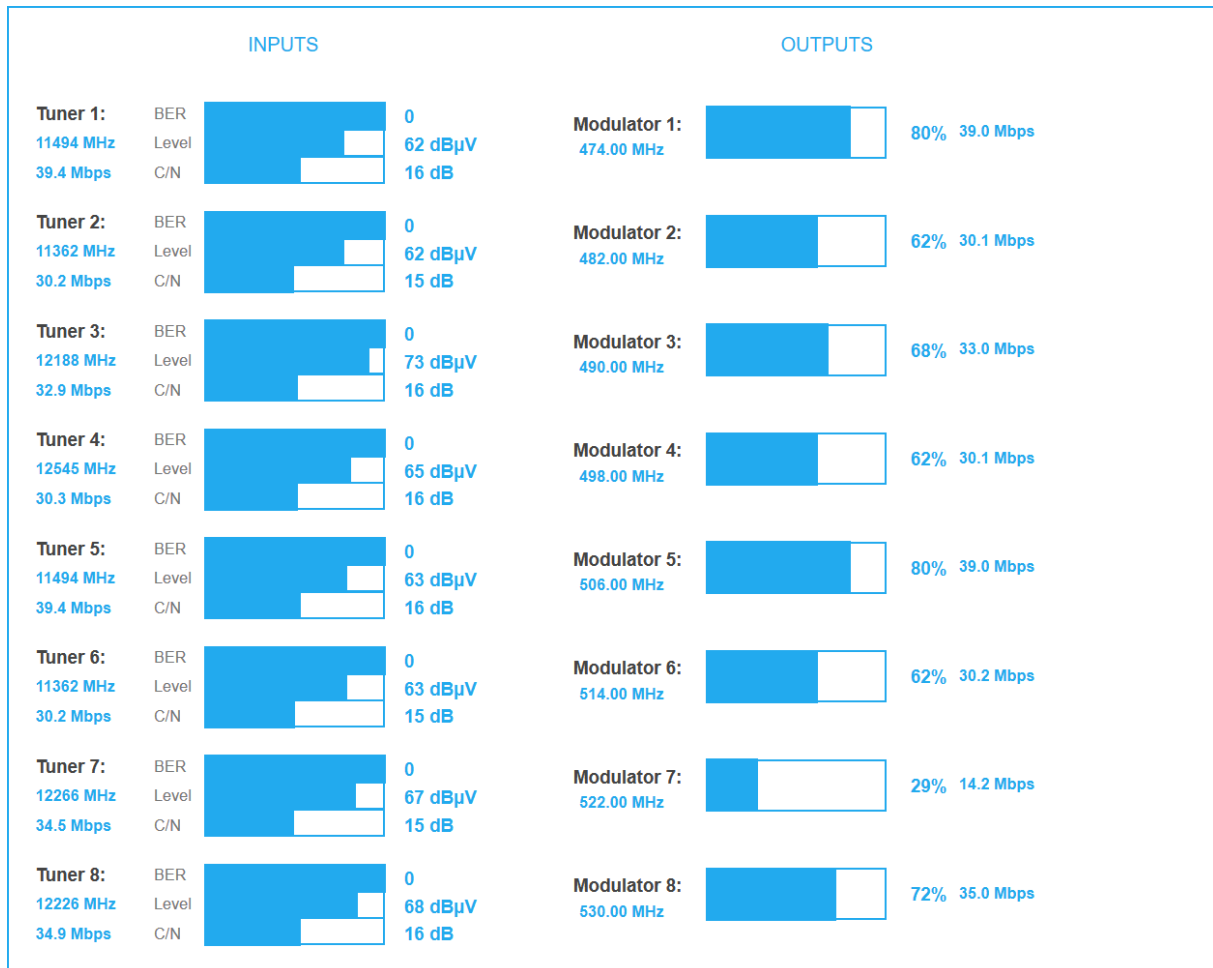
3.2. Home page

The home screen displays the information essential to the system's operation. The key factors are the signal quality at THE INPUT and the load on the modulators at THE OUTPUT.

3.2.1. Input

The bit error rate (BER) is displayed for all tuners. The number of erroneous bits is calculated per 1,000,000 transmitted bits.

In addition, the input level and the C/N ratio are displayed.



3.2.2. Output

The modulator FILL LEVELS are displayed on the right-hand side. A 100% modulator fill level corresponds to the maximum net data rate of the output channel.

If the maximum fill level is exceeded, this may lead to picture interference, such as mosaic patterns.

The data rate of the transmitters may vary depending on the image content and transmission quality. To ensure interference-free reception, it is essential to maintain a reserve.

We recommend a maximum fill level of 90%.

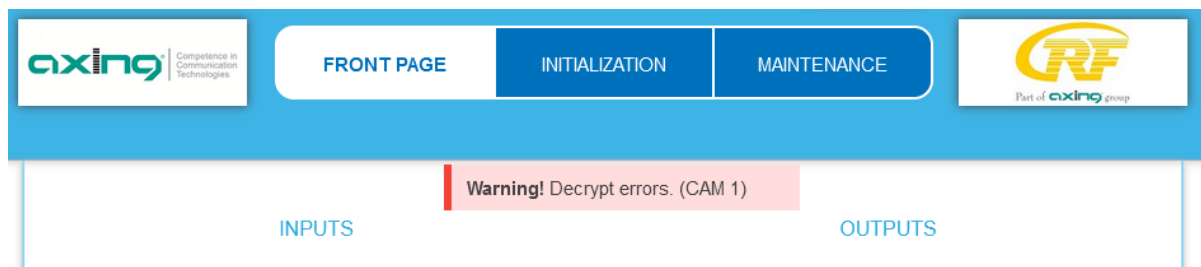
From a fill level of 95% upwards, this is displayed in red.



The number of selected channels (see 4.2 on page 21) and the configuration of the modulators (see 4.3 on page 33) influence the fill level.

3.2.3. Alarms

If alarms, warnings or messages from the headend are active, these are displayed on the home page after logging in.

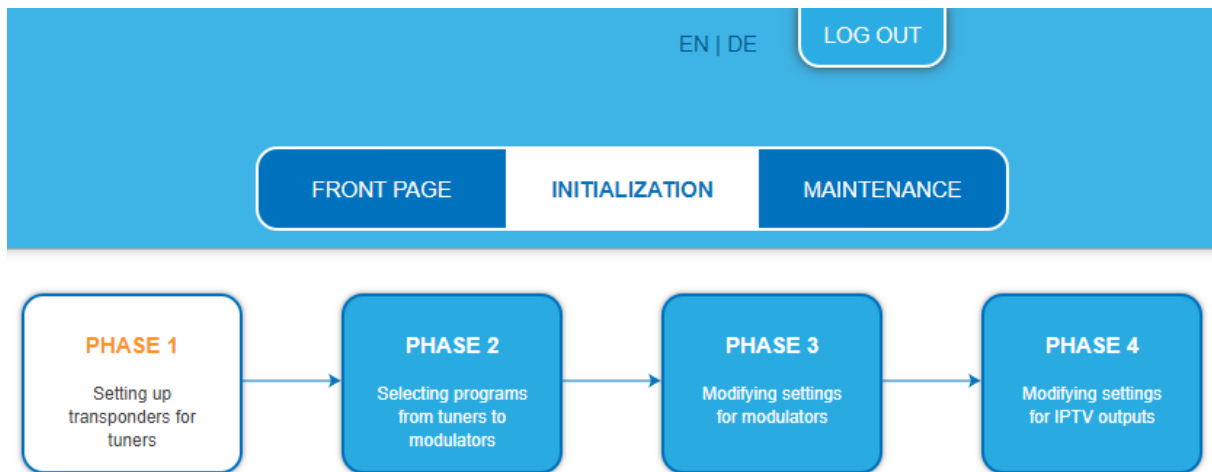


The example shows a warning regarding CA module 1.

4. Initialization

4.1. Initialization – Phase 1

➔ Select INITIALIZATION from the main menu.



In the first phase of initialisation, the tuner settings required for the channel search are configured and the channel search is carried out. The tuners operate independently of one another and according to the same principle. Phase 4 and the associated settings are only visible if IPTV operation is enabled.

4.1.1. DVB- S/S2 /S2X

➔ Select a tuner using the TUNER 1...8/12/16 button.

TUNER 1 - TRANSPONDER SETTINGS ☒ Tuner enabled

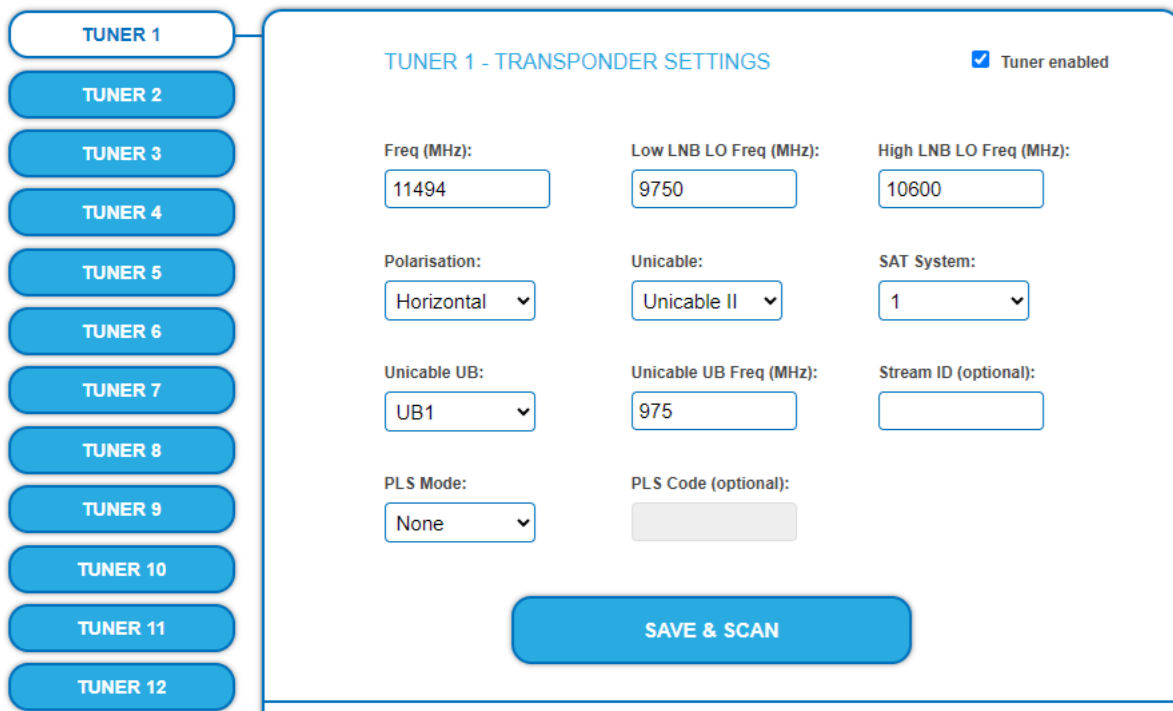
Freq (MHz): 11494	Low LNB LO Freq (MHz): 9750	High LNB LO Freq (MHz): 10600
Polarisation: Horizontal	Unicable: Off	DiSEqC: 1
LNB Power: On	Stream ID (optional): 	PLS Mode: None
PLS Code (optional): 		

SAVE & SCAN

- ➔ Enter the transponder frequency in the **Freq (MHz)** input field.
The frequency must be ≥ 1300 MHz, otherwise an error message will appear.
- ➔ The **Low LNB LO Freq (MHz)** and **High LNB LO Freq (MHz)** input fields refer to the LNB's oscillator frequencies in the low and high bands. The oscillator frequencies are set to 9750 MHz for the low band and 10600 MHz for the high band by default.
- ➔ The **Polarisation** select menu is used to switch between horizontal and vertical.

- ➔ The **Unicable** select menu is used to specify whether the SAT signal is a single cable signal and which single cable standard is used (Single Cable I, EN 50494 or Single Cable II, EN 50607). The settings menu changes slightly and is supplemented by a few radio buttons (see figure below).
- ➔ Use the **DiSEqC** select menu to switch off the DiSEqC control signals or, for a DiSEqC-compatible multiswitch, to select between positions 1 to 4. Only visible if the **Unicable** select menu is set to **Off**.
- ➔ Use the **LNB Power** select menu to switch the supply voltage for the LNB on or off.
- ➔ To receive multi-streams, set the **PLS Mode** to Root or Gold and enter the correct **Stream ID** (three digits) and the **PLS code** (six digits).
- ➔ Then click SAVE & SCAN.
A rotating circle is displayed during the search.

Connection to a single-cable LNB or single-cable multiswitch



- ➔ Use the **SAT System** select menu to select the required SAT system. Up to four SAT systems are possible.
- ➔ Use the **Unicable UB** select menu to select the user band ID.
- ➔ Use the **Unicable UB Freq (MHz)** input field to set the corresponding UB frequency.

4.1.2. DVB-C, DVB-T or DVB-T2



CAUTION

Before connecting an antenna cable, you must switch off the LNB power supply.

- ➔ Use the TUNER 1...16 button to select a tuner.
- ➔ In the **LNB Power** field, select the **Off** option!
- ➔ In the **Freq (MHz)** field, enter the centre frequency of the receive channel as a whole number (see table below). The frequency must be between 46 and 1002 MHz; otherwise, an error message will appear.

TUNER 1

TUNER 2

TUNER 3

TUNER 4

TUNER 5

TUNER 6

TUNER 7

TUNER 8

TUNER 1 - TRANSPONDER SETTINGS

☒ Tuner enabled

Freq (MHz):

Low LNB LO Freq (MHz):

High LNB LO Freq (MHz):

Polarisation:

DiSeqC:

LNB Power:

Stream ID (optional):

PLS Mode:

PLS Code (optional):

SAVE & SCAN

Channel	Input	Channel	Input	Channel	Input	Channel	Input
S 21	306	21	474	41	634	61	794
S 22	314	22	482	42	642	62	802
S 23	322	23	490	43	650	63	810
S 24	330	24	498	44	658	64	818
S 25	338	25	506	45	666	65	826
S 26	346	26	514	46	674	66	834
S 27	354	27	522	47	682	67	842
S 28	362	28	530	48	690	68	850
S 29	370	29	538	49	698	69	858
S 30	378	30	546	50	706		
S 31	386	31	554	51	714		
S 32	394	32	562	52	722		
S 33	402	33	570	53	730		
S 34	410	34	578	54	738		
S 35	418	35	586	55	746		
S 36	426	36	594	56	754		
S 37	434	37	602	57	762		
S 38	442	38	610	58	770		
S 39	450	39	618	59	778		
S 40	458	40	626	60	786		
S 41	466						

Note: Non-integer centre frequencies of channels with a 7 MHz bandwidth are rounded down to the nearest lower number. For example, the centre frequency of channel 5 is 177.5 MHz; the input is therefore 177.

Note: All other input fields are irrelevant. The multituner automatically detects the modulation type and all other parameters relevant to reception.

- ➔ To receive multi-streams, set the PLS mode to Root or Gold and enter the correct stream ID (three digits) and the PLS code (six digits).
- ➔ Then click CONFIRM AND SCAN.
A rotating circle is displayed during the search.

4.1.3. Bit error rate

The BIT ERROR RATE is displayed in the central area. The number of erroneous bits is calculated from 1,000,000 transmitted bits.

BIT ERROR RATE

Tuner 1: 0

4.1.4. Found programs

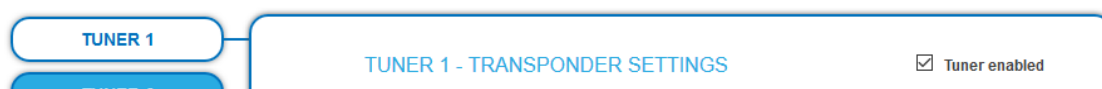
After a successful scan, the radio and TV channels are displayed in the FOUND PROGRAMS section.

FOUND PROGRAMS

Program Name	Type	Encryption
Das Erste HD	TV	FTA
arte HD	TV	FTA
SWR BW HD	TV	FTA
SWR RP HD	TV	FTA

4.1.5. Disabling a tuner

If a tuner is not required, it can be deactivated. The tuner will then no longer search for channels. In Phase 2 and in the channel list, which can be printed as a PDF, no channels will be displayed for the tuner.



- ➔ Select a tuner using the Tuner 1...16 button.
The **Tuner enabled** checkbox is selected by default.
- ➔ To disable a tuner, uncheck the '**Tuner enabled**' box.
- ➔ Then click SAVE & SCAN.
This will disable the tuner.

4.2. Initialization - Phase 2

- ➔ Click on PHASE 2 to proceed to the channel selection.

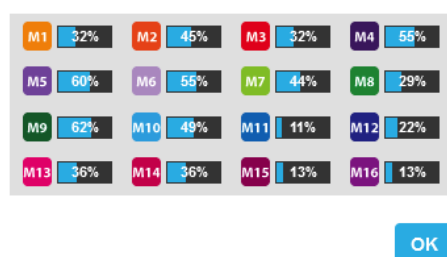


The channels found are listed by tuner. After the channel search in Phase 1, no channels are initially activated. In the **Modulator** column, there are coloured buttons labelled M1 to M16. These buttons correspond to the modulators at the headend. By clicking the relevant buttons in the tables, channels can be activated or deactivated.

Important:

- ➔ After making changes, click SAVE CHANGES.
Only then will the changes be saved and applied.
- The more programmes you assign to a modulator, the higher its data rate becomes. When saving, the fill levels of the individual modulators are therefore displayed.

Modulator fill:



→ Check the fill levels and click OK.

4.2.1. Remux mode

If the **network ID** is set to **auto**, the device is in REMUX MODE. In this mode, the IDs of the set transponders and satellites are adopted and forwarded unchanged to the modulators. The **TS ID1** to **TS ID16** of the modulators are then also set to **auto**.

COLOR CODES

M1 = Modulator 1
M2 = Modulator 2
M3 = Modulator 3
M4 = Modulator 4
M5 = Modulator 5
M6 = Modulator 6
M7 = Modulator 7
M8 = Modulator 8
M9 = Modulator 9
M10 = Modulator 10
M11 = Modulator 11
M12 = Modulator 12
M13 = Modulator 13
M14 = Modulator 14
M15 = Modulator 15
M16 = Modulator 16

TRANSPORT STREAMS AND NETWORK

TS ID1: M1 auto	TS ID2: M2 auto	TS ID3: M3 auto
TS ID4: M4 auto	TS ID5: M5 auto	TS ID6: M6 auto
TS ID7: M7 auto	TS ID8: M8 auto	TS ID9: M9 auto
TS ID10: M10 auto	TS ID11: M11 auto	TS ID12: M12 auto
TS ID13: M13 auto	TS ID14: M14 auto	TS ID15: M15 auto
TS ID16: M16 auto	Network ID: auto	

Network Name: Region:

ADVANCED OPTIONS REMUX MODE

SAVE CHANGES

CANCEL CHANGES

Note:

- If the device is in CROSS MULTIPLEX MODE, enter the value 'auto' in the **Network ID** field.
- Enter network name
- Select region to ensure EIT/EPG functionality
- Click SAVE CHANGES.
The device switches to REMUX MODE.

Selecting programs

In remux mode, each tuner is permanently assigned to a modulator. The tuner's programs can only be assigned to the assigned modulator.

→ For example, click on the M1 modulator buttons in the TUNER 1 table.

The programme is assigned to Modulator 1. The modulator button is highlighted in colour (clicking again cancels the assignment. The modulator button fades).

→ Select the desired programs for TUNER 1 to TUNER 16

→ Channel selection for IPTV is carried out via the IPTV column (visible only if IPTV operation is enabled)

→ Click SAVE CHANGES.

The programme assignments are saved in the device.

Assign programs to modulator

Select programs for IPTV

TUNER 1

Input mode: Default

Modulator								IPTV	LCN	Program Name	Type	Encryption	Decrypt
M1	M2	M3	M4	M5	M6	M7	M8	☒		Das Erste HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16	☒		arte HD	TV	FTA	no
M1	M2	M3	M4	M5	M6	M7	M8	☒		SWR BW HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16	☒		SWR RLP HD	TV	FTA	no

4.2.2. Cross Multiplex Mode

Cross-multiplex mode is used:

- to split transponders
- to combine programmes from several transponders into a single output channel

This makes better use of the available transmission capacity.

COLOR CODES

- M1 = Modulator 1
- M2 = Modulator 2
- M3 = Modulator 3
- M4 = Modulator 4
- M5 = Modulator 5
- M6 = Modulator 6
- M7 = Modulator 7
- M8 = Modulator 8
- M9 = Modulator 9
- M10 = Modulator 10
- M11 = Modulator 11
- M12 = Modulator 12
- M13 = Modulator 13
- M14 = Modulator 14
- M15 = Modulator 15
- M16 = Modulator 16

TRANSPORT STREAMS AND NETWORK

TS ID1: M1 1	TS ID2: M2 2	TS ID3: M3 3
TS ID4: M4 4	TS ID5: M5 5	TS ID6: M6 6
TS ID7: M7 7	TS ID8: M8 8	TS ID9: M9 9
TS ID10: M10 10	TS ID11: M11 11	TS ID12: M12 12
TS ID13: M13 13	TS ID14: M14 14	TS ID15: M15 15
TS ID16: M16 16	Network ID: 01	ONID: 02

Network Name: Axing
Region (PDS): Central Europe (0x28)

ADVANCED OPTIONS
CROSS MULTIPLEX MODE

➔ Change the **network ID** to a value greater than zero.

➔ Enter network name

➔ Select region to ensure EIT/EPG functionality

➔ Click SAVE CHANGES.

The transport stream IDs **TS ID1** to **TS 16** are automatically incremented from 1 to 16. Cross-multiplex mode is activated.

The network ID is automatically entered in the ONID (Original Network ID) field by default. The ONID can be entered manually here if necessary.

Important:

If you are using multiple MK headends in a network, the network IDs must be the same and the network name should also be the same. Transport stream IDs, on the other hand, may only be assigned once in the network.

Combining programmes in shared modulators

In cross-multiplex mode, the assignment of tuners to modulators is disabled.

Programs assigned to Modulator 2

TUNER 1					
Input mode: DEFAULT					
Modulator	LCN	Program Name	Type	Encryption	Decrypt
M1 M2 M3 M4 M5 M6 M7 M8		Das Erste HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					
M1 M2 M3 M4 M5 M6 M7 M8		arte HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					
M1 M2 M3 M4 M5 M6 M7 M8		SWR BW HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					
M1 M2 M3 M4 M5 M6 M7 M8		SWR RP HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					

TUNER 2					
Input mode: DEFAULT					
Modulator	LCN	Program Name	Type	Encryption	Decrypt
M1 M2 M3 M4 M5 M6 M7 M8		ZDF HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					
M1 M2 M3 M4 M5 M6 M7 M8		zdf_neo HD	TV	FTA	no
M9 M10 M11 M12 M13 M14 M15 M16					

→ For example, click on M2 in the Modulator column.

The channels are assigned to Modulator 2.

Splitting the channels of a transponder

If there are too many programmes on a single transponder. In this case, the programmes can be split across several modulators.

Programs from a transponder, split across two modulators (M1, M2)

TUNER 1												
Input mode: STANDARD												
Modulator		LCN	Programmname	Typ	Verschlüsselung	Entschlüsselung						
M1	M2	M3	M4	M5	M6	M7	M8		Das Erste HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16					
M1	M2	M3	M4	M5	M6	M7	M8		arte HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16					
M1	M2	M3	M4	M5	M6	M7	M8		SWR BW HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16					
M1	M2	M3	M4	M5	M6	M7	M8		SWR RP HD	TV	FTA	no
M9	M10	M11	M12	M13	M14	M15	M16					

→ For example, select modulator M1 for two channels and modulator M2 for two channels.

4.2.3. Select input mode

For each tuner, an input mode can first be selected in the **Input mode** drop-down menu.

TUNER 1															
Input mode: DEFAULT ?															
Modulator								LCN	Program	Type	Encryption	Decrypt			
M1	M2	M3	M4	M5	M6	M7	M8	1	Das Erste	TV	FTA	no ☐			
M9	M10	M11	M12	M13	M14	M15	M16								
M1	M2	M3	M4	M5	M6	M7	M8	4	BR Fernsehen Süd	TV	FTA	no ☐			
M9	M10	M11	M12	M13	M14	M15	M16								

- **Default**
Channels can be assigned to the respective modulators in Remux mode or distributed across different modulators in Cross-Multiplex mode
- **Select all**
Every channel on the tuner is activated for the modulator. If this option is enabled, no settings can be made in the LCN, Decryption, etc. columns.
- **Transmodulator**
The programmes and information (PIDs, NIT, etc.) are passed on 1:1 from the tuner to the modulator; nothing is changed
Important: In Transmodulator input mode, no changes can be made to the programmes, such as LCN, programme name, etc.

4.2.4. LCN (Logical Channel Numbering)

The LCN function allows for individual channel number assignment for the TV set's channel search.

- The connected TV sets must support the LCN function.
 - **The maximum number of LCNs per modulator is 63.**
 - Different LCN standards can be set using the **Region** selection field. The selected LCN standard must match that of the connected devices for LCN to work.
 - An **LCN** can only be entered for channels assigned to one of the modulators.
- ➔ Click in the **LCN** column for the relevant channel.

Modulator								LCN	Program	Type	Encryption	Decrypt			
M1	M2	M3	M4	M5	M6	M7	M8	3	ServusTV HD Oesterreich	TV	CA	CI 4 ☒			
M9	M10	M11	M12	M13	M14	M15	M16								

- ➔ Enter the LCN using the keyboard or increase/decrease the LCN using the arrow keys.
- ➔ Enter a separate LCN for each desired channel.

Modulator								LCN	Program	Type	Encryption	Decrypt			
M1	M2	M3	M4	M5	M6	M7	M8	1	ORF1 HD	TV	CA	CI 4 ☒			
M9	M10	M11	M12	M13	M14	M15	M16		ORF2W HD	TV	CA	no ☐			
M1	M2	M3	M4	M5	M6	M7	M8	3	ServusTV HD Oesterreich	TV	CA	CI 4 ☒			
M9	M10	M11	M12	M13	M14	M15	M16		ServusTV HD Deutschland	TV	FTA	no ☐			
M1	M2	M3	M4	M5	M6	M7	M8	2	ORF2N HD	TV	CA	no ☐			
M9	M10	M11	M12	M13	M14	M15	M16								

- ➔ To delete the LCN, enter a 0 in the LCN column.
- ➔ Click **SAVE CHANGES**.
The programme positions are saved in the device.

4.2.5. Changing programme names

The programme name can be changed. The programme name you enter will later appear in the channel list on the connected TV sets.

- Click on one of the programmes.

The table containing information about the programme will open.

Program Name:	Erstes Programm	✓ ✗
Service-ID:	28106	

- Click to the right of the '**Program Name**' field.
- Enter a custom programme name and click on the green tick.
This completes the entry.
- Once you have changed the desired programme names, click **SAVE CHANGES**.
The programme names you have entered will be saved in the headend.

4.2.6. Edit Service ID

In cross-multiplex mode, you can also edit the service ID.



Uncoordinated changes usually lead to problems!

Changes to the **service ID** are only necessary for STBs with a preset ID. These STBs are used by some providers to prevent reception with third-party devices. Please only make changes after consulting the provider.

Service-ID	4911	✓ ✗
------------	------	-----

- Enter the service ID using the keypad or increase/decrease it using the arrow keys.
- Click on the green tick to accept the ID or on the red cross to discard the entry.

4.2.7. PID remapping

Automatic PID remapping

If several programs within an output modulator contain packets with the same PID, this can lead to interference. For this reason, these PIDs are automatically remapped.

1

M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	Program Name:	Service-ID:	Programm duplizieren:	Hinzufügen	
																Das Erste	28106			
																Stream type	IN PID	OUT PID	FIXED	BLOCK
																PMT	100	100	☐	☐
																MPEG2 Video	101	101	☐	☐
																MPEG1 Audio (deu)	102	102	☐	☐
																MPEG1 Audio (mis)	103	103	☐	☐
																Teletext (deu)	104	104	☐	☐
																AC-3 Audio (deu)	106	106	☐	☐
																Private data	84	84	☐	☐
																Subtitles (deu)	105	105	☐	☐
																DSM-CC	1176	1176	☐	☐
																Private data	2070	2070	☐	☐
																DSM-CC	2171	2171	☐	☐

2

M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	Program Name:	Service-ID:	Programm duplizieren:	Hinzufügen	
																Eurosport 1 Deutschland	31200			
																Stream type	IN PID	OUT PID	FIXED	BLOCK
																PMT	280	280	☐	☐
																MPEG2 Video	101	5590	☐	☐
																MPEG2 Audio (ger)	103	4464	☐	☐
																Private data	104	7997	☐	☐
																Teletext (ger)	102	931	☐	☐
																SCTE-35	105	3338	☐	☐

In the example, both programmes are assigned to modulator M1 **(1)**. For both the top program “Das Erste” and the bottom program “Eurosport”, the IN PIDs **101 to 105** are identical. Consequently, the PIDs for the bottom program are remapped and different IDs are automatically entered in the OUT PID column **(2)**.

Fixing PIDs

Fixing a PID prevents PIDs from being remapped.

➔ Click on one of the channels.

The table with the packets opens.

Stream type	IN PID	OUT PID	FIXED	BLOCK
PMT	280	280	☐	☐
MPEG2 Video	101	101	☒	☐
MPEG2 Audio (ger)	103	103	☐	☐
Private data	104	104	☒	☐
Teletext (ger)	102	102	☐	☐
SCTE-35	105	105	☐	☐

➔ For the PIDs you wish to fix, tick the box in the FIXED column.

➔ Click SAVE CHANGES.

The fixed PIDs are saved in the headend.

Manual remapping

If packets are to be assigned a specific OUT PID, this can be entered manually.

Stream type	IN PID	OUT PID	FIXED	BLOCK	
PMT	280	280	☐	☐	
MPEG2 Video	101	110	☐	☐	✓✗
MPEG2 Audio (ger)	103	103	☐	☐	
Private data	104	104	☐	☐	
Teletext (ger)	102	102	☐	☐	
SCTE-35	105	105	☐	☐	

- ➔ Click in the **OUT PID** column for the relevant programme.
- ➔ Enter the PID using the keyboard or increase/decrease the PID using the arrow keys.
- ➔ Click on the green tick.
This will first complete the entry.
- ➔ Click on SAVE CHANGES.
The entered PIDs are saved in the headend.

4.2.8. PID filtering with MKS 1-01

The transport streams consist of packets identified by PIDs (Packet Identifiers). With the paid software extension MKS 1-01, individual packets can be filtered out of the transport stream based on the PID (Packet Identifier).

- ➔ Click on one of the programs.
The table containing the packets included in the program will open.

Stream type	IN PID	OUT PID	FIXED	BLOCK	
PMT	100	100	☐	☐	
MPEG2 Video	101	101	☐	☐	
MPEG1 Audio (deu)	102	102	☐	☐	
MPEG1 Audio (mis)	103		☐	☒	1
Teletext (deu)	104		☐	☒	2
AC-3 Audio (deu)	106	106	☐	☐	
Private data	84	84	☐	☐	
Subtitles (deu)	105	105	☐	☐	
DSM-CC	1176	1176	☐	☐	
Private data	2070	2070	☐	☐	
DSM-CC	2171	2171	☐	☐	

- ➔ For the PIDs you wish to filter out of the transport stream, tick the box in the **BLOCK** column (1).
The packet is no longer transmitted in the transport stream; the OUT PID column is empty for these PIDs (2).

4.2.9. EPG and EIT options

Electronic Programme Guide (EPG)

Only possible in remux mode: If a satellite provides the EPG on a specific transponder, the tuner receiving this transponder can be selected as **the EPG input**.

➔ In STEP 2, click on **ADVANCED OPTIONS**.



A dialogue box with additional options will open.

➔ Open the **EIT** option.

➔ Select the appropriate tuner in the **EPG Input** field.

▼ EIT

EPG input: ?

Custom EIT PID: ?

Tuner 1	18	Tuner 2	18	Tuner 3	18	Tuner 4	18
Tuner 5	18	Tuner 6	18	Tuner 7	18	Tuner 8	18
Tuner 9	18	Tuner 10	18	Tuner 11	18	Tuner 12	18
Tuner 13	18	Tuner 14	18	Tuner 15	18	Tuner 16	18

Specify a specific PID for the Event Information Table (EIT)

In some countries, the EIT is not transmitted on PID 18 (e.g. Israel PID 90). In this case, the headend can change this PID to PID 18.

➔ Enter the PIDs used to transmit the EIT for tuners 1 to 8, 12 and 16.

4.2.10. SDT PIDs

The Service Description Table (SDT) contains information about the broadcast programmes (services). It is usually transmitted with PID 17. However, if the SDT is transmitted with a different PID, the headend can change this other PID to PID 17.

➔ In STEP 2, click on **ADVANCED OPTIONS**.



A dialogue box with additional options will open.

➔ Open the **SDT** option.

The SDT PIDs currently used by the individual tuners are displayed (by default PID 17).

▼ SDT

Custom SDT PID: ?

Tuner 1	17	Tuner 2	17	Tuner 3	17	Tuner 4	17
Tuner 5	17	Tuner 6	17	Tuner 7	17	Tuner 8	17
Tuner 9	17	Tuner 10	17	Tuner 11	17	Tuner 12	17
Tuner 13	17	Tuner 14	17	Tuner 15	17	Tuner 16	17

➔ Enter the PIDs used to transmit the SDT for tuners 1 to 16 respectively. Valid values range from 32 to 8190. The entered SDT PID is then converted to PID 17.

4.2.11. 'Freezing' the NIT version

If the programs on a transponder change, the NIT is regenerated. As a rule, the end user is unaware of this because the receivers automatically read in the new NIT. In some countries (e.g. France), however, end users are prompted to start a channel scan.

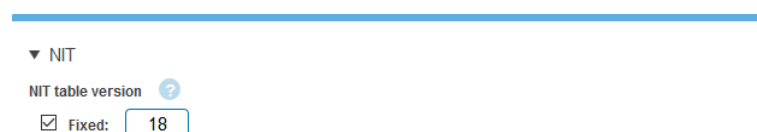
If one or more programs can only be received with a weak signal, the NIT frequently changes and end users are repeatedly and unnecessarily prompted to perform a channel scan. In this case, the NIT version can be "frozen" (recommended for use in France).

➔ In STEP 2, click on ADVANCED OPTIONS.



A dialogue box with additional options will open.

➔ Open the NIT option.



➔ Under **NIT Table Version**, select the **Fixed** option.

➔ Enter a version between **1 and 31**.

Note: If the channel list changes, the channel scan must be performed manually.

➔ You can access advanced options for editing the NIT via the MKS 1-00 software extension (see 6.7 on page 49).

4.2.12. Add unreferenced PIDs for OTA upgrade

To enable an **over-the-air upgrade**, for example, non-referenced PIDs can be manually forwarded to the output modulators

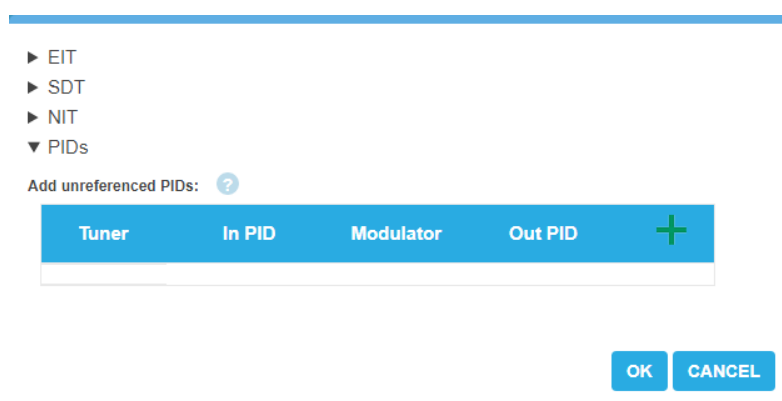
Notes:

- A valid licence for PID filtering must be installed for this function to work (see 6.12 on page 56)
- In Phase 1, a transport stream containing the unreferenced PID(s) must already have been selected.

➔ In PHASE 2, click on ADVANCED OPTIONS.

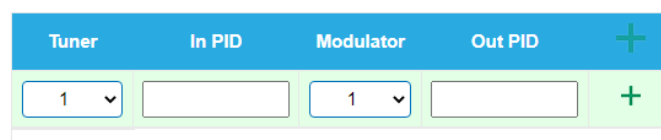
A dialogue box with additional options will open.

➔ Open the PIDs option.



➔ Under **Add Unreferenced PID**, click on the **green plus sign** in the table header.

A row for entering the PID is inserted.



- ➔ Under **Tuner**, select one of the available tuners.
- ➔ Under **In PID**, enter an unreferenced PID.
- ➔ Select the output **modulator**.
- ➔ Enter the output PID under **Out PID**.
The output PID can be the same as the input PID, or it can differ from it.

Tuner	In PID	Modulator	Out PID	+
2	7496	1	7496	+

- ➔ Click on the **green plus sign** next to the row.
The entered data is applied.

Tuner	In PID	Modulator	Out PID	+
1		1		+
1	7496	1	7496	 

- ➔ Enter any further non-referenced PIDs if necessary.

The same input PID can be forwarded to several output modulators if required. The output PID value can be entered separately for each output. In the following example, PID 7496 from Tuner 1 is forwarded to modulators 1, 2 and 3.

Tuner	In PID	Modulator	Out PID	+
1		1		+
1	7496	1	7496	 
1	7496	2	7496	 
1	7496	3	7496	 

- ➔ Then click on **SAVE**.
The entries are only saved in the headend once this is done.

Editing or deleting entries

- ➔ Click on the **pencil icon** to the right of the row.
You can now change **the Input, In PID, Modulator and Out PID**.

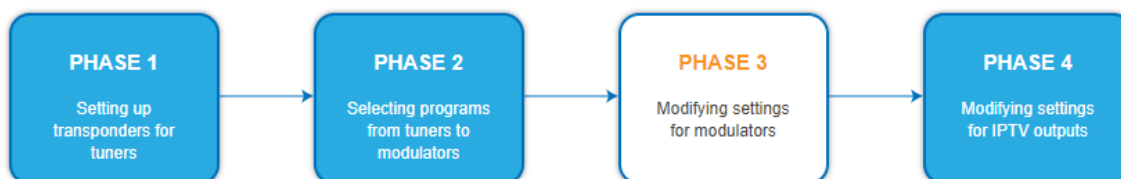
Tuner	In PID	Modulator	Out PID	+
1		1		+
1	7496	1	7496	✓✗
1	7496	2	7496	 
1	7496	3	7496	 

- ➔ Then click on the **green tick**.
The changes will be applied.
- ➔ To delete, click on the **bin icon** to the right of the row.
The row will be deleted.
- ➔ Then click on **SAVE**.
The entries will only be saved in the headend once you do this.

4.3. Initialization - Phase 3

Note: Depending on the configured modulation method or the device type, the signals are modulated as DVB-C, DVB-T or DVB-T2 (see page 43).

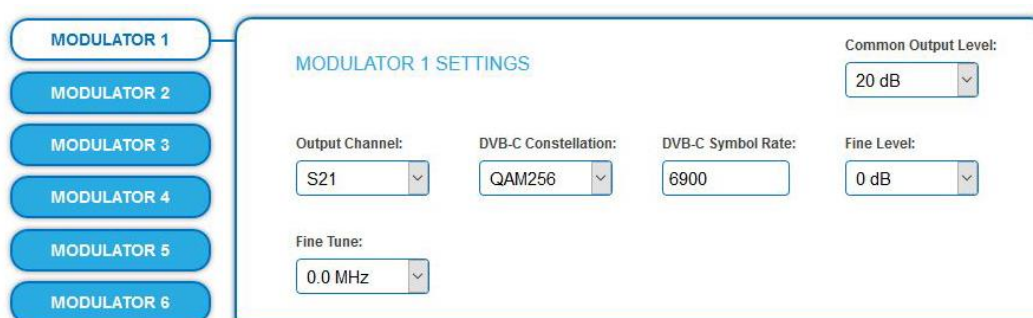
In Phase 3, the modulators are configured.



➔ Click on PHASE 3 to access the modulator configuration.

4.3.1. DVB-C

Modulator configuration



Parameter

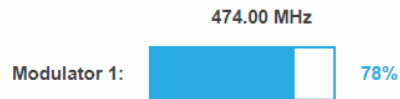
Output channel	Each of the modulators can be set to any output channel between S2 and K87. No output channel may be assigned more than once!
DVB-C modulation	For DVB-C modulation, you can choose between 16QAM, 32QAM, 64QAM, 128QAM and 256QAM. 256QAM enables the highest data transfer rate but also requires the best network quality.
DVB-C symbol rate	The DVB-C symbol rate can be freely set between 1000 and 7500. The default value is 6900. Some networks also operate at 6875. If only 7 MHz bandwidth is used, 6111 is common.
General output level	The general output level for all modulator outputs can be set from 20 dB to 0 dB. The highest output level is achieved with a setting of 20 dB, the lowest output level with a setting of 0 dB.
Fine level adjustment	The level fine adjustment attenuates the output level of each individual modulator output separately from 0 to -3 dB. In addition, each modulator output can be deactivated (off).
Frequency fine-tuning:	Fine tuning of the output channel can be performed in 0.5 MHz steps.

Fill level

The fill level depends on the number of programmes activated in the programme table (Phase 2 menu item). When set to CROSS MULTIPLEX MODE, particular care must be taken to ensure that not too many programmes are activated in a single modulator.

The data rate of the channels on the DVB-S/S2/S2X transponders may vary depending on the picture content and transmission quality.

FILL



To ensure interference-free reception, a reserve must be maintained. We recommend a maximum fill level of 90%. If the maximum fill level is exceeded, picture interference such as mosaic patterns may occur. In this case, the LEDs on the front panel will light up red.

The data rate of a DVB-C channel depends on the selected channel bandwidth (7 or 8 MHz), the set symbol rate and the DVB-C modulation (16QAM, 32QAM, 64QAM, 128QAM or 256QAM) of the modulator.

If the displayed data rate exceeds 90%, there are various ways to change this:

- ➔ Switch to a channel with 8 MHz bandwidth if a 7 MHz channel was previously selected.
- ➔ Set the DVB-C modulation to a higher value, e.g. switch from QAM 64 to QAM 256
- ➔ Reduce the number of selected channels in the channel list
- ➔ If the connected receivers allow it, increase the symbol rate

Selected programs

The 'SELECTED PROGRAMS' section of the channel table displays the channels that were activated for the modulator in Phase 2.

SELECTED PROGRAMS

Program Name	Type	Encryption
Das Erste HD	TV	FTA
SWR BW HD	TV	FTA

4.3.2. DVB-T

Modulator configuration

MODULATOR 1

MODULATOR 2

MODULATOR 3

MODULATOR 4

MODULATOR 5

MODULATOR 6

MODULATOR 7

MODULATOR 8

MODULATOR 1 SETTINGS

Norm:

CCIR

Output Channel:

S37

Common Output Level:

20 dB

DVB-T FEC Code rate:

7/8

DVB-T Bandwidth:

7 MHz

DVB-T Constellation:

QAM64

DVB-T Transmission Mode:

2k

Fine Level:

0 dB

DVB-T Guard Interval:

1/32

Fine Tune:

0.0 MHz

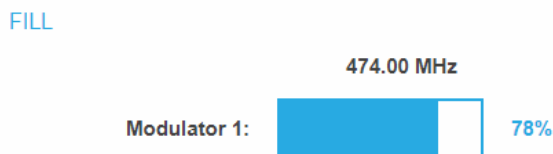
Parameter

Norm:	Sets the standard for the output channel grid in the Output Channel field. Note: A change to the standard follows these rules: CCIR -> Australia: The bandwidth of all modulators is changed to 7 MHz Australia -> CCIR: The bandwidth of the modulators is changed to 8 MHz, but the lower channels S2-S20 remain at 7 MHz bandwidth
Output channel:	Each of the modulators can be set to any output channel between S2...K69. No output channel may be assigned more than once!
General output level	The general output level for all modulator outputs can be set from 20 dB to 0 dB. The highest output level is achieved with a setting of 20 dB, the lowest output level with a setting of 0 dB.
DVB-T modulation:	The modulation can be set to QPSK, QAM 16 or QAM 64. With the QPSK setting, the output channel has the lowest data rate. The QPSK modulation method is used due to its robustness against interference and the higher reliability of transmission in poorer distribution networks. The QAM modulation method allows higher data rates to be achieved, thereby enabling more programmes to be transmitted over a single channel. The highest data rate is achieved with QAM 64 modulation. • QPSK (2 bits/symbol) – low data rate – very robust signal. • QAM 16 (4 bits/symbol) – medium data rate. • QAM 64 (6 bits/symbol) – high data rate.
DVB-T FEC (Forward Error Correction):	With the aid of error correction, errors caused by noisy transmission paths can be compensated for by reconstructing data. The data required to reconstruct the signal is contained in the transmitted FEC bits. Changing the FEC factor alters the proportion of FEC data relative to the payload data. A higher proportion of FEC data means greater redundancy during transmission. However, this reduces the bandwidth available for the payload data. With an FEC of 7/8, the highest payload data rate and the lowest redundancy during transmission are achieved. • FEC 1/2 – low data rate – high error protection. • FEC 7/8 – high data rate – low error protection.
DVB-T bandwidth:	The DVB-T standard provides for transmission in 7 or 8 MHz channels. A wider bandwidth allows more data to be transmitted in a single channel. In the CCIR channel grid, channels below 300 MHz have a specified bandwidth of 7 MHz. The remaining channels have a bandwidth of 8 MHz. The bandwidth of channels below 300 MHz can be manually increased from 7 to 8 MHz. By adjusting the bandwidth, the channels no longer correspond to the set channel grid. The output frequency for all modulators changes.

DVB-T Guard Interval:	A guard interval is transmitted between the transmitted symbols of the payload signal. This guard interval prevents symbol crosstalk during DVB-T transmission. Signals arriving late from other synchronised DVB-T transmitters or reflections have no effect on the decoding of the payload signal if they arrive during the guard interval. The propagation times of the echoes must be shorter than the duration of the guard interval. The guard interval expresses the ratio of transmission pauses to the useful data transmission time. A very long guard interval (e.g. 1/4) therefore results in a very low data rate. When transmitting in a fault-free coaxial distribution network, a very short guard interval is sufficient (1/32).
DVB-T transmission mode (2k and 8k):	The use of 8k mode is recommended in the event of reflections with very long propagation times or for reception in same-frequency networks.
Level Fine-Tuning	The level fine-tuning attenuates the output level of each individual modulator output separately from 0 to -3 dB. In addition, each modulator output can be deactivated (Off).
Fine tuning:	Fine tuning of the output channel can be performed in 0.5 MHz steps.

Fill level

The data rate of the program may vary depending on the image content and transmission quality. To ensure interference-free reception, it is essential to maintain a reserve.



We recommend a maximum fill level of 90%.

If the maximum fill level is exceeded, this may result in picture interference such as mosaic patterns.

If the net data rate of the signal exceeds the maximum net data rate of the output channel, an overflow occurs in the modulator. This overflow causes interference. The modulator overflow is indicated by the status LED on the front of the device lighting up red.

The data rate of the DVB-T channel also depends on the selected channel bandwidth (7 or 8 MHz), the set error correction rate (FEC) and the modulation scheme (QPSK, QAM16, QAM64) of the modulator.

If the displayed data rate exceeds 90%, there are several ways to change this:

- ➔ Switch to a channel with 8 MHz bandwidth if a 7 MHz channel was previously selected.
- ➔ Increase the modulation level to 64 QAM. QPSK corresponds to the lowest output data rate, whilst the QAM64 setting corresponds to the highest.
- ➔ Set the forward error correction to 7/8. This setting achieves a higher data rate but lower error correction. Lower error correction requires better transmission quality from the antenna network.
- ➔ Set the guard interval to 1/32. Shorter guard intervals result in higher data rates.
- ➔ Reduce the number of selected channels in the channel list.

The maximum net data rate depends on the settings selected. The bandwidth, modulation, code rate and guard interval all affect the net data rate. COFDM-modulated channels allow net data rates of 4.98 to 31.67 Mbit/s (typically 24).

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4,976	5,529	5,855	6,032
	2/3	6,635	7,373	7,806	8,043

	3/4	7,465	8,294	8,782	9,048
	5/6	8,294	9,216	9,758	10,053
	7/8	8,709	9,676	10,246	10,556
16-QAM	1/2	9,953	11,059	11,709	12,064
	2/3	13,271	14,745	15,612	16,086
	3/4	14,929	16,588	17,564	18,096
	5/6	16,588	18,431	19,516	20,107
	7/8	17,418	19,353	20,491	21.112
64-QAM	1/2	14,929	16,588	17,564	18,096
	2/3	19,906	22,118	23,419	24,128
	3/4	22,394	24,882	26,346	27,144
	5/6	24,882	27,647	29,273	30.16
	7/8	26,126	29,029	30.737	31.668

Selected programs

The SELECTED PROGRAMS table displays the programs that were activated for the modulator in Phase 2.

SELECTED PROGRAMS

Program Name	Type	Encryption
Das Erste HD	TV	FTA
SWR BW HD	TV	FTA

5. IPTV operation

The MK 16-0xH headend can be upgraded for parallel operation with IPTV using the MKS 1-03H software extension. The selected programs are then output as SPTS (Single Program Transport Stream).

- ➔ First order the MKS 1-03H; please provide the headend's serial number when purchasing.
- ➔ You will receive a licence file suitable for your headend.
- ➔ Install this licence file (see [Virhe. Viitteen lähde ei löytnyt.](#) on page [Virhe. Kirjanmerkkiä ei ole määritetty.](#)).

LICENSES

Feature	Expires
DVB-C/T	permanent
NIT	permanent
PID filtering	permanent
16 Modulators	permanent
IP output	permanent
SMARTPortal	permanent
Simulcrypt	Not activated

5.1. Transport stream output – SPTS

The transport stream output of the MK 16-0xH is **SPTS** (Single Program Transport Stream). This means that each program is assigned its own multicast IP address.

5.2. Initialisation – Phase 2



As described in [4.2](#), the desired programs are selected in Phase 2. Individual programs can be enabled or disabled in the **IPTV** column.

Note: The IPTV column is only visible in parallel operation.

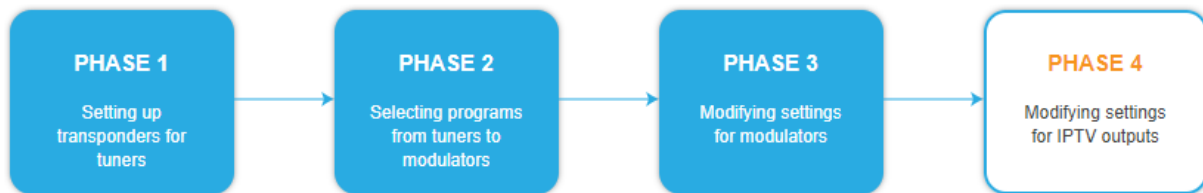
TUNER 1									
Input mode:		Default							
Modulator	IPTV	LCN	Program Name	Type	Encryption	Decrypt			
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16	☒		Das Erste HD	TV	FTA	no	▼	☐	
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16	☒		arte HD	TV	FTA	no	▼	☐	
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16	☒		SWR BW HD	TV	FTA	no	▼	☐	
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16	☒		SWR RLP HD	TV	FTA	no	▼	☐	

IMPORTANT

- ➔ The more programs you assign, the higher the data rate will be. Once you have assigned the programs in Phase 2, you must check the fill level in Phase 4.
- ➔ After making changes, click **SAVE CHANGES**; only then will the changes be saved and applied.

5.3. Initialisation – Phases 4

In PHASE 4, the outgoing transport streams are configured.



A destination address (multicast IP address) is assigned to each individual transport stream. You also define the port and the transmission protocol.



Destination IP	Port	Program Name	Mode	Decrypt	Mbps	
239.0.0.1	1234	Das Erste HD	UDP	☐	14.7	 
239.0.0.2	1234	arte HD	UDP	☐	8.6	 
239.0.0.3	1234	SWR BW HD	UDP	☐	17.1	 
239.0.0.4	1234	SWR RLP HD	UDP	☐	17.1	 
239.0.0.5	1234	ZDF HD	UDP	☐	14.8	 
239.0.0.6	1234	zdf_neo HD	UDP	☐	11.8	 
239.0.0.7	1234	BR Fernsehen Süd HD	UDP	☐	10.4	 
239.0.0.8	1234	BR Fernsehen Nord HD	UDP	☐	10.4	 

- ➔ In the Destination IP column, enter the multicast IP address.
- ➔ In the Port column, enter the port.
- ➔ Click on the program name to quickly go to Phase 2 and access the relevant program.
- ➔ Click on the Mode column to change the transmission protocol (UDP/RTP).
- ➔ The Decryption column indicates whether the program is decrypted.
- ➔ The Mbps column displays the current bitrate of the program.
- ➔ In the Action column (last column), you can enable editing of the program, confirm the changes made, or delete the program.

As there are up to 512 transport streams, a quick setup option is available.

- ➔ Click on QUICK SETUP.

Quick setup

Start-IP

Port

Mode

RTP required for Panasonic Viera TVs

Keep existing values ☐

- ➔ Enter the start IP.
The remaining IP addresses are incremented from this start IP (239.0.0.1, 239.0.0.2, 239.0.0.3 ...).
- ➔ Enter the port and select the transport protocol as the mode.
- ➔ Click OK.
All transport streams are configured accordingly.

5.3.1. Fill level

The fill level depends on the number of programmes activated in Phase 2.

The data rate of the channels on the DVB-S/S2/S2X transponders may vary depending on the picture content and transmission quality.



To ensure interference-free reception, it is essential to maintain a reserve. We recommend a maximum fill level of 95%. If the maximum fill level is exceeded, picture interference such as mosaic patterns may occur. In this case, the error LEDs on the front panel will light up red.

6. Maintenance

In the MAINTENANCE menu item, you can view status information for the headend and configure the technical parameters.

6.1. STATUS

6.1.1. Current settings MK 16-0xH



The screenshot shows the MAINTENANCE menu with three tabs: FRONT PAGE, INITIALIZATION, and MAINTENANCE. The MAINTENANCE tab is active. On the left, there is a vertical sidebar with buttons for STATUS, OUTPUT, SYSTEM, CONFIG, REBOOT, SMARTPORTAL, SNMP, NIT, M3U, SAP, LOGS, LICENSES, and CAS. The STATUS button is highlighted. The main content area is titled 'CURRENT SETTINGS' and displays the following information:

- Firmware version:** V102-20260417-U (DVB-C)
- Software version:** 3.15 (MKH)
- Serial number:** 1312944
- MAC Address:** Control: 8C:1F:64:14:08:B0
IPTV: 8C:1F:64:14:08:B1
- Devicename:** MK 16-06H
- Processor temperature:** 68°C
- Ventilation temperature:** 35°C
- RF output level:** OK
- Power:** 16.0V

Below the current settings, there is a section titled 'UPDATE A NEW DESIGN TO FLASH'. It contains a 'SOFTWARE FILE:' label, a file selection button labeled 'Datei auswählen' (which shows 'Keine ausgewählt'), and an 'UPDATE' button.

Under CURRENT SETTINGS, you will find the following information:

- **Firmware version:** Displays the firmware version and the type of output modulation.
- **Software version:** Displays the version of the user interface
- **Device serial number**
- **Device MAC addresses**
- **Device name** entered under SYSTEM
- **Processor temperature:** must remain below 90°C
- **Ventilation temperature:** must remain below 50°C
- **Output level status**
- **Output voltage of the power supply**

6.1.2. Update software

IMPORTANT

- ➔ After an update, initialization data saved with older software versions can be loaded into the headend using a newer software version.
- ➔ Initialization data saved using the current software version **cannot** be loaded into headends running an **older** software version.
- ➔ You should therefore update the software on all headends where possible.
For easier handling and a better overview, we recommend the AXING SMARTPortal (see 1.9 on page 7).

Download

You can find software updates to download by entering the item in the search field at www.axing.com.

- ➔ Download the latest version to your PC and unzip it.

Update firmware

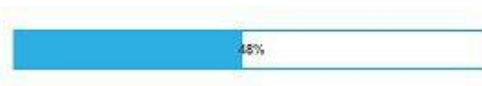
UPDATE A NEW DESIGN TO FLASH

SOFTWARE FILE:

Keine ausgewählt

UPDATE

- ➔ In the MAINTENANCE section, under SOFTWARE FILE, click on “Browse...”.
 - ➔ Locate the update file on your PC and select
- The file is loaded onto the device. The upload progress is displayed.



Reconfiguration

Once the upload is complete, the device will automatically begin reconfiguration. The remaining time is displayed in seconds. **Note:** During reconfiguration, the modulator outputs are switched off. This means that subscribers will not be able to receive a signal.

SYSTEM IS RECONFIGURING

PLEASE WAIT 102

The device will then restart automatically (the set parameters will not be lost).

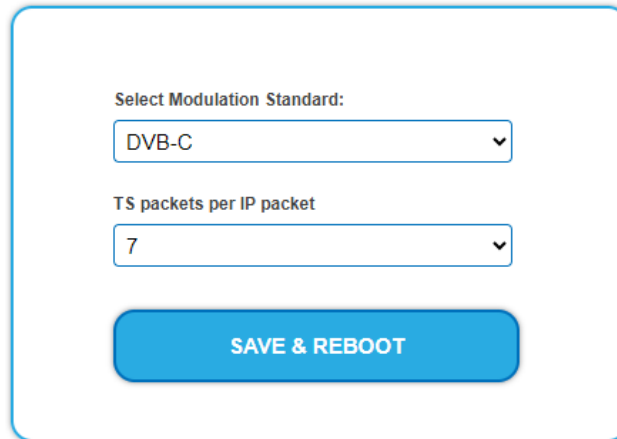
- ➔ After the restart, log in again and change the language back to DE.

6.2. Output

6.2.1. Modulation standard

Depending on the configured modulation standard, the output signals are modulated in DVB-C or DVB-T.

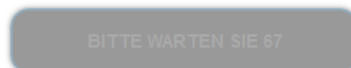
OUTPUT OPTIONS



➔ In the **TS packets per IP packet** field, select the number of TS packets.

➔ Click on **SAVE & REBOOT**.

The changes will be applied. The remaining time is displayed.



The device will then reboot automatically, and the login dialogue will be displayed.

➔ Log in again after the reboot and switch to the desired language.

6.3. System

6.3.1. Change IP address

The network options for both network interfaces are configured under the **SYSTEM OPTIONS** menu item.

Dynamic IP address

➔ Use a **dynamic IP address** to connect the device to a network with a DHCP server.

Static IP address

➔ Use a **static IP address** to connect the device to a network using a fixed IP address. Here, you can change the IP address, subnet mask and gateway. Additionally, you can enter DNS Server 1 and DNS Server 2.

SYSTEM OPTIONS

Control IPTV

☐ Use dynamic IP address
☒ Use static IP address

IP Address (0-255):
 192 168 179 163

Netmask (0-255): (0-255):
 255 255 255 0

Gateway (0-255):
 192 168 179 1

DNS Server 1 (0-255):
 192 168 179 1

DNS Server 2 (0-255):
 8 8 4 4

SAVE CHANGES

- ➔ Click SAVE CHANGES.
Once the changes have been saved, the headend will reboot automatically.
- ➔ After the reboot, you must enter the **new IP address** in your browser and log in again.

6.3.2. Change password

The factory-set password is: *Ramsen8262*.

The factory-set password should be changed immediately after the headend is first put into operation.

You can change the password under 'PASSWORD'.

PASSWORD

SET NEW PASSWORD

New password (8-10 characters):

Re-enter new password:

SAVE CHANGES

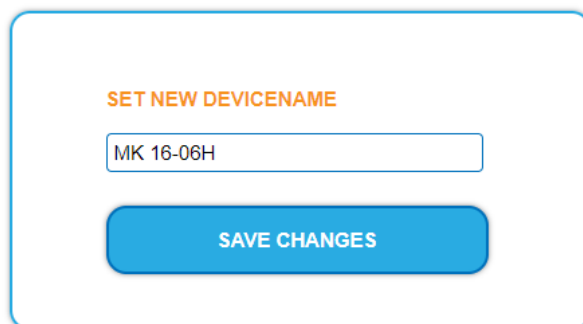
- ➔ Enter a new password consisting of 8 to 10 characters.

- ➔ Re-enter the password.
- ➔ Click on SAVE CHANGES.
You will receive confirmation that the password has been saved.

6.3.3. Enter device name

Under DEVICE NAME, you can enter a name for the headend.

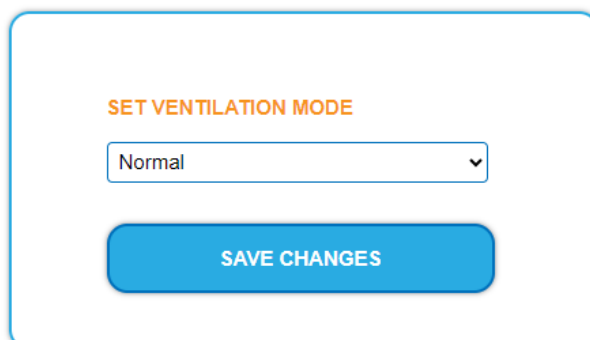
DEVICENAME



- ➔ Enter a name in the ENTER DEVICE NAME field.
- ➔ Click Save.
The device name is displayed on the login page.

6.3.4. Set ventilation mode

VENTILATION MODE:



The default setting is **Normal** mode. In **High ventilation** mode, the fans operate at higher speeds to improve air circulation. Recommended in warmer environments.

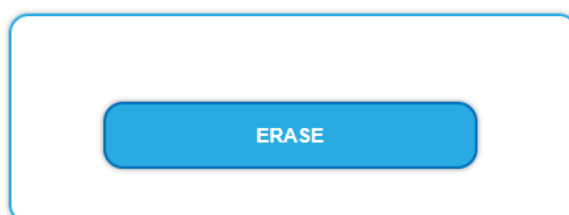
6.4. Config

6.4.1. Delete programme data

Under 'DELETE PROGRAMME DATA', the Phase 2 settings can be deleted. The transponders that have been set must be re-scanned using a channel search.

The headend will also be reset to remux mode.

ERASE SERVICE DATA

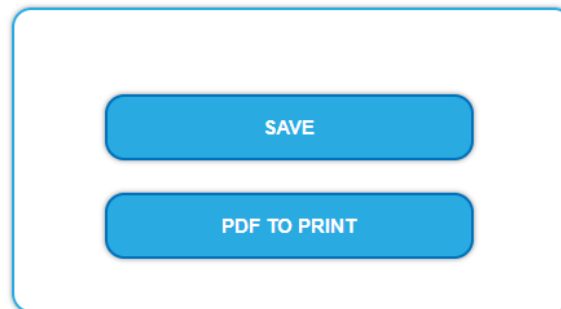


- ➔ Click on Delete.
You will be taken back to the home screen.

6.4.2. Save initialisation data

Under SAVE INITIALISATION SETTINGS AS FILE, you can save the current settings for initialisation phases 1 to 4 to a file.

SAVE SYSTEM INITIALIZATION DATA TO FILE



- ➔ Click SAVE;
and the data will be offered for saving as a file **named config.dat**.
- ➔ Click on 'PRINT PDF',
a PDF will be generated and offered for opening or saving as Config.pdf.

Note: The password and IP address are not saved.

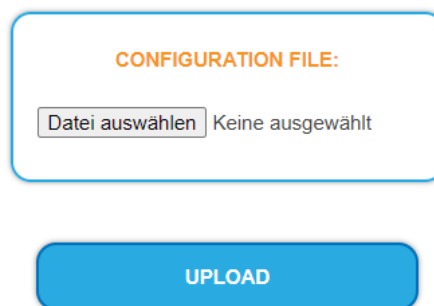
6.4.3. Load initialisation data

Under SETTINGS > INITIALISATION > LOAD FROM FILE, you can load the saved settings for initialisation phases 1 to 3 onto a headend.

NOTICE

- ➔ After an update, initialisation data saved with older software versions can be loaded onto a device running a newer software version.
- ➔ However, initialisation data saved with a newer software version **cannot** be loaded onto devices with an **older** software version.

UPLOAD SYSTEM INITIALIZATION DATA FROM FILE



- ➔ Select an INITIALISATION FILE.
- ➔ Click on LOAD FILE.
Loading the file data takes a few seconds.

6.4.4. Program list for all devices

You can create a shared program list for all devices on the network that are set to the same output modulation.

CHANNEL LIST FOR ALL DEVICES:

Select	IP Address	Device name
☒	This device	MK 16-06H
☐	192.168.179.85	MIE 3-02
☒	192.168.179.80	MIE 16-00
☐	192.168.179.90	SKF 82-00
☐	192.168.179.120	MIP 8-06
☒	192.168.179.160	MK 8-06I
☐	192.168.179.110	MIP 16-00 EPG-TEST

PDF TO PRINT

EXPORT TO CSV

- ➔ Select the headends you want to include in the channel list.
Notes: The device you are logged into is labelled 'This device' and is always selected. You can only select headends with the same output modulation.
- ➔ Click on PRINT PDF.
A PDF of the channel list will be generated, which you can open or save.
- ➔ Click on EXPORT TO CSV to save the channel list in CSV format.

6.5. Reboot

6.5.1. Restart

Under Restart, the device can be restarted via software

REBOOT THE SYSTEM

REBOOT

- ➔ Click on REBOOT
The device will reboot.
- ➔ You will need to log in again after the restart.

Note: If satellite reception is temporarily unavailable (e.g. during snowfall), the headend will automatically restart every 10 minutes. This ensures that once reception is available again, all configured channels will be available once more.

6.6. SMARTPortal

6.6.1. Access to the SMARTPortal

If you are a registered user of the SMARTPortal, you can remotely maintain the headend via the SMARTPortal and, if necessary, receive support from AXING (see also <https://axing.com/en/produkte/smartportal/>).

An internet connection for the headend is required.

ACCESS TO SMARTPORTAL

The screenshot shows a configuration window titled "ACCESS TO SMARTPORTAL". At the top, it says "Status: Connected". Below this are several fields: "State:" with a dropdown menu showing "Enabled"; a checkbox labeled "AXING support allowed" which is checked; "Country:" with a text box containing "CH"; "Town:" with a text box containing "Ramsen"; "Location:" with a text box containing "HE-MK 16-06H"; "Postal code:" with a text box containing "8262"; "Email address:" with a text box containing "he-ramsen@axing.com"; and "Userkey:" with a text box containing seven asterisks. At the bottom of the form is a blue button labeled "SAVE".

- ➔ Select the option **Enabled** in the **State** field.
 - ➔ If desired, enable the **AXING Support allowed** option.
 - ➔ Enter the relevant information for the headend in the **Country**, **Town** and **Postcode** fields.
 - ➔ In the **Location** field, enter a name for the headend's location. This name will appear later in the SMARTPortal and help you identify the headend.
 - ➔ In the **Email Address** field, enter the email address you used to register on the SMARTPortal.
 - ➔ In the **User Code** field, enter the user code you received when registering on the SMARTPortal.
 - ➔ Click **SAVE**. The data will be saved, the headend will restart, and the connection to the SMARTPortal will be established.
- You may need to adjust the connection details (see 6.3 on page 43).

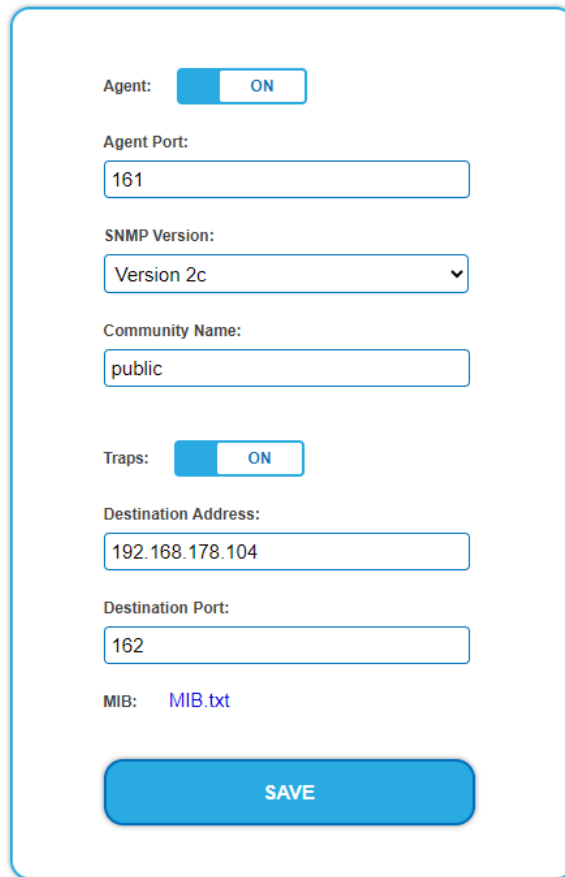
6.7. SNMP

6.7.1. SNMP (Simple Network Management Protocol)

The headend supports the Simple Network Management Protocol SNMPv1 and SNMPv2c. Information can be read or alarms received using a Network Management Station (NMS).

Supported SNMP message types are GET-REQUEST, GETNEXT-REQUEST and TRAP.

SNMP



The image shows a web-based configuration interface for SNMP. It is titled 'SNMP' at the top. The interface contains several fields and controls:

- Agent:** A toggle switch set to 'ON'.
- Agent Port:** A text input field containing '161'.
- SNMP Version:** A dropdown menu showing 'Version 2c'.
- Community Name:** A text input field containing 'public'.
- Traps:** A toggle switch set to 'ON'.
- Destination Address:** A text input field containing '192.168.178.104'.
- Destination Port:** A text input field containing '162'.
- MIB:** A text input field containing 'MIB.txt'.
- SAVE:** A large blue button at the bottom.

SNMP Agent

- ➔ Set the **Agent** switch to **ON** to be able to use GET-REQUEST and GETNEXT-REQUEST.
- ➔ The **agent port** is **161** by default; enter a different port if required.
- ➔ In the **SNMP Version** field, select SNMPv1 or SNMPv2c. SNMPv2c is recommended.
- ➔ The **Community Name** (the SNMP 'password') is 'public' by default; enter a different community name if required.

Traps

Traps can also be sent independently of the SNMP agent.

- ➔ If **traps** are to be transmitted from the headend, set the **Traps** switch to **ON**.
- ➔ Enter the NMS **destination address** for receiving traps
- ➔ Enter the NMS **destination port**; 162 is used by default.

MIB object definition

The MIB object definitions are stored in the device.

- ➔ Click on AXING-MIB.txt to open the definition.

Alternatively, if you are connected to the device via the network, you can download the file from the device:

URL = [Device IP address]/MIB/AXING-MIB.txt

Example: 192.168.0.145/MIB/AXING-MIB.txt

Notes on support for OpManager and Paessler PRTG Network Monitor

- ➔ When adding a device, check that the correct login details ("password") have been entered.
- ➔ By default, the headend supports the "SNMP v1/v2 Public" profile (community name "public").

The following SNMP settings must be changed to also display the CPU load:

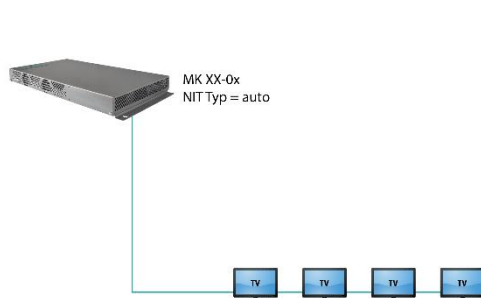
- ➔ Select Axiom-Device → Settings
- ➔ Scroll down to "SNMP Compatibility Options".
- ➔ Disable "Inherit from".
- ➔ Change the Walk Mode value to: "Use GETNEXT requests".
- ➔ Then click Save.

6.8. NIT (Network Information Table)

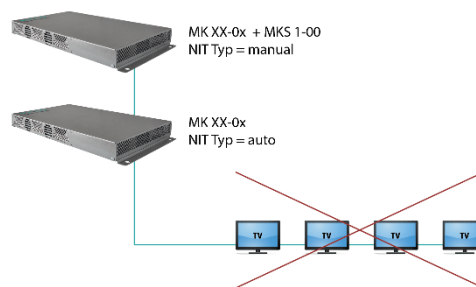
The NIT contains information about the signal configuration of a headend. A set-top box requires this information for a quick channel scan. The LCN (Logical Channel Numbering) is contained within the NIT, whereby the channels are virtually assigned to a memory location on the set-top box.

The headend provides an "Auto-NIT" as standard, which contains all channels from 114 MHz to 1002 MHz and only the most important parameters such as **symbol rate** and **modulation**.

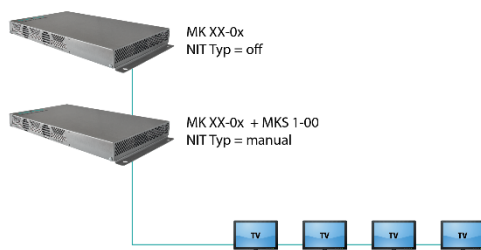
With the **MKS 1-00 software extension** (available for a fee), a Network Information Table (NIT) can be read from the devices, edited and uploaded back to the devices.



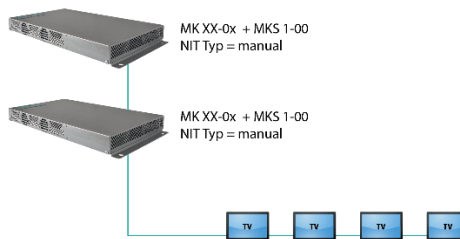
Operation with Auto-NIT provides all channels from 114 MHz to 1002 MHz.



Operation results in a conflict. Two NITs with ON-IDs and Network-IDs.



Operation with the NIT switched off does not result in a conflict (one NIT, ON-ID, Network-ID). However, no LCN from the headend without MKS 1-00.



Ideal solution: operation with MKS 1-00 in every device: a shared NIT, ON-ID, Network-ID and LCN from both headends.

6.8.1. Configure settings

- ➔ Click on NIT SETTINGS to open the settings dialogue.

6.8.2. Select type

→ Select **Auto**.

A NIT is created that contains all channels (from 114 MHz to 1002 MHz)

The unassigned channels contain only the most important parameters, such as **symbol rate** and **modulation**.

→ Select **Off**.

No NIT and therefore no LCN will be generated.

→ Select **Manual**.

The input fields for reading, checking and uploading the NIT are displayed.

Note: Only with the additional software extension **MKS 1-00** can the type be set to Manual and a Network Information Table (NIT) be read from the devices, edited and uploaded back to the devices. MKS 1-00 must be installed by AXING Support (this requires an internet connection for the headend).

6.8.3. Importing NIT

Under STEP 1: IMPORT NIT (DVB-C), the devices in the network are displayed.

NIT TYPE: Manual

STEP 1: READ NIT (DVB-C)

Select	IP Address	Device name
☒	This device	MK 16-06H
☐	192.168.179.80	MIE 16-00
☐	192.168.179.160	MK 8-06I

RESET NIT
READ NIT

→ Select the devices from which the NIT is to be read.

The device you are currently configuring (This device) is always selected.

→ Click on READ NIT.

The device data is read and listed under STEP 2: CHECK NIT.

Note: You may need to reset the NIT before reading it (see "Reset NIT" on page 53).

6.8.4. Verify NIT

Note: If the NIT is being edited, the device automatically switches to cross-multiplex mode.

STEP 2: VERIFY NIT

Network Name: Axing
Network ID / ON-ID: 4660

Freq (MHz)	SR	Mod	TS-ID	ON-ID	
354.000	6900	QAM256	1091	1	 
362.000	6900	QAM256	1101	1	 
370.000	6900	QAM256	1089	1	 
378.000	6900	QAM256	9700	702	 
386.000	6900	QAM256	1073	1	 
394.000	6900	QAM256	7	133	 
402.000	6900	QAM256	1089	1	 
410.000	6900	QAM256	1101	1	 

Overlapping values

Values that may overlap are displayed in red. These errors must be resolved before uploading.

Notes:

- Different TS-IDs must always be assigned
- The ON-ID must be the same for all headends

6.8.5. Edit NIT

- ➔ Click on the pencil icon next to a row. The fields can be edited.
- ➔ Click on the plus sign in the column header. An additional row is inserted.
- ➔ Enter plausible data into the fields that matches the other values.
- ➔ Click on the plus sign next to the cell to copy the row.

STEP 2: VERIFY NIT

Network Name: Axing
Network ID / ON-ID: 4660

Freq (MHz)	SR	Mod	TS-ID	ON-ID	
1004	6900	QAM256	123	1	 
1002.000	6900	QAM256	1019	1	 
354.000	6900	QAM256	1091	1	 

Add row

Copy values

Edit row

Delete row

- ➔ Click on the bin icon next to a row. The row will be deleted.

6.8.6. Uploading the NIT

STEP 3: UPLOAD NEW NIT TO DEVICES

Select	IP Address	Device name
☒	This device	MK 16-06H
☐	192.168.179.80	MIE 16-00
☐	192.168.179.160	MK 8-06I

UPDATE

- ➔ Select the devices to which the NIT is to be uploaded.
- ➔ Click on UPLOAD.
- ➔ The data will be uploaded and saved in the headend.

6.8.7. Add NIT from the DVB-C input (optional)

In cases where both DVB-S and DVB-C are used, a CATV provider's NIT can be read via an MK tuner and added to the output NIT.

STEP 4 (OPTIONAL): ADD NIT FROM DVB-C INPUT

Tuner input: ▼

- ➔ Select the relevant tuner in the **Tuner Input** field.

6.8.8. Reset NIT

Resetting the NIT is necessary under certain circumstances.

Example:

Three devices are being used.

The NIT is edited on the first device and uploaded to all devices. Subsequently, parameters such as the channel output frequency are changed at the modulator output of the first device. If the NIT is now re-read, the old channel output frequency is also re-read, as this is still stored in devices 2 and 3. Resetting removes all previously uploaded NIT configurations from the devices. When the NIT is re-read, the devices now only return their current configured settings.

- ➔ Click on RESET NIT.
The devices' NIT entries are reset.

6.9. M3U

6.9.1. Download M3U list or IP address of the M3U list

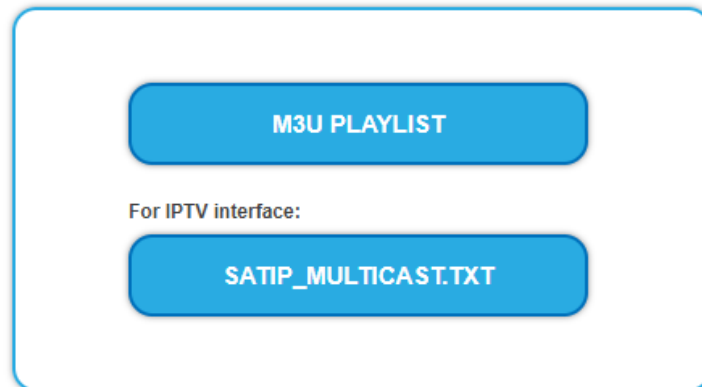
Under DOWNLOAD CONFIGURATION FILES, you can download an M3U list for Panasonic SMART TV devices to your PC. You then import the configuration file into your TV.

You can also determine the IP address of the M3U list. Using the IP address, the SMART TV locates the IPTV streamer's channel list and can load the channels via a channel scan.

Notes:

- Panasonic only supports the RTP network protocol, so RTP must be set as the output mode in Phase 4 .

DOWNLOAD CLIENT CONFIGURATION FILES



M3U playlist

- ➔ Click on M3U PLAYLIST. An M3U file is generated containing the IPTV streamer's channels configured for the transport stream.

SATIP_Multicast.txt

- ➔ Click on SATIP_MULTICAST.TXT. A text file will be generated containing the IP address of the M3U list (e.g. "http://192.168.178.31/satip.m3u").

6.9.2. Add further streams to the M3U list

The M3U list initially contains only streams from the MIP headend. If further streams, e.g. from an HKI headend, are fed in, these streams can be added under Other Services. These are then also included in the M3U file and can be read by set-top boxes or smart TVs.

OTHER SERVICES

Destination IP	Port	LCN	Program Name	Mode	
225.1.1.1	1234	67	AXING TV	UDP ▾	+

SAVE

6.10. SAP

SAP (Session Announcement Protocol) is defined in RFC 2974 and is used to announce multicast multimedia sessions, typically carrying SDP (Session Description Protocol) payloads. SAP works by periodically multicasting session announcements to a well-known multicast address and port. Receivers listen on that address and build up a cache of available sessions.

SAP (SESSION ANNOUNCEMENT PROTOCOL)

State: ☐ OFF

Announcement interval (seconds):

SAVE

- ➔ Enable the **State** switch and setup the interval
- ➔ Click SAVE to apply

6.11. Logs

6.11.1. Log entries

Under LOGS, you can view the headend's log entries.

- The status log is written to RAM and is cleared after a reboot.
- The system log is written to flash memory, so it is still available after a restart.

Log:

2026-04-24 13:49.57 (UTC) : Connected to SMARTPortal.

2026-04-24 14:47.35 (UTC) : ERROR - Tuner 3: errors in input signal.

2026-04-24 15:49.55 (UTC) : ERROR - Tuner 3: errors in input signal.

2026-04-25 01:59.39 (UTC) : ERROR - Tuner 3: errors in input signal.

2026-04-25 04:56.19 (UTC) : ERROR - Tuner 3: errors in input signal.

2026-04-25 13:11.36 (UTC) : ERROR - Tuner 3: errors in input signal.

2026-04-25 15:35.43 (UTC) : WARNING - SMARTPortal connection dropped, reconnect.

2026-04-25 15:36.45 (UTC) : Connected to SMARTPortal.

SAVE LOG

ERASE LOG

- ➔ Select **Status Log**.
The entries in the status log are displayed.
- ➔ Select **System log**.
The entries in the system log are displayed.
- ➔ Click SAVE LOG to save the respective log entries as a text file.
- ➔ Click on ERASE LOG to delete the respective log entries.

6.11.2. Tuners to monitor

Under TUNERS TO MONITOR, select the tuners that are to write log entries.

TUNERS TO MONITOR

- ☒ Tuner 1
- ☒ Tuner 2
- ☒ Tuner 3
- ☒ Tuner 4
- ☒ Tuner 5
- ☒ Tuner 6
- ☒ Tuner 7
- ☒ Tuner 8
- ☒ Tuner 9
- ☒ Tuner 10
- ☒ Tuner 11
- ☒ Tuner 12
- ☒ Tuner 13
- ☒ Tuner 14
- ☒ Tuner 15
- ☒ Tuner 16

SAVE CHANGES

6.12. Licences

6.12.1. Licences for software extensions

Software extensions can be used to expand the functionality of a headend (e.g. PID filtering/creating an NIT). You require a licence for a software extension. The licenses table list available licenses with corresponding status. **Permanent** means that license will never expire, **not activated** means that license is not activated yet.

LICENSES

Feature	Expires
DVB-C/T	permanent
NIT	permanent
PID filtering	permanent
16 Modulators	permanent
IP output	permanent
SMARTPortal	permanent
Simulcrypt	Not activated

Purchasing licences

You can purchase a licence by buying the relevant software extension from AXING. When purchasing, you must provide the headend's serial number. A licence file will be generated for you that corresponds to this exact serial number. **Important:** The licence is tied to the serial number and cannot be transferred to other devices!

Uploading the licence file

Licences can be uploaded to the headend in various ways:

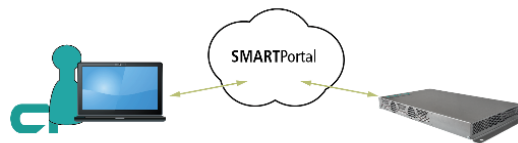
Via AXING Support using remote maintenance software (e.g. TeamViewer):

- ✓ The headend must be connected to a PC/laptop via Ethernet.
- ✓ The laptop requires internet access.
- ✓ You will need a valid software licence and the latest version of the remote maintenance software.



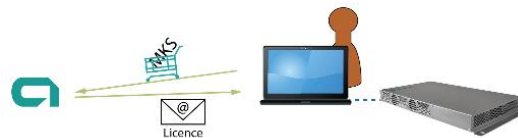
By the user or AXING Support via SMARTPortal:

- ✓ The headend must be integrated into the SMARTPortal and requires internet access.
- ✓ If AXING Support is to upload the licence file, the 'Allow AXING Support' option must be enabled for the headend.



By the user in the configuration interface:

- ✓ You have ordered a software extension and received a licence file by email.
- ✓ Upload the licence file (SN.lic) in the headend's configuration interface under MAINTENANCE > LICENCES.



Note: The function is only available after restarting the headend.

UPLOAD A NEW LICENSE

LICENSE FILE:

Datei auswählen

Keine ausgewählt

UPLOAD

- ➔ Select license file from local source
- ➔ Click UPLOAD
- ➔ Restart the device.

6.13. CASimulcrypt (with MKS 1-02)

Setting up a conditional access system requires the installation and configuration of a CAS server, which generates ECMs and EMMs, amongst other things. The setup of a CAS server is not described in this document. To configure the settings for the headend, you require the appropriate licence (see 6.12 on page 56). Once this licence has been activated in the headend, the necessary settings can be configured under **CAS**.

➔ Click on CAS.

Several fields and tables for the CAS settings will open (the settings are in English).

6.13.1. Global CAS settings

GLOBAL SETTINGS	
Enable Simulcrypt:	☒
Network Interface:	Control
EMMG Listening Port:	9998

- **Enable Simulcrypt:** Enable or disable Simulcrypt (a licence is required for activation).
- **Network Interface:** The network interface used for Simulcrypt-related network traffic; the selectable option is the Control interface. The IP address of the interface must be configured for the EMMG (CAS server) (see '6.3' on page 43).
- **EMMG Listening Port:** TCP port configured in the EMMG (CAS server) for the headend connection.

6.13.2. Scrambling Control Groups (SCG)

This table lists all the Scrambling Control Groups in use. Programmes connected to the same SCG are encrypted at the same time using the same control word (key). Each SCG can contain one or more programmes. The programmes are linked to the SCGs in Phase 2 (see 6.13.7 on page 61).

SCG LIST						
Name	Algorithm	Scrambling Policy	Fallback	Crypto Period (sec)	Status	+
Conax 2501	DVB-CSA-1	All ECMGs	Keep last CW	15		
Conax 2504	DVB-CSA-1	All ECMGs	Keep last CW	15		
Conax 2511	DVB-CSA-1	All ECMGs	Keep last CW	15		
Conax 2521	DVB-CSA-1	All ECMGs	Keep last CW	15		
Conax 2531	DVB-CSA-1	All ECMGs	Keep last CW	15		
Conax 2505	DVB-CSA-1	All ECMGs	Keep last CW	15		

Name: Used only in the configuration interface to easily identify the scrambling groups. Therefore, the groups should have descriptive names so that they can be easily identified in Phase 2 when linking programmes to SCGs.

- **Algorithm** (scrambling algorithm), selectable options are:

unscrambled (scrambling for the SCG is disabled)
 # DVB-CSA-1
 # DVB-CSA-2
 # DVB-CISSA
 # ATIS-IDSA
 # AES-ECB
 # AES-CBC

- **Scrambling Policy**, selectable options are:

All ECMGs: Programmes associated with this SCG are only encrypted if all ECMGs are connected.

- # Any ECMG: Programmes associated with this SCG are encrypted if at least one ECMG is connected.
- # Always : Programmes are always encrypted. If all ECMG connections are lost, there is no way to decrypt
- **Fallback:** (Fallback rule) if the scrambling policy is not met, selectable options:
 - # Revert to clear: Stop encryption. Subscribers receive the programmes unencrypted. Non-subscribers can also view the content.
 - # Keep last CW: Encryption continues with the last Control Word and the last ECM received. Subscribers can continue descrambling.
- **Crypto Period (sec):** Minimum period in seconds for a Control Word. The ECM generator may also specify a minimum period it supports, in which case the larger of these two values is used.
- **Status** (scrambling status), displayed as a traffic light

6.13.3. CAS List

This table is used to assign human-readable names to CAS IDs, making them easier to identify in the subsequent tables.

CAS LIST			
Name	CAS ID	Sub ID	+
Conax	0x0B00	0x0001	 
Test	0x1234	0x5678	 
Verimatrix	0x5604	0x0000	 

Enter all connected CA systems here. Each CA system is identified by two IDs: the "CA System ID" (**CAS-ID**) and the "CA Subsystem ID" (**Sub-ID**)².

6.13.4. ECM Generators

The ECM generator is provided by the CAS supplier to generate ECM messages.

ECM GENERATOR LIST						
Name	Channel ID	Remote IP	Port	CAS	Status	+
Conax	1	192.168.0.100	8007	Conax		 

- **Name:** Used only in the web interface to easily distinguish between ECMG servers.
- **Channel ID** <optional>: 'ECM_channel_id' Used when communicating with the ECMG. Some ECMGs require a specific value for this ID (check with the CAS provider if necessary). If the field is left blank, a random ID is used.
- **Remote IP:** IP address of the ECMG server to which a connection is to be established.
- **Port:** Port of the ECMG server to which a connection is to be established.
- **CAS:** CA system of this ECMG (name is configured in the CAS List)
- **Status:** ECMG server connection status, displayed as a traffic light

6.13.5. ECM List

ECM contains information from the CAS provider, which securely contains the Control Word, as well as authorisation information. Each ECM entry corresponds to a generated ECM stream. Each SCG requires at least one ECM stream, as otherwise nothing can be decrypted.

² Sometimes both values are combined into a single "Super CAS ID".

ECM LIST						
ECM Generator	ECM ID	SCG	Access Criteria	Private Data	Status	+
Conax	2501	Conax 2501	00 00 09 C5	<empty>		
Conax	2504	Conax 2504	00 00 09 C8	<empty>		
Conax	2505	Conax 2505	00 00 09 C9	<empty>		
Conax	2521	Conax 2521	00 00 09 D9	<empty>		
Conax	2511	Conax 2511	00 00 09 CF	<empty>		
Conax	2531	Conax 2531	00 00 09 E3	<empty>		

- **ECM Generator:** ECM generator responsible for generating this ECM stream (value from the ECM Generator List)
- **ECM ID** <optional>: Used when communicating with the ECMG. Some ECMGs may require a specific value for this (check with the CAS provider if necessary). If the field is left blank, a random ID is used.
- **SCG:** Scrambling Control Group, whose control words are transmitted by this ECM (value from SCG table)
- **Access Criteria:** Arbitrary binary data transmitted to the ECMG. Typically, this is used to inform the ECMG which customers should be able to decode the ECMs. Format and value are specified by the CAS supplier.
- **Private Data:** Binary data contained as 'private_data' in the "CA_descriptor" of the PMT associated with this ECM (information may be provided by the CAS supplier).
- **Status:** ECM stream status, displayed as a traffic light

6.13.6. EMM Configuration

EMM contains information from CAS providers specifying, for example, the authorisation levels of subscribers or groups of subscribers. The EMM generator is an external server belonging to the CAS provider, which generates EMM messages and repeatedly sends them to the headend.

The EMM configuration is divided into two tables: **EMM Generator List** and **EMM List**.

EMM GENERATOR LIST				
Name	IP Filter	CAS	Client ID	+
Conax	<none>	Conax	<use Super_CAS_id>	
Test	<none>	Test	<use Super_CAS_id>	

EMM Generator List:

- **Name:** Used solely to make it easier to identify individual EMMG servers
- **IP filter** <optional>: By default, different EMM generators are separated by client ID, so this cell can usually be left blank. However, if an IP address is entered, only connections via this address are permitted.
- **CAS:** CA system from the CAS list.
- **Client ID** <optional>: The value used by EMMG to identify itself (information from the CAS supplier). The 'Super_CAS_id' is often used as the 'client_id'. The field can then be left blank, and the device will use the 'Super_CAS_id' of the selected CAS.

EMM LIST					
EMM Generator	Data ID	Bandwidth (kbps)	Private Data	Status	+
Conax	<auto>	100	<empty>		

EMM List:

- **EMM Generator:** Name from the EMM Generator List
- **Data ID** <optional>: EMMG identifies separate streams by their Data ID . If the field is left blank, all Data IDs are accepted.

- **Bandwidth:** Allocated bandwidth (kbps) for this EMM stream. The EMM generator must maintain the bitrate.
- **Private Data** <optional>: Any binary data contained as 'private_data' in the CA_descriptor for this EMM.
- **Status:** EMM reception status, displayed as a traffic light

6.13.7. Programme encryption in Phase 2

In Phase 2, the programmes are linked to the SCGs for encryption:

- ➔ Click on the desired programme to view its details.
 - ➔ Select a Simulcrypt SCG from the drop-down list (all configured SCGs are displayed).
By default, all video and audio PIDs for the programme are selected for scrambling.
 - ➔ Select or deselect individual PIDs in the "Scramble" column to override the default settings.
 - ➔ Click "Save changes" when you are finished.
- After saving the changes, the Encryption Status column displays the encryption status for each programme selected for encryption.

Modulator		LCN	Program Name		Type	Encryption	Input
M1	M2	M3		RTL Television	TV		239.0.0.1:1234
Program Name: RTL Television Service-ID: 12003 Simulcrypt SCG: Conax 2501 Duplicate program: Add							
Stream type		IN PID	OUT PID	FIXED	BLOCK	SCRAMBLE	
	PMT	44	44	☐	☐	☐	
	MPEG2 Video	163	163	☐	☐	☒	
	MPEG1 Audio (ger)	104	104	☐	☐	☒	
	Private data	108	108	☐	☐	☐	
	Teletext (deu)	105	105	☐	☐	☐	
	AC-3 Audio (ger)	106	106	☐	☐	☒	
	Subtitles (deu)	110	110	☐	☐	☐	
	DSM-CC	111	111	☐	☐	☐	
	DSM-CC	112	112	☐	☐	☐	
M1	M2	M3	RTL Regional NRW (user modified)		TV		239.0.0.2:1234

6.13.8. Encryption Status Monitoring

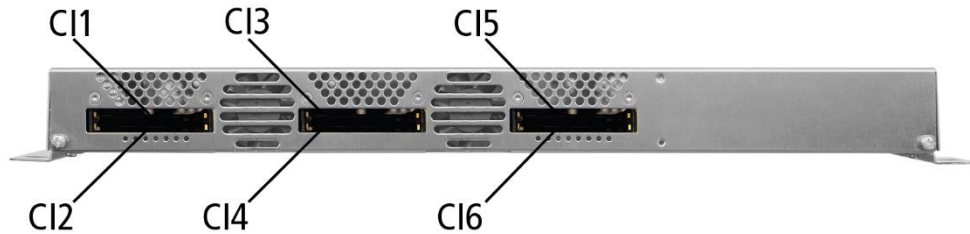
The web interface contains several Simulcrypt status indicators, each providing a different level of detail:

- **Phase 2 → Service scrambling status:** This is the most important status. If all encrypted services show green, the system is functioning without issues. However, if any programme shows red, further information is displayed under Maintenance>CAS.
- **SCG table status:** As soon as the SCG status is green, services connected to this SCG are encrypted, and the status must also be green in related rows in the ECMG and ECM tables. If the SCG status is red, please check the status columns in the ECMG and ECM tables.
- **ECM table status:** Status of the individual ECM streams. Check the value of the access criterion if the status is red.
- **ECMG table status:** Server connection status. The least critical item, but indicates a problem with the network configuration if the status colour is red. Check, for example, whether the network cable is correctly connected to the device. All other status elements remain red until the ECMG status turns green.
- **Maintenance → Logs** provides an overview of the scrambling status over the long term. All SCG errors are reported here.
- **SNMP traps** provide the most detailed real-time information for analysing, for example, CAS server connection issues. A good tool for collecting SNMP traps is iReasoning MIB Browser. Important: SNMP traps must first be enabled on the Maintenance page.

7. Using CA modules

7.1. Inserting the CA modules

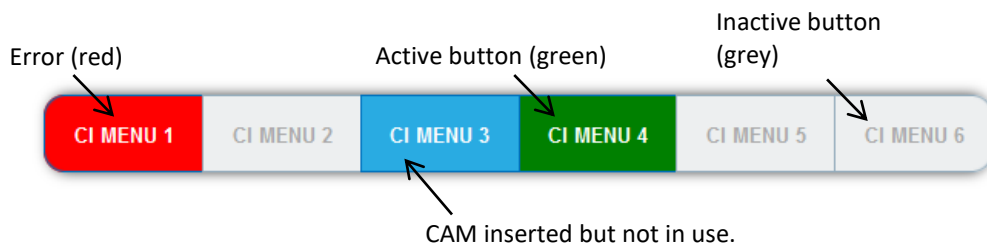
Into the CI slots on the front of the MK 16-06H. Up to six CA modules can be inserted into the 6 CI slots (CI1...CI6).



➔ Insert the CA modules carefully, without using force, and with the correct orientation into the corresponding CI slot.

7.2. CI menu

The settings for the CA modules can be configured in the CI menus on the home screen of the user interface. Once the modules have been inserted and initialised, the buttons for opening the CI menus become active.



If an error occurs, e.g. during decryption, the button turns red.

➔ Click on one of the buttons.

The corresponding CI menu will open.

7.2.1. Using the CI menu

The contents of the CI menu depend on the CAM manufacturer and the card used. Different settings are available depending on the manufacturer. The most important information relates to validity and authorisations.

→ Please refer to the manufacturer's operating instructions.

The input and navigation field is used to navigate within the CI menu.

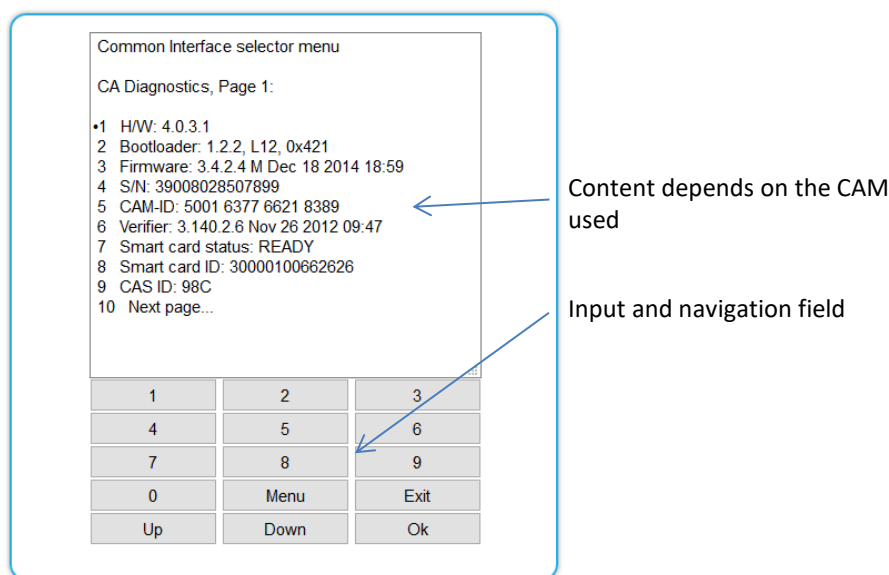
→ Use **Up** and **Down** to move up or down to a selection point.

→ Use **OK** to enter a corresponding submenu or to confirm a selection.

→ Use **Menu** to return to the next higher level

→ Use **Exit** to leave the CI menu.

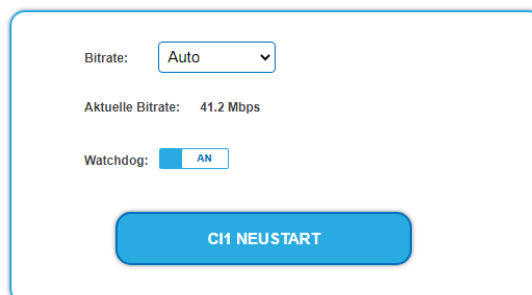
CI-MENU 2



7.2.2. Bitrate for high-speed CAM and restarting the CAM

Bitrate

The bitrate is set to "Auto" by default. This detects the bitrates of the most common CA modules. If necessary, the bitrate can also be set manually.



→ Then select the desired bitrate in the **Bitrate** field.

→ For example, select 105 Mbps for a High-Speed CAM.

The module will restart after selection. It will take a moment for all programmes to be decrypted again.

Watchdog

The Watchdog monitors the CAM's operation and automatically restarts the CA module in the event of a fault. If you do not wish this to happen, set the Watchdog to OFF.

Restarting the CAM

The CAM can be restarted manually if necessary.

→ To do this, click on Clx RESTART.

7.3. Decrypting channels

After the channel scan, you can identify encrypted programmes in the tuner tables by the abbreviation **CA** in the **Encryption** column.

By default, the option '**no**' is selected in the **Decryption** column. The programme is transmitted to the modulator in encrypted form and must be decrypted at the receiver.

If CA modules are installed in the headends, the corresponding programmes can be decrypted.

Select CI slot

TUNER 1						
Input mode: Standard ?						
Modulator	LCN	Programmname	Typ	Verschlüsselung	Entschlüsselung	
M1 M2 M3 M4 M5 M6 M7 M8		SRF 1 HD	TV	CA	CI 1 ▾	●
M1 M2 M3 M4 M5 M6 M7 M8		SRF zwei HD	TV	CA	CI 1 ▾	●
M1 M2 M3 M4 M5 M6 M7 M8		RTS Un HD	TV	CA	CI 1 ▾	●
M1 M2 M3 M4 M5 M6 M7 M8		RTS Deux HD	TV	CA	CI 1 ▾	●

➔ In the **Decryption** column, select CI 1 to CI 6 or CI 3.

The programme is transmitted to the selected modulator in decrypted form.

8. Technical specifications

8.1. MK 16-00H | MK 16-06H

Type	MK 16-00H	MK 16-06H
Inputs		
Frequency range	900 ... 2150 MHz @ DVB-S/S2/S2X 50 ... 898 MHz @ DVB-C 50 ... 898 MHz @ DVB-T/T2	
Input level	43 ... 84 dBμV @ DVB-S/S2/S2X 49 ... 84 dBμV @ DVB-C 39 ... 84 dBμV @DVB-T/T2	
LNB voltage	13/17 V; 22 kHz on/off; DiSEqC 1.0	
Max. LNB current	250 mA per input 1000 mA per device	
CI slots	-	6
Input modulation		
Type	QPSK/8PSK/8APSK/16APSK/32APSK @ DVB-S/S2/S2X QAM16, QAM32, QAM64, QAM128, QAM256 @ DVB-C QPSK, QAM16, QAM64 @ DVB-T QPSK, QAM16, QAM64, QAM256 @ DVB-T2	
Supported input transport streams	MPEG-2 ISO/IEC 13818 MPEG-4 ISO/IEC 14496	
Error correction	auto	
Symbol rate	1.5 ... 45 MS/s (< 40 MS/s in 32APSK) @ DVB-S/S2/S2X 1 ... 7.2 Mbaud @ DVB-C	
Output		
Number of channels	16 × DVB-C/DVB-T	
Frequency range	109 ... 1006 MHz @ DVB-C 109 ... 862 MHz @ DVB-T	
Output level adjustable	80 ... 100 dBμV @ DVB-C 77 ... 98 dBμV @ DVB-T	
Output modulation		
Type	QAM16, QAM32, QAM64, QAM128, QAM256 @ DVB-C QPSK, QAM16, QAM64 @ DVB-T	
MER	≥ 40 dB @ DVB-C ≥ 36 dB @ DVB-T	
IP output		
Transportstreams	512 × SPTS 16 × MPTS	
Total net data rate	900 Mbps	
Data rate per tuner	125 Mbps	
Supported transport protocols	UDP	
Supported application protocols	RTP	
Interfaces		

Ethernet connectors	2 × RJ 45
Ethernet standards	IEEE 802.3, 100 Base-T @ Control IEEE 802.3, 1000 Base-T /1 GbE @ IPTV OUT
Supported configuration protocols	HTTP, SNMP v1, SNMP v2c, AXING SMARTPortal**
General	
Operating temperature range (acc. to EN 60065)	−10 °C ... +50 °C
Operating voltage	100 ... 240 VAC/50 ... 60 Hz
Power consumption	70 W
Comments	* with software extension only ** encrypted, cloud-based application for configuration, monitoring and remote maintenance

Note: You find the detailed technical data at www.axing.com.

MK 8-00H | MK 8-06H

Type	MK 8-00H	MK 8-06H
Inputs		
Frequency range	900 ... 2150 MHz @ DVB-S/S2/S2X 50 ... 898 MHz @ DVB-C 50 ... 898 MHz @ DVB-T/T2	
Input level	43 ... 84 dBμV @ DVB-S/S2/S2X 49 ... 84 dBμV @ DVB-C 39 ... 84 dBμV @DVB-T/T2	
LNB voltage	13/17 V; 22 kHz on/off; DiSEqC 1.0	
Max. LNB current	250 mA per input 1000 mA per device	
CI slots	-	6
Input modulation		
Type	QPSK/8PSK/8APSK/16APSK/32APSK @ DVB-S/S2/S2X QAM16, QAM32, QAM64, QAM128, QAM256 @ DVB-C QPSK, QAM16, QAM64 @ DVB-T QPSK, QAM16, QAM64, QAM256 @ DVB-T2	
Supported input transport streams	MPEG-2 ISO/IEC 13818 MPEG-4 ISO/IEC 14496	
Error correction	auto	
Symbol rate	1.5 ... 45 MS/s (< 40 MS/s in 32APSK) @ DVB-S/S2/S2X 1 ... 7.2 Mbaud @ DVB-C	
Output		
Number of channels	8 × DVB-C/DVB-T	
Frequency range	109 ... 1006 MHz @ DVB-C 109 ... 862 MHz @ DVB-T	
Output level adjustable	82 ... 102 dBμV @ DVB-C 79 ... 100 dBμV @ DVB-T	

Output modulation	
Type	QAM16, QAM32, QAM64, QAM128, QAM256 @ DVB-C QPSK, QAM16, QAM64 @ DVB-T
MER	≥ 40 dB @ DVB-C ≥ 36 dB @ DVB-T
IP output	
Transportstreams	512 × SPTS 16 × MPTS
Total net data rate	900 Mbps
Data rate per tuner	125 Mbps
Supported transport protocols	UDP
Supported application protocols	RTP
Interfaces	
Ethernet connectors	2 × RJ 45
Ethernet standards	IEEE 802.3, 100 Base-T @ Control IEEE 802.3, 1000 Base-T /1 GbE @ IPTV OUT
Supported configuration protocols	HTTP, SNMP v1, SNMP v2c, AXING SMARTPortal**
General	
Operating temperature range (acc. to EN 60065)	−10 °C ... +50 °C
Operating voltage	100 ... 240 VAC/50 ... 60 Hz
Power consumption	60 W
Comments	* with software extension only ** encrypted, cloud-based application for configuration, monitoring and remote maintenance



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