axing® | Competence in Communication Technologies

MK 8-00 | MK 16-00
MK 8-06 | MK 16-06

Multituner | DVB-C/DVB-T compact headend

Operation instructions

HD TV

Table of contents

⚠ WARNING

Safety instructions:

- The installation of the device and repair work on the device must be carried out only by a professional in accordance with the applicable VDE directives. In case of incorrect installation, no liability is assumed.
- Never open the device. There are no parts to be maintained by the user inside the device, however, lethal voltages are present. This also applies to cleaning the device or working on the connections.
- Use only the mains cable enclosed to the device. Never replace any parts or make any modifications to the mains cable. Otherwise, there is a risk of death.
- If you intend not to use the device for a longer period of time, we recommend you to completely disconnect the device from the mains for safety reasons and for saving energy by pulling out the mains plug.
- Let the device adjust to the room temperature before commissioning, in particular if condensation is present on the device, or if it was exposed to large temperature fluctuations.
- The device must be operated only in moderate climate.
- The device must be operated only in dry rooms. In damp rooms or outdoors, there is a risk of short-circuits (attention: risk of fire) or electrical shocks (attention: risk of death).
- The device shall not be exposed to dripping or splashing. Do not place objects filled with liquids such as vases on the device.
- Plan the mounting or installation location such that you can easily reach the mains plug and interrupt the electric circuit in dangerous situations. Select the mounting or installation location such that children cannot play near the device and its connections without supervision. The mounting or installation location must allow a safe installation of all connected cables. Power supply cables and supply cables must not be damaged or squeezed by any objects.
- Operate the device only on a flat, firm surface and protect it against unintentional movements.
- Never expose the device to direct solar irradiation and avoid direct vicinity of heat sources (e.g. heaters, other electrical appliances, fireplace, etc.). It must be always ensured that devices with cooling elements or ventilation slots are not covered or obstructed.
- Ensure generous air circulation around the device. This will prevent possible damage to device and risk of fire due to overheating. It must be always ensured that cables are not located near heat sources (e.g. heaters, other electrical appliances, fireplace, etc.). The unit must be wall mounted with at least 5 cm clearance along the 4 sides. For 19-inch rack mounting, there must be at least 5 cm clearance in front of and behind the unit.
- In particular, the warranty and liability shall be excluded for the consequences of incorrect use, in case of incorrect modifications or repair work carried out by the customer. Use the device only as described in the operating instructions and in particular according to the state-of-the-art.
- The antenna system must be installed and grounded according to the current DIN EN 60728-11 standard.

CE   Herewith AXING AG declares that the marked products comply with the valid guidelines. You can call up the complete EU declaration of conformity for download by entering the article in the search field at www.axing.com.

🗑   WEEE Nr. DE26869279 | Electrical and electronic components must not be disposed of as residual waste, it must be disposed of separately.

1. Product description

1.1. General

MK 8-00   Eight independent multituner inputs

Transmodulates 8 × DVB-S/S2/S2x/T/T2/C into 8 × DVB-C or DVB-T (depending on the configured modulation standard, see 3.7.2 on page 31)

Expandable to 16 modulators with MKS 8-16 software.

MK 8-06   Like MK 8-00, with 6 CI slots (see chapter 4 on page 42)

MK 16-00   16 independent multituner inputs

Transmodulates 16 × DVB-S/S2/S2x/T/T2/C into 16 × DVB-C or DVB- T (depending on the configured modulation standard, see 3.7.2 on page 31)

MK 16-06   Like MK 16-00, with 6 CI slots (see chapter 4 on page 42)

Common Features:

- Remux | Crossmultiplex
- Web-based configuration | Remote maintenance
- Suitable for AXING SMARTPortal
- Can be used for wall mounting or as a 19" unit
- Built-in power supply

1.2. Scope of delivery

1 × Compact headend

1 × AC power cord

1 × Quick start guide

1.3. Inputs/multituner

Headend devices with multituner can receive DVB-S/S2/S2x, DVB-T/T2 or DVB-C. **For receiving DVB-T/T2 or DVB-C the LNB power has to be switched off before connecting a antenna cabel to one of the HF inputs (see 3.3.2 on page 17)!**
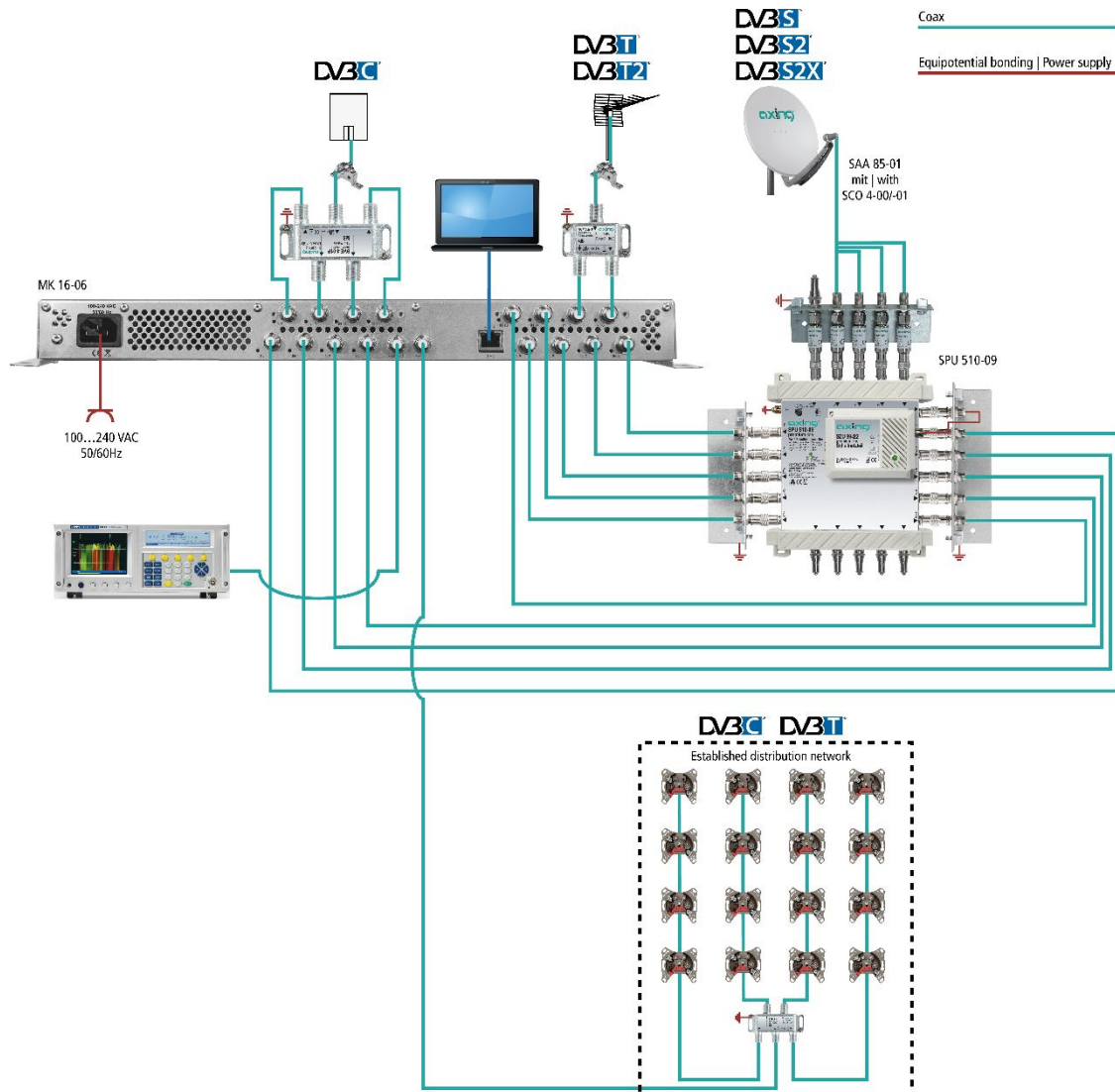
Direct connection to the LNBs

The devices have a remote supply voltage for the LNB and DiSEqC 1.0 functionalities at the inputs. The inputs can be connected directly to the LNB.

Multiswitches as input distributors (recommended)

Optionally, you can also use multiswitches as input distributors. The advantage of this solution is that you can set both the polarization and the satellite via the user interface. Changes in the list of programmes can be made using remote maintenance, so that it is not necessary to change or modify the input distribution on site.

Demodulation of the data stream

The selection of the frequency and the demodulation of the data stream are both done in the tuner.

If needed, the programmes from the data flow of the demodulated transponder can be filtered (Remux mode).

Thanks to the Cross Multiplex Mode, FTA programmes (Free to Air) can be filtered from the data flow of several tuners for a common output channel and be bundled again.

The prepared data flow is passed on to the modulators.

1.4.   Output/modulators

The **MK 8-0x** have eight output modulators. The **MK 16-0x** have 16 output modulators. All modulators can be set to any output channel (DVB-C = S2…K87 | DVB-T = S2…K69).

1.5.   Graphical user interface

The settings can be changed via the user interface of the integrated web interface. To access the user interface and thus configure the devices, you need a standard PC/laptop with a network interface and the actual version of the installed web browser (left).
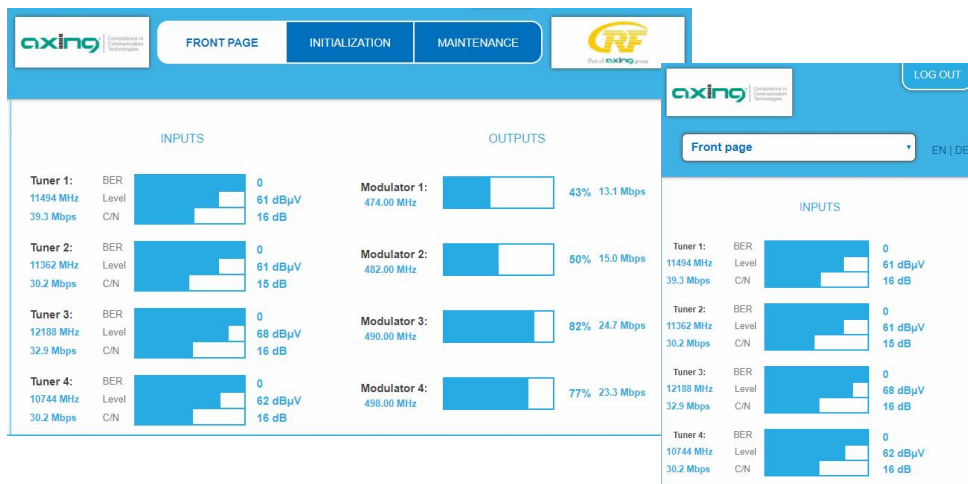
The configuration interface is "mobile ready" and can therefore also be used from the smartphone or tablet (right).

1.6.   SMARTPortal

AXING ensures with its **SMART**Portal, a web-based cloud application, an easy remote access on web configuration surfaces of its headends.

With AXING's SMARTPortal a worldwide configuration of all settings or software updates can be ensured. On customer request AXING can provide the necessary support.
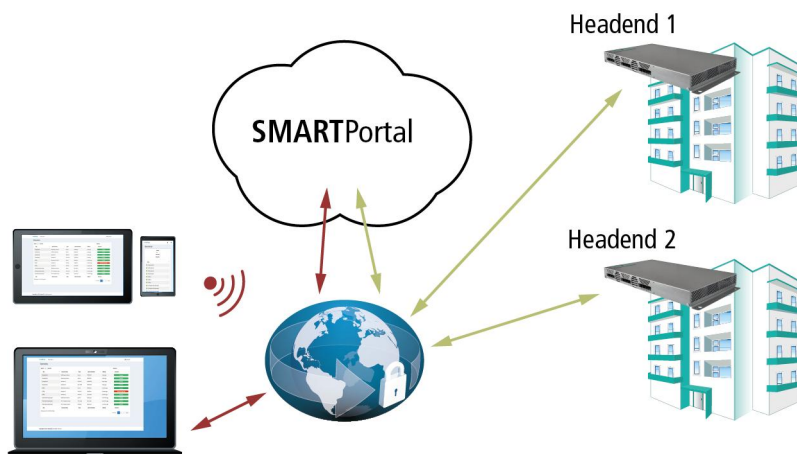
AXING headends ensure a continuous secure and encoded connection to the AXING SMARTPortal. Only requirement on site is an internet connection (e. g. via LAN, EoC, EoC-WLAN-Bridge, 3G/LTE-Router). There is no complicated configuration of a router and no additional software for the local computer needed (see 2.6 on page 11).

1.7. Display elements and connectors

1.7.1. MK 8/16-0x
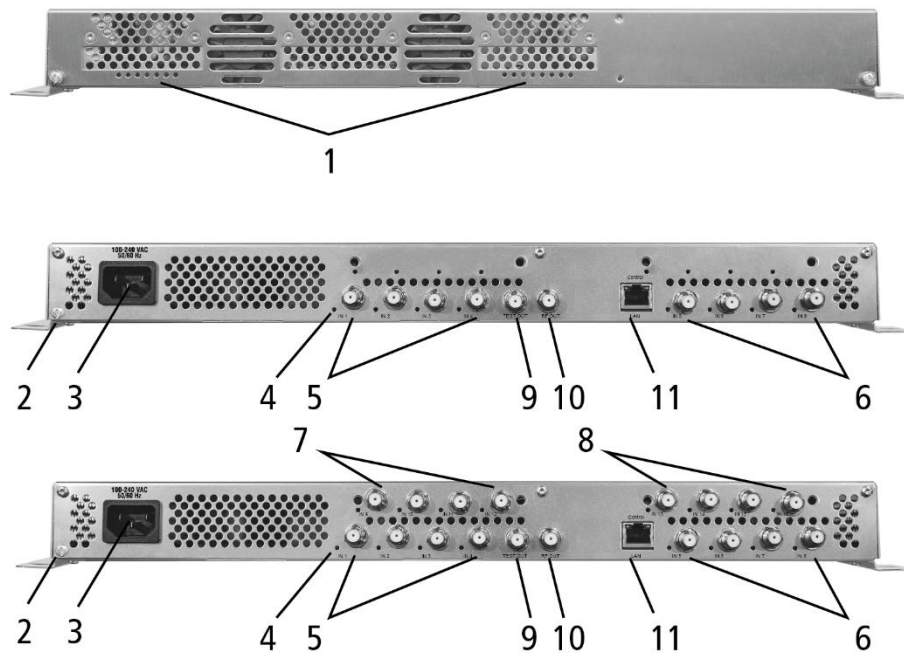
1. LED indicators

   Green   =   modulation is ok

   Green (blinking)   =   something is missing from the programmed TS

   Red   =   modulator overload.

2. Equipotential bonding connection

3. Mains connection

4. HF input LEDs:

   Yellow = MPEG data stream present,

   Off = MPEG data stream not present

5. RF input 1…4

6. RF input 5…8

7. RF input 9…12 (MK 16-0x only)

8. RF input 13…16 (MK 16-0x only)

9. Test port

10. RF output

11. RJ45 Ethernet connector

1.7.2. MK 8-06/16-06

MK 8-06 and MK 16-06 each have 6 CI slots (CI1 … CI6).

Which encrypted program you decrypt with which interface, you determine in the configuration.
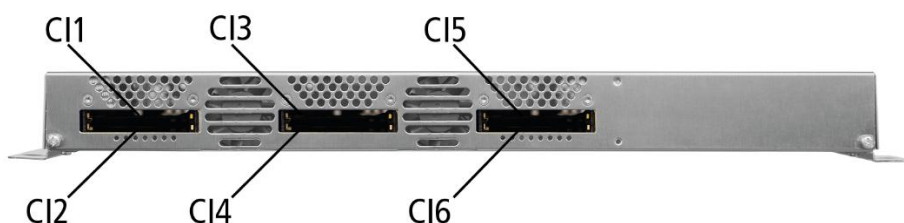
2. Mounting and Installation

➜ Installation must be performed by authorized and skilled electricians only.

➜ Before mounting and installation, pull the mains plug (1)!

➜ The antenna system must be installed and grounded according to the EN 60728-11 standard.

The compact headend can be mounted on either at the wall or be mounted in a 19 "rack.

2.1. Wall mounting

The compact headend are factory-fitted with wall brackets.

Note: The unit must be wall mounted with at least 5 cm clearance along the 4 sides.
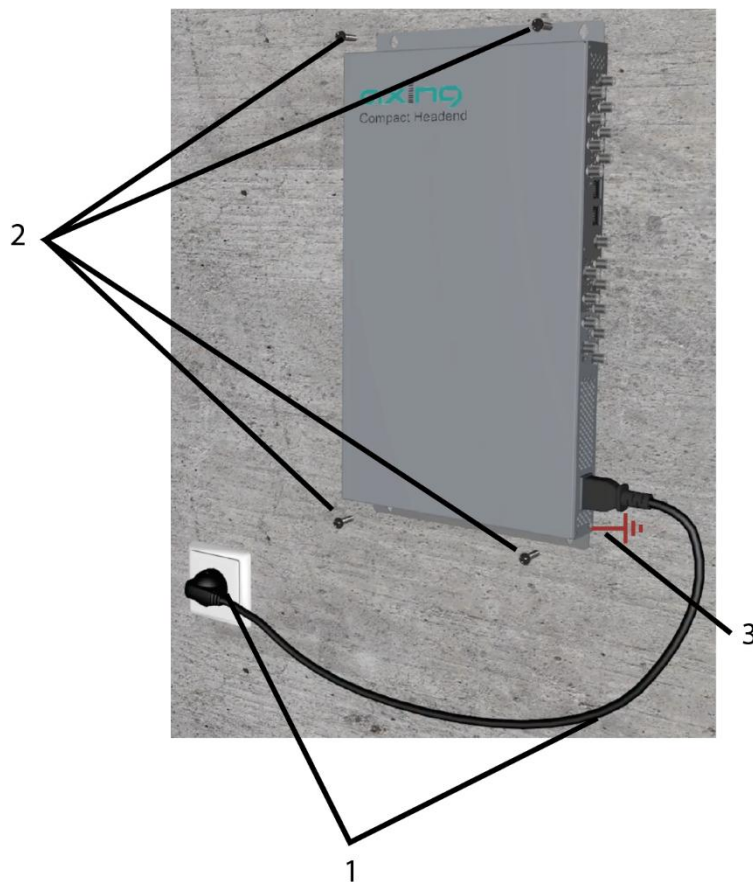
➜ The installation must be carried out on an even and vertical surface (any unevenness must be compensated).

➜ Fix the headend with with minimum four pcs. of 4 × 30 mm screws.

➜ The headend must be connected to the equipotential bonding according to EN 60728-11 (3)

2.2.   Mounting in a 19" rack

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

➔ Remove the wall bracket from the housing of the compact headend.

➔ Mount the front plate MKZ 1-00 onto the MK 8 / 16-00 (1).
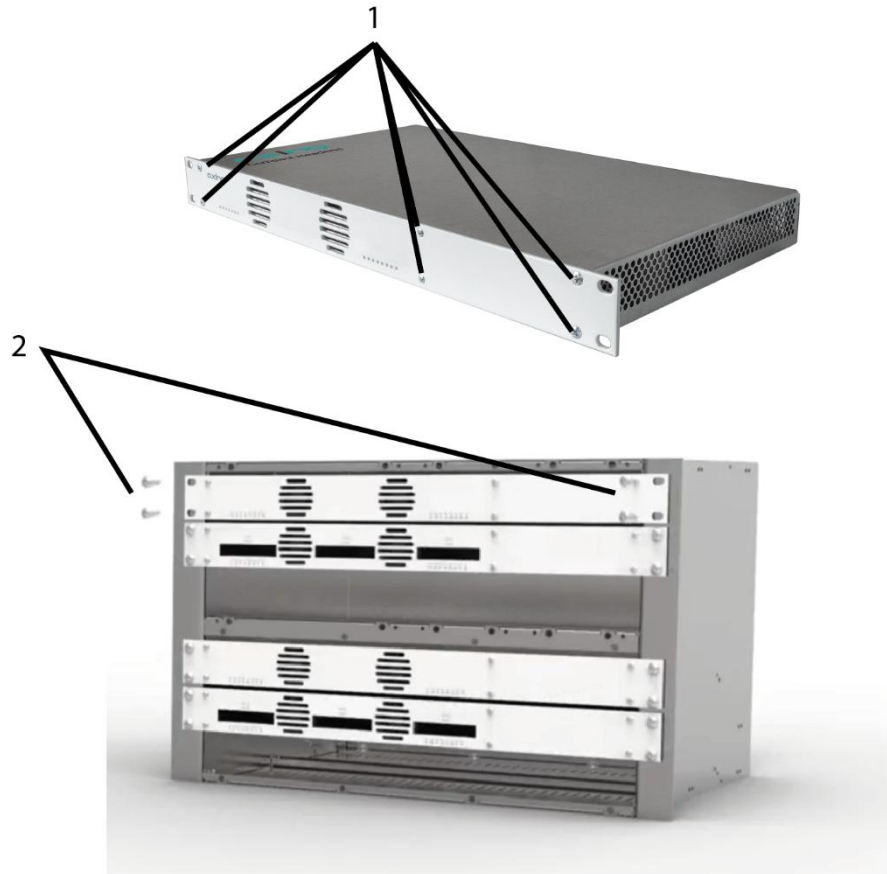
➔ Slide the compact headend into the 19 "rack.

➔ Screw the compact headend with four screws (2).

➔ Maintain the EN 60728-11.

2.3.   Equipotential bonding

➔ To connect the outer conductor of the coaxial cable to the equipotential bonding, use e.g. QEW earthing angles or CFA earth connection blocks at the inputs and output (see 2.5 on page 10).

2.4.   Power supply

The 19 "units have a built-in power supply. For example, connect the units to an electrical outlet (100 ... 240 VAC / 50 ... 60 Hz).

2.5.   RF Installation

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

⚠ **CAUTION**

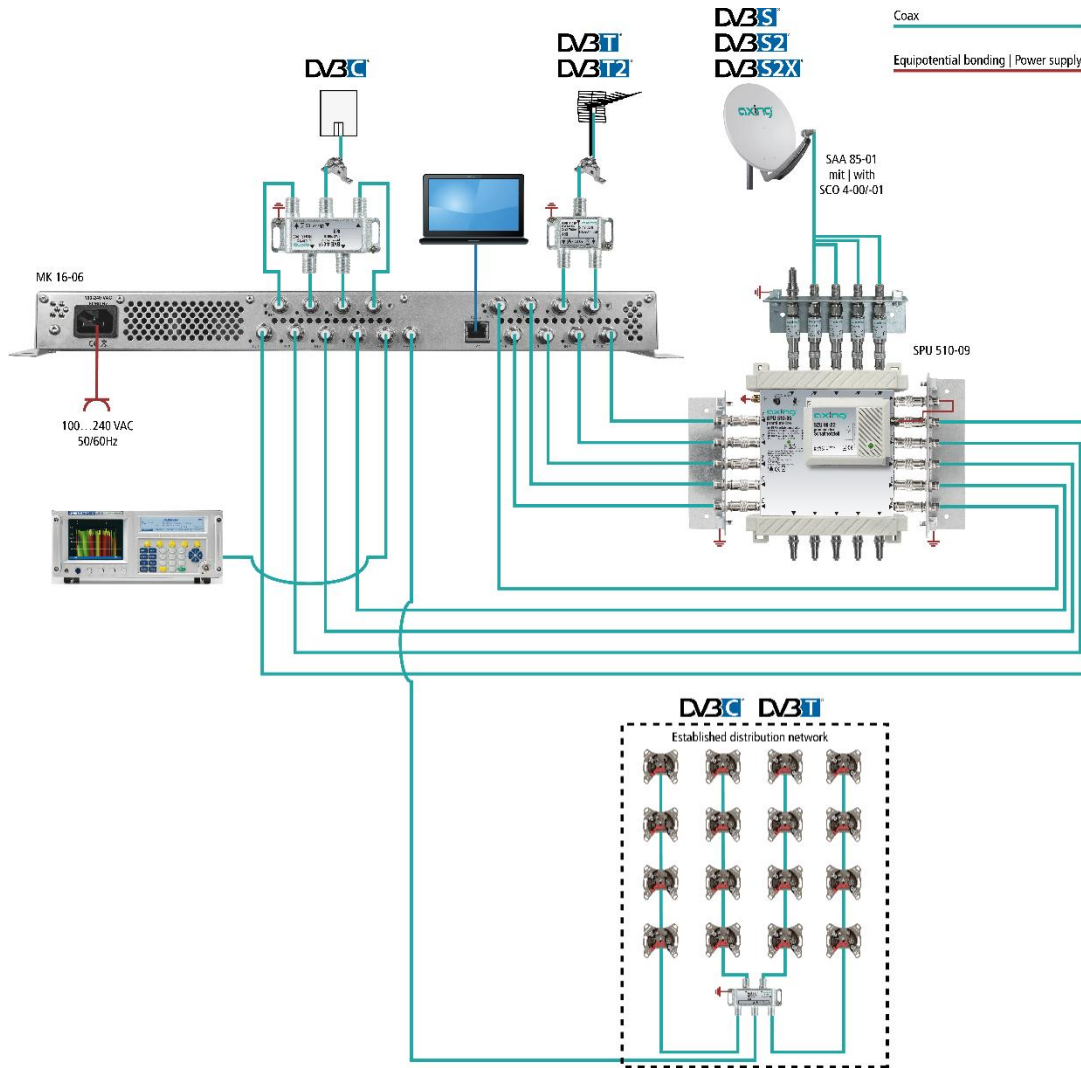**Before connecting the antenna cabel, the LNB power has to be switched off (see 3.3.2 on page 17). Active DVB-T antennas have to be supplied by an external power supply.**

2.5.2.   Connection to DVB-S/S2/S2x

Connection to the LNBs

On the SAT-IF input the compact headends have a remote supply voltage for the LNB and use DiSEqC 1.0 functionalities. Therefore, they can be connected directly to the LNB.

Multiswitches as input distributors

Optionally, you can also use multiswitches as input distributors. The advantage of this solution is that you can set both the SAT IF level and the satellite via the user interface. Changes in the list of programmmes can be made using remote maintenance, so that it is not necessary to change or modify the input distribution on site.

2.5.3.   Output

If you use more then one compact headend, you have to use a combiner to combine the output signals. Note: There has to be used galvanic isolator between the output connector and antenna network in Sweden and Norway state area.

2.6. Connection to the Internet
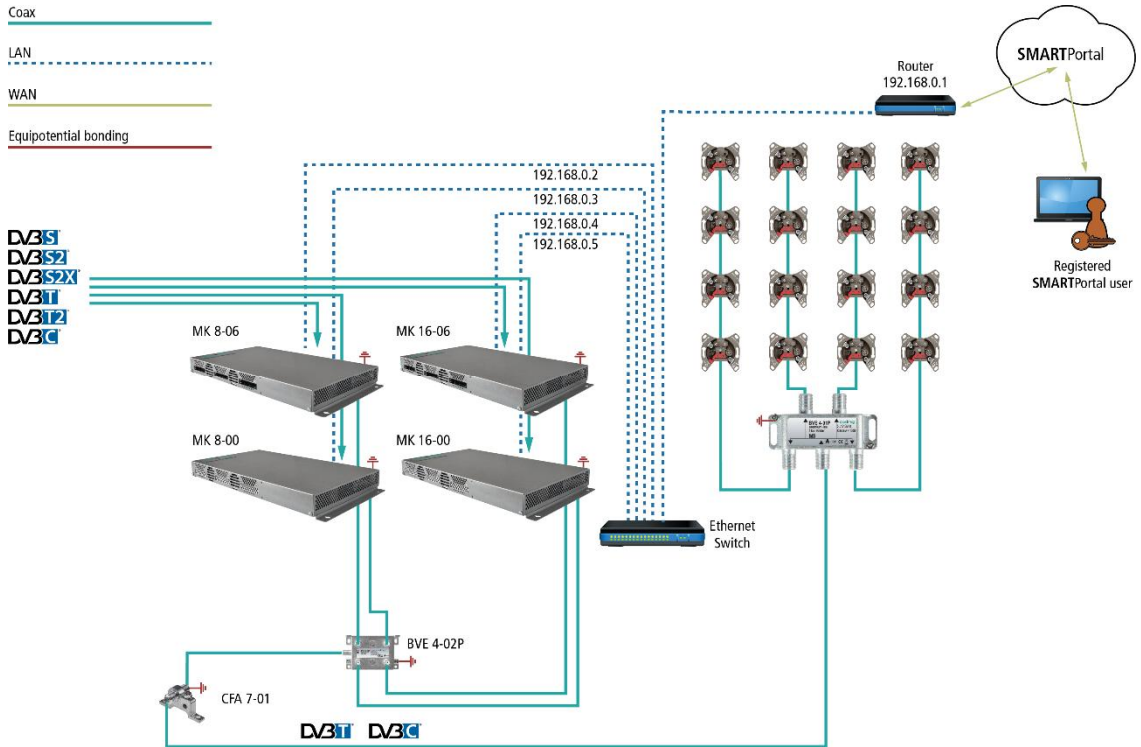
Connection via Ethernet switch to a router which is connected to the Internet.
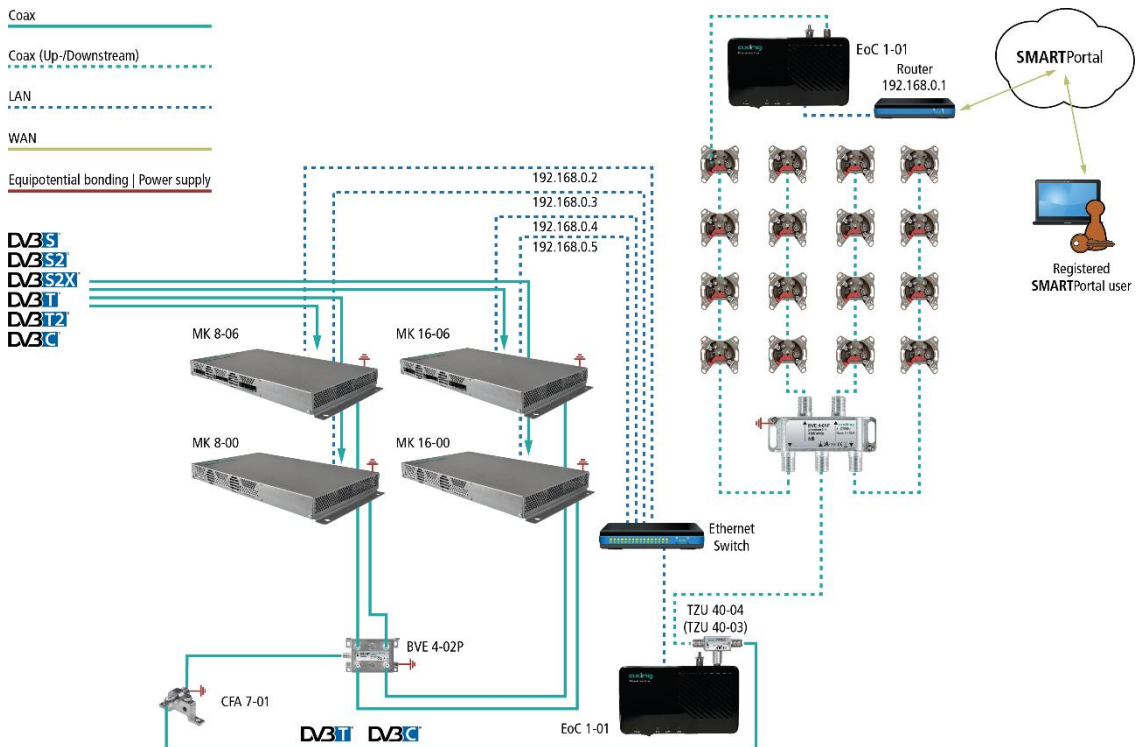
Connection via Ethernet over Coax to a router which is connected to the Internet.

Coax

LAN

WAN

Equipotential bonding | Power supply

DVB**S**
DVB**S2**
DVB**S2X**
DVB**T**
DVB**T2**
DVB**C**

192.168.0.3
192.168.0.4
192.168.0.5
192.168.0.6

EoC 2-01
192.168.0.2
Bridge Client Mode

SMARTPortal

WLAN Router
192.168.0.1

Ethernet
Switch

Registered
SMARTPortal user

MK 8-06

MK 16-06

MK 8-00

MK 16-00

BVE 4-02P

CFA 7-01

DVB**T**   DVB**C**
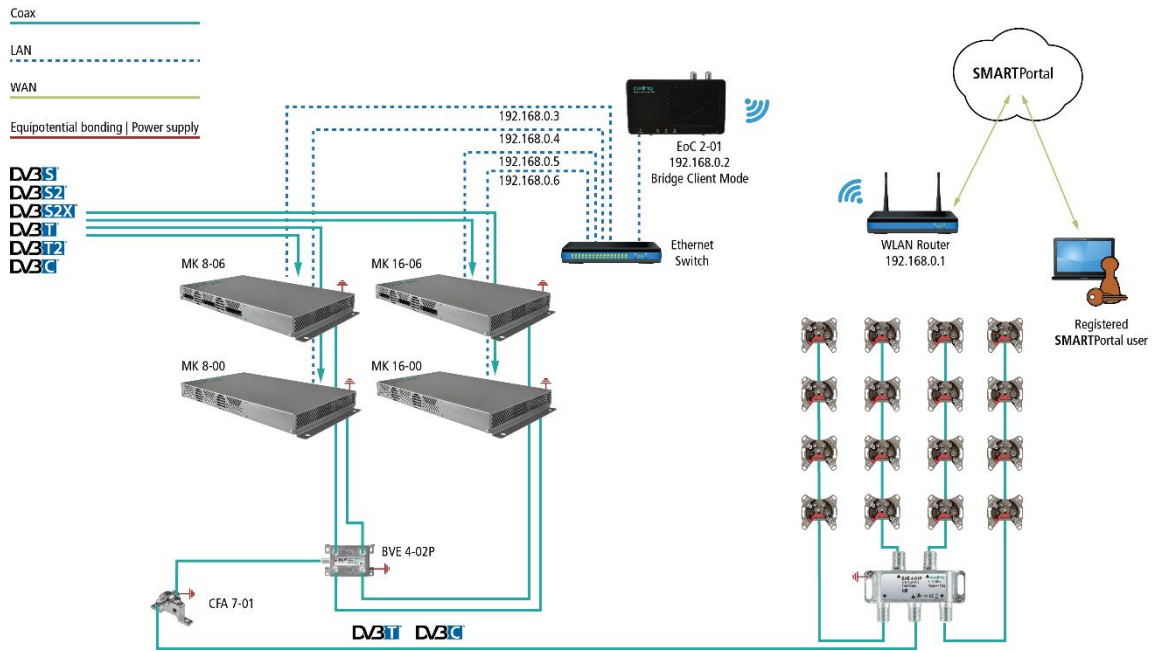
Connection via EoC 2-01 in „Bridge Client Mode" to a WLAN router.

3. Configuration

The device is configured via the graphical user interface of the integrated web interface.

To access the user interface, you need a standard PC/laptop with a network interface and the actual version of the installed web browser. To connect the network interface of the headend to the computer, you need a commercially available network cable.

The HTTP protocol is used for communication allowing a worldwide remote maintenance of the systems at various locations via the Internet. Access protection is implemented by means of the password prompt.

IP address:	192.168.0.145
Subnet mask:	255.255.255.0.

The computer and the headend must be in the same subnetwork. The network part of the IP address of the computer must be set to 192.168.0. and the subnet mask must be set to 255.255.255.0.

The host part of the network address is required for the identification of the devices and can be assigned in the subnetwork only once. You can allocate to the computer any not allocated host address between 0 and 255.

Hint:

Change the IP address and the subnet mask of your computer 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:
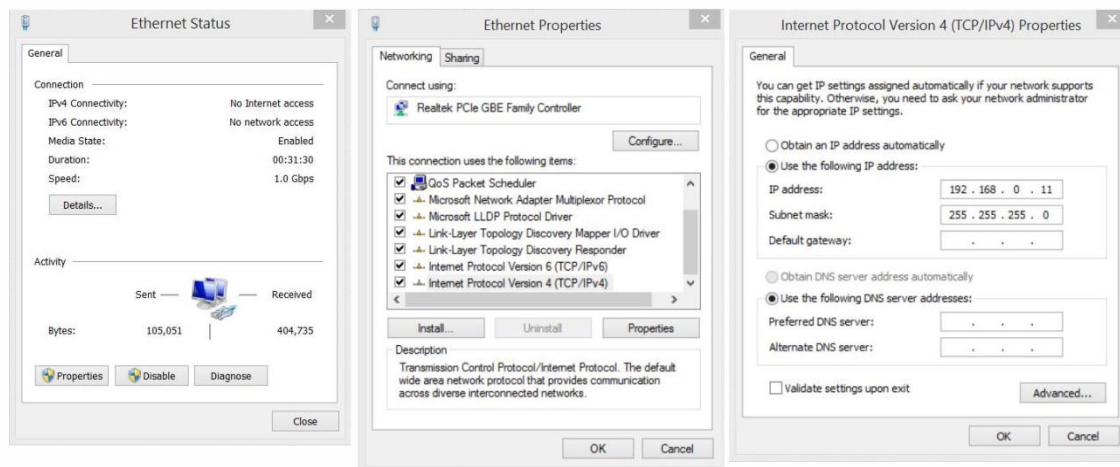
➔ Click OK to save.
➔ Start your web browser and enter the IP address of the headend: e.g.: 192.168.0.145.

3.1.   Login and logout

The web-based user interface is protected against unauthorized access. When accessing the user interface, the first thing is the password request.

➔ Enter the default password: *Ramsen8262*

➔ Click ENTER PASSWORD.

➔ If you are not automatically forwarded to the start page, click OPEN PAGE.

The standard language of the user interface is English. In the header, the the language of the user interface can be changed. The possibilities are German (DE) and English (EN). The chosen language applies until the end of the session.

➔ To log out, click LOG OUT.

Notes:

- If the browser is closed while you are still logged in, an automatic logout occurs 2.5 minutes later.
- If the browser window stays open, there is no automatic logout. It allows monitoring the installation via the web browser.

Changing the password:

➔ Please change the password immediately after the first commissioning and choose a sufficiently safe password. Keep this password at a safe place.

➔ Menu item: MAINTENANCE > SET NEW PASSWORD (see 3.7.4 on page 33).

Changing the IP address:

If needed, the headends can be integrated in a network. For this application, some changes must be applied to the network configuration.
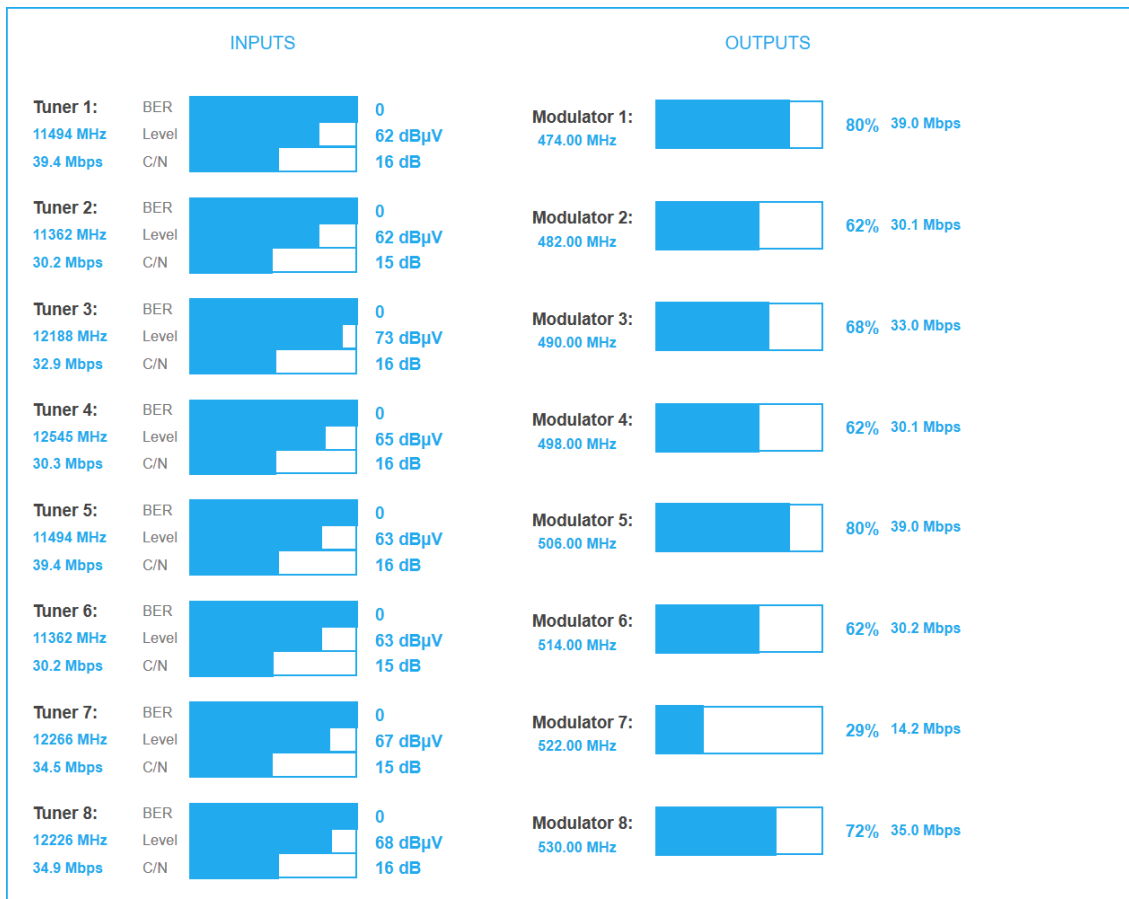
➔ Menu item MAINTENANCE > SYSTEM.

3.2. Front page

The relevant information required for the function of the system are shown on the front page. The decisive thing is the quality of the signals at the INPUT and the utilization of the modulators at the OUTPUT.

3.2.1. Input

The bit error rate BER of all tuners is shown on the left side. The amount of bit errors for the last 1,000,000 transferred bits is calculated.

Also the LEVEL and the C/N ratio are shown.

INPUTS					OUTPUTS		
Tuner 1:	BER		0		**Modulator 1:**	80%	39.0 Mbps
11494 MHz	Level		62 dBµV		474.00 MHz		
39.4 Mbps	C/N		16 dB				
Tuner 2:	BER		0		**Modulator 2:**	62%	30.1 Mbps
11362 MHz	Level		62 dBµV		482.00 MHz		
30.2 Mbps	C/N		15 dB				
Tuner 3:	BER		0		**Modulator 3:**	68%	33.0 Mbps
12188 MHz	Level		73 dBµV		490.00 MHz		
32.9 Mbps	C/N		16 dB				
Tuner 4:	BER		0		**Modulator 4:**	62%	30.1 Mbps
12545 MHz	Level		65 dBµV		498.00 MHz		
30.3 Mbps	C/N		16 dB				
Tuner 5:	BER		0		**Modulator 5:**	80%	39.0 Mbps
11494 MHz	Level		63 dBµV		506.00 MHz		
39.4 Mbps	C/N		16 dB				
Tuner 6:	BER		0		**Modulator 6:**	62%	30.2 Mbps
11362 MHz	Level		63 dBµV		514.00 MHz		
30.2 Mbps	C/N		15 dB				
Tuner 7:	BER		0		**Modulator 7:**	29%	14.2 Mbps
12266 MHz	Level		67 dBµV		522.00 MHz		
34.5 Mbps	C/N		15 dB				
Tuner 8:	BER		0		**Modulator 8:**	72%	35.0 Mbps
12226 MHz	Level		68 dBµV		530.00 MHz		
34.9 Mbps	C/N		16 dB				

3.2.2. Outputs

The fill level of all modulators is shown. 100% modulator fill level correspond to the maximal net data rate of the output channel.

If the current fill level exceeds the maximal fill level, it may cause image disturbances, e.g. mosaic images.

The data rates of the programmes are not constant. They are dynamically changed by the sender. To ensure an undisturbed reception, a reserve must absolutely be observed.

We recommend you to set the maximal fill level to 90%.

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

Modulator 2:	98%	29.7 Mbps
482.00 MHz		

The number of choosen programmes (see 3.4 on page 18) and the configuration of the modulators (see 3.5 on page 25) have an influence to the fill level.

3.3.   Initialization phase 1

➔   Choose INITIALIZATION from the main menu.

During the first phase of the initialization, the tuner settings required for the scan are made and the station scanning is carried out. The tuners work independently from each other and after the same principle.

3.3.1.   DVB-S/S2/S2x

➔ Click TUNER 1…8 to select one tuner.

➔ Configure the needed settings for all tuners.
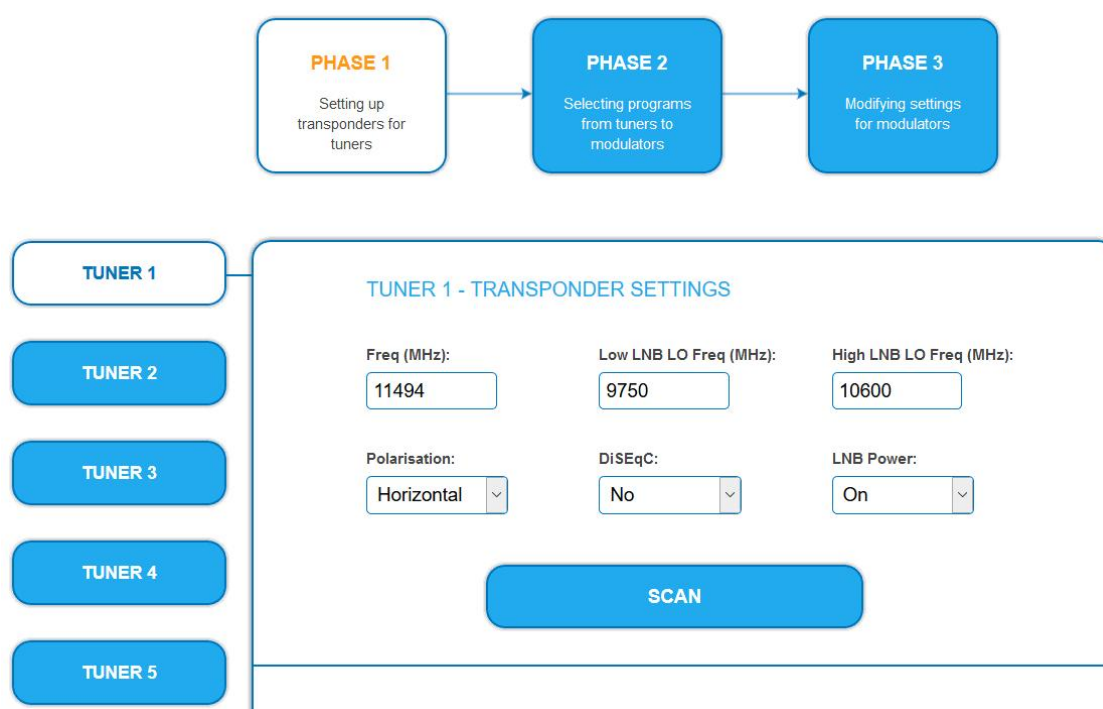
The SAT IF frequency of the transponder is entered in the input field **Freq (MHz).**

The input fields **Low LNB LO Freq (MHz)** and **High LNB LO Freq (MHz)** correspond to the oscillator frequencies of the LNB in low and high band. The default settings of the oscillator frequencies are 9,750 MHz for the low band and 10,600 MHz for the high band.

In the optional field **Polarisation**, you can switch from horizontal to vertical.

In the optional field **DiSEqC**, the DiSEqC command signals can be turned off or set to switch a DiSEqC-enabled multi switch on the positions 1 to 4.

If required, the operating voltage for the LNB can be switched off via the optional field **LNB Power**.

➔ After all settings have been made, click SCAN.
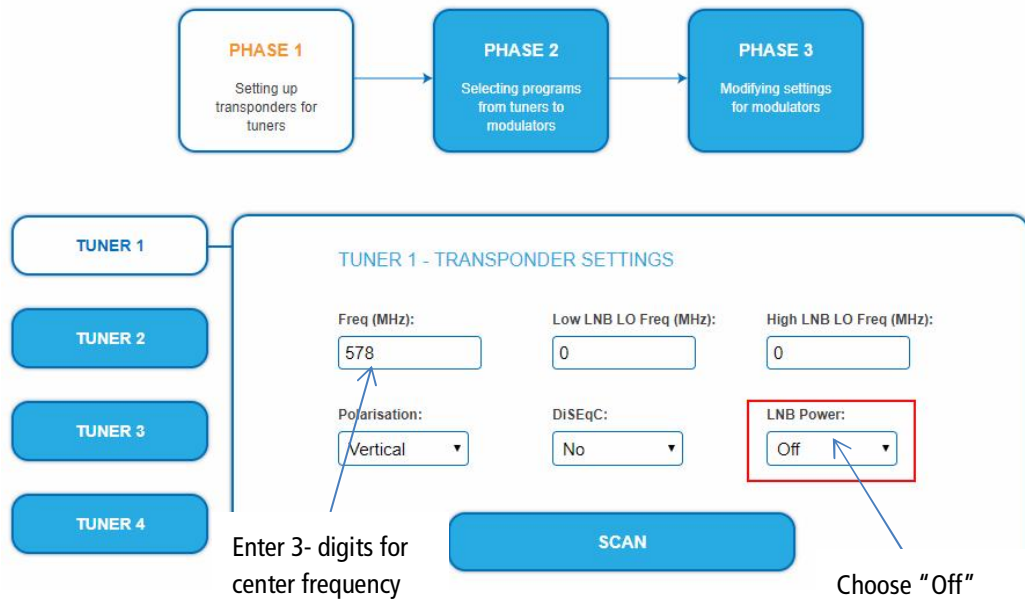   A rotating circle is shown during the scanning process.

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

⚠ CAUTION

Before connecting an antenna cable to an tuner, the **LNB Power** has to be set to **Off**

➜ Click TUNER 1…4 to select one tuner.

➜ In the field **LNB power** choose the option **Off**.

Enter 3- digits for center frequency

Choose "Off"

➜ Enter the center frequency (see table below) for the receiving channel into the field FREQ (MHz).

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: The center frequeny of channels using a bandwith of 7MHz will be rounded down to 3 full digits. For example: center frequency of CH 5 = 177,5 MHz, the according input = 177.

Note: All other entry fields are not relevant. Modulation and all other important parameter for reception are detected automatically.

3.3.3. Bit error rate

The BIT ERROR RATE is shown. The amount of bit errors for the last 1,000,000 transferred bits is calculated.

BIT ERROR RATE

Tuner 1:   0
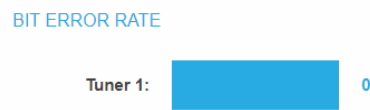
3.3.4. Found programmes

After a successful station scanning, the radio and TV stations are shown in the area FOUND PROGRAMS. The table contains information about the Program Name, the Type and the Encryption.
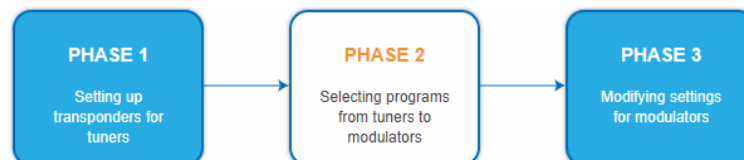
FOUND PROGRAMS

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

3.4. Initialization phase 2

In the initialization PHASE 2, the found programmes are subdivided by tuner.

➔ Click on PHASE 2, to select programs.

PHASE 1	PHASE 2	PHASE 3
Setting up transponders for tuners	Selecting programs from tuners to modulators	Modifying settings for modulators

After the station scanning in initialization phase 1 no programms are activated.

All lines of the programme table have in the "Modulator" column colored buttons M1 to M8/16. The buttons correspond to the modulators of the headend. The allocation of the buttons is given in the COLOR CODES legend.

You can assign programmes to modulators in REMUX MODE or in CROSS MULTIPLEX MODE.

IMPORTANT

➔With each programme you asign to an modulator, the data rate rises.

➔The performed modifications are only taken over by the system when you click on SAVE CHANGES.

3.4.1. Remux mode

If the the Network ID are set on **auto**, the device works in the Remux mode. In this mode, the IDs from the set transponder and from the satellite are used and forwarded to the modulators with virtually no changes. The **TS ID1** to **TS ID8/16** of the modulators, are also set on **auto**.

REMUX MODE

Note:

➔ If the device is already set to CROSS MULTIPLEX MODE, set the **Network ID** to **auto**.

➔ Click on SAVE CHANGES.

  The device ist set back to REMUX MODE.

Assigning programmes

Every tuner is assigned to a modulator. The programmes of the tuner can only be assigned to the associated modulator.

➔ For example click in table TUNER 1 on M1.

The program is assigned to modulator 1. The button of the modulator is highlighted in color (a new click on a modulator allow the assignment to be canceled. The modulator fades then again).

Choosen programs for modulator 1

	TUNER 1					
	☐ Select all incoming programs					
Modulator	LCN	Program Name	Type	Encryption	Decrypt	
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16		ORF1 HD	TV	CA	CI 4 ⌄	🔴
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16		ORF2W HD	TV	CA	no ⌄	⚪
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16		ServusTV HD Oesterreich	TV	CA	CI 4 ⌄	🔴
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16		ServusTV HD Deutschland	TV	FTA	no ⌄	⚪
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16		ORF2N HD	TV	CA	no ⌄	⚪

➔ Choose the programmes for TUNER 1 to TUNER 8/16.

➔ Click on SAVE CHANGES.

The assignment is saved tot he device.

3.4.2.   Cross Multiplex Mode

The cross multiplex mode is used:

• To split the programmes of a transonder to several modulators.
• To merge pogams of several transponders into one output channel.

Transmission capacities in the distribution networks can be optimized.

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

➜ Click on SAVE CHANGES.

The IDs of the transport streams **TS ID1** to **TS ID8[16]** are automatically incremented by one to eight[16], the cross multiplex mode is activated.

Important:

- A splitted transponder works like two transponders.
- If you use the cross multiplex mode in several headends, the **Network IDs** of the headends have to be different.

Assigning programmes to the modulators

In the cross multiplex mode, the tuners are no longer assigned to one modulator.

Programs, which are assigned to modulator 2

➜ Click the table TUNER 1 to TUNER 4 on M1.

The programs are assigned to modulator 1.

Splitting the programmes of a transonder

If there are to much programms transmitted in one transponder, they can be splitted to several modulators.

The programms of one transponder are spitted to two modulators

➜ For example: choose modulator M1 for two programmes and modulator M2 for two other programmes.

3.4.3. Select all programs

➜ Activate the option **Select all incoming programs**, with each program of the tuner the modulator button is activated.

Note: If the option is activated, then no settings can be made in the columns **LCN, decrypt** etc.

3.4.4. LCN (Logical Channel Numbering)

During the scan of TV stations, the stations are usually saved in the sequence of the channel lists in tuner 1-4. The LCN function enables channel allocation for the station scan of the TV devices. The TV device must support the LCN function.

*   LCN can be used in REMUX as well as in Cross-Multiplex-Mode.
*   Different LCN standards can be selected with the drop down menue **Region**. This standard may vary from area to area.
*   An LCN can only be entered for programs assigned to a modulator.

➔ Click on the **LCN** column for the corresponding program.

M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16	3 ⬍	ServusTV HD Oesterreich	TV	CA	CI · ⌄ 🟢

➔ Enter the LCN with the keyboard or increase / decrease the LCN with the arrow buttons right of the number.
➔ Enter a separate LCN for each desired program.

M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16	1	ORF1 HD	TV	CA	CI 4 ⌄ 🟢
M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16		ORF2W HD	TV	CA	no ⌄ ⚪
M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16	3	ServusTV HD Oesterreich	TV	CA	CI 4 ⌄ 🟢
M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16		ServusTV HD Deutschland	TV	FTA	no ⌄ ⚪
M1 M2 M3 M4 M5 M6 M7 M8 / M9 M10 M11 M12 M13 M14 M15 M16	2	ORF2N HD	TV	CA	no ⌄ ⚪

➔ To clear the LCN, enter 0 in the LCN column.
➔ Click SAVE CHANGES.

The numbers of the channels are saved.

3.4.5.   PID Filtering (with MKS 1-01)

With the fee-based software extension MKS 1-01, individual packages can be filtered out of the transport stream. The MKS 1-01 must be installed by the AXING support (this requires an internet connection for the headend).

➔ Click on one of the programs.
   The table with the Packeges opens. This contains the name, the PID and a check mark. By default, all PIDs are initially selected.

➔ Remove the check mark if desired.
   The packet is no longer transmitted in the transport stream.

Edit service ID (in crosmultiplex mode only)

In crosplex mode you can also edit the service ID.

Not provided modifications will cause problems!

Changes of the SID are only necessary for STBs using fix preset IDs. These STBs are used of some providers to suppress reception for external devices. Modifications should only be done after consulting the provider.

➔ Enter the Service ID with the keyboard or increase / decrease the ID with the arrow buttons right of the number.
➔ Click on the green check mark to accept the ID or on the red cross to discard the entry.

3.5.   Initialization phase 3 – DVB-C

Note: Depending on the modulation standard the signals are modulated into DVB-C or DVB-T (see 3.7.2 on page 31).

In phase 3, the modulators are configured.

➔   Click on PHASE 3, to modify the setting of the modulator.

The output channels are compulsory assigned to adjacent channels.

3.5.1.   Configuration of the modulator
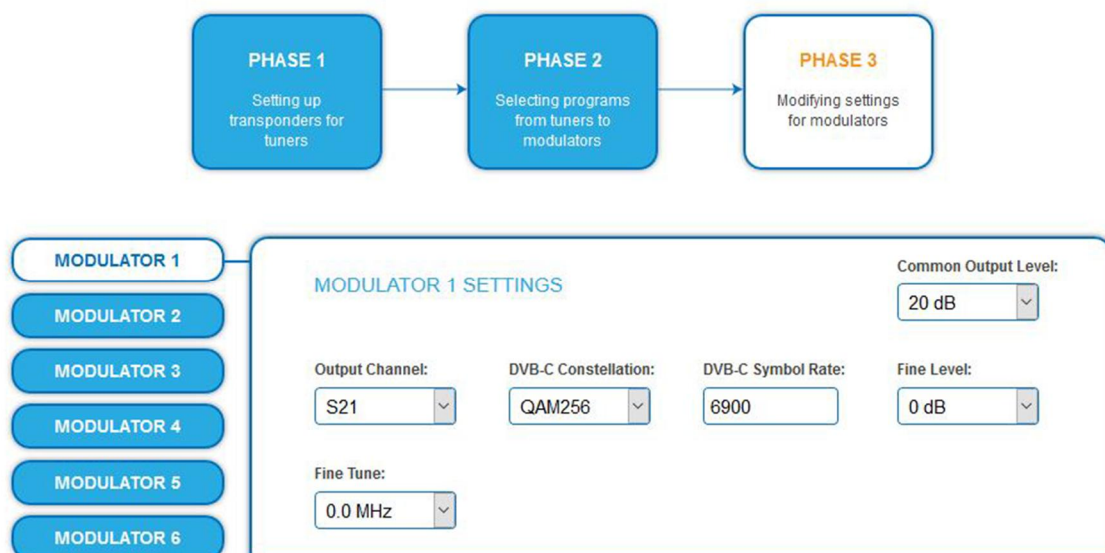
Output channels and channel spacing	The modulators can be set to any output channel between S2 and CH 87. No output channel can be assigned several times!
DVB-C modulation:	With DVB-C modulation, you can choose between 32QAM, 64QAM, 128QAM and 256QAM. 256QAM enables the highest data transmission rate, but it also requires the best network quality.
DVB-C symbol rate:	The DVB-C symbol rate can be freely set between 1000 and 7500. The standard value is 6900. Some networks also work with 6875. When working with a bandwidth of 7 MHz, 6111 is customary.
Common Output level	The *Common Output Level* option include a general attenuation of all modulator outputs. The highest output level is reached with a setting of 20 dB, the lowest level with a setting of 0 dB.
Fine Level	The *Fine Level* option include fine attenuation from 0 to -3dB of each modulator output and the deactivation of the modulator (off).
Fine Tune:	The *Fine Tune* adjustment of the output channel is performed in 0.5 MHz steps.

3.5.2. Fill level

The fill level depends on the number of activated channels in the channel list (menu item Phase 2) If the CROSS MULTIPLEX MODE is active, it must be ensured that the maximum number of activated channels in one modulator is not exceeded.

FILL

474.00 MHz

Modulator 1:   78%
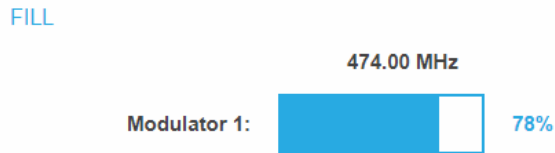
The data rate of the channels on the DVB-S/S2/S2x transponders may vary depending on the image contents and on the transmission quality. To ensure an undisturbed reception, a reserve must absolutely be observed. We recommend you to set the maximum fill level to 95%. If the current fill level exceeds the maximal fill level, it may cause image disturbances, such as mosaic images. The LEDs on the front panel will light up in red in this case.

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 (QAM32;64;128;256) of the modulator.

If the displayed data rate exceeds 95%, there are different possibilities

to change it:

➜ Change to a channel with a bandwidth of 8 MHz if a 7 MHz channel was selected previously.

➜ Set DVB-C modulation to a larger value, for example, change from QAM 64 to QAM 128.

➜ Reduce the number of selected channels in the channel list.

➜ If the connected receivers support this option, increase the symbol rate.

3.5.3. Selected Programmes

The programme table SELECTED PROGRAMS shows the programmes that were activated in phase 2.

SELECTED PROGRAMS

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

3.6. Initialization phase 3 – DVB-T

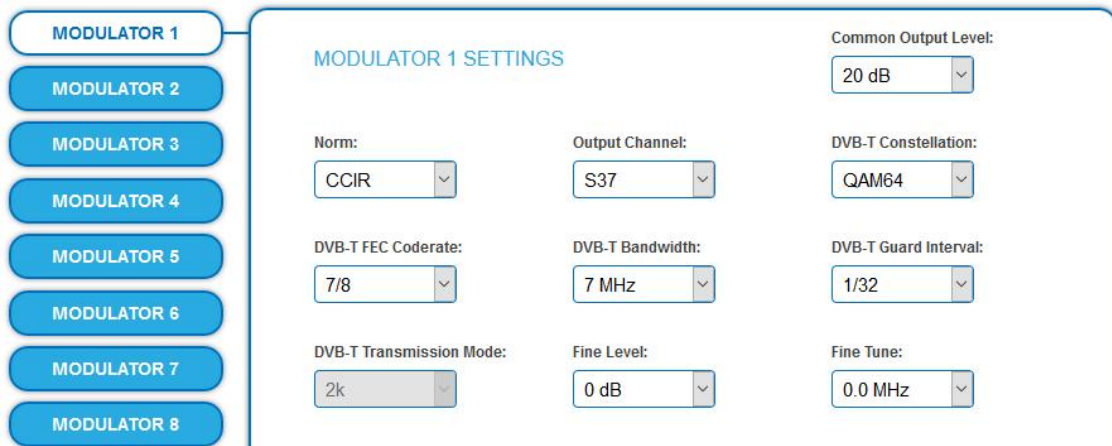**Note:** Depending on the modulation standard the signals are modulated into DVB-C or DVB-T (see 3.7.2 on page 31).

In phase 3, the modulators are configured.

After assigning programmes to the modulator the fill level has to be conntrolled. With the parameters of the modulator, the datarate can in certain circumstances be reduced.


3.6.1. Configuration of the modulator

Norm:	In this selection field, you can set the norm for the output channel spacing.
	Note: Changing the norm works now according to following rules:
	CCIR-->Australia : all modulators forced to 7MHz Australia-->CCIR : all modulators forced to 8MHz, however with following exception: low channels S2-S20 are 7MHz only, so those remain in 7MHz
Output channel:	The first modulator can be set to any output channel between S2 and CH 69. The other three modulators are automatically set by incrementing the output channels in accordance with the chosen channel spacing.
	For example: modulator 1 = Channel 21 modulators 2, 3 and 4 = Channels 22, 23 and 24
Common Output level	The *Common Output Level* option include a general attenuation of all modulator outputs. The highest output level is reached with a setting of 20 dB, the lowest level with a setting of 0 dB.
DVB-T modulation:	The modulation can be set on QPSK, on QAM 16 or on QAM 64.
	The QPSK-setting provides the smallest data rate to the output channel. The QPSK-modulation process is used in bad distribution networks because of its robustness against disturbances and of its safe transmission.
	The QAM-modulation process allow reaching higher data rates, so that more programmes can be transmitted on a channel. The QAM 64-modulation gives the highest data rate. • QPSK (2 bit) – small data rate – very robust signal. • QAM 16 (4 bit) - middle data rate. • QAM 64 (6 bit) - high data rate.

DVB-T FEC (forward error correction):	Thanks to the error correction, errors resulting from high-disturbed transmission routes can be balanced by restoring data.
	The data required to restore the signal are included in the transmitted FEC bits.
	Changing the FEC factor modifies the part of the FEC data in relation to the application data.
	A higher part of FEC data means an higher transmission redundancy. But this reduces the bandwidth for the useful data too.
	A FEC of 7/8 means the highest rate for the useful data and the smallest transmission redundancy.
	• FEC 1/2 - small data rate - strong protection against errors.
	• FEC 7/8 - high data rate - weak protection against errors.
DVB-T bandwidth:	The DVB-T standard plans a broadcast on 6, 7 or 8 MHz channels. A bigger bandwidth means that more data can be transmitted on a single channel.
	In the CCIR channel spacing, the lower channels: C5…S20 have a provided bandwidth of 7 MHz. The other channels have a bandwidth of 8 MHz.
	If the bandwidth is changed, the channel does not correspond any longer to the set channel spacing. Therefore, the output frequency for all 4 modulators also changes.
DVB-T guard interval:	A guard interval is transmitted between the symbols of the useful signal.
	This guard interval avoids the intersymbol interference during the DVB-T transmission.
	The delayed signals of other synchronized DVB-T senders or reflections have no effects on the decoding of the useful signal if they arrive during the guard interval. The period of the echoes must be shorter than the duration of the guard interval.
	Changing the guard interval adjusts the ratio between the transmission duration of the useful symbols and the duration of the guard interval.
	A great guard interval (e.g. 1/4) leads to a really small data rate.
	When transmitting on a perfect coaxial distribution network, a really small guard interval (1/32) is enough.
DVB-T transmission modes (2 k and 8 k):	Using the 8 k mode is recommended for reflections with really long durations. Due to the long symbol duration, long guard intervals are possible.
Fine Level:	The *Fine Level* option include fine attenuation from 0 to -3dB of each modulator output and the deactivation of the modulator (off).
Fine Tune:	The fine Tuning of the output channel is performed in 1 MHz steps.

3.6.2.   Fill level

The data rate of the sender may vary depending on the image contents and on the transmission quality. To ensure an undisturbed reception, a reserve must absolutely be observed.

FILL

474.00 MHz

Modulator 1:   78%
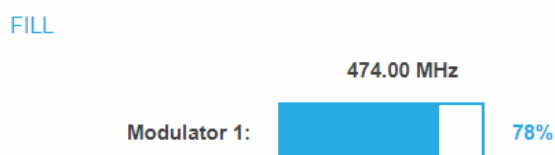
We recommend you to set the maximal fill level to 90%.

If the current fill level exceeds the maximal fill level, it may cause image disturbances, e.g. mosaic images.

If the net data rate of the signal exceeds the net data rate of the output channel, the modulator overflows. This overflow leads to disturbances. If the modulator overflows, the status LED on the front side of the device lights in red.

Filtering the programmes reduces the net data rate of the input signal. Subsequently, the net data rate of the output signal is also reduced.

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

If the displayed data rate exceeds 90%, there are different possibilities to change it:

➜ Change to a channel with a bandwidth of 8 MHz if a 7 MHz channel was selected previously.

➜ Raise the modulation rate to 64 QAM. QPSK corresponds to the lowest, the QAM64 setting to the highest output data rate.

➜ Set the forward error correction to 7/8. With this setting, the data rate is increased, but the error correction is lower. A lower error correction requires a better transmission quality from the antenna network.

➜ Set the guard interval to 1/32. This shorter guard interval allows you to reach greater data rates.

➜ Reduce the number of selected programmes in the channel list.

COFDM modulated channels allow net data rates from 4.98 up to 31.67 Mbit/s (typically 24).

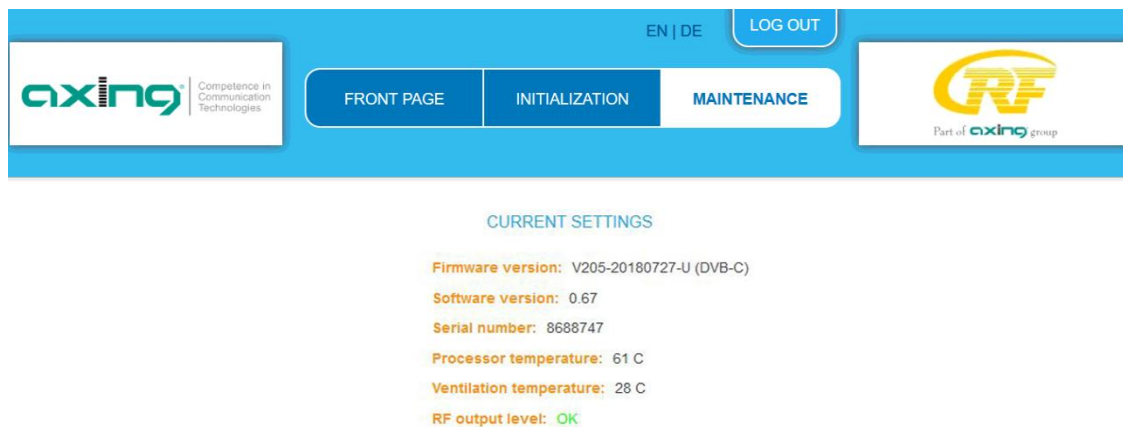| Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	3/4	14.929	16.588	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

3.6.3. Selected Programmes

The programme table SELECTED PROGRAMS shows the programmes that were activated in phase 2.

SELECTED PROGRAMS

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

3.7. Maintenance

The menu entry MAINTENANCE enables software updates, changing the IP address, changing the password, restarting the headend and erasing service data.

CURRENT SETTINGS

Firmware version: V205-20180727-U (DVB-C)
Software version: 0.67
Serial number: 8688747
Processor temperature: 61 C
Ventilation temperature: 28 C
RF output level: OK

Under Current Settings, you will find the following information:

- Firmware version: Displays the firmware version and the output modulation type.
- Software version: Displays the version of the interface
- Serial number of the device
- Processor temperature - must remain below 90° C
- Ventilation temperature - must remain below 50° C (only from hardware version 12-2018)
- RF output level OK (only from hardware version 12-2018)

Important: If you stay on the maintenance page for more than 2.5 minutes, an automatic logout will occur and you will have to repeat the login procedure.

3.7.1. Updating software

NOTICE

➔ After an update, initialization data saved with older Software versions can be loaded into the headend with a newer Software version.
➔ Initialization data saved with the current Software versions can **not be loaded** into headends with an **older Software** version.
➔ Therefore, if possible, make a Software update of all headends.
We recommend the AXING SMARTPortal for easier handling and overview (see 1.6 on page 6)

Download

Software updates are available at https://axing.com/en/downloads/software-and-firmware/

> Software for compact headends

➔ Download the current version of the file to your computer and unpack it.

Update

New software for the graphical user interface can be installed under SOFTWARE FILE.

➔ Click under SOFTWARE FILE on „Browse…".
➔ Browse for the file on your computer.
➔ Click on UPDATE.

The file will be uploaded to the device.

After this the update of the device begins, the remaining time ist shown as a countdown.

The headend will be automatically rebooted after an update. The enter password dialog will be displayed.
➔ After the Update, log in again.

3.7.2.   Modulation standard

Depending on the modulation standard the output signals are modulated into DVB-C or DVB-T.

➜ Select a **Modulation Standard**.

➜ Click SAVE & REBOOT.

The changing of the modulation standard begins, the remaining time ist shown as a countdown.

The headend will be automatically rebooted, the enter password dialog will be displayed.

➜ Enter the password again.

➜ Check especially the modulator settings and their fill level.

3.7.3.   Changing the IP address

The network options are configured under the menu item MAINTENANCE> SYSTEM OPTIONS.

Dynamic IP adress

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

Static IP adress

➜ **Use a static IP address** to connect the device to a network with a fixed IP address. The IP address, netmask and the gateway can be changed here. In addition, DNS server 1 and DNS server 2 can be entered.

➔ Click SAVE & REBOOT to confirm and save the changes.
   When the changes are saved, the device will reboot automatically.

➔ The **new IP address** has to be entered in the web browser and the enter password dialog will be displayed.

3.7.4.   Changing the password

The default password is: *Ramsen8262*.

The default password should be changed right after commissioning the headend.

➔ Type an new password with 8-10 characters (letters and/or digits).
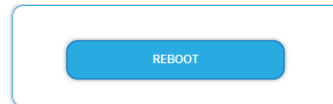
➔ Re-enter the password.

➜ Click SAVE CHANGES to confirm and save the changes.

When the changes are saved, the frontpage will be shown.

3.7.5. Rebooting

Under REBOOT THE SYSTEM the device can be rebooted.

REBOOT

➜ Click on REBOOT.

After rebooting, the password must be entered again.

Note: If SAT signals are temporarily unavailable (e.g. due to snow), the headend will reboot every 10 minutes. This ensures that all configured programmes will be available once the signal becomes available again.

3.7.6. Erasing service data

In the section ERASE SERVICE DATA you can erase the settings from phase 2. The transponder data must be read again for tuners 1-4 by executing a scan.

The headend is also set to remux mode.

ERASE SERVICE DATA

ERASE

➜ Click on erase.

The frontpage will be shown.

3.7.7. Save Initialization Data

In the section SAVE SYSTEM INITILIZATION DATA TO FILE you can save the current initilization data from phase 1 to 3 into a file on your computer.

SAVE SYSTEM INITIALIZATION DATA TO FILE

SAVE

PDF TO PRINT

➜ Click on SAVE.

The data will be saved in a file called config.dat at the download folder on your computer.

➜ Click on PDF TO PRINT.

A PDF will be generated and saved in a file called config.pdf at the download folder on your computer.

Note: Password and IP adress will not be saved.

3.7.8. Upload Initialization Data

In the section UPLOAD SYSTEM INITILIZATION DATA FROM FILE you can upload the initiaization data from a file to the modul.

➔ Choose a configuration file.
➔ Click on UPLOAD.
    The upload will take a few seconds.

After the upload you have to log in again.

3.7.9. Device name

In the section DEVICE NAME you can set a new device name for the headend.

➔ Enter a name in the field SET NEW DEVICE NAME.
➔ Click on SAVE CHANGES.
    The new device name is shown at the login.

3.7.10. Access to SMARTPortal

If you are a registered user of the SMARTPortal, then you can remotely control the headend via the SMARTPortal and, if necessary, receive support from AXING.

Prerequisite is an internet connection for the headend.

ACCESS TO SMARTPORTAL

State:

Enabled

☑ AXING support allowed

Location:

Ramsen

Email address:

andreas.glum@instruktur.de

Userkey:

••••••••••••

SAVE & REBOOT

➜ In the **State** field, select **Enabled**.
➜ Activate, if required, the option **AXING support allowed**.
➜ In the field **Location**, enter a name for the location of the headend. This name will appear later in the SMARTPortal to help you identify the headend.
➜ In the field **Email address**, enter the e-mail address with which you are registered at SMARTPortal.
➜ In the field **User key**, enter the user key that you received when registering at SMARTPortal.
➜ Click on SAVE & REBOOT. The data is saved, the headend is rebooted and the connection to the SMARTPortal is established.
Where required, you have to adjust the connection data (see 3.7.3 on page 32).

3.7.11. Log files

LOGS

VIEW LOGS

In the section LOGS you can view the Log files .
➜ Choose Status Log.
The status log is written to RAM and starts again after a restart. In the status log for example, the lock in time and the frequencies of the tuners are stored.
➜ Select System log.
The system log is written to the flash memory, so it is still available after a restart. In the system log for example, the boot time and hardware defects are stored.

3.7.12. Channel list for all devices

You can create a common channel list for all devices with the same output modulation in the network.

CHANNEL LIST FOR ALL DEVICES:

Select	IP Address	Device name
☑	This device	MK8-00_Technik
☐	192.168.178.240	SKT 40-00_1.32
☑	192.168.178.20	SKQ40-00_Technik
☐	192.168.178.22	SKT40-04_Technik
☑	192.168.178.21	SKQ40-04_Technik

PDF TO PRINT

➔ Select the headends that shouled be included in the channel list.
   Note: You can only select headends with the same output modulation.

➔ Click on PRINT To PDF.
   A PDF of the list is generated which you can open or save.

### 3.7.13. Network Information Table (NIT)

The NIT contains information about the signal configuration of a headend. A TV needs this information for a fast channel search. The LCN (Logical Channel Numbering) is located within the NIT, which virtually allocates the programs to a place.

The headend provides an auto NIT at the factory, which includes all channels from 114 MHz to 1002 MHz and only the most important parameters such as symbol rate and modulation.
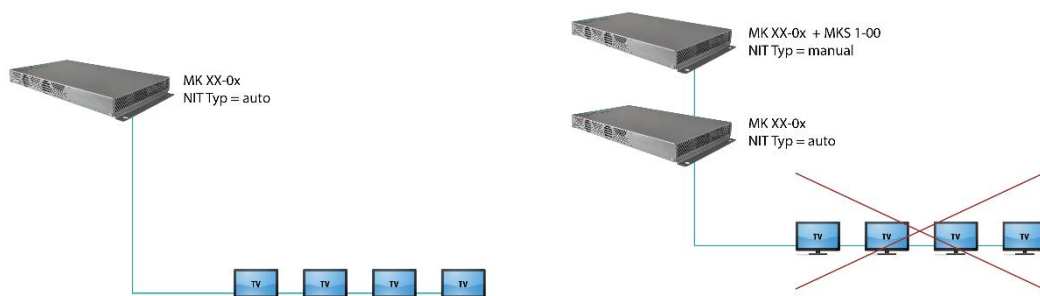
Operation with auto NIT supplies all channels from 114 MHz to 1002 MHz.

Operation leads to a conflict because of two NITs with ON IDs and Network IDs.
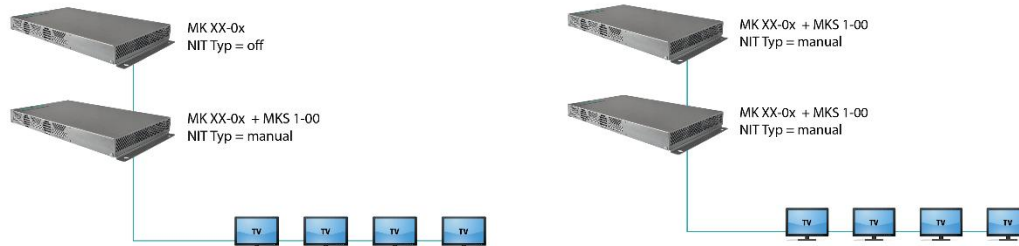
Operation does not lead to conflict (NIT, ON ID, Network ID). But no LCN from the headend without MKS 1-00 is delivered.

Ideal Solution: One common NIT, ON ID, Network ID and LCN from both headends.

Start NIT Configuration

➔ Click on NIT CONFIGURATION to open the settings dialog.

Select type

➔ Select Auto.
   An NIT is created that contains all channels (from 114 MHz to 1002 MHz).
   The unoccupied channels contain only the most important parameters such as symbol rate and modulation.
➔ Select Off.
   There is no NIT created and therefore no LCN output.
➔ Select Manual.
   The input fields for reading, checking and uploading the NIT are displayed.
   Note: Only with the 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. The MKS 1-00 must be installed by AXING support (for this purpose, a connection with the Internet is necessary).

Read NIT

Under STEP 1: READ NIT (DVB-C) the devices in the network are displayed.
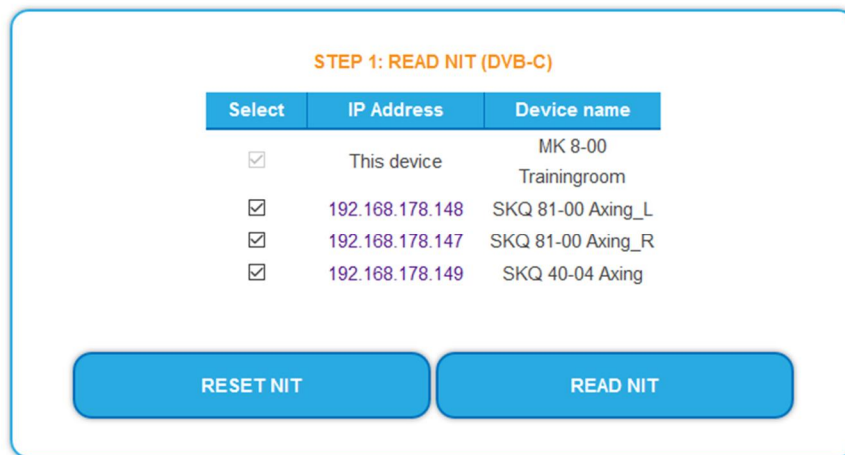
➔ Select the devices from which the NIT is to be read out.
   The device you are currently configuring (This device) is always selected.
➔ Click on READ NIT.
   The data of the devices are read in and listed under STEP 2: VERIFY NIT.

Note: If necessary, you must reset the NIT before importing (see „Reset the NIT" on page 40).

NIT Check

Note: If the NIT is edited, the headend automatically switches to cross-multiplex mode.
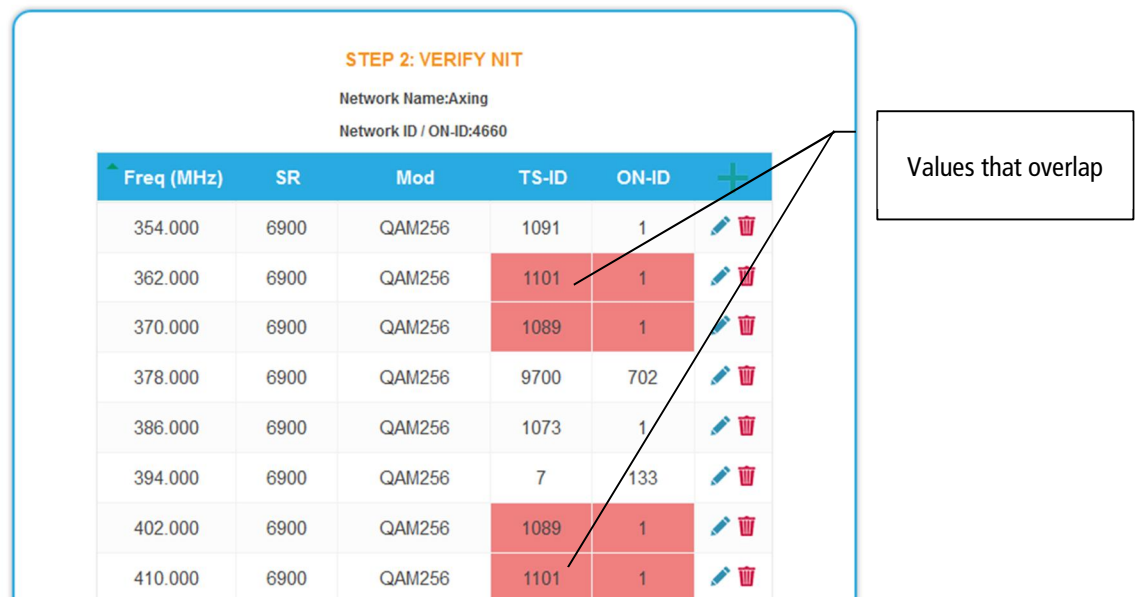
Values that overlap are displayed in red. These errors must be cleaned up before uploading.

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

Edit NIT

➜ Click the pen symbol next to a line.
  The fields can be edited.
➜ Click on the plus sign in the column header.
  An additional line is inserted.
  Enter plausible data in the fields, matching the other values.
➜ Click on the plus sign next to the cell.
  The line will be adopted.

➜ Click the wastebasket icon next to a line.
  The line is deleted.

Upload NIT to the devices

➜ Select the devices you want to upload to.
➜ Click UPDATE.
  The data is uploaded and stored in the headend.

Reset the NIT

Resetting the NIT is necessary in certain circumstances.

Example:

Three devices are used.

In the first device, the NIT is edited and uploaded to all devices. Subsequently, in the modulator output of the first device, parameters such as the channel output frequency are changed. If the NIT is read in again, the old channel output frequency will also be read in as it is still in device 2 and 3. Resetting removes all previous loaded NIT configurations from the devices. These now only return their current configured settings while reading.
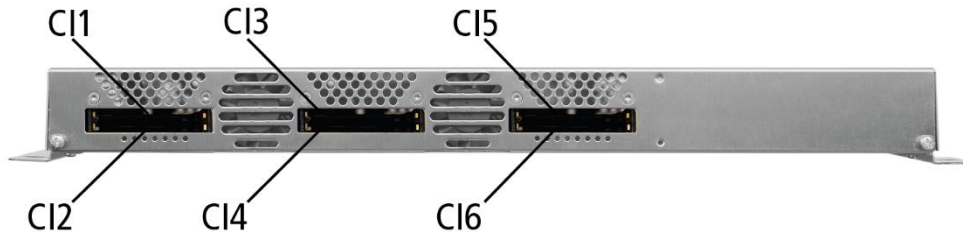
➔ Click RESET NIT.

The NIT entries of the devices are reset.

4. Use of CA modules

4.1. Insertion of CA modules

Up to six CA modules can be inserted into the CI-slots at the front side of the MK 8-06 or MK 16-06.

➔ Carefully insert the CA modules to the corresponding CI slot without exerting force.

4.2. CI menu for SKM 4x-04M

In the CI menus, settings of CA modules can be made. The buttons for opening the CI menu will be activated after the modules have been plugged in and initialised.

Active buttons for
the CI menu.

➔ Click one of the buttons.

The corresponding CI menu is displayed.

4.2.1. Using CI menu

The content of the CI menu depends on the CAM manufacturer and the card being used. Depending on the manufacturer, various settings are possible. Information on validity and authorisation are the most important.

➔ Please observe the operating instructions provided by the manufacturer.
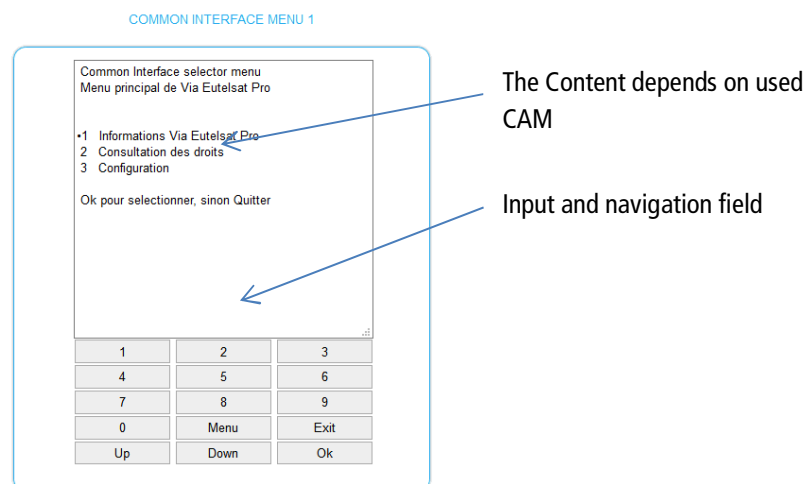
According to the used CAM different settings can be done. Most important is getting information about authorisation.

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

➔ Use **Up** or **Down** to reach a higher or lower selection point.

➔ Use **Ok** to enter a corresponding sub menu or confirm a selection.

➔ Use **Menu** to come back to the next superordinate level.

➔ Use **Exit** to leave the menu.

4.3.   Decryption of programmes

Scrambled programmes are indicated by the abbreviation CA in the column **Encryption** of the TUNER table.

By default, in the column **Decrypt** the option **no** is choosen. The program will be transferred to the modulator in encrypted form and must be decrypted in the receiver.

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

Choose a CI slot

➔ Choose **CI 1**…**CI 6** in the column **Decrypt**.

The programm will be transferred to the choosen modulator in decrypted form.

5. Technical specifications

	MK 8-00/MK 8-06	MK 16-00/MK 16-06
Input tuner	8 × DVB-S/S2/S2x/T/T2/C	16 × DVB-S/S2/S2x/T/T2/C
Input frequency range DVB-C | DVB-T/T2 | DVB-S/S2/S2X	50…898 MHz | 900…2150 MHz	
Input level DVB-C | DVB-T/T2 | DVB-S/S2/S2X	49…84 dBµV | 39…84 dBµV | 43...84 dBµV	
LNB voltage	13/17 V; 22 kHz on/off; DiSEqC 1.0	
LNB current per input (max.)	150 mA	
Symbol rate	1,5…45 MS/s	
Input error correction	automatic	
Input connector, female	8 × F	16 × F
Output TV channels	8 × DVB-C/DVB-T	16 × DVB-C/DVB-T
Output frequency range DVB-C | DVB-T	111…1006 MHz | 111…862 MHz	
Output channels DVB-C | DVB-T	S2…K87 | S2…K69	
Output level adjustable	80…100 dBµV	
Output modulation DVB-C | DVB-T	QAM 32, 64, 128, 256 | QPSK, QAM 16, 64	
Output transmission symbol rate	1-7,5 M'Symbol sec	
MER DVB-C | DVB-T	≥ 40 dB | ≥ 36 dB	
FFT mode DVB-T	2k, 8k	
FEC DVB-T	1/2, 2/3, 3/4, 5/6, 7/8	
Output guard interval DVB-T	1/4, 1/8, 1/16, 1/32	
Output connector, female	1 × F	
Test port output	-30 dB	
Data interface	2 × RJ45	
Operation voltage	100…240 VAC/50…60 Hz	
Power consumption	50 W	60 W
Ambient temperature range (acc. to EN 60065)	-10°C…+50°C	
Dimensions (W × H × D) appr.	480 × 253 × 47 mm	