

POLYTRON®

PCU 4111 / 4121

Compact Headend



User manual

CE EAC

MADE IN GERMANY

0901778 V7

Contents

1. Mounting and safety instructions	3
2. General information	5
3. Description	5
4. Scope of delivery	5
5. Input circuit	5
6. Assembly	6
6.1. Grounding	6
7. Installation	7
7.1. Pre-programming	8
7.2. Input level	8
7.3. Output level	8
8. General programming	9
8.1. Software installation	9
8.1.1. Installation of the driver	9
8.1.2. Installation of the programming software	10
8.2. Programming of the device parameters	11
8.2.1. Input parameters SAT reception	12
8.2.2. Input parameters for the terrestrial range	13
8.2.3. Output parameters DVB-C	14
8.2.4. Output parameters DVB-T	16
8.3. Function „Service list“ (Program list)	17
8.3.1. Delete and add Services (Programs)	18
8.3.2. Selection of the channels to be encoded	19
8.3.3. „LCN“ function	20
8.3.4. „Dual Channel“ function	21
8.3.5. SID-Remapping – manual assignment of Service-IDs	24
8.3.6. NIT-processing (Network Information Table)	28
8.4. Storage of the programming	39
8.4.1. Storage of settings	39
8.4.2. Loading of settings	39
8.5. LAN function	40
8.5.1. Creating the headends	41
8.6. Diagnostic	42
8.7. LED key	42
8.8. Firmware update	43
8.8.1. Firmware version overview	43
8.8.2. Changing the output signal	44
8.8.3. Teletext ON / OFF	45
8.8.4. „Password“ function	46
9. Application examples	48
10. Technical data	49

1. Mounting and safety instructions



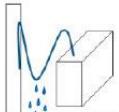
Attention

The rated voltage stated on the device must correspond with the mains voltage. The instructions for operating the device must be observed.



Grounding and potential equalization

Please establish grounding and perform potential equalization before initial startup.



Connection cable

Always install the connection cables with a loop so that no condensed water can penetrate along the cable.



Select installation site

Install only on a solid, plane and at most fire-resistant surface. Avoid strong magnetic fields in the surroundings. Too strong heat effect or accumulation of heat will have an adverse effect on the durability. Don't mount directly over or nearby heating systems, open fire sources or the like, where the device is exposed to heat radiation or oil vapours. Don't block the ventilation slots of devices fitted with fans or heatsinks, as this will cause heat to build up inside the devices and may cause fire. Free air circulation is absolutely necessary to permit the device to function properly. It's imperative to observe the mounting position!



Moisture

Protect the device from high humidity, dripping and splashing water. If there is condensation, wait until the device is completely dry. Operating environment according to the specified IP protection class.



Caution! Danger of life!

According to the currently valid version of EN 60728-11, coaxial receiving and distribution systems must meet the safety requirements regarding grounding, potential equalization, etc., otherwise damage to the product, fire or other hazards may occur. Electrical fuses may only be replaced by authorised specialist persons. For the replacement of electric fuses, only same type and amperage have to be used. In case of damage the device has to be taken out of service.



Mounting and service works

May be only done by authorized staff according to the rules of technology. Devices have to be switched off before starting any maintenance or service work. In order to guarantee interference immunity, all device covers must be screwed tight again after opening.



Thunderstorm

Do not carry out maintenance or repair work on the device due to higher risk of lightning strike.



Ambient temperature

Operation and storage only within the specified temperature range.



Termination

Not used receiver and trunk line outputs have to be terminated with 75 Ohm-resistors.



Caution! Laser beam -> risk of accidents due to blinding!

Don't look into the laser beam or at direct reflexes of reflecting or polished surfaces. There is a danger of injury to the eyes.



Recycling

All of our packaging materials (packaging, identification sheet, plastic foil and bag) are fully recyclable.

ATTENTION

This module contains ESD components! (ESD = Electrostatic Sensitive Device).
An electrostatic discharge is an electrical current pulse, which can flow also through an electrically insulated material, when triggered by large voltage difference.

To ensure the reliability of ESD components, it is necessary to consider their most important handling rules:

Electrostatic sensitive components can be processed only on electrostatic protected area (EPA)!

- Pay attention permanently to potential equalization (equipotential bonding)!
- Use wrist straps, approved footwear for personnel grounding!
- Avoid electrostatically chargeable materials such as normal PE, PVC, polystyrene!
- Avoid electrostatic fields >100 V/cm !
- Use only labeled and defined packing and transportation materials!

Damage caused by faulty connections and / or improper handling are excluded from any liability.

Waste disposal

Electronic equipment does not belong in household waste, but must be disposed of properly in accordance with Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Please return this device to the designated public collection points at the end of its use for disposal.



WEEE-Reg.-Nr. DE 51035844

GENERAL INFORMATION ON THE OPERATING INSTRUCTIONS

- All parameter data are exemplary only.
- Technically realizable parameters are freely selectable.
- Menu views can vary slightly depending on the software version; the operability does not change as a result.
- The images in this manual are for illustration purposes only.

2. General information

The PCU 41x1 is a modern, compact transmodulator converting 4 DVB-S/S2, DVB-T/T2 or DVB-C signals into 4 DVB-C/DVB-T channels. The headend can decode encoded programmes using a suitable CI module. It's simple and quick assembly, configuration and programming enable commissioning without problems. Up to 4 transponders from up to 4 different signals can be transmitted. This makes it possible to transmit SD and HD programmes via all transponders, regardless of whether these are encoded or non-encoded.

3. Description

The compact headend PCU 41x1 from POLYTRON converts four signals (DVB-S/S2, DVB-T/T2 or DVB-C) into DVB-C/DVB-T signals. The four inputs are each provided with a CI interface for decoding encoded signals. With this, QAM communal installations can be simply and cheaply supplemented with centrally decoded ranges. Also conceivable is the use as free-to-air basic supply in a small boarding house or hotel, because around 20 programmes of 4 transponders are already available. The headend can easily and quickly be programmed via the USB interface. No knowledge whatsoever the assigning and administration of IP addresses is required for this. The selected settings can be printed and saved and also transferred to other devices by using an USB stick. Due to the integrated LAN connection, it is possible to remotely control all parameters. The headend works in the frequency range 112 to 862 MHz and converts the selected satellite transponders completely including the additional services Teletext, EPG etc. The output is also suitable for adjacent channels and has a level of 90 dB μ V. The PCU 41x1 is equipped with an energy-saving switching power supply which also serves for the supply of the LNB (tuner 1 and tuner 2). At tuner 4, a 12V supply is available on the terrestrial input. The supply voltages can be switched on or off by means of jumpers.

PCU 4111 = DVB-C at the output

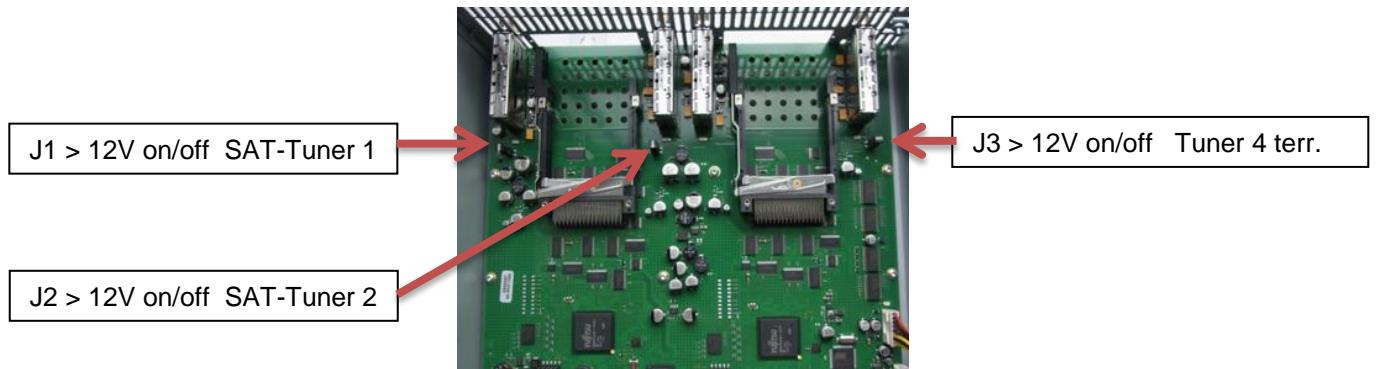
PCU 4121 = DVB-T at the output

4. Scope of delivery

- 1 x PCU 41x1
- 1 x Power cable
- 1 x USB cable
- 1 x USB stick (Programming software)
- 1 x Operating instructions
- 1 x Installation accessories
- 1 x LAN patch cable

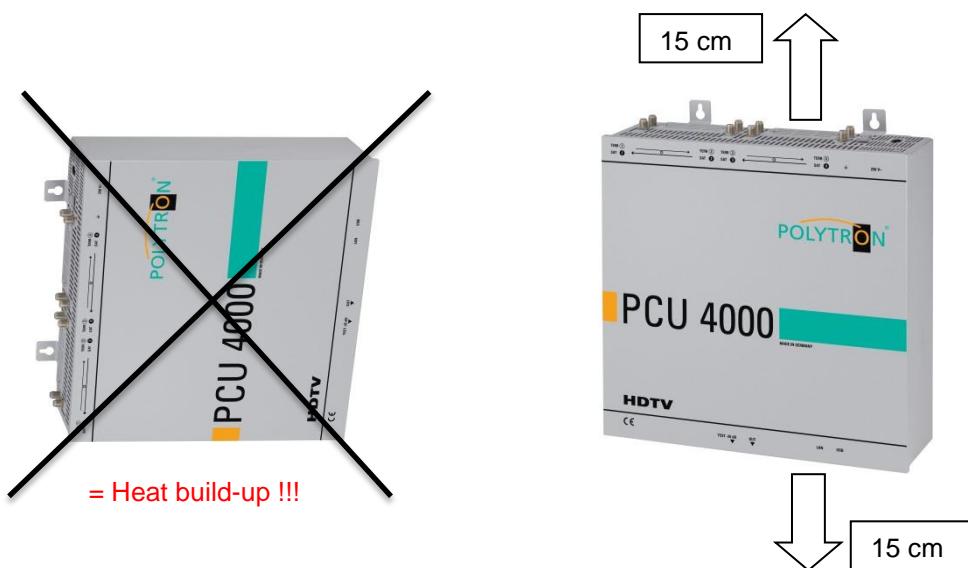
5. Input circuit

In the PCU 41x1, signals are directly fed to the input tuners. Due to the triple tuner, there are 4 ports for SAT signals and 4 ports for terrestrial signals (DVB-T/T2 or DVB-C). As factory default, there is an additional 12V DC input for LNB supply on the SAT input tuner 1 and tuner 2. This input can be switched off using the jumpers J1 and J2. On tuner 4, 12V supply voltage for the terrestrial range can be connected by plugging in the jumper J3. The operating states are indicated by LEDs.



6. Assembly

The compact headend must be mounted in a well-ventilated room. The ambient temperature must not exceed 45 °C. It must be ensured that the air can circulate freely through the ventilation holes, especially in horizontal 19" mounting. There must be at least 15 cm of space around the device, so that the air can circulate properly. For mounting or when working on the wiring, the mains plug must be pulled.



6.1. Grounding

The device must be grounded in accordance with EN 60728-11.

- Strip approx. 15 mm of the cable insulation of the grounding cable (4mm²).
- Push stripped end under the earth screw and tighten the screw.



7. Installation

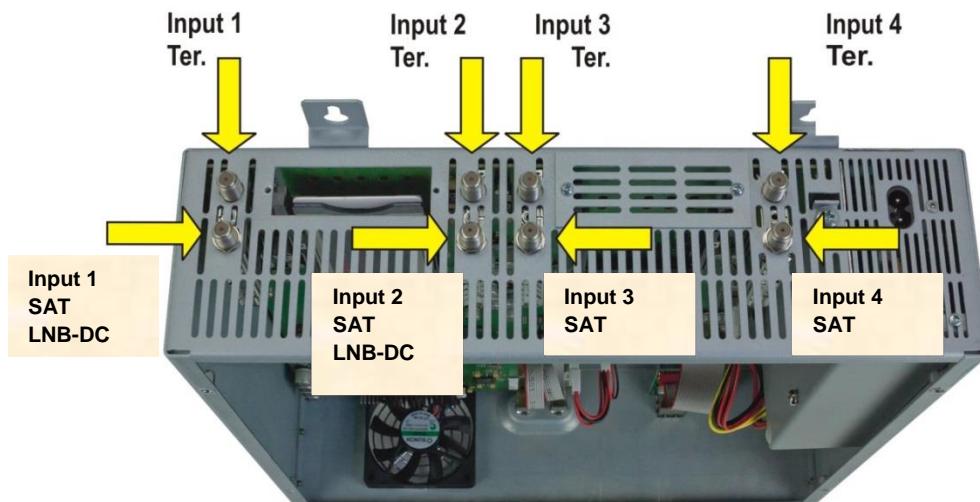
Connection of the input signals

Connect SAT signals directly or via splitter to the SAT tuner inputs. At input 1 and 2 there are 12 V DC for the supplying of the LNB. DVB-T and DVB-C need to be connected to the terrestrial inputs. At the terrestrial input 4 there are 12 V DC for a terrestrial pre-amplifier.



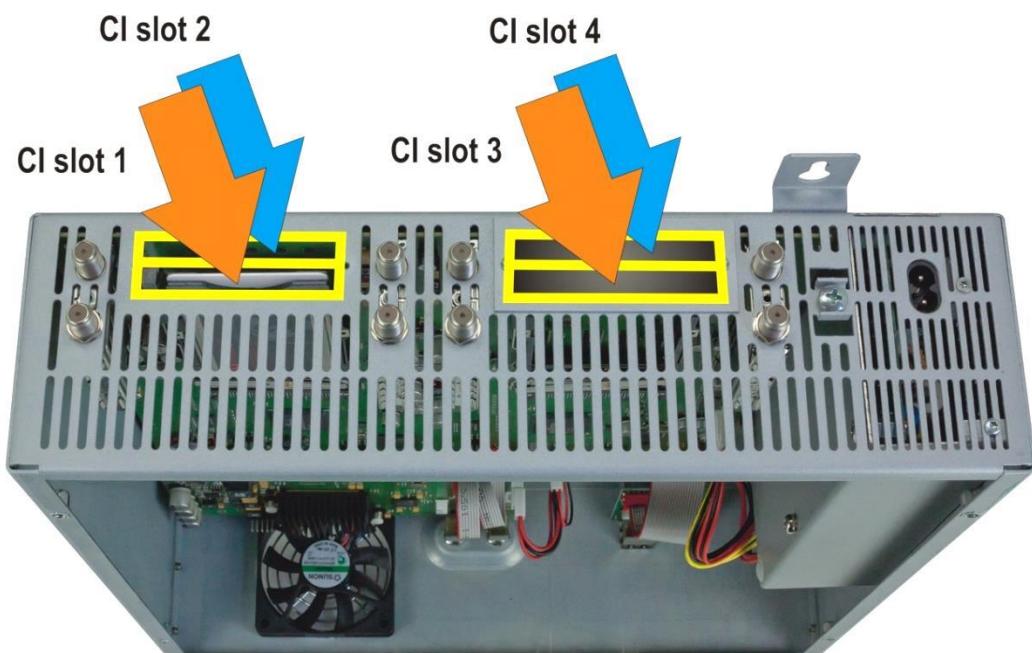
Please note that the consumption of each input must not exceed 250 mA.

A total of 500 mA is available.



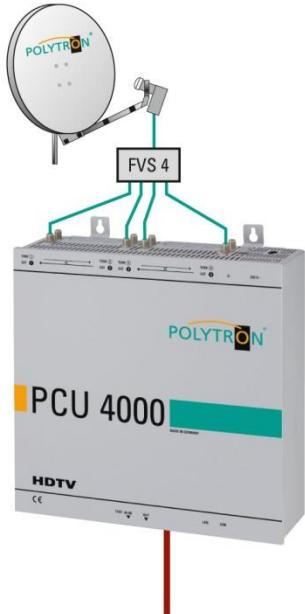
Insertion of the CI modules

To insert the CI modules, the covers must be removed. Use the picture to see how the CI slots are assigned to the SAT inputs. Always insert the module with the address facing forwards (in the direction of the lid).



7.1. Pre-programming

The inputs and outputs of the device are pre-programmed ex-factory with a German standard frequency allocation. In order to receive the pre-programmed ASTRA transponder, the SAT inputs must be connected with the "horizontal high" level in accordance with the following picture.



Platz/ Slot	1	2	3	4
Transponder	ARD Digital HH 11836 27500 kSym	ZDF Vision HH 11954 27500 kSym	SAT1 / Pro7 HH 12545 22000 kSym	RTL World HH 12188 27500 kSym
Symbolrate				
ASTRA	Das Erste BR FS Süd HR SWR BW WDR Köln BR FS Nord	ZDF 3 Sat Ki.Ka ZDF Info ZDF neo ZDF kultur	Sat. 1 Pro 7 Kabel 1 N24 Sat. 1 Gold etc.	RTL RTL 2 VOX Super RTL N-TV etc.
Ausgang/ Output	306 MHz	314 MHz	322 MHz	330 MHz

7.2. Input level

In order to ensure flawless reception, make sure that the level at the inputs is between **50** and **80 dB μ V**.



When receiving digital signals it is advantageous to have a lower input level instead of an excessively high one.

If the input level is too high, an attenuator is to be used.

7.3. Output level

Upon delivery, the output level is **90 dB μ V**. This can be changed via the device programming. There is an output level reduced by 20 dB at the TEST socket.



8. General programming

After the mains cable is connected, the device runs through an internal routine and all 4 channels are set with the previously stored data. During this, the **status LED** next to the USB socket flashes green.

Only after the **status LED** is continuously green or orange, contact is possible between PCU 41x1 and Laptop/PC.

8.1. Software installation

Download the software package from the homepage www.polytron.de (**SATC12_Vxxx.zip**) and unzip in the directory of your choice (**e.g. C:\ PCU 41x1**).

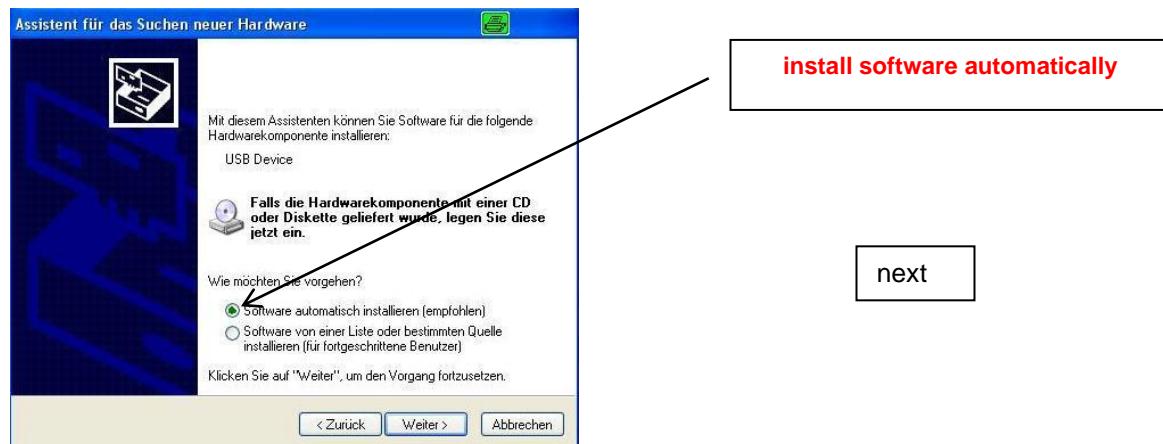
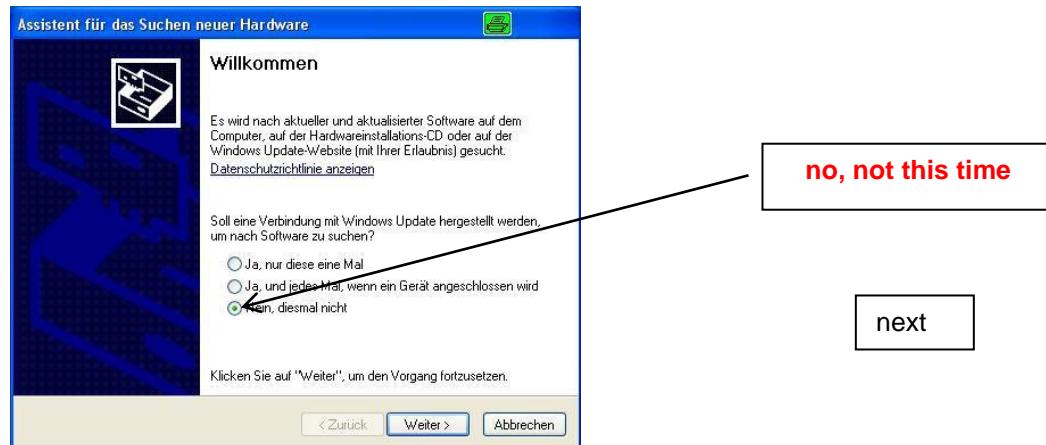
The software can also be loaded from the enclosed USB stick.

8.1.1. Installation of the driver

Start **Instal_driver.cmd**

Follow the instructions on the screen.

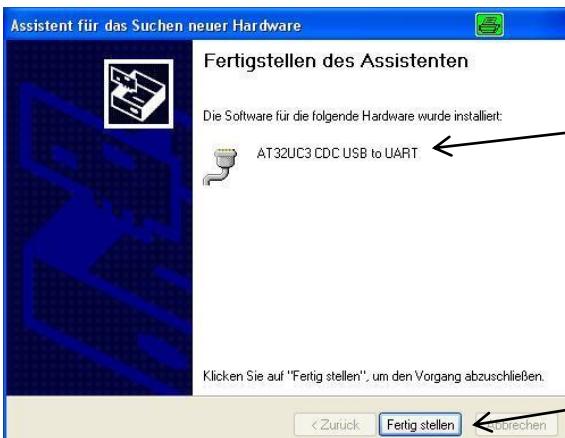
In some first installations the following dialog can appear. This depends on the operating system. Carry out the following instructions and select the selection fields:





If this notice is displayed:

Continue the installation



The software was installed for
the following hardware

finish

The installation of the driver software is now complete.

8.1.2. Installation of the programming software

Install the software by starting the "**Setup.exe**" program in the desired folder.

Follow the instructions on the screen.

Close the screen displays once the installation has ended.



After the installation of the programming software on the PC, the PCU 41x1 can be connected to the PC with the USB cable.

Only connect the device to
the PC once the software
installation has been completed.



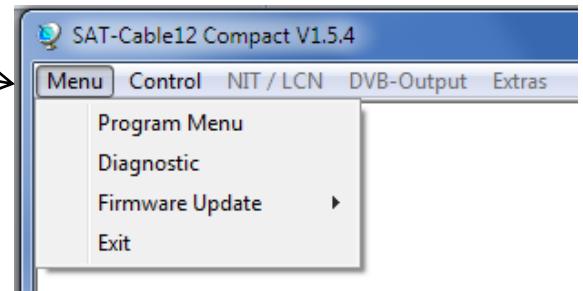
8.2. Programming of the device parameters

Start the program **SATC12**

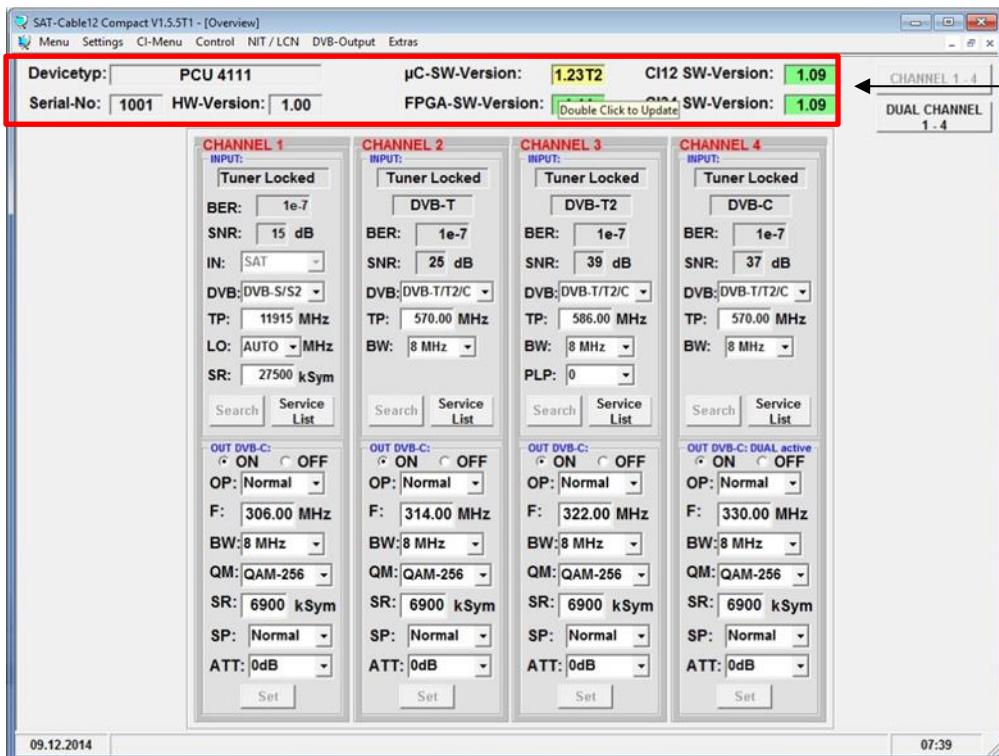
Click on **Menu** at the top left

The following menu points are available:

- **Program Menu**
- **Diagnostic**
- **Firmware Update**
- **Exit**



Select **Program Menu**: All adjustments of the input and output parameters are carried out here. After calling up the menu, all 4 channels are queried and the set parameters are displayed.



In the top part of the menu, the device data is displayed, such as type, serial number, hardware version and the software status for CPU and FPGA.

8.2.1. Input parameters SAT reception

DVB > Input signal

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

Choose the kind of signal

If DVB-T/T2 or
DVB-C is chosen, go further in
the passage TER. reception

TP > Transponder frequency

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

Enter transponder frequency

Auto > LO frequency

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

AUTO sets the required
frequency automatically.
Can however be set to **09750**,
10600 or another
OTHER frequency.

SR > Symbolrate

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

Enter symbol rate

Search >

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

After the button **Search** has
been activated, the data is
accepted and the desired
transponder is set.

Tuner Locked

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

If the tuner finds the transponder,
Tuner Locked is displayed in the upper
field.

Receiving Conditions

CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 15 dB
IN: SAT
DVB: DVB-S/S2
TP: 12188 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List

The quality of the input signal can be
evaluated using the bit error ratio
BER and the signal-to-noise ratio **SNR**.

The guidelines shown apply to the signal-to-noise ratio SNR. The corresponding values of the FEC (forward error correction) have to be taken from the tables of the satellite operators. If e.g. the transponder has an FEC of 5/6, the SNR display must be at least 9 dB to guarantee good signals.

FEC	gut	sehr gut
1/2	5-7dB	8-11dB
2/3	7-9dB	10-13dB
3/4	8-10dB	11-14dB
5/6	9-11dB	12-15dB
7/8	10-12dB	13-16dB

8.2.2. Input parameters for the terrestrial range

TP > Input Frequency

CHANNEL 1
INPUT:
Tuner Locked
DVB-T2
BER: 1e-7
SNR: 40 dB
TP: 614,00 MHz
BW: 8 MHz
PLP: 1
Search Service List

The kind of input signal will be identified automatically.

Select input frequency

BW > Channel Bandwidth

CHANNEL 1
INPUT:
Tuner Locked
DVB-T2
BER: 1e-7
SNR: 40 dB
TP: 614,00 MHz
BW: 8 MHz
PLP: 1
Search Service List

7 or 8 MHz

PLP > Select Service (DVB-T2)

CHANNEL 1
INPUT:
Tuner Locked
DVB-T2
BER: 1e-7
SNR: 40 dB
TP: 614,00 MHz
BW: 8 MHz
PLP: 1
Search Service List

Select PLP

Search > Searching

CHANNEL 1
INPUT:
Tuner Locked
DVB-T2
BER: 1e-7
SNR: 40 dB
TP: 614,00 MHz
BW: 8 MHz
PLP: 1
Search Service List

After the button **Search** has been activated, the data is accepted and the desired channel is set.

If the tuner finds the channel **Tuner Locked** is displayed in the upper field.

Receiving Conditions

CHANNEL 1
INPUT:
Tuner Locked
DVB-T2
BER: 1e-7
SNR: 40 dB
TP: 614,00 MHz
BW: 8 MHz
PLP: 1
Search Service List

The quality of the input signal can be evaluated using the bit error ratio **BER** and the signal-to-noise ratio **SNR**.

Recommendation: bit error ratio **BER** should be $\leq 1e-6$

For DVB-T, the limit value for the signal-to-noise ratio **SNR** at DVB-T is 26 dB and 32 dB for DVB-T2.

8.2.3. Output parameters DVB-C

OP > Operating Mode

Normal > normal mode

Single > single carrier for level measurement with an analog antenna measuring device

Zero > digital channel with content 0 (constant level without fluctuations)

F > Output Frequency

Frequency freely selectable.
It is recommended to stick to the corresponding TV standard channel spacing.
The frequency of the channel middle is set.
(e.g. channel 21, 470...478 MHz, set to 474 MHz)

BW > Bandwidth

Choose bandwidth depending on output frequency between 7 MHz and 8 MHz

Setting of the possible QAM mode (16, 32, 64, 128, 256) dependent on the data rate of the input transponder. Only the QAM mode that is possible is displayed

SR > Symbol Rate

Up to 7,200 kilo symbols/ sec. is dependent on the selected QAM mode (used setting in cable networks: 256 QAM / SR 6.900). Only the symbol rates that are possible are accepted.

Normal > normal mode

Inverted > Useful signal can be inverted in its spectral position. Inversion is only necessary in exceptional cases.

On **OFF** >

Switching Off Output Channel

If not all 4 output channels are to be assigned, each channel can be switched off individually with **OFF**.

ATT > Output Level

The output level at the output is 90 dB μ V and can be weakened in each channel by up to 12 dB in 1 dB steps.

Set > Accept Programming

After the setting of all parameters press the **Set** button. With this, the adjusted data is accepted. Repeat steps for other channels.



Notice: The DVB-C / QAM receivers must be programmed in accordance with the set parameters (search).

8.2.4. Output parameters DVB-T

OP > Operating Mode

The screenshot shows the 'OP' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Normal> normal mode

Single> single carrier for level measurement with an analog antenna measuring device

Zero > digital channel with content 0 (constant level without fluctuations)

F > Output Frequency

The screenshot shows the 'F' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Frequency freely selectable.

It is recommended to stick to the corresponding TV standard channel spacing.

The frequency of the channel middle is set. (e.g. channel 21, 470...478 MHz, set to 474 MHz)

BW > Bandwidth

The screenshot shows the 'BW' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Choose bandwidth depending on output frequency between 7 MHz and 8 MHz

CR > Code Rate

The screenshot shows the 'CR' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Setting of the possible Code rate (1/2, 2/3, 3/4, 5/6, 7/8)

GI > Guard Intervall

The screenshot shows the 'GI' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Setting of the possible Guard intervall (1/4, 1/8, 1/16, 1/32)

CM > Carrier Modulation

The screenshot shows the 'CM' settings dialog with the following configuration:

- OUTPUT: ON
- OP: Normal
- F: 306,00 MHz
- BW: 8 MHz
- CR: 5/6
- GI: 1/32
- CM: 2k
- QM: 64QAM
- SP: Normal
- AT: 0dB

Display of possible carrier modulation - only 2k.

QM > QAM Mode

OUTPUT:	<input checked="" type="radio"/> ON <input type="radio"/> OFF
OP:	Normal
F:	306,00 MHz
BW:	8 MHz
CR:	5/6
GI:	1/32
CM:	2k
QM:	64QAM
SP:	Normal
AT:	0dB
<input type="button" value="Set"/>	

Setting QAM mode
(16, 32, 64)

SP > Spectrum

OUTPUT:	<input checked="" type="radio"/> ON <input type="radio"/> OFF
OP:	Normal
F:	306,00 MHz
BW:	8 MHz
CR:	5/6
GI:	1/32
CM:	2k
QM:	64QAM
SP:	Normal
AT:	0dB
<input type="button" value="Set"/>	

Normal > normal mode

Inverted > Useful signal can be inverted in its spectral position.
Inversion is only necessary in exceptional cases.

On OFF > Switching Off Output Channel

OUTPUT:	<input checked="" type="radio"/> ON <input type="radio"/> OFF
OP:	Normal
F:	306,00 MHz
BW:	8 MHz
CR:	5/6
GI:	1/32
CM:	2k
QM:	64QAM
SP:	Normal
AT:	0dB
<input type="button" value="Set"/>	

If not all 4 output channels are to be assigned, each channel can be switched off individually with **OFF**.

ATT > Output Level

OUTPUT:	<input checked="" type="radio"/> ON <input type="radio"/> OFF
OP:	Normal
F:	306,00 MHz
BW:	8 MHz
CR:	5/6
GI:	1/32
CM:	2k
QM:	64QAM
SP:	Normal
AT:	0dB
<input type="button" value="Set"/>	

The output level at the output is 90 dB μ V and can be weakened in each channel by up to 12 dB in 1 dB steps.

Set > Accept Programming

OUTPUT:	<input checked="" type="radio"/> ON <input type="radio"/> OFF
OP:	Normal
F:	306,00 MHz
BW:	8 MHz
CR:	5/6
GI:	1/32
CM:	2k
QM:	64QAM
SP:	Normal
AT:	0dB
<input type="button" value="Set"/>	

After the setting of all parameters press the **Set** button. With this, the adjusted data is accepted. Repeat steps for other channels.

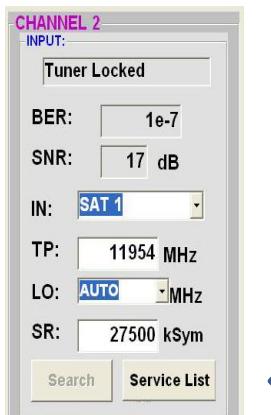


Notice: The DVB-T / COFDM receivers must be programmed in accordance with the set parameters (search).

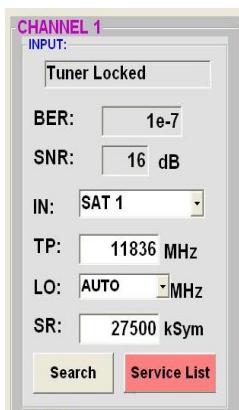
8.3. Function "Service List"

If certain services within a transponder are not desired at the output, they can be removed. Encoded services can still be selected for decoding via this function.

8.3.1. Delete and add services (programs)

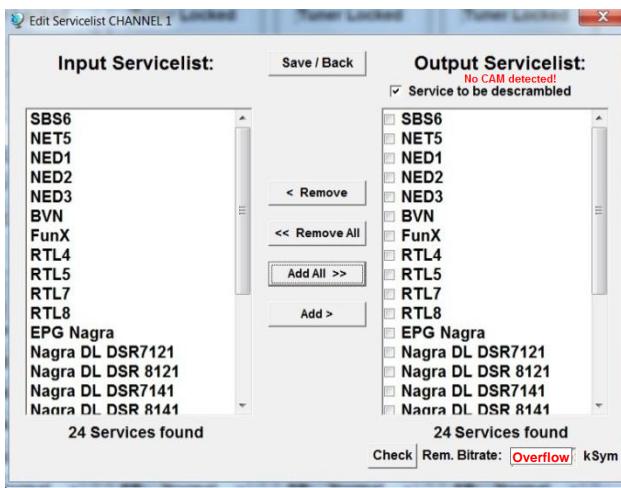


The button **Service List** is only active if the tuner is locked.



If the data rate at the input is higher than the data rate that is possible at the output due to the set parameters an error message appears and the button for the **Service List** turns red. In this case, a reduced selection of the desired services must be made.

Clicking on this button opens the following window. The list of services available at the input is shown on the left. On the right, one can see the services contained in the output signal.

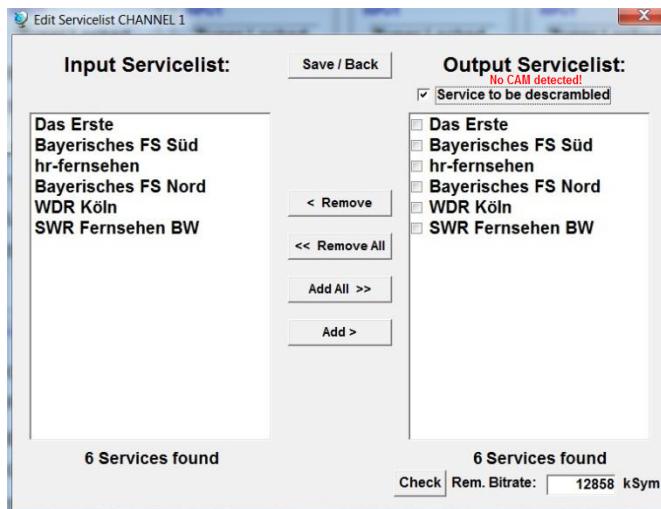


If the data rate at the output is too high, the word "Overflow" appears in the field "Rem. Bitrate". This means that the data rate is too high for the set parameters, and services must be removed. Undesired services can of course also be deleted if there is no overflow.

The field Bitrate is marked by colors. **Green** means: The remaining bitrate is higher than 10000 kSym. **Yellow** means: The remaining bitrate is less than 10000 kSym. **Red** means: The remaining bitrate is less than 5000 kSym. **Overflow means**: The data rate is too high in accordance to the adjusted DVB-C or DVB-T parameters.

By clicking on a service in the input list and clicking on the command **Add**, this service is added to the output list (also double-clicking on a service in the input list automatically adds it to the output list).

Clicking on a service in the output list and clicking on the command **Remove** removes this service from the output list (also double-clicking on a service in the output list removes the service automatically).
 By single-clicking on the **Save/Back** button, the output list is saved and the window is automatically closed.
 If you want to choose only a few services from a transponder containing many services, you can first click on **Remove ALL** and then select the required services.

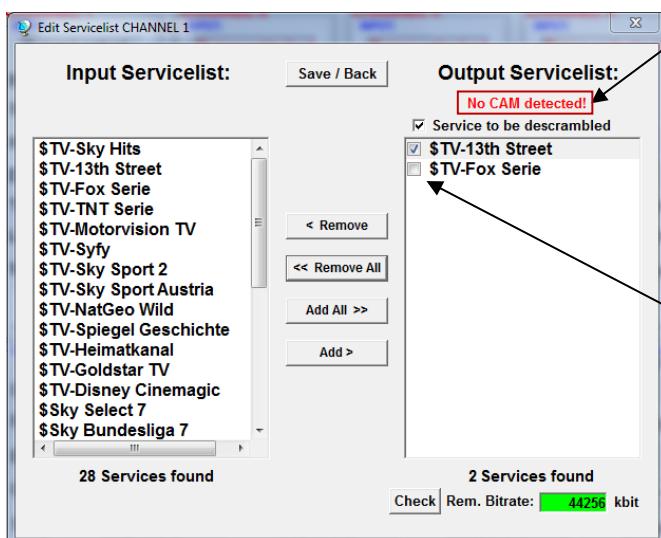


The still available data rate is shown in the field "Rem. Bitrate". This should be at least 5.000 kSym.

8.3.2. Selection of the channels to be decoded

Insert the CAM module with the appropriate smart card into the CI slot.

In case of not inserted or not detected CAM module following information appears:



Selection of desired services which should be encoded by applying a check mark.

Note: If the CAM module is not detected not any service can be decoded!

Encoded as well as non-encoded services can be selected and processed together.

With a click on the **Save/Back** button the output list is saved and the window is automatically closed.

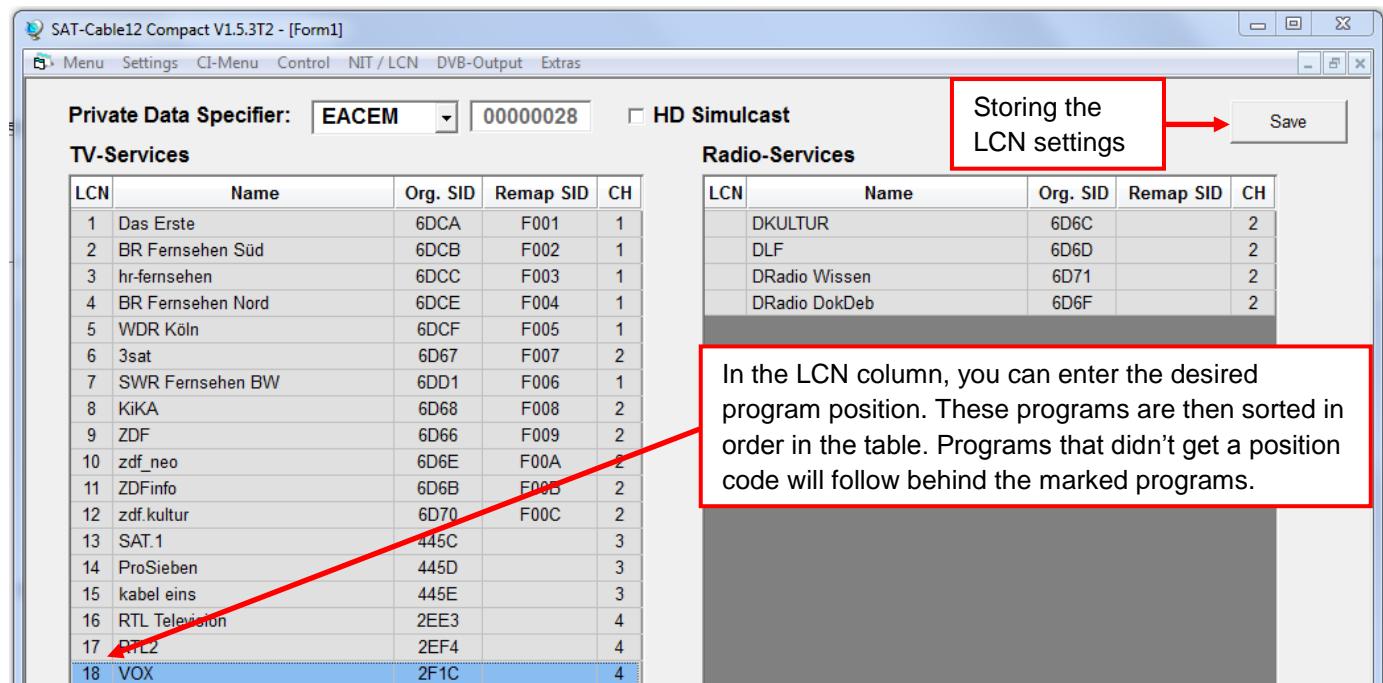
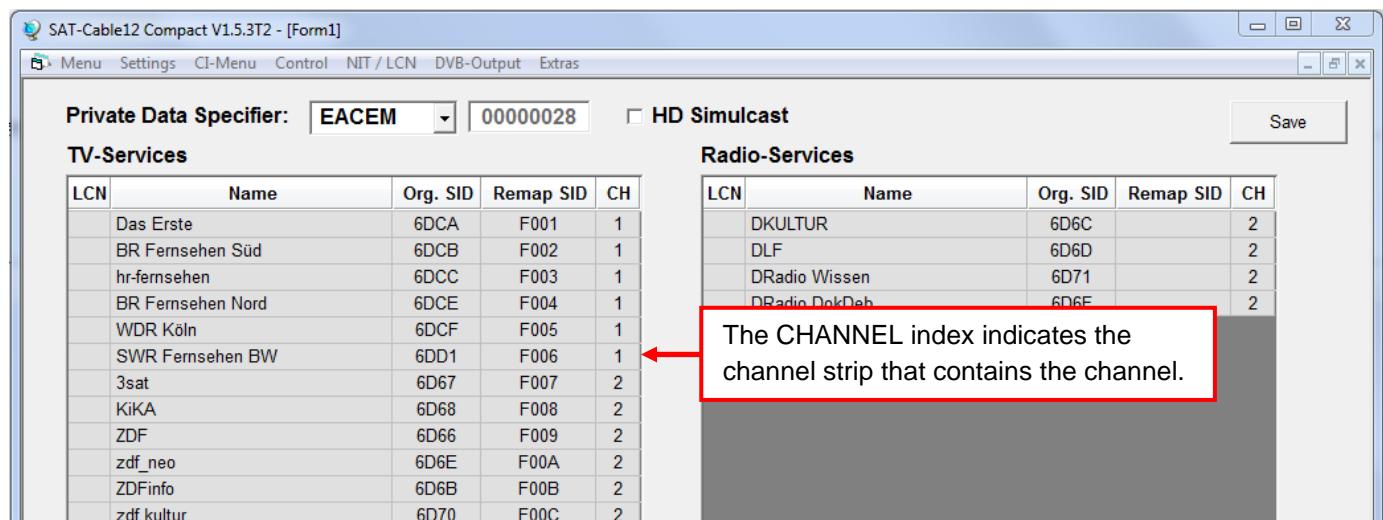
The CAM modules should be only inserted in power-off mode of the unit.



8.3.3. "LCN" function for the allocation of program positions

Precondition is that the TVs/receivers support LCN.

→ Click on LCN / Remap Settings.



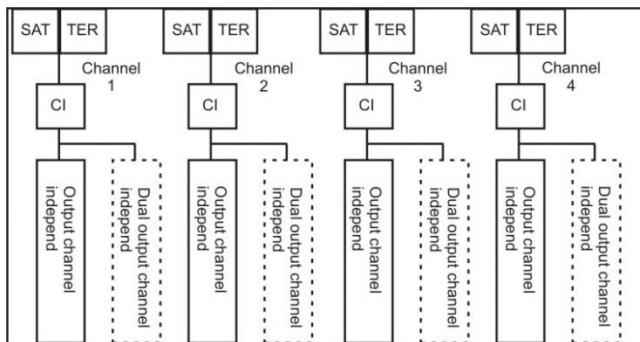
8.3.4. "Dual Channel" function

For headend PCU 41x1

Application:

The data rate of a transponder is too high to place the TV programs in one 7 or 8 MHz DVB-C channel. With the dual channel function, it's possible to split an input signal into two DVB-C output channels.

Block diagram of the dual channel function of the PCU 4111 (QAM output)



If the Dual Channel function is needed please click on following button.



It's not possible to change the input parameters!

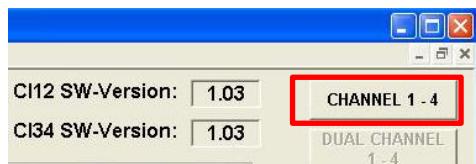
This is the information which transponder will be split.

To activate the dual channel function switch from OFF to ON.

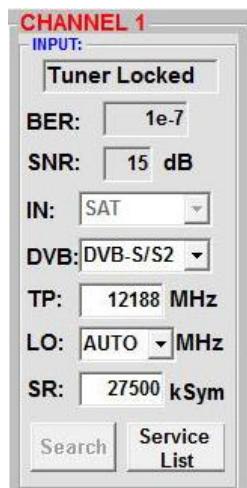
Now the output frequency and other parameters, for the second channel could be changed.

The second output channel is totally independent from the first output channel.

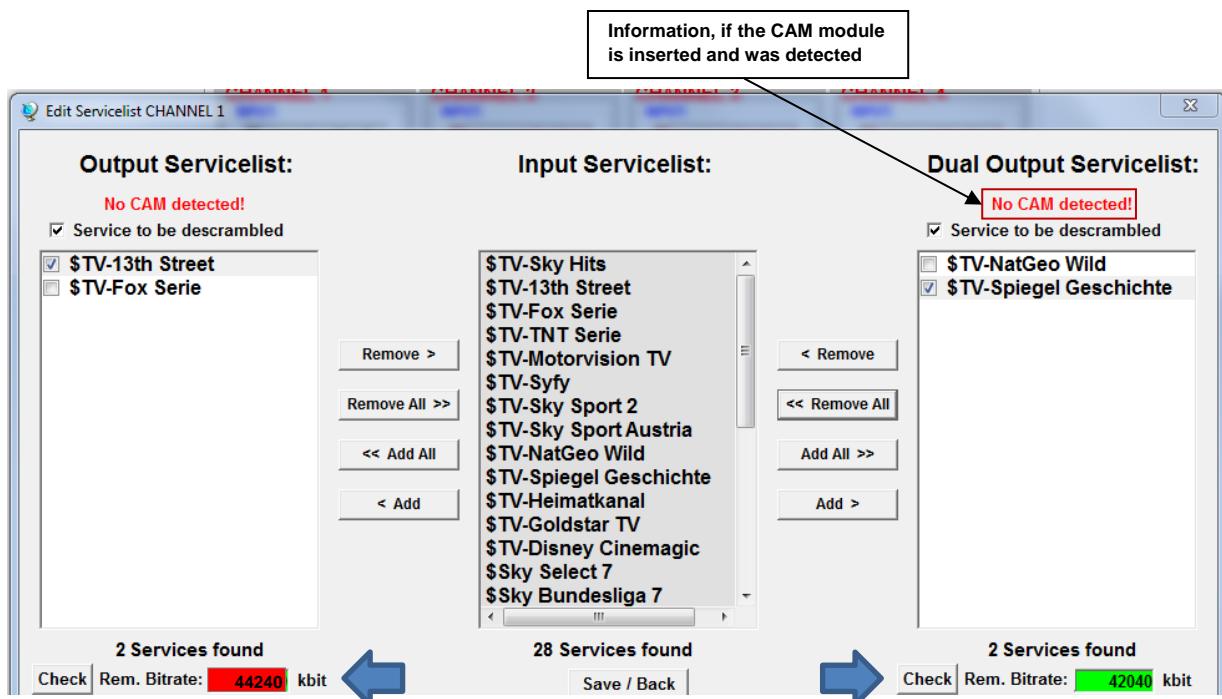
To save the parameters please click „Set“.



Back to the main menu.



To split the TV programs to both output channels, please click the button **Service List**.



The table in the middle „Input Servicelist“ shows all channels of the input transponder. With the button **Add** and **Remove** the TV programs can be allocated to both outputs. To control the Bitrate please click the button **Check**. The field “Bitrate” is marked by colors.

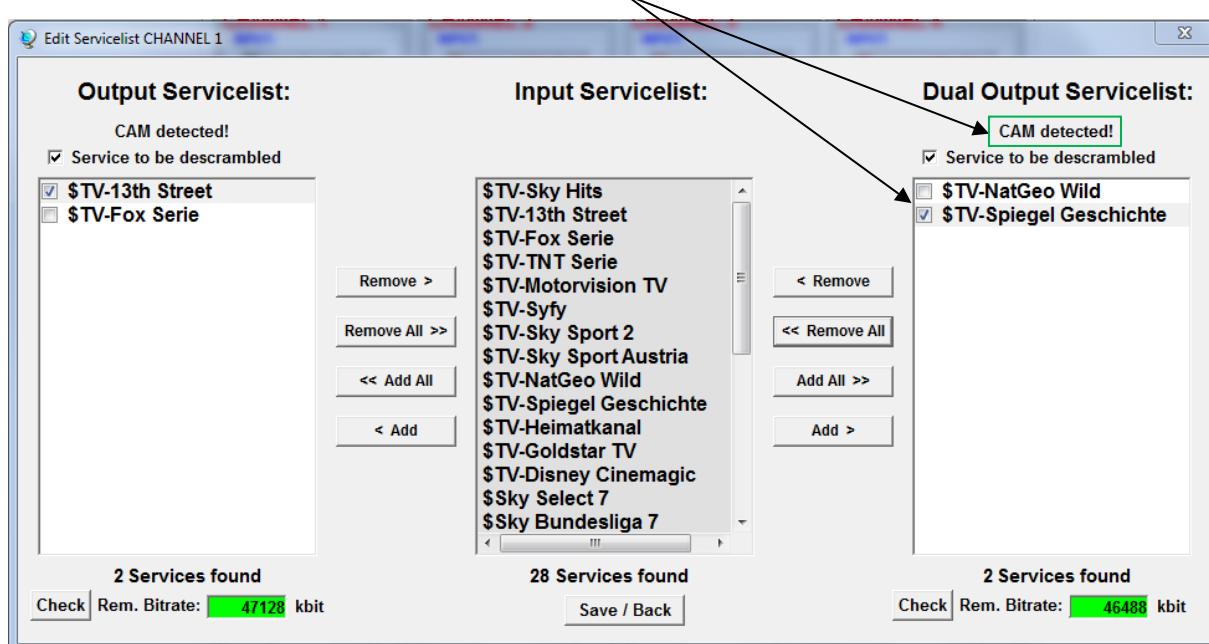
Green means: The remaining bitrate is higher than 10000 kSym.

Yellow means: The remaining bitrate is less than 10000 kSym.

Red means: The remaining bitrate is less than 5000 kSym.

Overflow means: The data rate is too high in accordance to the adjusted DVB-C or DVB-T parameters.

To decode the favored services a hook must be placed in front of the service name.



With button **Save/Back** the parameters will be saved and the main menu appears.

Encoded as well as non-encoded services can be selected and processed together. With a click on the **Save/Back** button the output list is saved and the window is automatically closed.

The CAM modules should be only inserted in power-off mode of the unit.

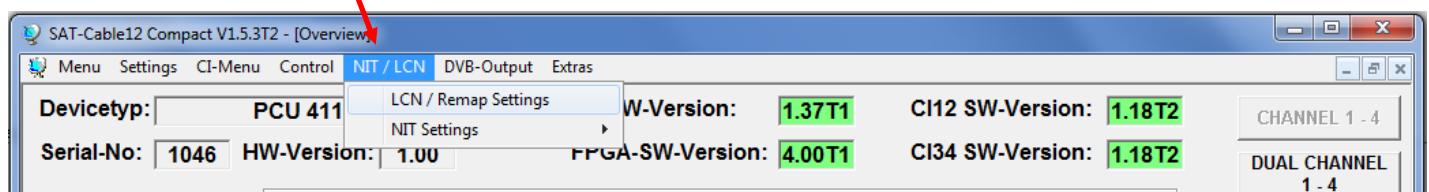


8.3.5. SID-Remapping – manual assignment of Service-IDs

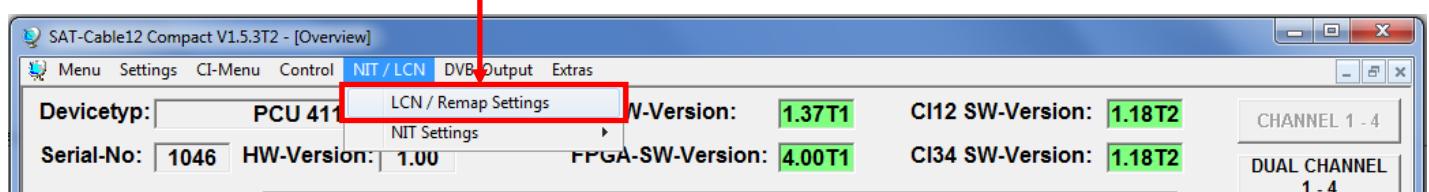
- With the feature SID-remapping new programs can be transmitted without retuning the receivers.
- Selected services are assigned with a new Service ID = (SID).
- Important:** Please ensure that a unique SID is assigned to the programs which are changed.
- The max. number of programs to be remapped must be assigned and scanned at first installation (some may be used as „placeholder“).
 - changes to less numbers of programs -> no new channel search is needed
 - changes to higher numbers of programs -> new channel search is required
- Important:** If service-remapping should be applied, this adjustment has to be done **before** creating the combined NIT.

Settings:

→ Click on the tab **NIT / LCN**.



→ Afterwards click on **LCN / Remap Settings**.



→ Example 1 (continuous allocation of Service IDs over all transponders):

LCN	Name	Org. SID	Remap SID	CH
	Das Erste	6DCA	F001	1
	BR Fernsehen Süd	6DCB	F002	1
	hr-fernsehen	6DCC	F003	1
	BR Fernsehen Nord	6DCE	F004	1
	WDR Köln	6DCF	F005	1
	SWR Fernsehen BW	6DD1	F006	1
	3sat	6D67	F007	2
	KiKA	6D68	F008	2
	ZDF	6D66	F009	2
	zdf_neo	6D6E	F00A	2
	ZDFinfo	6D6B	F00B	2
	zdf.kultur	6D70	F00C	2

LCN	Name	Org. SID	Remap SID	CH
	DKULTUR	6D6C		2
	DLF	6D6D		2
	DRadio Wissen	6D71		2
	DRadio DokDeb	6D6F		2

→ Example 2 (continuous allocation of Service IDs for every transponder):

LCN	Name	Org. SID	Remap SID	CH
	Das Erste	6DCA	F001	1
	BR Fernsehen Süd	6DCB	F002	1
	hr-fernsehen	6DCC	F003	1
	BR Fernsehen Nord	6DCE	F004	1
	WDR Köln	6DCF	F005	1
	SWR Fernsehen BW	6DD1	F006	1
	3sat	6D67	F001	2
	KiKA	6D68	F002	2
	ZDF	6D66	F003	2
	zdf_neo	6D6E	F004	2
	ZDFinfo	6D6B	F005	2
	zdf.kultur	6D70	F006	2

LCN	Name	Org. SID	Remap SID	CH
	DKULTUR	6D6C		2
	DLF	6D6D		2
	DRadio Wissen	6D71		2
	DRadio DokDeb	6D6F		2

Service IDs are entered manually. We recommend to use hexadecimal values within the range of F001 and FFFE.

Important: The allocation of the Service ID can be continuously (example 1). A service is referenced inside of a transponder by the unique pairing of ONID/TSID/SID. That's why the same SID can be used again in another transponder (example 2). Within one transponder the same SID must not be used twice.



[Click Save to apply the changes.](#)



→ Indication of fault case (the same SID is used twice for transponder 1):

The screenshot shows the 'TV-Services' section of the software interface. A red arrow points from the 'Save' button at the top right towards the 'Remap SID' column of the first two rows, highlighting the error where both rows have the same value 'F001'. The 'Save' button is also highlighted with a green border.

LCN	Name	Org. SID	Remap SID	CH
Das Erste		6DCA	F001	1
BR Fernsehen Süd		6DCB	F002	1
hr-fernsehen		6DCC	F003	1
BR Fernsehen Nord		6DCE	F001	1
WDR Köln		6DCF	F005	1
SWR Fernsehen BW		6DD1	F006	1
3sat		6D67	F007	2
KiKA		6D68	F008	2

Error correction: By manually change of the SID and **Save**.

→ Indication for the case, that instead of originally 6 programs of transponder 1 only 4 programs were fed into after changing:

The screenshot shows the 'TV-Services' section after changes have been made. A red box highlights the removed rows for 'BR Fernsehen Nord' (Org. SID 6DCE), which now have remap SIDs F005 and F006. The 'Save' button is highlighted with a green border.

LCN	Name	Org. SID	Remap SID	CH
Das Erste		6DCA	F001	1
BR Fernsehen Süd		6DCB	F002	1
hr-fernsehen		6DCC	F003	1
BR Fernsehen Nord		6DCE	F004	1
			F005	1
			F006	1
3sat		6D67	F007	2
KiKA		6D68	F008	2
ZDF		6D66	F009	2
zdf_neo		6D6E	F00A	2
ZDFinfo		6D6B	F00B	2
zdf.kultur		6D70	F00C	2

Important: A new channel search is not required for this example but the picture on the receivers site will remain „black“ for the 2 services with the SID F005 and F006.

Add LCN numbers:

Enter the corresponding LCN numbers manually.

The screenshot shows the 'TV Services' table on the left and the 'Radio-Services' table on the right. A red arrow points from the text above to the TV Services table. A green box highlights the 'Save' button at the top right of the window.

LCN	Name	Org. SID	Remap SID	CH
1	Das Erste	6DCA	F001	1
2	BR Fernsehen Süd	6DCB	F002	1
3	hr-fernsehen	6DCC	F003	1
4	BR Fernsehen Nord	6DCE	F004	1
5	WDR Köln	6DCF	F005	1
6	3sat	6D67	F007	2
7	SWR Fernsehen BW	6DD1	F006	1
8	KiKA	6D68	F008	2
9	ZDF	6D66	F009	2
10	zdf_neo	6D6E	F00A	2
11	ZDFinfo	6D6B	F00B	2
12	zdf.kultur	6D70	F00C	2
13	SAT.1	445C		3
14	ProSieben	445D		3
15	kabel eins	445E		3
16	RTL Television	2EE3		4
17	RTL2	2EF4		4
18	VOX	2F1C		4

LCN	Name	Org. SID	Remap SID	CH
	DKULTUR		6D6C	2
	DLF		6D6D	2
	DRadio Wissen		6D71	2
	DRadio DokDeb		6D6F	2

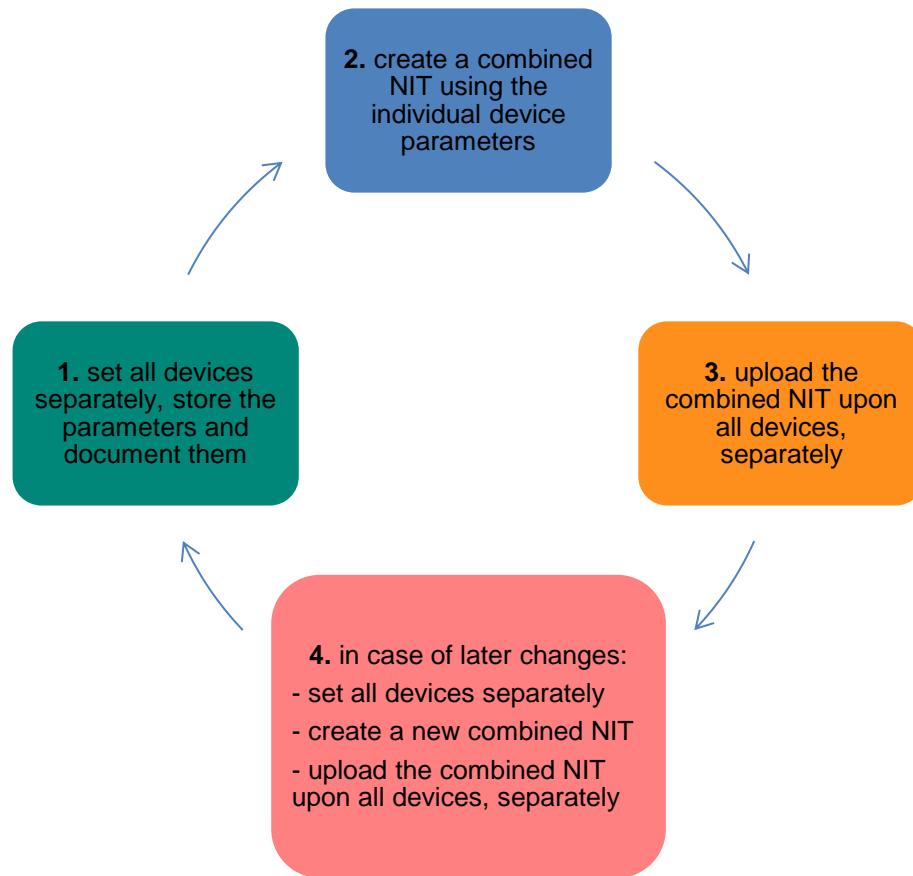
[Click Save to apply the changes.](#)



8.3.6. NIT-processing (Network Information Table)

- NIT stands for a transponder table which includes information for direct reception of digital programmes.
- NIT-processing requires advanced skills of DVB-standards!
- The combined NIT includes all relevant data of all connected devices and contains information about all receivable programmes in the network.
- **Important:** Place output channels within a combined NIT onto the lower frequency range, if possible. Many receivers start scanning at the lower end of the band ensuring that the combined NIT is found at first. This is particularly the case if existing systems with devices from other manufacturers will be upgraded and the combined NIT is missing.
- **Important:** The skilled employee should create a precise system and programming plan **before** installation/programming.
- **Important:** If service-remapping should be applied, this adjustment has to be done **before** creating the combined NIT.

Process scheme:

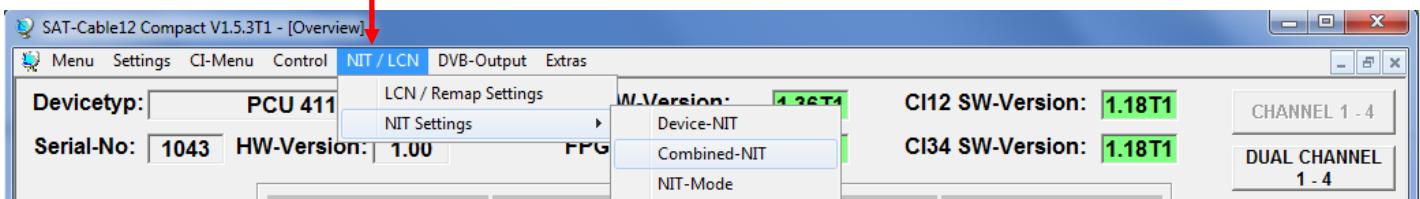


Changes to the NIT table(s) first become effective after closing the PC software.

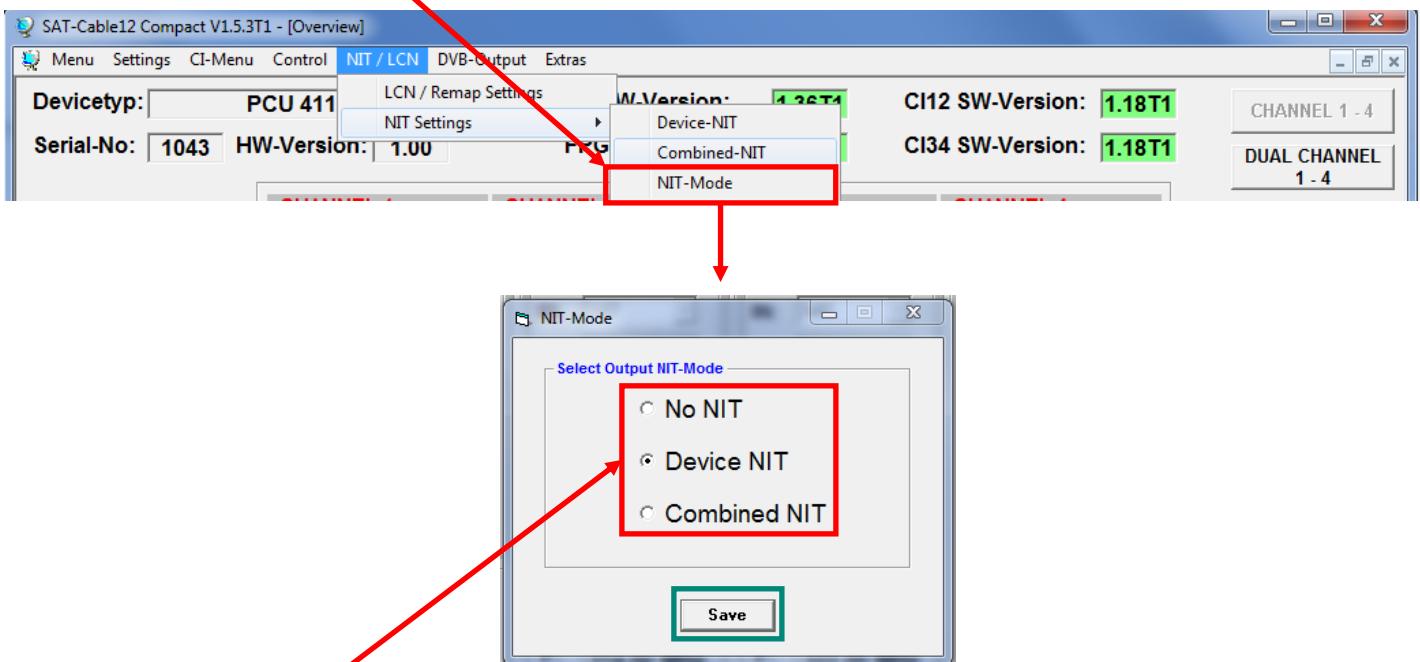
 **Please wait approx. 1 min. after closing the PC software until the changes become effective in all relevant systems.**

Settings:

→ Click on the tab **NIT / LCN**.



→ Afterwards click on **NIT Mode** to determine which NIT should be used.



No NIT: No NIT will be sent (for special applications, not according to DVB-standard).

Device NIT: A valid NIT will be sent automatically for the actual device (factory setting).

Combined NIT: A cross-device NIT will be sent. Assumed, that the user has created and stored a cross-device NIT onto the device.

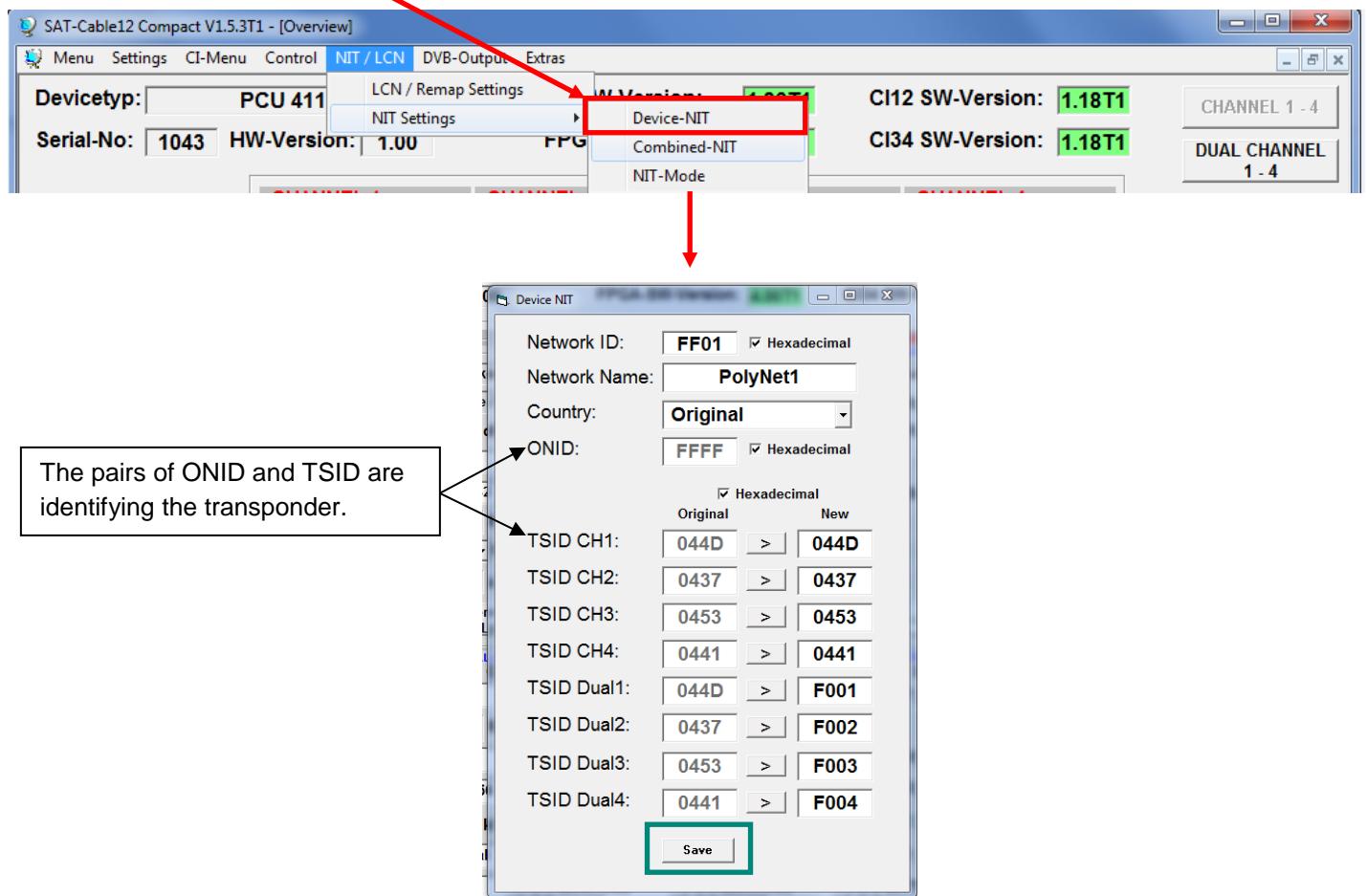


Click Save to apply the change.



Device NIT:

→ After clicking on **Device NIT** following screen window appears:



Note: Be aware of the plausibility and/or overlaps of the data before being entered!

Network ID: DVB-C at the output -> factory setting **FF01** (modification possible)
 DVB-T at the output -> factory setting **3002** (modification possible)

Network Name: Can be defined by the user.

Country: DVB-C at the output -> factory setting **Original** (modification possible, by choosing **Original** the received ONID from the satellite will be used)
 DVB-T at the output -> factory setting **Germany** (modification possible)
 The country setting should be the same as the receiver settings.

TSID New: If using the dual modulators, the original TSID is assigned twice. Therefore a new TSID has to be created in this box. We recommend to use hexadecimal values within the range of F001 and FFFE.



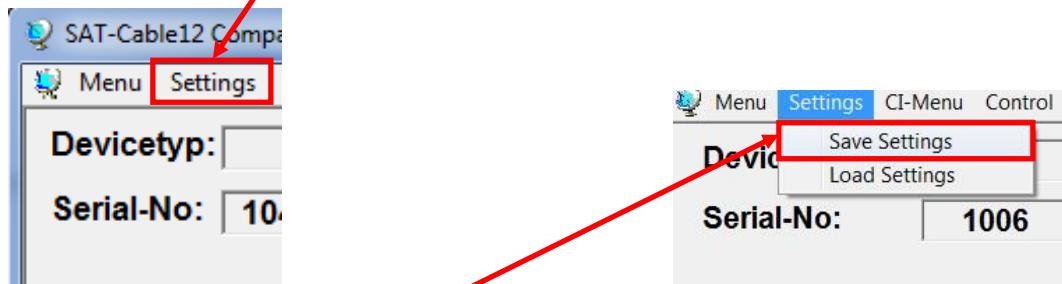
Click Save to apply the changes.



Combined NIT:

The settings of the individual devices must be stored before creating the combined NIT.

By choosing the menu point **Settings** it is possible to save existing settings on a PC/Laptop or to load it from a PC/Laptop.



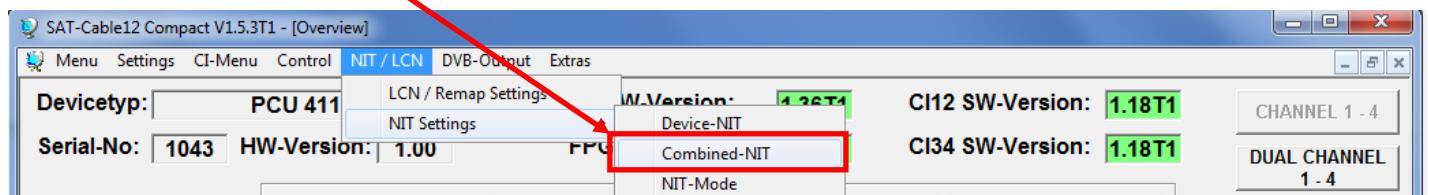
With the menu point **Save Settings** it is possible to save the programming onto the PC/Laptop.

A folder and a file name (e.g. object) has to be entered. The file name must retain the ending .c12!!

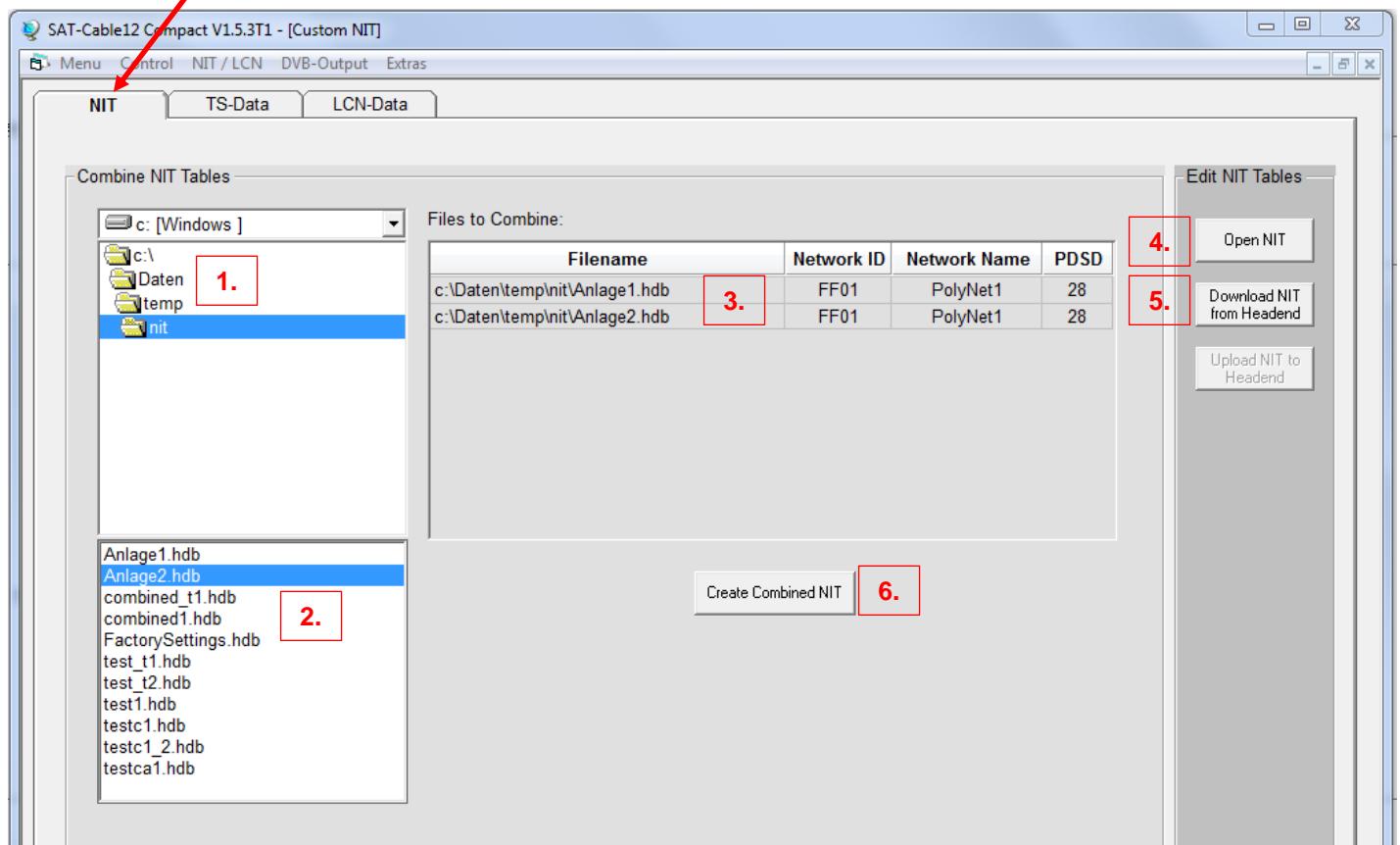
The settings are also saved to an *.rtf-file. This is located in the same folder as the PCU 41x1 software. This file format can be opened, edited and printed with e.g. Microsoft Word, Open Office or WordPad.

Additionally to that a *.hdb-file is created, which is needed to create a combined NIT.

→ After selecting **Combined NIT** the screen window below appears:



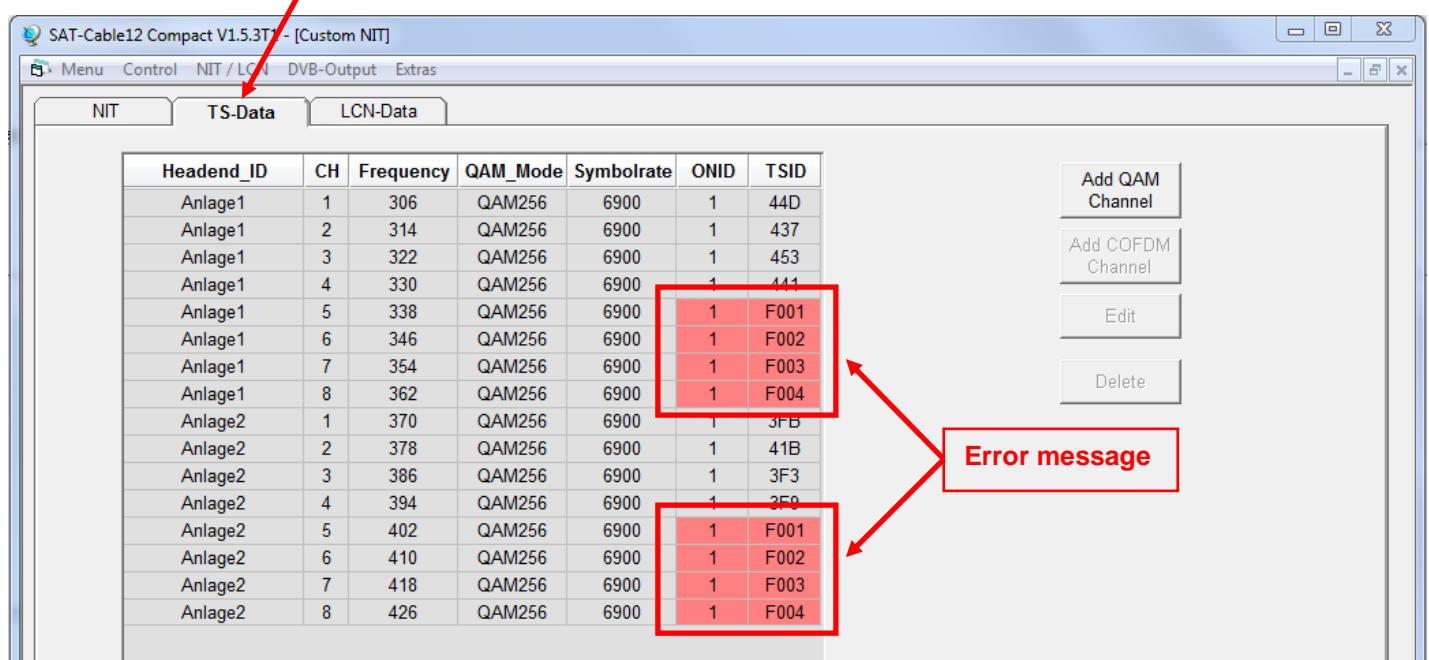
→ By the **NIT** tab the individually devices could be combined.



1. Search the folder containing the setting files of the individual devices and select it.
2. Double-click on the required *.hdb-files.
3. The selected files will be listed under Files to Combine and can be deselected by double-click, if desired.
4. If a combined NIT already exists, press button **Open NIT** to load it from the PC/Laptop.
5. Download of a stored NIT-table from the headend.
6. Click on **Create Combined NIT** after entering and checking **all** data to create the combined NIT. This NIT will be stored in a folder on the PC/Laptop.

Note: Implementation of external output channels (e.g. a modulator) see page 34-37!

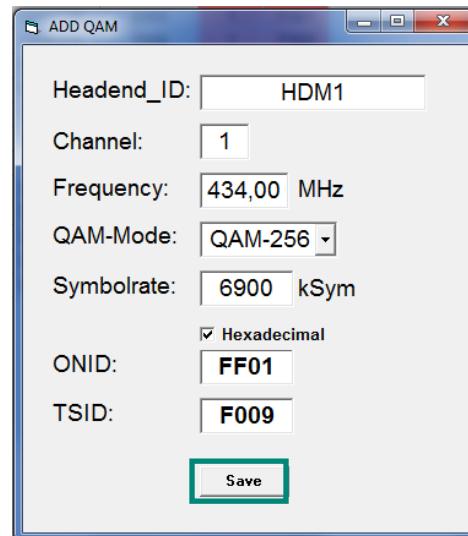
→ Click on the **TS-Data** tab for showing the transport stream-data of the combined NIT.



Headend_ID	CH	Frequency	QAM_Mode	Symbolrate	ONID	TSID
Anlage1	1	306	QAM256	6900	1	44D
Anlage1	2	314	QAM256	6900	1	437
Anlage1	3	322	QAM256	6900	1	453
Anlage1	4	330	QAM256	6900	1	441
Anlage1	5	338	QAM256	6900	1	F001
Anlage1	6	346	QAM256	6900	1	F002
Anlage1	7	354	QAM256	6900	1	F003
Anlage1	8	362	QAM256	6900	1	F004
Anlage2	1	370	QAM256	6900	1	3FB
Anlage2	2	378	QAM256	6900	1	41B
Anlage2	3	386	QAM256	6900	1	3F3
Anlage2	4	394	QAM256	6900	1	3F0
Anlage2	5	402	QAM256	6900	1	F001
Anlage2	6	410	QAM256	6900	1	F002
Anlage2	7	418	QAM256	6900	1	F003
Anlage2	8	426	QAM256	6900	1	F004

- This user interface allows to check the programming data and to add an external output channel (DVB-C = QAM or DVB-T = COFDM) to the list.
- The plausibility check of the pre-programmed data runs automatically.
- Existing plausibility problems and overlaps will be highlighted with coloured background (see example above). A few combinations ONID/TSID of the device 1 and 2 (Anlage1 / 2) in the example above are the same, which must be avoided within a network.
- **Important:** Set all devices separately first. Afterwards create a new combined NIT and upload the combined NIT upon all devices, separately!
- **Note:** At the user interface only manual added entries can be modified!

- Adding of an external output channel (e.g. additional modulator) via the TS-Data tab. Click on the tab **Add QAM Channel** (DVB-C) or **Add COFDM Channel** (DVB-T). Following menu appears:



Note: Be aware of the plausibility and/or overlaps of the data before being entered!

Headend ID: Can be defined by the user. Should be documented for later reference.

Channel: Set the individual playback channel.

Frequency: Enter the frequency of the output channel.

QAM-Mode: Select the relevant QAM-Mode.

Symbolrate: Define the required symbol rate.

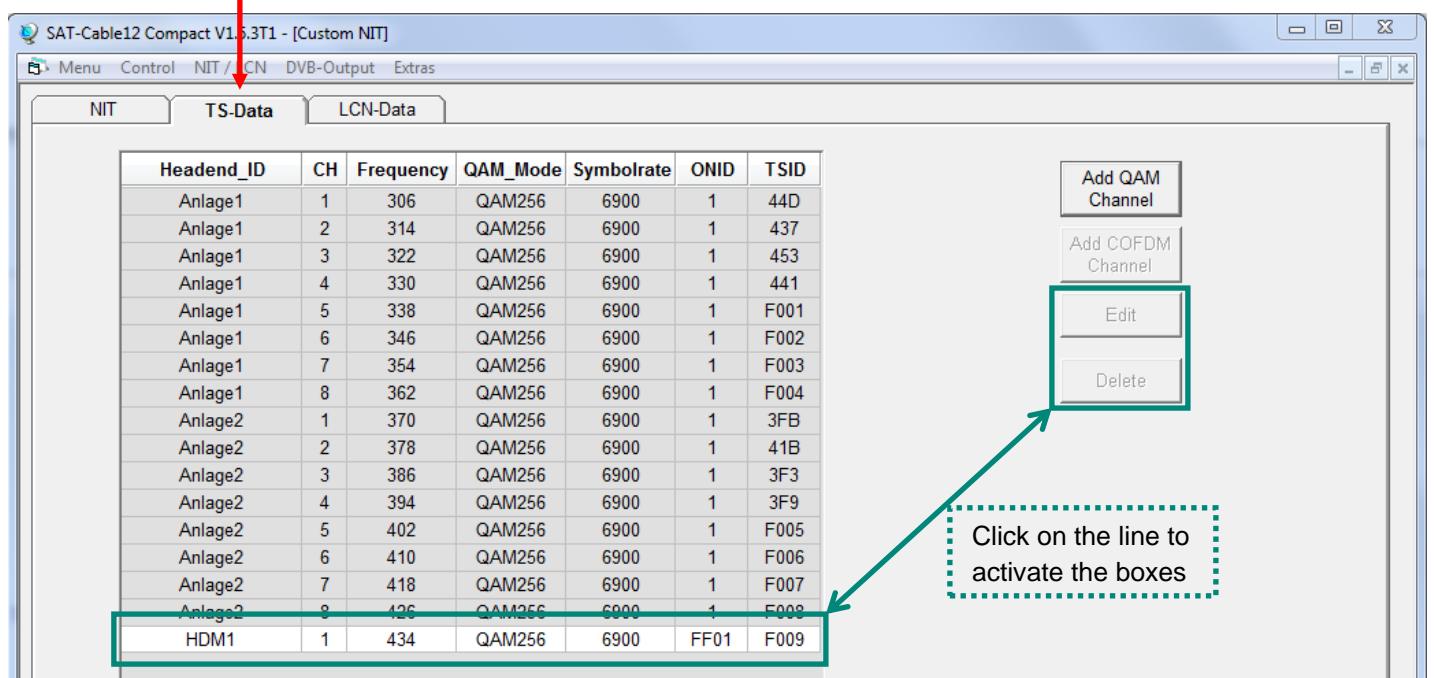
ONID / TSID: Enter the ONID and the TSID. We recommend to use hexadecimal values within the range of F001 and FFFE.



Click **Save** to apply the changes.



- The data of the added output channel will be shown after storing and after the plausibility and overlaps checks have been done:

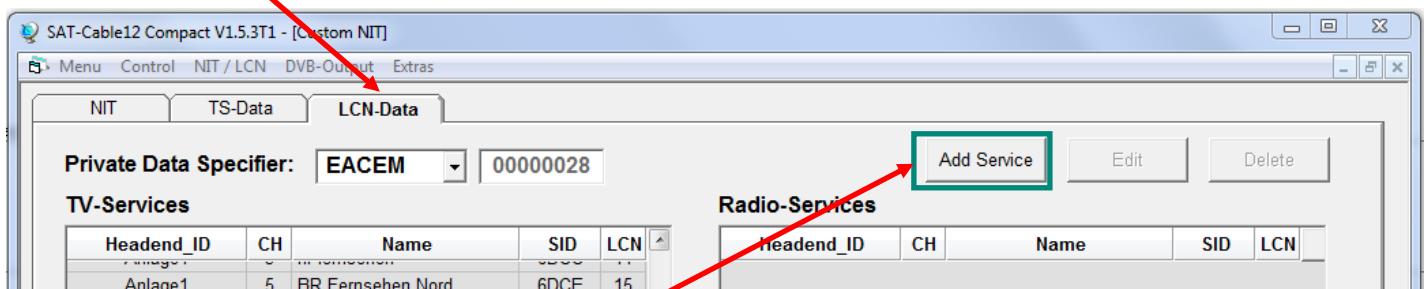


Note: Manually added output channels will be displayed with a white background.

The functions **Edit** and **Delete** are only available for manually added output channels.

Click on the corresponding line to activate the boxes.

→ By the **LCN-Data** tab the corresponding data of the combined NIT will be shown.



Click on **Add Service** to add LCN to the “manually added” channels.
Following input mask appears:

Note: Be aware of the plausibility and/or overlaps of the data before being entered!

Headend ID: Select the added device.

Channel: Set the individual playback channel.

Service Name: Can be defined by the user.

Service ID: Enter a Service ID. We recommend to use hexadecimal values within the range of F001 and FFFE.

Service Type: Choice between the options TV and Radio.

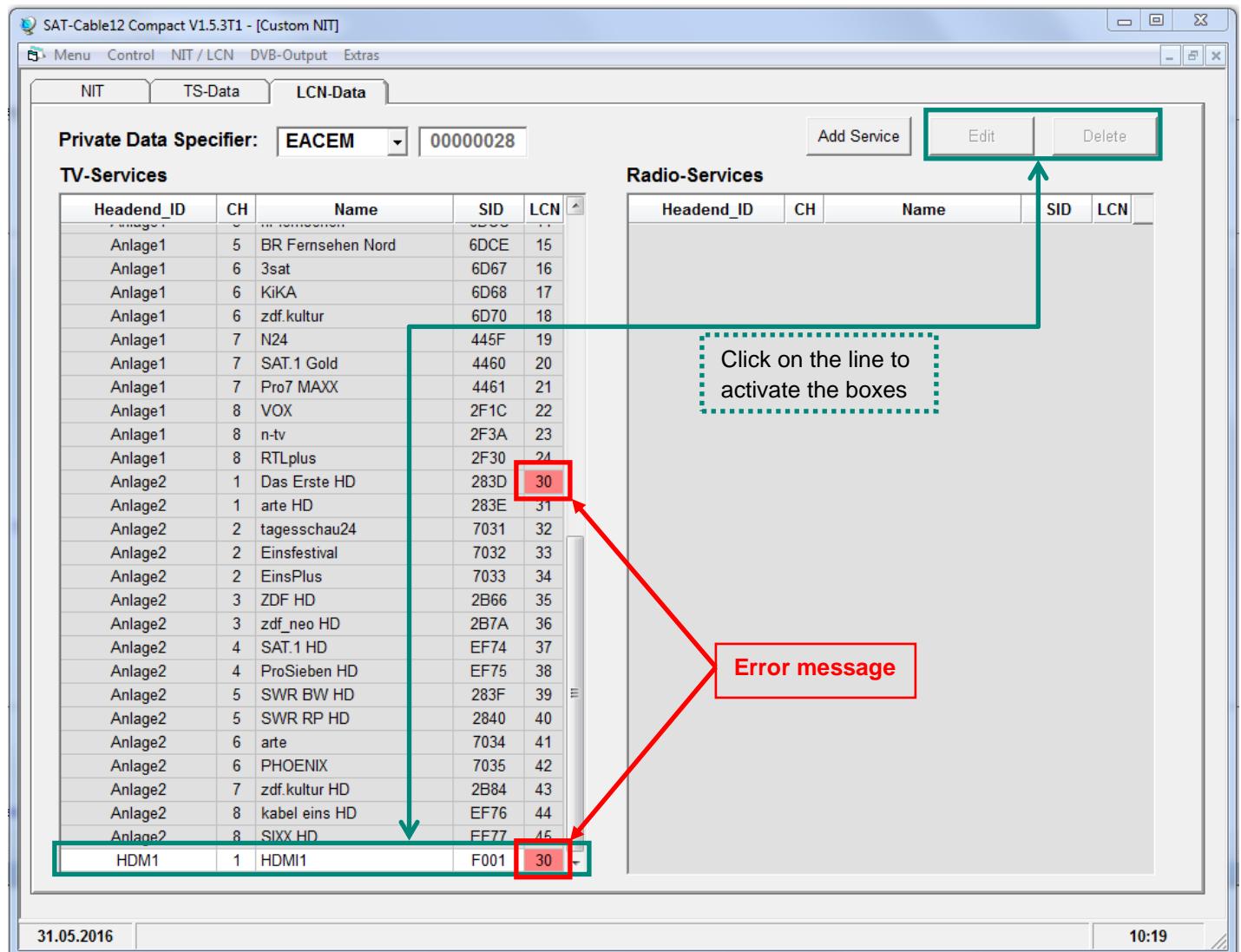
LCN: Determination of the program number in the LCN-system.

Click Save to apply the changes.

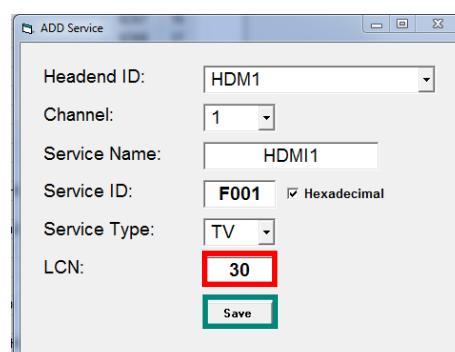
Note: Manually added output channels will be displayed with a white background.

The functions **Edit** and **Delete** are only available for manually added output channels.

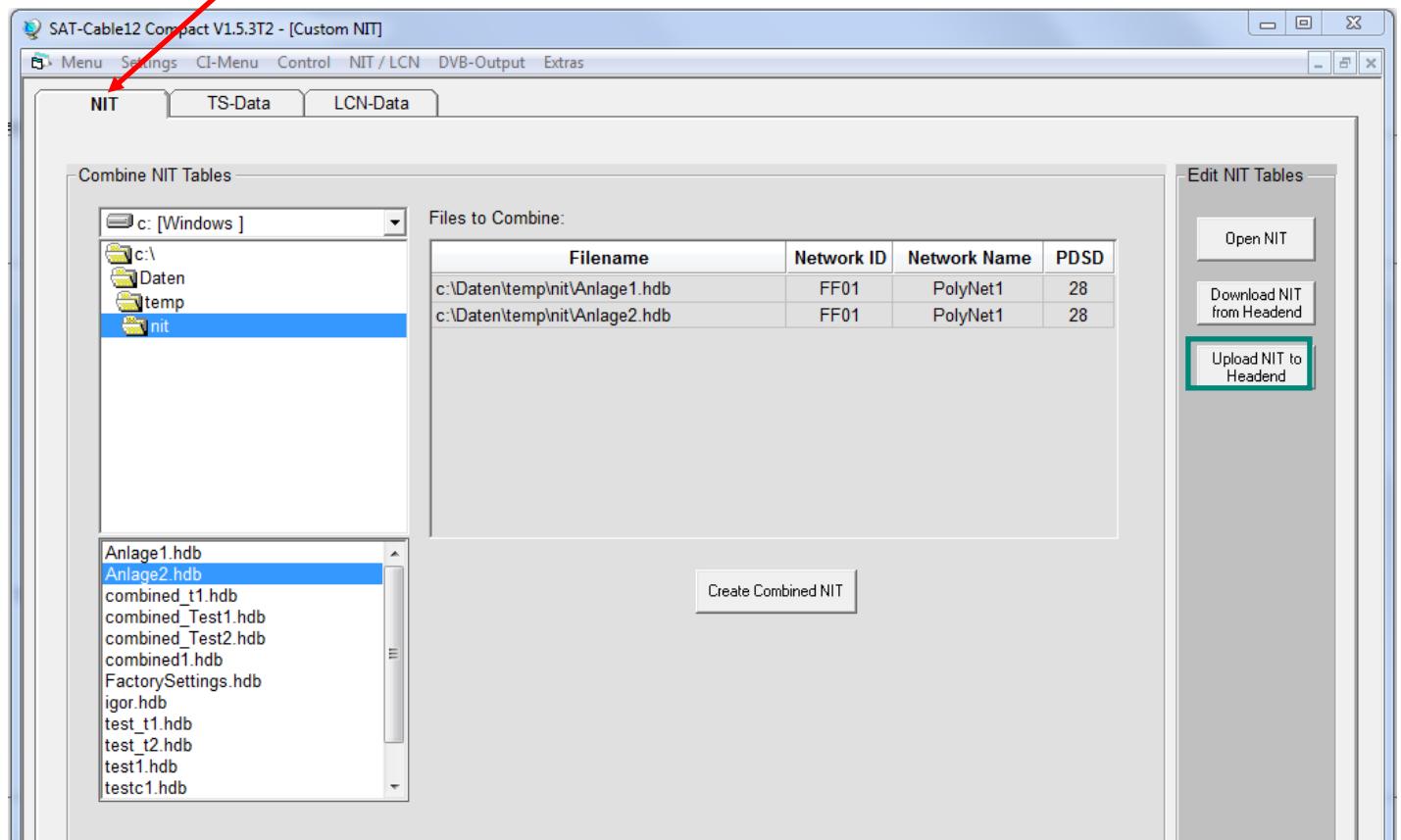
Click on the corresponding line to activate the boxes.



- The plausibility check of the pre-programmed data runs automatically.
- Existing plausibility problems and overlaps will be highlighted in coloured background (see example above). In the example above two program numbers in the LCN-system are the same, which must be avoided within a network.
- Error correction for the example above: Click on the LCN-program number of the line with the white background (HDMI1) and then click on **Edit**. Change the LCN-program number in the input mask accordingly and store the setting by click on **Save**.



→ Using the **NIT** tab, finally upload the combined NIT to the headends.



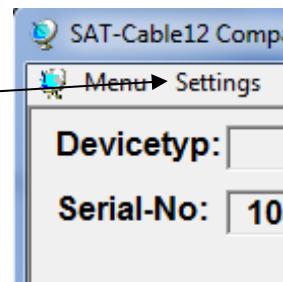
The button **Upload NIT to Headend** is now active. After clicking on this button the created „Combined NIT“ is transferred to the device and transmitted to the output channels.

8.4. Storage of the programming

It is possible to save existing programming on a PC and/or to load it from a PC. Program combinations can thus be archived.

The main program is opened with the menu point

Settings

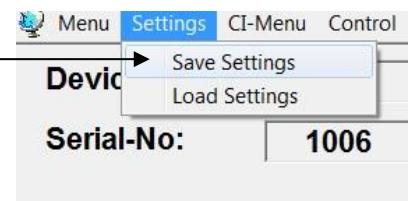


8.4.1. Storage of settings

With the menu point

Save Settings

it is possible to save the programming onto the PC. A directory and file name (e.g. object) are to be entered for this.
The file name must retain the ending .c12!!



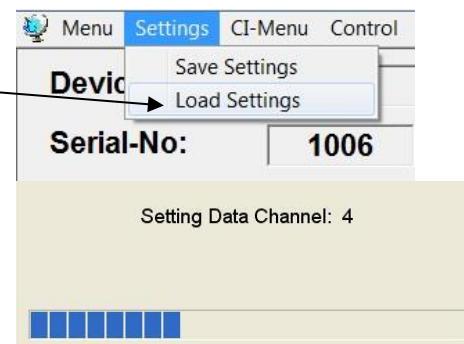
The settings are also saved in an rtf-file. This is located in the same folder as the PCU 41x1 software. This file format can be opened, edited and printed with e.g. Microsoft Word, Open Office or WordPad.

8.4.2. Loading of settings

With the menu point

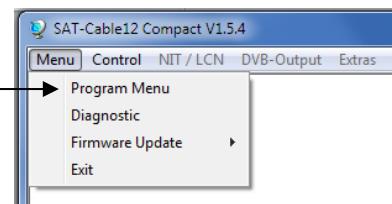
Load Settings

it is possible to load existing programming from the PC onto a PCU 41x1.
For this, the desired file name is to be selected and opened in the register.
The date is automatically loaded.



8.5. LAN function

Click on **Program Menu** to open the programming environment. The basic settings are loaded and the user interface is started.

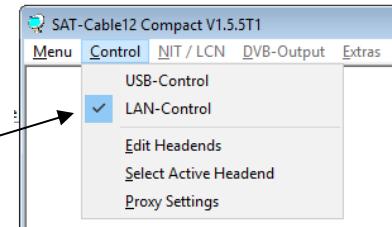


The PCU 41x1 possesses the IP address:

192.168.001.227 as a standard setting.

If the system is used in a network with a different network address, the IP address of the PCU 41x1 must be accordingly altered.

This change is carried out under the menu point **LAN-Control**.



Example:

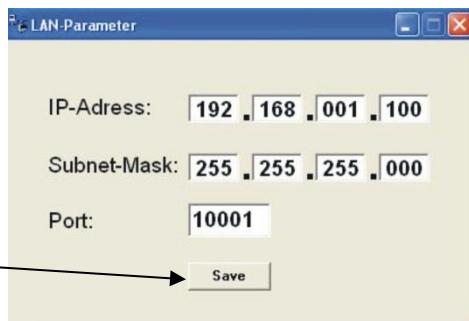
The PC operated in the network has the following settings:

IP address: 192.168.001.068
 network share host share

The IP address of the PCU 41x1 may differ only in the last block (host share) compared to the connected PC. The figures 0, 255 and all figures already used are not permitted!

Example IP address: 192.168.001.100

All changes are saved with **Save**.



Please note:

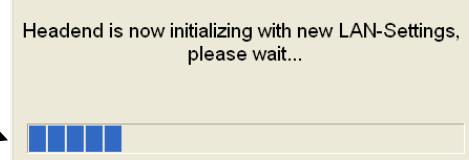


The listed IP addresses are intended as examples.

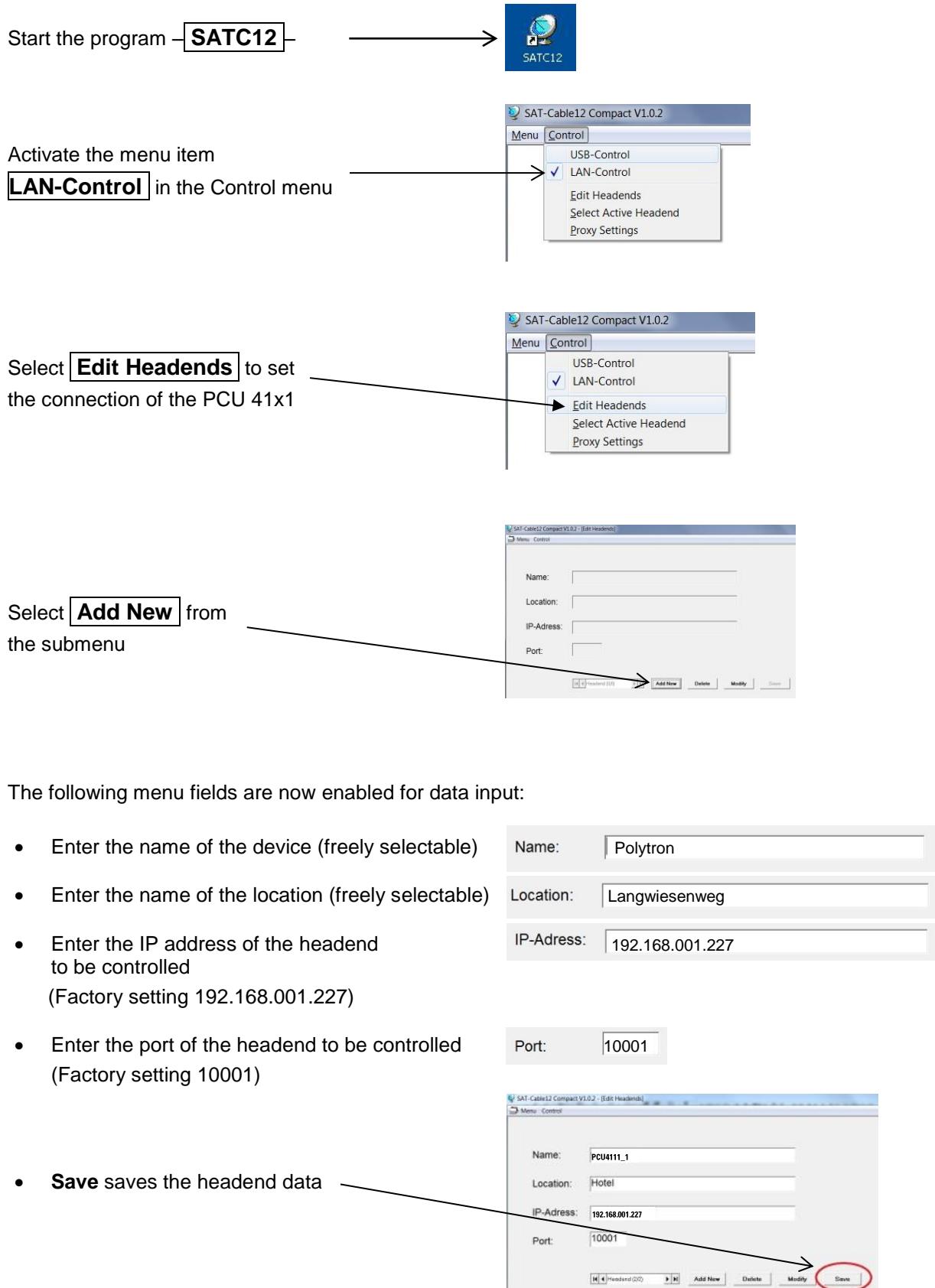
All addresses must be adapted to the network at the location.

If this information is not known, the responsible IT specialist should be contacted!

The progress of saving is displayed on the bar diagram.
 This process can last up to a minute.



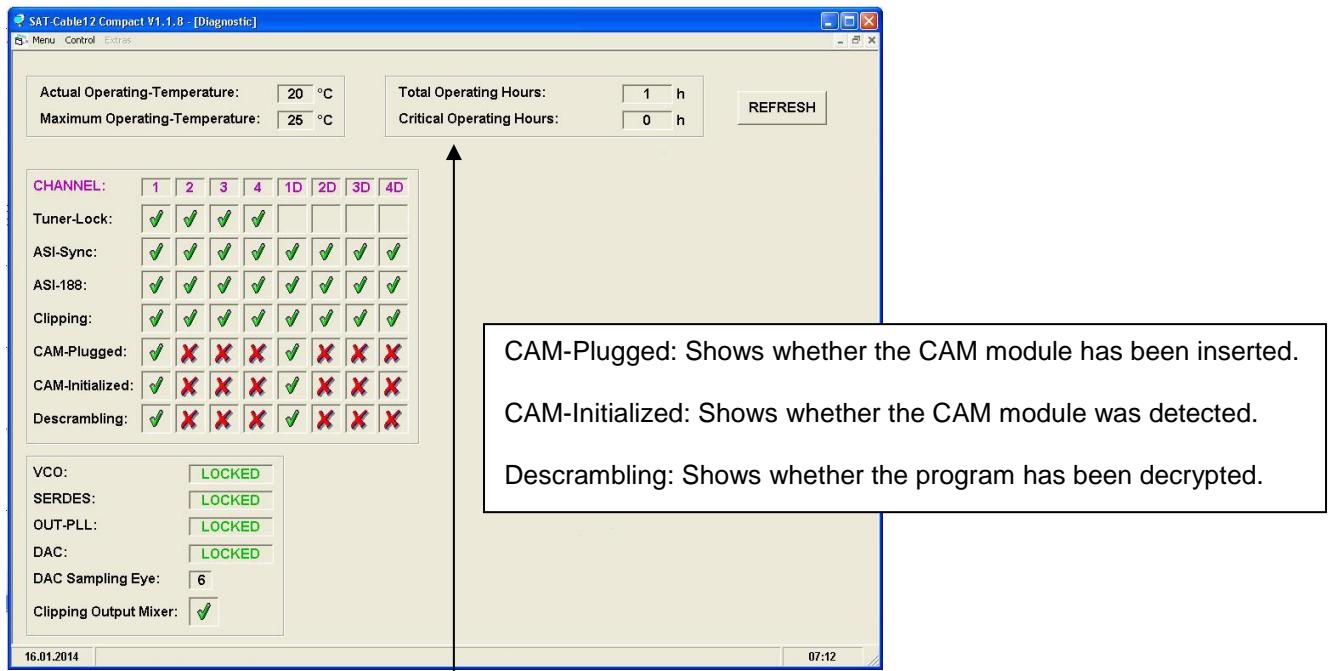
8.5.1. Creating the headends



Note: Same procedure for creating further headends!

8.6. Diagnostics

The "Diagnostic" menu is for service purposes and can be helpful during error analysis by telephone on the **Hotline+49(0)7081-1702-0**. The displayed data can be updated with **REFRESH**.



Menu Header Display:

Actual Operating Temperature: approx. current ambient temperature

Total Operating Hours: operating hours

Maximum Operating Temperature: maximum measured ambient temperature

Critical Operating Hours: operating hours at ambient temperature of over 45°C

The temperatures shown only correspond to the actual values in the case of correct, vertical installation with a closed housing cover.

8.7. LED key

LNB green: 12V output voltage
off: no output voltage

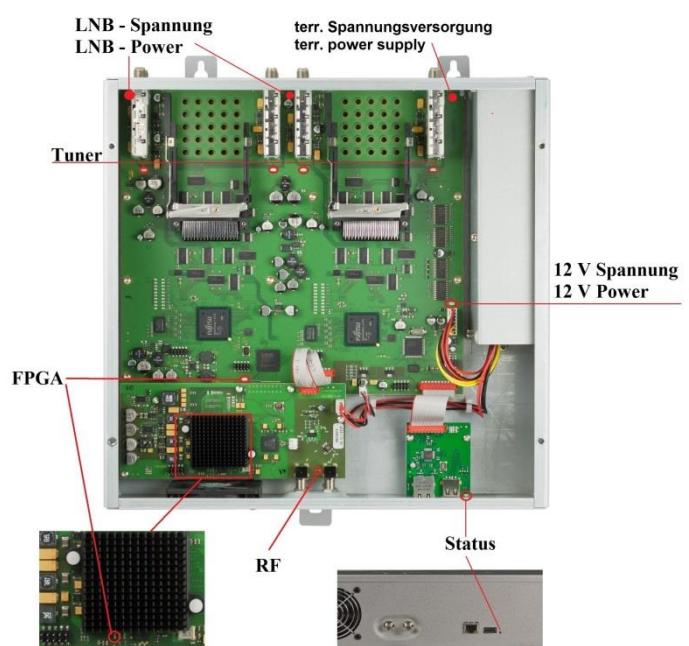
Tuner green continuous: tuner logged
green flashing: tuner not logged

FPGA green: configured, ready to operate
off: fault

12 V green: 12 V power adaptor O.K.
off: power adaptor fault

RF green: output O.K.
off: fault

Status green: all tuners logged, ready for use
orange: different functions in programming



8.8. Firmware update

The menu “firmware update” is used to refresh the firmware of the device. In this way, the basic software of the device will be updated.

The programming of the input and output parameters carried out under 8.2 is not influenced by this.

8.8.1. Firmware version overview

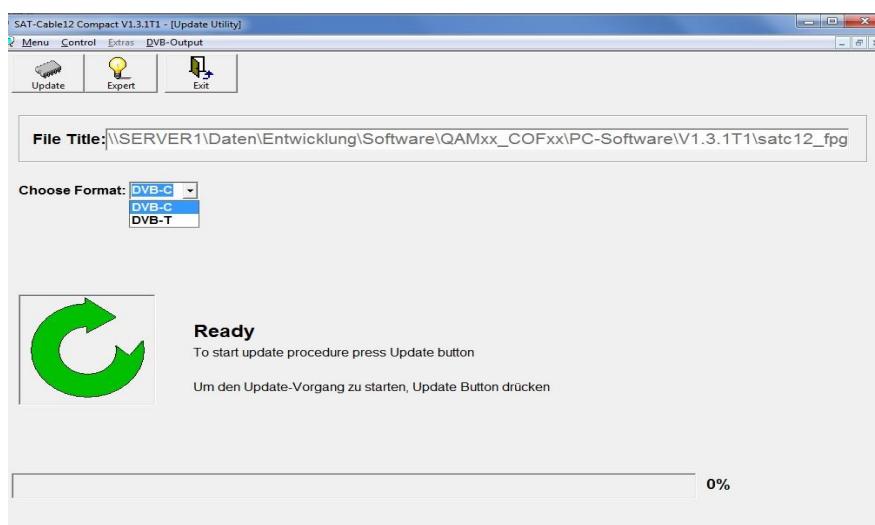
The appropriate display boxes of the firmware overview are highlighted in coloured background.

Green indicates that the firmware is up to date.

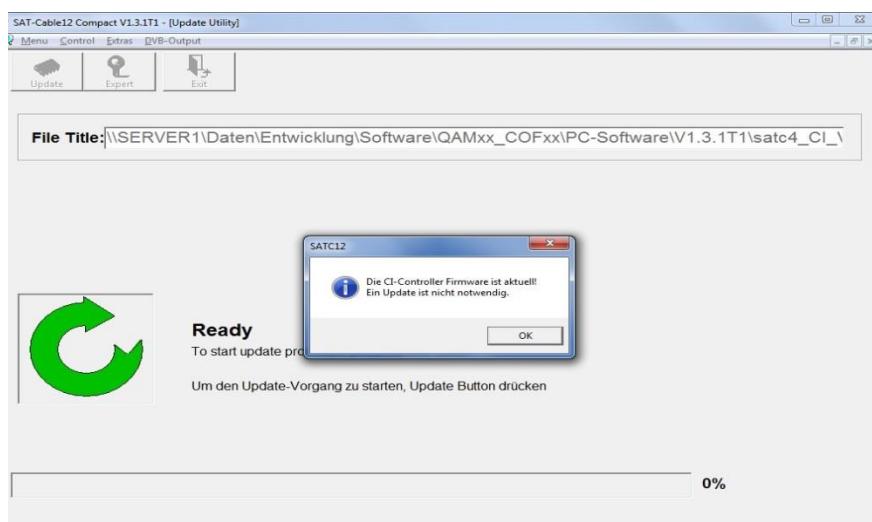
Yellow indicates that a new firmware is available.



Double click on the display box which shows the firmware, opens automatically the update menu.



If the firmware is up-to-date, following picture appears:



8.8.2. Changing the output signal

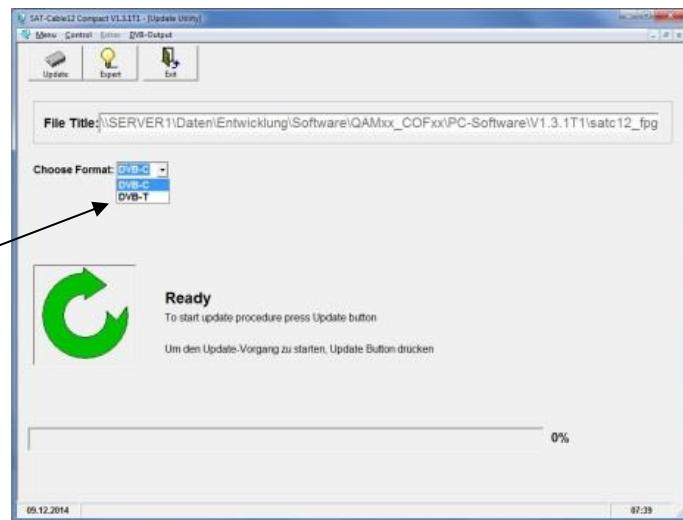
Software: SATC12_QAMxxx.RBF

Update by Laptop/PC:

- Select **Firmware Update**
- Select **QAM- FPGA**

Choose DVB-T or DVB-C

Click the **Update** buttons and new FPGA- Software will loaded.



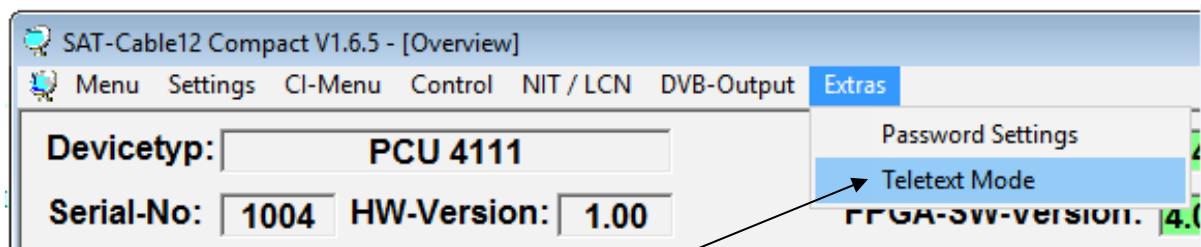
The FPGA update takes about 15 minutes



and should under no circumstances be interrupted before!

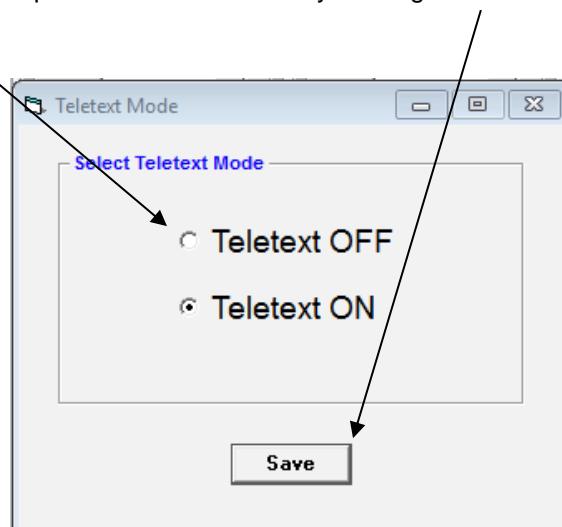
Important: Please follow the update instructions carefully. Do not switch off the power and unplug the power cord from the outlet. Both disregarding the instructions and interrupting the power supply during the firmware / FPGA update installation may interrupt the update process and cause the unit to stop responding or repair.

8.8.3. Teletext ON / OFF



Switch teletext on / off:

- Call up the **Extras** menu item
- Select **Teletext Mode** menu item
- Switch teletext on or off as required and then save it by clicking **Save**.



Note: Default setting -> Teletext is switched on!

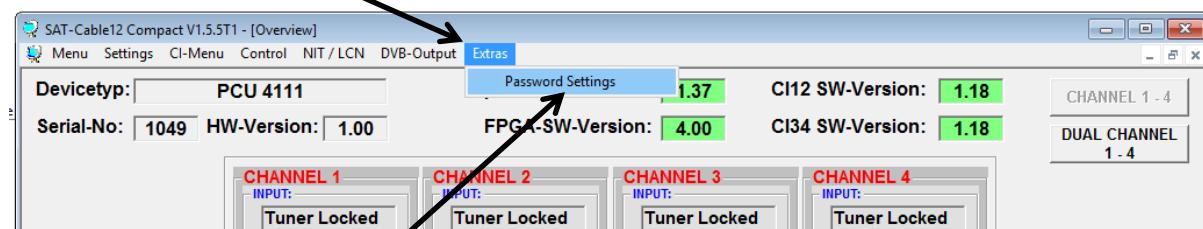
8.8.4. „Password“ function

→ Protection against unauthorized access to the Program-Menu.

The password function isn't activated in the factory settings and can be switched on from µC-SW-Version 1.31 on, like described as follows:

- Start program [SATC12] → 

- Klick on **Extras** in the upper row.



- Klick on **Password Settings**. It appears following pop-up window, please urgently note the serial-number, because this will be needed to reset the password, if required.



- Place a tick in the check-box to select **Use Password**.
- Enter the password (min.6 / max.10 digits) in the input field **Password** (consisting of letters, numbers or special characters in random sequence) and retype the password in the input field **Retype Password**.
- By clicking on **Change Password** a new password can be created.

← **Klick on Save to store the password-settings.** →

- Exit the program [SATC12] or go on with the settings, if necessary.

After next time starting the program [SATC12] please enter the password in the input field and then click on **OK** to confirm the password or click on **Cancel** to correct the password, if required.



→ Please note: **In this pop-up window is no change of the password possible.**

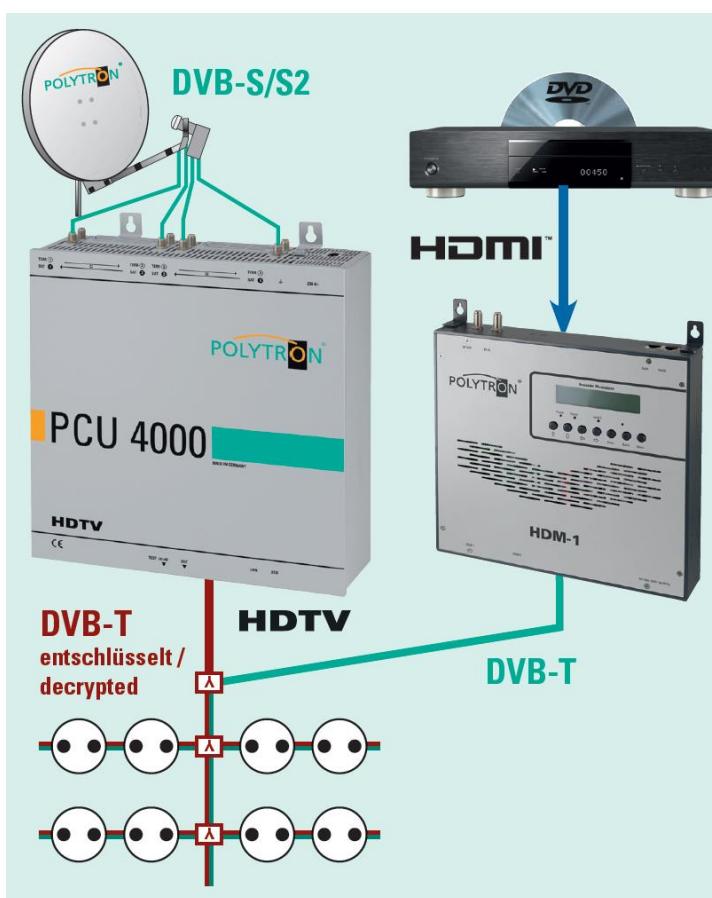
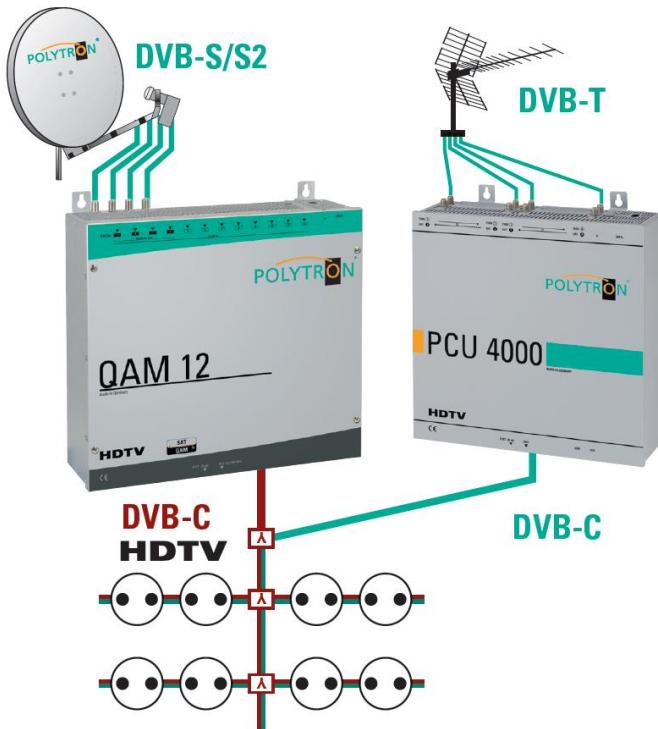
Should the password get lost or has fallen into oblivion we willingly help you relating to the generally password-reset. For this purpose we urgently need the serial-number of the device, as already mentioned on the previous page. The serial-number you can also find on the label which is affixed on the outer side of the housing.

The generally password-reset can only be applied by POLYTRON, for this procedure you will get a new password to reactivate the access to the device again.

By removing the tick in the check-box **Use Password** you can certainly also deactivate the password function, but you will need the password to log on before.



9. Application examples



10. Technical data

Type	PCU 4111	PCU 4121
Article no.	5552150	5552160
Inputs	4	
CI slots		4
Input frequency SAT	950 - 2150 MHz (1 MHz steps)	
Input frequency Terr.	110 - 862 MHz (250 kHz steps)	
Input level		50 - 80 dB μ V
Demodulator		
DVB-S/S2		
SR DVB-S / QPSK	1 - 45 MS/s	
SR DVB-S2 / QPSK	1 - 45 MS/s	
SR DVB-S2 / 8PSK	1 - 45 MS/s	
Modulation		8PSK / QPSK
CR DVB-S / QPSK	1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
CR DVB-S2 / 8PSK		3/5, 2/3, 3/4, 5/6, 8/9, 9/10
Roll off		0.35, 0.25, 0.20
DVB-T		
Modulation		QPSK, 16QAM, 64QAM
FFT		2K, 8K
Bandwidth		7, 8 MHz
Code rate		1/2, 2/3, 3/4, 5/6, 7/8
Guard interval		1/4, 1/8, 1/16, 1/32
DVB-T2		
Modulation		QPSK, 16QAM, 64QAM, 256QAM
FFT		1K, 2K, 4K, 8K, 16K, 32K
Bandwidth		7, 8 MHz
Code rate		1/2, 3/5, 2/3, 3/4, 4/5, 5/6
Guard Interval		1/4, 5/32, 1/8, 5/64, 1/16, 1/32, 1/64, 1/128
DVB-C		
Modulation		16QAM, 32QAM, 64QAM, 128QAM, 256QAM
Symbol rate		7.2 MS/s
Bandwidth		6, 7, 8 MHz
Output modulation ex works	DVB-C	DVB-T
Modulation	16QAM, 32QAM, 64QAM, 128QAM, 256QAM	QPSK, 16QAM, 32QAM, 64QAM
FEC	/	1/2, 2/3, 3/4, 5/6, 7/8
Symbol rate	1 - 7.2 MS/s	/
FFT	/	2k
Bandwidth	7, 8 MHz	7, 8 MHz
Output		
Output channels		4 + 4
Frequency range		112 - 862 MHz (250 kHz steps)
Output level		90 dB μ V
Channel attenuation		0 - 12 dB (1 dB steps)
MER	≥40 dB	38 dB (typ.)
Operating parameters		
Power consumption	45 W	40 W
Operating voltage		180...265 V, 50/60 Hz
Dimensions (B x H x T)		331 x 328 x 103 mm

Notes

Notes

Polytron-Vertrieb GmbH

Postfach 10 02 33
75313 Bad Wildbad
Germany

Zentrale/Bestellannahme
H.Q. Order department + 49 (0) 70 81 / 1702 - 0

Technische Hotline + 49 (0) 70 81 / 1702 - 0
Technical hotline + 49 (0) 70 81 / 1702 - 0
Telefax + 49 (0) 70 81 / 1702 - 50

Internet <http://www.polytron.de>
Email info@polytron.de

Technische Änderungen vorbehalten
Subject to change without prior notice

Copyright © Polytron-Vertrieb GmbH