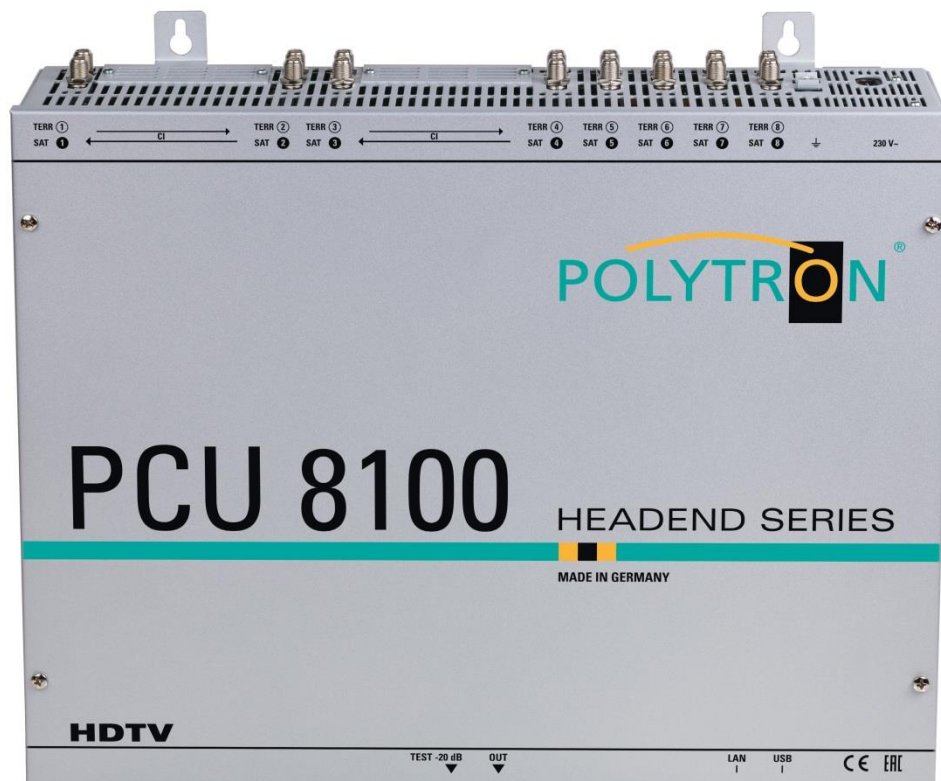


PCU 8112 / 8122

Compact Headend



User manual



MADE IN GERMANY

0901906 V2

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1. Mounting and safety instructions



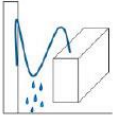
Attention

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 new models PCU 8112 and PCU 8122 of the compact headend series enable the combined processing of encrypted and open channels.

The reception mode can be selected individually at each of the eight inputs: DVB-S/S2, DVB-T/T2 or DVB-C. Four of the eight channel strips are each equipped with a CI interface for decoding encrypted signals.

The processed signals are optionally converted into DVB-C or DVB-T.

The PCU 8112 / 8122 compact headend units are used wherever PAY-TV content and free-to-air channels are to be combined.

3. Description

With the POLYTRON PCU 81x2 compact headend from POLYTRON, community antenna systems can be easily and cost-effectively extended 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 dBµV. The PCU 81x2 is equipped with an energy-saving switching power supply which also serves for the supply of the LNB (tuner 1, 2, 5 and 6). At tuner 4 and 8, a 12V supply is available on the terrestrial input. The supply voltages can be switched on or off by means of jumpers.

PCU 8112 = DVB-C at the output

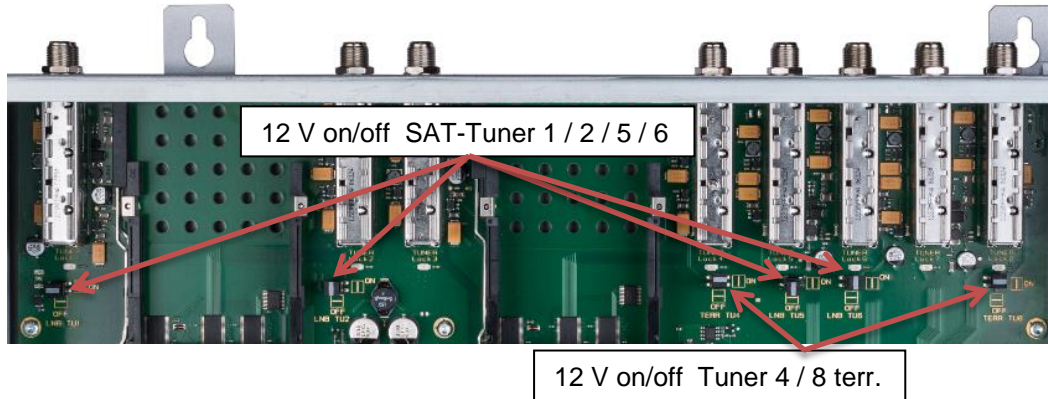
PCU 8122 = DVB-T at the output

4. Scope of delivery

- 1 x PCU 81x2
- 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

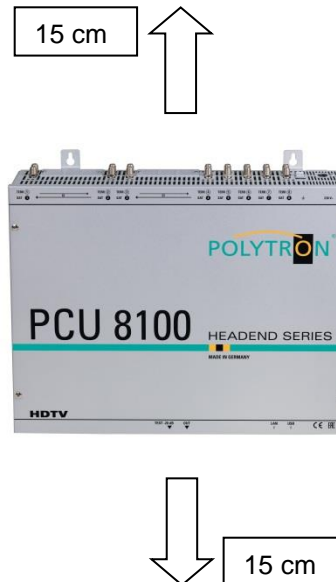
5. Input circuit

In the PCU 81x2, signals are directly fed to the input tuners. Due to the triple tuner, there are eight inputs each for SAT and eight 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, 2, 5 and 6. This can be switched by the corresponding jumpers. A 12 V supply voltage for the terrestrial range can be applied to tuner 4 and 8 by plugging in the corresponding jumpers. The operating states are visibly signaled from the outside 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

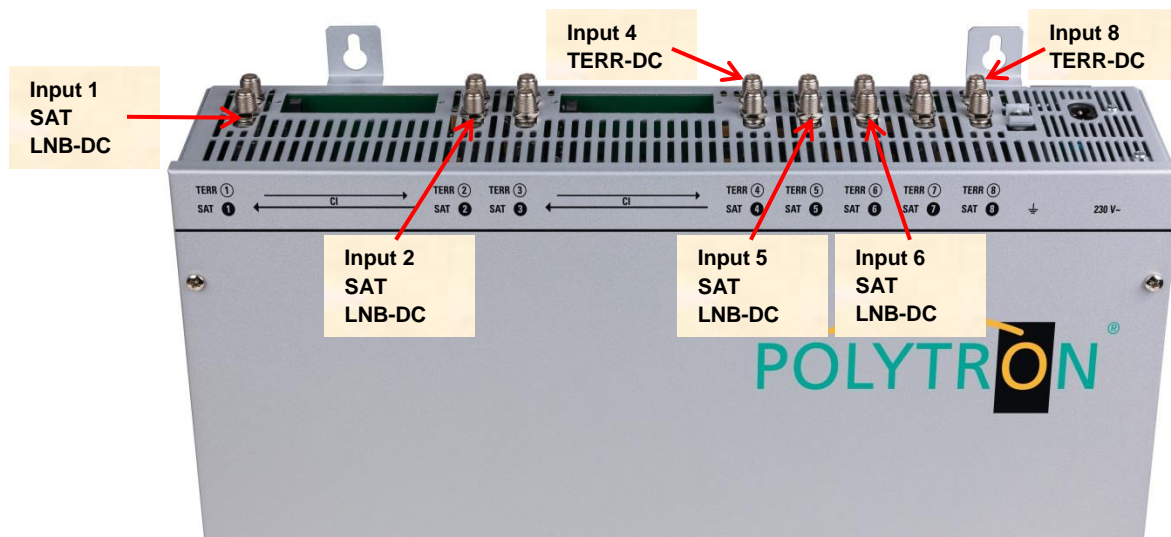
Connection of the input signals

Connect SAT signals directly or via splitter to the SAT tuner inputs.

At the SAT input Tuner 1, 2, 5 and 6 a 12 V DC voltage is applied for the LNB supply. DVB-T and DVB-C are connected via the terrestrial inputs. A 12 V supply is available at the terrestrial input on Tuner 4 and 8.

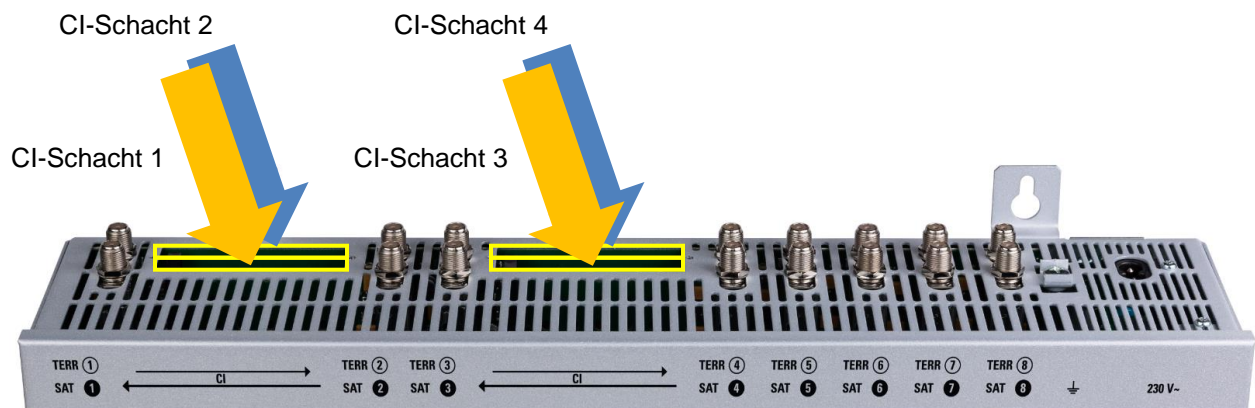


**Please note that the consumption of each input must not exceed 250 mA.
A total of 500 mA is available.**



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. For wall mounting: Always insert the module with the label facing the front (direction lid).



7.1. Pre-programming

The inputs and outputs of the device are pre-programmed ex works with a standard frequency assignment. The separate supplementary sheet with the pre-programming is included with the device.

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**.

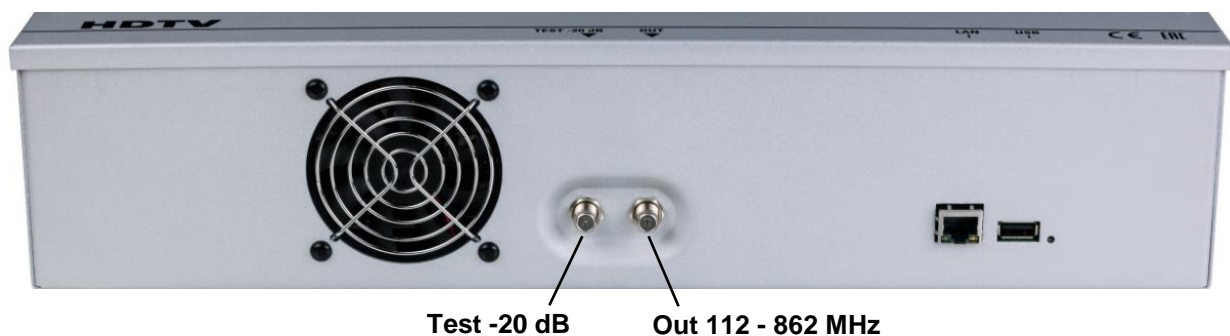


When receiving digital signals it is advantageous to have a lower input level instead of an excessively high one.

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

7.3. Output level

The output level at delivery is **90 dB μ V**. This can be changed via device programming. An output level reduced by 20 dB is available at the TEST socket.



8. General programming

After connection, the device runs through an internal routine and all 8 channels are set to the previously stored data. During this time, the **status LED** next to the USB socket flashes green. A connection between the PCU 81x2 and the PC/laptop is only possible after the **status LED** lights up permanently green or orange.

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 81x2**).

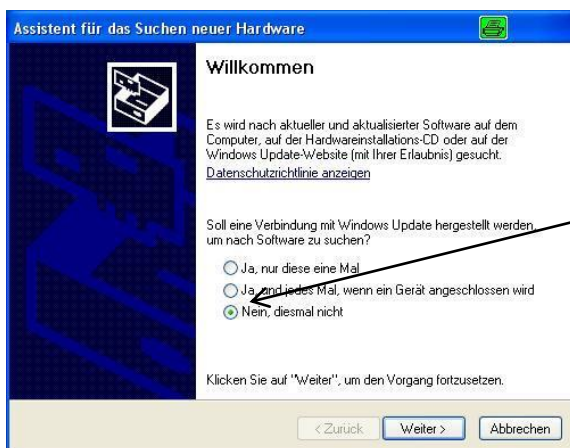
The software can also be loaded from the enclosed USB stick.

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:



No, not this time

Next

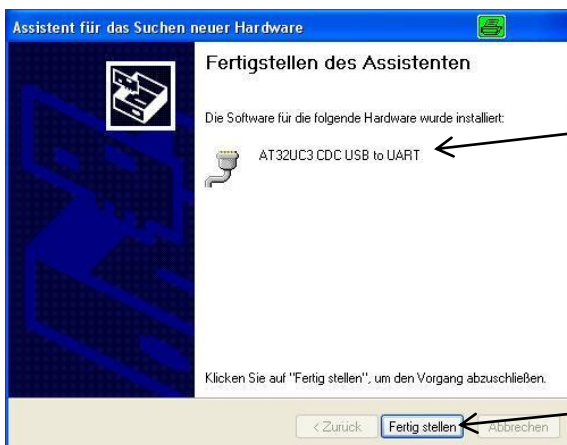


Install software automatically

Next



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 81x2 can be connected to the PC with the USB cable.

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



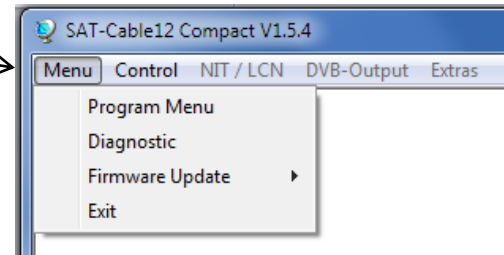
USB

8.2. Programming of the device parameters

Start the program — **SATC12** —



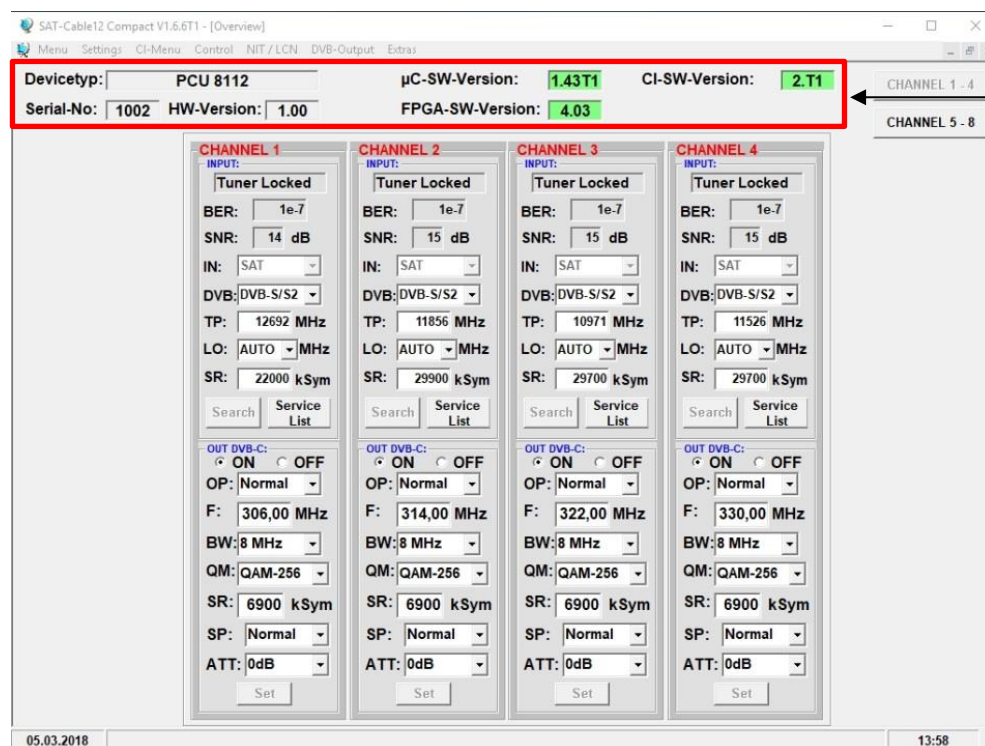
Click on **Menu** at the top left



The following menu points are available:

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

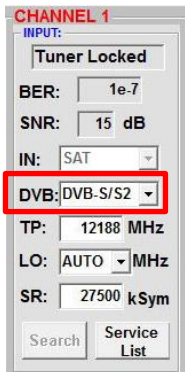
Select **Program Menu**: All adjustments of the input and output parameters are carried out here. After calling up the menu, all 8 channels are queried and the set parameters are displayed.



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, CI and FPGA.

8.2.1. Input parameters SAT reception

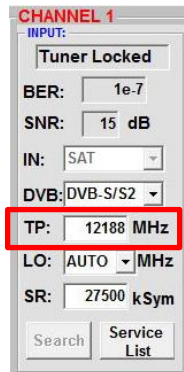
DVB > Input signal



Choose the kind of signal

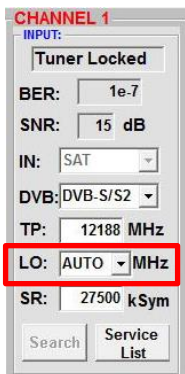
If DVB-T/T2 or DVB-C is selected, go further in the passage TER. reception.

TP > Transponder frequency



Enter transponder frequency

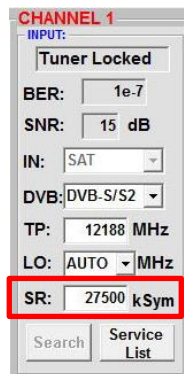
Auto > LO frequency



AUTO sets the required frequency automatically.

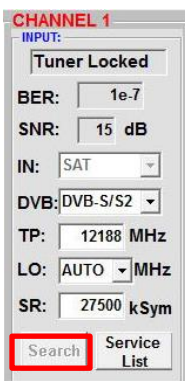
Can however be set to **09750**, **10600** or another **OTHER** frequency.

SR > Symbol rate



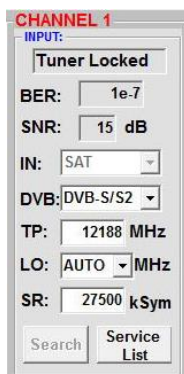
Enter symbol rate

Search > Searching



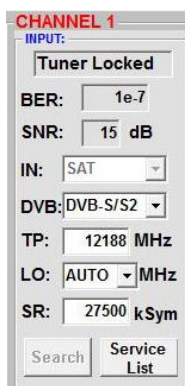
After the button **Search** has been activated, the data is accepted and the desired transponder is set.

Tuner Locked



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

Receiving conditions



The quality of the input signal can be evaluated using the bit error ratio

BER and the signal-to-noise ratio **SNR**.

These depend on the quality of the reception conditions and the SAT signals.

Recommendation: Bit error rate **BER** should be $\leq 1e-6$.

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	good	very good
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 > Frequency

BW > Channel bandwidth

The kind of input signal will be identified automatically.

Enter input frequency

7 or 8 MHz

PLP > Select service (DVB-T2)

Search > Searching

Select PLP

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

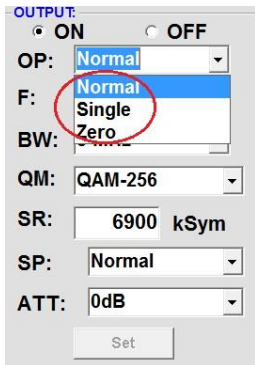
The quality of the input signal can be evaluated using the bit error ratio **BER** and the signal-to-noise ratio **SNR**.

These depend on the quality of the reception conditions and the SAT signals.

Recommendation: Bit error rate **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

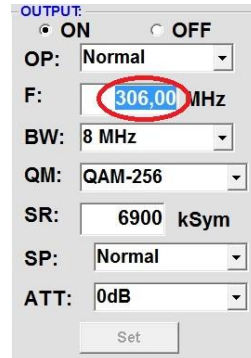


Normal > normal mode

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

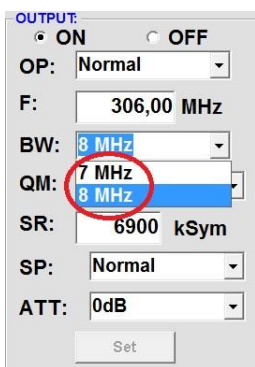
Zero > digital channel with content 0 (constant level without fluctuations)

F > Output frequency



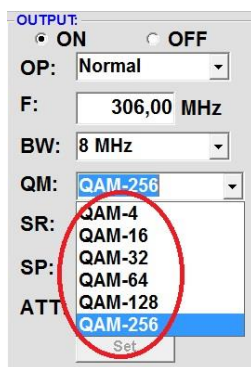
Frequency freely selectable. It is recommended to stick to the corresponding TV standard channel spacing. The frequency of the channel middle is set. (e.g. channel 21, 470...478 MHz, set to 474 MHz)

BW > Bandwidth



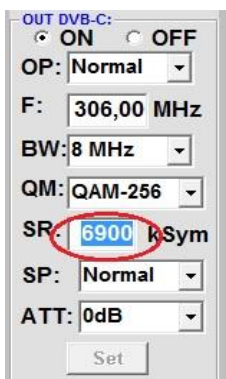
Choose bandwidth depending on output frequency between 7 MHz and 8 MHz

QM > QAM mode



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.

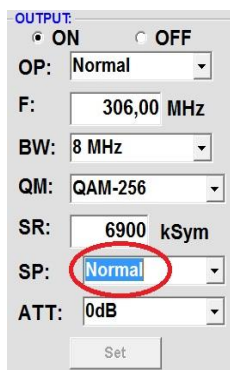
SR > Symbol rate



up to 7,200 kilo **S**ymbols/ 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.

SP > Spectrum



Normal > normal mode

Invers > 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 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

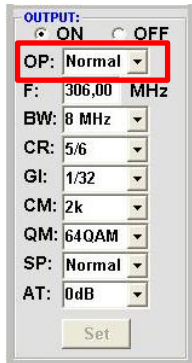
After the setting of all parameters press the **Set** button. With this, the adjusted data is accepted. Repeat steps for other channels.



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

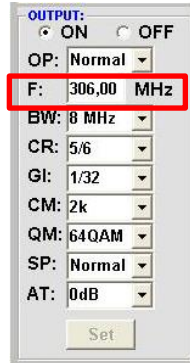


Normal > normal mode

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

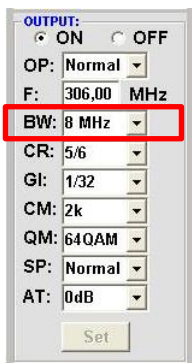


Frequency freely selectable.

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

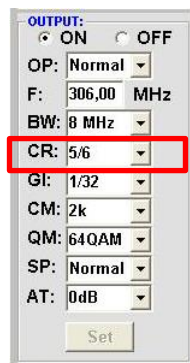
The frequency of the channel middle is set. (e.g. channel 21, 470...478 MHz, set to 474 MHz)

BW > Bandwidth



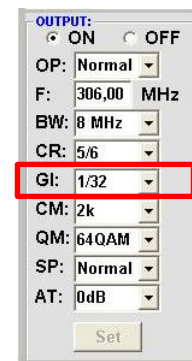
Choose bandwidth depending on output frequency between 7 MHz and 8 MHz

CR > Code rate



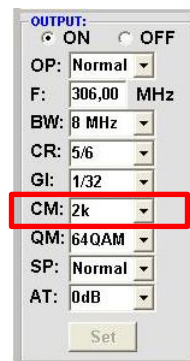
Setting of the possible code rate (1/2, 2/3, 3/4, 5/6, 7/8)

GI > Guard interval



Setting of the possible guard interval (1/4, 1/8, 1/16, 1/32)

CM > Carrier modulation



Display of possible carrier Modulation - **only 2k!**

QM > QAM mode

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

Setting of the possible QAM mode (16, 32, 64)

SP > Spectrum

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

Normal > normal mode

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

On OFF > Switching off output channel

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

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

ATT > Output level

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

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

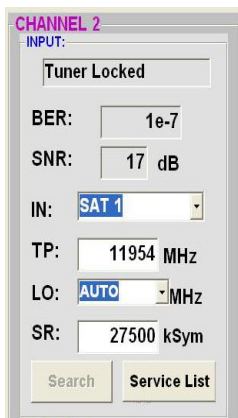


Notice: The DVB-T / COFDM receivers must be programmed in accordance with the set parameters (search).

8.3. Function “Service list” (Program 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 (only channels 1 - 4):

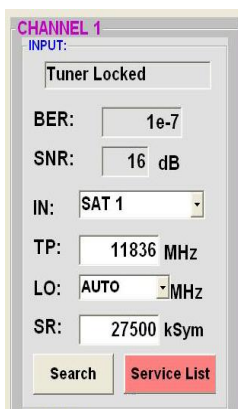
8.3.1. Delete and add services (programs)



CHANNEL 2
INPUT:
Tuner Locked
BER: 1e-7
SNR: 17 dB
IN: SAT 1
TP: 11954 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List



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

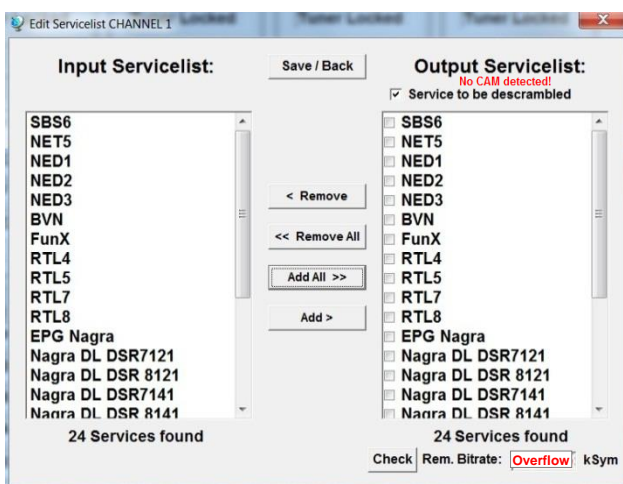


CHANNEL 1
INPUT:
Tuner Locked
BER: 1e-7
SNR: 16 dB
IN: SAT 1
TP: 11836 MHz
LO: AUTO MHz
SR: 27500 kSym
Search Service List



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.



Edit Servicelist CHANNEL 1
Input Servicelist: SBS6, NET5, NED1, NED2, NED3, BVN, FunX, RTL4, RTL5, RTL7, RTL8, EPG Nagra, Nagra DL DSR7121, Nagra DL DSR 8121, Nagra DL DSR7141, Nanra DL DSR 8141. 24 Services found.
Output Servicelist: SBS6, NET5, NED1, NED2, NED3, BVN, FunX, RTL4, RTL5, RTL7, RTL8, EPG Nagra, Nagra DL DSR7121, Nagra DL DSR 8121, Nagra DL DSR7141, Nanra DL DSR 8141. 24 Services found.
Check Rem. Bitrate: **Overflow** kSym



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.

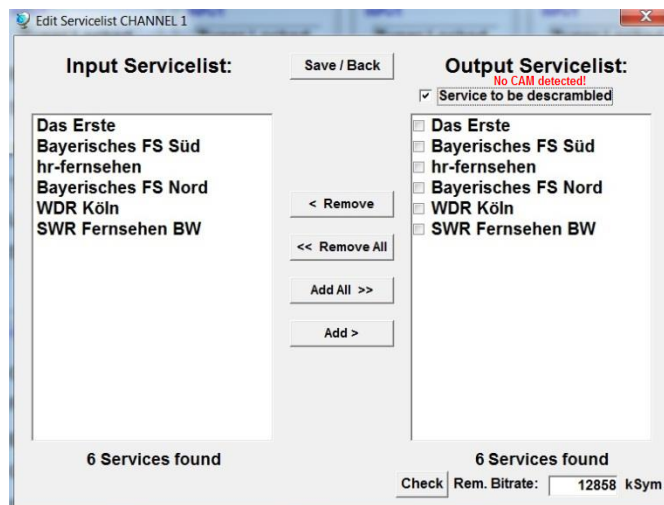
The field Bitrate is marked by colors.
Green means: The remaining bitrate is higher than 10000 kSym.
Yellow means: The remaining bitrate is less than 10000 kSym.
Red means: The remaining bitrate is less than 5000 kSym.
Overflow means: The data rate is too high in accordance to the adjusted DVB-C or DVB-T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

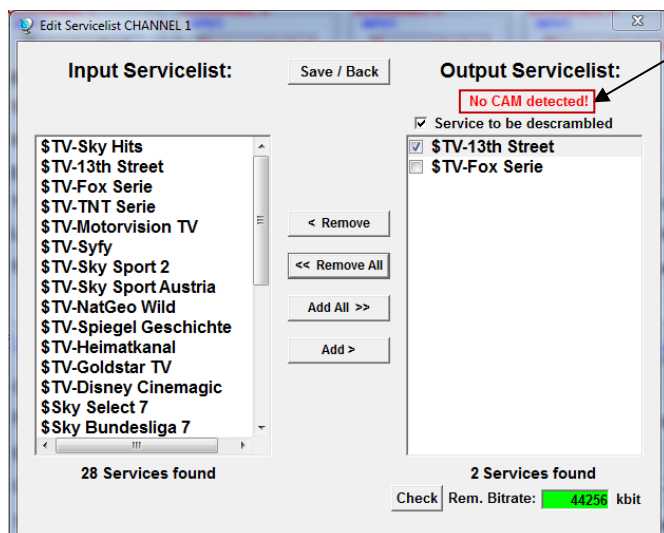


The still available data rate is shown in the field "Rem. Bitrate". This should be at least 5.000 kSym.

8.3.2. Selection of the channels to be decoded

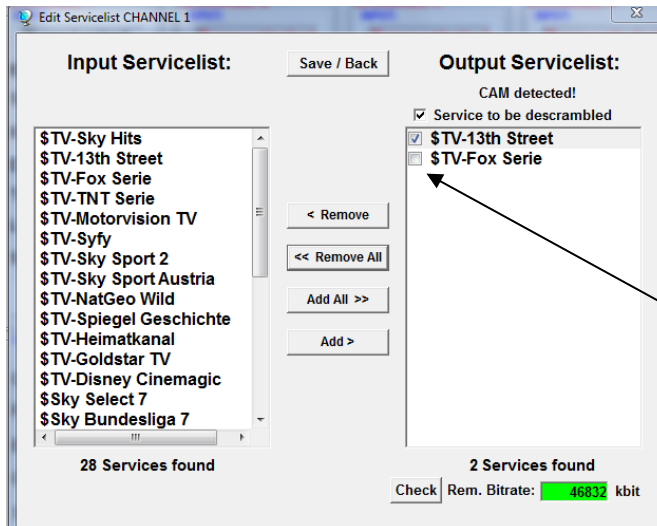
Insert the CAM module with the corresponding smart card in the switched off state.

If there is no detection or if no CAM module is inserted, a corresponding message appears:



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.



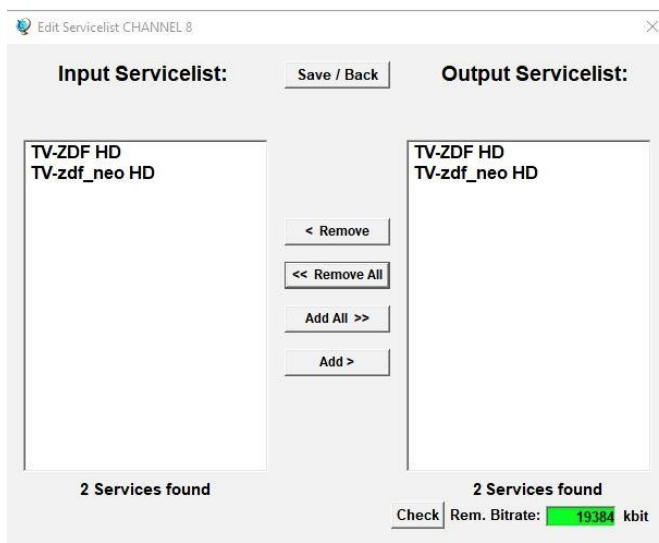
The CAM modules should be only inserted in power-off mode of the unit.

Note

The following function is NOT available for channels 5 - 8:

- Choice of encrypted services for decryption

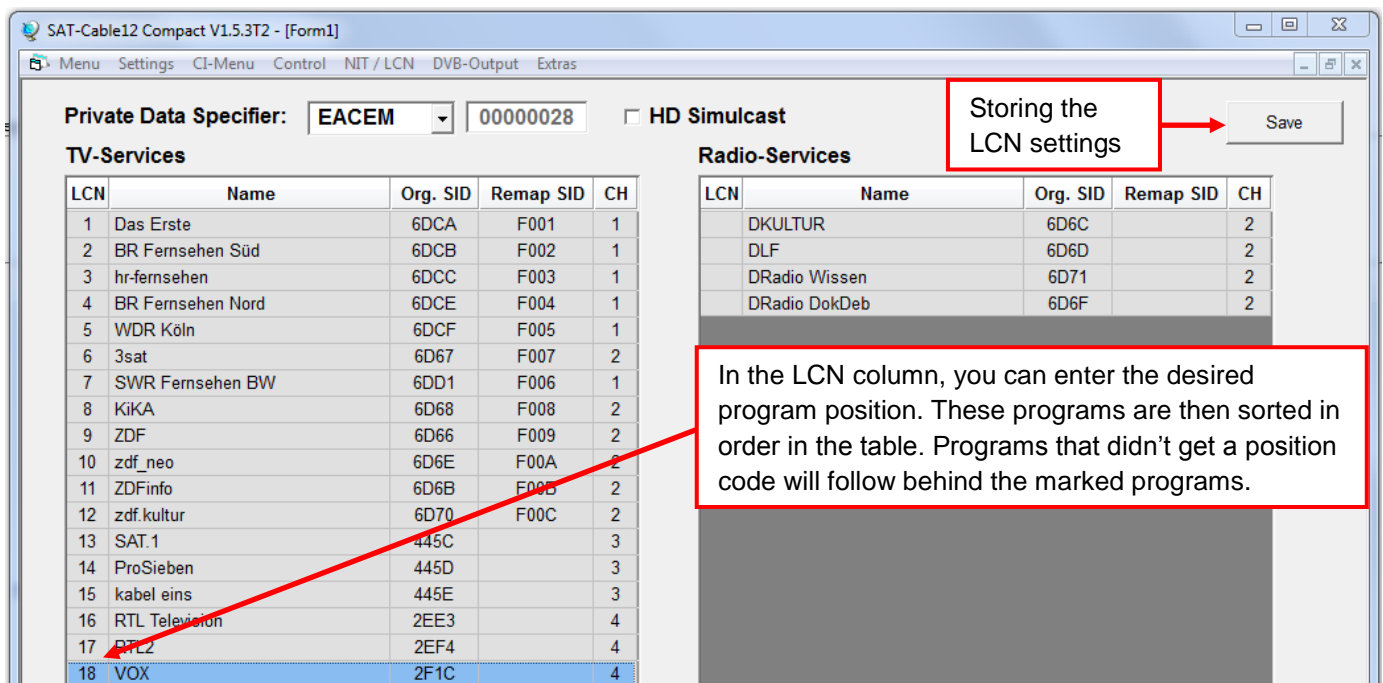
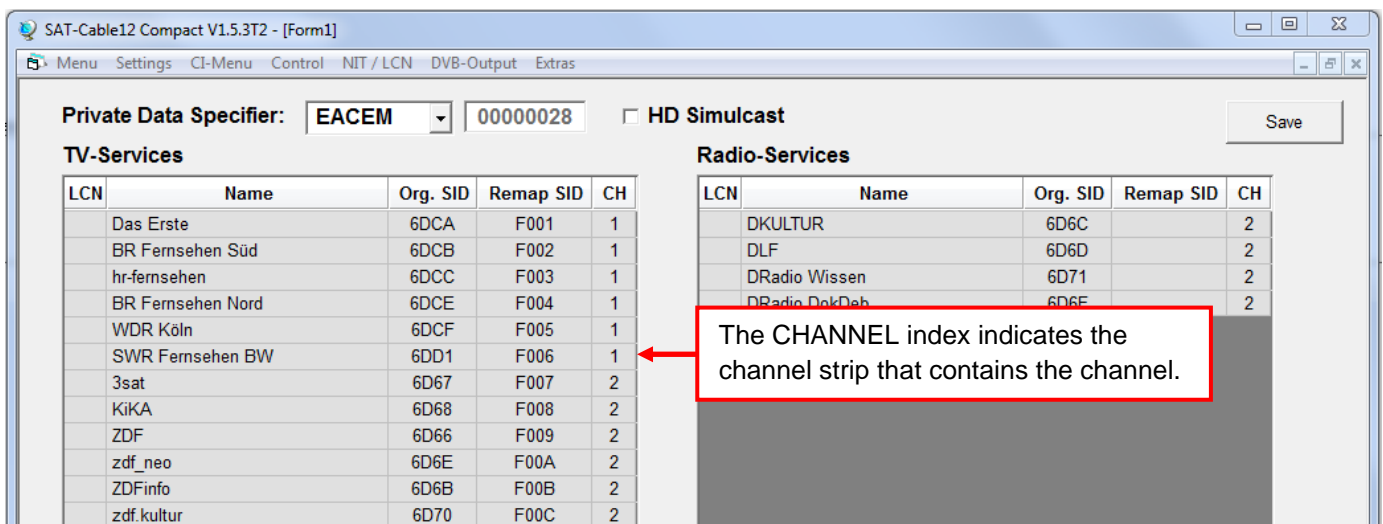
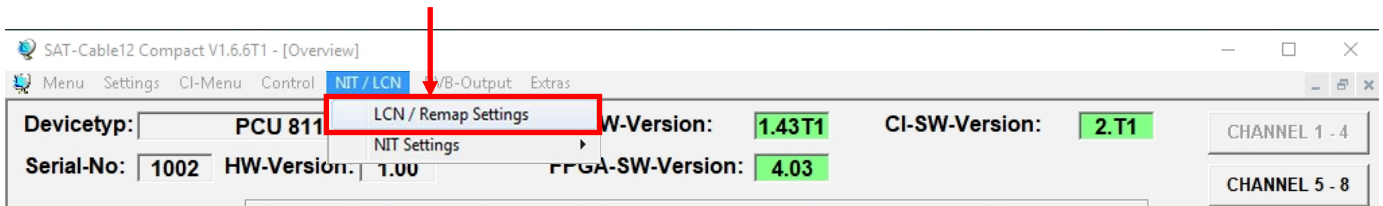
➔ Deviating display for channels 5 - 8:



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. 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.

Sequence of settings:

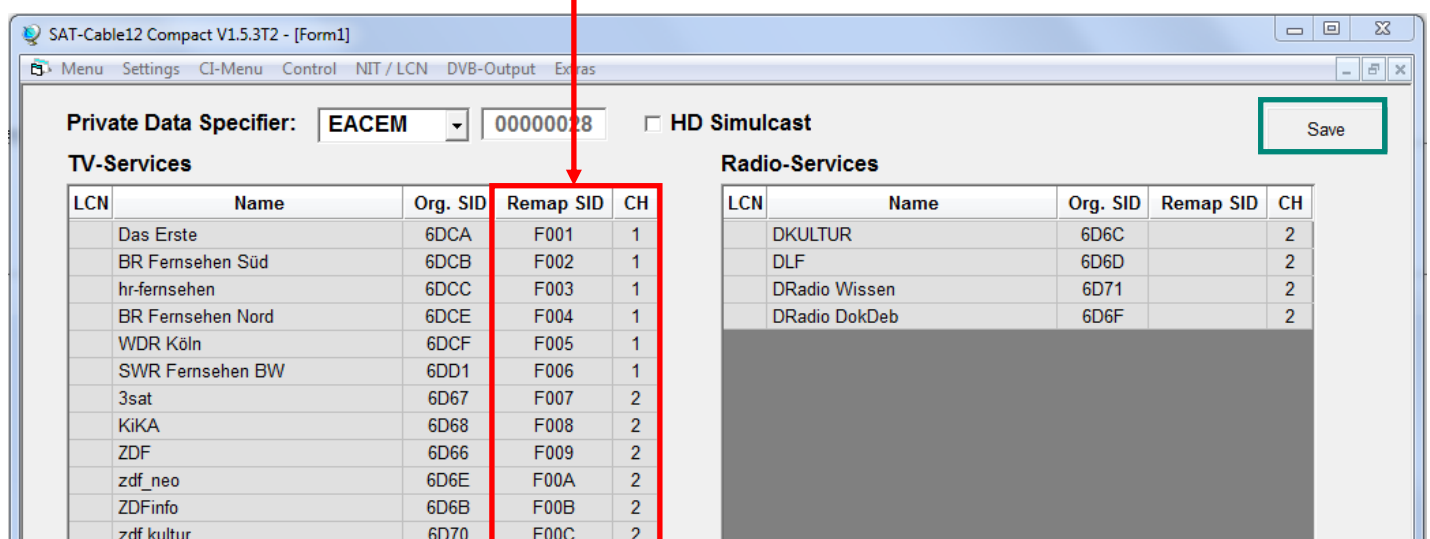
→ Click on the tab **NIT / LCN**.



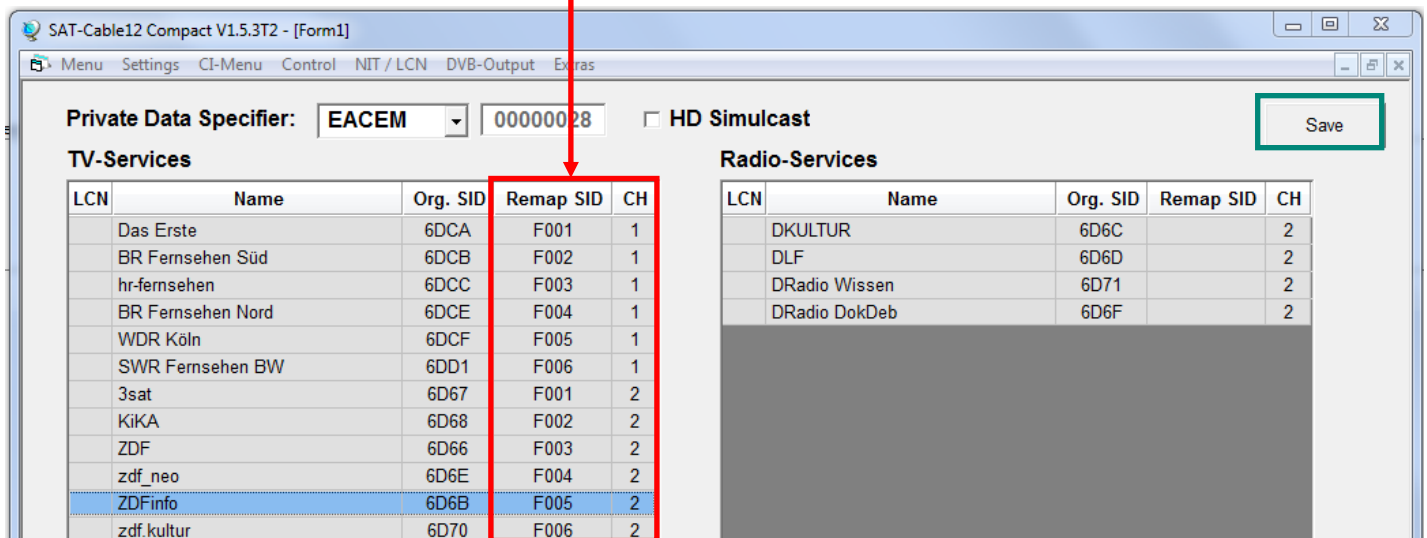
→ Afterwards click on **LCN / Remap Settings**.



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



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



Private Data Specifier: **EACEM** ☐ HD Simulcast Save

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.

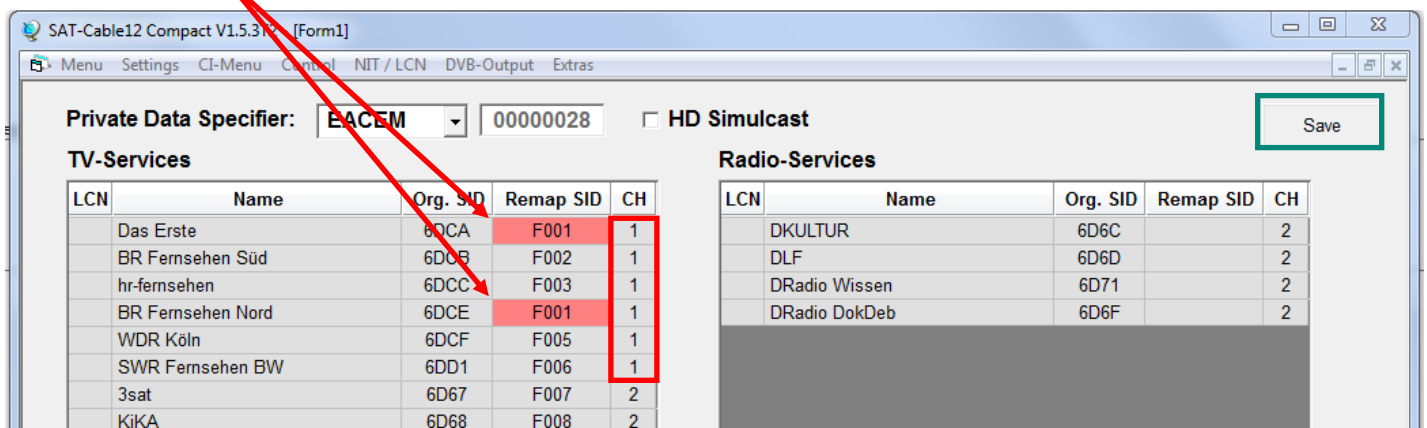
Important: The allocation of the Service ID can be continuously (example 1). A service is referenced inside of a transponder by the unique pairing of ONID/TSID/SID. That's why the same SID can be used again in another transponder (example 2). Within one transponder the same SID must not be used twice.



Click **Save** to apply the changes.



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



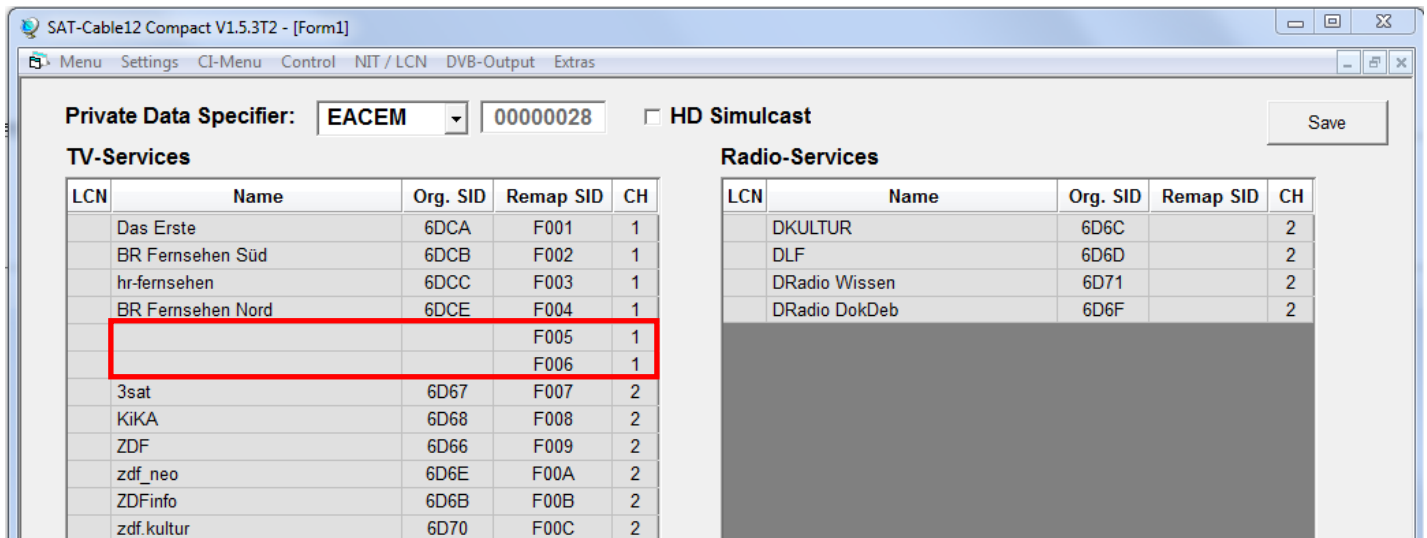
Private Data Specifier: **EACEM** ☐ HD Simulcast Save

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

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



Private Data Specifier: EACEM 00000028 ☐ HD Simulcast Save

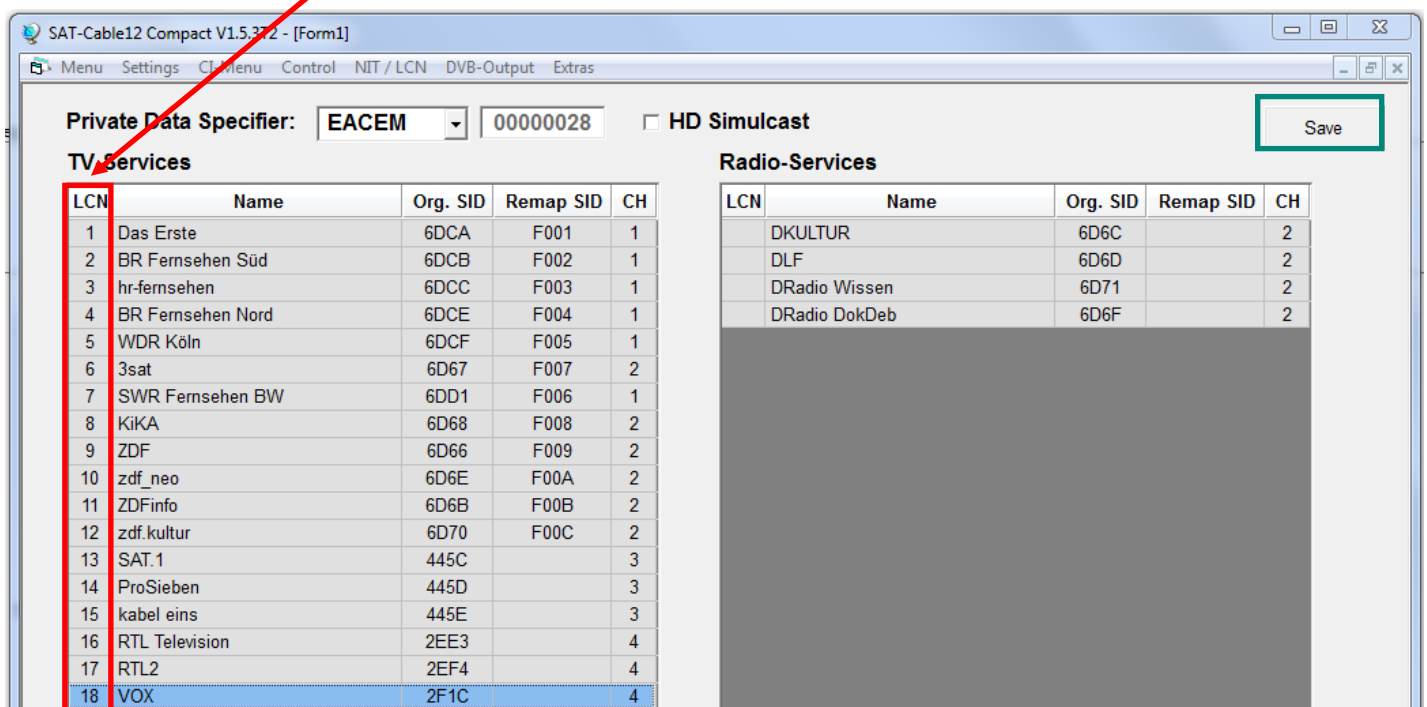
LCN	Name	Org. SID	Remap SID	CH
	Das Erste	6DCA	F001	1
	BR Fernsehen Süd	6DCB	F002	1
	hr-fernsehen	6DCC	F003	1
	BR Fernsehen Nord	6DCE	F004	1
			F005	1
			F006	1
	3sat	6D67	F007	2
	KiKA	6D68	F008	2
	ZDF	6D66	F009	2
	zdf_neo	6D6E	F00A	2
	ZDFinfo	6D6B	F00B	2
	zdf.kultur	6D70	F00C	2

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



Private Data Specifier: EACEM 00000028 ☐ HD Simulcast Save

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



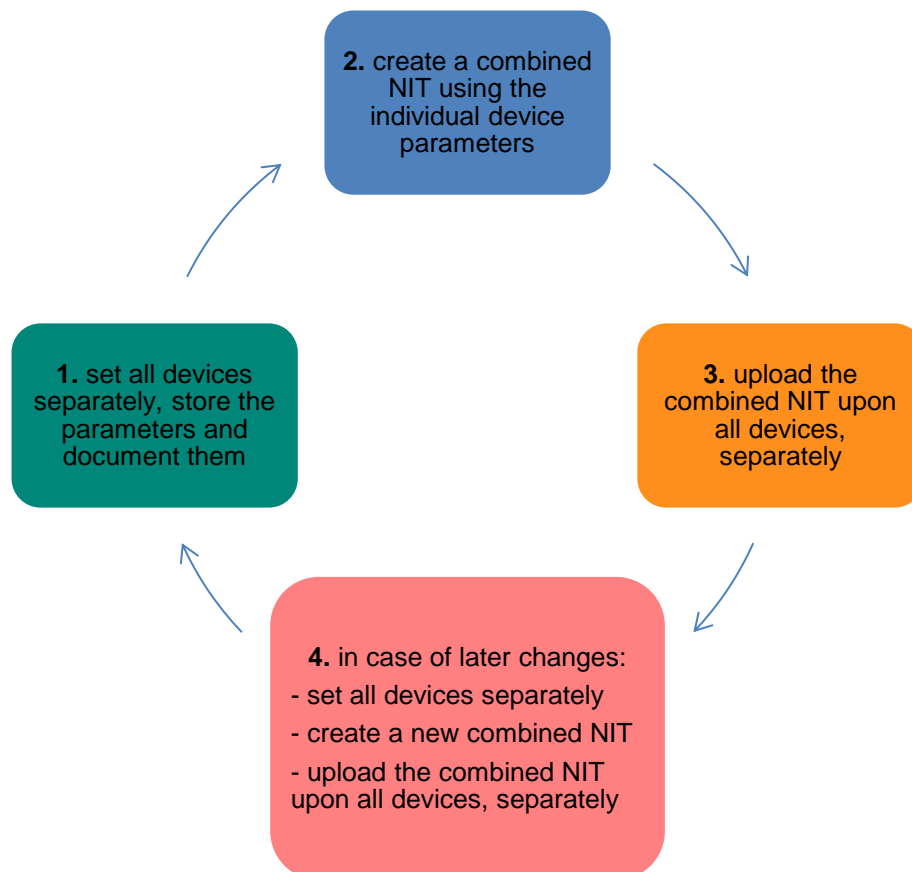
Click **Save** to apply the changes.



8.3.5. 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:



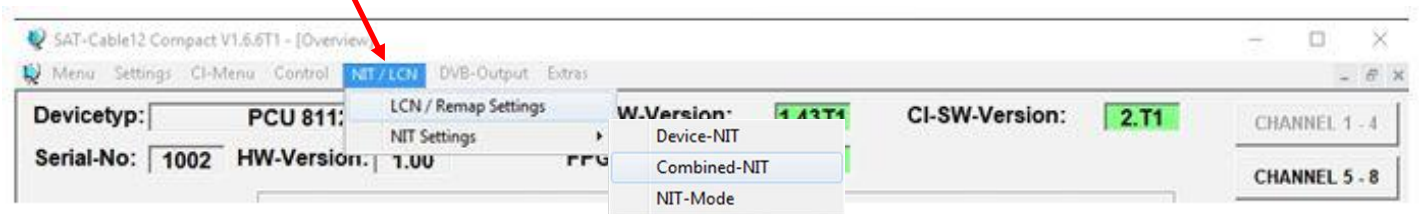
Changes to the NIT table(s) first become effective after closing the PC software.



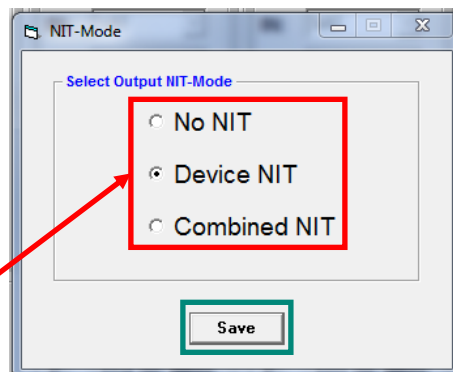
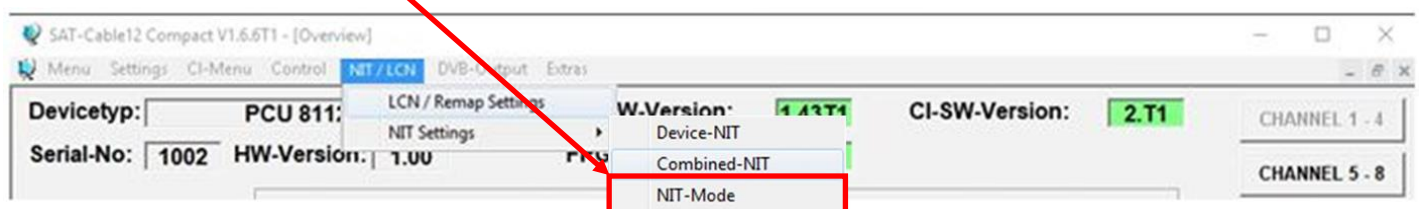
Please wait approx. 1 min. after closing the PC software until the changes become effective in all relevant systems.

Sequence of 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.

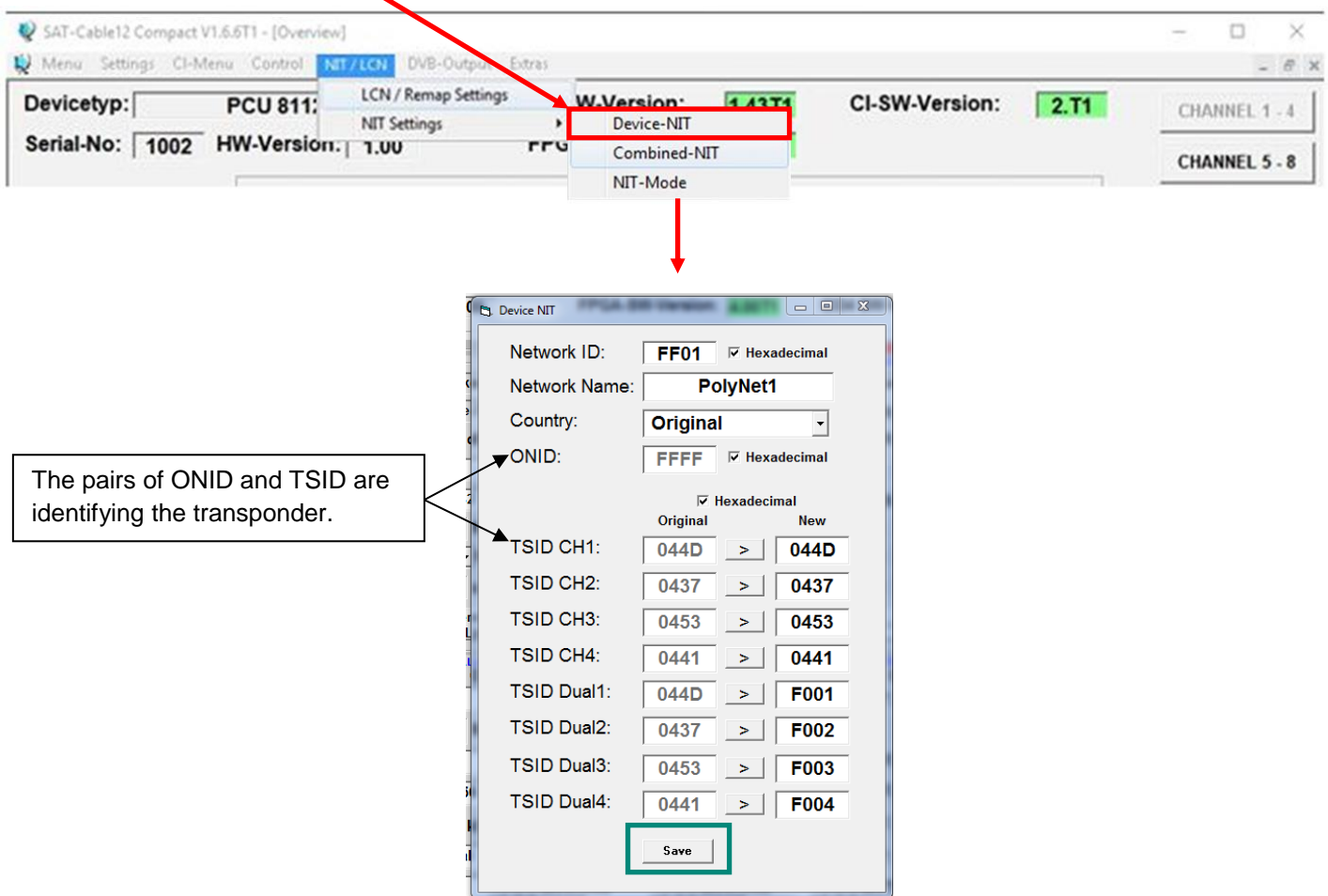


Click **Save** to apply the change.



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 e.g. dual modulators are used, the original TSID has been 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 FFEE.



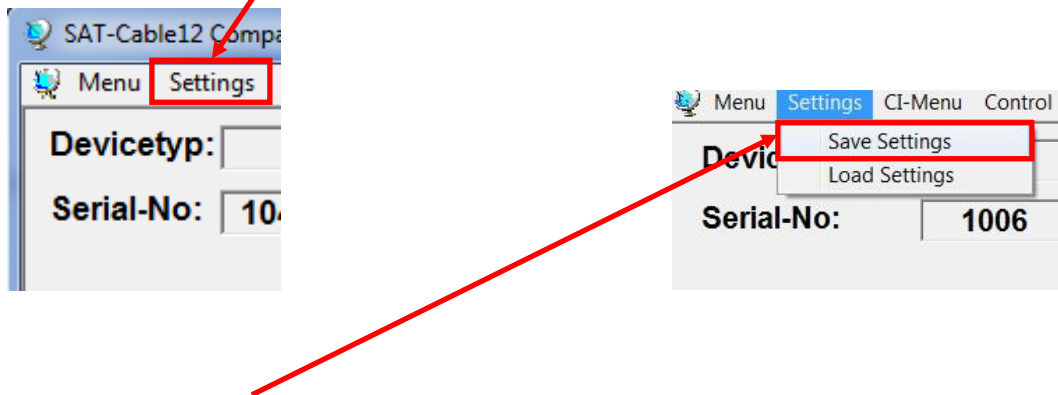
Click **Save** to apply the changes.



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.



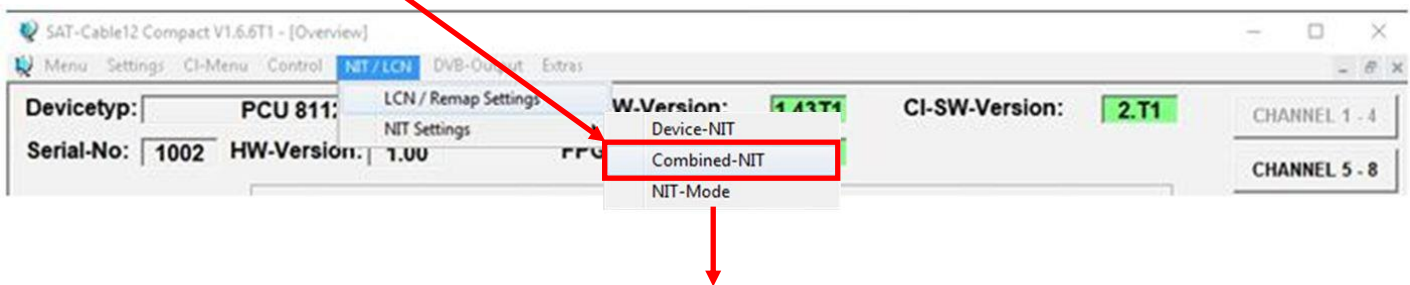
With the menu point **Save Settings** it is possible to save the programming onto the PC/Laptop.

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

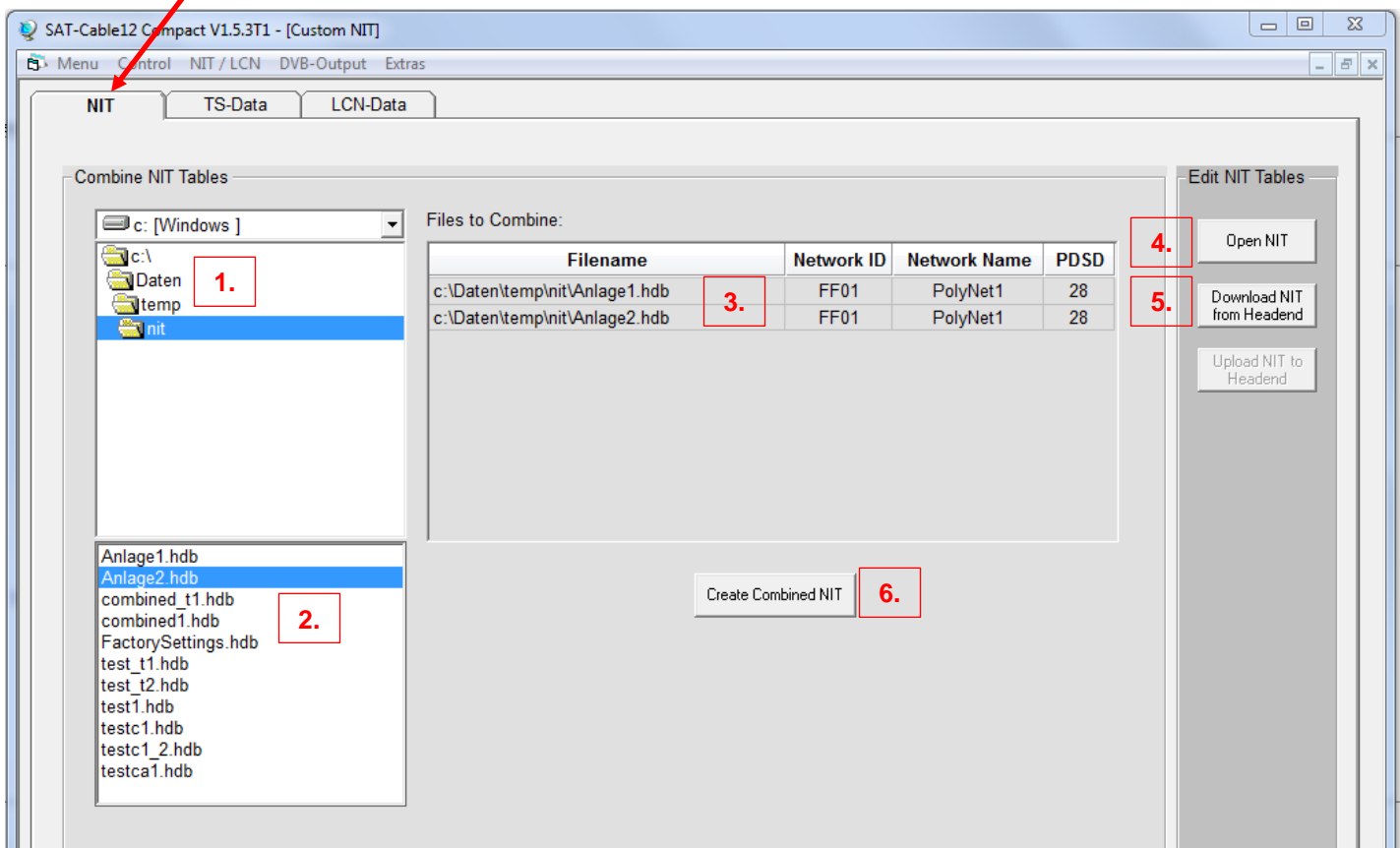
The settings are also saved to an *.rtf-file. This is located in the same folder as the PCU 81x2 software. This file format can be opened, edited and printed with e.g. Microsoft Word, Open Office or WordPad.

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:



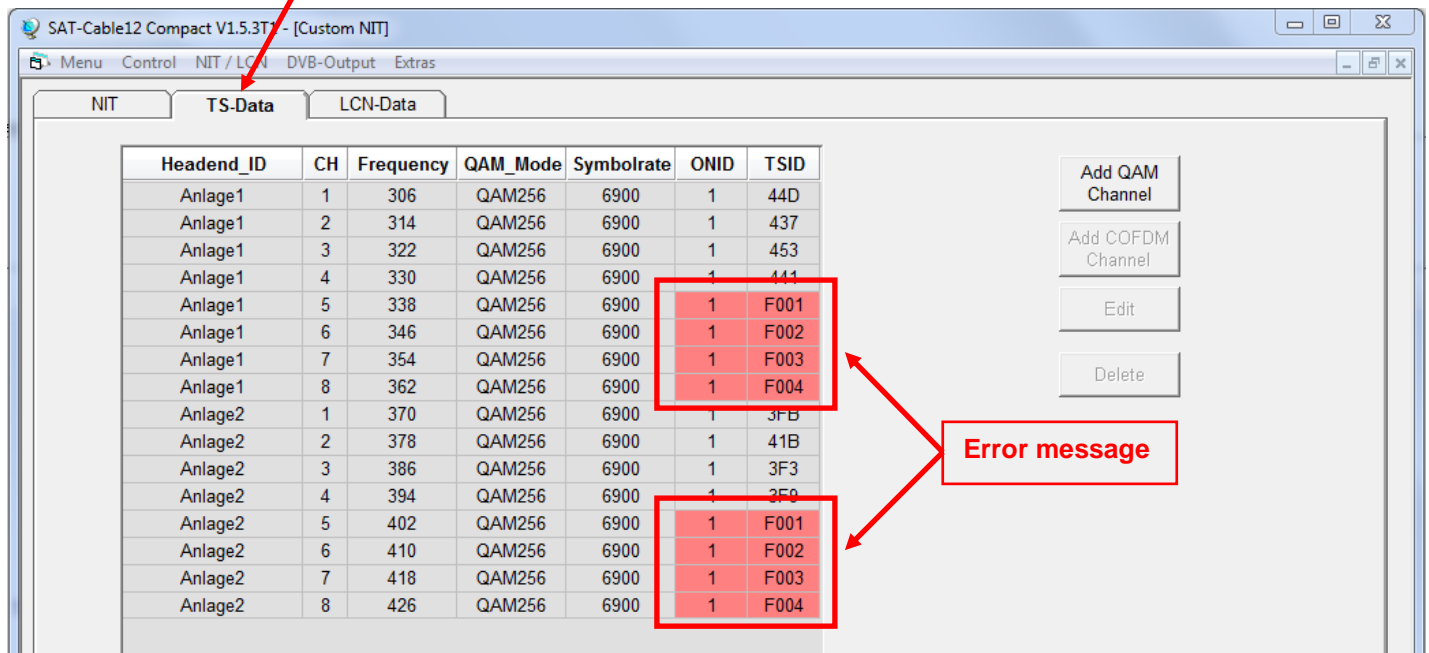
→ By the **NIT** tab the individually devices could be combined.



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 31-34!

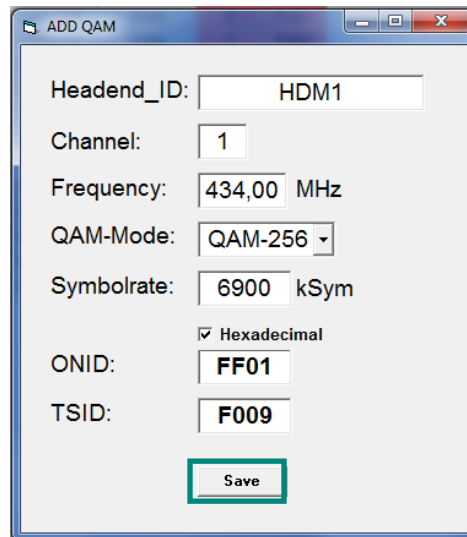
→ Click on the **TS-Data** tab for showing the transport stream-data of the combined NIT.



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	3F8
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.

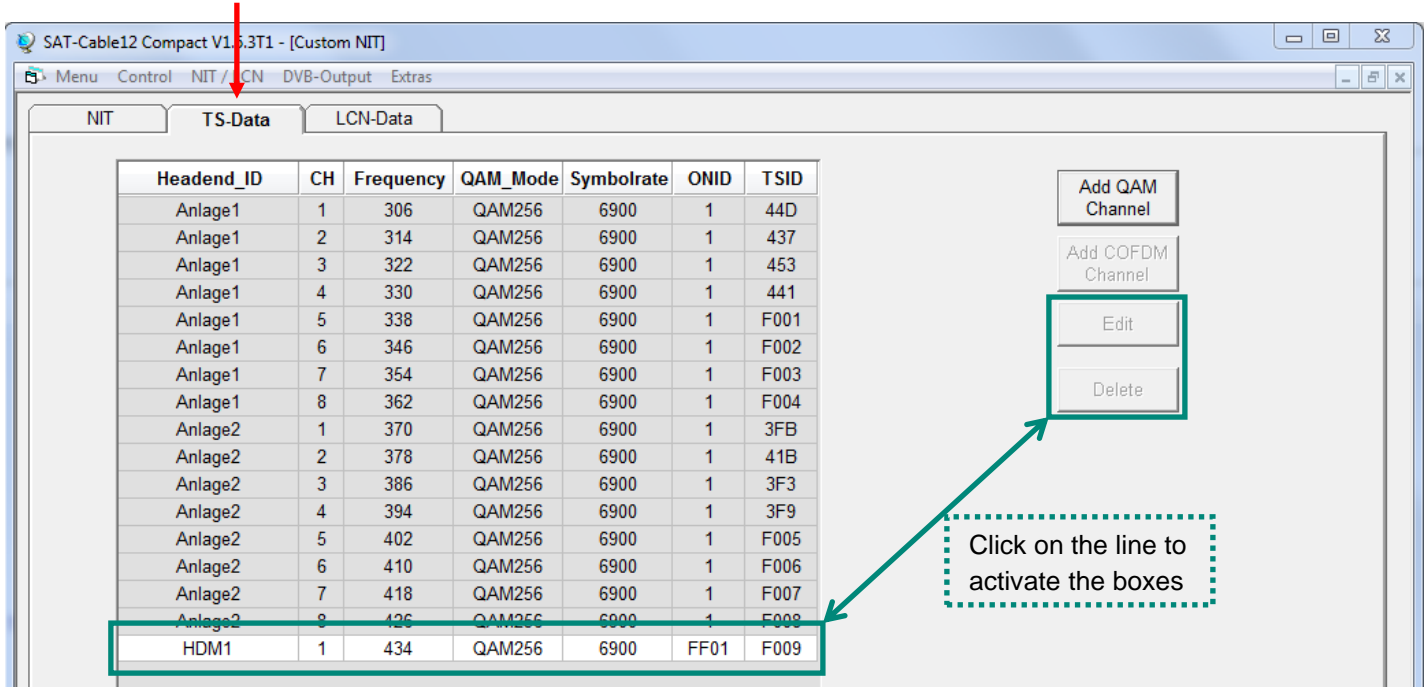
ONID / TSID: Enter the ONID and the TSID. We recommend to use hexadecimal values within the range of F001 and FFFE.



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:

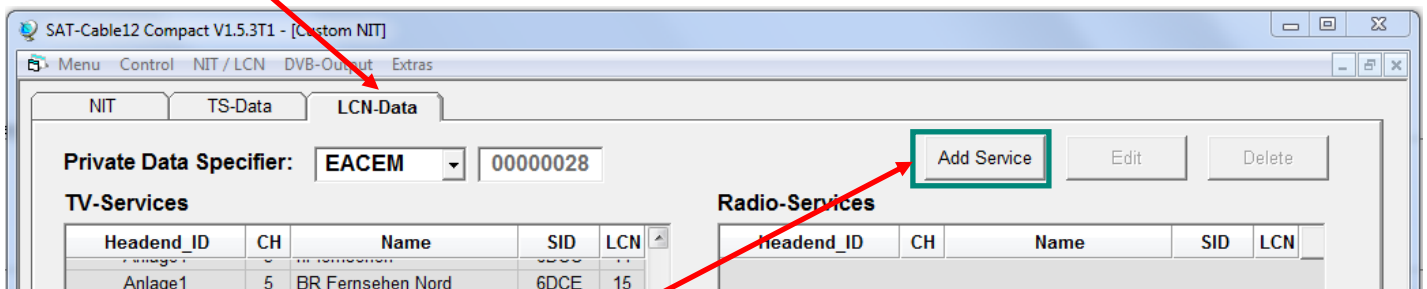


The screenshot shows the SAT-Cable12 Compact V1.5.3T1 - [Custom NIT] interface. The 'TS-Data' tab is selected, displaying a table of channels. The table has columns: Headend_ID, CH, Frequency, QAM_Mode, Symbolrate, ONID, and TSID. The table lists 18 channels, with the last one, 'HDM1', highlighted in white. To the right of the table, there are three buttons: 'Add QAM Channel', 'Add COFDM Channel', and a box containing 'Edit' and 'Delete' buttons. A green arrow points from a dashed box containing the text 'Click on the line to activate the boxes' to the 'HDM1' row in the table.

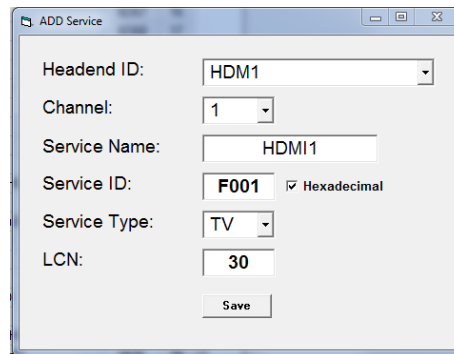
Headend_ID	CH	Frequency	QAM_Mode	Symbolrate	ONID	TSID
Anlage1	1	306	QAM256	6900	1	44D
Anlage1	2	314	QAM256	6900	1	437
Anlage1	3	322	QAM256	6900	1	453
Anlage1	4	330	QAM256	6900	1	441
Anlage1	5	338	QAM256	6900	1	F001
Anlage1	6	346	QAM256	6900	1	F002
Anlage1	7	354	QAM256	6900	1	F003
Anlage1	8	362	QAM256	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	3F9
Anlage2	5	402	QAM256	6900	1	F005
Anlage2	6	410	QAM256	6900	1	F006
Anlage2	7	418	QAM256	6900	1	F007
Anlage2	8	426	QAM256	6900	1	F008
HDM1	1	434	QAM256	6900	FF01	F009

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.

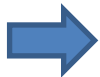
Channel: Set the individual playback channel.

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.

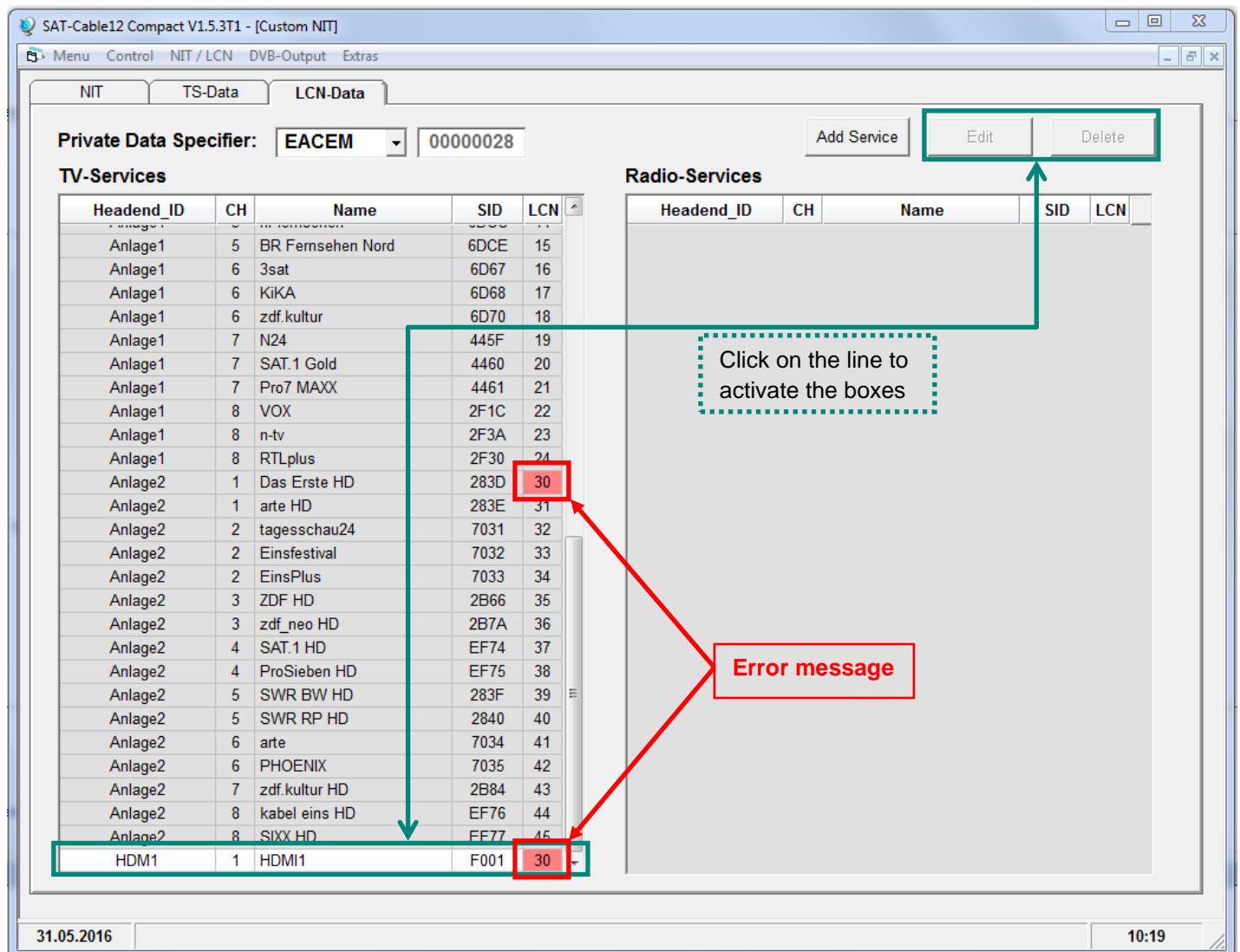
LCN: Determination of the program number in the LCN-system.



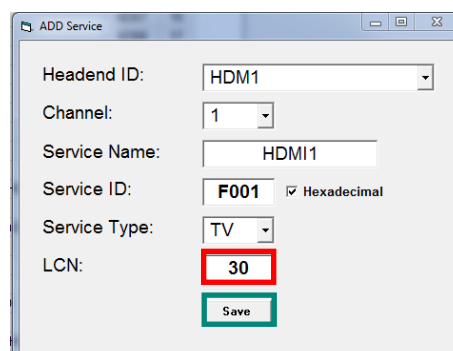
Click **Save** to apply the changes.



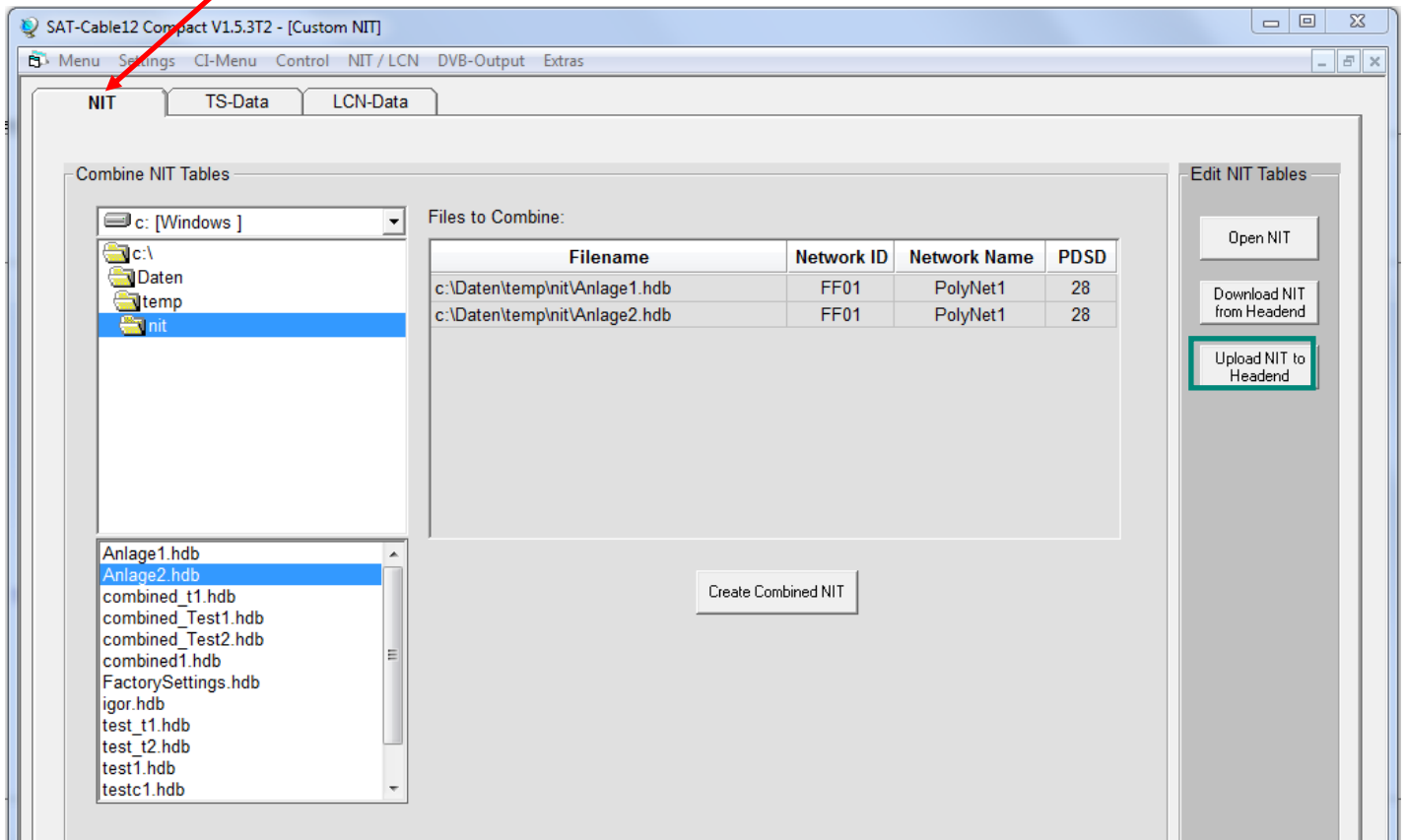
Note: Manually added output channels will be displayed with a white background.
The functions **Edit** and **Delete** are only available for manually added output channels.
Click on the corresponding line to activate the boxes.



- 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.



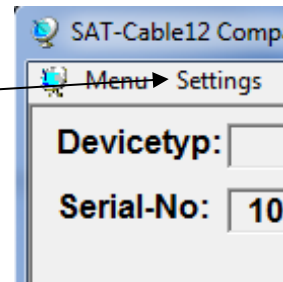
The button **Upload NIT to Headend** is now active. After clicking on this button the created “Combined NIT” is transferred to the device and transmitted to the output channels.

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

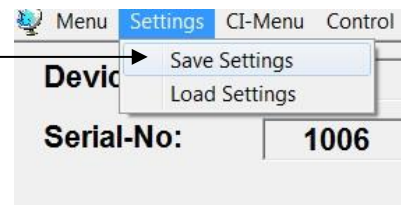


8.4.1. Storage of settings

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!!



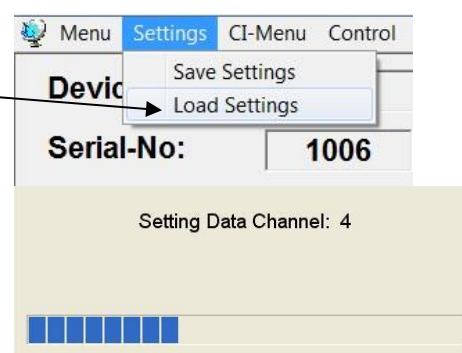
The settings are also saved in an rtf-file. This is located in the same folder as the PCU 81x2 software. This
file format can be opened, edited and printed with e.g. Microsoft Word, Open Office or WordPad.

8.4.2. Loading of settings

With the menu point

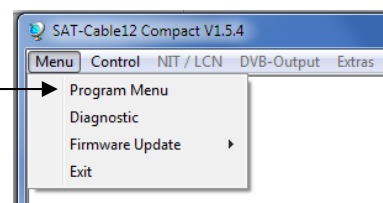
Load Settings

it is possible to load existing programming
from the PC onto a PCU 81x2.
For this, the desired file name is to be
selected and opened in the register.
The date is automatically loaded.

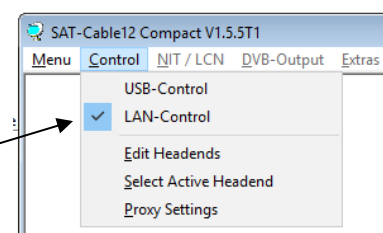


8.5. LAN function

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



The PCU 81x2 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 81x2 must be accordingly altered.
This change is carried out under the menu point **LAN-Control**.

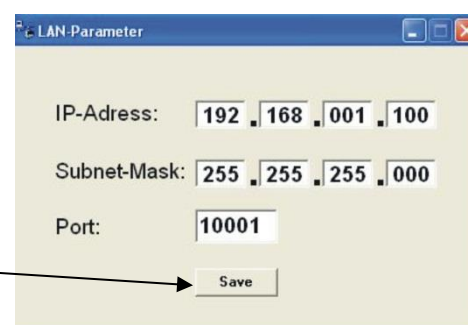


Example:

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 81x2 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**.

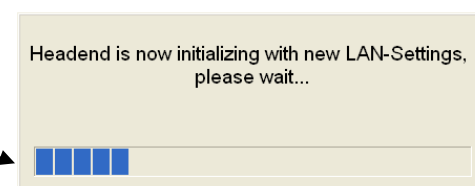


Please note:




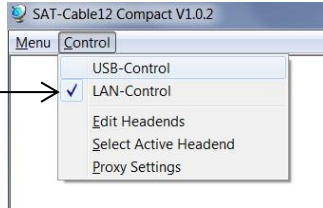
The listed IP addresses are intended as examples.
All addresses must be adapted to the network at the location.
If this information is not known, the responsible IT specialist should be contacted!

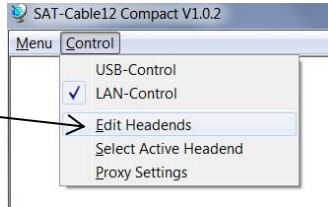
The progress of saving is displayed on the bar diagram.
This process can last up to a minute.

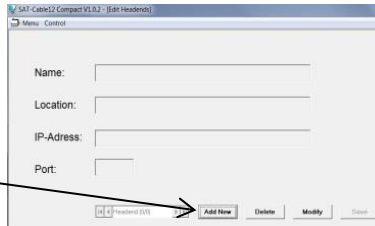


8.5.1. Creating the headends

Start the program — **SATC12** — → 

Activate the menu item **LAN-Control** in the Control menu → 

Select **Edit Headends** to set the connection of the PCU 81x2 → 

Select **Add New** from the submenu → 

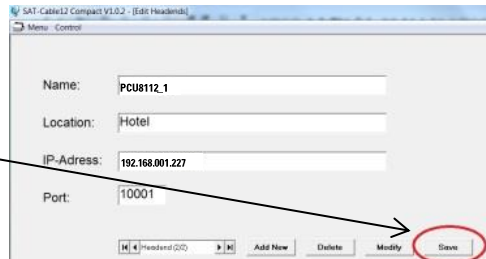
The following menu fields are now enabled for data input:

- Enter the name of the device (freely selectable)
- Enter the name of the location (freely selectable)
- Enter the IP address of the headend to be controlled
(Factory setting 192.168.001.227)
- Enter the port of the headend to be controlled
(Factory setting 10001)

Name:	Polytron
Location:	Langwiesenweg
IP-Adress:	192.168.001.227

Port:	10001
-------	-------

- **Save** saves the headend data



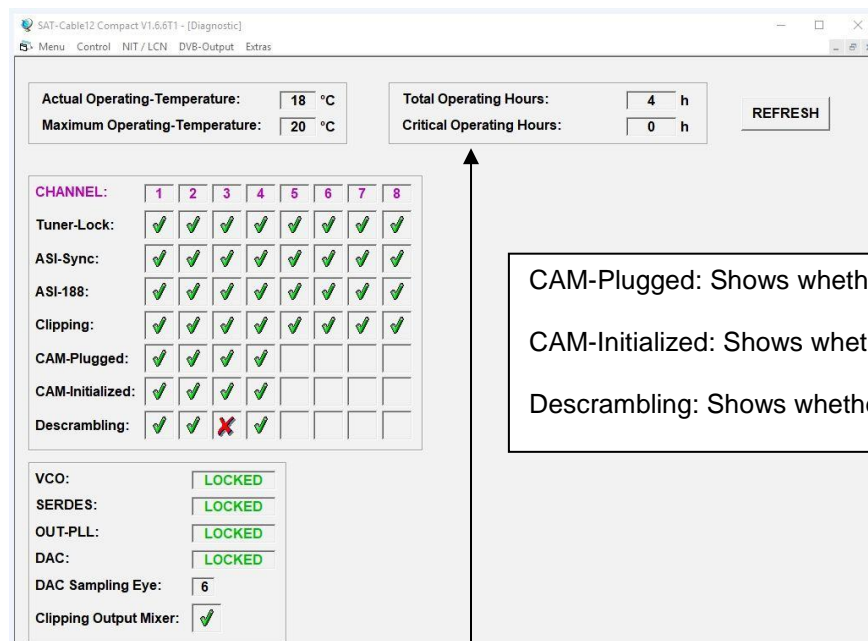
The dialog shows the following values: Name: PCU8112_1, Location: Hotel, IP-Adress: 192.168.001.227, Port: 10001. The Save button is circled in red.

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**.



CHANNEL:	1	2	3	4	5	6	7	8
Tuner-Lock:	✓	✓	✓	✓	✓	✓	✓	✓
ASI-Sync:	✓	✓	✓	✓	✓	✓	✓	✓
ASI-188:	✓	✓	✓	✓	✓	✓	✓	✓
Clipping:	✓	✓	✓	✓	✓	✓	✓	✓
CAM-Plugged:	✓	✓	✓	✓				
CAM-Initialized:	✓	✓	✓	✓				
Descrambling:	✓	✓	✗	✓				

VCO: LOCKED
 SERDES: LOCKED
 OUT-PLL: LOCKED
 DAC: LOCKED
 DAC Sampling Eye: 6
 Clipping Output Mixer: ✓

CAM-Plugged: Shows whether the CAM module has been inserted.

CAM-Initialized: Shows whether the CAM module was detected.

Descrambling: Shows whether the program has been decrypted.

Menu Header Display:

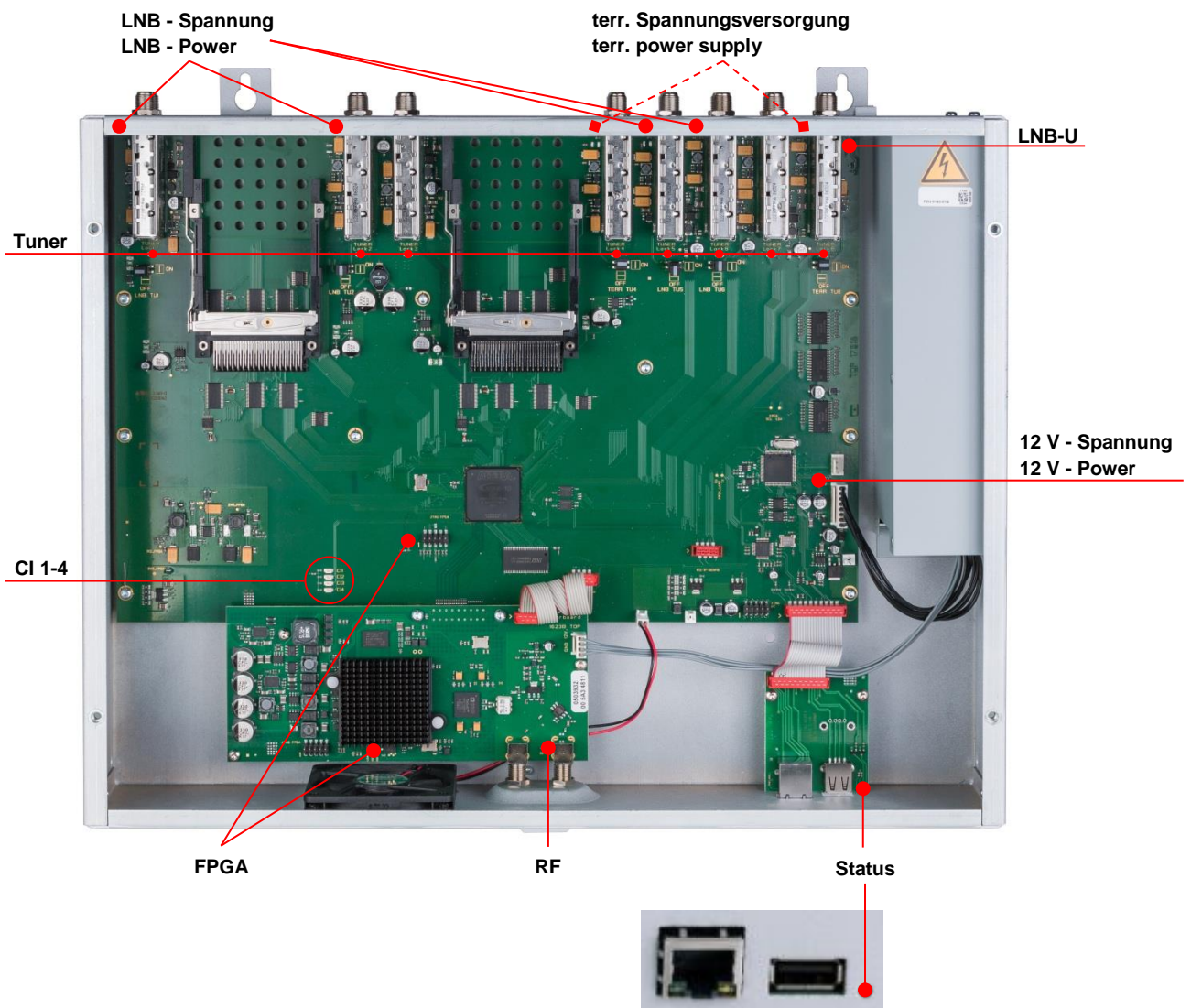
Actual Operating Temperature: approx. current ambient temperature
 Total Operating Hours: operating hours

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
LNB-U	green: 12 V LNB power O.K. red: short circuit and/or overload
FPGA	green: configured, ready to operate off: fault
CI 1-4	green: CAM detected and initialized off: no CAM detected
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 prerequisite is that the latest programming software is installed on the PC/notebook. This can be found on www.polytron.de in the Service / Software Download section.

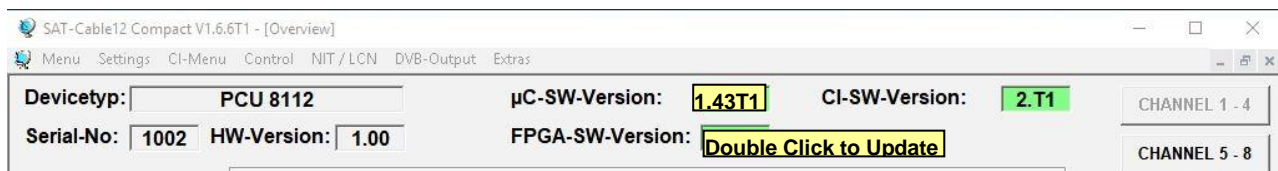
The programming of the input and output parameters carried out under 8.2 is not influenced by this.

8.8.1. Firmware version overview

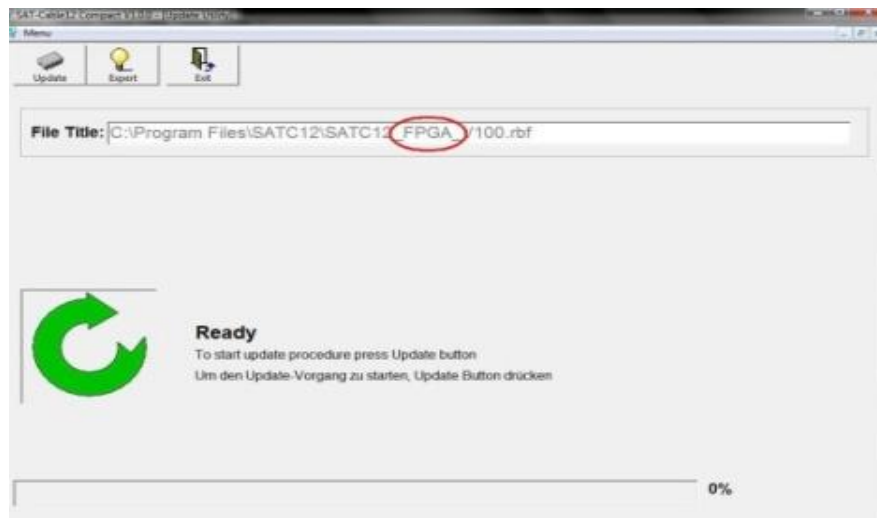
The appropriate display boxes of the firmware overview are highlighted in coloured background.

Green indicates that the firmware is up-to-date.

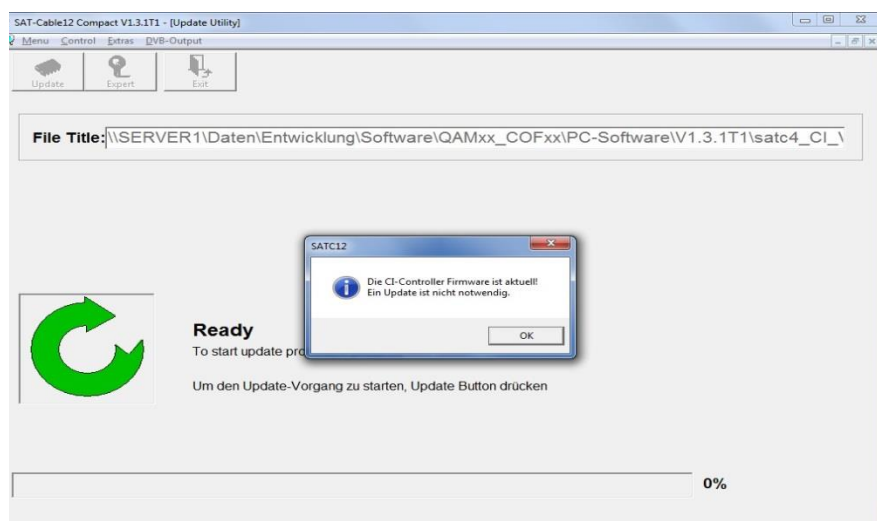
Yellow indicates that a new firmware is available.



A double click on the display box which shows the firmware opens automatically the update menu.



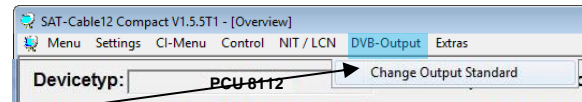
If the firmware is up-to-date, following picture appears:



8.8.2. Changing the output signal

Update by PC/Laptop:

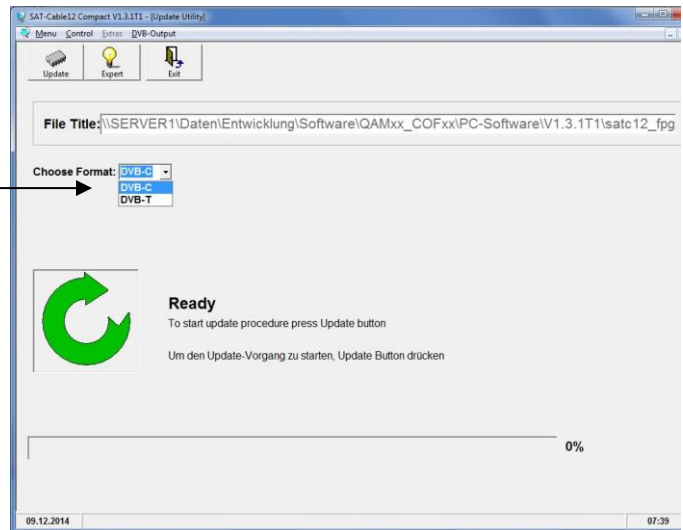
- Select menu item **DVB-Output**
- Select menu item **Change Output Standard**



Selection DVB-T or DVB-C



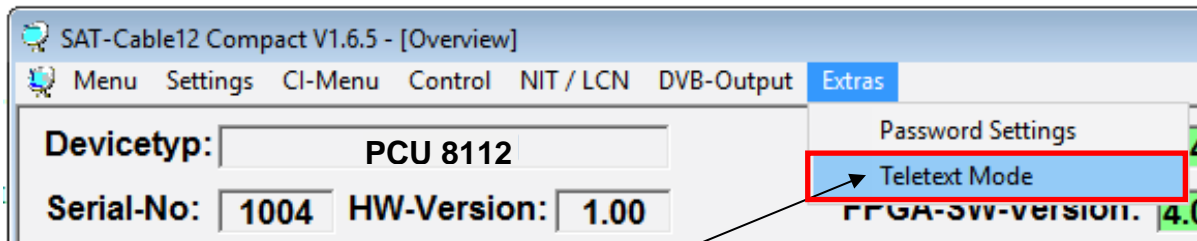
Click on the **Update** Button,
new FPGA software is loaded



**The FPGA update takes about 15 minutes
and should under no circumstances be
interrupted before!**

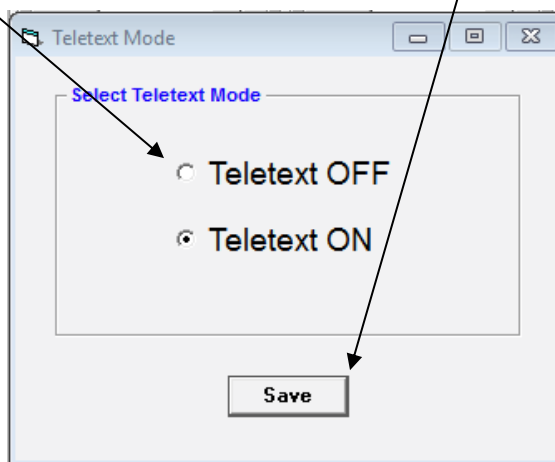
Important: Please follow the update instructions carefully. Do not turn off the unit or unplug the power cord from the wall outlet. Failure to comply with the instructions, as well as interruption of power supply during the firmware / FPGA update installation, may interrupt the update process and cause the device to stop responding or require 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

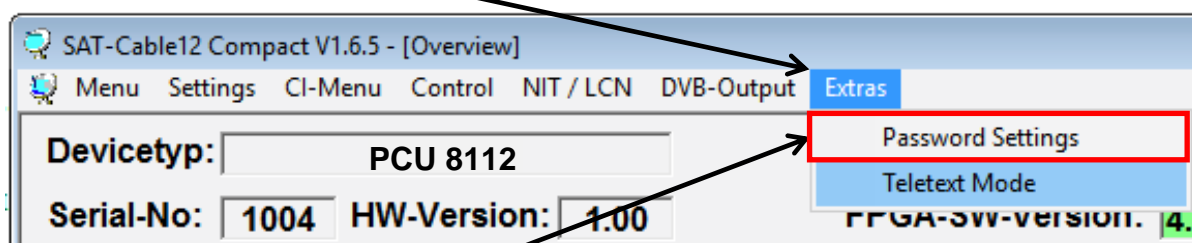
➔ Protection against unauthorized access to the program menu.

Password protection is not activated at the factory and can be switched on as follows from µC-SW version 1.31 onwards:

- Start program – **SATC12** –.



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



- Click 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.

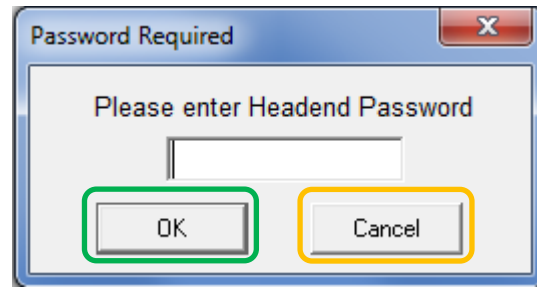


Click on **Save** to store the password-settings.



- 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.**

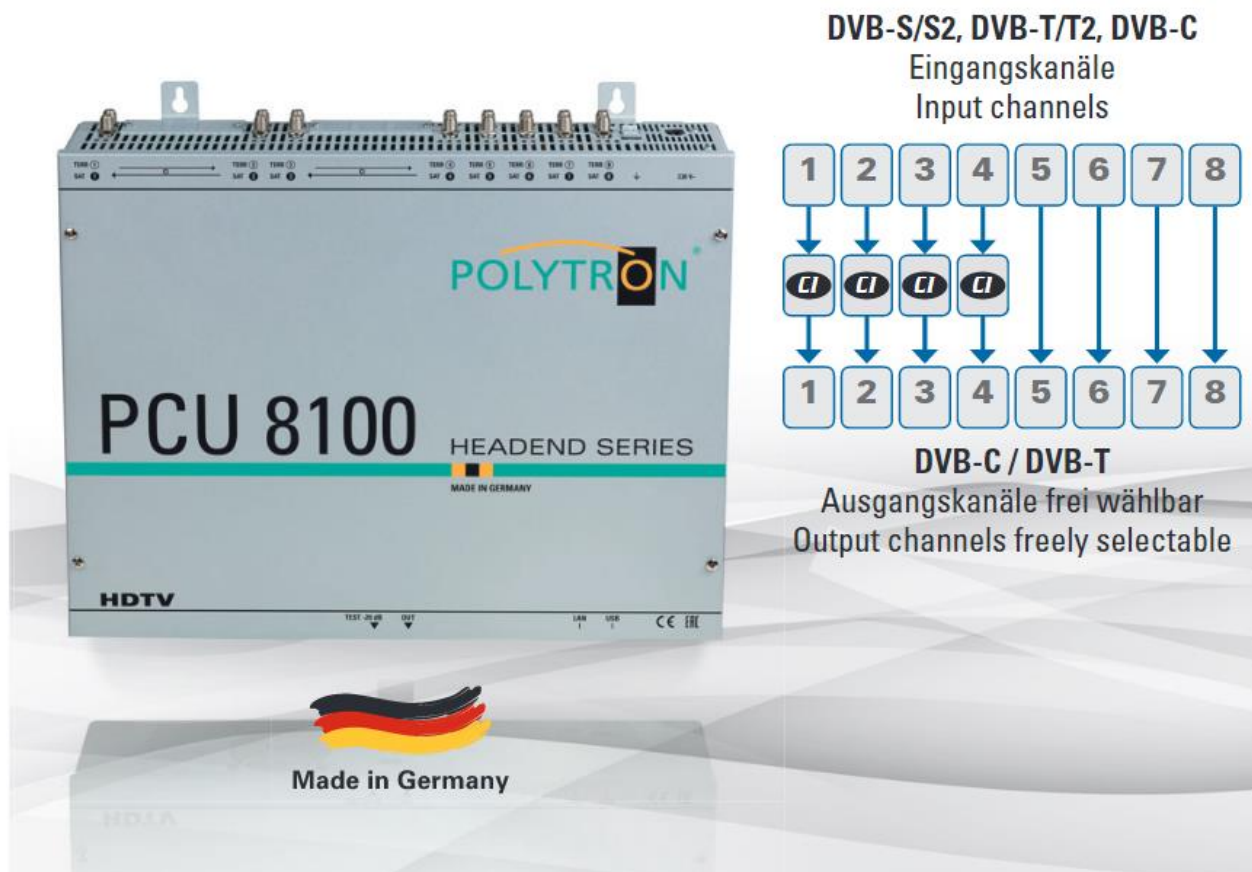
Should the password get lost or has fallen into oblivion we willingly help you relating to the generally password-reset. For this purpose we urgently need the serial-number of the device, as already mentioned on the previous page. The serial-number you can also find on the label which is affixed on the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



The compact headends PCU 8112 and 8122 are the ideal choice when free-to-air channels and PAY-TV content are to be combined.

Application Germany:

SKY as a supplement to the FTA channels.

Application Austria / Switzerland:

Decrypted public stations combined with German FTA channels.

Application holiday countries (e.g. Netherlands):

Decrypted local channels combined with foreign language programs.

Application of mixed reception:

Combination of satellite reception with local terrestrial programs.

10. Technical data

Type	PCU 8112	PCU 8122
Article no.	5552270	5552275
Inputs	8	
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 dBμV	
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	8	
Frequency range	112 - 862 MHz (250 kHz steps)	
Output level	90 dBμV	
Channel attenuation	0 - 12 dB (1 dB steps)	
MER	≥40 dB	≥38 dB
Operating parameters		
Power consumption	ca. 45 W	
Operating voltage	180...265 V, 50/60 Hz	
Dimensions (W x H x D)	428 x 331 x 103 mm	

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Technische Änderungen vorbehalten
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