Fte®
maximal

T4SF 800
User's manual

Rev 1.0

Index

1 Installation

1.1 Safety rules

1.- Never place the device next to hot sources.

2.- Never undergo the device to temperatures that exceed its level of operation.

3.- Never expose the device to leakings nor spatterings.

4.- Never place objects that contain liquids over the device.

5.- Respect the ventilation slots of the device, do not cover them with any kind of object.

6.- Avoid locations with possibilities of spilling liquids on the inside of the device, and with important changes of temperature. Keep an ambient temperature of 0 °C to +50 °C.

7.- Never open the device by yourself due to electric risk. In case of problems, go always to qualified technicians.

8.- Never, under no circumstances, open the device when connected to the electrical net.

9.- During the handling disconnect the device from the electrical net.

10.- Obey the electricity security rules during the assembling. Use materials that obey the current law.

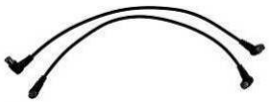
11.- Do not perform installation and service work during thunderstorms.

12.- The service and the maintenance of the device must be done by TV and radio specialised technicians.

1.2 Box content

Quick installation guide

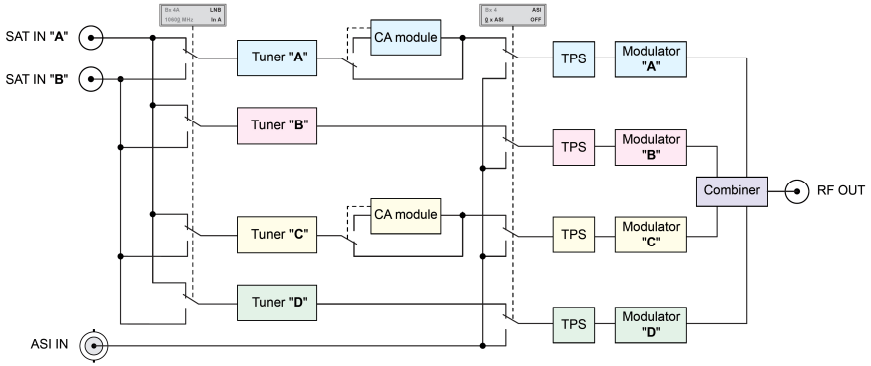
T4SF 800



2 RF cables

1.3 General description

The quad transmodulator module converts all services modulated according to DVB-S / DVB-S2 standard (also 16/32 APSK) into four COFDM modulated signals A, B, C and D.



T4SF 800 Block diagram

The module is equipped with 2 SAT IF inputs and one ASI input. The module has 4 tuners A, B, C and D that can select one of the 2 SAT inputs signals independently of the other. At the tuners output A and C, there are CI modules that allow opening encrypted channels with an appropiate CI module and card. Each DVB-T output modulator can select as signal source the SAT tuner signal or the data signal from the ASI input, as showed on the table on "Programming schema".

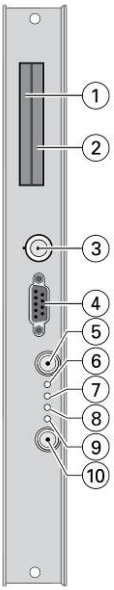
The modulators "B" and "D" work at the adjacent channels of modulators"A" and "C". E. g. if output channel of modulator A is set to channel 23, the modulator B will be set to channel 24.

Four LEDs provide an indication of the SAT IF input signal quality based on their colour and indicate if the respective channel strip is switched on (LED illuminates) or off:

LED indicator	SAT IF signal quality
Green	Signal quality is good
Orange	Signal quality is poor
Red	No signal
Red <–> Green	Data rate overflow (output)
Off	Channel strip (modulator) off

⚠ To operate this module the software version of the control unit must be **V 45** or higher.

1.4 Connections



Module

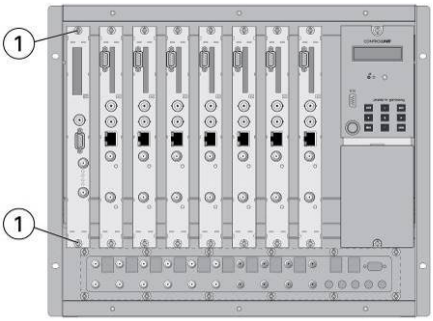
1. Slot for CI module of "tuner A"
2. Slot for CI module of "tuner C"
3. ASI input
4. D-SUB socket "RS 232"
5. SAT input "A"
6. Status LED of channel strip "A"
7. Status LED of channel strip "B"
8. Status LED of channel strip "C"
9. Status LED of channel strip "D"
10. SAT input "B"

1.5 Installation

Installing the module in the headend

⚠ Before installing or changing a module unplug the power cable from the mains power socket.

- Remove the fastening screws (1) of an unoccupied slot from the bracket of the headend.
- Insert the module in this slot and push it into the housing.
- Align the module and apply slight pressure to connect it to the connections of the board and the RF bus bar.
- Fasten the module with the screws (1).

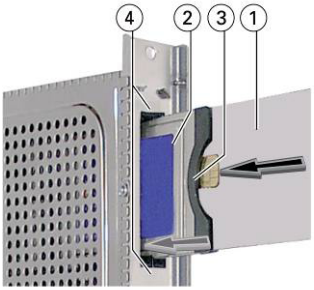


Connecting the module

- Connect "SAT input A" and "SAT input B" to the respective outputs of the SAT IF input distributors. Avoid wide differences in level at the inputs.
- If required connect the ASI input to the ASI output of a corresponding signal source.

Inserting a CI module

- Insert the smart cards (1) into the CI modules (2) so that the chip (3) on the smart card 1 faces the thicker side (top) of the CI module.
- Insert the CI modules into the slots (4) with the top sides of the CI modules in left direction.
- Push the CI modules without canting into the guide rails of the CI slots (4) and contact them to the common interfaces.



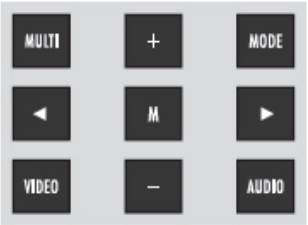
Note: If the module is inserted in the headend, the left common interface is assigned to tuner "A", the right one to tuner "C".

2 Programming and configuration

2.1 Control panel description

Programme the module using the buttons on the control unit of the headend.

- MODE scrolls forward through the menus
- ◄ / ► select parameters in the menus
- + / - set values
- MULTI selects sub-menus
- AUDIO scrolls backward through the menus
- M saves all entries



2.2 Menu items

Use the MODE key to select the following menu items:

- Output signal settings:
  - Modulator on/off, level
  - Output channel (modulators A and C)
  - Output frequency (modulators A…D)
  - Transmission parameters
  - Substitute signal
- ASI input
- Input signal settings:
  - LNB oscillator frequency
  - Input symbol rate
  - Input frequency
  - Service filter
  - CI module
  - Economize descrambling capacity
- Options:
  - Transport stream and ORGNET-ID
  - BAT, STD-other
  - Deleting a PID
  - Renaming a PID

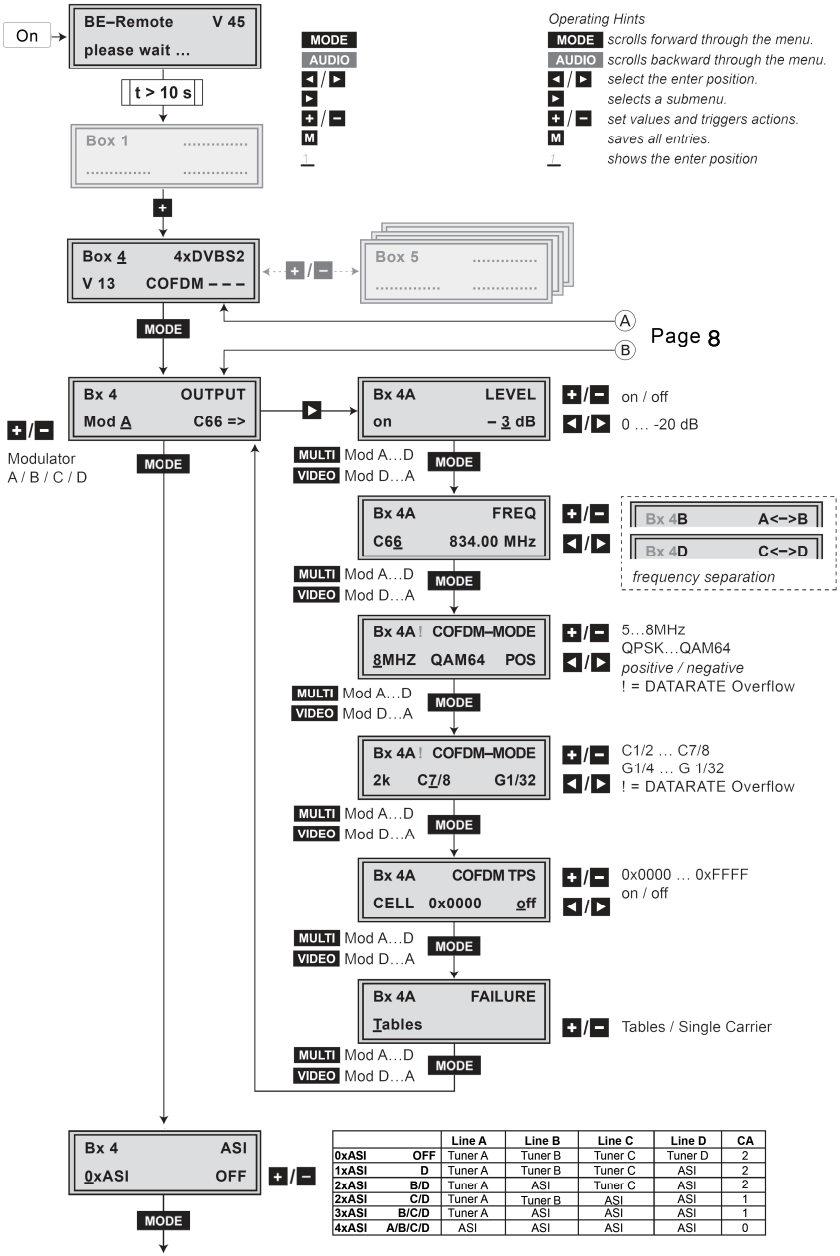
- Data rate
- Network Information Table (NIT)
- Factory reset

The two-line display of the control unit then shows the menus.

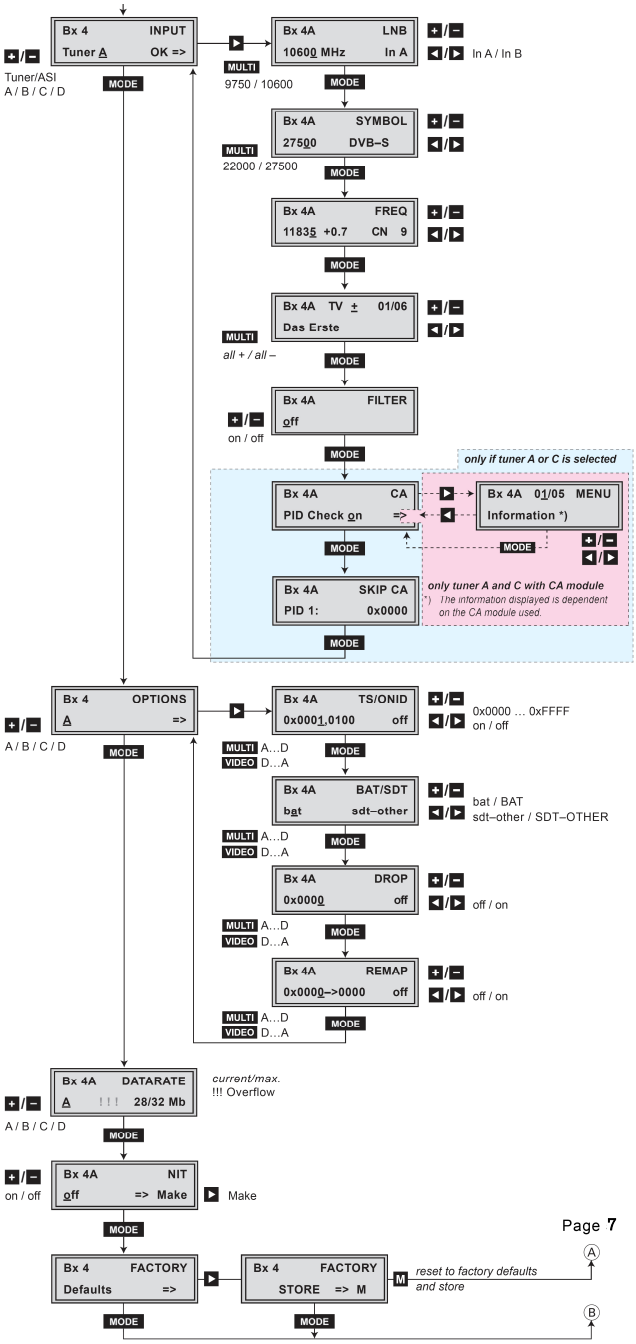
2.3 Keypad advanced functions

- Pressing the MODE button for longer than 2 seconds cancels the programming procedure. This takes you back to the programme item "Selecting the module" from any menu. Any entries that have not been saved are reset to the previous settings.
- Entries in the menus can be saved by pressing the M key. You are taken back to the "Selecting the module" menu item.
- The cursor position for settings is shown by "_".
- Dependent on the settings not needed menus are hidden.

2.4 Programming schema



		Line A	Line B	Line C	Line D	CA
0xASI	OFF	Tuner A	Tuner B	Tuner C	Tuner D	2
1xASI	D	Tuner A	Tuner B	Tuner C	ASI	2
2xASI	B/D	Tuner A	ASI	Tuner C	ASI	2
2xASI	C/D	Tuner A	Tuner B	ASI	ASI	1
3xASI	B/C/D	Tuner A	ASI	ASI	ASI	1
4xASI	A/B/C/D	ASI	ASI	ASI	ASI	0


Bx 4 INPUT
Tuner A OK =>
Tuner/ASI
A / B / C / D
MODE
Bx 4A LNB
10600 MHz In A
In A / In B
MULTI
9750 / 10600
Bx 4A SYMBOL
27500 DVB–S
MULTI
22000 / 27500
Bx 4A FREQ
11835 +0.7 CN 9
Bx 4A TV + 01/06
Das Erste
MULTI
all + / all –
Bx 4A FILTER
off
on / off
only if tuner A or C is selected
Bx 4A CA
PID Check on =>
Bx 4A 01/05 MENU
Information *)
Bx 4A SKIP CA
PID 1: 0x0000
only tuner A and C with CA module
*) The information displayed is dependent on the CA module used.
Bx 4 OPTIONS
A =>
A / B / C / D
Bx 4A TS/ONID
0x0001.0100 off
0x0000 … 0xFFFF
on / off
MULTI A…D
VIDEO D…A
Bx 4A BAT/SDT
bat sdt–other
bat / BAT
sdt–other / SDT–OTHER
Bx 4A DROP
0x0000 off
off / on
Bx 4A REMAP
0x0000–>0000 off
off / on
Bx 4A DATARATE
A ! ! ! 28/32 Mb
current/max.
!!! Overflow
Bx 4A NIT
off => Make
Make
Page 7
Bx 4 FACTORY
Defaults =>
Bx 4 FACTORY
STORE => M
reset to factory defaults
and store
A
B

2.5 Programming procedure

2.3.1 Switching on the headend

Switch on the headend and the display will show the software version of the headend.

```
Be-Remote  V 45
Please wait…
```

The processor reads the modules data.

Press the **MODE** button in order to activate the "Selecting the module" menu.

2.3.2 Selecting the module

Select the module you want to programme by pressing the **+ / -** buttons.

```
Box 4     4xDVBS2
V13     COFDM ---
```

The display shows the following information:

- Box 1: Module number
- 4xDVBS2 COFDM : Module type
- V13: Software version of the module

Once selected the module to be programmed, press the **MODE** button to activate the main menu.

2.3.3 Output settings

In this menu you select the modulator (A, B, C or D) for which you would like to do the output settings in the related submenus.

```
Box 4      OUTPUT
Mod A      C21 =>
```

- In order to skip the "Output settings", press button **MODE**.
- It is possible to rotate through the submenus of all modulators using the buttons **MULTI** (ascending) and **VIDEO** (descending).

- Using buttons **+ / -** select the desired modulator. Once selected press the ► button to activate "Level" submenu:

2.3.3.1 Modulator On/Off, Level:

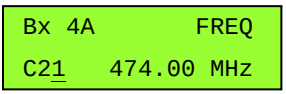
This menu item is used to set the output levels of the four modulators to the same value and to switch the modulators on or off.

```
Bx 4A       LEVEL
on          – 3 dB
```

- By pressing **+ / -** adjust the higher output levels to the output level of the modulator with the lowest output level incrementally (0 dB ~ -20 dB).
- Use the ◄ button to place the cursor under "on" resp. "off".
- Use the **+ / -** buttons to switch each modulator on or off.

Press the MODE button to activate "Channel / Frequency" submenu.

2.3.3.2 Channel, Frequency

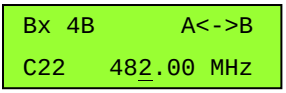


In this menu you can adjust the output channel (only at modulator A and C) or the output frequency of the respective modulator.

Channel setting (only modulators "A" and "C")

- Use buttons ◄ / ► to select the cursor position for channel setting.
- Use buttons + / - to adjust the desired channel.

NOTE: The modulators "B" and "D" by default are fixed to a spacing of + 8 MHz to the modulators "A" and "C". Only this spacing to the modulators "A" and "C" can be set via the frequency setting.



Frequency setting (modulators A, B, C and D)

- Use buttons ◄ / ► to select the cursor position for frequency setting.
- Use buttons + / - to adjust the desired frequency.

Press the MODE button to activate "Output signal" submenu.

2.3.3.3 Output signal

In this menu, you can set the bandwidth, the carrier modulation and the spectral position of the output signal.

Bandwidth of the output signal

To transmit the output signal in the channel range of C21 to C69 a bandwidth of 8 MHz can be used.

In the channel range of C5 to C12 a bandwidth of ≤ 7 MHz must be set.

If frequency setting is selected you can set the bandwidth dependent on the frequency of the adjacent channel.

- Use buttons + / - to set the bandwidth of the output signal (5MHz ~ 8MHz).

Carrier modulation

In this menu item the carrier modulation is set. At this the setting "QPSK" corresponds to the lowest and the setting "QAM64" to the highest output data rate.

- Use the ◄ / ► buttons to place the cursor under the modulation parameter.
- Set the carrier modulation of the output signal using the + / - buttons (QPSK, QAM16 or QAM64).

Spectral position – inverting the user signal

For exceptional cases and "older" digital cable receivers, the spectral position of the user signal can be inverted "NEG". The default setting is "POS".

- Use ◄ / ► to place the cursor under "POS".
- Use + / - to set the spectral position to "NEG".

Press the MODE button to activate "Transmission parameters" submenu.

2.3.3.4 Transmission parameters

In this menu you can set the code rate and the guard interval.

Code rate

During a transmission, data can be lost or changed. To recover this data, redundancy is added to the signal to be transmitted (forward error correction). The factor of the quantity of redundancy contained in the bits transmitted is called code rate.

Using the setting "C7/8" you can get the highest output data rate at lowest redundancy.

- Use the ◄ / ► buttons to place the cursor under "C...".
- Set the code rate required using the + / - buttons (1/2, 2/3, 3/4, 5/6, 7/8).

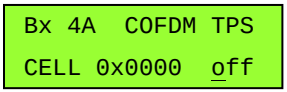
Guard interval

In this menu item you set the relation of the duration of the user symbols to the duration of the guard intervals to be transmitted. A high guard interval, e.g. "G1/4" causes a low output data rate.

- Use the ◄ / ► buttons to place the cursor under "G...".
- Set the guard interval required using the + / - buttons (1/4, 1/8, 1/16 or 1/32).

Press the MODE button to activate "Transmitter identification" submenu.

2.3.3.5 Transmitter identification



At terrestrial transmission an identification is referred to each COFDM modulated transmitter. When COFDM modulated signals are fed into cable networks this identification is not necessary usually. If receiving problems should occur you must refer a transmitter identification (CELL ID) to each output channel and switch "on" the transmitter identification.

- Use the ◄ / ► buttons to position the cursor under the digit of the hexadecimal number to be set.
- Press + / - to set the respective digit of the hexadecimal number.
- Repeat the procedure by the quantity of the digits to be set.

- Using the ► button place the cursor under "**off**" and switch "**on**" the transmitter identification using the **+** / **-** buttons.

Press the **MODE** button to activate "Substitute signal" submenu.

2.3.3.6 Substitute signal in case of an incorrect input signal

You use this menu to set whether a COFDM signal filled with null packets and self-made tables "**Tables**" or a "**Single Carrier**" signal should be provided as an output signal whenever an incorrect input signal occurs. Self-made tables are transmitted furthermore.

```
Bx 4A    FAILURE
Tables
```

- Use the **+** / **-** buttons to set the required output signal.

```
Box 4     OUTPUT
Mod A     C21 =>
```

Press the **MODE** button to return to "Output settings" main menu.

2.3.4 ASI input

Press the **MODE** button to activate "ASI input" menu.

In this menu you can assign the ASI input instead of the tuners as the source for the channel strips (lines). The following settings are available:

```
Bx 4          ASI
0xASI         OFF
```

		Line A	Line B	Line C	Line D	CI
0x ASI	OFF	Tuner A	Tuner B	Tuner C	Tuner D	2
1xASI	D	Tuner A	Tuner B	Tuner C	ASI	2
2xASI	B/D	Tuner A	ASI	Tuner C	ASI	2
2xASI	C/D	Tuner A	Tuner B	ASI	ASI	1
3xASI	B/C/D	Tuner A	ASI	ASI	ASI	1
4xASI	A/B/C/D	ASI	ASI	ASI	ASI	0

- Use the **+** / **-** buttons to set the required numbers of lines using the ASI input signal. On the left side you select the number of "ASI lines", on the right side you see, which lines are used.

```
Bx 4          ASI
2xASI         B/D
```

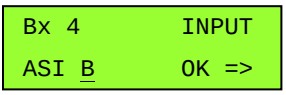
Press the **MODE** to activate the "Input" main menu.

2.3.5 Input settings

In this menu you select the tuner (A, B, C or D) for which you would like to do the input settings in the related submenus.

```
Bx 4          INPUT
Tuner A       OK =>
```

- In order to skip the "Input settings", press button MODE.
- "OK" indicates a present input signal.



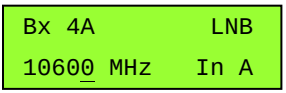
- Using the buttons + / - select the desired channel strip (A, B, C or D). Press button ►:

  In case of signal source ASI, submenu "Service filter" is activated.

  In case of Tuner signal you will access to these submenus:

2.3.5.1 LNB oscillator frequency, Input

In this menu select the SAT input and set the oscillator frequency of the LNB used.



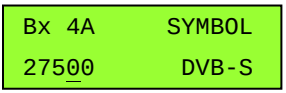
- Use buttons ◄ / ► to place the cursor under the digit to be set for the oscillator frequency displayed.
- Press buttons + / - to enter the respective digit of the oscillator frequency of the LNB used.
- Repeat the procedure by the quantity of the digits to be set.
- Use button ► to place the cursor under "In A" resp. "In B".
- Press buttons + / - to select the respective SAT input ("A" or "B").

Press the MODE button to activate "Input symbol rate, DVB mode" submenu.

2.3.5.2 Input symbol rate, DVB mode

In this menu set the symbol rate of the desired transponder.

The DVB mode is indicated.



Symbol rate

The symbol rates of the satellite transponders can be found in the current channel table of the satellite operator, in various satellite magazines and in the Internet.

- Use ◄ / ► to position the cursor under the digit to be set for the symbol rate displayed.
- Press + / - to enter the respective digit of the symbol rate needed.
- Repeat the procedure by the quantity of the digits to be set.

DVB mode

- The module recognizes the transmitted DVB mode and switches over between the normal QPSK mode (DVB-S) and the DVB-S2 mode.

Press the MODE button to activate "Input frequency" submenu.

2.3.5.3 Input frequency

If three dots " **...** " appear in the second line of the display, the module is in the "**service search**" mode. Please wait until the process has finished.

Once the RF receiver has synchronised to the input signal, any offset to the target frequency is displayed in MHz, e.g. "**– 1.8**".

If a question mark "**?**" appears in the second line of the display, there is no input signal present. In this case check the configuration of the antenna system and headend as well as the preceding settings of the module.

"CN …" (Signal to Noise ratio) indicates the current signal to noise ratio, in order to estimate the quality of the input signal.

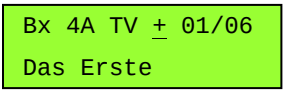
- Use ◄ / ► to position the cursor under the digit of the frequency displayed to be set.
- Press **+** / **-** to set the respective digit of the input frequency needed.
- Repeat the procedure by the quantity of the digits to be set.
- Set the frequency offset shown in the display (e.g. "**– 1.8**") to less than 1 MHz ("**± 0.x**") by varying the input frequency using the **+** / **-** buttons.

Press the **MODE** button to activate "Services selection" submenu.

2.3.5.4 Services selection

In this menu services of a transponder can be switched off.

Herein you select which scrambled service should be descrambled using an adequate CI module (only via tuner "A" and "C").



Meaning of the indicators in the example:

- Bx 4A: Slot 4, channel strip A
- TV: TV channel type. It can be "**TV**" (television) or "**RA**" (radio)
- +: Service switched on "**+**", switched off "**-**" or scrambled (**X**)
- 01/06: The 1st of 6 services is being displayed
- "Das Erste": Service name

- Use the ◄ / ► buttons to call up the services in sequential order, then use **+** / **-** to activate (indicated by " + ") or to deactivate them (indicated by " **–** ").
- Using button **MULTI** all service can be activated/deactivated.
- If a service is scrambled (indication "*") in this menu you select whether it should be descrambled using an adequate CI module (only possible via tuner "A" and "C").
- Press button **+** twice to descramble a service (indication "X").

Press the **MODE** button to activate "Services filter" submenu.

2.3.5.5 Services filter

Herein you can switch on resp. off the service filter. This influences the behaviour of the module when changing the service assignment of the input signals.

```
Bx 4A      FILTER
off
```

Filter **on**

Only services which are selected (+) in menu **Services selection** will be passed. New services will be blocked until they will be activated in the **Services selection** menu (+).

Filter **off**

All services will be passed – also "new" services – this may cause data overflow at the output!

- Use the **+** / **-** buttons to switch "**on**" or "**off**" the service filter.

Press the **MODE** button to activate "PID monitoring" submenu.

2.3.5.6 PID monitoring

In this menu you can switch off the PID monitoring and call up a menu for the settings of the CI module (dependent on the CI module) (Only for tuners **A** and **C**).

```
Bx 4A          CA
PID Check on   =>
```

- Use the **+** / **-** buttons to switch "**off**" or "**on**" the PID monitoring.
- Use the ► button to activate the menu of the CI module (only if Tuner "A" or "C" is selected).

2.5.5.6.1 CI module

The menu varies according to which CI module you are using. For this reason, please refer to the operating manual of your particular CI module. The relevant information is shown in the display of the headend. This may appear as a fixed display or as scrolling text according to display capabilities.

```
Bx 4A 01/05 MENU
Information *)
```

Meaning of the indicators on display:

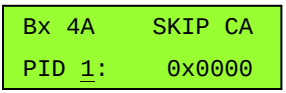
- Bx 4A: Slot 4, modulator A
- 01/05: The first of five menu items is activated
- MENU: The menu of the CI module is activated

- Use the **+** / **-** buttons to activate the menu desired.
- Press the ► button to activate the menu.
- Use the **+** / **-** buttons to select the function desired.
- To set the CI module use the ◄ / ► and **+** / **-** buttons.

- By pressing the **MODE** button you can cancel the settings in the menu of the CI module and are returned to the "PID monitoring" – "**CI**" menu.
- All settings are saved by pressing the **M** button.

Press the **MODE** button to activate "Economize descrambling capacity" submenu.

2.3.5.7 Economize descrambling capacity



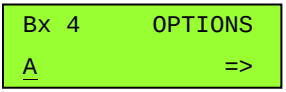
In this menu up to 9 not needed PIDs (e.g. audio PIDs of foreign language versions) can be excluded from the descrambling in order to economize descrambling capacity.

If tuner B or D is selected, this menu is out of order.

- Using buttons **+ / -** select the desired memory location (PID 1…9).
- Use ◄ / ► to position the cursor under the digit of PID to be set.
- Press **+ / -** to set the respective digit of the PID needed. To delete a stored PID, overwrite it by "0000".

Press the **MODE** button to return to "Input settings" - "**INPUT**" main menu.

2.3.6 Option settings

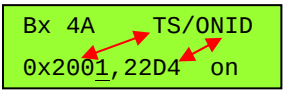


Press the **MODE** button again to activate "Options" menu.

In this menu you select the channel strip for which you would like to do the option settings in the related submenus.

- In order to skip the "Option settings", press button **MODE**.
- Using the buttons **+ / -** select the desired channel strip **A**, **B**, **C** or **D**. Press button ► in order to access to all "Options" submenus:

2.3.6.1 TSID and ONID



If the services of a transponder are split into the transport streams of several channel strips, a new identification must be allocated to the further transport streams to realise the channel search of the settop boxes connected without mistakes.

TSID has a value in the range 0001 – FFFF. It must be different for each equipment on the installation.

ONID must be set depending on the country. For example:

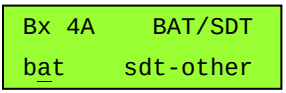
Spain: 22D4 France: 20FA Italy: 217C Portugal: 22C8 UK: 233A

- Use the ◄ / ► buttons to position the cursor under the digit of the hexadecimal number to be set.

- Press **+ / -** to set the respective digit of the hexadecimal number.
- Repeat the procedure by the quantity of the digits to be set.
- Using the ► button place the cursor under "**off**" and switch "**on**" the transmitter identification using the **+ / -** buttons.

Press the **MODE** button to activate "BAT/SDT-OTHER" submenu.

2.3.6.2 BAT/SDT-Other tables



In this menu you can switch on resp. off the BAT and SDT-OTHER tables.

BAT (Bouquet Association Table)

Information in the data stream about the affiliation of service packets to a specific bouquet.

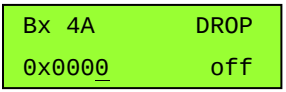
SDT-OTHER (Service Description Table – Other data stream)

Information in the data stream about service parameter of other data streams.

- Using the ◄ button place the cursor under "**bat**" and switch "on" ("**BAT**") or "off" ("**bat**") the bouquet association table using the **+ / -** buttons.
- Using the ◄ button place the cursor under "**sdt-other**" and switch "on" ("**SDT-OTHER**") or "off" ("**sdt-other**") the service description table using the **+ / -** buttons.

Press the **MODE** button to activate "Deleting a PID" submenu.

2.3.6.3 Deleting a PID

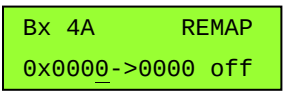


In this menu a PID of the transport stream can be deleted.

- Use the ◄ / buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be deleted ("0x0000") and set the hexadecimal number using **+ / -** .
- Use the ► button to set the cursor under "**off**" and delete the PID using the **+ / -** buttons ("**on**").

Press the **MODE** button to activate "Renaming a PID" submenu.

2.3.6.4 Renaming a PID



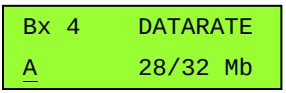
In this menu you can allocate a new address to a PID retaining the complete data content.

- Use the ◄ / ► buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be changed ("**0x0000**") and set the hexadecimal number using **+ / -.**
- Use the ◄ / ► buttons to place the cursor under the respective digit of the hexadecimal number of the new PID ("**–> 0000**").

- Set the hexadecimal number using **+** / **-**.
- Use the ► button to set the cursor to "**off**" and rename the PID using the **+** / **-** buttons.

Press the **MODE** button to return to "Output data rate" - "**DATARATE**" main menu.

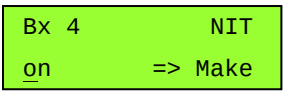
2.3.7 Output data rate



Press the **MODE** button again to activate "Output data rate" menu. This menu shows the output data rate defined using the COFDM settings and the current output data rate (Eg. 32Mb) and the current measured gross output data rate (Eg. 28Mb).

Press **MODE** button to activate the NIT table menu.

2.3.8 NIT table



NIT table (Network Information Table) can be activated in this menu.

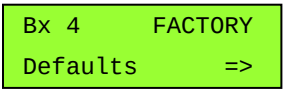
- To switch NIT "**on**" resp. "**off**" press the **+** / **-** buttons.
- Press the ► button to activate NIT ("**Make**").

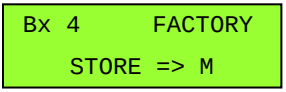
Press the **MODE** button to activate the FACTORY defaults menu.

2.3.9 Factory reset

In this menu you can reset all settings to the factory defaults.

- Press the ► button.
- The factory defaults are invoked (**"FACTORY STORE"**).
- By pressing the **MODE** button, you will be returned to the menu item "Output settings" **without** invoking the factory defaults.
- By pressing the **M** button The factory defaults are saved. The display shows "STORE".





3 Technical specifications

IF SAT inputs	
Input frequency range	950 ~ 2150 MHz
Input level range	60 dBµV ~ 80 dBµV
DVB-S modes	QPSK 1/2 , 2/3 , 3/4 , 5/6 , 7/8
DVB-S2 modes	QPSK 1/2 , 3/5 , 2/3 , 3/4 , 4/5 , 5/6 , 8/9 , 9/10
	8PSK 3/5 , 2/3 , 3/4 , 5/6 , 8/9 , 9/10
	16APSK 2/3 , 3/4 , 4/5 , 5/6 , 8/9 , 9/10
	32APSK 3/4 , 4/5 , 5/6 , 8/9 , 9/10
Symbol rate DVB-S	QPSK: 1 ~ 45 MSymb/s
Symbol rate DVB-S2	QPSK: 4.5 ~ 45 MSymb/s
	8PSK: 4.5 ~ 45 MSymb/s
	16APSK: 4,5 ~ 39 MSymb/s
	32APSK: 4,5 ~ 32 MSymb/s
ASI input	
Standard	DIN EN 50083-9
Format	MPEG ISO IEC 13818-1
Maximum data rate	108 Mbit/s
Level (input / output)	800 mVPP ± 10%
Return loss (input)	> 17 dB (5 … 270 MHz)
COFDM modulator	
Signal processing	DIN EN 300744
Transmission mode	2k
Modulation type	QPSK, 16 QAM, 64 QAM
Code rates	1/2, 2/3, 3/4, 5/6, 7/8
Guard intervals	1/4, 1/8, 1/16, 1/32
RF output	
Frequency range	42 ~ 860 MHz
Output channels	C5 – C12, C21 – C69
Otput level	101 dBµV
MER	> 35 dB
Output impedance	75 Ω

Connections	
SAT inputs	2 F connectors
ASI input	1 BNC connectors
RF output	1 IEC connectors
10-pin connector strip	For supply voltages and control circuits
RS-232 socket	Serial interface for software update
Common Interface	2 slots
Remote maintenance	
Remote control	Through SW 800
Remote upgrading	Yes

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