BLANKOM®

Professional Headend Solutions

Device manual

ENCODER/ MULTIPLEXER

SDI/ A/V → ASI(TS) & IP(TS)
HDMI → ASI(TS) & IP(TS)

EMA 308/ 407/ 408
EMA 508/ 608/ 708
Part N°: 917x.xx

...Setting Signals

Contents

1. Installing and operating instructions

1.1 Safety instructions

- When assembling and commissioning the EMA and executing the settings, always follow the accompanying instructions exactly.
- The devices are not to be assembled and brought into use by anybody who is not an authorised technician.
- When components are being installed in areas where reception is important, ensure that EMC regulations are observed.
- All assembly, installation and cable connection must take place when no electricity has been connected.
- The provisions of DIN EN 50083 must be observed at all times when working with the equipment. In particular, DIN EN 60728-11 [1] regarding safety may on no account be ignored.
- The devices come under protection classification I. It is absolutely necessary, therefore, to insert the mains plug into a fused socket.
- **Warning**
  Connecting external video sources of which the mass has a different potential from that of the EMA device may cause “wow” (avoided by matching the potentials or isolating them from each other).

1.2 Contact

If there are any questions or problems, help is available from:

BLANKOM Antennentechnik GmbH
Hermann-Petersilge-Str. 1
07422 Bad Blankenburg
Germany

Phone: +49 (0) 3 67 41 / 60-0
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Service hotline: +49 (0) 7000 / BLANKOM
+49 (0) 7000 / 252 65 66

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web: www.blankom.de

1.3 General description of functions

The EMA devices with “cascade” facility are MPEG encoder and transport stream multiplexer. With them the user‘s own digital program “bouquets“ in the DVB transport stream format can be produced. The output signals are provided via an ASI transport stream interface and a separately configurable IP interface. These signals can be broadcast or fed into the cable TV network with the aid of appropriate modulators.
Depending on the application, the devices are pre-configured by hardware. Using the integrated user interface, the operating parameters be varied within wide limits.

EMA device variants:

EMA 308 9173.81 SDI/ A/V → ASI-TS & IP-TS (MPEG-2 SD), 85 ... 264 V~, 110...370 V– input
EMA 308 9173.82 SDI/ A/V → ASI-TS & IP-TS (MPEG-2 SD), 36...75 V– input

EMA 407 9174.71 ASI-TS (H.264/ AVC) → ASI-TS & IP-TS (MPEG-2 SD), 85 ... 264 V~, 110...370 V– input
EMA 407 9174.72 ASI-TS (H.264/ AVC) → ASI-TS & IP-TS (MPEG-2 SD), 36...75 V– input

EMA 408 9174.81 SDI/ ASI-TS (MPEG-2) → ASI-TS & IP-TS (H.264/ AVC SD/ HD),
A/V → ASI-TS & IP-TS (H.264/ AVC SD), 85 ... 264 V~, 110...370 V– input *
EMA 408 9174.82 SDI/ ASI-TS (MPEG-2) → ASI-TS & IP-TS (H.264/ AVC SD/ HD),
A/V → ASI-TS & IP-TS (H.264/ AVC SD), 36...75 V– input *

EMA 508 9175.81 SDI/ ASI-TS (MPEG-2)/ HDMI ** → ASI-TS & IP-TS (H.264/ AVC SD/ HD), AC3, 85 ... 264 V~, 110...370 V– input
EMA 508 9175.82 SDI/ ASI-TS (MPEG-2)/ HDMI ** → ASI-TS & IP-TS (H.264/ AVC SD/ HD), AC3, 36...75 V– input

EMA 608 9176.81 SDI/ ASI-TS (MPEG-2) → ASI-TS & IP-TS (H.264/ AVC SD/ HD), AC3, 85 ... 264 V~, 110...370 V– input
EMA 608 9176.82 SDI/ ASI-TS (MPEG-2) → ASI-TS & IP-TS (H.264/ AVC SD/ HD), AC3, 36...75 V– input

EMA 708 9177.81 SDI/ ASI-TS (MPEG-2)/ HDMI ** → ASI-TS & IP-TS (H.264/ AVC SD/ HD), 85 ... 264 V~, 110...370 V– input *
EMA 708 9177.82 SDI/ ASI-TS (MPEG-2)/ HDMI ** → ASI-TS & IP-TS (H.264/ AVC SD/ HD), 36...75 V– input *

* AC3 pass through
** currently HDCP encryption is not supported

		EMA 308	EMA 407	EMA 408	EMA 508	EMA 608	EMA 708
Input channels		4	2	4	4	4	4
IN	**OUT**						
AV	ASI + IP MPEG-2 SD	√					
SDI	ASI + IP MPEG-2 SD	√					
ASI H.264/ AVC	ASI + IP MPEG-2 SD		√				
A/V	ASI + IP H.264/ AVC SD			√			
SDI	ASI + IP H.264/ AVC SD/ HD			√	√	√	√
ASI MPEG-2	ASI + IP H.264/ AVC SD/ HD			√	√	√	√
HDMI*	ASI + IP H.264/ AVC SD/ HD				√		√
SDI	ASI + IP H.264/ AVC SD/ HD, AC3			AC3 pass through	√	√	AC3 pass through
HDMI*	ASI + IP H.264/ AVC SD/ HD, AC3				√		AC3 pass through

Table 1: Device versions

* currently HDCP encryption is not supported

Up to four input signals are encoded at each device and inserted into the output transport stream. The output signal is a DVB transport stream as per ISO13818-1 [5] at a maximum data rate of 214 Mbps and is transmitted via the ASI interface. It can be sent either to a cascaded EMA or to a downstream modulator. By cascading EMA devices (up to 8), a transport stream with up to 32 services can be produced or these services can be added to an incoming transport stream.
The EMA ASI input port copes with a transport stream signal at a maximum rate of 214 Mbps. With adequate transmission rate on the part of the external transport stream, the internal encoded A/V signals can be embedded in accordance with the DVB standard using the multiplexer integrated into the EMA device.
The output signal contains all the tables necessary to the program and associated services (PAT, PMT and SDT). A NIT will be generated but will not contain any network-specific information. A downstream modulator is responsible for the necessary adaptation of the NIT.

1.4 Multiplexer/ Re-multiplexer/ PID filter

A multiplexer has been integrated into the EMA device for processing the incoming transport stream. On condition that in this transport stream (requiring forwarding) an adequate transmission rate is available, or additional transport volume is achievable by raising the transport stream bit rate, new services and/ or program components can be added.
Depending on the configuration of the 4 input interfaces, the analogue or digital A/V signals (SDI) will be converted into DVB data and pooled to a standard DVB signal or added to the DVB transport stream being forwarded.
The parameters necessary for the input interfaces and the transport stream parameters have been pre-set at the factory (see section 3.2).
See section 3.3.4 for details of how EMA cascade systems using multiple devices are brought into use and how the transport stream can be manipulated from the HTML user interface.

2. Explanation of the functional elements

2.1 Front view

Fig. 1: Front view - in this case: EMA 408

POWER (green)

LED on	Device switched on

System (green)

LED on	Internal system components are ready for operation.
LED flashing	Wrong parameter is chosen/ configuration error is recognised.
LED off	Internal fault

INPUT VIDEO A, B, C, D (yellow)

LED off	Input port is deactivated.
LED flashing	No standard video signal is recognised at the input port.
LED on	Video signal is recognised at the input port.

INPUT TS (yellow)

LED off	Input port is deactivated.
LED flashing	ASI signal isn't recognised at the input port.
LED on	ASI signal is recognised at the input port.

Stream port

IP stream port	RJ45, Ethernet 10/ 100/ 1000, UDP/ RTP

2.2 Rear view

Fig. 2a: Rear view of the devices EMA 308, 407, 408, 608

Fig. 2b: Rear view of the devices EMA 508, 708

2.2.1 Input and output ports

VIDEO A, B, C, D	Video input port, FBAS/ SDI (configurable)
AUDIO A, B, C, D	Audio input port, analogue, SPDIF*
ASI IN	DVB transport stream input port
ASI OUT	DVB transport stream output port
NET	Ethernet interface, network connection point (device control, etc.)
RS232	Serial connection (firmware update, restoration of delivery status)
FACTORY SET	Resetting to delivery status (see section 3.4.5)

* SPDIF: input of a digital audio signal; only available, if there are H.264/ AVC encoder modules (EMA 407/ EMA 408)

2.2.2 Pole allocation of the audio sockets (EMA 308, 407, 408, 608)

The audio input ports are symmetrical. If they are used asymmetrically, pin 1 and 3 must be allocated as signal lines and pin 4, 5 and 2 as return lines (shielding/ ground).

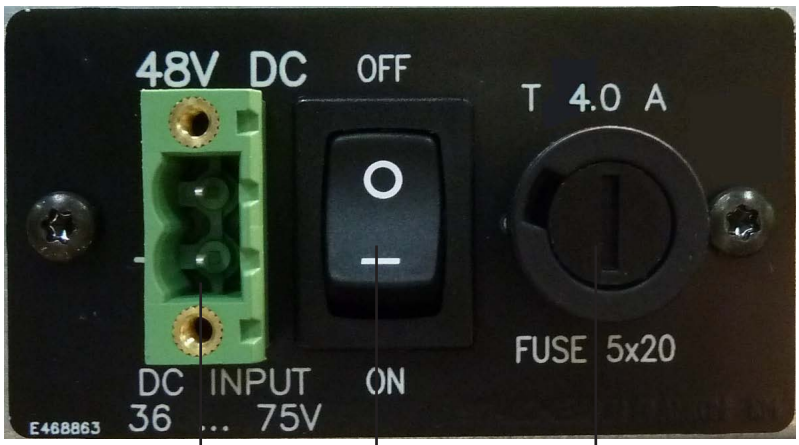
Operating mode/ Functionality			Pin	Pin 8 = ground SPDIF	Pin	Operating mode/ Functionality		
mono	dual	stereo	7 (n.c.)	7 8 6	6 (SPDIF)*	stereo	dual	mono
not in use	channel B	right channel	3 (+)	3 1	1 (+)	left channel	channel A	signal
			5 (-)	5 2 4	4 (-)			
				Pin 2 = shielding				

Fig. 3: Pole allocation, audio socket

* SPDIF: input of the digital audio signal; only available, if there are H.264/ AVC encoder modules (EMA 407/ EMA 408)

2.2.3 EMA variants with 48 V DC connection

The EMA also be offered as versions with 48 V DC connection (EMA x08: 917x.82, EMA 407: 9174.72). In these unit types make sure that the specified voltage range and polarity are observed.
The rear view of the device variants is in the power supply as follows:



3. Operating instructions

3.1 Commissioning of the EMA (EASY, without configuration)

All assembly and connection work must take place when no electricity has been connected. On no account may the safety notes (see section 1.1) be ignored.

Contact must be made for the video, audio and ASI signals at the appropriate connection points on the rear of the device using appropriate cables.

As soon as all the wiring has been done for the signal, the power supply can be connected and the device switched on. The operating status is shown by the LED's on the front panel.

Warning:
When more than one device is being used ensure that identical network parameters have been set in all of them as the delivery status. The setting up and configuration of multiple devices within a network has to be done **step by step** (see section 3.3.1).

3.2 Basic settings on delivery (Factory settings)

When delivered EMA devices are optimal preconfigured according to the hardware assembly and the main use case. At the ASI output port a transport stream is produced with a bit rate of 38 Mbps into which the data of the input signals will be included. The "ASI Main Input" is not activated.
The delivery status can always be made by "Factory setting" (see section 3.4.5). All program details and transport stream information are neutral and can be adapted to match the requirements of the cable network operator.

To change the configuration, the HTML user interface is provided via the Ethernet interface (see section 3.3). The adjustments of the installed encoder cards are set to the respective encoder mode automatically. The basic settings of the EMA devices are shown in the following table:

EMA 308		**EMA 407**		**EMA 408/ 508/ 608/ 708**	
IP address:	192.168.2.86	IP address:	192.168.2.86	IP address:	192.168.2.86
IP netmask:	255.255.255.0	IP netmask:	255.255.255.0	IP netmask:	255.255.255.0
IP gateway:	0.0.0.0	IP gateway:	0.0.0.0	IP gateway:	0.0.0.0
SNMP trap (IP):	0.0.0.0	SNMP trap (IP):	0.0.0.0	SNMP trap (IP):	0.0.0.0
Login password:	neu	Login password:	neu	Login password:	neu
		For the operating mode transcoder from H.264/ AVC to MPEG-2 SD the following is to be set:			
General Selections:		**General Selections:**		**General Selections:**	
PSI mode:	DVB	PSI mode:	DVB	PSI mode:	DVB
ASI main input:	OFF	ASI main input:	OFF	ASI main input:	OFF
(Hardware slot A..D:	MPEG-2)	(Hardware Slot A+C:	H.264/ AVC)	(Hardware slot A..D:	H.264/ AVC)
Slot operating mode:	SDI emb. audio	(Hardware slot B+D:	MPEG-2)	Slot A..D op. mode:	SDI emb. audio
Mapped channel:	OFF	Slot A+C op. mode:	decoder	Mapped channel:	OFF
IP out streaming:	OFF	Slot B+D op. mode:	intern	IP out streaming:	OFF
		Mapped channel:	OFF		
		IP out streaming:	OFF		
Slot Parameter:		**Slot Parameter Slot A+C:**		**Slot Parameter:**	
Program name:	Prog-A..D	Video system:	PAL/ SECAM (50Hz)	Program name:	Prog-A..D
Program language:	deu	Video format:	625/ 525	Program language:	deu
Video system:	PAL/ SECAM (50Hz)	TS input:	Slot Input	Video system:	PAL/ SECAM (50Hz)
System bit rate:	6000 kbps	Input service ID:	0x ..... (Auswahl)	Video format:	625/ 525
Audio bit rate:	320 kbps	Input format:	HD 1080i	System bit rate:	6000 kbps
Audio mode:	stereo	**Slot Parameter Slot B+D**		Audio bit rate:	320 kbps
Video format:	4:3	Program name:	Prog-B (D)	Audio mode:	stereo
Audio channel pair:	1+2	Program language:	deu	Audio channel pair:	1+2
Audio volume:	0 dB	Video system:	PAL/ SECAM (50Hz)	Audio volume:	0 dB
Cable equalizer:	OFF	System bit rate:	6000 kbps	Cable equalizer:	OFF
TTX processing:	Video-IN	Audio bit rate:	320 kbps	TTX processing:	Video-IN
VPS, WSS, CC:	OFF	Audio mode:	stereo		
		Video format:	16:9		

EMA 308		EMA 407		EMA 408/ 508/ 608/ 708	
Channel Mux:		**Channel Mux:**		**Channel Mux:**	
ASI output mode:	continous	ASI output mode:	continous	ASI output mode:	continous
Bytes per packet:	188	Bytes per packet:	188	Bytes per packet:	188
TS out bit rate:	38000 kbps	TS out bit rate:	38000 kbps	TS out bit rate:	38000 kbps
TS ID:	XXXXX (device nº.)	TS ID:	XXXXX (device nº.)	TS ID:	XXXXX (device nº.)
Provider name:	Provider	Provider name:	Provider	Provider name:	Provider
Network ID:	100	Network ID:	100	Network ID:	100
Original network ID:	1	Original network ID:	1	Original network ID:	1
Create TDT/ TOT:	ON	Create TDT/ TOT:	ON	Create TDT/ TOT:	ON
Create NIT:	dummy	Create NIT:	dummy	Create NIT:	dummy
Cascade number:	1	Cascade number:	1	Cascade number:	1
Device within cascade:	1	Device within cascade:	1	Device within cascade:	1
Table extension:	OFF	Table extension:	OFF	Table extension:	OFF

Table 2: Basic settings

3.3 Configurations via the Ethernet interface

If it is necessary to change the basic configuration or to create a cascade of more than one EMA device to create a DVB transport stream (see Fig. 20), the particular HTML user interface must be called up on a computer connected to the device(s). All the settings can be made via Internet browser. How the user interface works is almost self-explanatory. Any special features of use will be explained in the following chapters.

3.3.1 Network connection to the computer

System requirements:

- PC/ laptop with an Ethernet interface 10/ 100 Mbps
- Internet browser (such as Windows Internet Explorer, Mozilla Firefox or similar)

Making the connections:

The PC and the EMA device must be connected to the network using an Ethernet cable. If the EMA device is connected directly to the PC, a cross-link Ethernet cable must be used. To establish the connection, the IP addresses of the devices must first be matched up.

That of the EMA device is **192.168.2.86** on delivery. The address of the network connection in the PC must be adapted to the IP address of the EMA (subnet mask: 255.255.255.0, IP address: 192.168.2.XXX). Do not let XXX be exactly the same as the IP address of the EMA device.
When cascades are being configured initially, it is necessary to ensure that there is always only one EMA device connected to the network, as the IP addresses of all the devices are identical on delivery. Once the IP addresses have been individualised, all the devices can be connected to the network.

Connection setup:

When the IP address for the device has been entered into the address field of the browser, a connection will be made to the relevant device and the appropriate log-in window will be displayed:

Fig. 4: Log-in window

As **"serial number"** a 5-digit serial number of the device is entered. This number can be found on the rear of the device.

Access to the configuration menu is password protected. On delivery, the **password** is: **neu**.

Please note:

If the password or the IP address are unknown or have been forgotten, pressing the "FACTORY SET" key on the rear of the device will return the details to what they were on delivery (see section 3.4.5).
The device will then have access and basic settings as described above. Any setting which has already been individualised, will, of course, be lost.

3.3.2 Configuration menu (HTML page)

The configuration menu will appear on successful log-in. It is divided into the two following sections:

1. **Status information and help functions**
   Change Passwort, Help, Factory setting, Set Date & Time and Status xxx (if enabled)

2. **Configuration**
   Ethernet Interface, General Selection

Please note:
If any changes made to the configuration in the section "General Selection", these changes are to be saved in the device to unlock the corresponding configuration options. To do this, the button "Save to Device" is to be pressed.

3.3.2.1 Status information/ help functions

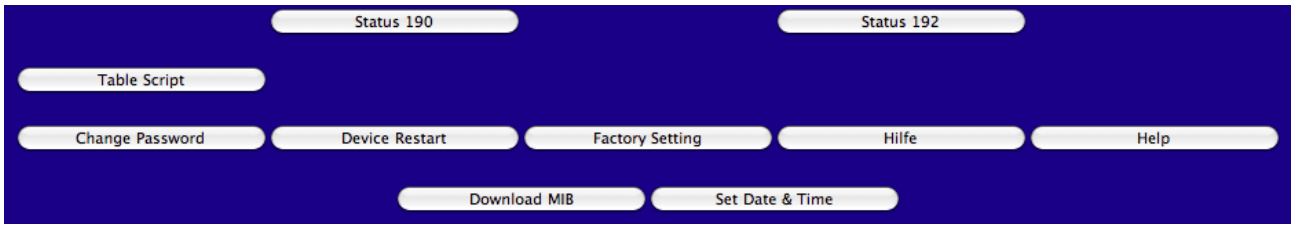


Fig. 5: Web interface, status information/ help functions

Status :
Technical informations und status indication for service und remote maintenance, e.g. 190: bit rate overview, 192: service tables.

Change Password:
The password for the configuration access is a maximum of eight characters; allowed characters: Letters in uppercase and lowercase letters and numbers (no special characters, no umlauts).

Factory setting:
All parameters are set to the values of the factory default. The process takes about 10 seconds. During this time no transport stream signal is available. In this function, the set IP address is **not** reset to factory default. **Please note:** "Factory setting" by pressing on the button of the rear side of the device resets the IP address to 192.168.2.86 and the password to "neu".

Set Date & Time:
Transfer of the PC's settings date and time on the device.

Download MIB:
All parameters of the device can be alternatively set via the "Simple Network Management Protocol"**.** The required structure file "ME.mib" (Management Information Base) for the management software is available for download here.
Note: The MIB is in accordance with the currently adjusted device configuration dynamically created and deployed on the device. That means, if in "General Selection" configuration changes must be made and stored, the new MIB has to be loaded for further SNMP configuration.

Table Extention:
Calling a script command (expert mode) for programming of special configurations. The activation of the function is carried out under the "Channel MUX".

3.3.2.2 Settable parameters

(Anything pre-set under "Factory Setting" will be underlined in the display.)

3.3.2.2.1 Ethernet interface (control port)

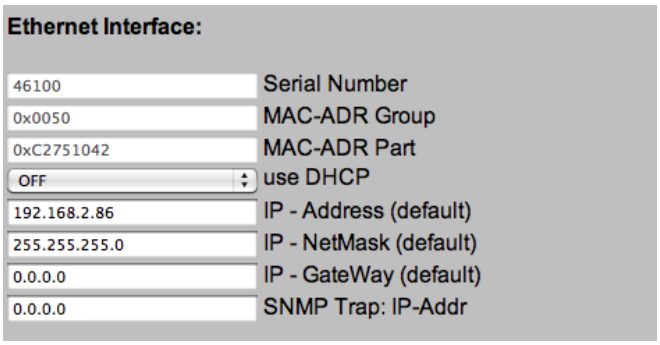


Fig. 6: Settings for the Ethernet network interface

use DHCP: [ON/ OFF]
Allocation of IP address, default : 192.168.2.86
"ON"
One-time at the start an IP address via a DHCP server is requested. If the probe fails, will use the default IP address.

"OFF"
The default IP address is used.

IP-Address: [0.0.0.0 ... 192.168.2.86 ... 255.255.255.255]
A default IP address for the case that "use DHCP" is set to "OFF", or no DHCP server could be reached.

IP-Subnetmask: [0.0.0.0 ... 255.255.255.0 ... 255.255.255.255]
The mask corresponding to the IP address.

IP-Gateway: [0.0.0.0 .. 255.255.255.255] An IP address for a possibly used gateway in the network. The definition of a gateway address is only required if the device is to send SNMP traps to a server that is only accessible via a gateway.

SNMP Trap IP-Addr: [0.0.0.0 .. 255.255.255.255] IP address to a possilble used SNMP trap manager.
Important device functions are constantly monitored and possibly forwarded as an SNMP trap to a superior manager. Depending on the hardware fitting the following system messages are sent:

ENCODER	**ASI-IN**	**Device**
EncA no input	ASI-IN overrun	Fan OFF
EncA error	Encoder TS overrun	Fan ON
EncB no input	ASI-In no input	Device has started
EncB error	ASI-In error	Reload Parameter
EncC no input		Default error
EncC error		
EncD no input		
EncD error		

3.3.2.2.2 General selection

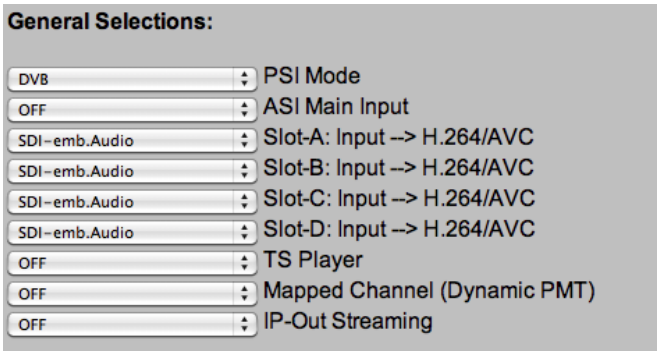


Fig. 7: Standard operating mode (EMA 408 , 508, 608, 708)

Setting the operating mode is based on the equipped hardware. Changes in this section need to be saved ("Save to Device") to adapt the relevant configuration entries in the following sections and provide for input.

PSI Mode: [DVB/ ATSC]
Multiplexer mode according to the national transmission standard

ASI Main Input: [OFF/ Loop → ASI-Out/ Mux with Intern/ Flt-DROP & MUX]
"OFF"
Input deactivated;

"Loop → ASI-Out"
Loop-through of the signal ASI-IN → ASI-Out;

"Mux with Intern"
All services of the TS at the ASI input can be multiplexed with the internally generated services to a common TS.

„Flt-DROP & MUX"
Selected services of the TS at the ASI input can be multiplexed with the internally generated services to a common TS. The selection of the filtered out services must be made in this mode by the function call "Drop Services" in the header of the configuration.
Warning: If there are overlaps of the PID/ SID the relevant services of the TS from ASI-IN will be deleted..

Slot A..D (Encoder moduls):[OFF/ CVBS/ SDI, emb. Audio/ SDI, anal. Audio/ [ASI-TS]/ [CVBS-SPDIF]/ [SDI-SPDIF]/ Intern/ Transcoder / Decoder]
The hardware configuration is automatically detected. The purpose of their possible modes are provided.
"OFF"
Module deactiviated.

"CVBS" **(available in EMA 308, 408, 608)**
The input signal is an analogue A/V signal (SD).

"SDI embedded Audio"
The input signal is a serial digital video signal (MPEG-2 only SD-SDI) with integrated audio (AES-EBU, 48kHz), teletext (WST/ PAL) is possible.

"SDI analog Audio" **(available in EMA 308, 407, 408, 608)**
Input signal SDI with possible teletext and analogue audio input.
[ASI-TS], [CVBS-SPDIF], [SDI-SPDIF] (option with restrictions): **(available in EMA 308, 408, 608)**
"CVBS-SPDIF"/ "SDI-SPDIF"
Processing of the CVBS/ SDI video signals with digital (SPDIF) audio signal (PCM).

"Intern" **(available in EMA 407)**
Internal input of the MPEG-2 encoder is enabled (transcoder mode H.264/ AVC → MPEG-2).

„CVBS-SPDIF, SDI-SPDIF" **(available in EMA 308, 408, 608)**
Processing of the CVBS/ SDI video signals with digital (SPDIF) audio signal (PCM/ AC3)

"Transcoder" * **(available in EMA 408, 508, 608, 708)**
Input signal is TS with a selected MPEG-2 service.

"Decoder" * **(available in EMA 407)**
Input signal is TS with a selected H.264/ AVC service (configuration of the TS feeding, see below.: parameter "Slot-A .. D")

* special operation, see section 3.3.3 Transcoder operating mode

TS Player (Option): [OFF/ Play from HDD]
If a hard disk player is integrated, the feature can be activated with "Play from HDD" .

Mapped Channel (Dynamic PMT): [OFF/ ON]
"ON"
Allows a PMT (Program Map Table) influence in connection with option TS player, for example for switching transmission windows in existing programs.

IP-Out Streaming: [OFF/ Simple UDP (rear) / RTP/UDP (front)]
"OFF"
deactivated

"Simple UDP"
Multiprogram streaming via control port (rear of the device) up to 20 Mbps without service selection.

"RTP/ UDP"
Stream function via separate stream port (front panel), 16 configurable channels. Configuration under "IP-Out Stream Interface" (see chapter 3.3.2.2.8)

3.3.2.2.3 ASI main input

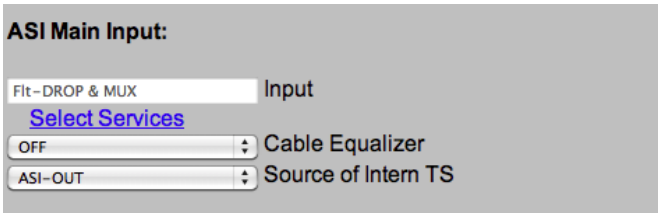


Fig. 8: Adaptation of the ASI input (with service mode filter)

Select Services:
Link to call the "drop-list" for the suppression of services from MAIN ASI-IN (activation of the function of "General Selection, ASI Main Input" selection:"Flt-DROP & MUX", see chapter 3.3.2.2.2).
Filter function for the activated input transport stream (TS-IN) to remove unwanted services (programs). The function is only available when in the "General Selection" in the field "ASI Main Input" the mode "Flt-DROP & MUX" is selected and with "Send" is enabled. Provided is a table of all present services (programs) at the input. The selected services will be removed from the transport stream.

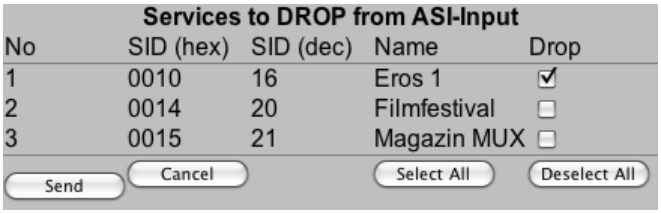


Fig. 9: Open drop-table. All present services at the ASI-IN are displayed. The marked services in the column "Drop" are not forwarded.

Cable Equalizer: [OFF, ON]
When using larger cable lengths to feed the signal, an equalizer can be switched on at the input.

Source of Intern TS: [Main ASI-IN/ ASI-Out]
Selection function for internal signal feed for transcoder/ decoder operation mode.

Adjustments for each encoder/ input (A..D)

3.3.2.2.4 Slot A (Input-A) parameters

All the following setting notes apply equally to encoders B ... D.

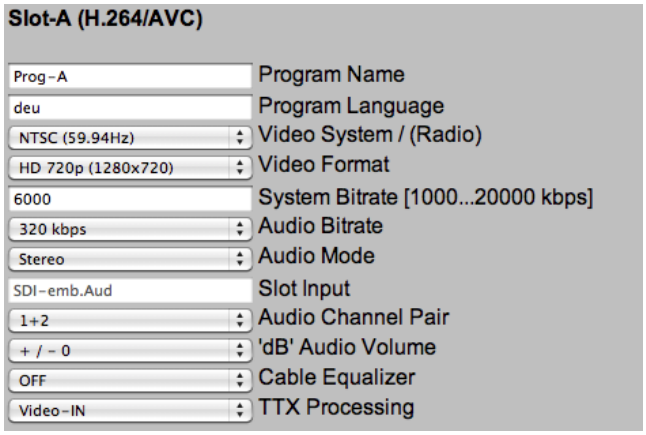


Fig. 12: Setting of encoder parameters for the individual input channels (EMA 408, SDI input signal)

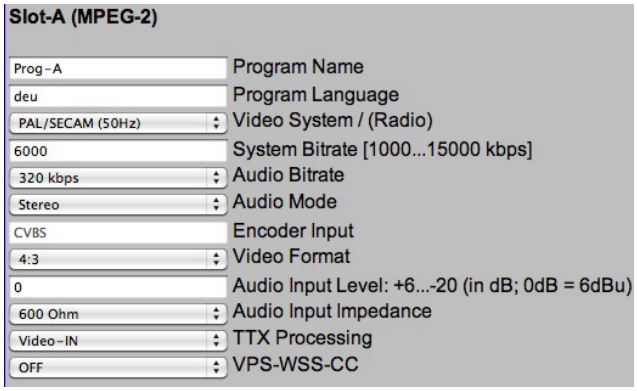


Fig. 13: Setting of encoder parameters for the individual input channels (EMA 308, analogue input signal)

Program Name:
Assignment of a name for each imported or transformed program. The program name is displayed on the terminal equipment (TV). The program name must be unique and may appear only once in a cascade of encoders. The maximum length is 16 characters.

Program Language: [deu, eng, ...]
Identifies the language for the audio data stream and teletext. It should be designated as per ISO 639-2 [4].

Video System: [PAL/ SECAM (50 Hz), NTSC (60 Hz), OFF (Digital Radio), OFF (Audio Channel)]
Sets the type of the input video signal. The following signal types are processed: at 50 Hz/ 25 fps - PAL (B, D, G, H, I, N, Nc) and SECAM; at 60 Hz/ 30 fps - NTSC (J, M, 4.43) and PAL (M, 60). In the “OFF-Radio” setting, the video signal is ignored and a digital radio channel is generated. With the “Table Extension“ this can be assigned to other encoders as an additional audio channel.

Video Format (MPEG-2): [4:3, 16:9, use WSS]
This is how the means of interpreting the video input signal for the MPEG header is established. In respect of “use WSS“, only the “16:9 Fullformat“ is evaluated. Anything else will be transmitted as 4:3. Condition: VPS-WSS = WSS or VPS+WSS

System Bitrate: [1000..6000..15000 kbps]
Here the bandwidth is established for audio, video and table data in the relevant encoder (slot). The value is only an upper limit. The bit rate actually generated will be slightly slower and will not be absolutely constant.

Audio Bitrate: [64..320..384 kbps] This determines the audio data bit rate. It is an element of the system bit rate.

Audio Mode: [Stereo/ Joint Stereo/ Dual Channel/ Mono/ use VPS]
Here the type of audio data is identified.
“use VPS“
here the identification transferred within the VPS signal is taken over into the MPEG data stream as audio header.

Video Format (H.264/ AVC): [SD 625/525/ HD 720p (1280x720), HD 1080i (1920x1080)]
The chosen configuration must reflect the actual parameters of the encoder input signal.

Audio Typ: [PCM-->MP-2, PCM-->AC3, AC3 pass through]
„PCM-->MP-2“:
Sound signal is changed in MPEG-1, Layer 2 format (DVB standard)

„PCM-->AC3“:
Sound signal is changed in AC3 format **(available in EMA 508, 608)**

„AC3 pass through“:
An AC3 sound signal existing in input signal is adopted into the output signal. **(available in EMA 408, 508, 608, 708)**

Audio Channel Pair (SDI): [1/2 .. 15/16]
When SDI with embedded audio is being transmitted, it can be selected an audio signal pair for the processing.

‚dB‘ Audio Volume (SDI): [-6..0..6]
Decrease or increase the audio level.

Audio Input Impedance (analogue):
Input impedance switch: 600 ohms/ 10 kohms

Audio Input Level (analogue):
Adaption of the audio level at the input.

TTX Processing: [OFF, Video IN, Intern (ViTex)]
"OFF"
Feature deactivated.

"Video IN"
The teletext of the video input signal is converted to DVB compliant data packets and is transmitted in the TS.

"Intern"
With special additional software (Vitex), a separate teletext can be generated (functionality only available for SD video signals).

VPS-WSS-CC: [OFF/ VPS/ WSS/ VPS+WSS/ Closed Captions]
VPS and/ or WSS lines of the video input signal are converted to DVB compliant data packets and transmitted in the transport stream. For NTSC input signals "Closed Captioning" can be processed (functionality only available for SD video signals).

3.3.2.2.5 Additional data → MUX

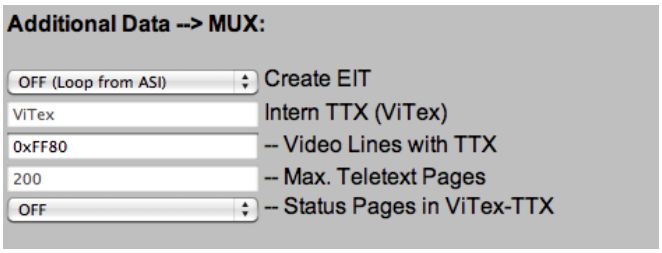


Fig. 12: Parameter settings "Additional Data → MUX"

Create EIT: [OFF (Loop from ASI)/ ON (own EIT only)/ ON (p/f only)/ ON-Line-p/f]
"OFF"
EIT forwarding from Main ASI-IN

"ON"
Options only in connection with TS-player or with additional software.

Video Lines with TTX: [0xFF87]
The lines used for the video text carousel being internally administered can be determined here in the vertical blanking interval (VBI) of the video signal, the areas from line 7 to 22. The setting is bit by bit: "1" means "use", "0" means "don't use". The entries are hexadecimal; line 7 is equivalent to 0x8000, line 22 to 0x0001.

The standard line use is equivalent to the setting 0xFF87:

TV line	7 320	8 321	9 322	10 323	11 324	12 325	13 326	14 327	15 328	16 329	17 330	18 331	19 332	20 333	21 334	22 335
Binary	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1
Hexadecimal, 0x ...	F				F				8				7			

Table 3: configuration of the line use for teletext

Notes:

Lines 16 to 19 and 329 to 332 usually exclude teletext (kept as test lines). "0x" as a prefix indicates hexadecimal figures. A calculator can be used for the calculation of the hex figure, for instance the calculator in Windows. For the [Bin] element, the binary values 0 and 1 are entered in the desired order. When the display is switched over to hexadecimal [Hex], the hexadecimal result will appear.

Status Pages in ViTex-TTX: [ON(19x), OFF]
If the device is being used to manage its own videotext, status pages will be transmitted for service purposes, giving current system states and messages, using pages 190 … 199. When the setting is "OFF", all the status pages are suppressed. This page range is available for conventional teletext tasks.

3.3.2.2.6 Channel MUX (settings for the transport stream)

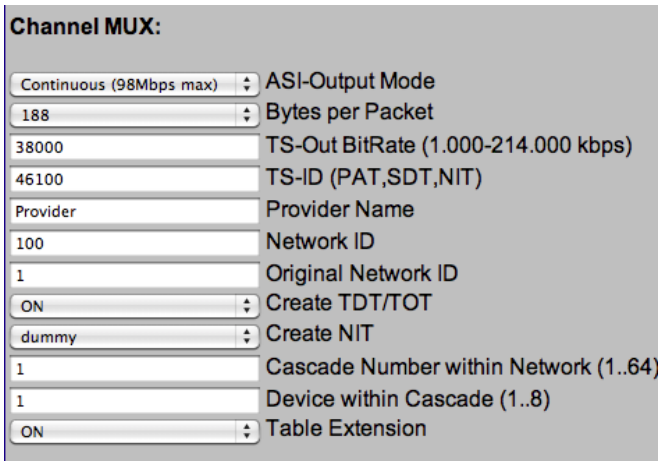


Fig. 13: Parameter settings for the transport stream configuration

ASI Output Mode: [Continuous/ Burst]
"Continuous Mode"
All the bytes in the output stream have a fixed temporal distance from each other. The maximum data rate in this mode is 98 Mbps.

"Burst Mode"
All bytes of a packet are sent without a space, as a burst (27 MHz). The bit rate is enforced by the spacing of the packets from each other. A maximum of 214 Mbps is possible here.

„Loop IN → OUT":
The input signal is connected directly to the output.

Note: When the IP output is activated, only continuous mode up to 98 Mbps is possible.

Bytes per Packet: [188/ 204]
For the TS-Out 188 or 204 bytes per packet can be selected (mode „Loop IN → OUT" always 188).

TS OUT Bitrate: [1000..38000..214000]
The output bit rate can amount to 1,000 .. 214,000 kbps.
Note: If the IP streaming mode **"Simple UDP (rear) - Streaming via Control"** is selected ("General Selection", see 3.3.2.2.2 and 3.3.2.2.6), the TS-OUT bit rate is limited to 20,000 kbps in order not to overload the control interface.

TS-ID: [1..65535]
(Transport stream Identifier) Factory setting = device number. This is the ID of the generated transport stream in the transponder. All devices of a cascade must use the same TS ID (see 3.3.4.2).

Provider Name: [Provider]
For the formed transport stream, the "Program Provider" can assign a name. The name for any particular TS ID should be the same in all devices in a cascaded system. The length of the name is limited to 16 characters.

Create NIT: [OFF, dummy, Cable, Satellite, Terrestrial]
"OFF"
No NIT (network information table) is generated.

"dummy"
The multiplexer creates an empty NIT as place-holder (extendable with table script)

"Cable", "Satellite", "Terrestrial"
The NIT is produced with the appropriate specification but without any details of frequency.

Create TDT/ TOT: [OFF, ON]
With the help of the internal RTC (Real Time Clock) and the "Local Time Offset" the tables for time are generated here.

Network ID: [1..100..65535]
Unique identifier for the network, for instance, number of the cable network. The network ID of all transport streams generated in a network should be the same.

Original Network ID: [1..65535]
Information to identify the origin.

Cascade Number within Network: [1..64]
Cascade number: to distinguish equipment installed cascade within a transmission network. It must be the same number for all devices of a cascade and it serves to generate unique program numbers (designated by service ID), see also chapter 3.3.4.2.

Device within Cascade: [1..8]
Device number: to distinguish the installed devices within a cascade. It is used to generate unique program numbers (service ID) and PID's automatically.

Table Extension: [OFF, ON]
Extension of the device configuration via script programming (expert mode, for example to affect the automatic generated PID and SID).
"OFF"
no script processing

"ON"
Providing the function call "Table Script" in the header of the configuration. Script processing enabled.

Notes:

PID/ SID will be assigned to the configured slots (programs, channels) automatically according to a fixed system. By providing unique device numbers in a cascade as well as clear cascades numbers ensures that the values do not overlap. Are "foreign" transport streams on ASI input processed, there is the suppression of such signals by overlapping the SID/ PID values. To avoid this, the device configuration must be adapted. Where appropriate, with the option "Table Extension" an individual assignment within the unit generated PID/ SID is necessary (see table 4 in chapter 3.3.4.2).

3.3.2.2.7 System parameters

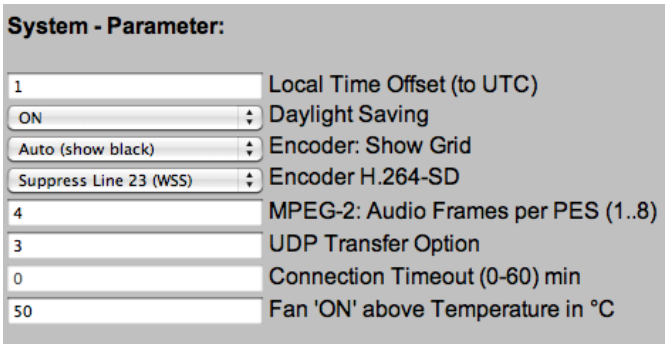


Fig. 14: System settings for real time, encoder, fan control

Local Time Offset (to UTC):
This is the difference between local time and "Coordinated Universal Time" (e.g. Germany = 1).

Daylight Saving: [ON,OFF]
"ON"
automatic daylight saving time switch

Encoder: Show Grid: [never, Auto (no input), Force (Testmode), Auto (show black)]
Encoder mode, if **SDI input signal is failure**.
"never":
never displays a test image, if signal is failure, the last valid image is frozen.

"Auto (no input)":
automatic display of a test image, if signal is failure

"Force (Test Mode)":
Test image is constrained, independently from input signal

"Auto (show black)":
automatic display of a black image if signal is failure

Encoder H.264-SD: [Show Line 23, Suppress Line 23 (WSS)]
"Show Line 23": SD-SDI signal is converted with visible WSS line 23 in H.264

"Suppress Line 23 (WSS)": line 23 is suppressed.

MPEG-2: Audio Frames per PES Block:[1..4..8]
Encoder parameter of audio block size

FAN "ON" above Temperature in °C: [0..50..100]
Switching threshold of the device fan.

3.3.2.2.8 IP streaming

Depending on the selection under "General Selection" (see also 3.3.2.2.2) different input masks are available:
Selection:

"Simple UDP (rear)" - Streaming via control port

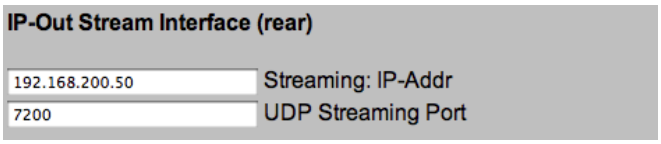


Fig. 15: Parameter settings streaming via control port

In this mode, **all the services of ASI Out TS** signal are outputed via the control port. The data rate of IP stream is thus determined directly from the TS-OUT bit rate of the system (settings see 3.3.2.2.6 Channel MUX) From the control port provided bandwidth is sufficient to output services with a total of 20 Mbps on the specified destination (IP address/ steaming port).
If this mode is selected, it is automatically limited to the output data rate (TS-OUT, see 3.3.2.2.6) of the system to a maximum of 20,000 kbps.

Note:

In order not to overload the network data, precautions for the unbundling of the data traffic to be taken by insertion of network routers and choice of stream target addresses.
Selection:

"RTP/ UDP (front)" - Streaming via stream port

Fig. 16: Parameter settings streaming via stream port

The output of the IP stream module is provided with a separate RJ45 jack on the front panel parallel to the ASI output and can be individually programmed to stream request. Is an active IP stream module available, the button for the function call is available when you select this function under the heading "IP Stream Interface".
With one click, it opens the configuration. The 16 possible logical stream channels can be defined as a
multi-program stream or **single program stream**
and can be operated according to the IP address space specified in
multicast or **unicast mode**.

Configuration:

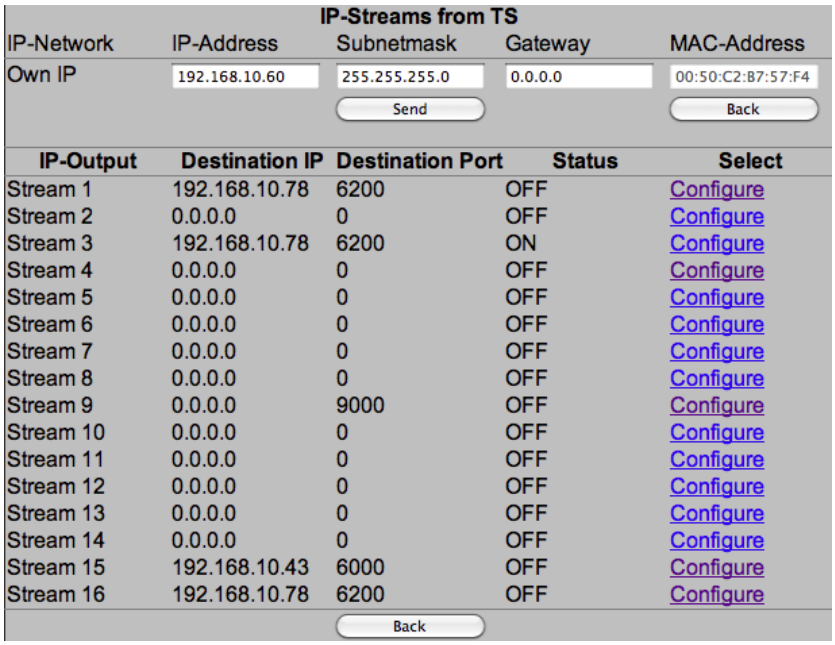


Fig. 17: Main menu of the IP stream configuration

In the first step IP address, netmask and gateway address are assigned to the ethernet interface for use in the local network and so are individualized.
About the link "Configure" the input mask for the destination device address and stream parameter is open.
The settings can be made separately for each stream channel.

Example1:

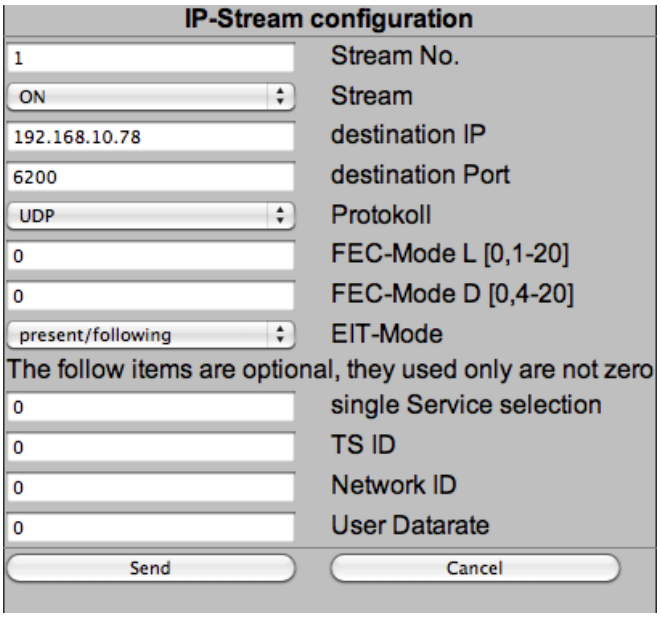


Fig. 18: IP stream configuration example 1

- stream N°=1
- stream activated
- sends to target address 192.168.10.78, port 6200
- with UDP protocol
- FEC modes on UDP without functionality
- "Present/ Following" informations are taken from the TS EIT table
- service selection=0: all in the ASI TS included services are taken over (**multi-program-transport-stream, MPTS**)
- TS ID=0: ID is not changed.
- network ID=0: ID is not changed.
- user data rate=0, TS out bit rate is adopted unchanged in the IP stream [0..65535 max]
  user data rate≠0: see 3.3.2.2.6

Example 2:

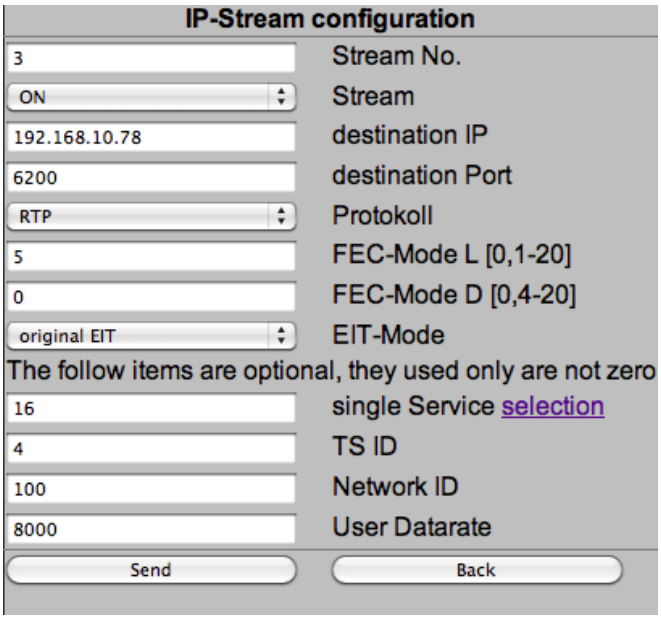


Fig. 19: IP stream configuration example 2

- stream N°=3
- stream activated
- sends to target address 192.168.10.78, port 6200 with RTP protocol
- FEC mode L=5 (communicates with the receiver of RTP protocol with error correction mode L=5. The receiver must be configured with identical settings, and must support the corresponding correction mode.)
- FEC mode D=0 (correction function is disabled)
- "original EIT" informations are taken from the TS EIT table
- single service selection=16: The in the ASI TS contained service can also be selected via the "Selection". He will broadcast exclusively on channel 3 of the IP stream (**single-program-transort-stream, SPTS**)
- TS ID=4: The TS ID is setting to 4.
- network ID=100: The network ID is set to 100.
- user data rate=8000: For the transfer of the services are provided 8000 Kbps in IP stream regardless of data content.

3.3.3 Transcoder operating modes

The in the EMA 407 and EMA 408 used H.264/ AVC encoder modules contain decoding functions for MPEG-2 (HD/ SD) signals and an encoder unit producing H.264/ AVC signals for signal processing of DVB signals. By feasible combinations of the function groups the following transcodings, each with a H.264/ AVC encoder, are possible:

MPEG-2 HD → H.264/ AVC HD
MPEG-2 HD → H.264/ AVC SD
MPEG-2 SD → H.264/ AVC SD

Note:

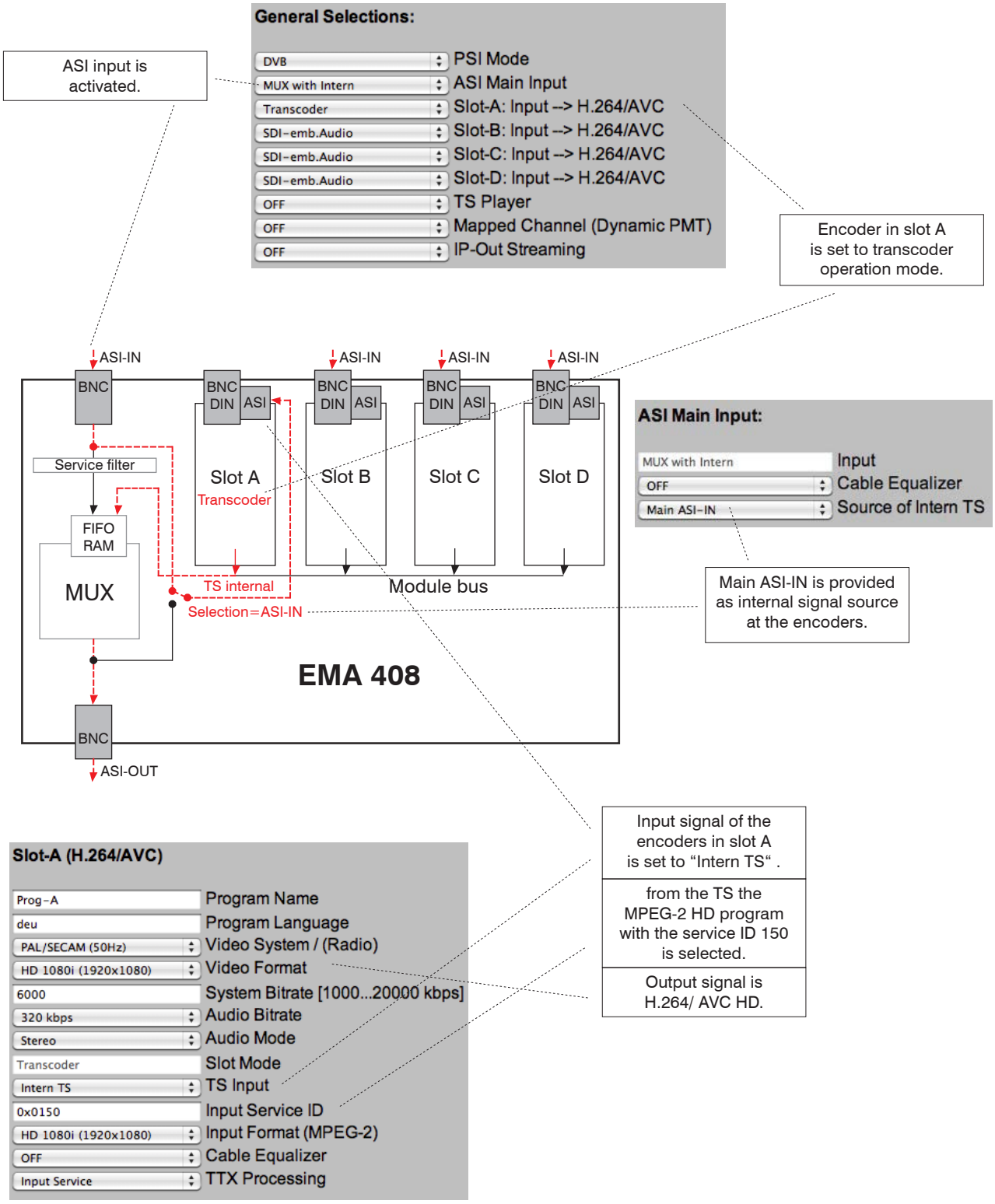
Up-Scale funktions for the generation of HDTV signals from SDTV signals **are not available!**

The signals of the demodulator functional group can be supplied via an internal bus to an MPEG-2 encoder in the adjacent slot to generate a MPEG-2 service.
In EMA 407, two such groups of modules are included that enable the following transcoder modes:

H.264/ AVC HD → MPEG-2 SD
H.264/ AVC SD → MPEG-2 SD

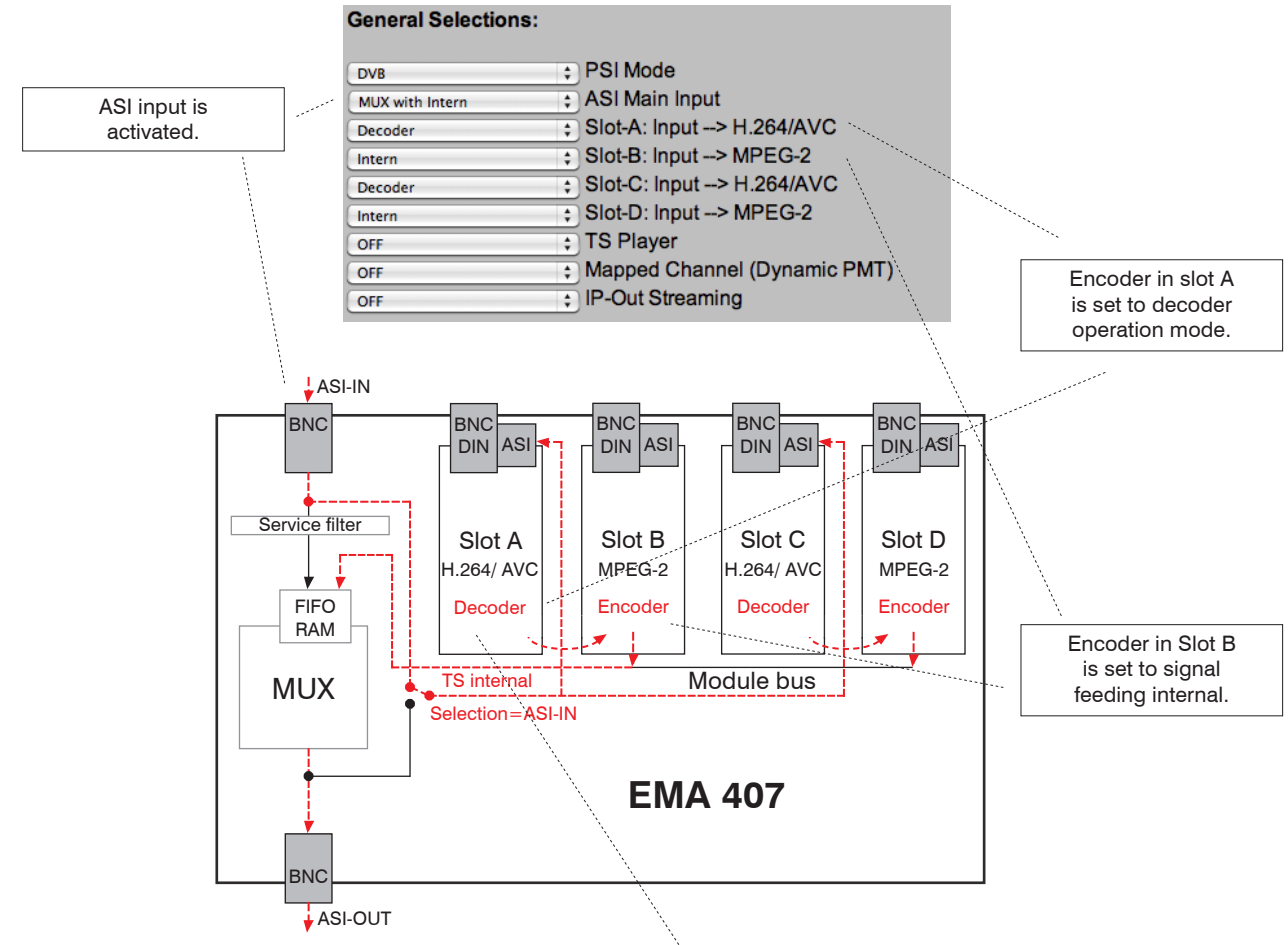
3.3.3.1 EMA 408 transcoder, MPEG-2 to H.264/ AVC

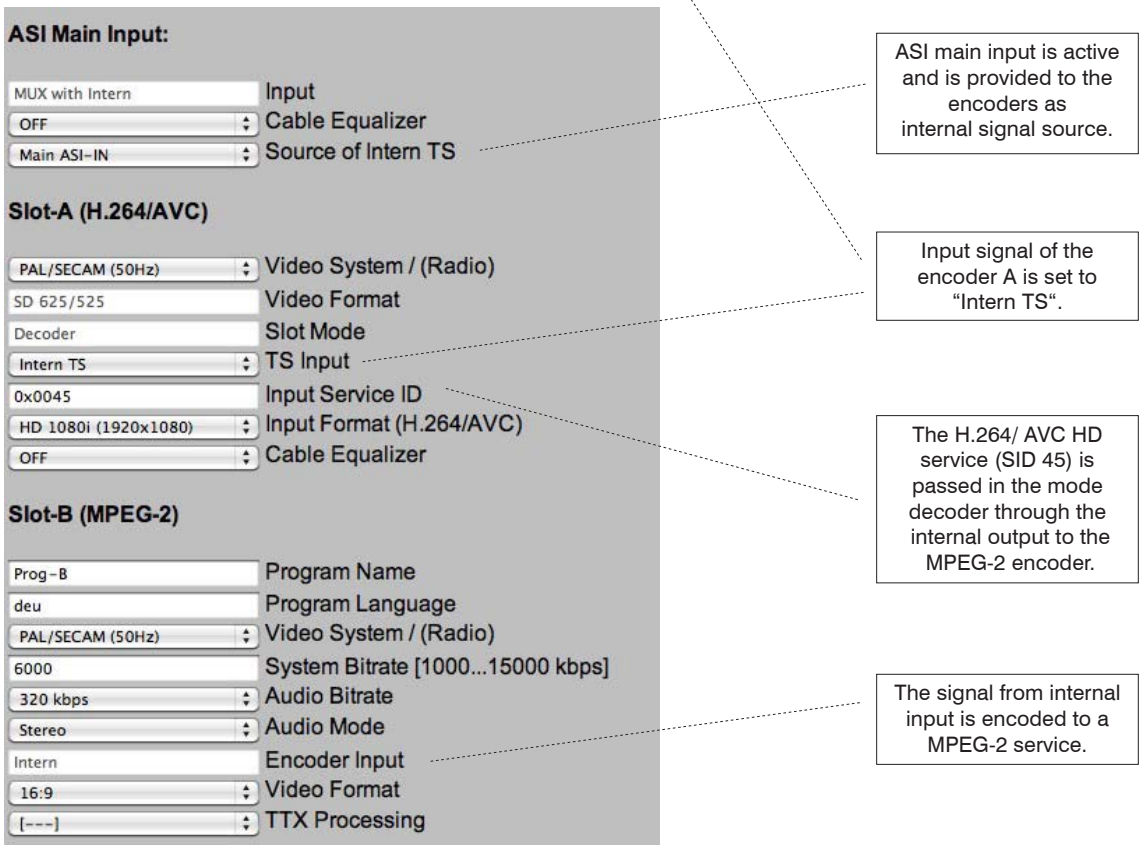
Example: A MPEG-2 service from the ASI input signal is transcoded to H.264/ AVC.



3.3.3.2 EMA 407 Transcoder, H.264/ AVC to MPEG-2

Example: A H.264/ AVC service from the ASI input signal is transcoded to MPEG-2 SD.
Maximum 2 per unit, services can be implemented in this mode.





3.3.4 Detailed configuration (for single and multiple device systems)

Depending on the task and the desired number of channels per DVB transport stream, the devices can be operated individually or in groups (cascades) of up to 8 devices.

3.3.4.1 The 1-device system

This is the configuration on delivery. Possible detailed configuration options are:

IP address	the default is 192.168.2.86
IP subnet mask	the default is 255.255.255.0
TS ID	the default is die the 5-digit serial number
Provider name	the default is “Provider“
Network ID	the default is “100“
Program name	the defaults are “Prog-A“ ... “Prog-D“
System bit rate	the default is 6,000 kbps
TS out bit rate	the default is 38,000 kbps

All the setting options can be found in section 3.3.2 or on the on-line (internet) help page. The default is 4 channels with standard figures for the system bit rate. It is possible to change these pre-set bit rates as long as the set “TS Out bit rate” is taken into consideration (see section 3.3.5).

3.3.4.2 The multiple device system (commissioning cascades)

The fact that the EMA devices can be cascaded means that multi-device systems can be created so that DVB transport streams exist for up to 32 services. Multi-device systems have to be used if more than 4 new services (this means TV programmes with their additional informations) have to be combined into a transport stream or added to one. If this is done, changes need to be made to the set parameters for all devices from the HTML pages.
Additionally signal connections ASI-OUT/ IN must be made between the devices using 75-ohms BNC cables. (see Fig. 20).

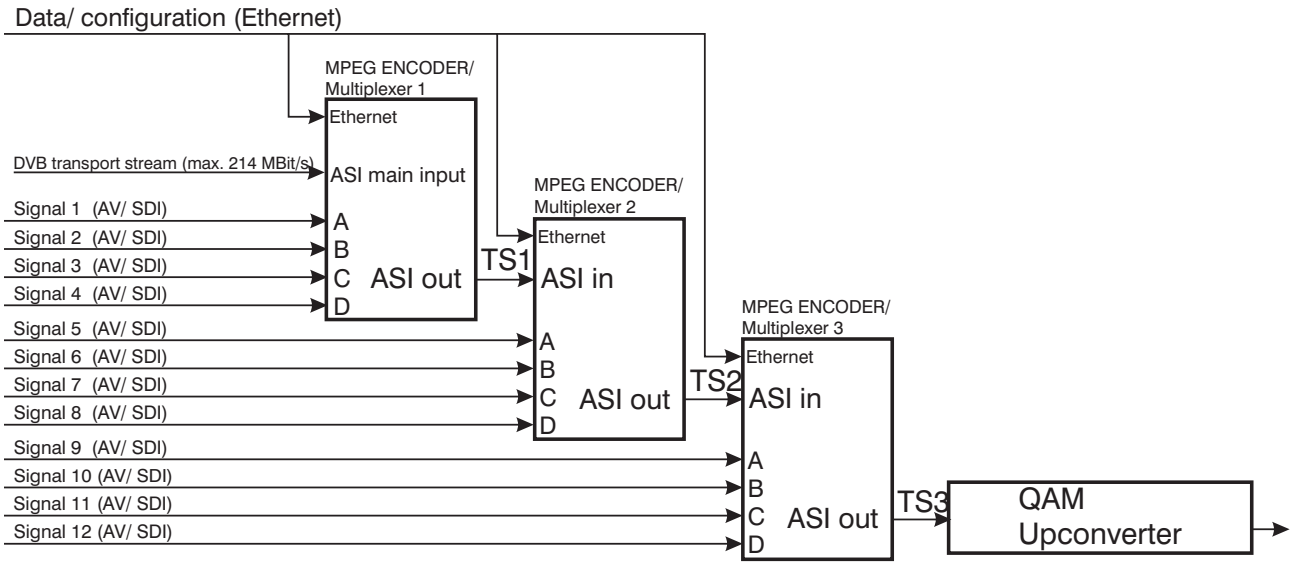


Fig. 20: Block diagram of a triple cascade (additionally with an external transport stream)

Every device is capable of adding 4 new programs (services) to the existing DVB transport stream as long as there is enough transport stream capacity or extendibility. If devices have been completely individualised in their basic settings, each new service would be added as a transponder in its own right. To ensure the newly added services belong together, it is possible to link up to 8 devices in a logical order to become a single cascade. In this way each of the newly added services is allocated to a transponder.

The following settings must be identical for every device in a cascade, in order to ensure generation of a unique transport stream:

- **Transport stream identification (TS-ID):** Unique identification of the transport stream is generated. The TS ID can be any number between 1 and 65,535. However, at the start the TS ID will be the 5-digit serial number of the EMA being initialised. In the simplest case, the TS ID of the first device should also be entered for all the devices.
  IMPORTANT! In cable networks each TS ID is allowed to appear only once. For this reason, neither the different transport streams generated by means of the (possibly cascaded) EMA devices nor the transport streams from other program providers may have the same transport stream ID. The TS IDs of transport streams already existing in the cable must be known in this context.

- **Cascade within Network:** All devices belonging to a cascade within a single network (a head end) have to be designated with the same cascade number.

- **Network ID:** This identifies the distribution network (the head end); all transport streams generated or processed in a head end are given the same network ID.

The following settings must be unique to the relevant device or will be taken account of by only one device in the cascade:

- **IP address:** The IP address of each device must be unique within the IP network.
- **Device within Cascade:** Within a cascade of a maximum of 8 devices, each device must receive a unique ID [1 … 8]. The serial order due to the ASI cabling is quite irrelevant.
- **Create NIT:** If a blank network information table is created for a device during configuration, the device configured to receive it will overwrite with the current values all NIT information contained in the transport stream. If this option is configured in more than one device, it will be the table in the last device which is functional.
- **Create TDT/ TOT:** see above.
  If TDT or TOT tables are created for a device during configuration, the device configured to receive it will overwrite with the current values all the relevant information contained in the transport stream. If this option is configured in more than one device, it will be the table in the last device which is functional.
- **Program Name:** The program name is the designation of the service taken over via the relevant interface, A to D. If more than one device is in use, the default setting for each device will automatically generate the program name "Prog A" … "Prog D". These names will show in the program tables of the reception devices. They should be unequivocal in meaning and should therefore be changed to represent the actual situation.

The information on cascades and positions which has been set in the configuration will be the basis for the distribution of the transport stream over the individual programs (or services) and of the automatic allocation of neutral program names and of A/V PIDs and service IDs in ascending order. It is possible to change the program names but not the PIDs.

Automatically allocated service ID's and PID's

Device/ Nº.	Input port	Program name	Service	PMT	Video	Audio	TTX [2]	VTX [1]
EMA .../ 1	**A**	Prog-A	0x10	0x110	0x210	0x310	0x410	0x414 [1]
	B	Prog-B	0x11	0x111	0x211	0x311	0x411	0x414 [1]
	C	Prog-C	0x12	0x112	0x212	0x312	0x412	0x414 [1]
	D	Prog-D	0x13	0x113	0x213	0x313	0x413	0x414 [1]
EMA .../ 2	**A**	Prog-A	0x20	0x120	0x220	0x320	0x420	0x424 [1]
	B	Prog-B	0x21	0x121	0x221	0x321	0x421	0x424 [1]
	C	Prog-C	0x22	0x122	0x222	0x322	0x422	0x424 [1]
	D	Prog-D	0x23	0x123	0x223	0x323	0x423	0x424 [1]
EMA .../ 3	**A**	Prog-A	0x30	0x130	0x230	0x330	0x430	0x434 [1]
	B	Prog-B	0x31	0x131	0x231	0x331	0x431	0x434 [1]
	C	Prog-C	0x32	0x132	0x232	0x332	0x432	0x434 [1]
	D	Prog-D	0x33	0x133	0x233	0x333	0x433	0x434 [1]
EMA .../ 4	**A**	Prog-A	0x40	0x140	0x240	0x340	0x440	0x444 [1]
	B	Prog-B	0x41	0x141	0x241	0x341	0x441	0x444 [1]
	C	Prog-C	0x42	0x142	0x242	0x342	0x442	0x444 [1]
	D	Prog-D	0x43	0x143	0x243	0x343	0x443	0x444 [1]
...	**...**	...	...	...	...	...	...	...
EMA .../ 8	**A**	Prog-A	0x80	0x180	0x280	0x380	0x480	0x484 [1]
	B	Prog-B	0x81	0x181	0x281	0x381	0x481	0x484 [1]
	C	Prog-C	0x82	0x182	0x282	0x382	0x482	0x484 [1]
	D	Prog-D	0x83	0x183	0x283	0x383	0x483	0x484 [1]

Table 4: Automatically allocated service IDs and PIDs

[1)] VTX: Teletext internally generated.
The EMA device has the facility that a teletext carousel can be generated for each particular device. This teletext can be allocated to one or all of the services being shown. This is an optional function and a charge is made for it.

[2)] TTX: Teletext of the external signal at the Video IN ports A … D

Note:

The SID/ PID for the slots configured (the programs and channels) is automatically allocated according to a fixed pattern. Inserting details of the device in the cascade and the number of the cascade ensures that the values will not overlap. If "outside" transport streams are being processed at the ASI input port, care must be taken to ensure that if the SID/ PIDs of any external and internal program streams overlap, the internal program streams have priority. Any "external" program streams with the same names will be blocked at a filter and not fed into the output port.

Operating several cascades within a network (a head end)

To get unique service ID's if there are several cascades in one head end, an offset is automatically added for the parameter "cascade number within network" (CN°):

Cascade N°	1	2	3	4	5	6	7	8
Offset	0x00	0x04	0x08	0x0C	0x80	0x84	0x88	0x8C

Table 5: Offset for the service ID's if several cascades are operated in a network

3.3.5 Transport stream bit rate (TS out bit rate), system bit rate

The transport stream bit rate at the ASI output port can be set in the range between 1,024 kbps and 214 Mbps with steps of 1 kbps. The output bit rate can be selected independently of the input bit rate at the ASI input port. However, care must be taken to ensure that the entire volume of data is transmitted, including the DVB channels generated additionally by the EMA device. It should be noted that the transport stream at the ASI input may contain components with a fluctuating data rate. When estimating the bandwidth which will be necessary for the transmission of newly generated programs, this should be borne in mind.
The bit rate ("TS-Out bit rate") is selected in the configuration settings under "Channel Mux".

For the EMA device, the maximum "TS Out Bit Rate" possible is 214 Mbps. When deciding the "TS Out Bit Rate" it is necessary and important to check what is the maximum transport stream bit rate which can be processed or forwarded by succeeding components such as modulators and upconverters.

The bandwidth (bit rate) which is available can be distributed across the channels generated by the EMA device in any proportions desired. The more channels are transmitted, the lower is the available system bit rate (slot bandwidth) for each channel. Whenever individual settings are made, care should be taken to ensure that the figures entered into the configuration mask make sense.

Configuration of the system bit rates and "TS-Out Bit Rate", the output bit rate

When delivered and if reset is carried out with firmware, the system bit rates (slot bandwidth) of each channel will be set to 6 Mbps. This setting should be seen simply as an upper limit and can be varied according to the content of the data being transmitted. It is possible to adjust the figures for each channel according to need. The "TS-Out Bit Rate", which is the data output rate, is preset to 38 Mbps, which gives enough scope for reliable operation as long as the "ASI Main IN", the input port, is deactivated. The output rate must be decided in relation to the content being added, with a safety margin of at least 10 per cent, since it is not possible definitely to exclude swings in the data rate taking it over the upper limit.

Examples of estimation of the "TS-Out Bit Rate", the output bit rate

Example 1: Single device with 4 encoders

"ASI Main IN" = "OFF"
The encoder input ports A ... D employ the following system bit rates: 3x 6 Mbps and 1x 10 Mbps, total **28** Mbps
This allocation, including the necessary **10%** reserve for safety, gives a figure of **31** Mbps (minimum) to be set as the data output rate at the output port.

Example 2: Single device with 4 encoders and an "ASI Main IN"

"ASI Main IN" = "MUX with intern"
Here the incoming data stream has a bit rate of 50 Mbps, and 36 Mbps are used for the transport of the data. 14 Mbps are filled with "empty packets".
The encoder input ports A ... D employ the following system bit rates: 2x 4 Mbps and 2x 8 Mbps, total **24** Mbps
36+24=**60**, plus **10%** safety margin, so that the data output rate at the output port is **66** Mbps (minimum).

3.4 Extended configuration, individual settings

The configurations explained so far suffice for the intended use of the EMA device to generate transport streams in conformity with DVB. There are further options possible for professional use with special functions.

3.4.1 TTX processing/ VPS/ WSS

These configuration settings control how teletext information contained in the analogue signal will be adopted and the VPS and WSS control signals will be captured, processed and forwarded in the transport stream.

The following settings and functions are possible:

Switches	State	Function
TTX processing	OFF	No teletext or VPS and WSS data adopted.
TTX processing	Video-IN	Teletext data from lines 7 to 15, 19 to 22, 320 to 328 and 332 to 335, will digitalised and transmitted in the DVB transport stream.
TTX processing	Video-IN	Teletext data from lines 7 to 15, 19 to 22, 320 to 328 and 332 to 335, will digitalised and transmitted in the DVB transport stream. In addition, VPS, WSS or VPS+WSS (depending on what has been selected) will be digitalised and then transmitted as part of the DVB transport stream.
VPS-WSS	VPS WSS VPS+WSS	

Table 6: Configuration for processing of teletext, WSS and VPS

3.4.2 Special configurations via Table Script

Table Script-configuration of parameters outside the specified default

The connection of this function is realized in the parameter field “Channel MUX “ (see 3.3.2.2.6). The option “Table Extention“ provides a tool with which specific DVB system parameters outside the given range in the web interface can be set or changed. After activating the feature in the “Channel MUX“, “Extension Table“ and subsequent retention of configuration (“Save“ or “Save to device“) will appear above the web interface the function button “Script Table“ on the call the script editor is used.

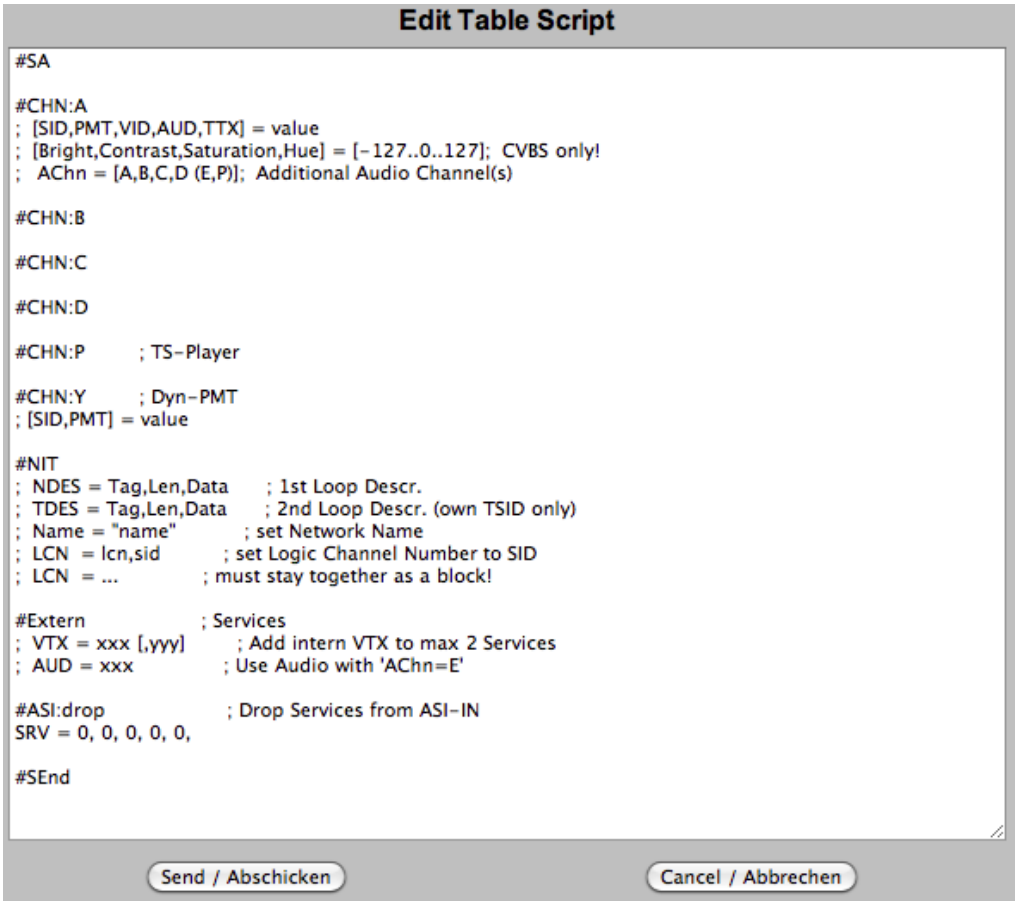


Fig. 21: Opend script editor of the web interface with prepared “empty“ script

Script structure:
- The key lines #SA and #SEnd condition are.
- Each section (starting with #) shall be permitted only once.
- A NIT section is only functional when the device creates its own NIT. In this case, all NIT of ASI-IN deleted (The mixing of external and internal NIT is not possible.).
- Spaces are delimiters before or between the words, but no significance.
- A semicolon “;“ opened the comment section. Values can be decimal, hexadecimal and expressed as a byte value with “A“.

- The activation of a script is done by “Send“. Changed values can be reviewed at the transport stream output.
- The basic function can be checked via the status page 190th. In the lower part of the table of the error status of the script processing **TblErr**: is displayed:
  0: Skript OK
  2: Error in NIT section
  8: Error in CHN section (x=0..3 for CHN A..D)

The archiving or creating a backup script is executable only by copying the relevant lines from the Windows clipboard, and subsequent storage place in a text file.

Example of a scripting application:
#CHN:A
SID = 1010 ; sets the service ID to 1010
PMT = 0x400 ; sets the PMT PID to 1024 (400 Hex)
#CHN:C
Bright = 20 ; the brightness of the composite signal applied at input C is raised to the value 20
; The values range is from -127 to +127.
PMT = 100 ; sets the PMT PID to 100
#NIT
LCN = 20,1010 ; sets the logical channel number of the service 1010 to 20.

“Reset“ of scripts
If you run the downloaded script version does not and should not lead to modifications of the target version, the script is a factory setting is enforced.

Steps to reset the script:
- entire script delete
- blank window send to the device
- call by pressing “Table Script“ the editor with the default script

3.4.3 Options

Adaptations or options supplied to customer specifications may be charged for.

3.4.4 Firmware updates (emergency program)

If a firmware update becomes necessary, a Windows update program will be made available. The update will be carried out either via the Ethernet interface or via the (RS232) control interface on the EMA device. For this purpose the computer and the EMA device must be connected to each other by means of either an Ethernet cable or a null modem cable (cross-linked cables in each case). After the program has been opened, the computer interface to be used must be selected in the update window. If the right interface is selected, the “Upload” button will be activated, allowing the update to be started with this button.
Firmware updates do not change any parameters already set (whereas the opposite is true of using the recessed “Factory setting” key, which restores settings to what they were on delivery of the device).

3.4.5 Re-set to status on delivery (Factory settings)

The following 3 possible ways of restoring the status on delivery:

A. Factory setting using the user software (HTML page):
This will only be possible if the IP configuration for the device is known, including network address subnet mask, and the device can be contacted via the Ethernet interface. The Internet browser should be used as described in section 3.3.2 (“Connecting the network to the computer”) to access the device operation system. When the access data have been entered, the configuration menu will appear. The “Factory Setting” box is displayed in the menu header. If this box is clicked, all the parameters for the device which are capable of configuration, excluding the IP address (!), will be reset to those for the state the device was delivered in, and the device will be restarted. A **reset of the IP address** to the default value is proceed as described in **section B**.

B. Factory setting using the “Factory Set“ key (on rear of device):
In order to re-set all configurable parameters **including the IP address for the device** so that they are as delivered, this key must be activated for at least 5 seconds, until all the LED‘s on the front flash at the same time. The flashing LED‘s are the confirmation that the factory set function has been carried out. When the key is released, a new start will follow automatically in which the parameters are as reset. After changing the IP address the connection to the device is invalid and thus interrupted. To restore the connection, the steps in section 3.3.1 (“Network connection to the computer“) are processed.

C. Factory setting with the aid of the maintenance software (via RS 232):
The maintenance software is a Windows PC program module obtainable from BLANKOM Antennentechnik GmbH which will create the factory settings. Firstly, the maintenance software has to be installed on the control PC and a cable connection must be established between this and the EMA device. The cable must be a null-modem cable. When the program has been started and the various procedures run, the EMA device is restarted with all parameters reset.

If B or C is used, the IP address of the EMA device after reset is: 192.168.2.86 with the subnet mask 255.255.255.0.

3.4.6 Integration into the head end management system for B-LINE or C-LINE

If a EMA device is being used in association with B- or C-LINE head end components, the possibility exists (using HCB x00 “BLUE“, from 9650.03 upwards) of integrating the encoder into the overview of the head end and calling it up from this screen. A hub will be necessary in this case, through which the Ethernet connections of the HCB x00 and the EMA device are networked. Before this happens, the “lowest” of the IP addresses of all the EMA encoders must be entered in the configuration menu for the IP address of the HCB x00. It is only possible to enter (or change) IP addresses into the HCB x00 directly. This cannot be done from the html user interface.

Warning:

If multiple EMA devices are being integrated, it is important to note that the HCB x00 will search in the network for any IP address (N) with the “lowest” value and will then search for nine more with ever “higher” addresses (N+1...N+9). In consequence, the maximum number of EMA devices which can be included in the head end overview of an HCB x00 is ten. Switching on or re-setting the HCB x00 will cause any EMA device in the network to be read and shown in the overview along with the rest of the system. By clicking “Edit”, a link is made to the IP address of the EMA device and the login window opens. Once the “serial number” and the “password” have been entered, the EMA device can be further configured as described in section 3.3.3.

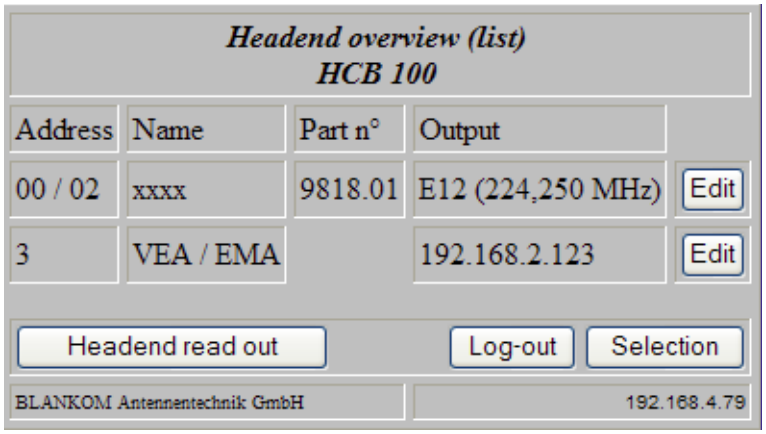


Fig.22: User interface: HCB x00 head end overview

4. Appendix

4.1 Technical data

	EMA 308	EMA 407	EMA 408	EMA 508	EMA 608	EMA 708
Casing/ dimensions for installation						
19“ rack, 1 RU (steel sheet) HxWxD = 44 x 444 x 300 mm	√	√	√	√	√	√
Operating parameters						
Operating voltage 85 ... 264 V~, 50/ 60 Hz or 110 ... 370 V-	√	√	√	√	√	√
Power consumption	15 VA	20 VA	30 VA	35 VA	30 VA	35 VA
Weight	4,200 g	4,200 g	4,200 g	4,350 g	4,200 g	4,350 g
Temperature range -10 ... +55 °C, Temperature range for data keeping 5 ... 45 °C	√	√	√	√	√	√
Encoder, video input signal						
PAL (B/G, H, I, N), SECAM, NTSC (M)	√		√		√	
SD-SDI 270 Mbps	√		√	√	√	√
HD-SDI 1,5 Gbps			√	√	√	√
Transport stream (DVB-ASI) with MPEG-2 HD/ SD			√	√	√	√
Transp. stream (DVB-ASI) with H.264/AVC HD/SD		√				
Input format						
720x576 50i 720x480 60i	√	√	√	√	√	√
1280x720 50p/ 59,94p/ 60p 1920x1080 50i/ 59,94i/ 60i		√	√	√	√	√
Compression						
MPEG-2 (MP@ML) according ITU-T Rec. H.262/ ISO/ IEC 13818-2 [8]	√	√				
H.264/ AVC (MP@L3.0/ HP@L4.0) according ITU-T Rec. H.264 / ISO/ IEC 14496-10 [9]			√	√	√	√
System bit rate (slot bandwidth)						
individually per channel (slot) adjustable	√	√	√	√	√	√
1 024 ... 15 000 kbps	√	√				
1 024 ... 20 000 kbps			√	√	√	√
Encoder, audio (compression)						
MPEG-1, Layer 2 (mp2)	√	√	√	√	√	√
Dolby Digital 2.0 (AC-3)					√	√
Dolby Digital plus					√	√
Sample frequency: 48 kHz, stereo	√	√	√	√	√	√
Bit rate: 64 ... 384 Kbps	√	√	√	√	√	√
Transport stream output/ input						
Protocol: ISO/ IEC 13818-1 DVB-ASI/ ATSC burst or interleave mode 188/ 204	√	√	√	√	√	√
Connection: BNC, 75 ohms, 800 mV_{pp}	√	√	√	√	√	√
Bit rate: 1...214 Mbps in burst mode/ 1... 98 Mbps in continuous mode, adjustable in 1Kbps steps	√	√	√	√	√	√
Video inputs						
Number of inputs	4	2	4	4	4	4
analogue: 1V_{pp}, digital: 800 mV_{pp}, audio embedded (AES/ EBU, 48 kHz) adjustment range +/- 6 dB	√	√	√	√	√	√

	EMA 308	EMA 407	EMA 408	EMA 508	EMA 608	EMA 708
Transport stream (DVB-ASI) with MPEG-2 HD/SD			√	√	√	√
Transp.stream (DVB-ASI) with H.264/AVC HD/SD		√	√	√	√	√
HDMI*				√		√
Audio IN: 4x sockets according EN 50083-5 annex B (without control functions) [5] 600 ohms/ 10 kohms switchable, symmetrical (mono, stereo, dual) adjustable in range: +6 dB ... -20 dB (0.5 dB steps)	√	√	√		√	
SPDIF at DIN socket PIN 6, 8 (PCM/ AC-3)			√		√	
IP output (front side)						
Ethernet 10/ 100/ 1000 Base-T, RJ 45	√	√	√	√	√	√
Protocols: UDP, RTP, ARP; additional error correction according pro-MPEG Code of practise 3 rev. 2 [7]; encapsulation according ETSI TS 102034 [6]	√	√	√	√	√	√
Data rate 98 Mbps, continuous mode	√	√	√	√	√	√
Control port/ IP output (rear side)						
Ethernet 10/ 100 Base-T, RJ 45	√	√	√	√	√	√
Protocols: UDP, IP	√	√	√	√	√	√
Output data rate 20 Mbps	√	√	√	√	√	√
Remote control						
Settings, data: Ethernet interface, UDP/ IP	√	√	√	√	√	√
Cascade system						
Up to 8 devices can be combined into a cascaded system to form a DVB transport stream using the ASI interface.	√	√	√	√	√	√
Extra functions						
Teletext, VPS, WSS: Transparent feed of teletext signals, conversion and onward transmission of VPS und WSS signals.	√	√	√	√	√	√
SNMP	√	√	√	√	√	√
Options						
Teletext inserter: 200 pages	+	+	+	+	+	+
+ 1000 pages	+	+	+	+	+	+

* currently HDCP encryption is not supported

4.2 Accessories

4.2.1 Accessories as standard

1x device connection cable
1x 19“ installation set (4 bolts; 4 washers; 4 cage nuts)
2x replacement T fuses 2 A/ 250 V
1x null modem cable; 3 m; 9 poles (2 sub D sockets)
1x patch cable; cross-linked; 3 m; 8 poles (2 RJ45 plugs)
1x BNC connecting cable; 0.34 m
4x DIN plug connectors, 8 poles
1x guarantee certificate
1x operating manual (this document)

4.2.2 Optional accessories

The optional accessories can be ordered individually as required.

Purpose	Plug connection	Length	Type	Item n°.
Video and ASI connector cable	BNC-BNC	0.34 m	VVK 526	8025.26
		1 m	VVK 540	8025.40
		2 m	VVK 541	8025.41
		3 m	VVK 542	8025.42
		... m*	VVK 543	8025.43
Video adapter cable	BNC-Cinch	1 m	VAK 537	8025.37
		2 m	VAK 538	8025.38
		3 m	VAK 539	8025.39
		... m*	VAK 560	8025.60
Audio connector and control cable	DIN-8p.-DIN-8p.	1 m	ASK 545	8025.45
		2 m	ASK 546	8025.46
		3 m	ASK 547	8025.47
		... m*	ASK 548	8025.48
Audio adapter cable	DIN-5p.-2x XLR-sockets	0.2 m	AAK 536	8025.36
	DIN-5p.-2x Cinch	1 m	AAK 564	8025.64
		2 m	AAK 535	8025.35
		3 m	AAK 566	8025.66
		... m*	AAK 567	8025.67
Cable to connect apparatus to mains	C13 (standard connector cable) CEE7/7 (Schuko-type angle plug)	2 m	NKW 200	0144
Audio plugs (for cable diameter 6 mm)	DIN plug, 5 poles		SV 050	0143
	DIN plug, 8 poles		SV 081	0141

* ... length as specified by customer

Further accessories are to be found in the BLANKOM Antennentechnik main catalogue.

4.3 Glossary and abbreviations

Term	Meaning	Notes
ASI	**A**synchron **S**erial **I**nterface	Interface for DVB transport stream BNC connection, 75 ohms
Audio bit rate	Digital bandwidth for audio transmission, element of the system bit rate	The higher the value the better the transmission quality, but it may (slightly) limit the video bit rate.
Audio mode	Options for the audio channels to be transmitted. The options are: stereo, joint stereo, mono, dual channel, Use VPS.	The relevant option is entered (unchangeably) into the EMA coding. It will be transmitted with the additional DVB information.
Burst mode	ASI TS mode: either 188 or 204 data bytes are sent as a bundle with no intervals between them, then “sync words” follow.	Identical with the mode: contiguous, packed, packed space, packed timing,data packed, packed burst
Continuous mode	ASI TS mode: data bytes are continuously transmitted alternately with sync words at equal intervals.	Identical with the mode: interleave, distributed, spread out, byte-space, byteburst, byte timing, equality, data byte
DHCP	**D**ynamic **H**ost **C**onfiguration **P**rotocol: enables networked devices to receive IP addresses automatically	If there is no DHCP service available or DHCP is switched off, the (default) IP address which has been set will be used.
Input channel	Audio or video signal input	Analogue (video and audio separately), SDI (video with audio embedded or separate)
IP address	Network address for access to data and configuration (in case there is no DHCP service)	Factory setting: 192.168.2.86
IP subnet mask	Mask for detailed identification of the address in the network	Factory setting: 255.255.255.0

Term	Meaning	Notes
Kbps	Bit rate	**K**ilo **B**it **p**er **s**econd (where Kilo=1024)
Load	Reads out the parameter settings of the EMA device and shows them in the settings masks.	The parameters can be viewed and altered. “Save” saves the edited parameters.
Mbps	Bit rate	**M**ega **B**it **p**er **s**econd
MIB	**M**anagement **I**nformation **B**ase	The device-specific file (ME.mib) to serve the system via SNMP
Network ID	Network identification: this ID gives the unique identification for the link between DVB transport streams (TS‘s) and a particular (cable) network Within the network this ID is the same for all TS‘s.	This is an element of the NIT and is usually overwritten by the succeeding modulator component.
NIT	**N**etwork **I**nformation **T**able this is an important table for the transmission of channel parameters. The NIT supports, for example, the “seek” function in the DVB receivers so that a broadcaster is found.	The EMA device is capable of setting up this table. A succeeding modulator component can add to it or overwrite it.
Password	Access to configuration via the IP network is password-protected.	The password on delivery is set to: neu
Program Language	This shows the program language; the abbreviations to be used are those in ISO 639-2 [4] code, (i.e. “deu” for German)	The details will be displayed in the receiver for the information of the watcher.
Program Name	This is the name of the newly generated DVB program. Every A/V channel should be given a name.	The name of the program will be presented for selection in the table of broadcasters by the DVB receiver.
RDS	**R**adio **D**ata **S**ystem	Additional digital information concerning analogue radio programs, e.g. name of broadcaster, short details, special announcements.
Save	Saves the configuration values which have been set for the EMA device	These parameters are read using “Load” and stored using “Save”.
SDI	**S**erial **D**igital **I**nterface for digital, uncompressed video signals	270 Mbps, transmission via BNC cables, audio data can be embedded
SDT	**S**ervice **D**escription **T**able	This contains the programs offered and relevant details of broadcaster.
Serial number	The 5-digit device serial number	This contains the programs offered and relevant details of broadcaster
SNMP	**S**imple **N**etwork **M**anagement **P**rotocol	An interface protocol allowing data exchange and device control via the network.
System bit rate	The digital bandwidth available for an A/V channel.	The system bit rate for a channel is composed of the video and audio shares combined.
TS	**T**ransport **s**tream (a data signal in packet form)	The whole of the information necessary to enable transmission of digital signals. One transport stream can contain more than one program, with audio, video, teletext and details.
TS ID	**T**ransport **s**tream **id**entifikation (unique designation of the transport stream)	When devices are linked up in series for a shared transport stream, they must all use the same TS ID.
TS out bit rate	Output data bit rate of the transport stream = digital bandwidth	This rate must be adequate to the quantity of data.
TTX processing	**T**ele**tex**t processing and onward transmission	Conversion of the teletext signal contained in the analogue signal into digital transport packets which are then transmitted in the DVB signal.
Video format Video system	Standards applying to the analogue video input signals which require conversion	Factory setting: PAL/ SECAM (50 Hz); alternatively, NTSC (60 Hz) or OFF (Digital Radio) can be selected
VPS/ WSS	VPS (**v**ideo **p**rogramming **s**ystem): this is the recording control for the video recorder WSS (**w**ide **s**creen **s**ignalling): format control for the TV itself	Both these signal components are contained in the analogue TV signal. WSS = ON and VPS = ON: here the signal components are converted and transmitted in the DVB signal.

5. Bibliography

[1] EN 60728-11: Cable networks for television signals, sound signals and interactive services Part 11: Safety (IEC 60728-11:2005); German version EN 60728-11:2005

[2] EN 50083-2: Cabled distribution systems for television and sound signals. Electromagnetic compatibility for equipment;EN 50083-2: 2001 + A1:2005

[3] EN 50083-5: Cabled distribution systems for television and sound signals. Head end equipment, German version EN 0083-5:2001

[4] ISO 639-2:1998 – Codes for the representation of names of languages – Part 2: Alpha-3 code

[5] ISO13818-1: 2000 - Information technology - Generic coding of moving pictures and associated audio information: Systems

[6] ETSI-TS 102034: Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks, Ver. 1.4.1, 2009-08-04

[7] SMPTE 2022-1: Forward Error Correction for Real-Time Video/ Audio Transport Over IP Networks, 2007

[8] ISO13818-2: 2000 - Information technology - Generic coding of moving pictures and associated audio information: Video

[9] ISO/IEC 14496-10:2012 - Information technology - Coding of audio-visual objects - Part 10: Advanced Video Coding

6. Document history

Version	Date	Modification	Author
1.00	29.03.2011	basic document	Häußer
1.01	20.05.2011	revision accessories	Häußer
1.02	25.08.2011	additions chapter 4.1	Häußer
1.03	28.10.2011	correction SPDIF	Häußer
1.04	19.06.2012	insert the EMA 508...708 devices	Häußer
1.05	24.07.2013	revision, especially EMA 508, 708	Häußer

Options available upon request. Subjects to changes due to technical progress.

CE Declaration of Conformity

Manufacturer: BLANKOM Antennentechnik GmbH
Hermann – Petersilge – Straße 1
07422 Bad Blankenburg
Germany

Product Name: Encoder/ Multiplexer

Type Name: EMA 308, EMA 407, EMA 408, EMA 508, EMA 608, EMA 708

Type N°: 9173.81, 9173.82, 9174.71, 9174.72, 9174.81, 9174.82, 9175.81, 9175.82, 9176.81, 9176.82, 9177.81, 9177.82

BLANKOM Antennentechnik GmbH confirms that the mentioned products meet the guideline(s) of the Council for the approximation of legislation of the member states.

Electromagnetic compatibility (2004/ 108/ EC)
The following standards are met: DIN EN 50083-2: 2007-04 (EN 50083-2:2006-06)

Low voltage guideline (2006/ 95/ EC)
The following standards are met: DIN EN 60950-1: 2006-04 (EN 60950-1:2006-11)
Information technology equipment -Safety-

Restriction of hazardous substances (2011/ 65/ EC)
The following standards are met: DIN EN 50581: 2013-02 (EN 50581:2012)

Bad Blankenburg, Germany, 2012-06-19

Dr. Piero Kirchner
(Managing Director)