

USER MANUAL

■ MPEG-ENCODER / MULTIPLEXER EMA 207



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1. Installing and operating instructions

1.1 Safety instructions

- When assembling and commissioning the EMA 207 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 50083/1 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 207 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:

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Hermann-Petersilge-Str. 1
07422 Bad Blankenburg
Germany

Telephone: +49 (0) 3 67 41 / 60-0
Fax: +49 (0) 3 67 41 / 60-100

Email: info@blankom.de
Web: www.blankom.de

1.3 General description of functions

The EMA 207 with “cascade” facility is an MPEG-Encoder and Transport Stream Multiplexer. With it, the user’s own digital programme “bouquets” can be produced; also, pre-existing programmes. They are transmitted as a DVB-compatible MPEG transport stream in the ASI format. This signal can be broadcast or fed into the cable TV network with the aid of appropriate modulators.

The EMA 207 encodes both analogue AV signals and digital AV signals (SDI, uncompressed) into an MPEG2 Transport Stream. 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 at a maximum data rate of 214 Mbps and is transmitted via the ASI interface. It can be sent either to a cascaded EMA 207 or to a downstream modulator.

By cascading EMA 207 devices (up to 14), a transport stream with up to 56 services can be produced or these services can be added to an incoming transport stream.

The EMA 207 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 AV signals can be embedded in accordance with the DVB standard using the multiplexer integrated into the EMA 207.

The output signal contains all the tables necessary to the programme and associated services (PAT, PMT and SDT). An 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 207 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 programme components can be added.

Depending on the configuration of the 4 input interfaces, the analogue or digital AV 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 3.3.3 for details of how EMA 207 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: EMA 207, front view

POWER (green)

LED illuminated	Device switched on
-----------------	--------------------

System (green)

LED illuminated	Internal system components ready for operation
LED flashing	Wrong parameter chosen / configuration error recognised
LED not illuminated	Internal fault

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

LED not illuminated	Input port deactivated
LED flashing	No standard video signal recognised at the input port
LED illuminated	Video signal recognised at the input port

INPUT TS (yellow)

LED not illuminated	Input port deactivated
LED flashing	ASI signal not recognised at the input port
LED illuminated	ASI signal recognised at the input port

2.2 Rear view



Fig. 2: EMA 207, rear view

Factory set

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
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)

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).

Mono	Dual	Stereo	Pin		Pin	Stereo	Dual	Mono
Not in use	Channel B	Right channel	3 (+)	Pin 2 = Shielding (6 to 8 not used)	1 (+)	Left Channel	Channel A	Mono signal
			5 (-)		4 (-)			

Fig. 3: Pole allocation, audio socket

2.2.2 Further function and control elements

Mains connection block	Fuse, switch, low temperature outlet
earth screw	For potential equalisation
FACTORY SET	Resetting to delivery status (see Section 3.4.5)

3. Operating instructions

3.1 Commissioning of the EMA 207 (EASY, without configuration)

NB 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. The device is intended to be installed on sliding rails in a 19-inch rack.

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 the power supply can be connected and the device switched on. The operating status is shown by the LEDs 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.

Before multiple devices can be linked into a network, they must be given individual IP addresses (see Section 3.3.2.2.2). They should first be connected to the PC and have differentiated IP addresses set (see Section 3.3.1). Ask the network administrator for an IP address space.

3.2 Basic settings on delivery (Factory settings)

The EMA 207 is delivered with optimal configuration for 4 AV channels.

At the ASI output port a transport stream is produced with a bit rate of 38 Mbps into which the data of the 4 input signals will be included. The “ASI Main Input” is activated.

All programme 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 basic settings of the EMA 207 are shown in the following list:

Encoder Input	CVBS	FBAS (PAL), analogue audio
ASI Main Input	ON	ASI input port is activated
DHCP	OFF	The set IP address will be used
IP Address	192.168.2.86	default IP address
IP Net Mask	255.255.255.0	
TS OUT bit rate	38,000 kbps	Range: 1 000 – 214 000 kbps
System bit rate	6,000 Kbps	Bandwidth for each input channel (encoder)

Table 1: Basic settings

The delivery status can be restored via “Factory setting” at any time (see Section 3.4.5).

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 207 to create a DVB Transport Stream (see Fig 12), 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 207 must be connected to the network using an Ethernet cable. If the EMA 207 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 207 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 207 (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 207.

When cascades are being configured initially, it is necessary to ensure that there is always only **one** EMA 207 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.

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

serial number: Here, the 5-digit serial number of the device is entered. This number can be found on the rear of the device and is repeated at various points in the device documentation on a label. These labels should be stuck to the device where they can be seen once it has been installed, or should be used for the documentation of the equipment as a whole. Doing this will make access much easier later.

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

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 two sections, explained in detail below.

Section 1 covers status information and help functions:

Change password, Help, Factory setting, Set Date & Time and Status xxx (when activated)

Section 2 contains the settings for the parameters:

General Input Selection, Ethernet Interface, Channel MUX, ASI Main Input, Encoder (1st, 2nd, 3rd and 4th Input A ... D), Sys(tem) – Parameters, Load and Save (Softkey).

Please note: items selected from the “General Input Selection” menu require certain fields to be completed in the subsequent menu. If the selection is altered, the details so far must be saved (with Save), so that the relevant fields are actually adjusted.

3.3.2.1 Status information / Help functions

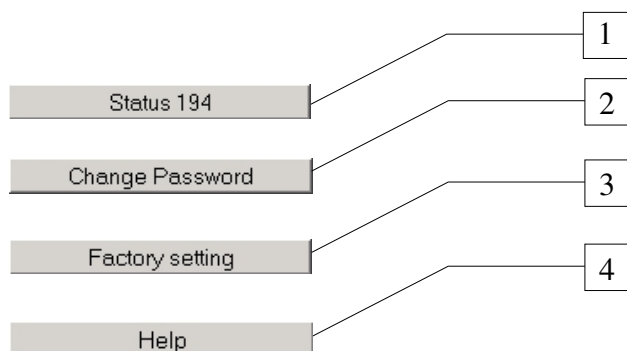


Fig. 5: Web Interface, Status information / Help functions (Section 1)

- (1) **Status 19x:**
The status pages regularly deliver updated internal information for maintenance checks on the status and functioning of the device. For example, the status 190 reported the actual input status.
- (2) **Change password:**
The password for the access to the configuration menus consists of a maximum of 8 characters. Permitted characters: any lowercase or uppercase letter, any figure, but no symbols and no umlauts. On delivery, the password is: **neu**.
- (3) **Factory setting (Softkey):**
Using this key returns all parameters to the values they had on delivery. The procedure takes approximately 10 seconds. During this period, no transport stream signal is available at the ASI output port. However, this function will **not** return to the factory setting the IP address which has been set.
Factory set (see 3.4.5) by means of the key on the rear of the device returns the IP address to **192.168.2.86** and the password to **neu**.
- (4) **Help:**
online help, call-up of the help pages in German (Hilfe) or English (short instructions).

3.3.2.2 Settable parameters for the EMA 207

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

3.3.2.2.1 General Input Selection

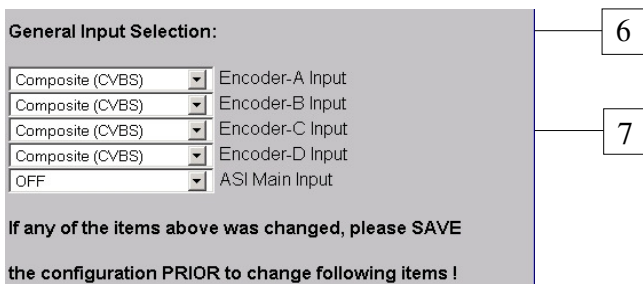


Fig. 6: Selection of types of input signal

This is the area in which the expected audio and video signal norms are allocated to the input ports.

Options: If any input ports are switched off in the configuration as delivered or if any input components are not installed, a grey field with the text “Channel OFF” will be displayed; this cannot be altered.

(6) **Encoder A ... D:**

Here, the type of operation which is desired for each channel can be selected by clicking through the list.

"Channel OFF":

No data is reaching the multiplexer via the channel.

"Composite (CVBS)":

in this case, analogue signals are expected for both video and audio.

"SDI, embedded Audio":

Here, the input signal is serial digital video (SMPTE 259M-C, 270 MHz) with integrated audio (AES-EBU, 48 KHz) and possibly with video text (WST/PAL). (For details, see Section 3.4.2)

"SDI, analogue Audio":

SDI processing, possibly with video text, together with analogue audio input (For details, see Section 3.4.2)

(7) **ASI Main Input:**

"OFF": there will be no processing of data from this input port

"Mux with Intern":

When this is displayed, the transport stream from the ASI input port is multiplexed to a shared stream with the data from the internal sources. This port is primarily intended for the cascading of a number of devices, but can also process other, “outside”, streams. If it is used for this, great care must be taken to avoid overlaps with the SID/PID. N.b., in this mode, no editing or mapping is possible.

3.3.2.2.2 Ethernet Interface

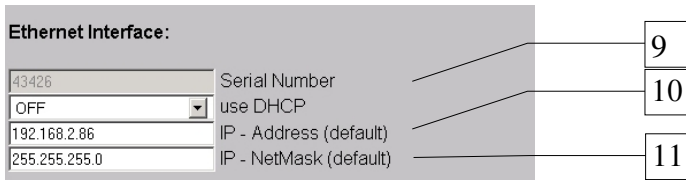


Fig. 7: Settings for the Ethernet interface with the network

- (9) **Use DHCP:** [ON/OFF] (Allocation of the IP address, default, e.g.: 192.168.2.86
 "ON": once only, on start-up, an IP address will be requested via a DHCP server. If the request elicits no response, the preset IP address will be used.
 "OFF": the preset IP address will be used.
- (10) **IP Address:** [0.0.0.0 ... 192.168.2.86 ... 255.255.255.255]
 This is a sample IP address in case "use DHCP" is signalled as OFF, or it has been impossible to contact a DHCP server.
- (11) **IP subnet mask:** [0.0.0.0 ... 255.255.255.0 ... 255.255.255.255]
 This is the mask allocated to the IP address.

3.3.2.2.3 Channel MUX (Settings for the transport stream)

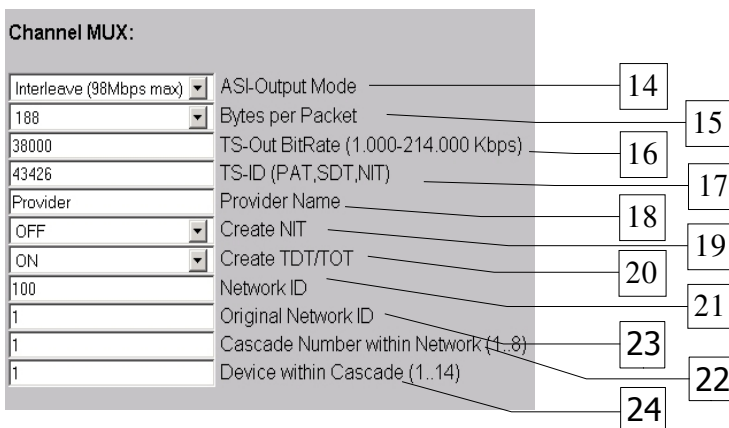


Fig. 8: Parameter settings for the configuration of the transport stream

- (14) **ASI Output Mode:** [Continuous / Burst / Loop]
 An ASI transport data packet consists in 188 or 204 payload bytes.

Continuous mode:

Payload bytes are continuously transmitted alternating with "sync words" (K28.5). The bit rate is dictated by the interval between the payload bytes. This interval is dictated by the number of "sync words". The maximum bit rate possible with this type of output is 98 Mbps.

Burst mode:

In this mode, all the payload bytes in a packet are sent at a frequency of 27 MHz in one burst (without “sync words”), then the “sync words” follow. The number of sync words dictates the interval between the data packets, which then gives the bit rate. The maximum bit rate possible in this case is 214 Mbps.

Loop IN -> OUT:

Here the input signal is looped to the output. The length of the packet at the output port is always 188 bytes in this mode.

Please note:

One sometimes meets different definitions of the expressions “Continuous Mode” and “Burst Mode” but the technical content is basically the same. See Section 4.3.

- (15) **Bytes per packet:** [188/204]
Here, 188 or 204 can be set, but not for LOOP.
- (16) **TS Out Bit Rate:** [1,000 ... 214,000]
The output bit rate can be 1,000 ... 214,000 kbps. It must be selected in association with the ASI output mode (see also point 14 above and Section 3.3.4)
- (17) **TS-ID:** [1 ... 65,535]
(Transport stream identifier) This detail is how the transponder identifies the transport stream generated. All devices in a cascaded system must use the same TS-ID.
- (18) **Provider name:** [Provider]
The programme provider can insert a name here for the transport stream that has been formed. 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.
- (19) **Create NIT:** [OFF, dummy, Cable, Satellite, Terrestrial]
dummy:
The multiplexer creates an empty NIT (network information table) as place-holder, and this table will be filled in by the succeeding device, if any; a QAM modulator, for example.
Cable, Satellite, Terrestrial:
The NIT is produced with the appropriate specification but without any details of frequency.
OFF:
In this case, no NIT is generated.
- (20) **Create TDT/TOT:** [OFF, ON]
With the help of the internal real-time clock and the “local time offset” (see point 39), the tables for time are generated here. The clock will keep going when the EMA 207 is switched off.
- (21) **Network ID:** [1 ... 100 ... 65 535]
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.
- (22) **Original Network ID:** [1 ... 65 535]
When programmes or transponders are being forwarded, the origin of the data can be indicated here by inserting the “original” network ID for purposes of information.
- (23) **Cascade number within network:** [1 ... 8]
The number of the cascade is inserted here to distinguish between the EMA 207 cascades installed. It must be the same number for all the EMA 207s of a cascade and it serves to generate unique programme numbers (designated by ServiceID) within a network.

(24) **Device within cascade:** [1 ... 14]

The number of the device within the cascade is inserted here to distinguish between the EMA 207s installed within the cascade. The number must be different for all the EMA 207s of this cascade and it serves to generate unique programme numbers (designated by ServiceID) and PIDs within a transport stream. The order in which the devices are wired is of no significance for the numbering.

3.3.2.2.4 ASI Main Input

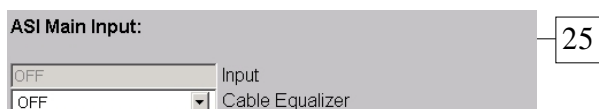


Fig. 9: electrical adapter at the ASI input port

(25) **Cable Equalizer:** [OFF, ON]

It is possible to set up an equaliser at the input port if long lengths of cable are being used.

3.3.2.2.5 Encoder (Input-A ... D)

(All the following setting notes apply equally to encoders 1 ... 4.)

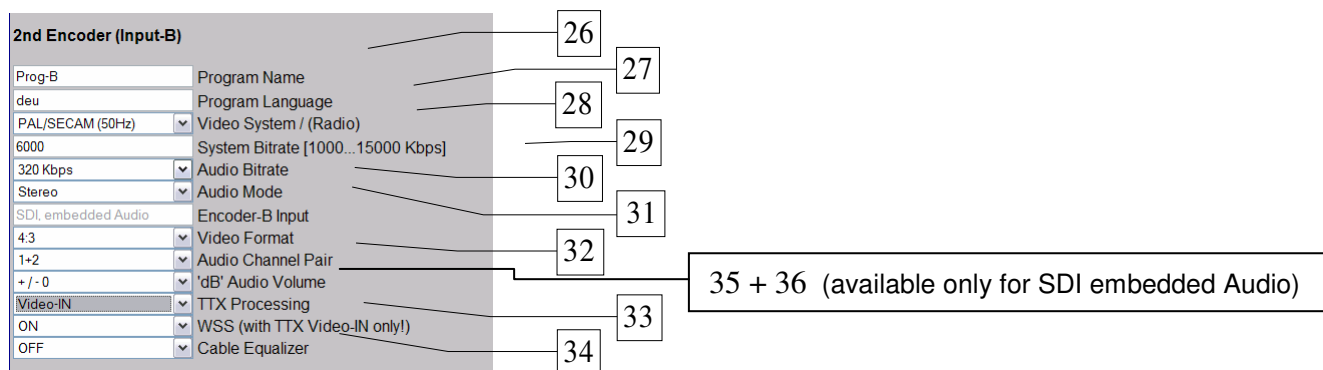


Fig. 10: Setting of encoder parameters for the individual input channels

(26) **Programme name:**

This is where a programme name is allocated for each encoder input port. The programme name will be displayed by the set-top box. The programme name must be unique and may appear only once in a cascade of encoders. The maximum length is 16 characters.

(27) **Programme language:** [deu, eng ...]

identifies the language for the audio data stream and teletext. It should be designated as per ISO 639-2.

(28) **Video system:** [PAL/ SECAM (50 Hz), NTSC (60 Hz), OFF (Digital Radio)]

These options set the type of video signal being accommodated. If PAL is the type, there are the variants B, G, H, I, N; this and SECAM operate at 50 Hz. NTSC in the M version operates at 60 Hz. In the "OFF" setting, the video signal is ignored and a digital radio channel is generated.

- (29) **System bit rate:** [1,000 ... 6,000 ... 15,000 kbps]
 Here the bandwidth is established for audio, video and table data in the relevant encoder. The value is only an upper limit. The bit rate actually generated will be slightly slower and will not be absolutely constant.
Warning: The sum of all the bit rates (from bandwidth for channels) and the bit rate (the bandwidth) of the "ASI Main Input" used must be less than 90% of the "TS Out bit rate", otherwise data transfer cannot be guaranteed.
- (30) **Audio bit rate:** [64 ... 320 ... 384 kbps]
 This determines the audio data bit rate. It is an element of the system bit rate.
- (31) **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.
 Additional condition applying to "use VPS":
 TTX Processing = Video IN and VPS-WSS = VPS or VPS+WSS
- (32) **Video format:** [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. For this it is a condition that TTX is set at "Video IN".
- (33) **TTX processing:** [OFF, Video IN, Intern (ViTex)]
 Video IN:
 Here teletext from the video input signal is changed into data packets conforming to DVB and is transmitted in the transport stream.

 Intern:
 At this point, using special additional software (ViTex), it is possible to administer an internal video text carousel and transmit it in the transport stream.

 OFF: No teletext will be generated.
- (34) **VPS-WSS:** [OFF, VPS, WSS, VPS+WSS]
 VPS and/or WSS lines in the video input signal will be converted into data packets conforming to DVB and transmitted in the transport stream. For this it is a condition that TTX is set at "Video IN".
- (35) **Audio Channel Pair:** [1/2 ... 15/16]
 When SDI with embedded audio is being transmitted, the audio channel pair to be used for the transmission can be selected here (see Section 3.4.2).
- (36) **Audio Input Level:** [+6 ... 0 ... -20 dB]
 This is for adaptation to the audio level at the encoder input port.
 The 0 dB setting is equivalent to an input level of 6 dBu.
 Here are some examples:
 If the level is 12 dBu, „6“ must be entered to obtain +6 dB, and, similarly, if the level is -14 dBu, „-20“ must be entered for -20 dB.

3.3.2.2.6 System parameters

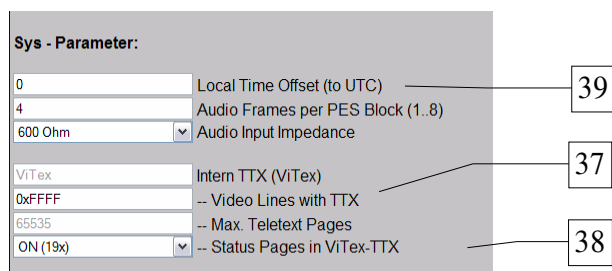


Fig. 11: System settings for video text and real time

(37) **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 and 320 to 335. 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, 1 st - 2 nd half of the picture	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
Binary	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1
Hex, 0x...	F				F				8				7			

Table 2: configuration of the line use for video text

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.

(38) **Status Pages in ViTex-TTX:** 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 but page 199 are suppressed. This page range is available for conventional teletext tasks.

(39) **Local Time Offset (to UTC):**

This is the difference between local time and “Coordinated Universal Time”, e.g. Germany = 1).

Audio Frames per PES Block (1 to 8):

Although the standard allows 1 to 8 frames, this range is not supported from every connectable audio device with an ASI TS input port known to BLANKOM. This, with an inappropriate combination of frame value and audio bitrate, can lead to sound problems (for example, periodic breaks). With this menu item, it is now possible to adapt the BLANKOM device to accommodate the one connected.

All “audio only” devices tested so far will work reliably with the setting “1” or “2”; devices for digital video and audio signals (ASI TS) require the setting “4”.

Audio input impedance:

Depending on need, the impedance of the symmetrical audio input ports can be selected as 600 ohms or 10 kilo-ohms. Whichever is selected will always apply for all inputs to the device.

3.3.3 Detailed configuration (for single and multiple device systems)

Depending on the job in hand and the desired number of channels per DVB transport stream, the devices can be operated individually or in groups (cascades) of up to 14 devices.

3.3.3.1 The 1-device system

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

IP address	the one pre-set is 192.168.2.86
IP subnet mask	the one pre-set is 255.255.255.0
TS-ID	the 5-figure serial number is entered as default
Provider name	the default entry is "Provider"
Network ID	the default entry is "100"
Programme name	the default settings are „Prog-A“ ... "Prog-D"
System bit rate	the default entry is 6,000 kbps
TS Out bit rate	the default entry 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 3.3.4).

3.3.3.2 The multiple device system (commissioning cascades)

The fact that the EMA 207 can be cascaded means that multi-device systems can be created so that DVB transport streams exist for up to 56 services. Multi-device systems have to be used if more than 4 new services (this means TV programmes with their additional information) 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.

Also, signal connections must be made (between ASI-OUT and ASI-IN) between the devices using 75-ohm BNC cables. (see Fig. 12).

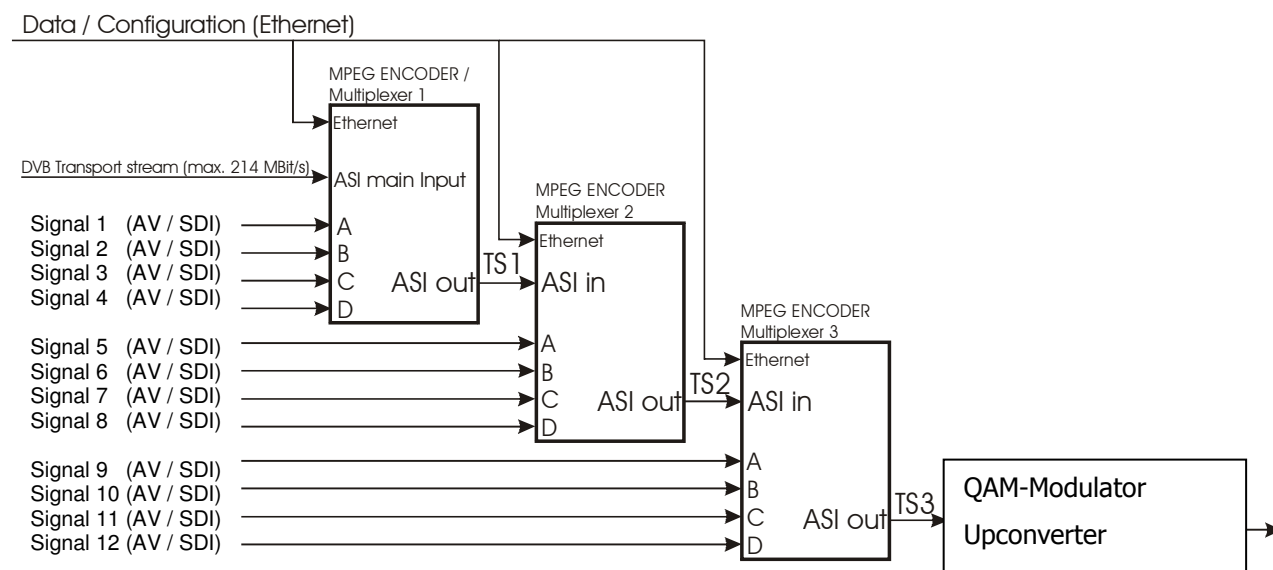


Fig. 12: Circuit diagram of a triple cascade (additionally with an external transport stream)

Every device is capable of adding 4 new programmes (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 14 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 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 207 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 207 nor the transport streams from other programme 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 headend) have to be designated with the same cascade number.
- **Network ID:** This identifies the distribution network (the headend); all transport streams generated or processed in a headend 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 14 devices, each device must receive a unique ID [1 ... 14]. 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.
- **Programme name:** The programme 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 programme name "Prog A" ... "Prog D". These names will show in the programme 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 programmes (or services) and of the automatic allocation of neutral programme names and of AV PIDs and service IDs in ascending order. It is possible to change the programme names but not the PIDs.

Automatically allocated Service-IDs and PIDs

Device/No.	Input port	Programme name	Service	PMT	Video	Audio	TTX ²⁾	VTX ¹⁾
EMA 207/1	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 207/2	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 207/3	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 207/4	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 207/14	A	Prog-A	0xE0	0x1E0	0x2E0	0x3E0	0x4E0	0x4E4 ¹⁾
	B	Prog-B	0xE1	0x1E1	0x2E1	0x3E1	0x4E1	0x4E4 ¹⁾
	C	Prog-C	0xE2	0x1E2	0x2E2	0x3E2	0x4E2	0x4E4 ¹⁾
	D	Prog-D	0xE3	0x1E3	0x2E3	0x3E3	0x4E3	0x4E4 ¹⁾

Table 3: Automatically allocated service IDs and PIDs

- 1) VTX: Videotext internally generated.
The EMA 207 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: Videotext of the external signal at the video IN ports A ... D

Note

- The SID/PID for the slots configured (the programmes 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 programme streams overlap, the internal programme streams have priority. Any “external” programme 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 headend)

To get unique service IDs if there are several cascades in one headend, an offset is automatically added for the parameter “cascade number within network” (CNr):

Cascade No.	1	2	3	4	5	6	7	8
Offset	0	0x04	0x08	0x0C	0x80	0x84	0x88	0x8C

Table 4: Offset for the service IDs if several cascades are operated in a network

3.3.4 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 (for continuous mode, the maximum is 98 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 207. 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 programmes, 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 207, 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 207 in any proportions desired. Whenever individual settings are made, care should be taken to ensure that the figures entered into the configuration mask make sense. The notes in the following sections should be observed in this respect.

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 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 Input”, 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 Input = „OFF“

The encoder input ports A ... D employ the following system bit rates:

3x 6 Mbps and 1x 10 Mbps, making **28** Mbps in all

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 Input

ASI Main Input = „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:

3x 4 Mbps and 2x 8 Mbps, making **24** Mbps in all

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 207 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
VPS-WSS	Any	
TTX processing	Video IN	The teletext data contained in lines 7 to 22 and 320 to 335 are digitalised and transmitted in the DVB transport stream
VPS-WSS	OFF	
TTX processing	Video IN	Teletext data from lines 7 to 22 and 320 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 5: Configuration for processing of teletext, WSS and VPS

3.4.2 SDI signal interface

The encoder input ports can be configured to process SDI input signals. A mixture (SDI / CVBS) of different configurations for the 4 input components is possible. The operational fields in the configuration menu will be offered for each channel as appropriate to the configuration (see 3.3.2.2.1).

The following signal components can be processed:

- SDI video signals with accompanying analogue sound signal:
Here the signal processing is as for FBAS with an analogue sound signal.
- SDI video signals with embedded digital sound signal (this is known as embedded audio)
In this case, there are additional configuration options available for the processing of the audio signal:

Audio Input Level: Setting of the audio level (see 3.3.2.2.5)
Audio Channel Pair: Selection of stereo pair

An SDI signal may contain a number of stereo sound channels carrying different signals. The EMA 207 can select any pair of signals from these and embed them in the DVB transport stream.

3.4.3 Options

The EMA 207 can access the signals when processed in a variety of ways. If there is a need for further functions, it is always possible to enquire about them (Section 1.2, contact). Adaptations or options supplied to customer specifications may be charged for.

3.4.4 Firmware updates (emergency program)

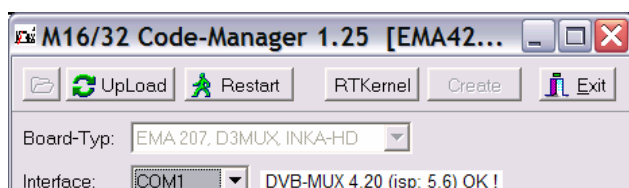


Fig.13: Update window

If a firmware update becomes necessary, a Windows update programme will be made available. The update will be carried out either via the Ethernet interface or via the (RS232) control interface on the EMA 207. For this purpose the computer and the EMA 207 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 setting)

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

Version 1:

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.

Version 2:

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 LEDs on the front flash at the same time. The flashing LEDs 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.

If the connection with the device has become invalid because of the restoration of the original IP address, the steps indicated in Section 3.3.2, “Connecting the network to the computer” must be followed in order, after which access will again be possible.

Version 3:

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 207. The cable must be a null-modem cable. When the program has been started and the various procedures run, the EMA 207 is restarted with all parameters reset.

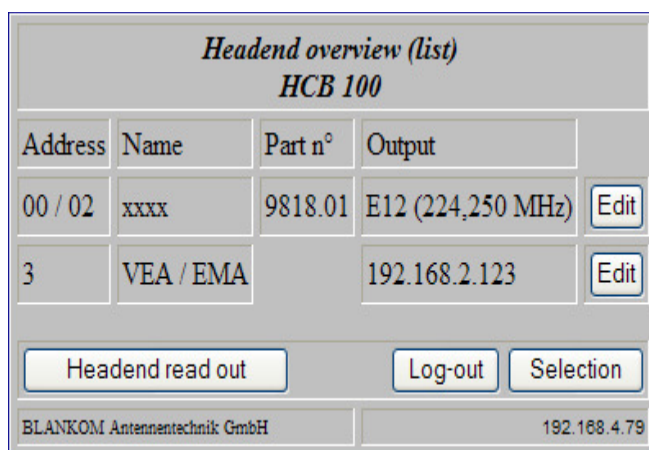
When the second or third versions are used, the IP address of the EMA 207 after the re-start will be: of the EMA 207 after the re-start will be: 192.168.2.86 with the net mask 255.255.255.0.

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

If a EMA 207 is being used in association with B- or C-LINE headend components, the possibility exists (using HCB100 „BLUE“, from 9650.03 upwards) of integrating the encoder into the overview of the headend and calling it up from this screen. A hub will be necessary in this case, through which the Ethernet connections of the HCB100 and the EMA 207 are networked. Before this happens, the “lowest” of the IP addresses of all the EMA 207 encoders must be entered in the configuration menu for the IP address of the HCB100. It is only possible to enter (or change) IP addresses into the HCB 100 directly. This cannot be done from the html user interface.

Warning:

If multiple EMA 207s are being integrated, it is important to note that the HCB 100 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 207s which can be included in the headend overview of an HCB100 is ten. Switching on or re-setting the HCB 100 will cause any EMA 207 in the network to be read and shown in the overview along with the rest of the system. By clicking “Edit” (this word means “change” in German), a link is made to the IP address of the EMA 207 and the login window opens. Once the “serial number” and the “password” have been entered, the EMA 207 can be further configured as described in Section 3.3.3.



Address	Name	Part n°	Output	
00 / 02	xxxx	9818.01	E12 (224,250 MHz)	Edit
3	VEA / EMA		192.168.2.123	Edit

Headend read out Log-out Selection

BLANKOM Antennentechnik GmbH 192.168.4.79

Fig. 14: User interface: HCB 100 headend overview

4. Appendix

4.1 Technical data

Device

Casing, dimensions for installation	19" rack, 1 height unit (steel sheet), HxWxD = 44 x 444 x 300 mm
Operating voltage	85 ... 264 V~, 50/60 Hz or 110 ... 370 V-
Power taken up	15 VA
Weight	approx. 4,500 g

Video Encoder

Standards	PAL/SECAM (50 Hz), NTSC (M, 60 Hz)
Compression	MPEG-2 (MP@ML)
Format	720 x 576 pixels
System bit rate	1,024 ... 15,000 kbps, settable for each individual channel (or slot), depending on the total bandwidth and the number of channels

Audio Encoder

Compression	MPEG-1, layer 2
Sampling frequency	48 kHz, stereo
Bit rate	64 ... 384 kbps

Transport Stream output port

Protocol	DVB-ASI, choice between burst and continuous mode
TS data packet length	Choice between 188 and 204 bytes
Connection	BNC, 75 ohms, 800 mV _{pp}
Bit rate	1 ... 214 Mbps in burst mode, 1 ... 98 Mbps in continuous mode - settable in steps of 1 kbps
Channels	1 ... 4 encoder channels per individual device

Transport Stream input port (input in the case of a multi-device configuration)

Protocol	DVB-ASI, choice between burst and continuous mode, 188 or 204 bytes (will adapt of itself)
Connection	BNC, 75 ohms, 800 mV _{pp}
Bit rate	98 or max. 214 Mbps (continuous or burst mode, respectively)

AV input ports

Video IN	4x BNC / 75 ohms analogue: PAL/SECAM (50 Hz), NTSC (60 Hz), 1 V _{pp} digital: SDI, 270 Mbps (SMPTE 259M-C), 800 mV _{pp} , audio embedded (AES/EBU, 48 kHz) (any analogue audio is fed in through "Audio IN")
Audio IN	4x sockets as per EN50083-5 appendix B (no control functions) Choice between 600 ohms and 10 kilo-ohms, symmetrical, (mono, stereo, dual) +6 dB ... -20 dB: settable in steps of 0.5 dB over the range +6 dB to -20 dB

Remote control

Settings, data	Ethernet interface, UDP/IP
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Extensions

Cascade system	Up to 14 devices can be combined into a cascaded system to form a DVB transport stream using the ASI interface. A maximum of 8 cascades per network (i.e. per headend) is possible.
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Extra functions

Teletext, VPS, WSS	Transparent feed of teletext signals, conversion and onward transmission of VPS und WSS signals
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Options

Teletext	200 pages (generated in the device)
Optional	1,000 additional pages (extended memory)
SNMP	Coming soon
Editable Service ID and PID	Coming soon

4.2 Accessories

4.2.1 Accessories as standard

1	device connection cable
1	19" installation set (4 bolts; 4 washers; 4 cage nuts)
2	replacement T fuses 1A / 250V
1	null modem cable; 3 m; 9 poles (2 sub D sockets)
1	patch cable; cross-linked; 3 m; 8 poles (2 RJ45 plugs)
1	BNC connecting cable; 0.34 m
4	DIN plug connectors, 5 poles
1	guarantee certificate
3	copies of serial number with 5 digits (in the storage pocket of the device manual)
1	operating manual (this document)

4.2.2 Optional accessories

The optional accessories can be ordered individually as required.

Purpose	Plug connection	Length	Type	Item no.
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 8-pole – DIN 8 pole	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 5-pole. -2 x XLR sockets	0.2 m	AAK 536	8025.36
	DIN 5-pole. -2 x 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
Purpose	Plug connection	Length	Type	Item no.
Audio plugs (for cable diameter 6 mm)	DIN plug connector, 5 poles		SV 050	0143
	DIN plug connector, 8 poles		SV 081	0141

m* = 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 synchronous S erialles 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 207 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, byte-burst, byte timing, equality, data byte
DHCP	Dynamic Host Configuration Protocol: 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 channels	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
Kbps	Bit rate	Kilobits per second (where 1 Kilo=1024)
Load	Reads out the parameter settings of the EMA 207 and shows them in the settings masks.	The parameters can be viewed and altered. "Save" saves the edited parameters
Mbps	Bit rate	Megabits per second.
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 (TSs) and a particular (cable) network. Within the network this ID is the same for all TSs.	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 207 is capable of setting up this table. A succeeding modulator component can add to it or overwrite it.

Term	Meaning	Notes
Password	Access to configuration via the IP network is password-protected	The password on delivery is set to: neu
Programme language	This shows the programme language; the abbreviations to be used are those in ISO 639-2 code, (i.e. "deu" for German)	The details will be displayed in the receiver for the information of the watcher.
Programme name	This is the name of the newly generated DVB programme. Every AV channel should be given a name.	The name of the programme 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 programmes, e.g. name of broadcaster, short details, special announcements.
Save	Saves the configuration values which have been set for the EMA 207	These parameters are read using "Load" and stored using "Save"
SDI	Serial Digital Interface for digital, uncompressed video signals	270 MBit/s, transmission via BNC cables, audio data can be embedded
SDT	S ervice D escription T able	This contains the programmes offered and relevant details of broadcaster
Serial number	The 5-digit device serial number	This serial number is on the rear of the device (it will be needed for "login")
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 packeted form)	The whole of the information necessary to enable transmission of digital signals. One Transport Stream can contain more than one programme, with audio, video, teletext and details.
TS-ID	T ransport S tream I dentification (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 eletext 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): WSS 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.