BLANKOM 4K Encoder HDE-4K5

User Manual
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Product Outline

An (U)HD encoder & streamer for live broadcasting platforms and Video-over-IP applications. Up to 3840*2160@30fps UHD resolution. Very stable operation on multicast distribution on local area networks. Suitable for Video-over-IP application through internet. 4 IP output streams at the same time with different resolutions, e.g. for LAN, Youtube (restricted because RTMPs isn’t supported currently), Facebook, Twitch simultaneously.

- h.265 / h.264 encoder & IP streamer combined
- One HDMI input, (TF-) Micro-SD-Card slot for recording/playback
- 2 IP stream output
- Stable and effective embedded HiLinux OS
- HD Resolution 2160p30 (4K), 1080p, 1080i, 720p and downscaling down to 176x144
- Low latency: > 200ms … 1200ms max., depending on configuration and load
- IP output: Unicast / Multicast: RTSP, RTMP, HTTP, UDP/RTP, FLV, OVF, HLS
- Distribution of Video camera, PC Monitor, dif. STB, DVD / Blu-ray player content over LAN, WAN or Internet
- Live stream broadcast, Digital signage, Video conferencing, RTSP-ONVIF support
- Video-over IP applications
- IPTV/OTT/Info-Channel applications
- Local IPTV on LAN applications, Corporate IPTV, Hotel IPTV, Campus IPTV, Education IPTV
- VLC and FFmpeg mode selectable, VBR/CBR bitrate mode encoding
- Logo insertion (as *.bmp file) and Text insertion feature on main stream & on secondary stream(s), for each channel
- Streams to Ustream, Atlas™, Wowza®, and Adobe® Flash® Servers, www.vmix.com conform to YouTube (RTMPs currently not supported), Vimeo, Twitter, Facebook, Twitch live broadcast platforms
- HLS encoding feature, Android and iOS mobile devices compatible

Statement:

Text and pictures herein are subject to changes w/o notifications. The user manual will be updated in real time without special notice. This user manual is provided only as a reference guide for technicians as an example.

Default Values

| The factory default administrator account:     | admin          |
| The factory-default user password:             | admin          |
| The factory default IP address:                | 192.168.1.168   | NM 255.255.255 | GW 192.168.1.1, DNS settings might vary but can be changed to local needs |

Set the administrator’s computer IP as: 192.168.1.* to avoid IP conflicting with the units own default IP address 192.168.1.168.
192.168.1.*: use an IP setting “*” in the number range 2-254 and except the units default IP.
Remark: .0 is often the network router, .1 often the Gateway of the used router, .255 might be a network broadcasting address.
Please change these account settings according to your local policy and network. -> Do not forget to safe and backup the configuration by Web-Interface and its related system-sub-menu.
The encoder can be always set back to factory default settings by using the RESET-switch in Web-IF or the button at the front.

**A few words about Network settings and VLC – Player on a PC/Laptop.**

Usually the default IP settings should be changed according to your local network.

If you have i.e. a company network structure with multiple subnet’s like

A:
- 192.168.0.1 (Gateway example a Fritzbox –DSL Router)
- Netmask 255.255.255.0
- DHCP enabled, or your IP Range for static IP Addresses are 192.168.0.100 - 250

B:
- 192.168.1. ... and so on...

You should configure the network port of the Encoder to your preferred network by using a static and FREE IP address. Avoid collision’s please !!!

If you use the default settings and cannot receive the encoded streams in your device by VLC, please make sure, your network card doesn’t have 2 IP addresses manually setup:

> **VLC cannot gather via which of your IP addresses it should receive the stream. This can be forced by setting your METRIC Values accordingly and/or configure appropriate routes**
Of course, instead of the HDMI-Encoder a usage of the HD-SDI-encoder SDE-264/265 is possible in parallel too. The HDE-4K5 can be easily used with a PC/Laptop with 4K UHD outputs of a 2nd graphic card or a Blue Ray Player output for i.e. Hotel – Guest Information displays in the lobby streaming to a BLANKOM UHD IPTV STB. Because it supports 1 Main-Stream encoding in max. 4K@30fps and 1 sub-stream downscaled into HD or less @30fps in parallel the same content can be deployed to several destinations (HLS, RTMP, RTSP/http, and multicasts).
Specifications:

INPUT

- One HDMI input
- Input Resolution 2160p, 1080p, 1080i, 720p and below
- Embedded audio from HDMI signal or optional Stereo Input by 3.5mm jack

OUTPUT

- Simultaneous 2 different streams output per channel (Mainstream and 1 Substream)
- Video data rate 0.1 Mbps … 32 Mbps
- Output Resolution 2160p, 1080p, 1080i, 720p and below (max. 2160p@30fps or 1080p@30 fps on main stream)
- Main Stream output resolution support: 3840×2160, 1920×1080, 1680×1056, 1280×720, 1024×576, 850×480, 720×576, 720×540, 720×480, 720×404, 704×576, 640×480, 640×360, 608×448, 544×480, 480×480, 480×384, 480×360, 480×320, 480×272, 480×270, 400×320, 400×224, 352×480, 352×228, 320×256, 320×240, 320×180, 240×180, 200×144.
- Latency: 200ms … > 1000ms max., depending on configuration and load

SYSTEM

- HiLinux OS
- Unicast/Multicast HTTP, RTSP, RTMP, UDP/RTP, FLV, ONVIF, HLS
- Video encoder h.264 and h.265 (MPEG-4, AVC) high profile Level 4.0 UHD 4K max. 30fps
- Audio encoder AAC, MP3
- Data interface RJ45, 1000 Base-T Ethernet interface, Management by web browser
- Encoding Rate control CBR/VBR
- GOP Structure IBBP Adv
- Pre-treatment De-interlacing, Noise reduction, Sharpening, Y-C adjustments
- Sampling rate Auto (44100/48000)
- Audio Bit-rate 48K/64K/96K/128K/160K/192K
- Audio Sampling precision 24 bit
- Audio Data Rate 12 kbps ~ 320 kbps .... 40000... max. 640000 depending on used Codec
- User interface: WEB GUI
- 4 different Logo (as *.bmp file) and Text insertion feature on main stream & separately on all 3 secondary streams as well
- Firmware upgrade support by WebIF

GENERAL

- DC 5V 2A power adapter (USB-charger style)
- Dimensions: 103 x 61 x 16mm
- Weight: 150g
- Power consumption: 6W
**Video**

<table>
<thead>
<tr>
<th>Input</th>
<th>1x HDMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports HDMI Resolution</td>
<td>4K@30fps, 1080P/1080i/720P @50/60Hz and below</td>
</tr>
<tr>
<td>Encoding Levels</td>
<td>h.264(MPEG4) / h.265(HEVC) AVC</td>
</tr>
<tr>
<td>Output TS Steam Resolution</td>
<td>max support of 4K@30fps, 1920x1080P@up to 60fps ... downscaling</td>
</tr>
<tr>
<td>Video fps</td>
<td>5-30 fps</td>
</tr>
<tr>
<td>Video Bitrate</td>
<td>0.1... 32Mbps adjustable</td>
</tr>
<tr>
<td>Bitrate control</td>
<td>VBR / CBR</td>
</tr>
<tr>
<td>TS Protocols</td>
<td>Unicast: HTTP/HLS/FLV/RTMP/RTSP (w/ selectable ONVIF)</td>
</tr>
<tr>
<td></td>
<td>Multicast: UDP/RTP</td>
</tr>
<tr>
<td>Playback/Record</td>
<td>From/To optional TF-Card (Micro-SD) exFAT preferred</td>
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**Audio**

<table>
<thead>
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<th>Input</th>
<th>HDMI Audio or external Stereo Jack 3.5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Rates</td>
<td>44.1 kHz, 48.0 kHz</td>
</tr>
<tr>
<td>Encoding</td>
<td>AAC HE and LC / MP3, or G.711 (i-Law/a-Law) for RTSP-ONVIF protocol</td>
</tr>
<tr>
<td>Bitrate</td>
<td>12K ... 320K adjustable dep. On CODEC chosen</td>
</tr>
<tr>
<td>ONVIF</td>
<td>G.711 onvif version: 2.8.32</td>
</tr>
</tbody>
</table>

**Network**

<table>
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<tr>
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<th>1000Base-T Ethernet interface</th>
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</thead>
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**System**

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<th>Control Panel</th>
<th>Http Web</th>
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</thead>
<tbody>
<tr>
<td>Firmware Update</td>
<td>By Web-IF</td>
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</tbody>
</table>

**Working environment**

| Operating temperature | -20 ... 80 °C |
| Storage temperature | -40 ... 90 °C |
| Relative Humidity | 5% ... 90% non-condensing |

**Dimension & Accessories**

| Dimension | 103 x 61 x 16mm |
| Weight | 180g |
| Power adapter | DC 5V 2A |
Appearance and description

LED’s are showing the operating status located at the front of the unit: Operating ready (BLUE), Ethernet connected (GREEN), Signal Input ready (RED). LAN LEDs showing connection and data transfer. RST = RESET Button to factory defaults (use a thin wire & press > 10 seconds). The REC button will light as well when in use.

Size-comparing to a matches-box

and power supply (110V...240V AC 50/60Hz, 5V DC, 2A max)
Installation Guide

Accessories

When you open the package of the device, it is recommended to check delivered items according to the packing list. Normally it should include the following items:

- HDE-4K5 Encoder 1 pcs
- User’s Manual (usually via download PDF from Blankom.de) 1 pcs
- Power Supply with 110…230VAC - 5VDC 2A with Euro plug 1 pcs
- USB-cable 1 pcs

Some models will have Audio-Chinch – 3.5mm jack and/or HDMI cable in the box

Installation Preparation

When users install device, please follow the below steps. The details of installation will be described at the rest part of this chapter. You can also refer rear panel chart during the installation.

**IMPORTANT NOTE:**

Please connect your PC/Laptop and the Encoder(s) always to the Ethernet with a GbE auto-negotiation Switch (10/100/1000BaseT) or fixed 1GbE switches - if both devices are supporting that speed in between. Please do not use PoE Switches. Otherwise you might damage either your laptop or the encoder RJ45 port or at least get connection problems.

Assure that your switch doesn’t do Multicast-blocking on the ports you connect it – if you use UDP/RTP multicasts.

Please use High-Speed HDMI Cables to secure UHD-Content support. DVI to HDMI Adapter do not support Audio, so an external Audio from the sound-card output can be used (Analog Stereo)
The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Connecting signal cables (HDMI/SDI depending on source interface)
- Connecting communication port RJ45 GbE (WEB-IF + Streaming)
- Connecting Power supply
- The LED’s should flash and if the OS is loaded, LED’s are constantly ON
- RJ45 – port LED’s showing Ethernet connection ready
- Suggestion: CAT 6e Ethernet cable for GbEthernet for streaming purpose it should be shielded. Example: DST CAT6 = Double shielded twisted pair

Recording & Playback Presets:

Insert your TF-Card into your PC/Laptop and use an SD-Card adapter if needed:

![Image of file format options](image)

**Remark:** The Encoder supports exFAT or FAT32, please note, that FAT32 supports only file length of max. 4 Gbyte. So exFAT might be the better choice.

Use the USB-function of your Windows based computer to safely unload the TF Card:

![Image of USB function](image)

Now you can insert it into the Micro-SD Card slot. Refreshing the browser will show the space in use:

![Image of SD card slot](image)

Browser configuration

*We recommend to use the latest Firefox browser on your PC/Laptop for this operation.*
Login Interface

A login interface will pop up firstly when the software is running and give a user prompt to input user name and password (The default user name is admin and password is admin). You can change user and password as needed. Details please refer to below ... System Settings). The menu shows up as follows - This might look slightly different depending on your used browser:

You will enter the STATUS page.

First of all change the network settings to your needs:
Network settings:

Default settings: DHCP=OFF because otherwise your router will give it an IP-address and it might change from time to time when restarting the power of the device. You probably need to check your router for its actual IP address ... so better to use a fixed IP.

DNS-address can be changed as well as the default streaming ports for HTTP and RTSP.

In this example we have changed it to 192.168.0.168, GW 192.168.0.1:

-> APPLY and the device asks for a reboot which you should perform:
After the reboot, please log in with your browser and use the new address:

192.168.0.168/indexE.html

Remember: default user/password is admin/admin which can be changed to your needs here:

Back to the Status page:
In this status page the streams you will land in the HDMI-Main-stream info-page and the actual enabled Stream address will be shown. By simply copy and paste (to i.e. VLC-player) of the address an easy setup output can be controlled:

Just copy and paste:

To VLC: Please note, that in some addresses VLC needs this @ in between:
Please be a little patient when changing the HDMI-Source and/or its resolution: The encoder needs some time to swing into the new content (Audio and Video). If after a source changing, the encoder doesn’t stream, you can control the Input value here:

That might be also the case if the input is disconnected or out of range (4K encoder supports only 30fps). Sometimes the encoder need a complete restart.

The AUDIO overview just shows Stereo, Input sample rate and the running encoded bits in size total.
The hardware status is just informal and shows if some packets were interrupted or lost.

System settings:

Here you can change your password. If you once forgot your password, you can RESET the unit by a front-switch button (press RST > 10 seconds better 15 by a needle through the hole) and all default factory settings will come back. Or you can RESET the unit if you already are logged in. The Version info shows actual installed Firmware Version.

Scheduled restart interval adjustment:

The device can also be forced to reboot periodically to swing into new input- and output circumstances -like if the network is periodically interrupted (i.e. by DSL Router or ISP disconnection over night) - you can program a scheduled task for restarting every 0...200 hours.

**Hint:** If you change some settings in particular for the encodings, and press SETUP/Modification, a popup message will appear:
Software update:

Self-explaining isn’t it? The filename must be `upgrade.bin` and must be selected from your PC/Laptop, than start the upload. A reboot will be necessary after this finished Upload -see above menu item.

**WARNING:** Flashing the wrong firmware will cause the device to not be able to start any more. So it is highly recommended to ask us before.
Encoder Settings

The Encoder is designed to save its own CPU and RAM resources to not being overloaded by highest settings applying. So the MAIN Stream support encoding (even upscaling) to 2160p30!

Therefore the Input resolution shouldn’t be higher than that.

Supported Codecs can be chosen in the Stream V(ideo)enc: h.264 or h.265 (HEVC). The bitrate control of the encoding process can be set to VBR (variable) or CBR (constant):

If VBR was selected, another setting appears:

- **Set Stream Venc**: H265
- **channel name**: chan
- **Bitrate control**: vbr
- **Key interval**: 30 [30-180, multiple of 30]
- **Encoded size**: auto
- **Encoding frame rate**: 5 [5-60]
- **MinOp**: 5 [1-51]

- **Set Stream Venc**: H265
- **channel name**: chan
- **Bitrate control**: cbr
- **Key interval**: 30 [30-180, multiple of 30]
- **Encoded size**: 10 K
- **Bitrate**: 400 [16-61200]
- **Fluctuate Level**: 10 K

**techn. data are subject to change w/o notice!**
The default settings are almost sufficient but you can play with them...

Should be kept as default on auto but might stabilise some fluctuations...

Automatically set some issues reg. FFMPEG or VLC-known issues. Usually FFMPEG should be OK. Important:
can be chosen for all of your Multicast output streams which you usually configure (Address + Port) in the Main + Substream menus. Some essential hints for RTP and Multicasts can be found at the end of this manual. Read it carefully before setup a RTP.
DVB-Transportstream related settings:

To be conform with IP-Input of multiplexers / Modulators, several improvements has been done in the past to be DVB-TS conform:

<table>
<thead>
<tr>
<th>PMT ID</th>
<th>200</th>
<th>[1-85535]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport ID</td>
<td>254</td>
<td>[256-3840]</td>
</tr>
<tr>
<td>Stream ID</td>
<td>200</td>
<td>[256-3840]</td>
</tr>
<tr>
<td>Program ID</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SDT name</td>
<td>Service01</td>
<td></td>
</tr>
</tbody>
</table>

TS ID can be inserted.

PMT (Program Map Table) start PID for the VIDEO-PID/Audio PID etc... can be setup. Every stream or Service will get an increased PID-number.

Service name can be changed to your needs as well as the service provider name you choose. TS-empty packets will insert the zero-stuffing PID 8192hex to fill the stream with multiples of zero-packets on top of your datarate for the stream which is usually a variable bitrate stream (DVB).

**UNICAST** can be streamed as Point to Point by HTTP or RTSP (RTMP as well but that is a topic for later in this manual):

A RTSP password can be enabled for the output stream like

HTTP: **www**

HTTP Port: 80 [1-65535]

RTSP: **www**

RTSP Port: 854 [1-65535]

RTSP Authentication: **disable**

RTSP Mode: **disable**

RTSP TCP: **disable**

So the encoder asks the VLC user to insert username/password which are the same like you have setup in:

RTSP Authentication: **enable**

User Name: **mainus**

Password: **mainpw**

RTSP Mode: **video+audio**

RTSP TCP: **UDP**

VLC is asking...

**BTW:** Some settings apply for both Main and secondaries and are adjusted only in the Mainstream settings, like the RTSP net-transport mode: UDP or TCP.

**BTW2:** RTSP is used if need ONVIF (Camera syncs)
Direct Streaming to a Unicast Address P2P:

Unicast IP: 200.0.0.1
Unicast Port: 1234

Multicast (explanations see end of this document):

Multicast IP: 238.10.10.101
Multicast Port: 12246
RTP Server IP: 238.111.111.111
RTP Port: 6666

Sorry for the RTP-Server IP, it should be the DESTINATION where you are streaming to.
RTP is used as a Top Layer of UDP transporting time stamps and additional header information.
And a second stream ion Port-Number +1 = The RTCP information.
MAINSTREAM Settings:

After chosen the Stream values in the SYSTEM Menu (i.e. UDP or RTP) you can start setting up your Main encoder settings.

The Input is automatically detected (takes some seconds if re-connect it or Source has changed) and displayed in the STATUS page:

The Secondary Stream cannot operate as UHD like the Main stream but downscale in HD so it starts from 1080:
Extended Settings:

This works in parallel for both streams Main and secondary.
Here you set ONVIF support for the RTSP as well. Default= Off
Select the source: HDMI embedded or external 3.5mm Jack.

Audio bitrates for sampling can be chosen:

Higher bitrates asuring higher sound quality.

You can select only left or right or both:

as well as the codec:

And the AAC-Version:

as well pass through or resample the Audio:

The device is giving popup hints for settings of different ranges in different modes/protocols and codecs used

You’ll get a hint if the values are not corresponding:

If you need ONVIF:
Audio Level can be decreased or increased:

Both encoder streams can overlay Text in different colours and sizes as well as logo’s you design.

2 Logos can be uploaded independently and will be stored in the unit:

The Main osd logo has to be named **logo.bmp**

while the 2nd osd logo must be named **logo_ext.bmp**

You can adjust your streams Picture corrections/enhancements:
As well as Image settings/filterings:

Better to check the real function by control the streams and there destination players...
Checking stream values with a stream analyser:

Of course, the Input on HDMI will cause the encoder settings capabilities. Example: If the HDMI Input does contain an AC3 Audio Signal, the AC3-mode can will not be processed. If no Audio comes in, no Audio will be processed as well. So it's recommended to check the source than process the Audio encoding settings.

You can also check the Audio codec with i.e. VLC:
Audio Encoding settings

Source can be external 3.5mm Stereo Jack or HDMI embedded.

Encoding-Bitrates can be chosen:
depending on the Codec your are using AAC-LC or HE or MP3

Resampling also:

RTSP mode:

If you want to use ONVIF, than RTSP is mandatory to setup as the output stream.

For loudness adjustment you can change the Audio Amplifying or attenuation:

Audio encoding settings are a general issue and are working for all streams: Main – and sub-streams.
Logo and Text-Insertion:

Every Stream outputs can insert up to 4 different static text messages and 1 Logo which can be uploaded:

We have done that with our 'setting signals...':

The format of the background is importand and if the logo should be transparent !!!

The Logo is limited to the file-mode BMP (Windows usual bitmap). The Logo can be designed as Transparent by keeping its background in the colour – 0xF1F1F1 (a slightly grey): Please keep an eye on its max resolutions and size.

Sometimes its easy to convert a transparent PNG to BMP with PC grafic tools and might work.

Adding text:
Is as easy as the menu explains but you need to chose the right color:
Picture and other enhancement settings:

Smart-Encoding can be chosen if needed (i.e. b-frames):
RTMP-Settings: Streaming as a CLOUD:

This enables HLS and RTMP in parallel. The unit should be as a RTMP media device...
But the RTMP streaming settings have to be done here:
HDMI-Main or 2nd encoder setup:

Example for streaming to VIMEO Live by RTMP:

Encoding Type:1920x1080@25
Bitrate (kbit):1800
HLS URL:Disable
FLY URL:Disable
RTSP URL:Disable
Multicast URL:Disable
VIMEO gives the user an RTMP–address with a live token at the end. No username/password is necessary because they handover individual stream-keys which simply needs to be inserted as

```
rtmp://rtmp.cloud.vimeo.com/live?token=**********/streamkey
```

Than you can control it by checking the vimeo live portal of your stream:

![Vimeo Live Portal](image)

So that’s all for the configuration actually. Do not expect a high professional encoder with realtime encoding capabilities because such units cost around 10K USD and more.

Also this encoder is limited to one Audio mode only (no Dual Language AC3 support or multiple Stereo by embedded SDI signals (depending on Frontend used : HDMI/HD-SDI/VGA/CVBS, ...).
Regarding Latency:

Depends on used Chipset. Please do not expect a realtime encoding from this devices. The range is from 200ms up to 2 seconds (worst case).

Here is an example page used with an encoder and a media server by RTMP:

The Latency is of course depending from the encoder settings profile and the related values like:

- Bitrate, Profile: VBR/CBR, Codec, Frame rates, ... BTW: Upscaling is consuming more CPU power

And Stream capacity and Picture Improvement settings.

- Downscaling settings (Same as Input ... down to 176x144 size)
- And finally the OSD Insertion actions (if you enable this).

All these values have an impact on processing load and therefore the latency.
Recording capabilities

A Micro TF Card can be inserted in the slot at the back:

The record button can be used for manually start and stop it.

This TF Card should be one with special high-speed with enough Memory for your actions.

exFAT is recommended because of the FAT32 restrictions of max. 4Gbyte storage.
Different modes can be selected.

With the file manager you can manage them to and from the TF Card by automatically opening an FTP access to it:

**FTP-Stammverzeichnis auf 192.168.0.160**

```plaintext
11/13/2018 12:00  Verzeichnis System Volume Information
01/01/2000 12:00  B count.bak
01/01/2000 12:00  B count.dat
01/01/2000 12:00  66,229,856 record-video-00001.mp4
01/01/2000 12:00  29,032,078 record-video-00002.mp4
01/01/2000 12:00  25,032,894 record-video-00003.mp4
01/01/2000 12:00  147,922,027 record-video-00004.mp4
01/01/2000 12:00  98,729,843 record-video-00005.mp4
01/01/2000 12:00  3,529,591 record-video-00006.mp4
01/01/2000 12:00  8,045,456 record-video-00007.mp4
01/01/2000 12:00  8,081,453 record-video-00008.mp4
01/01/2000 12:00  8,571,595 record-video-00009.mp4
01/01/2000 12:00  8,719,386 record-video-00010.mp4
01/01/2000 12:00  8,726,315 record-video-00011.mp4
01/01/2000 12:00  4,116,486 record-video-00012.mp4
01/01/2000 12:00  8,803,216 record-video-00013.mp4
01/01/2000 12:00  8,462,269 record-video-00014.mp4
01/01/2000 12:00  8,726,425 record-video-00015.mp4
01/01/2000 12:00  8,928,110 record-video-00016.mp4
01/01/2000 12:00  8,984,285 record-video-00017.mp4
01/01/2000 12:00  8,728,974 record-video-00018.mp4
01/01/2000 12:00  8,692,096 record-video-00019.mp4
01/01/2000 12:00  8,719,439 record-video-00020.mp4
01/01/2000 12:00  8,280,857 record-video-00021.mp4
01/01/2000 12:00  4,772,036 record-video-00022.mp4
01/01/2000 12:00  2,255,443 record-video-00023.mp4
01/01/2000 12:00  77,717 record-video-00024.mp4
```

Format will erase all content on the TF Micro-SD Card.
Finally some useful Hints about the network streamings:

We recommend to make yourself familiar with the h.264/h.265 AVC (and HEVC depending on Encoder unit) encoding methods as well as streaming itself. IGMP is one of the important mechanism for IPTV securing overloadings of i.e. STB’s by pushing too many streams to it.

As a **Multicast capable Switch** we recommend is the HP (ARUVA) 2530 24G or 48G. (For Floor switches we have an own branded one and support IGMP as well) IGMP should be set to ON in the port configs. The latest HP Firmware might not be the best choice. Better to test IGMP functions before installation into a HOT running System and eventually do a downgrade of the Firmware. This one works:
Encoding and codec parameters


Loss resilience features including:

- A Network Abstraction Layer (NAL) definition allowing the same video syntax to be used in many network environments. One very fundamental design concept of H.264 is to generate self-contained packets, to remove the header duplication as in MPEG-4's Header Extension Code (HEC). This was achieved by decoupling information relevant to more than one slice from the media stream. The combination of the higher-level parameters is called a parameter set. The H.264 specification includes two types of parameter sets: Sequence Parameter Set (SPS) and Picture Parameter Set (PPS). An active sequence parameter set remains unchanged throughout a coded video sequence, and an active picture parameter set remains unchanged within a coded picture. The sequence and picture parameter set structures contain information such as picture size, optional coding modes employed, and macroblock to slice group map.

- Flexible macroblock ordering (FMO), also known as slice groups, and arbitrary slice ordering (ASO), which are techniques for restructuring the ordering of the representation of the fundamental regions (macroblocks) in pictures. Typically considered an error/loss robustness feature, FMO and ASO can also be used for other purposes.

- Switching slices, called SP and SI slices, allowing an encoder to direct a decoder to jump into an ongoing video stream for such purposes as video streaming bit rate switching and "trick mode" operation. When a decoder jumps into the middle of a video stream using the SP/SI feature, it can get an exact match to the decoded pictures at that location in the video stream despite using different pictures, or no pictures at all, as references prior to the switch.

General notes about Streams:

Multicast Address Ranges:

We recommend, that the addressing of your Multicast streams should be in conjunction with this listings to avoid conflicts with other network equipment or protocols. https://www.iana.org/assignments/multicast-addresses/multicast-addresses.xhtml

One small part from this:

IPv4 Multicast Address Space Registry

Last Updated 2018-01-05

Expert(s)
Stig Venaas

Note
Host Extensions for IP Multicasting [RFC1112] specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. The multicast addresses are in the range 224.0.0.0 through 239.255.255.255. Address assignments are listed below.

The range of addresses between 224.0.0.0 and 224.0.0.255, inclusive, is reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols, such as gateway discovery and group membership reporting. Multicast routers should not forward any multicast datagram with destination addresses in this range, regardless of its TTL.
Available Formats  XML  HTML  Plain text

Registries included below

- Local Network Control Block (224.0.0.0 - 224.0.0.255 (224.0/24))
- Internetwork Control Block (224.0.1.0 - 224.0.1.255 (224.0/24))
- AD-HOC Block I (224.0.2.0 - 224.0.255.255)
- RESERVED (224.1.0.0-224.1.255.255 (224.1/16))
- SDP/SAP Block (224.2.0.0-224.2.255.255 (224.2/16))
- AD-HOC Block II (224.3.0.0-224.4.255.255 (224.3/16, 224.4/16))
- RESERVED (224.5.0.0-224.5.255.255 (251/16s))
- DIS Transient Groups 224.252.0.0-224.255.255.255 (224.252/14))
- RESERVED (225.0.0.0-231.255.255.255 (7/8s))
- Source-Specific Multicast Block (232.0.0.0-232.255.255.255 (232/8))
- GLOP Block
- AD-HOC Block III (233.252.0.0-233.255.255.255 (233.252/14))
- Unicast-Prefix-based IPv4 Multicast Addresses
- Scoped Multicast Ranges
- Relative Addresses used with Scoped Multicast Addresses

Multicast (as opposed to unicast) is used to send UDP packets from 1 source to multiple destination servers. This is useful for example for streaming from a satellite/DVB-T receiver to multiple receiving PCs for playback. Multicast can also be used on the output of an encoder to feed multiple streaming servers. Multicast only works with UDP and is not possible with TCP due to the 2 way nature of TCP, most commonly multicast is used with RTP and MPEG2-TS.

A multicast IP address must be chosen according to IANA information, we recommend using an address in the range 239.0.0.0 to 239.255.255.255 as this is reserved for private use. Using multicast addresses in the 224.0.0.0 range may clash with existing services and cause your stream to fail. For more details see http://www.iana.org/assignments/multicast-addresses/multicast-addresses.xml

Choosing a UDP port number for multicast streams is also important. Even if you use a different multicast IP for each of your streams, we strongly recommend using different UDP port numbers as well. This is because a server and all software running on the server receives ALL multicast traffic on an open port and extra processing is required to filter out the required traffic. If the each stream arrives on a different port, the server can safely ignore any traffic on ports that are not open. Port numbers MUST be chosen so that don’t clash with any existing services or ephemeral ranges. The ephemeral range for Windows Vista, 7, 2008 is 49152 to 65535, for older Windows it is 1025 to 5000 and for Linux it is 32768 to 61000. For more information on Windows see http://support.microsoft.com/kb/929851 Care should also be taken to avoid system ports 0 to 1024. See http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml Generally one of the unassigned User Ports (1024-49151) should be used, you can run the netstat -abn (as admin under windows) command to see which ports are currently in use.
Registered port

A registered port is a network port (a sub-address defined within the Internet Protocol, in the range 1024–49151) assigned by the Internet Assigned Numbers Authority (IANA) (or by Internet Corporation for Assigned Names and Numbers (ICANN) before March 21, 2001, [1] or by USC/ISI before 1998) for use with a certain protocol or application.

Ports with numbers 0–1023 are called system or well-known ports; ports with numbers 1024-49151 are called user or registered ports, and ports with numbers 49152-65535 are called dynamic and/or private ports. [2] Both system and user ports are used by transport protocols (TCP, UDP, DCCP, SCTP) to indicate an application or service.

- Ports 0–1023 – system or well-known ports
- Ports 1024–49151 – user or registered ports
- Ports >49151 – dynamic / private ports


Range for Ephemeral port

The Internet Assigned Numbers Authority (IANA) suggests the range 49152 to 65535 (2¹⁵+2¹⁴ to 2¹⁶–1) for dynamic or private ports. [1]

Many Linux kernels use the port range 32768 to 61000. [note 2] FreeBSD has used the IANA port range since release 4.6. Previous versions, including the Berkeley Software Distribution (BSD), use ports 1024 to 5000 as ephemeral ports. [2][14]


Packet structure

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Octet</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octet</td>
<td>Bit</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Source port</td>
<td>Destination port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>Length</td>
<td>Checksum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The UDP header consists of 4 fields, each of which is 2 bytes (16 bits). [1] The use of the fields "Checksum" and "Source port" is optional in IPv4 (pink background in table). In IPv6 only the source port is optional (see below).
Source port number

This field identifies the sender's port when meaningful and should be assumed to be the port to reply to if needed. If not used, then it should be zero. If the source host is the client, the port number is likely to be an ephemeral port number. If the source host is the server, the port number is likely to be a well-known port number. [4]

Destination port number

This field identifies the receiver's port and is required. Similar to source port number, if the client is the destination host then the port number will likely be an ephemeral port number and if the destination host is the server then the port number will likely be a well-known port number. [4]

Length

A field that specifies the length in bytes of the UDP header and UDP data. The minimum length is 8 bytes because that is the length of the header. The field size sets a theoretical limit of 65,535 bytes (8 byte header + 65,527 bytes of data) for a UDP datagram. However the actual limit for the data length, which is imposed by the underlying IPv4 protocol, is 65,507 bytes (65,535 – 8 byte UDP header – 20 byte IP header). [4]

In IPv6 jumbograms it is possible to have UDP packets of size greater than 65,535 bytes. [5] RFC 2675 specifies that the length field is set to zero if the length of the UDP header plus UDP data is greater than 65,535.

Checksum

The checksum field may be used for error-checking of the header and data. This field is optional in IPv4, and mandatory in IPv6. [6] The field carries all-zeros if unused. [7]

RTP:

a part from: https://tools.ietf.org/html/rfc3550

Chapter 11:
RTP relies on the underlying protocol(s) to provide demultiplexing of RTP data and RTCP control streams. For UDP and similar protocols, RTP SHOULD use an even destination port number and the corresponding RTCP stream SHOULD use the next higher (odd) destination port number.

For applications that take a single port number as a parameter and derive the RTP and RTCP port pair from that number, if an odd number is supplied then the application SHOULD replace that number with the next lower (even) number to use as the base of the port pair. For applications in which the RTP and RTCP destination port numbers are specified via explicit, separate parameters (using a signaling protocol or other means), the application MAY disregard the restrictions that the port numbers be even/odd and consecutive although the use of an even/odd port pair is still encouraged. The RTP and RTCP port numbers MUST NOT be the same since RTP relies on the port numbers to demultiplex the RTP data and RTCP control streams.

In a unicast session, both participants need to identify a port pair for receiving RTP and RTCP packets. Both participants MAY use the same port pair. A participant MUST NOT assume that the source port of the incoming RTP or RTCP packet can be used as the destination port for outgoing RTP or RTCP packets. When RTP data packets are being sent in both directions, each participant’s RTCP SR packets MUST be sent to the port that the other participant has specified for reception of RTCP. The RTCP SR packets combine sender information
for the outgoing data plus reception report information for the incoming data. If a side is not actively sending data (see Section 6.4), an RTCP RR packet is sent instead.

Note: Regarding SAP (Session Announcement Protocol)

IPv4 global scope sessions use multicast addresses in the range 224.2.128.0 - 224.2.255.255 with SAP Announcements being sent to 224.2.127.254 Port 9875 (note that 224.2.127.255 is used by the obsolete SAPv0 and MUST NOT be used).

IPv4 administrative scope sessions using administratively scoped IP multicast. The multicast address to be used for SAP announcements is the highest multicast address in the relevant administrative scope zone.

For example, if the scope range is 239.16.32.0 - 239.16.33.255, then 239.16.33.255 is used for SAP Announcements.
# Appendix DB

## Conversions of Power @ 75Ω / Umrechnungstabelle dBµV <-> dBm

<table>
<thead>
<tr>
<th>dBmV</th>
<th>dBµV</th>
<th>dBm 75Ω</th>
<th>mV RMS</th>
<th>mW 75Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>68</td>
<td>-40.75</td>
<td>2.51</td>
<td>8.4E-05</td>
</tr>
<tr>
<td>9</td>
<td>69</td>
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<td>1.1E-04</td>
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<td>3.16</td>
<td>1.3E-04</td>
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<td>3.55</td>
<td>1.7E-04</td>
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<td>4.47</td>
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<td>mV RMS</td>
<td>mW 75Ω</td>
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</tbody>
</table>
Appendix A

Product Disposal

Warning! Ultimate disposal of this product should be handled according to all national laws and regulations.

製品の廃棄
この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

警告
本产品的废弃处理应根据所有国家的法律和规章进行。

Warning
Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!
Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention
La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

경고
이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing
De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.
Safety instructions

Read the safety instructions carefully before assembling or commissioning the device and ensure that you comply with them.

1. Installation

- Danger: The device may only be installed and started up by competent people (see EN 60065).
- Danger: The device and the peripheral distribution devices must be earthed properly (potential equalization) in accordance with EN 60728-11 before Commissioning and remain earthed even when the device is dismantled.
- Danger: The device may not be installed on a flammable base (risk of fire).
- Danger: Only connect the device to a socket that is installed correctly and connected to devices that has an earth conductor (Depending on Model and Usage).
- Danger: Plan the assembly or installation location to ensure that children cannot play with the device and its connections. There is a risk of electric shock (Danger of death).
- Danger: Select an assembly or installation location in which fluids or objects cannot get into the device under any circumstances (e.g. condensation, water for watering plants, etc.).
- Danger: Ventilation slots and refrigeration units are important function elements on the devices. If devices have refrigeration units or ventilation slots, you must ensure that they are never covered or built over. Also ensure that there is sufficient air circulation around the device. This prevents possible damage to the device and the risk of fire due to overheating. Ensure a minimum of clearance of 20cm between the device and other objects.
- Danger: The assembly or installation location must allow all connected cables to be laid safely. Cables and power supply cables must not be damaged or crushed by any objects. Furthermore, ensure that cables are not laid in the immediate vicinity of sources of heat (e.g. radiators, other electrical devices, fireplaces, etc.) (Risk of fire), (risk of electric shock danger of death)
- Danger: In order to prevent damage to the device, as well as possible subsequent damage (risk of fire), devices intended for installation on the wall are only permitted to be installed on a level surface and not above head height.
- Warning: (Only for optical transmitters and their peripheral distribution devices) Never look directly or indirectly into the laser beam. Only connect the device to the power supply once all optical lines are connected securely.
- Warning: The safety regulations in the relevant current standards EN 60728-11 and EN 60065 must be complied with.
- Warning: Comply with all applicable national safety regulations and standards.
- Warning: The device's mains plug must be easily accessible at all times.
- Warning: Follow all instructions in the device-specific operating manual.

2. Operation

- Danger: The device is only permitted to be operated in dry rooms in a non-tropical climate. In damp rooms or outdoors, there is the risk of short circuits (risk of fire) or electric shock (danger of death).
- Danger: Do not insert any objects through the ventilation slot. Risk of electric shock (danger of death).
- Danger: Do not put any containers filled with liquid (e.g. vases) on the device. There is a risk of electric shock (danger of death) or (risk of fire).
- Danger: No open sources of fire such as burning candles are permitted to be placed on the device (risk of fire).
- Danger: Ensure that there is a clearance of at least 20cm around the device. The device ventilation is not permitted to be impaired by covering the
- Ventilation openings with objects such as newspapers, tablecloths, curtains, etc. (risk of fire).
- Warning: Follow all instructions in the device-specific operating manual.
3. Maintenance

- **Danger:** Maintenance tasks must always be carried out by competent people (see EN 60065).
- **Danger:** Do not carry out servicing work during thunderstorms. There is a risk of electric shock (danger of death).
- **Warning:** (Only for devices with batteries): Risk of explosion if the battery is replaced improperly. Only replace with the same type!
- **Warning:** Batteries must not be subjected to excessive heat such as sunlight, fire or similar (risk of explosion).
- **Warning:** Only use the manufacturer's accessories or accessories with identical technical properties.
- **Warning:** (For optical transmitters and their peripheral distribution devices) unplug the mains plug before dismantling the device.

4. Repairs

- **Danger:** The device may only be opened by competent people (see EN 60065). Before opening the device, unplug the mains plug or disconnect the power supply; otherwise there is a danger of death! The device is only permitted to be connected to the power and operated when the mains adaptor cover is installed. This also applies when you clean the device or work on the connections.
- **Danger:** Repairs on the device may only be carried out by a specialist (see EN 60065) observing the applicable VDE (German Association for Electrical, Electronic & Information Technologies) guidelines.
- **Danger:** Only use components of the same type and with identical technical properties for the repair. Otherwise, there is a risk of electric shock (danger of death) and risk of fire.
- **Warning:** (For optical transmitters and their peripheral distribution devices) unplug the mains plug before dismantling the device.

If you have any queries regarding repairs, please contact our company service: E-mail: info@blankom.de, contact: www.blankom.de

5. Sale

- **Caution:** If the device is sold, these safety instructions and the operating manual for the relevant device must be handed over to the purchaser.

6. Disposal

- **Caution:** Dispose of the device in accordance with the applicable environmental regulations.
- **Caution:** Dispose of batteries (if present) in accordance with the applicable environmental regulations.
- Cartons and all pcs. of the packaging can be sent back to us for recycling for sustainable environment protection.
Sicherheitshinweise

Sicherheitshinweise bitte vor Montage bzw. Inbetriebnahme des Gerätes sorgfältig lesen und befolgen.

1. Installation

Gefahr: Das Gerät darf ausschließlich von sachverständigen Personen (siehe EN 60065), installiert und in Betrieb genommen werden.

Gefahr: Das Gerät und/oder die Verteilperipherie muß vor Inbetriebnahme gemäß EN 60728-11 vorschriftsmäßig geerdet sein (Potentialausgleich) und bleiben, auch wenn das Gerät ausgebaut wird.

Gefahr: Das Gerät darf nicht auf brennbarem Untergrund montiert werden (Brandgefahr).

Gefahr: Schließen Sie das Gerät nur an eine vorschriftsmäßig installierte Steckdose mit Schutzleiter an.

Gefahr: Planen Sie den Montage - bzw. Aufstellungsort so, daß Kinder nicht am Gerät und dessen Anschlüssen spielen können.

Es droht Gefahr durch elektrischen Schlag (Lebensgefahr).

Gefahr: Wählen Sie einen Montage - bzw. Aufstellungsort, an dem unter keinen Umständen Flüssigkeiten oder Gegenstände in das Gerät gelangen können (z.B. Kondenswasser, Gießwasser etc.).


Gefahr: Der Montage- bzw. Aufstellort muß eine sichere Verlegung aller angeschlossenen Kabel zulassen. Stromversorgungskabel sowie Zuführungskabel dürfen nicht durch irgendwelche Gegenstände beschädigt oder gequetscht werden. Es ist darüber hinaus unbedingt darauf zu achten, daß Kabel nicht in die direkte Nähe von Wärmequellen verlegt werden (z.B. Heizkörper, andere Elektrogeräte, Kamin etc.) (Brandgefahr), (Gefahr durch elektrischen Schlag).

Gefahr: Um sowohl Beschädigungen am Gerät als auch mögliche Folgeschäden (Brandgefahr) zu vermeiden, dürfen für Wandmontage vorgesehene Geräte nur auf einer ebenen Grundfläche montiert werden und nicht über Kopf.

Warnung: (Nur für optische Sender sowie deren Verteilperipherie) Blicken Sie auf keinen Fall direkt oder indirekt in den Laserstrahl. Schließen Sie das Gerät erst an die Stromversorgung an, wenn alle elektrischen und optischen Leitungen sicher verbunden sind.

Warnung: Die Sicherheitsbestimmungen der jeweils aktuellen Normen EN 60728-11 und EN 60065 sind zwingend einzuhalten.

Warnung: Befolgen Sie auch alle anwendbaren nationalen Sicherheitsvorschriften und Normen.

Warnung: Der Netzstecker des Gerätes muß jederzeit leicht erreichbar sein.

Warnung: Befolgen Sie alle Instruktionen in den gerätespezifischen Bedienungsanleitungen

2. Betrieb

Gefahr: Das Gerät darf nur in trockenen Räumen bei nicht tropischem Klima betrieben werden. In feuchten Räumen oder im Freien besteht die Gefahr von Kurzschluß (Brandgefahr) oder elektrischen Schlag (Lebensgefahr).

Gefahr: Stecken Sie keine Gegenstände durch die Lüftungsschlitze. Gefahr durch elektrischen Schlag (Lebensgefahr).

Gefahr: Stellen Sie keine mit Flüssigkeit gefüllten Gefäße (wie z. B. Vasen) auf das Gerät. Es droht Gefahr durch elektrischen Schlag (Lebensgefahr) oder
(Brandgefahr).

**Gefahr:** Es dürfen keine offenen Brandquellen, wie z. B. brennende Kerzen, auf das Gerät gestellt werden (Brandgefahr).

**Gefahr:** Sorgen Sie für einen Freiraum von mindestens 20cm um das Gerät. Die Belüftung des Gerätes darf nicht durch Abdecken der Belüftungsoffnungen mit Gegenständen wie z. B. Zeitungen, Tischdecken, Gardinen usw. behindert werden (Brandgefahr).

**Warnung:** Befolgen Sie alle Instruktionen in der gerätespezifischen Bedienungsanleitung.

### 4. Wartung

**Gefahr:** Wartungsarbeiten sind stets von sachverständigen Personen (siehe EN 60065) vorzunehmen.

**Gefahr:** Keine Servicearbeiten bei Gewitter. Es droht Gefahr eines elektrischen Schlags (Lebensgefahr).

**Warnung:** (nur für Geräte mit Batterie): Explosionsgefahr bei unsachgemäßem Auswechseln der Batterie. Ersatz nur durch den gleichen Typ!

**Warnung:** Batterien dürfen nicht übermäßiger Wärme wie Sonnenschein, Feuer oder dergleichen ausgesetzt werden (Explosionsgefahr).

**Warnung:** Verwenden Sie nur das Zubehör des Herstellers oder Zubehör mit identischen technischen Eigenschaften.

**Warnung:** (Bei optischen Sendern sowie deren Verteilperipherie) ziehen Sie den Netzstecker bevor das Gerät ausgebaut wird.

### 5. Reparatur

**Gefahr:** Das Gerät darf nur durch sachverständige Personen (siehe EN 60065) geöffnet werden. Vor Öffnen des Gerätes Netzstecker ziehen bzw. Stromzuführung entfernen, andernfalls besteht Lebensgefahr! Das Gerät darf nur mit montierter Netzteilabdeckung an Spannung angeschlossen und betrieben werden. Dies gilt auch, wenn Sie das Gerät reinigen oder an den Anschlüssen arbeiten.

**Gefahr:** Reparaturen am Gerät sind ausschließlich vom Fachmann (siehe EN 60065) unter Beachtung der geltenden VDE-Richtlinien durchzuführen.

**Gefahr:** Verwenden Sie nur Bauteile des gleichen Typs und mit identischen technischen Eigenschaften für die Reparatur, andernfalls droht Gefahr eines elektrischen Schlags (Lebensgefahr) und Brandgefahr.

**Warnung:** (Bei optischen Sendern sowie deren Verteilperipherie) ziehen Sie den Netzstecker bevor das Gerät ausgebaut wird.

Bei Fragen zur Reparatur wenden Sie sich an den IRENIS-Service: E-Mail: info@blankom.de, Kontakt: www.blankom.de

### 6. Verkauf

**Vorsicht:** Im Falle eines Verkaufs müssen diese Sicherheitshinweise und die Bedienungsanleitung des entsprechenden Geräts dem Käufer ausgehändigt werden.

### 7. Entsorgung

**Vorsicht:** Entsorgen Sie das Gerät entsprechend den geltenden umweltrechtlichen Bestimmungen. Elektrische und elektronische Geräte dürfen nicht in den Hausmüll!

**Vorsicht:** Entsorgen Sie Batterien (falls vorhanden), entsprechend den geltenden umweltrechtlichen Bestimmungen.

**Verpackungen** können an uns zurückgeschickt werden. Wir kümmern uns um Recycling und/oder fachgerechte Entsorgung.
Installation guide for F-connectors:

Installationhinweis für den F-Anschluß:

Die LNB-Anschlüsse sind meist entsprechend gekennzeichnet

*The LNC – connectors are almost marked as:*

- **HH** = Horizontal High-Band
- **HL** = Horizontal Low-Band = **LH**
- **VL** = Vertical Low-Band = **LV**


Electronic equipment is not household waste - in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 on used electrical and electronic equipment, it must be disposed of properly.

At the end of its service life, take this unit for disposal to an appropriate official collection point

**Installation and safety instructions / Montage und Sicherheitshinweise**

- Die beschriebenen Geräte dienen ausschließlich der Installation von Satelliten-Empfangsanlagen.
- *The equipment described is designed solely for the installation of satellite receiver systems.*
- Jegliche anderweitige Nutzung oder die Nichtbeachtung dieses Anwendungshinweises hat den Verlust der Gewährleistung bzw. Garantie zur Folge.
- *Any other use, or failure to comply with these instructions, will result in voiding of warranty cover.*
- Die Geräte dürfen nur in trockenen Innenräumen montiert werden. Nicht auf oder an leicht entzündlichen Materialien montieren.
- *The equipment may only be installed in dry indoor areas. Do not mount on or against highly combustible materials.*
- Die Geräte sind mit einer Potenzial-Ausgleichsleitung (Cu, mindestens 4 mm²) zu versehen.
- *The equipment must be provided with an earthing wire (Cu, at least 4 mm²).*
- Die Sicherheitsbestimmungen der jeweils aktuellen Normen EN 60728-11 und EN 60065 sind zu beachten.
- *The safety regulations set out in the current EN 60728-11 and EN 60065 standards must be complied with*
- Verbindungsstecker: HF-Stecker 75 Ohm (Serie F) nach EN 61169-24
- Connector: **HF plug 75 Ohm (series F) to EN 61169-24**
- **Nicht benutzte Teilnehmerausgänge** sollten mit 75-Ohm Widerständen (z. B. EMK 03) abgeschlossen werden. (Verringerung der terrestrischen Signalwelligkeit)
- **Unused subscriber ports** should be closed off by 75 Ohm resistors (e.g. EMK 03).
- **Nicht benutzte Kaskadenausgänge** sind mit 75 Ohm Widerständen inkl. DC-Blocker abzuschließen. 75 Ohm Widerstände ohne Gleichspannungssperren können das Gerät beschädigen!
- **Unused trunk outputs** must be terminated with 75Ohm resistors including DC Blocker. Otherwise the device may be inoperable or damaged.

Please check the installation against shortage in coax cables and connectors before switching on. The input levels should be adjusted accordingly. Power-LED’s showing operational mode. If this is not illuminated, please check the power source.

Stromführendes Gerät
Current-carrying unit

- Nicht öffnen oder am Gerät manipulieren!
- Do not open or tamper with the unit!
- Bei Arbeiten an der Anlage immer die Netzstecker aus der Steckdose ziehen!
- When working on the system always unplug the mains plug from the wall socket!
- Auf ausreichenden Abstand achten! Nach allen Seiten mind. 5 cm!
- Ensure adequate clearance! Min. 5 cm to all sides!
- Nicht über Kopf montieren.
- Do not install overhead.
- Für die Geräteentwärmung muss freie Luftzirkulation möglich sein. Überhitzungsgefahr!
- Free circulation of air must be possible to discharge the heat emitted by the unit. Risk of overheating!
- Zulässige Umgebungstemperatur -20 bis +50°C
- Permissible ambient temperature -20 to +50°C

**Important notes: / Zur Beachtung**

- Auf das Netzgerät dürfen keine mit Flüssigkeit gefüllten Gegenstände gestellt werden.
- No liquid-filled items may be placed on top of the power supply unit.
- Das Gerät darf nicht Tropf- oder Spritzwasser ausgesetzt sein.
- The power supply unit must not be exposed to dripping or splashing water.
- Der Netzstecker muss ohne Schwierigkeiten zugänglich und benutzbar sein.
- The mains plug must be easily accessible and operable.
- Das Gerät kann nur durch Ziehen des Netzsteckers vom Netz getrennt werden.
- The only reliable method of disconnecting the unit from the mains is to unplug it.
- Bei größerem Durchmesser des Kabel- Innenleiters als 1,2 mm bzw. Grat können die Gerätebuchsen zerstört werden.
- If the inner cable conductor diameter is greater than 1.2 mm or in case of burr, the device sockets may be destroyed.

Bitte installieren Sie die Anschlüsse gemäß dem Aufdruck
Please install according to the sticker on the Multiswitch

Hinweis: Elektrische Installationen sollten nur durch geschultes Fachpersonal vorgenommen werden!
Note: Electrical installations should only be done by well-educated and skilled technicians!
Contact:

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Owiesenkehre 1
D-22177 Hamburg - Germany

Managing Director: Dipl.Ing. Murad Önen
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techn. data are subject to change w/o notice!