MAGIC AE4 DAB/DAB+ Audio Encoder

Quad DAB/DAB+ Audio Encoder

Hardware Manual

AVT Audio Video Technologies

INDEX

1 INTRODUCTION

MAGIC AE4 DAB/DAB+ Audio Encoder offers in the standard version one DAB/DAB+ hardware encoder and can be optionally upgraded to a dual, triple or quad DAB/DAB+ encoder. Each of the four channels are independent and can be configured independently as a DAB or DAB+ encoder.

The audio programs can be supplied via the four digital AES/EBU stereo interfaces. An analogue Stereo interface is also available. The unit offers a headphone interface on the front side.

MAGIC AE4 is realized in a compact, fan less and DSP-based design and has an integrated wide area power supply, a keypad with display and LEDs on the front side.

1.1 Conventions

In this manual the following conventions are used as text markers:

The **Tip** symbol marks information which facilitates the operation of the system in its daily use.

The **Note** symbol marks general notes to observe.

The **Attention** symbol marks very important advice that is absolutely to observe. In case of non-observance malfunctions and even system errors are possible.

1.2 Safety

The unit described has been designed to the latest technical parameters and complies with all current national and international safety requirements. It operates on a high level of reliability because of long-term experience in development and constant and strict quality control in our company.

This manual contains basic safety instructions that must be observed during configuration and operation. It is essential that the user reads this manual before the system is used and that a current version of the manual is always kept close to the equipment.

1.3 General safety requirements

To keep the technically unavoidable residual risk to a minimum, it is absolutely necessary to observe the following rules:

- Transport, storage and operation of the unit must be under the permissible conditions only.

- Installation, configuration and disassembly must be carried out only by trained personal on the basis of the respective manual.

- The unit must be operated by competent and authorised users only.

- The unit must be operated in good working order only.

- The device must be protected from water.

- The device may only be installed in indoor rooms.

- The device may only be cleaned with a dry cloth.

- Any conversions or alterations to the unit or to parts of the unit (including software) must be carried out by trained personnel authorised by the manufacturer. Any conversions or alterations carried out by other persons lead to a complete exemption of liability.

- Only specially qualified personnel are authorised to remove and override safety measures, and to carry out the maintenance of the system.

- External software is used at one's own risk. Use of external software can affect the operation of the system.

- Use only tested and virus-free date carriers.

1.4   Construction

MAGIC AE4 contains a mainboard with an additional connector, a display, a keypad and five LEDs as well as a headphone interface on the front side.

The functions of the system are implemented in a 19" x 1U housing, the dimensions are 434mm x 44,5mm , 252mm. MAGIC AE4 can be used as a table-top device or it can be mounted in a 19" rack. The 19" mounting brackets are included in delivery.

MAGIC AE4 front view

MAGIC AE4 rear view

MAGIC AE4 rear view with optional Dual LAN Upgrade and redundant power supply upgrade

1.5 Functionality

MAGIC AE4 offers in the standard version one DAB/DAB+ hardware encoder and can be optionally upgraded with three further encoders. Each of the four channels are independent and can be configured independently as a DAB or DAB+ encoder.

The audio programs can be supplied via the **four digital AES/EBU stereo interfaces**. An **analogue stereo interface** is also available.

The **PAD** is usually fed in via the Ensemble Multiplexer, which scans the PAD via the return path of the transmission protocol on the encoder. All PAD services supported by the multiplexer can be used.

Alternatively, it is also possible to feed PAD services directly into the Encoder.

In addition to PAD, service information such as the **Program Type (PTy)** and **Traffic Announcement (TA)** can also be transmitted via UECP for each program. The triggering of a traffic announcement can be easily implemented via a TTL contact.

As transmission protocols with reconfiguration capability and PAD insertion, the system supports the proprietary standards AVTMUX, FhG MuxEnc, AVTVDL and ODR DabMux.

The EDI (ETI) standard also allows the system to be connected to almost any Ensemble Multiplexer from other manufacturers. In this case, however, reconfiguration and PAD feeding from the multiplexer is not possible, since EDI cannot transfer control information.

Two network interfaces are available as standard. Up to **three IP addresses** can be assigned to each Ethernet interface.

With the **Dual LAN Upgrade**, the system can be extended by two additional LAN interfaces, so that a total of four LAN interfaces are available.

In addition, the system supports VLANs for all kinds of services such as audio & PAD, SNMP, UECP and NTP, making it easy to separate the subnets for audio transmission, data transfer and management.

For monitoring, but also for assessing the quality of the encoded audio signal, a **Monitoring Decoder** is also integrated, which enables direct monitoring of the uncoded and encoded signal.

The monitoring can be done either via the headphone interface on the front or via the analogue and digital audio interfaces on the rear panel.

A comfortable configuration and monitoring of all four encoders is carried out via a modern **HTML5-capable web browser**.

In addition, the device can be integrated into a network management system via SNMP.

Finally, **eight TTL inputs/outputs** and eight relays can be freely programmed, e. g. for alarming.

Optionally the **Redundant Power Supply Upgrade** can be selected, the 5V DC table power supply is included in this hardware upgrade.

2 PUTTING MAGIC AE4 INTO OPERATION

2.1 Mounting

With its dimensions (W $\times$ H $\times$ D) of 434 mm $\times$ 44,5 mm (1 U) $\times$ 252 mm the **MAGIC AE4** system can either be used as desktop device or mounted into a 19-inch rack. 19"mounting brackets are included in delivery. When mounting the unit please keep in mind that the bending radius of the connected cables is always greater than the minimum allowed value.

When the **MAGIC AE4** is installed, please make sure that there is sufficient cooling: It is recommended to keep a spacing of ca. 3 cm from the openings. In general, the ambient temperature of the system should be within the range of +5 °C and +45 °C. These thresholds are specially to observe if the system is inserted in a rack. The system works without ventilation.

The system temperature can be indicated on the display under MENU > STATUS INFORMATION > DEVICE TEMPERATURE or in the software under Extras > System Monitor > System Temperature.

During operation humidity must range between 30% and 85%.

Attention! Incorrect ambient temperature and humidity can cause functional deficiencies.

Improper use of the unit can lead to a loss of warranty claim.

2.2   Connection to the mains voltage

Attention! High touch current possible! Before connecting the power supply, MAGIC AE4 must be earthed.

For this purpose, the earthing cable must have a conductor cross-section of at least 2.5mm² if it is mechanically protected, or otherwise 4.0mm².

The following graphic symbols are located on the rear of the unit to indicate the correct and safe use.

After plugging the power cable and switching on the device, the unit boots within 30 seconds.

An additional power supply socket for connecting an external 5 V power supply unit is optional available.

2.3 Operational elements at the front side

The system has an illuminated graphical display with a resolution of 160 x 32 pixels and 19 operating buttons.

On the right side next to the display there are two softkeys whose current functions are indicated on the display. In the middle there are two buttons for navigation (selection upwards/downwards) and the OK button. The numerical pad supports in addition to the numerical 0…9 also the '*' and '#' button. For entering text, the numerical pad can also be used as a normal keypad.

2.4 Front status LEDs

The system has five LEDs for status indication. When the device boots, all five LEDs blink.

- POWER: green
  - OFF
  - ON

- SYNC: yellow
  - OFF (no alarm)
  - ON (configured reference clock available)
  - BLINK (configured reference clock missing)

- ALARM: red
  - OFF (no alarm)
  - ON (any application alarm)
  - BLINK (any system/hardware alarm)

- INFO 1: yellow
  - OFF (no audio alarm)
  - ON (Audio Silence on any encoder channel)
  - BLINK (audio framing (AES/EBU)/stream (AES67) alarm on any encoder channel)

- INFO 2: yellow
  - OFF (no PAD alarm)
  - ON (PAD Server or PAD Fallback alarm on any encoder channel)
  - BLINK (no PAD available on encoder)

2.5   Wiring

The system offers four digital AES/EBU stereo Audio interfaces and one analogue stereo Audio interface. Eight TTL inputs/outputs and eight relays can be freely programmed, e. g. for alarming. Two network interfaces are available as standard.

Module slot 1
(*optional* Dual LAN module)

Analogue
Audio Inputs

Analogue
Audio Outputs

2 x LAN
(Control , VoIP, *optional* AES67)

Redundant power supply
(optional)

4 x AES Audio In-/Outputs
(8 x digital Audio lines)

8 x programmable TTL In-/Outputs

8 x programmable Relays
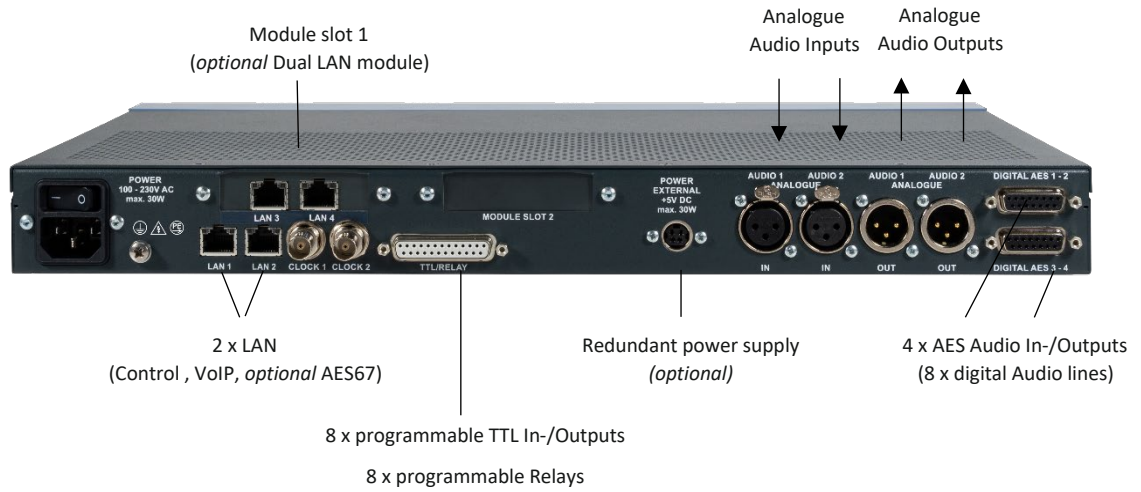
3   INTERFACES

On the front side of the unit 5 LEDs for status indication and a headphone interface for monitoring are available. The connectors for the interfaces are at the rear side.

MAGIC AE4 front view

MAGIC AE4 rear view

MAGIC AE4 rear view with optional Dual LAN Upgrade and redundant power supply upgrade

3.1 LAN 1 and LAN 2 interfaces

All services (Audio, PAD, SNMP, NTP, etc.) can be configured freely for both network interfaces. For the LAN interface a RJ45 socket is used. The pin assignment of the socket is shown below.

Pin assignment: ETHERNET INTERFACES LAN 1 / LAN 2
Socket: RJ-45
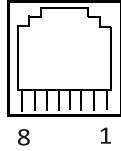
Pin	Signal		Electrical characteristics
1	TX+	Data out +	Recommendation: IEEE 802.3/Ethernet
2	TX-	Data out -	Data rate (Auto neg.): 10/100 Mbit/s
3	RX+	Data in +	Recommended cable: CAT5 or higher
4	not used		Max. cable length: 100m
5	not used		
6	RX-	Data in -	
7	not used		
8	not used		

8   1

3.2   TTL/Relay interface

The TTL / Relay interface is realised as a 25-pin socket. It provides 8 TTL in- puts or outputs and 8 Relay contacts. The pin assignment of the socket is shown below.
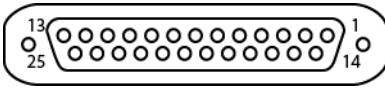
Table: TTL/Relay interface

Pin	Signal		Electrical characteristics
1	TTL 1	input/output	**TTL interface:**
2	TTL 2	input/output	Capacity of the TTL outputs:
3	TTL 3	input/output	Maximum voltage: 3.3V
4	TTL 4	input/output	Maximum current: 10mA
5	TTL 5	input/output	
6	TTL 6	input/output	**Relay interface:**
7	TTL 7	input/output	Capacity of the relays:
8	TTL 8	input/output	Maximum voltage: 48V
9	RELAY 4 (B)	output, NO	Maximum current: 200mA
10	RELAY 5 (B)	output, NO	
11	RELAY 6 (B)	output, NO	
12	RELAY 7 (B)	output, NO	
13	RELAY 8 (B)	output, NO	
14	RELAY 1 (A)	output, NO	
15	RELAY 1 (B)	output, NO	
16	GND		
17	RELAY 2 (A)	output, NO	
18	RELAY 2 (B)	output, NO	
19	RELAY 3 (A)	output, NO	
20	RELAY 3 (B)	output, NO	
21	RELAY 4 (A)	output, NO	
22	RELAY 5 (A)	output, NO	
23	RELAY 6 (A)	output, NO	
24	RELAY 7 (A)	output, NO	
25	RELAY 8 (A)	output, NO	

NO = normally open contact

3.3   Headphone interface

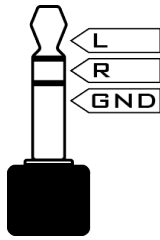For Audio Monitoring a standard 6.3 mm phones interface is available at the front panel.

Table: Headphone interface

Pin	Signal		Electrical characteristics
-	GND	Ground	Connector (female): 6.3 mm jack[1]
-	L	Audio Left	
-	R	Audio Right	

3.4   Analogue Audio interface

The unit provides an analogue Audio input and output.

For the input an XLR socket and for the output an XLR plug is available. The pin assignment of the socket and connector is shown below.

Table: Analogue Audio Input

Socket: 3 pin XLR female
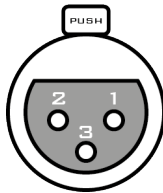
Pin	Signal	Description
1	GND	Ground
2	A	+
3	B	-

Table: Analogue Audio Output

Socket: 3 pin XLR male
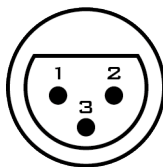
Pin	Signal	Description
1	GND	Ground
2	A	+
3	B	-

3.5   Digital Audio interfaces

MAGIC AE4 provides four digital AES/EBU Audio inputs and outputs available on two 15-pin Sub-D sockets.

As an option adapter cables with XLR connectors can be provided. The pin assignment of the 15-pin Sub-D sockets is described below.
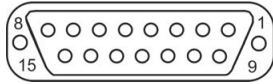
Table: Digital Audio Interfaces AES/EBU 1-2 and AES/EBU 3-4

Socket: Sub-D 15 pin

Pin	Signal	Description
1	AES 1 IN +	IEC 60958
2	AES 1 IN -	
3	AES 2 IN +	
4	AES 2 IN +	
5	AES 1 OUT +	
6	AES 1 OUT -	
7	AES 2 OUT +	
8	AES 2 OUT -	
9	GND	
10…15	GND	

3.6   Clock interfaces

The BNC socket CLOCK1 can be configured as external clock input (48-kHz). If CLOCK1 is not configured, a synchronous 48-kHz sampling clock is provided by default.

Table: World Clock, BNC Socket 'CLOCK 1'
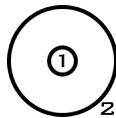
Pin	Signal	Electrical characteristics	
1	CLOCK IN/OUT	Amplitude:	0: < 0,8 V_{OP} | 1: > 2 V_{OP}
2	GND	Impedance:	75 Ohm unbalanced

The BNC socket CLOCK2 always provides a synchronous 48-kHz sampling clock.

Table: World Clock, BNC Socket 'CLOCK 2'
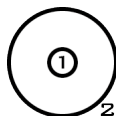
Pin	Signal	Electrical characteristics	
1	CLOCK OUT	Amplitude:	max. 3,3 V_{OP}
2	GND	Impedance:	75 Ohm unbalanced

3.7 Power supply

3.7.1 AC power supply socket
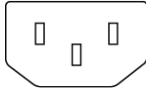
100 – 230 V AC, 50 – 60 Hz, auto adjusting, max. 30 W

3.7.2 Optional DC power supply socket

Only use the +5 V DC power supply provided by AVT.

Pin assignment: 5 V power supply socket
Socket: KYCON KPJ-S4
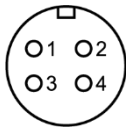
Pin	Signal	Electrical characteristics
1,3	GND	Voltage: + 5V
2,4	+5 V	Power: max. 30W

4   TECHNICAL DATA

- **Coding algorithms**

    o   MPEG4 HE-AAC v2 (FhG-Licence)   ETSI TS 102 563

    o   ISO/MPEG 1/2 Layer 2 (FhG-Licence)   EN300401

- **Coding modes**

    o   MPEG4:

        ▪   HE-AAC LC: Mono, Stereo

        ▪   HE-AAC v1: Mono + SBR, Stereo + SBR

        ▪   HE-AAC v2: Stereo + SBR + PS

    o   MPEG 1/2 Layer 2:

        ▪   Mono, Dual Channel, Joint Stereo, Stereo

- **Sampling frequencies**

    o   24, 48-kHz

    o   16, 32-kHz

- **Data rates**

    o   8-kbit/s … 384-kbit/s (depending on selected algorithm)

- **Analogue Audio**

    o   Electronically balanced input   XLR female

    o   Electronically balanced output   XLR male

    o   Impedance   Input   > 25 kΩ
                                   Output   < 50 Ω

    o   Frequency response   20 Hz … 20.000 Hz

    o   Audio level   -3 … +9 dBu

    o   Headroom   0 … 15 dB

- **Digital Audio AES/EBU**

    - Format   IEC-958   AES/EBU Professional

    - Balanced input: 15-pin SUB-D female

    - Balanced output: 15-pin SUB-D female

    - Impedance   Input: 110 Ω
                        Output: 110 Ω

    - Separate Sample Rate Converter for Inputs

- **Headphone**

    - Unbalanced Stereo max. 6 dBu   6.3 mm jack

- **Network interfaces**

    - 2 x LAN
      6 IP addresses
      VLAN support

    - *Optional:* Dual LAN Upgrade

- **Synchronisation**

    - Auto, NTP, AES/EBU, External (via CLOCK1 = 48 kHz), Internal
      (Auto = synchronisation in the following order:
      NTP, AES/EBU, External, Internal)

- **Protocols**

    - Unicast, Simulcast (2 Streams), Multicast

    - Formats

        - UDP (VDL)

        - AVTMux with Secure Streaming

        - Optional: EDI(ETI), FhG MuxEnc

- **PAD/SI**
  - Local services via LAN/FTP
    - Dynamic Label / Dynamic Label +
    - MOT Slideshow / Categorised Slideshow
    - TA (TTL/UECP)
    - PTy (UECP)

- **Monitoring**
  - SNMP v1/v2c

- **GPIO**
  - 8 x TTL
  - 8 x Relay

- **Display**
  - Graphical resolution 160 x 32 Pixel
  - Illuminated (can be switched off)

- **Power supply**
  - Integrated power supply:
    AC   100 – 230 V
    Power   max. 30 W
  - Redundant external power supply (opt.):
    DC   +5 V
    Power   max. 30 W

- **Temperature Range**   +5 °C − 45 °C

- **Relative humidity**   30 % – 85 %

- **Mains voltage**   100 – 230 V

- **Mains frequency**   50 – 60 Hz

- **Power consumption**   max. 30 W

- **Dimensions (H x W x D)**   44,5 mm x 434 mm x 252 mm

- **Weight**   Ca. 3,6 kg

5   GENERAL

5.1   Order numbers

- MAGIC AE4 DAB/DAB+ Audio Encoder   804105
- MAGIC AE4 Encoder Upgrade 1-Channel   450174
- EDI Upgrade   800989
- FhG MuxEnc Upgrade   800999
- AES67 8-Channels Upgrade   430566
- Audio Backup Upgrade   430624
- Dual LAN Upgrade   802034
- MAGIC Ravenna Interface   800037
- Redundant Power Supply Upgrade   802035

5.2   Scope of delivery

- MAGIC AE4

    o   1 x power cable

    o   4 x Self-adhesive feet

    o   19'' Mounting brackets

5.3   Declaration of conformity

The declaration of conformity you will find at the end of this manual.

6   SERVICE INFORMATION

6.1   Software and firmware updates

On our homepage you can download software updates for free. Go to

> ***https://www.avt-nbg.de***

and select ***Downloads > Software***.

6.2   Support

Our support is available on working days:

> Monday to Friday from 09:00 - 16:30 CET.
>
> | | |
> |---|---|
> | Support portal: | **https://avt-nbg.zammad.com** |
> | Email: | **support@avt-nbg.de** |
> | Phone number: | **+49 911 5271-110** |

To deal with your problem efficiently please note down the factory number of the unit as well as the software version that you use.

The factory number is visible in the software under ***Administration → Registration***.

If you bought the system via your local dealer, please contact them first.

6.3   Repairs

If your unit is defective, please contact us before sending in the device.

To send in the system please fill in the ***Service Request***[1] and send the unit to the following address:

> **AVT Audio Video Technologies GmbH**
> **- Repairs -**
> **Nordostpark 91**
> **90411 Nuernberg**
> **Germany**

---

[1] Download from:
https://www.avt-nbg.de/sites/default/files/2022-08/service-request-avt.pdf

6.4 WEEE (Directive on Waste Electrical and Electronic Equipment)

Due to Directive 2012/19/EU on waste disposal, this device must be recycled.
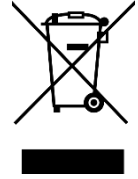
All electrical and electronic equipment must be disposed of separately from general household waste via approved collection points or disposal companies. The proper disposal and separate collection of old electrical and electronic equipment serves to prevent possible damage to the environment and health. The device contains valuable raw materials that can be recycled.

For proper recycling, send the device to us:

AVT Audio Video Technologies GmbH

- Recycling -

Nordostpark 91

90411 NÜRNBERG

GERMANY

WEEE Reg. No. DE83099164

Only prepaid parcels will be accepted!

These instructions only apply to appliances installed and sold in countries of the European Union. In countries outside the European Union, other regulations may apply to the disposal of electrical and electronic equipment.

Always recycle packaging material and electrical appliances or their components through authorised collection points or disposal companies.

$C\!\epsilon$ EU-Konformitätserklärung

EU-Declaration of Conformity

Name des Anbieters: AVT Audio Video Technologies GmbH
Supplier's name:

Anschrift des Anbieters: Nordostpark 91
Supplier's address: 90411 Nürnberg
  Germany

erklärt, dass das Produkt
declares, that the product

Produktname(n): MAGIC AE4 DAB/DAB+ Audio Encoder 804105
Product name(s):

mit den Vorschriften folgender Europäischer Richtlinien übereinstimmt:
conforms to the standards of the following European directives:

Elektromagnetische Verträglichkeit (EMV)	2014/30/EU
Electromagnetic compatibility (EMC)	
Niederspannungs-Richtlinie	2014/35/EU
Low voltage directive	
Beschränkung der Verwendung bestimmter gefährlicher	2011/65/EU
Stoffe in Elektro- und Elektronikgeräten (RoHS)	incl. amendment
2015/863/EU	

*Restriction of the use of certain hazardous substances in
electrical and electronic equipment (RoHS)*

Die Übereinstimmung wird nachgewiesen durch vollständige Einhaltung folgender Normen:
The conformity is evidenced by strictly meeting the following standards:

- EN IEC 62368-1
- EN IEC 63000
- EN 55032
- EN IEC 61000-6-2
- EN IEC 61000-6-4
- EN 55016-2-1

- EN 55016-2-3
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4

- EN 61000-4-5
- EN 61000-4-6
- EN 61000-4-8
- EN 61000-4-11

Ort, Datum: Nürnberg, 01.07.2022 **Name(n):** Wolfgang Peters
Place, date: Name:

Rechtsverbindliche Unterschrift:
Legally binding signatures:

Telefon: +49 911 5271-0
Phone:

Diese Erklärung beinhaltet keine Zusicherung von Eigenschaften.
This declaration includes no warranty of properties.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
The safety instructions specified in the product documentation delivered must be observed.