MAGIC AE4 DAB/DAB+ Audio Encoder

Quad DAB/DAB+ Audio Encoder

Hardware Manual

Audio Video Technologies

A publication of
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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

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.

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.

2 PUTTING MAGIC DABMUX GO RF INTO OPERATION

2.1 Mounting

With its dimensions (W × H × D) of 434 mm × 44,5 mm (1 U) × 252 mm the ***MAGIC AE4*** system can be used either as desktop device or mounted in 19-inch racks. The 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. It must also be ensured that the power cable is installed close to the equipment and is easily accessible.

When the unit is installed, please make sure that there is sufficient air ventilation: it is recommended to keep a spacing of ca. 3cm from the openings. In general, the ambient temperature of the system should be within the range of +0°C and +45°C. This threshold is specially to observe if the system is inserted in a rack. The system works without ventilation.

The temperature of the system can be displayed via the System Monitor of the web interface.

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

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

MAGIC AE4 must be earthed. The earthing can be carried out via the earthing screw on the back side of the unit.
MAGIC AE4 may only be used with the included power cable. The power cable must not be replaced by an inadequately dimensioned power cable.

The unit has a circuit closer. After plugging in the power cable and pressing the circuit closer, the system boots within a few seconds.

2.3 Operational elements at the front side

The system has an illuminated graphical display with a resolution of 160 x 32 pixels and 21 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 Alarm indication LEDs

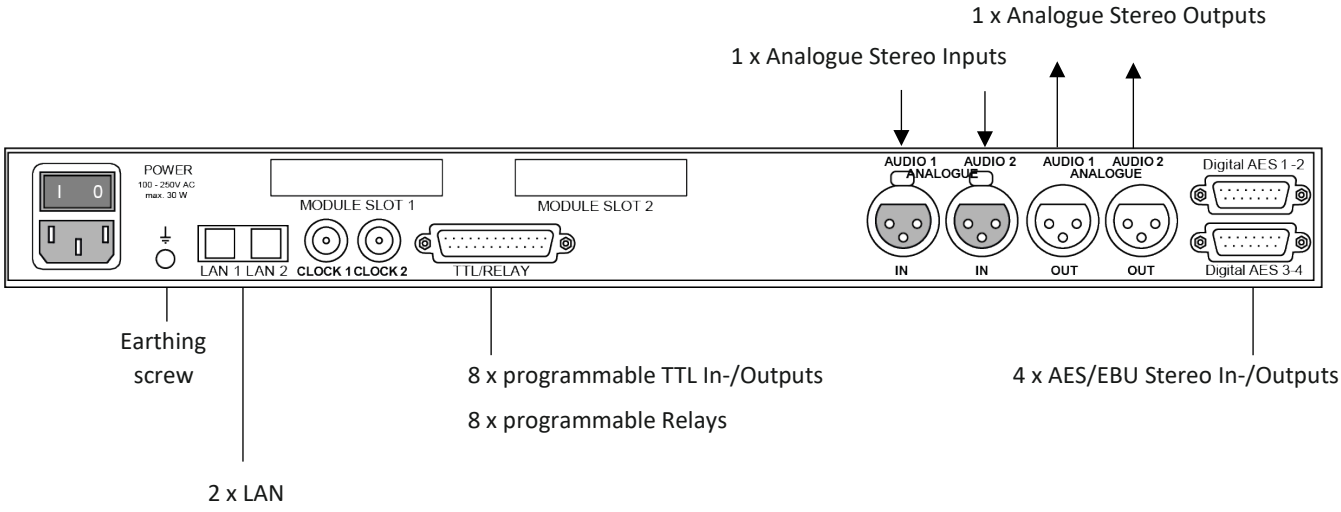
The system has five LEDs for status indication. When the device boots, all five LEDs blink.

- POWER: green
  - OFF
  - ON
- SYNC: yellow
  - OFF (no alarm)
  - BLINK (system clock missing)
- ALARM: red
  - OFF (no alarm)
  - ON (any application alarm)
  - BLINK (any hardware alarm)
- INFO 1: yellow
  - OFF (no audio alarm)
  - ON (any audio level alarm)
  - BLINK (any AES/EBU alarm)
- INFO 2: yellow
  - OFF (no PAD alarm)
  - ON (no input from external PAD server or Local PAD Inserter fall-back active)
  - BLINK (no PAD available on encoder)

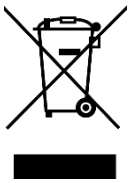
2.5 Wiring

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.

The system must be earthed via the earthing screw. After plugging in the power cable on the left side and pressing the circuit closer, the system boots within a few seconds.



2.6 Proper disposal



All electrical and electronic equipment must be disposed separately from general household waste via authorised collection points or disposal companies. Proper disposal and separate collection of old appliances serves to prevent potential damage to the environment and health. The device contains valuable raw materials that can be reused. Therefore, return the appliance to an appropriate collection point.

Detailed information on the disposal of your old appliances can be obtained from your local authority, your waste disposal service, the specialist dealer where you purchased the product or your sales contact.

These statements apply only to equipment installed and sold in the countries of the European Union. Countries outside the European Union may have different regulations for the disposal of electrical and electronic equipment.

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

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

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.

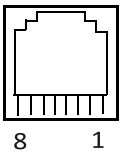


Table: LAN Interface

Pin	Signal		Electrical characteristics
1	TX+	Data out +	Socket: Western 8 pin, RJ45
2	TX-	Data out -	
3	RX+	Data in +	Recommendation: IEEE 802.3/Ethernet
4	not used		Data rate (Auto neg.): 10/100 Mbit/s
5	not used		Recommended cable: CAT5 or higher
6	RX-	Data in -	Max. cable length: 100m
7	not used		
8	not used		

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.

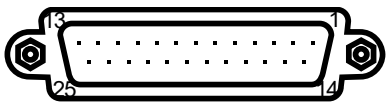


Table: TTL/Relay interface

Pin	Signal	Direction	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	NO = normally open
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	

3.3 Headphone interface

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

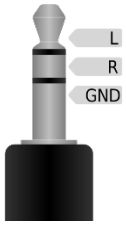


Table: Headphone interface

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

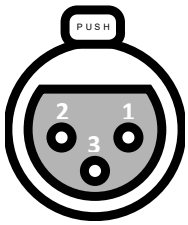
3.4 Analogue Audio interface

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

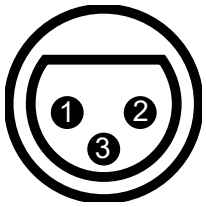
Socket: 3 pin XLR



Pin	Signal	Description
1	GND	Ground
2	A	+
3	B	-

Table: Analogue Audio Output

Socket: 3 pin XLR



Pin	Signal	Description
1	GND	Ground
2	A	+
3	B	-

[1] Graphic source: Benedikt.Seidl, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=4173292

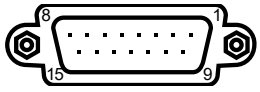
3.5 Digital Audio interfaces

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 +	
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_{0P} | 1: > 2 V_{0P}
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_{0P}
2	GND	Impedance:	75 Ohm unbalanced

4 TECHNICAL DATA

- **Coding algorithms**
  - MPEG4 HE-AAC v2 (FhG-Licence) ETSI TS 102 563
  - ISO/MPEG 1/2 Layer 2 (FhG-Licence) EN300401

- **Coding modes**
  - MPEG4:
    - HE-AAC LC: Mono, Stereo
    - HE-AAC v1: Mono + SBR, Stereo + SBR
    - HE-AAC v2: Stereo + SBR + PS
  - MPEG 1/2 Layer 2:
    - Mono, Dual Channel, Joint Stereo, Stereo

- **Sampling frequencies**
  - 24, 48-kHz
  - 16, 32-kHz

- **Data rates**
  - 8-kbit/s … 384-kbit/s (depending on selected algorithm)

- **Analogue Audio**
  - Electronically balanced input XLR female
  - Electronically balanced input XLR male
  - Impedance Input > 25 kΩ
Output < 50 Ω
  - Frequency response 20 Hz … 20.000 Hz
  - Audio level -3 … +9 dBu
  - 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: LAN 3/4 Module

- **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)

- **Temperature Range** +0 °C – 45 °C
- **Relative humidity** 30 % – 85 %
- **Mains voltage** 100 V – 230 V
- **Mains frequency** 50 Hz – 60 Hz
- **Power consumption** max. 15 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

5.2 Scope of delivery

- MAGIC AE4
    - 1 x power cable
    - 4 x Self-adhesive feet
    - 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

http://www.avt-nbg.de

and select ***Download Software***.

6.2 Support

Our support is available on working days:

Monday until Friday from 09.00h – 17.00h CET:

Phone number:	**+49 911 5271-110**
Email:	**support@avt-nbg.de**

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 him first.

6.3 Repairs

If, contrary to expectations, your unit is defective please fill in the attached ***Service Request***[1] and send the unit to the following address:

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

[1] Or download from:
http://avt-nbg.de/downloads/Info/Service%20Request%20AVT.pdf

CE Conformity

Declaration of Conformity

Name des Anbieters: Supplier's name:	AVT Audio Video Technologies GmbH
Anschrift des Anbieters: Supplier's address:	Nordostpark 91 D-90411 Nürnberg Germany

erklärt, dass das Produkt
declares, that the product

Produktname(n): Product name(s):	MAGIC AE4	804105

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

Nummer/Text: Number/title:	EN 60950 A4 Gerätesicherheit

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

Harmonisierte Normen: Harmonized Standards:	EN 55022, EN55024 EN 300386 FCC Part 15 B
Ort, Datum: Place, date:	Nürnberg, 12.10.2018
Name(n): Name:	Wilfried Hecht
Rechtsverbindliche Unterschrift: Legally binding signatures:	
Telefon: Phone:	+49 911 5271-0

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.