MAGIC DABMUX *plus*

DAB/DAB+ Ensemble Multiplexer

Hardware Manual

AVT Audio Video Technologies

Release date: September 2020

Version 2.4

CONTENT

1 INTRODUCTION

MAGIC DABMUX plus is a DSP-based Ensemble Multiplexer in accordance with standard ETSI EN 300401 V2.1.1 – optimized for medium and large DAB headends. Up to 25 program providers can be connected via external Audio Encoders. The configuration of the system can be carried out via a web browser.

MAGIC DABMUX plus is available as 19" system with an integrated power supply.

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

The functions of the *MAGIC DABMUX plus* are integrated in a full 19" x 1U housing with an including a wide-area power supply as well as an internal fan.

Figure 1: MAGIC DABMUX plus Front View

Figure 2: MAGIC DABMUX plus Rear View with Dual LAN Module

1.5   Functionality

MAGIC DABMUX plus is implemented on a signal processor-based hardware platform which is assembled in an optimised way and achieves best values in terms of power consumption and reliability. Despite its size, all features such as re-configuration (manually and scheduled), extraction of Sub Channels of other Multiplexers, integration of PAD and NPAD data services, creation of Service Information etc. are integrated.

Up to 25 program providers can be connected via external Audio Encoders. An installation of the Encoders directly in the studio avoids effectively an interference in Audio quality because of Codec cascading.

Audio Services can be supplied via the AVTMUX or the EDI(ETI) protocol from external Multiplexers. As output signal the Multiplexer supplies an EDI signal for transmission to the transmitters.

The synchronisation is done via NTP.

The configuration, operation and monitoring are carried out via a HTML5 web browser. An alarm can also be signalled via SNMP.

The system has three GBit Ethernet network interfaces, each allows the configuration of up to three IP addresses as well as VLANs.

For later extensions two USB 2.0 interfaces as well as an SD Card Slot are available.

The module slot can be equipped with the optional *Dual LAN Interface Module* (ID: 800021) or the optional *ETI Module* (ID: 470100).
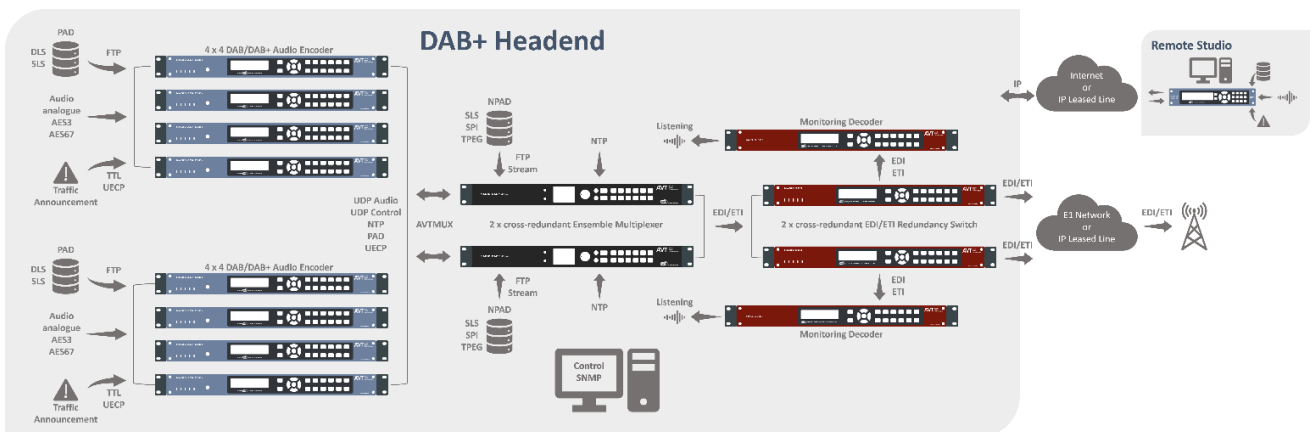

Figure 3: DAB/DAB+ Headend

2   PUTTING MAGIC DABMUX PLUS INTO OPERATION

2.1   Mounting

With its dimensions (W × H × D) of 430 mm × 44,45 mm (1 U) × 225 mm the **MAGIC DABMUX plus** system can be used either as desktop device or mounted in 19-inch racks. Mounting brackets are included in the scope of 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 of the **MAGIC DABMUX plus** is installed close to the equipment and are easily accessible.

Although the system has an integrated fan for proper cooling, it is recommended to have sufficient ventilation. The ambient temperature of the system should be within the range of +5°C and +40°C. This threshold is specially to observe if the system is inserted in a rack.

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

The integrated mains supply is designed as a wide-range power supply (100 - 240V AC). A redundant power supply is possible via the 12V DC voltage input. An external 12V table power supply is optionally available (ID: 490248; Phihong USA Corp.; Model PSAC30U-120L6-R; 100-240V AC; max. 0,8A; 50-60Hz; 12V DC; 2,5A; max. 30W; EN60950-LPS; EN62368).

If the 12V DC input is used, the described external power supply type is mandatory. The maximum power consumption is less than 30W.

After plugging the power cable and switching on the device, the unit boots in a few seconds.

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

2.3 Operational elements at the rear side

The system has three buttons at the rear side.

- B1:   Press at power on for factory reset
- B2:   Press at power on for boot loader start (192.168.96.102/24)
- RST: Short press - Reset of the system and boot from Flash EPROM
  Long press (> 10 sec) - Reset of the system and boot from
  SD card

2.4 Operational elements on the front side

Figure 4: Front Panel

2.4.1 LEDs

The system has two multicolour LEDs:

- **POWER**   Static green

  - System is booted

  Red flashing

  - System is booting

- **STATUS**   Static green

  - No alarm

  Static orange

  - Indicates a pending warning

  Static red

  - Indicates a pending maintenance alarm

  Red flashing

  - Indicates a pending critical alarm

2.4.2 Display

The colour display (LCD) has a resolution of 320 x 240 pixels and is used for basic configuration (e.g. IP address) and display of the system status.

2.4.3 Rotary Knob

The rotary knob is used for fast scrolling through menus and selecting elements (e.g. letters).

Selection is made by pressing the knob.

2.4.4 Keypad

- **OPT** Key

    o To select the options of a menu

- **ESC** Key

    o To cancel the last configuration or jump to the previous menu

    o To save changes

- **INFO** Key

    o Displays the system status

- **MENU** Key

    o Opens the configuration menu

- **0** … **9 / * / #** Key

    o For entering of digits e.g. IP address

2.5 Wiring of the system

The wiring of **MAGIC DABMUX plus** is simple as possible.

- LAN 1

    o Default IP Address: 192.168.96.102
      Subnet Mask: 255.255.255.0

        ▪ Management Web Interface

- LAN 2

    o Default IP Address: 192.168.96.103
      Subnet Mask: 255.255.255.0

- LAN 3

    o Default IP Address: 192.168.96.104
      Subnet Mask: 255.255.255.0

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   THE WEB INTERFACE OF MAGIC DABMUX PLUS

The configuration of the system is described in a separate document.

i | Please note that only **one** user can access the system via the web browser simultaneously.

We recommend using one of the following web browsers:

- Firefox (version 47 or higher)

- Google Chrome (version 85 or higher)

- Safari (version 9 or higher)

- Edge (version 85 or higher)

After entering the IP address into the address line of your browser you should be automatically connected to *MAGIC DABMUX plus* and shows the dashboard.
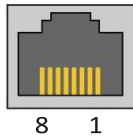
4   INTERFACES

Figure 5: MAGIC DABMUX plus Rear View with optional Dual LAN Module

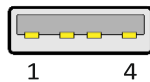Figure 6: MAGIC DABMUX plus Rear View with optional ETI/E1 Module

4.1   LAN1 … LAN 3 Interfaces

For the three <u>Gbit</u> Ethernet interfaces standard RJ45 socket are used. The pin assignment of the socket is shown below.

Table 1: LAN1 ... LAN3 Interfaces

Pin	Signal	Description	Electrical characteristics
1	TX+	Data out +	Socket: Western 8 pin, RJ45
2	TX-	Data out -	
3	RX+	Data in +	Recommendation: IEEE802.3z
4	NC	Not used	1000Base-T
5	NC	Not used	Data rate (Auto neg.): 1 Gbit/s
6	RX-	Data in -	Recommended cable: CAT5 or higher
7	NC	Not used	Max. cable length: 100 m
8	NC	Not used	

4.2   USB Interfaces

The system has two USB2.0 interfaces for future applications.

Table 2: USB Interfaces

Pin	Signal	Description	Electrical characteristics
1	VCC+	+5V	Socket: USB 2.0 Type A
2	DATA-	Data -	Max. cable length: 5 m
3	DATA+	Data +	
4	GND	Ground	

4.3 SD Card Slot

The system has one SD Card slot.
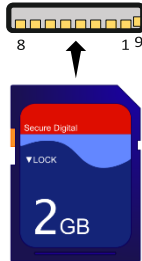The function is currently the alternative booting from the SD card (see chapter 2.3).

Table 3: SD Card Slot

Pin	Signal	Description	Electrical characteristics
1	CD/DAT3	Card/Data 3	Capacity: 2 GB … 32 GB (SDHC)
2	CMD	Commands	
3	GND1	Ground	
4	VDD	DC 2,7…3,6V	
5	CLK	Clock	
6	GND2	Ground	
7	DAT0	Data 0	
8	DAT1	Data 1	
9	DAT2	Data 2	

4.4 External +12V Power Supply Input

The external power supply input can be used for a redundant power supply. An optional tabletop power supply is available (ID: 490222).

The type code of the fitting connector is: KYCON KPPX-3P

Table 4: External +12 Power Supply Input

Pin	Signal	Description	Electrical characteristics	
1	GND	Ground	Socket:	3 pole, KYCON KPJX-3S-S
2	+12V	+12V DC	Voltage:	+12V DC / 2.5A
3	NC	Not used	Power:	max. 30W

5   OPTIONAL MODULES

The system can be equipped either with an ETI or Dual LAN interface module.

5.1   ETI Module

The optional ETI Module (ID: 470100) offers one ETI output and one ETI input as well as one 2.048 MHz clock in-/output.

Table 5: ETI Input

Pin	Signal	Description	Electrical characteristics
1	DATA IN	ETI In	Socket: BNC, female Amplitude: 3 Vpp/G.703
2	GND	Ground	Impedance: 75 Ω unbalanced Max. cable length: 100 m

Table 6: ETI Output

Pin	Signal	Description	Electrical characteristics
1	DATA OUT	ETI Out	Socket: BNC, female Amplitude: 3 Vpp/G.703
2	GND	Ground	Impedance: 75 Ω unbalanced Max. cable length: 100 m

Table 7: Clock In-/Output (programmable)

Pin	Signal	Description	Electrical characteristics
1	CLK	2.048 MHz Clock	Socket: BNC, female Amplitude: 0.5 ... 1.9 V0p In 1.5 V0p Out
2	GND	Ground	Impedance: 75 Ω unbalanced Max. cable length: 100 m

5.2 Dual LAN Interface Module

The optional Dual LAN Interface Module (ID: 800021) offers two additional <u>Fast</u> Ethernet interfaces with a standard RJ45 socket. The pin assignment of the socket is shown below.
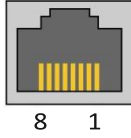
Table 8: LAN4 ... LAN5 Interfaces

Pin	Signal	Description	Electrical characteristics
1	TX+	Data out +	Socket: Western 8 pin, RJ45
2	TX-	Data out -	
3	RX+	Data in +	Recommendation: IEEE802.3u 100Base-TX
4	NC	Not used	
5	NC	Not used	Data rate (Auto neg.): 100 Mbit/s
6	RX-	Data in -	Recommended cable: CAT5 or higher
7	NC	Not used	Max. cable length: 100 m
8	NC	Not used	

6 TECHNICAL DATA

- **DAB Ensemble Multiplexer**

    o According to ETSI EN 300 401 Version 2.1.1

- **Input protocols**

    o AVTMUX with Secure Streaming

    o 4 x EDI (Sub Channel Extraction)
      according ETSI TS 102 693 Version 1.1.2

- **Output formats**

    o EDI (ETI) according ETSI TS 102 693 Version 1.1.2

    o Optional: ETI (G.703/G.704)

- **Audio services**

    o Max. 25 Audio Encoders can be connected

    o Support of DAB and DAB+

    o Data rates: 16-kbps up to 384-kbps

    o SBR, PS, Mono, Stereo, Joint Stereo, Dual Channel

- **Control software**

    o Web interface

- **Dimensions (W x H x D)**

    o 430 mm $\times$ 44,45 mm (1 U) $\times$ 225 mm

- **Weight**

    o 2,80 kg   (without mounting brackets)

- **Additional Information**

    o Temperature Range   +5 °C to 40 °C

    o Relative humidity   30% to 85%

    o Mains voltage   100V – 230V

    o Mains frequency   50Hz – 60Hz

    o Power consumption   max. 30W

7   GENERAL

7.1   Scope of delivery

- MAGIC DABMUX plus

- IEC Mains Power Supply Cable

- 4 x Self-adhesive feet

- 2 x 19'' Mounting brackets (already mounted)

7.2   Order numbers

MAGIC DABMUX plus   804310

Optional:

Redundant Power Supply   490248

ETI Module   470100

Dual LAN Interface Module   800021

7.3   Software Options

Emergency Warning Break-In Upgrade   430601

Cable Upgrade   430602

ETI/EDI Switch Redundancy Upgrade   430604

EDI Redundancy+ Upgrade   430608

DAB System Manager Upgrade   430620

…

7.4   Declaration of conformity

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

8   SERVICE INFORMATION

8.1   Software and Firmware Updates

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

http://www.avt-nbg.de

and select *Downloads → Software*.

8.2   Support

Our support is available on working days:

Monday until Friday from 09.00h – 17.00h CET

Please primarily use our ticket portal:

Ticket system: **avt-nbg.zammad.com**

Emergency support hotline for customers with support contract:

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.

8.3   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 Nürnberg
Germany

---

[1] Or download from: https://www.avt-nbg.de/download/other/service-request-avt.pdf

9   LIST OF FIGURES

$C\epsilon$ EU-Konformitätserklärung

EU-Declaration of Conformity

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

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

erklärt, dass das Produkt
declares, that the product

Produktname(n):
Product name(s):
MAGIC DABMUX plus   804310

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 62368-1:2020 + A11:2020
- EN 55032:2012 +AC:2013
- EN IEC 61000-6-2:2019
- EN 61000-6-4:2007 +A1:2011
- EN 55016-2-1:2014 + A1:2017
- EN 55016-2-3:2017
- EN 61000-3-2:2014

- EN 61000-3-3:2013
- EN 61000-4-2:2009
- EN 61000-4-3:2006 + A1:2008 + A2:2010
- EN 61000-4-4:2012
- EN 61000-4-5:2014 + A1:2017
- EN 61000-4-6:2014
- EN 61000-4-11:2004

Ort, Datum:
Place, date:
Nürnberg, 11.09.2020

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.