

# MAGIC TBR

## Tunnel Break-In Rebroadcast System for DAB

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Hardware and Software Manual



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## 1 INTRODUCTION

**MAGIC TBR** System is a compact and cost-efficient solution for the DAB tunnel provisioning. A major feature of the system – as requested in the EU Tunnel Directive 2004/54/EC – is the break-in possibility in case of emergencies or also for purely informative announcements.

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### 1.1 Conventions

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



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

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

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

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### 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.

In normal operation the unit is safe.

However - especially if daily routine and technical errors coincide - some potential sources of danger for person, material and optimal operation remain.

This manual therefore 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.

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### 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 personnel 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.
- 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 data carriers.



## 1.4 Construction

The functions of **MAGIC TBR** are implemented in a single 19" x 2U unit which is designed for mounting in 19" racks. The front keypad and display of the system allow a basic configuration of the most important parameters like IP address, operating mode etc. Additionally, status information can be displayed via five LEDs. For monitoring purposes, a Phones interface with a 6.3 mm jack is available.



Figure 1: MAGIC TBR Front View

For high reliability the systems have two integrated redundant wide area power supplies. By default, a system can handle one Ensemble. Optionally, a second module can be equipped to use two independent Ensembles.



Figure 2: MAGIC TBR Rear View

## 1.5 Functionality

**MAGIC TBR** 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. The standard system has a demodulator/modulator module for one Ensemble. If required, the system can be equipped with a further module for a second Ensemble. Both Ensembles are completely independent from each other – a separate break-in is also possible. For the break-in function per ensemble three encoders are permanently running: one DAB+ and two DAB Encoder allow you to replace all Audio service in any configuration regarding bitrate, sampling frequency etc. The break-in signal can be monitored via a Monitoring Decoder.

### Repeater and Remodulator Function

In the standard operation mode, the system functions as classic **Repeater** (see Figure 3). The DAB Ensemble is received by an antenna outside the tunnel, is filtered digitally and processed. Via the tunnel antenna the signal is broadcasted again. A GPS signal is not required for this function. However, inputs are available for future extensions.

Depending on local situations (e.g. bad reception conditions) it can be helpful to use the system permanently in **Remodulator** mode (see Figure 4). This mode can also be used during configuration to adjust and optimise the antenna signals at a tunnel entry.

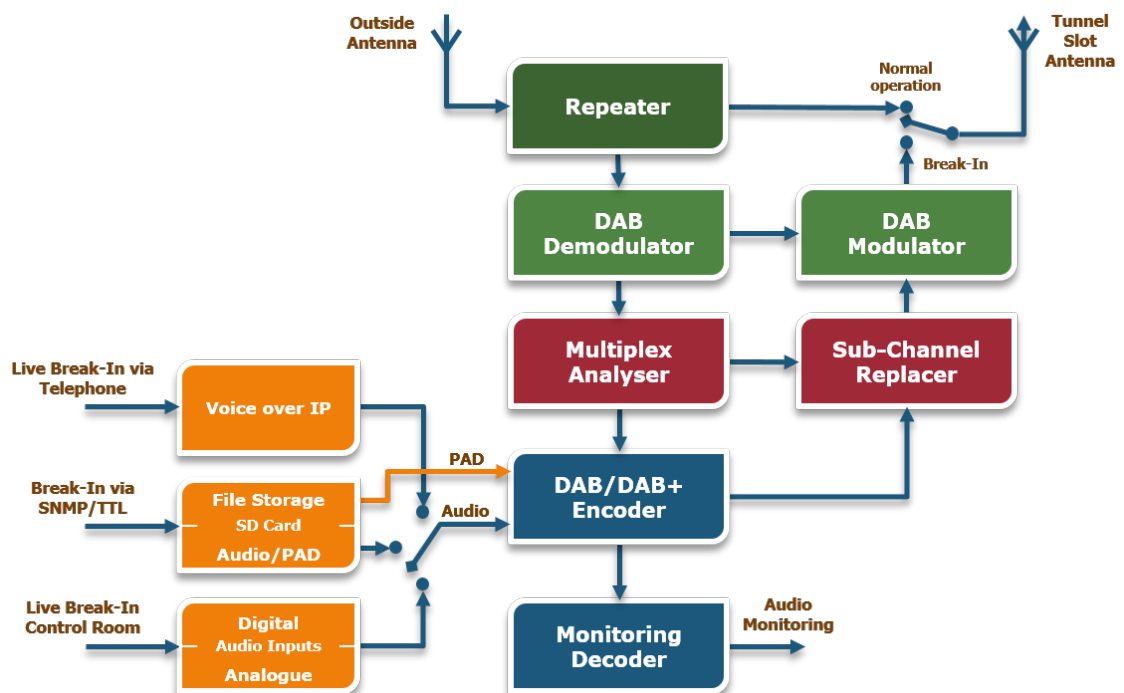


Figure 3: Repeater Mode

### Voice Break-In Function

During the repeater operation the received Ensemble is analysed permanently to always have the current Multiplex Configuration Information (MCI) available – even after reconfigurations.

In case of a necessary voice break-in all DAB and DAB+ Audio sub channels are automatically replaced by the emergency signal. The signal will be completely remodulated (see Figure 4).

The encoder bitrate of the break-in signal depends on the currently lowest bitrate of all Audio sub-channels in an ensemble.

The complete Multiplex is fully replicated and replaced frame-synchronously. From the view of a DAB Radio a continuous signal is received in terms of data rate, sampling frequency, error protection, but also CIF Counter, time etc.

In this way it is guaranteed that the DAB receiver does not lose the synchronisation or even re-scans the DAB band.

In parallel, PAD data can be transmitted as Slideshow and/or as Dynamic Label so that the respective information can also be presented visually.

If a car driver listens to another medium (e.g. CD), the receiver can be switched automatically to DAB radio via an appropriate alarm signalling (if the receiver supports this feature).

The break-in trigger is in general realised via a TTL input signal, an IP SNMP command or optionally via a remote VoIP telephone call.

Beside live break-in, multiple predefined break-in signals – together with a Dynamic Label (DL) and a Slide Show (SLS) – can be stored in the system.

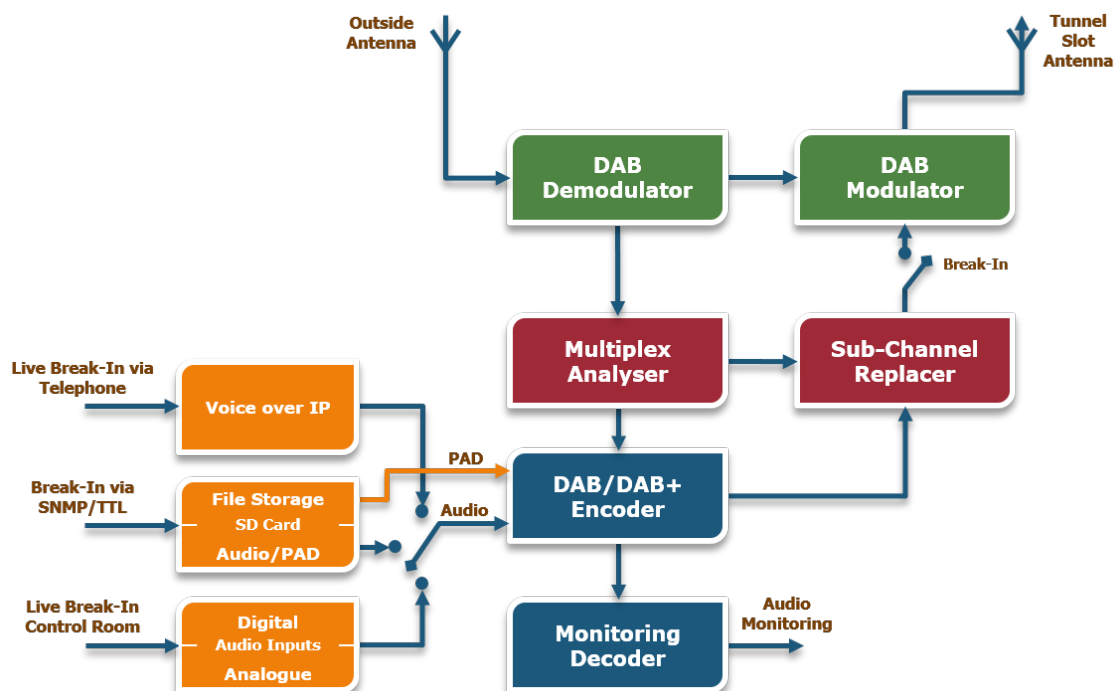


Figure 4: Remodulator Mode



## 2 PUTTING MAGIC TBR INTO OPERATION

### 2.1 Mounting

With its dimensions (W × H × D) of 440 mm × 44,5 mm (1 U) × 273 mm the **MAGIC TBR** system can be used either as desktop device or mounted in 19-inch racks. Corresponding 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.

Although **MAGIC TBR** 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 +45°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 front panel under MENU > STATUS INFORMATION or via the System Monitor of the web interface.

During operation humidity must range between 5% and 85%.



**Incorrect ambient temperature and humidity can cause functional deficiencies.**

Operation outside the threshold values indicated above leads to a loss of warranty claim.

### 2.2 Connection to the main voltage

The system can be operated with main voltage in the range from 100 V to 220 V via the integrated redundant power supplies. The line frequency can vary from 45 Hz to 65 Hz. The maximum power consumption is not higher than 50 W if both modules are equipped.

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### 2.3 Earthing of the system

For EMC reasons an earthing via the earthing screw on the back side of the unit must be carried out in either case.

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#### Earthing



A lacking earthing can cause functional deficiencies within the unit. Because of the 'pending' potential, unlike the protective earth conductor potential, slight electric shocks can occur by touching the rack. These are absolutely not dangerous; however, they can be avoided totally by earthing.

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## 2.4 Operational elements of the front keypad and display

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

On the right next to the display there are two soft keys whose current functions are mentioned on the display. In the middle there are two cursor buttons (upwards/downwards) as well as an **OK** button. The two phone buttons for accepting/dropping have no special function except that you can display the IP address of the system by pressing the **DROP** button.

The numerical pad supports also the '\*' - and '#' -key in addition to the numerical characters **0...9**. For text entries the numerical pad can also be used as a normal keypad.

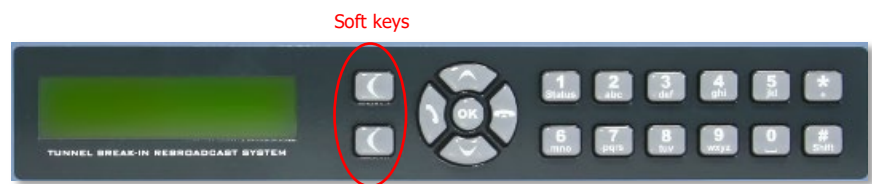


Figure 5: Front keypad and display

## 2.5 Front status LEDs

**MAGIC TBR** has five LEDs for status indication:

- **POWER** green
  - System is ready for operation
- **SYNC** yellow blinking
  - RF input of one or both modules is not sufficient.
- **ALARM** red
  - At least one system alarm is pending
- **INFO 1/2** yellow blinking
  - Active break-in on ensemble 1/2

2.6    Wiring of the system

The wiring of *MAGIC TBR* is simple as shown in Figure 6.

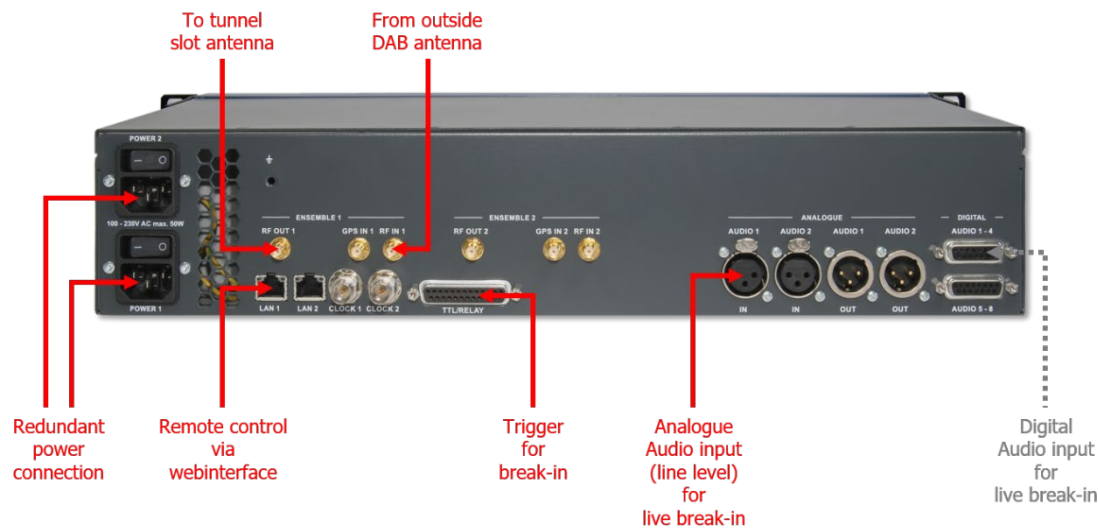


Figure 6: Wiring diagram



You can use either LAN1 or LAN2 interface (or both). If you plan to use the VoIP telephone call break-in possibility later, it is recommended to use the LAN2 interface since VoIP must run via LAN1.



## 2.7 Basic configuration via front panel

Although the most important functions are available via the front keypad and display the configuration with a web browser is more comfortable.

However, at least one IP address must be configured on **MAGIC TBR** directly to allow an access via a web browser:

- The standard IP address of the system is 192.168.96.102, the subnet mask is 255.255.255.0 and the standard control port 10000.
- To enable a connection with your PC, you have to be in the same subnet. Enter an IP address at your system from your subnet or activate - to get the correct settings automatically - DHCP (Dynamic Host Configuration Protocol), if a DHCP server is available.
- To change the IP address manually at the system, press the soft key **Menu** and then select **system settings** → **LAN Interface** → **LAN 1 settings** → **IP Address** (or **LAN 2 Settings** if you have the system connected via LAN 2 interface). Enter now the desired IP address. When entering manually you have to be sure that the IP address is not already used by another unit.



Maybe further settings are necessary (e.g. sub-net mask, gateway etc.). In that case please contact your network administrator, who can tell you the correct settings, or you use DHCP.

You can activate DHCP at the system via **Menu** → **system settings** → **LAN settings** → **DHCP**.



You can identify the assigned or manually set IP address by pressing the **DROP** button on the front keypad. The current IP address is displayed.



### 3 THE WEB INTERFACE OF MAGIC TBR

After configuring the IP address of the system as described in CHAPTER 2.7, you should be able to connect with the system via your web browser.



Please note that only **two** users can access the system via the web browser simultaneously.

We recommend to use one of the following web browser:

- Firefox (version 47 or higher)
- Google Chrome (version 53 or higher)
- Safari (version 9 or higher), also on iPad or iPhone
- Internet Explorer (version 11 or higher)

After entering the IP address into the address line of your browser you should be automatically connected to MAGIC TBR as shown in Figure 7 (of course an ensemble will not be displayed if system is not fully configured).

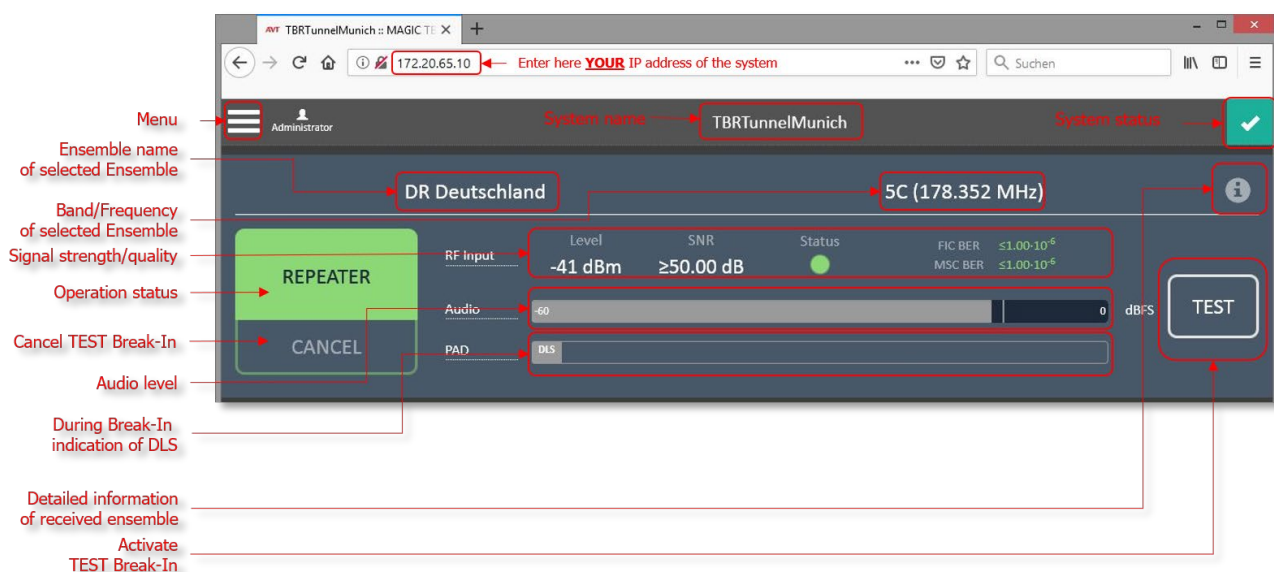


Figure 7: Web interface of MAGIC TBR

### 3.1 SETTINGS - Step-by-step configuration of the system

For a standard configuration only a few settings are mandatory:

- Setup of Operation mode (see CHAPTER 3.1.1)
- Configuration of **Break-In** scenarios (see CHAPTER 3.1.2)
- Setup of the **Audio Input** for live Audio announcements (see CHAPTER 3.1.3)

All other settings of the system are optional and depend on the local environment.

Press the **Menu** button in the left corner to display the configuration menu.

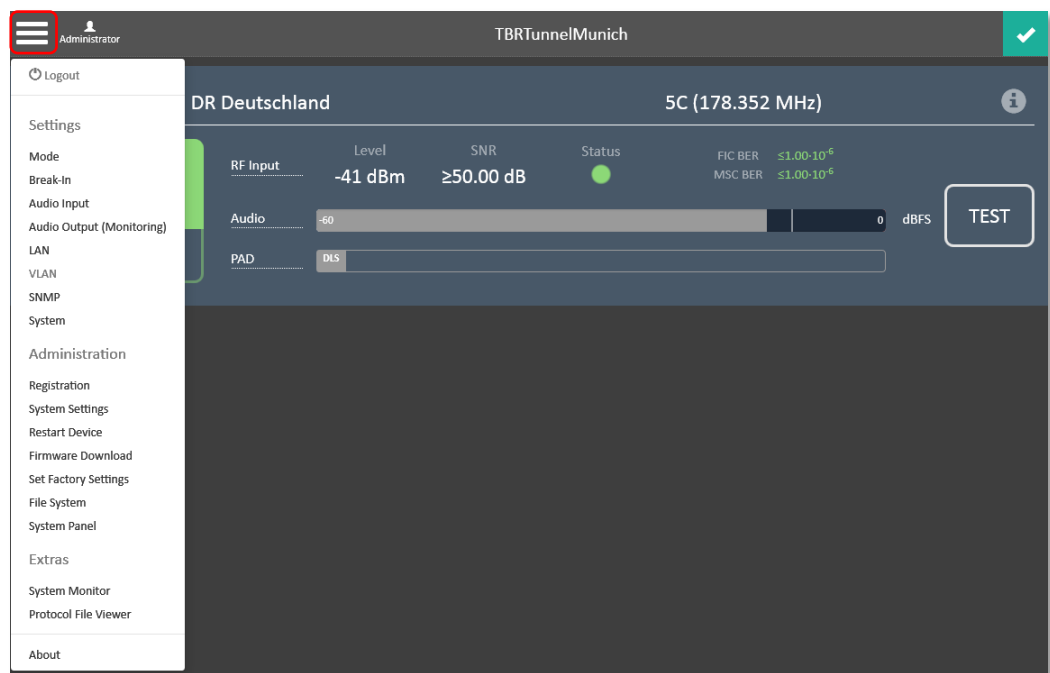


Figure 8: Configuration Menu

### 3.1.1 Operation mode configuration

The **Mode** configuration allows you to setup the system either in **Repeater** or **Remodulator** mode:

Figure 9: Operation Mode

- In **Repeater** mode the system passes through the received signal to the RF output with a very low delay of a few  $\mu$ s. Only in case of a break-in the system is switched to the Remodulator mode – in sync to the Null symbol as well as the CIF counter – to exchange all audio sub channels.
- In **Remodulator** mode the system refreshes the received signal permanently and provides a full remodulated signal on the RF output. In case of a break-in the audio content will be replaced. This mode has a much higher delay due to the high level processing (approx. 750 ms).



We recommend to use the **Repeater** mode as default mode to minimize the influence on DAB car receivers during normal operation.

Now select the desired **Input Frequency** (5A ... 13F) of the ensemble which you want to use for break-in.

The setting **Output Level** can be used to adjust the strength of the RF output in a range of -40 dBm ... 0 dBm.



If a second module is equipped the configuration has to be repeated with the desired parameters.

Press **OK** to store the configuration in the system

In the main window the **Ensemble name(s)** of the selected ensemble(s) should be displayed as well as the **RF Input** signal strength and the **Quality** indicator.



For a good reception the **Quality** indicator should be higher than 40%.

3.1.2 Break-In configuration

Break-In

Ensemble 1 (Slot 1)

Default settings

Jingle

0:/Audio/Jingle.wav

Jingle

DLS Text

Attention! Announcement

Slide Show

0:/SLS10

SLS

Scenarios

Live

Fire Alarm!

Accident

Roadworks

TEST

TTL Pin 1

TTL Pin 2

TTL Pin 3

TTL Pin 4

TEST Button

Alias

Live

Break-In Interval

0

sec

Scenario To Play

Jingle - Live Audio - Jingle

Scenario Repetition

0

Jingle

Use Default Jingle

DLS

Use Default DLS Text

Slide Show

Use Default SLS

Get default Slide Show images

Cancel

Apply

OK

Figure 10: Break-In Configuration

The system allows you to define up to four **Break-In** scenarios which can be triggered either by TTL inputs (Ensemble 1: Pin 1 ... Pin 4 respectively Ensemble 2: Pin 5 ... Pin 8 of the TTL interface, see Figure 6) or SNMP commands (see CHAPTER 3.1.9).



Scenario 1 has the highest and scenario 4 the lowest priority, respectively. In general, a break-in can be cancelled by triggering Pin 1 (Pin 5 for Ensemble 2) only with a short pulse (< 200 ms).

For test purposes a test scenario can be defined which can be triggered directly via the **Test** button of the web interface (see Figure 7).

Each scenario can consist of:

- Live Audio content (**Live Audio Announcement**) with or without pre- or post-jingle
- Pre-recorded Audio content (**File Announcement**) with or without pre- or post-jingle
- Dynamic Label (DLS)

- Slideshow (SLS)
- In addition, it is possible to setup different repetitions of the Audio content.
- For all scenarios you can choose to use the default DLS and SLS or a separate one for each scenario.
- The live Audio announcement sequences are shown in Figure 11, the file based Audio announcements are shown in Figure 12.

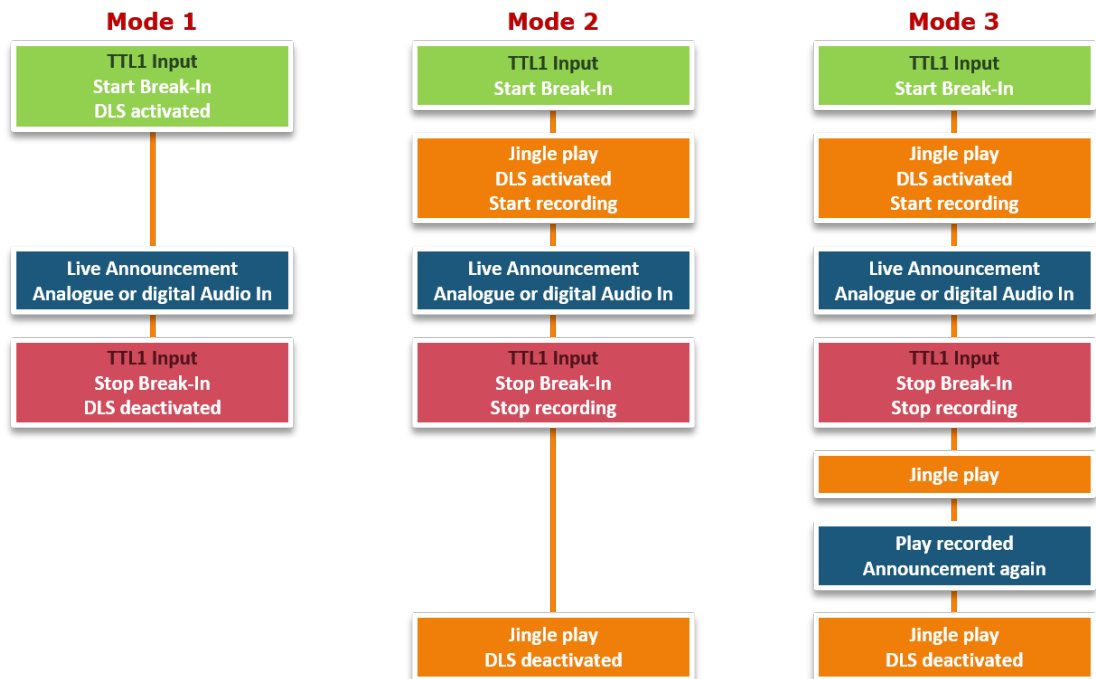


Figure 11: Live Audio Announcement Modes

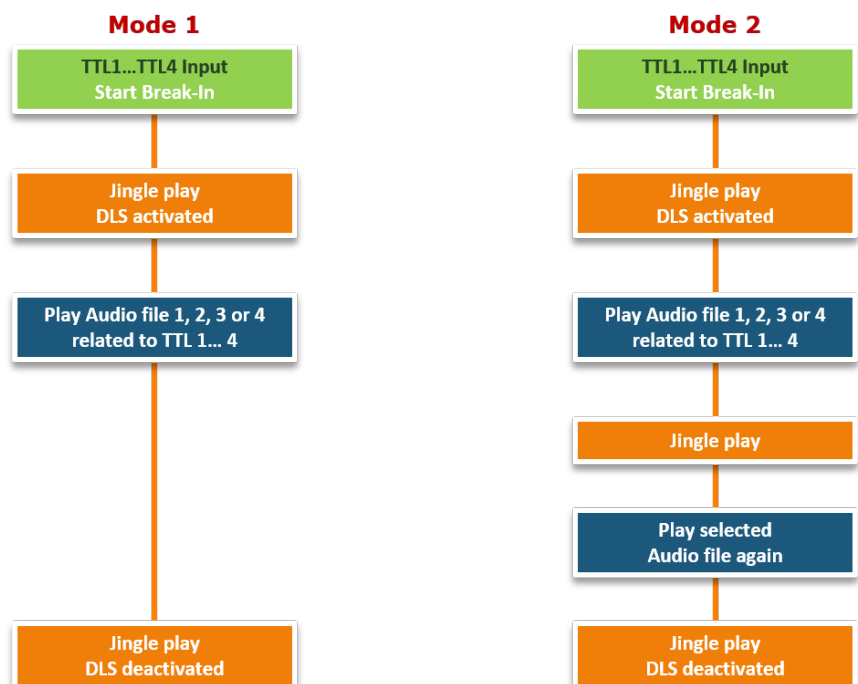


Figure 12: File Announcement Modes



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### ***Restrictions and Recommendations for Audio, DLS and SLS files***

The live Audio is recorded automatically in the system so that a playout of the last live announcement in a loop is possible. The maximum length of a live Audio recording is limited to 30 minutes.

To use pre-recorded Audio content for file announcements simple WAV files can be used. Please note that the sampling frequency must be 48 kHz. All other parameters like channels, resolution etc. will be converted automatically.

Depending on the DAB receiver it needs a few seconds until the DLS is displayed. Some receivers show a new label first when the currently displayed label is completely finished.

The maximum string length of a DLS can be 200 Bytes which can be less than 200 characters if unicode characters are used.

To reduce the time which is necessary to transmit a slideshow picture it is helpful to minimize the file size of the picture. We recommend to use PNG files with less colours. File sizes of 2 ... 3 KB with the dimensions of 320 x 240 pixel (which is a must) are perfect for a proper transmission.

Although it is possible to transmit more than one picture in a slideshow, please do not forget that the transmission rate for SLS during an announcement is limited to 1.5 ... 8 kbit/s depending on the break-in encoder bitrate. That means that a file with 3 KB needs approx. 6 seconds to be transmitted.

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### 3.1.3 Audio Input configuration

For live Audio announcements the Audio input must be configured via the sub-menu **Audio Input**.

Figure 13: Audio Input Configuration



Please note that the system offers analogue or digital line inputs. A microphone input is not available.

Select first the desired Audio **Input** type (**Analogue** or **Digital**) for Ensemble 1 respectively Ensemble 2.

In case of using **Analogue** Audio you can adjust the nominal **Level** in a range of -3 ... +9 dBu as well as the **Headroom** in a range of 0 ... 15 dBr.

#### *Audio Interface Assignment (see CHAPTER 4.3)*

Ensemble 1:	ANALOGUE	AUDIO 1 IN
	DIGITAL	AUDIO 1 (AES1 IN LEFT)
Ensemble 2:	ANALOGUE	AUDIO 2 IN
	DIGITAL	AUDIO 1 (AES1 IN RIGHT)
		or AUDIO 2 (AES2 IN LEFT)

3.1.4 Audio Output (Monitoring)

If desired, it is possible to monitor the **active** break-in signals.

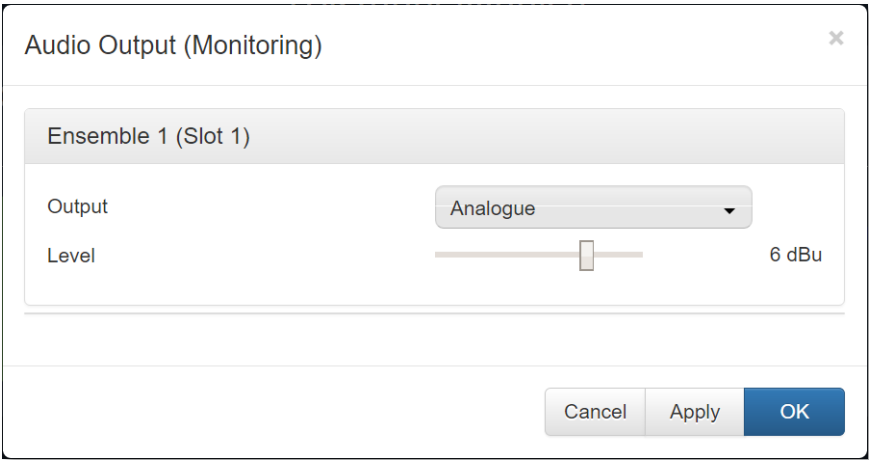


Figure 14: Audio Output Configuration

Select first the desired Audio **Output** type (analogue or digital) for Ensemble 1 respectively Ensemble 2.

In case of using **Analogue** Audio you can adjust the nominal **Level** in a range of -3 ... +9 dBu.

If **Digital** Audio is selected, the **Clock Source of Digital Output** can be configured as **Internal** or **External** (interface CLOCK 1, see Table 10).

*Audio Interface Assignment (see CHAPTER 4.3)*

Ensemble 1:	ANALOGUE	AUDIO 1 OUT
	DIGITAL	AUDIO 1 (AES1 OUT LEFT)
Ensemble 2:	ANALOGUE	AUDIO 2 OUT
	DIGITAL	AUDIO 1 (AES1 OUT RIGHT)
		or
		AUDIO 2 (AES2 OUT LEFT)

### 3.1.5 General settings

Figure 15: General Settings

The general settings allow you to setup the parameters for

- **Display language**
  - Currently English or German
- **Front Keypad Tone**
  - On or Off
- **Backlight**
  - Permanent On
  - Auto-switch Off
- **Display Contrast**
  - Range 0 ... 15
- **System Name**
  - The system name is shown in the main window and can be used as DNS hostname
  - Max. 63 characters
  - Allowed characters are: A ... Z, 0 ... 9 and –  
The . is only allowed to separate parts of the domain name

3.1.6 LAN settings

MAGIC TBR provides two separate Ethernet interfaces LAN 1 and LAN 2 which can be used for independent IP subnets.

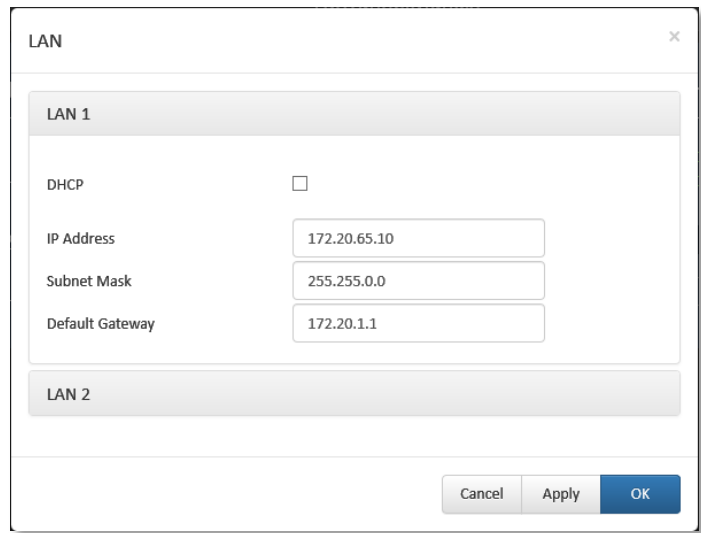


Figure 16: LAN Settings

For each Ethernet interface you can define an *IP Address*, the *Subnet Mask* and the *Default Gateway*.

Please ask your IT Administrator for the right settings.



If you plan to use live announcements via VoIP, please use LAN 2 as control interface. VoIP is only possible via LAN 1.



Please note that only **two** users can access the system via the web browser simultaneously.

### **3.1.7 VLAN settings**

The VLAN feature will be available in a later release.

3.1.8 SNMP settings

For remote monitoring the system can be integrated into a Network Management System (NMS).



The necessary MIB files can be downloaded via the SNMP download link directly from the system.

Up to four NMS can be addressed.

To use the function, activate the checkbox **SNMP Enabled** first.

SNMP Parameters

Under **SNMP Parameters** select the desired version **V1** or **V2C** which is supported by the NMS first.

Please ask your IT Administrator for the correct **READ**, **TRAP** and **WRITE Community** parameters as well as the **SNMP Port** (default: 161).

Under **System Description**, **Contact** and **System Location** you can send informative details about the installed system to the NMS.

To initialise the NMS, it is recommended to **Send All Traps At Startup** as well **After Enabling**.

To minimise the number of alarms at the NMS site the system offers a classification of all available alarms (see **Traps**) with up to four categories A ... D (e.g. Important, Not Important, Informative etc.).

For each category you can enter an **Alias** to make it clearer for the users.

Figure 17: SNMP Parameters

### NMS Parameters

Assign under **NMS Parameters** the desired **LAN** interface, the **IP Address** and the **Port** (default: 162) of each of the four possible Network Management Systems that you want to integrate into your monitoring.

The screenshot shows the 'SNMP' configuration window. At the top, 'SNMP Enabled' is checked. Below it are sections for 'SNMP Parameters', 'NMS Parameters', 'SNMP Alarm Traps', 'Ensemble Alarm Traps', 'System Alarm Traps', and 'Application Alarm Traps'. The 'NMS Parameters' section contains a table with four rows for NMS 1 through NMS 4. Each row has a 'LAN' dropdown menu (all set to 'LAN 1'), an 'IP Address' text input, and a 'Port' text input (all set to '162').

	LAN	IP Address	Port
NMS 1	LAN 1	172.20.75.254	162
NMS 2	LAN 1	0.0.0.0	162
NMS 3	LAN 1	0.0.0.0	162
NMS 4	LAN 1	0.0.0.0	162

At the bottom, there is a 'Get SNMP MIB files' button and 'Cancel', 'Apply', and 'OK' buttons.

Figure 18: NMS Parameters

### SNMP Alarm Traps

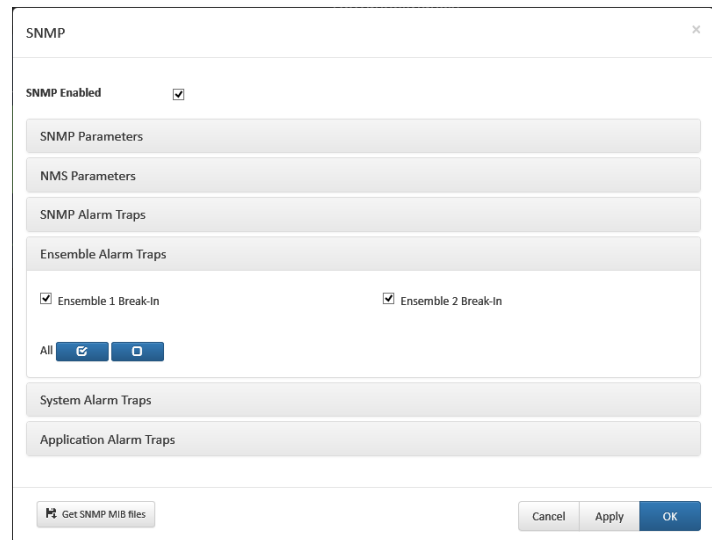
Under **SNMP Alarm Traps** you can define which of the listed alarms should be used.

The screenshot shows the 'SNMP' configuration window, specifically the 'SNMP Alarm Traps' section. 'SNMP Enabled' is checked. The 'SNMP Alarm Traps' section contains a list of traps with checkboxes: 'Cold Start' (checked), 'Authentication Failure' (checked), 'Category A' (checked), 'Category B' (checked), 'Category C' (unchecked), and 'Category D' (unchecked). Below the list are 'All', 'Reset', and 'Clear' buttons. The 'Ensemble Alarm Traps', 'System Alarm Traps', and 'Application Alarm Traps' sections are empty. At the bottom, there is a 'Get SNMP MIB files' button and 'Cancel', 'Apply', and 'OK' buttons.

Figure 19: SNMP Alarm Traps

### ***Ensemble Alarm Traps***

Under ***Ensemble Alarm Traps*** you can define which of the listed alarms should be used.



The image shows a web interface window titled "SNMP" with a close button (X) in the top right corner. The window contains several sections:

- SNMP Enabled**: A checkbox that is checked.
- SNMP Parameters**: A section header.
- NMS Parameters**: A section header.
- SNMP Alarm Traps**: A section header.
- Ensemble Alarm Traps**: A section containing two checkboxes, both of which are checked:
  - ☒ Ensemble 1 Break-In
  - ☒ Ensemble 2 Break-In
- All**: A label followed by two buttons: a blue button with a circular arrow icon and a blue button with a square icon.
- System Alarm Traps**: A section header.
- Application Alarm Traps**: A section header.

At the bottom of the window, there is a button labeled "Get SNMP MIB files" on the left and three buttons labeled "Cancel", "Apply", and "OK" on the right.

Figure 20: Ensemble Alarm Traps



### System Alarm Traps

System alarms occur if a hardware problem exists. Typically, there is a communication problem between the processor and the indicated hardware component (e.g. Flash EPROM).

SNMP

SNMP Enabled ☒

SNMP Parameters

NMS Parameters

SNMP Alarm Traps

Ensemble Alarm Traps

System Alarm Traps

<input type="checkbox"/> LCA	Category A	<input type="checkbox"/> Overheated	Category D
<input checked="" type="checkbox"/> Time Keeper	Category A	<input type="checkbox"/> Main EEPROM	Category D
<input type="checkbox"/> Temperature Sensor	Category B	<input type="checkbox"/> Display Contrast DAC	Category D
<input type="checkbox"/> Flash EPROM	Category B	<input checked="" type="checkbox"/> Audio I/O Port	Category B
<input type="checkbox"/> Ethernet MAC 1	Category A	<input checked="" type="checkbox"/> Ethernet MAC 2	Category A
<input type="checkbox"/> DSP 2 Access	Category A	<input checked="" type="checkbox"/> DSP 2 Boot	Category A
<input checked="" type="checkbox"/> SD Card	Category B	<input type="checkbox"/> Redundant Power Supply	Category C
<input type="checkbox"/> Slot 1: DABRF Module	Category D	<input type="checkbox"/> Slot 1: Access	Category C
<input checked="" type="checkbox"/> Slot 1: Boot	Category A	<input type="checkbox"/> Slot 2: DABRF Module	Category C
<input checked="" type="checkbox"/> Slot 2: Access	Category A	<input checked="" type="checkbox"/> Slot 2: Boot	Category A

All ☒ ☐ ☐ Set All To Category None A B C D

Application Alarm Traps

Get SNMP MIB files

Cancel Apply OK

Figure 21: System Alarm Traps



To make it easier for the service technician in the NMS to interpret the different alarms we recommend to use only categories (see PAGE 30, SNMP Parameters) which you can assign separately for each available system alarm.

**Application Alarm Traps**

Application alarms reflect a problem which is typically software-based (e.g. Audio encoder is not running) or which results from the external environment (RF Synchronisation if no antenna is connected or wrong frequency is selected).

SNMP

SNMP Enabled

☒

SNMP Parameters

NMS Parameters

SNMP Alarm Traps

Ensemble Alarm Traps

System Alarm Traps

Application Alarm Traps

☒ AES/EBU Input 1

Category B

☐ AES/EBU Input 2

Category B

☐ Inter-DSP-Communication

Category B

☐ Ensemble 1: RF Blocker

Category B

☐ Ensemble 1: RF Synchronisation

Category B

☐ Ensemble 1: Encoder 1

Category B

☐ Ensemble 1: Encoder 2

Category B

☐ Ensemble 1: Encoder 3

Category B

☐ Ensemble 2: RF Blocker

Category B

☐ Ensemble 2: RF Synchronisation

Category B

☐ Ensemble 2: Encoder 1

Category B

☐ Ensemble 2: Encoder 2

Category B

☐ Ensemble 2: Encoder 3

Category B

All

Set All To Category

None

A

B

C

D

Get SNMP MIB files

Cancel

Apply

OK

Figure 22: Application Alarm Traps



To make it easier for the service technician in the NMS to interpret the different alarms we recommend to use only categories (see PAGE 30, SNMP Parameters) which you can assign separately for each available system alarm.

### 3.1.9 Triggering of a Break-In via SNMP

Similar to the break-in via hardware TTL inputs a break-in is also possible via SNMP SET commands.

For each ensemble, 6 separate OIDs are available which must be set to TRUE (except cancel trigger) to activate and FALSE to deactivate a break-in.

- amtbrEnsXBrkInScn1LiveTrigger (X=1  $\triangle$  TTL1, X=2  $\triangle$  TTL5)
- amtbrEnsXBrkInScn2Trigger (X=1  $\triangle$  TTL2, X=2  $\triangle$  TTL6)
- amtbrEnsXBrkInScn3Trigger (X=1  $\triangle$  TTL3, X=2  $\triangle$  TTL7)
- amtbrEnsXBrkInScn4Trigger (X=1  $\triangle$  TTL4, X=2  $\triangle$  TTL8)
- amtbrEnsXBrkInTestTrigger ( $\triangle$  Website TEST button)
- amtbrEnsXBrkInCancel ( $\triangle$  Website CANCEL button)

where X=1 for Ensemble 1 and X=2 for Ensemble 2




---

The necessary **MIB** files can be downloaded via the SNMP download link directly from the system.

---



## 3.2 ADMINISTRATION of the system

### 3.2.1 Registration

On the tabs **Main**, **SD Card Module**, **DAB RF Module 1** and **Module 2** all relevant features of the system for identification like **Subject Number**, **Factory Number**, **Year**, **Hardware Version**, **Firmware Version** as well as the **MAC Addresses** are displayed.

Main	
Firmware Version	1.310
Subject Number	450159
Factory Number	16/03/1036
Year	2016
Hardware Version	3.00
MAC Address 1	00-06-9B-02-1B-F7
MAC Address 2	00-06-9B-02-1B-F8

SD Card Module	

Slot 1 (DAB RF Module)	

Features	
MAGIC TBR Basic	<input checked="" type="checkbox"/>
Ensemble Module Upgrade	<input type="checkbox"/>
Enter Option Password	<input type="text"/>

Cancel Apply OK

Figure 23: Registration

Under **Features** all available software upgrades are listed.



### Software Upgrades

We need the serial number (**Factory Number**) of the system for an upgrade. Please read out the serial number **always** from the **Registration** since the serial number on the system label could be different.

To activate further software upgrades later please enter the password which you received from us in the **Enter Option Password** field.

3.2.2 File System

By selecting the submenu **File System**, the file directory of the system (similar to the hard disk of a PC) is displayed.



Please do not carry out any actions under **File System** unless our support asked you to. All user import/export functions can be found under the menu.

Via the **Recycle Bin** symbol the currently selected file is deleted from the system.

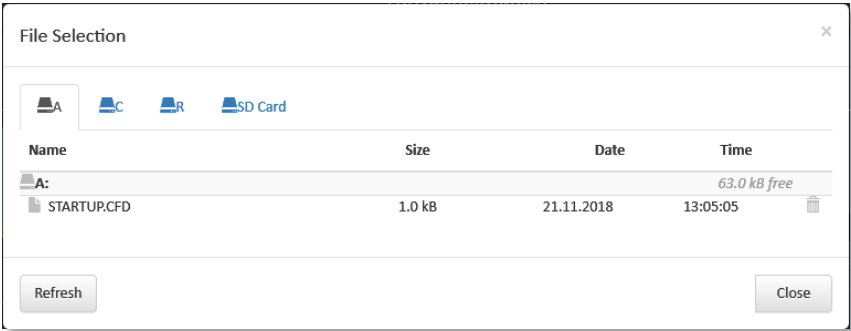


Figure 24: File System

### 3.2.3 Firmware Download

New firmware can be downloaded free of charge from our website to provide the newest features and bug fixes.

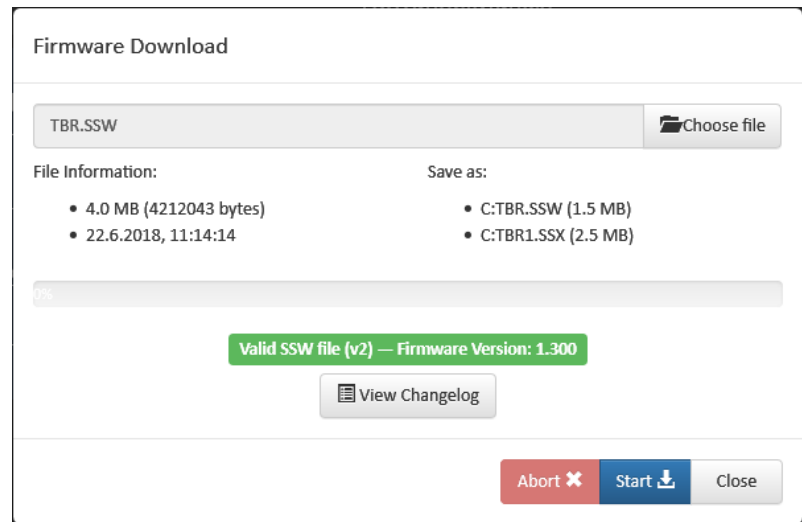


Figure 25: Firmware Download

Via the submenu **Firmware Download** the firmware can be comfortably loaded to the system.

- Select the downloaded firmware file with the **Choose File** button.
  - The standard name of the firmware file is **TBR.ssw**.
  - After choosing the file you will see additional information like version, size etc.
- Press **Start** to initialise the firmware transfer to the system.
- After a few minutes (approx. 6 min) the update of the system is done and an automatic reset will be initiated.



During the transfer time the system is still working. The transmission will be interrupted first **after** the system reset.

**Note:** In case of a necessary update of the RF modules the restart process needs more time than usually.

Don't worry if something happens during a download: The web access is still possible and you can simply restart the firmware download.

3.2.4 System Panel



The **System Panel** is only for service purposes. Please enter commands only in the prompt, if our support asks you to do so.

Press the **Recycle Bin** to clean and the **X** symbol to close the System Panel.

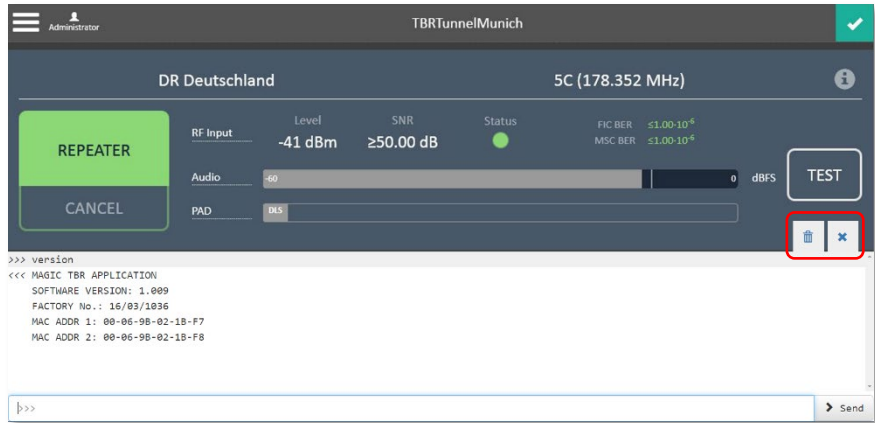
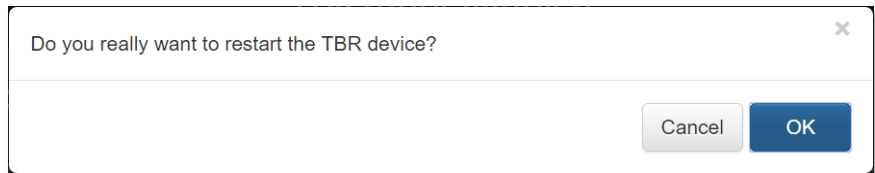


Figure 26: Main Window with opened System Panel

3.2.5 Restart Device

In the unlikely case that the system shows an unexpected behaviour a reset of the system can be initiated via the submenu **Restart Device**.





---

### 3.3 EXTRAS – Maintenance functions

Via the **Extras** menu maintenance functions are available.

#### 3.3.1 System Monitor

Via the submenu **System Monitor** all important information about the status of the system is displayed.



---

The **System Monitor** can also be opened by pressing the **System Status** symbol in the main window.



No active alarm



Active alarm

---

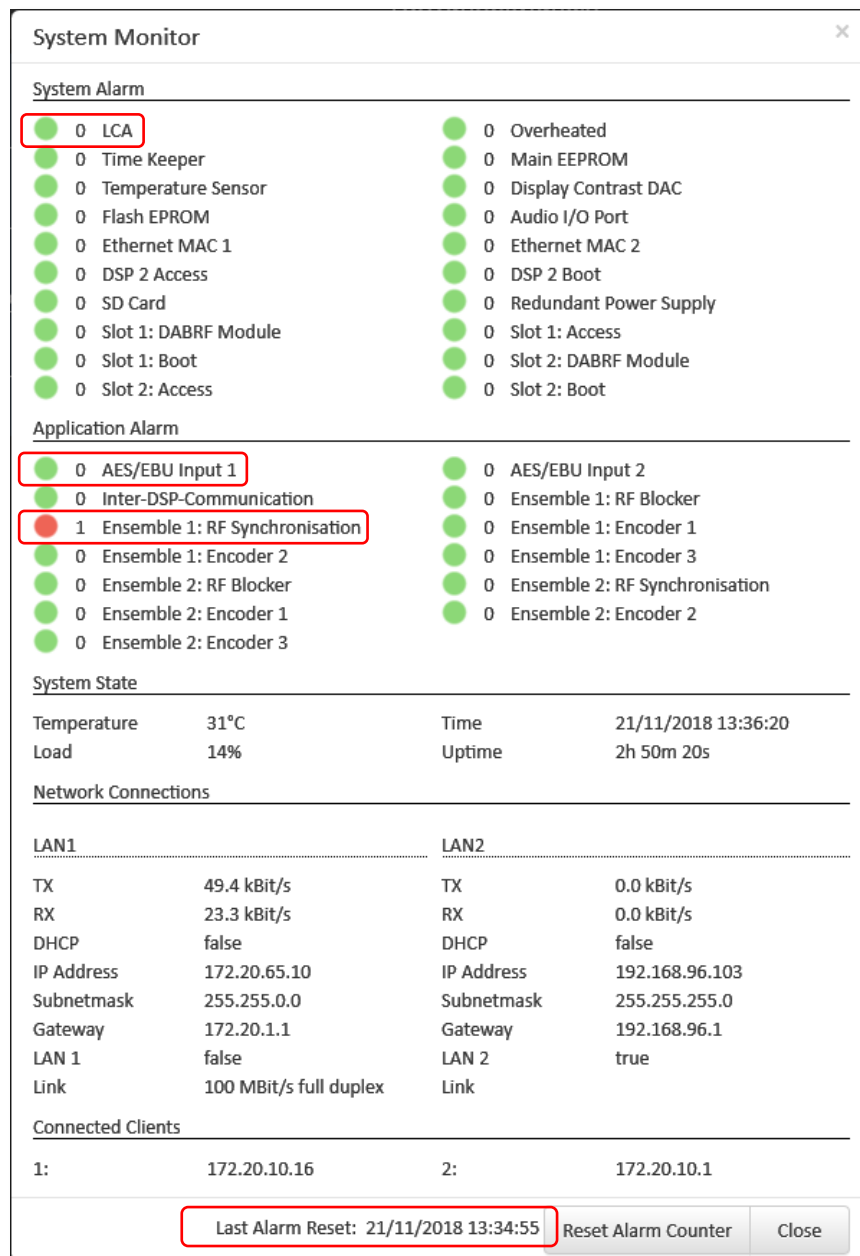


Figure 27: System Monitor

A **red** LED indicates a currently existing alarm, a **blue** LED means that an alarm has occurred since the last **Reset Alarm Counter**. A **green** LED shows that everything is running without any problems.

The **Alarm Counter** on the left side of an LED displays how often the alarm occurred since the unit has been switched on respectively the last **Reset Alarm Counter**.

In general, the available alarms are divided into **System Alarms** (hardware alarms) and **Application Alarms** which corresponds to the SNMP alarms (see CHAPTER 3.1.8).

Additional information is shown for:

- **System Temperature:** The temperature is measured in °C. A normal system temperature lies around 30°C ... 45°C
- **Load:** DSP Load of the system
- **Time:** The current local time which is taken from the received DAB signal of Ensemble 1
- **Uptime:** The time between now and the last power on or reset.
- **Ethernet State:** Information about the LAN 1 and LAN 2 link
- **Absolute Data Rates:** Information about the data rate of the two Ethernet interfaces for RX and TX direction
- **Connected Clients:** Information about the clients IP address which are currently accessing the system
- **Last Alarm Reset:** Time when the Reset Alarm Counter button was pressed

3.3.2 Protocol File Viewer

The integrated *Protocol File Viewer* shows all important events of the system. Depending on the entry typical up to 5000 events can be stored.

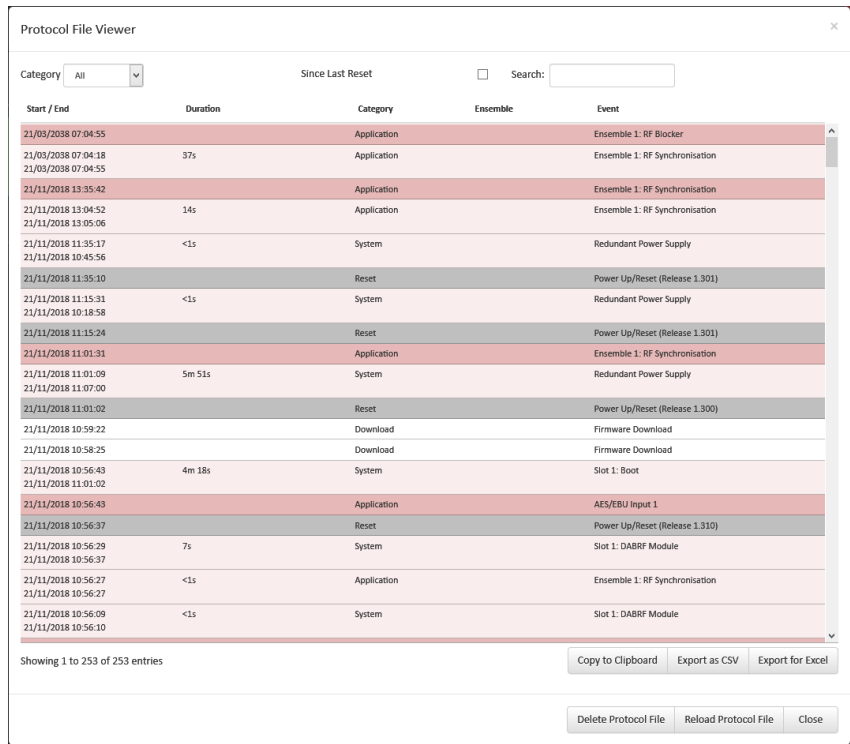



Figure 28: Protocol File Viewer

Via the options **Category** and **Search** you can simply filter the log file to find certain events.

Additionally, it is possible to export the log file as **CSV** or **MS Excel** file or to copy it to the clipboard.

### 3.3.3 Detailed Ensemble Information

Via the  symbol in the main window detailed information about the selected ensemble can be displayed.

The following details are available:

- Frequency
- Ensemble Label
- Ensemble ID

As graph related to the time (last 20 seconds):

- Reception Level
- Signal-to-Noise Ratio (SNR)
- Crest Factor
- Reception Quality
- Bit Error Rate (BER) of the FIC
- Bit Error Rate (BER) of the MSC

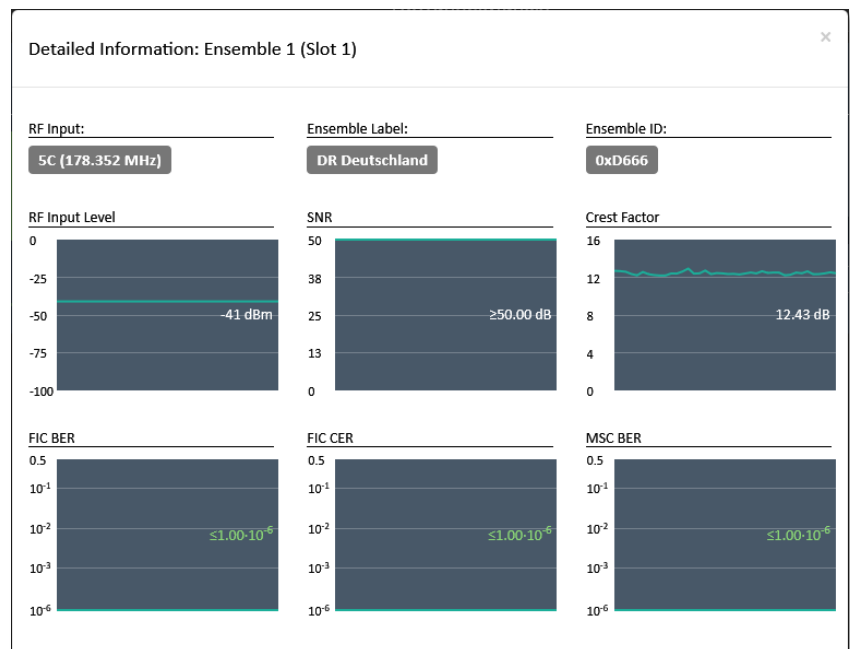


Figure 29: Detailed Ensemble Information

### 3.3.4 About

In the **About** dialogue, you will find the **Firmware version** of the system  
Furthermore, you can find our contact information especially for support requests.



Figure 30: About Dialogue

### 3.3.5 Login/Logout

Via submenu **Login** you will get full access to the system after entering the password which you can configure under submenu **General**.



To secure the system against unauthorised access do not forget to **Logout** from the system or to close the web browser.



If you have forgotten the password, a reset of the password is only possible by loading the **Factory Settings via the front keypad**.







4 INTERFACES

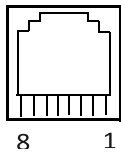


Figure 31: Interfaces of MAGIC TBR

4.1 LAN 1/2 Interface

The LAN 1 and LAN 2 interfaces can be used as control interfaces. LAN 1 can also be used as VoIP interface. For the LAN interfaces RJ45 sockets are used. The pin assignment of the socket is shown in Table 1.

Table 1: LAN 1/2 Interface



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

4.2 TTL/Relay Interface

The TTL/Relay interface is realised as a 25-pin socket. It provides 8 programmable TTL inputs or outputs and 8 relay contacts. The pin assignment of the socket is shown in Table 2.

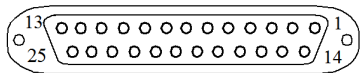


Table 2: TTL/Relay Interface

Pin	Signal		Electrical characteristics
1	TTL 1	input/output	Socket (female): SUB-D 25-pin  TTL: Maximum voltage: 3.3 V Maximum current: 10 mA  Relay interface: Maximum voltage: 48 V Maximum current: 200 mA
2	TTL 2	input/output	
3	TTL 3	input/output	
4	TTL 4	input/output	
5	TTL 5	input/output	
6	TTL 6	input/output	
7	TTL 7	input/output	
8	TTL 8	input/output	
9	RELAY 4 (B)	output, NO	
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	

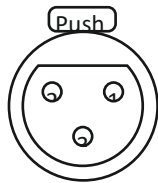
NO = Normally Open

4.3 Audio Interfaces

The Audio input interfaces can be used for live Audio announcements and the Audio output interfaces for Audio monitoring.

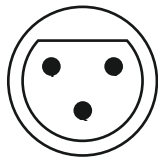
4.3.1 Analogue Inputs/Outputs

Table 3: Analogue Audio Input Interface



Pin	Signal		Electrical characteristics
1	GND	Ground	Socket (female): XLR 3-pin
2	A	Audio +	
3	B	Audio -	

Table 4: Analogue Audio Output Interface



Pin	Signal		Electrical characteristics
1	GND	Ground	Connector (male): XLR 3-pin
2	A	Audio +	
3	B	Audio -	

4.3.2 Phones Interface

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

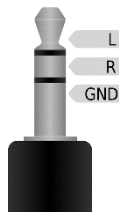


Table 5: Phones Interface

Pin	Signal		Electrical characteristics
-	GND	Ground	Connector (male): 6.3 mm jack <sup>1</sup>
-	L	Audio Left	
-	R	Audio Right	

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

4.3.3 Digital AES/EBU Audio Interfaces

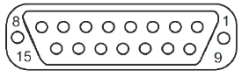


Table 6: Digital Input/Output Interfaces

Pin	Signal		Electrical characteristics
1	AES 1 IN +	AUDIO 1/2 IN a) Ensemble 1 (left) b) Ensemble 1/2 (left/right)	Socket (female):  SUB-D 15-pin   Standard:  AES/EBU (AES3) IEC 60958
2	AES 1 IN -		
3	AES 2 IN +	AUDIO 3/4 IN a) Ensemble 2 (left) b) -	
4	AES 2 IN -		
5	AES 1 OUT +	AUDIO 1/2 OUT a) Ensemble 1 (left) b) Ensemble 1/2 (left/right)	
6	AES 1 OUT -		
7	AES 2 OUT +	AUDIO 3/4 IN a) Ensemble 2 (left) b) -	
8	AES 2 OUT -		
9	GND	Ground	
10	GND	Ground	
11	GND	Ground	
12	GND	Ground	
13	GND	Ground	
14	GND	Ground	
15	GND	Ground	

4.4 RF IN/RF OUT/GPS IN

The RF Input has to be connected to the DAB outside antenna.

The RF Output must be connected to the tunnel slot antenna.

The GPS Input is currently not in use.

Table 7: RF IN 1/2 Interface



Pin	Signal		Electrical characteristics
1	RF IN	RF input	Socket female: SMA  Input level: -70 dBm ... 0 dBm at 50 Ohm
2	GND	Ground	

Table 8: RF OUT 1/2 Interface



Pin	Signal		Electrical characteristics
1	RF OUT	RF output	Socket female: SMA  Output level: -40 dBm ... -0 dBm at 50 Ohm
2	GND	Ground	

Table 9: GPS IN 1/2 Interface



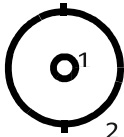
Pin	Signal		Electrical characteristics
1	GPS IN	GPS input	Socket female: SMA  Input Sensitivity: -148 dBm at 50 Ohm
2	GND	Ground	

4.5 Clock 1/Clock 2 Interfaces

Clock 1 can be used as external reference clock input if the digital Audio output is used and external clock source is selected.

Clock 2 is not in use.

Table 10: Clock 1/Clock 2 Interfaces



Pin	Signal		Electrical characteristics
1	CLOCK IN/OUT	Signal	Socket: BNC  Amplitude: 0.5 to 1.9 V <sub>0p</sub> Impedance: 75 Ohm unbalanced
2	GND	Ground	



## 5 TECHNICAL DATA

- **Coding algorithms per ensemble**
  - 2 x DAB                      EN 300401
    - all bit rates and sampling frequencies
  - 1 x DAB+                    ETSI TS 102 563
    - all bit rates and sampling frequencies
- **Line Interfaces**
  - VoIP                          LAN 1
- **Control Interfaces**
  - LAN 1 and/or LAN 2
  - Access via web browser  
(max. 2 user simultaneously)
  - TTL/RELAY
    - 8 x Relay
    - 8 x TTL Input/output
- **Audio interfaces**
  - Analogue Audio 1/2:
    - Electronically balanced input              XLR female
    - Electronically balanced output            XLR male
    - Impedance
      - Input                      > 25 k $\Omega$
      - Output                   < 50  $\Omega$
  - Digital Audio AES/EBU:
    - Format IEC-958
    - AES3 (AES/EBU) Professional
    - Electronically balanced input
      - 15-pin SUB-D female
    - Electronically balanced output
      - 15-pin SUB-D female

- Impedance
    - Input: 110  $\Omega$
    - Output: 110  $\Omega$
  - Separate Sample Rate Converter for Inputs
- **Display**
  - graphical resolution 160 x 32 Pixel
  - illuminated (can be switched off)
- **Dimensions**
  - H x W x D 44,5 x 434 x 257 mm
- **Weight**
  - ca. 8 kg
- **Additional Information**
  - EMC CISPR 32
  - Electric safety EN 60950
  - Temperature Range +5 °C to 45 °C
  - Relative humidity 5% is 85%



## 6 GENERAL

---

### 6.1 Order numbers

MAGIC TBR	804200
Ensemble Module Upgrade	804201

---

### 6.2 Scope of delivery

- MAGIC TBR
- 2 x power cable
- 4 x Self-adhesive feet
- 19" Mounting brackets
- Manual on CD or USB stick

---

### 6.3 Declaration of conformity

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



## 7 SERVICE INFORMATION

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### 7.1 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***.

---

### 7.2 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](mailto: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.

---

### 7.3 Repairs

If, contrary to expectations, your unit is defective please fill in the attached ***Service Request***<sup>1</sup> and send the unit to the following address:

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

---

<sup>1</sup> Or download from:

<http://avt-nbg.de/downloads/Info/Service%20Request%20AVT.pdf>



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# CE Conformity

## *Declaration of Conformity*

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

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

erklärt, dass das Produkt  
declares, that the product

**Produktname(n):** MAGIC TBR 804200  
Product name(s):

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

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

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

**Harmonisierte Normen:**  
Harmonized Standards:

- CISPR 32
- Radiocommunications (Short Range Devices)  
Standard 2014 (referencing AS/NZS 4268)
- Radiocommunications (Low Interference Potential Devices)  
Class Licence 2015

**Ort, Datum:** Nürnberg, 20.05.2016  
Place, date:

**Name(n):** Wilfried Hecht  
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.