6 LBB442x/00 Power Amplifiers

6.1 Introduction

The main function of the LBB442x/00 Power Amplifiers is the amplification of audio signals for the loudspeakers. See figure 6.1 for a block diagram of the power amplifier.

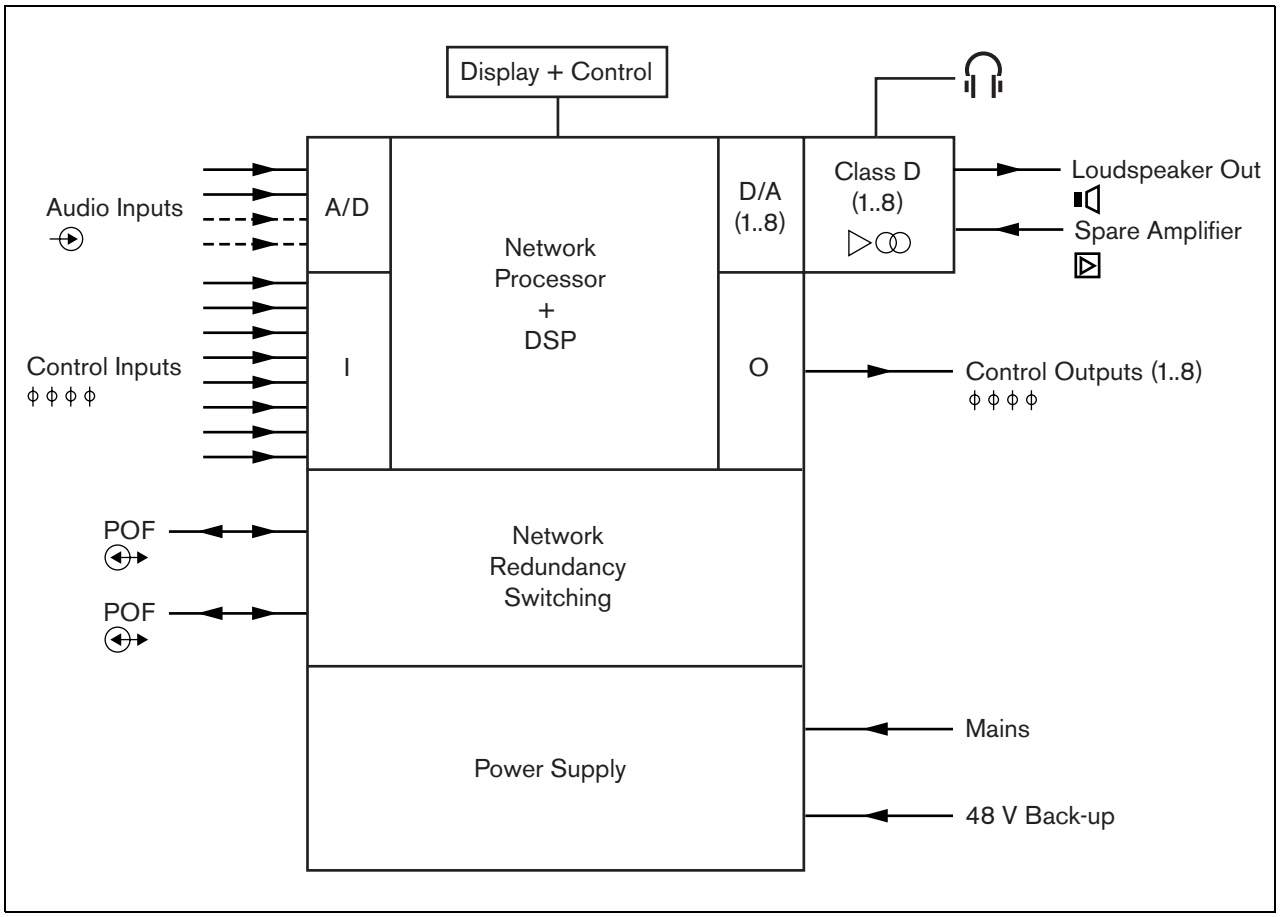


figure 6.1: Block diagram of a power amplifier

Note
The number of input, spare amplifier connections, loudspeaker lines and control outputs depends on the type of power amplifier.

6.2 Controls, connectors and indicators

6.2.1 Front view

The front of the power amplifier (see figure 6.2) contains the following:

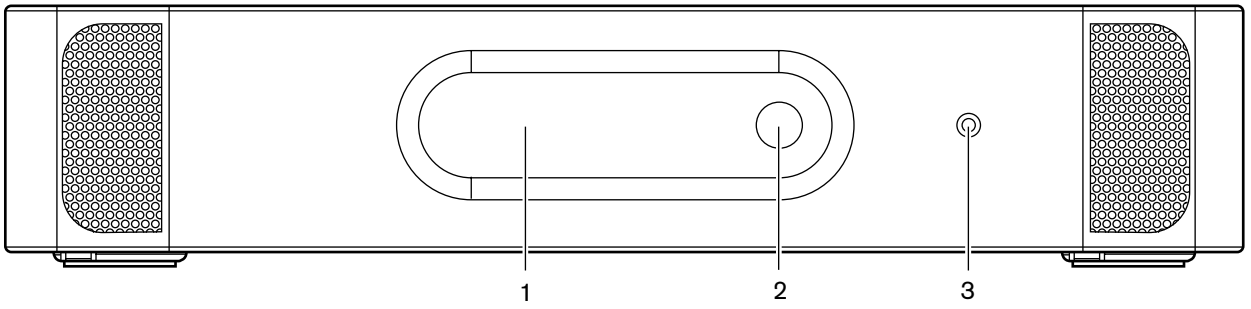
1 **Menu display** - A 2x16 character LCD display gives information about the power amplifier (see section 6.5).
2 **Menu button** - A turn-and-push button to operate the menu (see section 6.5).
3 **Monitoring headphones output** - A 3.5 mm (0.14 inch) jack socket to connect headphones for audio monitoring purposes.

6.2.2 Rear view

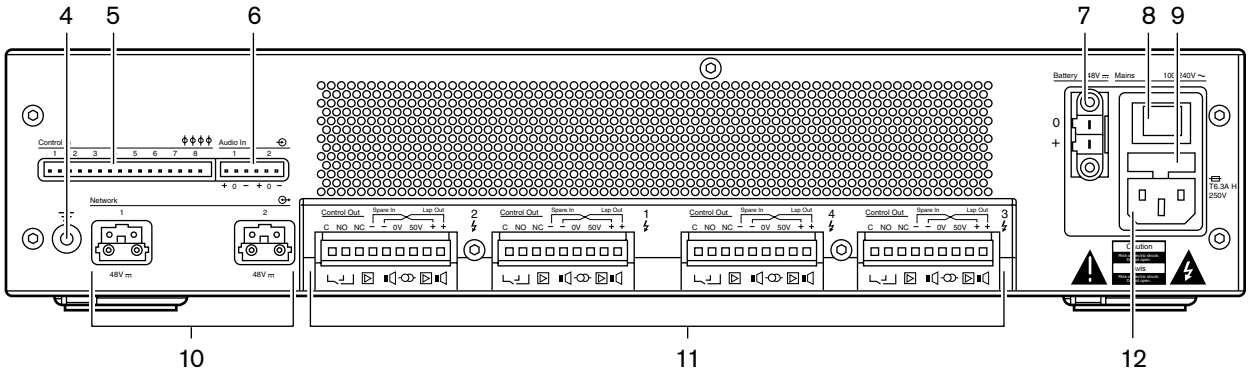
The rear of the power amplifier (see figure 6.2) contains the following:

4 **Ground** - A connection to electrically ground the power amplifier
5 **Control inputs** - The control inputs can be used to receive signals from third party equipment that must trigger actions in the Praesideo network (see section 6.3.6).
6 **Audio inputs** - Audio inputs for receiving audio signals from analogue audio sources (see section 6.3.5).
7 **Back-up power** - A socket for connecting a back-up power supply (see section 6.4.1).
8 **Mains on/off switch** - A switch to switch the mains of the power amplifier on and off (see section 6.3.2).
9 **Fuse holder** - A fuse holder with a fuse that protects the power supply of the power amplifier (see section 6.3.2).
10 **System bus** - Two system bus connectors to connect the power amplifier to other Praesideo equipment.
11 **Amplifier channels** - Each power amplifier unit contains 1 to 8 completely separated and configurable amplifier channels. The number of amplifier units (and therefore the number of amplifier channels) depends on the type of power amplifier (see section 6.3.4).
12 **Mains inlet** - A mains socket to connect the power amplifier to the mains (see section 6.3.2).

LBB442X/00
Power Amplifier



LBB4421/00, LBB4422/00, LBB4424/00, LBB4426/00
Power Amplifier



LBB4428/00
Power Amplifier

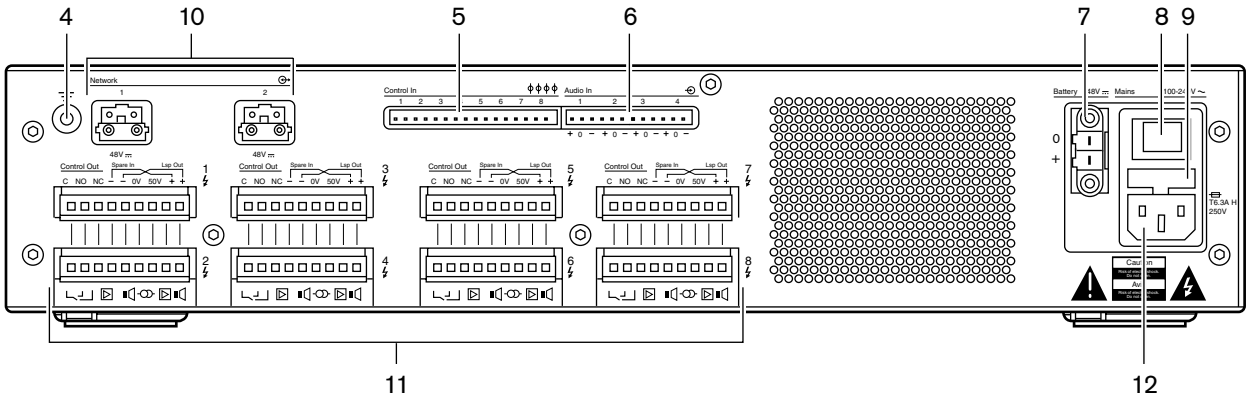


figure 6.2: Front and rear views of the power amplifier (all types)

6.3 Connections

6.3.1 Introduction

This section gives an overview of typical system connections using the power amplifier.

- Connecting the mains (see section 6.3.2).
- Connecting the network (see section 6.3.3).
- Connecting the amplifier channels (see section 6.3.4).
- Connecting audio inputs (see section 6.3.5).
- Connecting control inputs (see section 6.3.6).
- Connecting back-up power supply (see section 6.4.1).

6.3.2 Connecting the mains

Proceed as follows to connect the power amplifier to the mains:

1 Select the correct local mains voltage using the voltage selector on the rear of the network controller (see table 6.1).

table 6.1: Voltage selector and fuse

Selector	Mains voltage V(AC)	Fuse
115	100 - 120	T2.5A 250 V
230	220 - 240	T2A H 250 V

2 Put the correct type of fuse in the network controller (see table 6.1).

3 Connect an approved mains cord to the network controller.

4 Connect the mains cord to an approved mains outlet.

6.3.3 Connecting the network

Connect the power amplifier to the Praesideo system using the system bus connectors and LBB4416 network cables. Both connectors are interchangeable.

6.3.4 Connecting the amplifier channels

6.3.4.1 Introduction

An amplifier channel (see figure 6.3) is a group of outgoing signals that have been processed by the same amplifier unit of the power amplifier. The number of amplifier channels depends on the type of power amplifier (see table 6.2)

table 6.2: Number of amplifier channels

Type	Amplifier channels
LBB4420	1
LBB4422	2
LBB4424	4
LBB4426	4
LBB4428	8

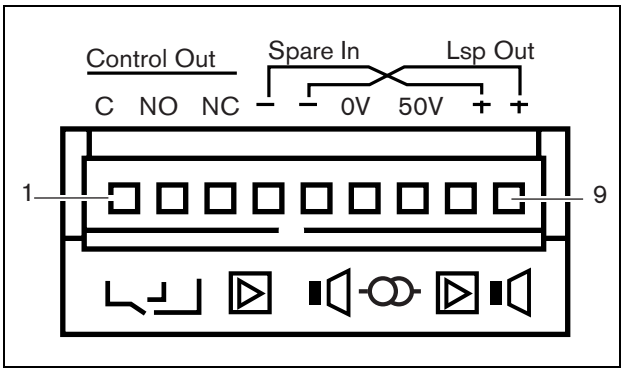


figure 6.3: Amplifier channel connector

table 6.3: Amplifier channel connector details

Pin	Description
1, 2, 3	Control outputs contacts. See section 6.3.4.4.
4, 8	Spare amplifier. See section 6.3.4.5.
5, 9	Loudspeaker line. See section 6.3.4.2.
6, 7	Fixed 50 V line. See section 6.3.4.3.

6.3.4.2 Loudspeaker lines

Between the *Lsp Out+* and *Lsp Out-* connections, the loudspeakers must be connected. The voltage between these connections (100 V, 70 V or 50 V) depends on the position of the jumper switch on the output board (see figure 6.5).

Caution
Check the specifications of the loudspeakers to find out which maximum voltage can be provided on the loudspeakers outputs of the power amplifiers.

It is possible to use the different voltages to reduce the volume of the loudspeaker line. For example, if all loudspeakers are suitable for 100 V, the maximum output level is 40 dBV. If the loudspeaker line voltage is set to 70 V, the maximum output level is reduced to 37 dBV (difference: -3 dB). If it is set to 50 V, it is reduced to 34 dBV (difference: -6 dB).

6.3.4.3 50V output

The 50 V output provided by the amplifier channel is actually a tap-off from the 50 V voltage for the loudspeaker line. The availability of the 50 V line does not depend on the selected loudspeaker voltage, since the tap-off is situated in front of the jumper (see figure 6.4).

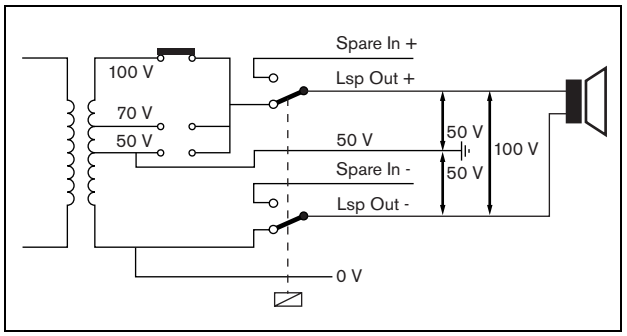


figure 6.4: 50 V output

If the 50 V is connected to ground, a 'balanced' output for the loudspeaker voltage can be created. In that case, the maximum voltage between the loudspeaker line and ground is always 50 V (see figure 6.4).

If the 50 V is connected to ground on purpose, the ground supervision of the amplifier output should be disabled. Otherwise, a short-to-ground fault would be generated (see chapter 39).

6.3.4.4 Control outputs

Each amplifier channel has one control output. The control output can be used to send signals to third party equipment to trigger actions. Each control output has three pins (see figure 6.3). The common (C) pin of the control output should always be connected. Whether the other pin that is connected is the normally closed (NC) or normally open (NO) depends on which action you want to take place when the control output is active (see table 6.4).

table 6.4: Control outputs details

Behaviour	Abbreviation	Description
Normally closed	NC	By default, the NC contact is connected with common contact C. When the output is activated, the NC contact is opened.
Normally open	NO	By default, the NO contact is not connected with common contact C. When the output is activated, the NO contact is closed.

In the configuration software (see chapter 30), a purpose must be attached to the control outputs that indicates the action to be taken when it becomes active.

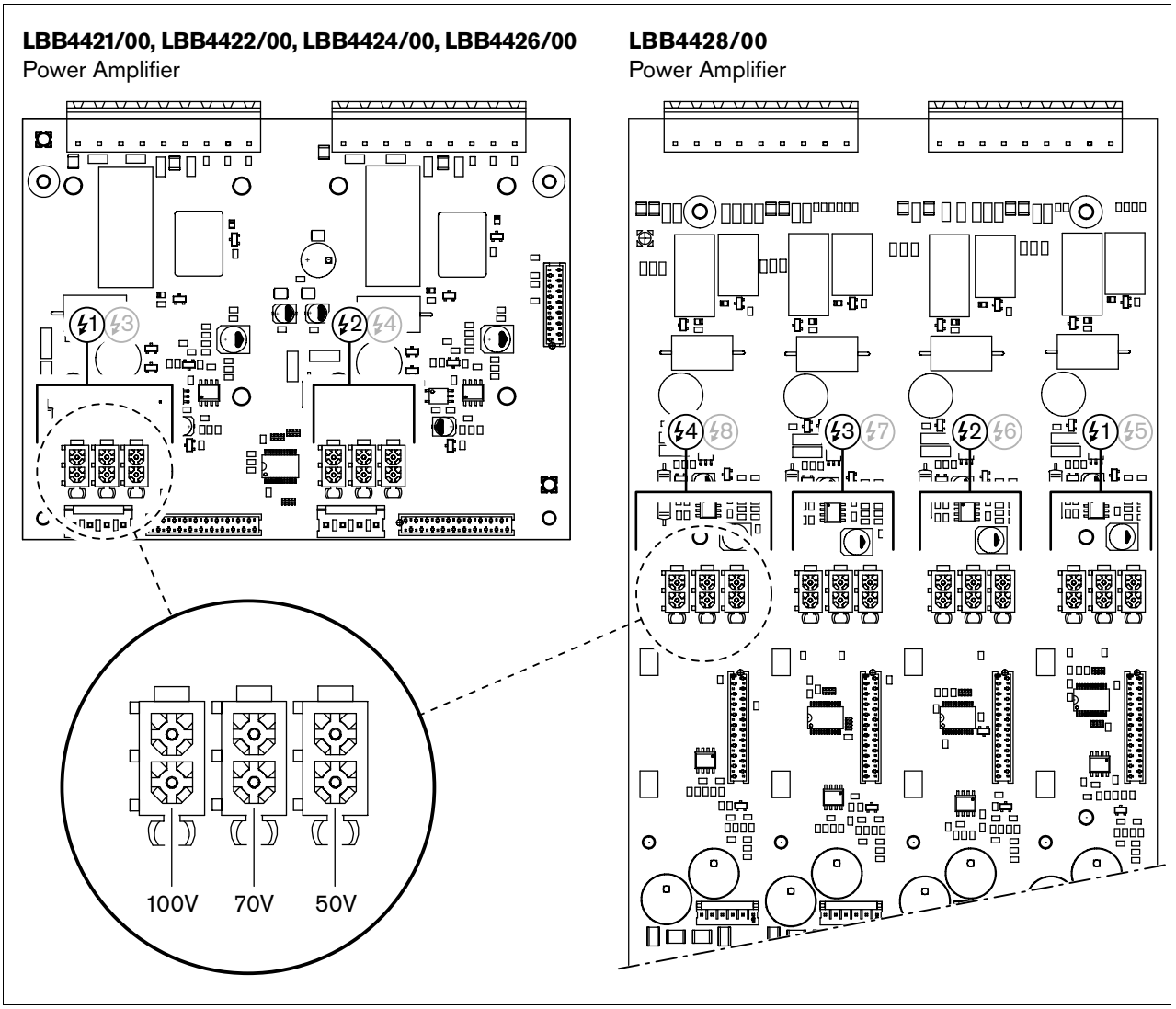


figure 6.5: Top view of the power amplifier output boards

6.3.4.5 Spare amplifiers

If a power amplifier has a defect, all loudspeaker lines are switched automatically to a spare amplifier (if connected and programmed). See figure 6.6 for a connection diagram. Keep the following in mind:

- The main and spare power amplifiers must be of the same type. If the main power amplifier is a LBB4424/00, the spare power amplifier must also be a LBB4424/00
- The way the loudspeaker lines are connected to the spare amplifier must be exactly the same as the way they are connected to the main amplifier. For example, if the loudspeaker lines use the fixed 50 V output of the main amplifier, they also must be connected to the fixed 50 V output of the spare amplifier.

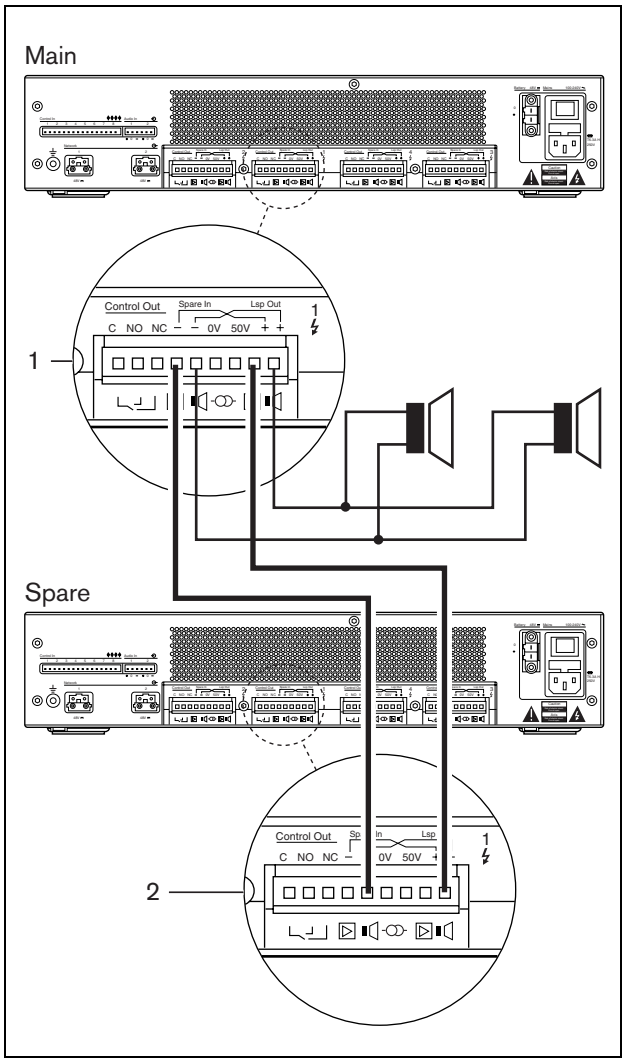


figure 6.6: Connecting a spare amplifier

Note
It is allowed to connected one spare power amplifier to more than one main power amplifier.

The actual spare switch is carried out by a relay. See figure 6.7 for the situation before spare switching and figure 6.8 for the situation after spare switching. As long as the main power amplifier (1) functions correctly, this relay is energised (see figure 6.7) and the audio is routed to the loudspeaker line (*Lsp Out+* and *Lsp Out-* terminals). The spare amplifier (2) does not route any audio, since it has no connection to any loudspeaker line.

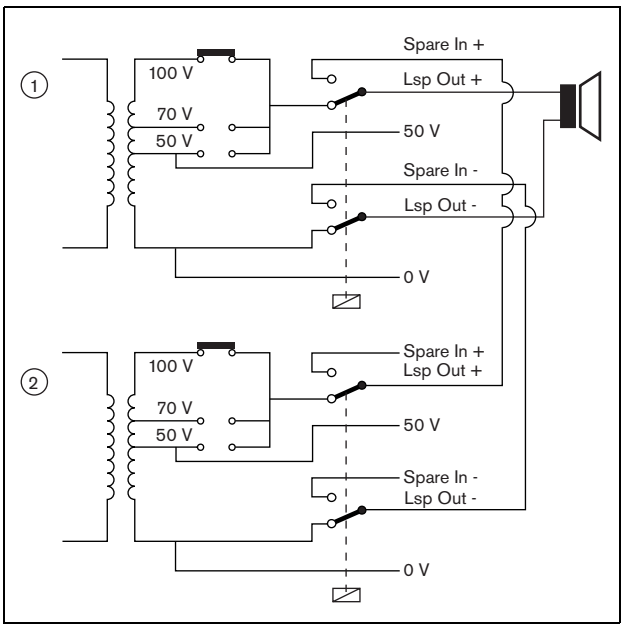


figure 6.7: Power amplifier, before spare switching

At the moment the main amplifier (1) goes down, the relay is de-energised and the switches fall into their default positions: *Spare In* - and *Spare In* + (see figure 6.8). This means that the audio output of the spare amplifier (2) is routed to the loudspeaker line through the main amplifier (1).

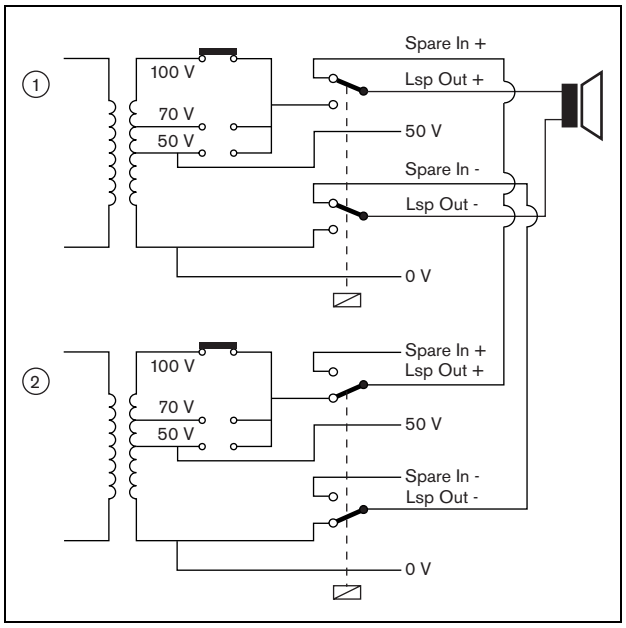


figure 6.8: Power amplifier, after spare switching

Often, for each rack of main amplifiers, one spare amplifier is used. To connect multiple main amplifiers of the same type to a spare amplifier of the same type:

- Connect the loudspeaker output of the spare amplifier to the spare inputs of the first main amplifier.
- Loop-through the spare inputs of the first main amplifier to the spare inputs of the other main amplifiers.

6.3.5 Connecting audio inputs

6.3.5.1 General

The number of audio inputs depends on the type of power amplifier.

table 6.5: Number of audio inputs

Type	Audio inputs
LBB4421	2
LBB4422	2
LBB4424	2
LBB4426	2
LBB4428	4

The audio inputs are used to interface with analogue audio sources. Each audio input is selectable between line and microphone.

Note
AVC is not possible for the LBB4428/00 8 x 60 W Power Amplifier.

Because there is no galvanic separation, it is possible to connect unbalanced signal as well as balanced signals. Unbalanced signals can be connected to the 0 (GND) and the + or - pins (see figure 6.9). The remaining, non-connected pin does not have to be connected to the 0 pin. A balanced signal should be connected between the + and - pins of the audio input. If necessary, the 0 (GND) pin can be connected to the shielding of the signal cable. However, this is not required.

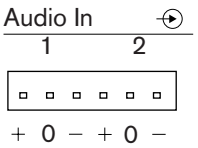


figure 6.9: Audio input connectors

6.3.5.2 Ambient noise sensing microphones

Ambient noise sensing microphones for AVC (see chapter 7) must always be connected to audio input 2 of the power amplifier. The type of a ambient noise sensing microphone is not critical. Expensive, high-quality microphones are not required. However, it is recommended to use a microphone cable of good quality, because often the cable is position on a location that is hard to reach.

Note
The choice for a directional or for an omni-directional microphone depends on the local situation.

To ensure a correct measurement of the ambient noise, observe the following guidelines:

- Separate the microphone cable from high power, mains cables. Interference caused by these cables can disturb the measurement of the ambient noise level.
- Position the ambient noise sensing microphone in a spot in which the ambient noise level is representative for the AVC area as a whole.
- Do not mount the microphone too close to the expected noise source. A loud, very local sound might result in a high call level in the whole AVC area.
- Do not mount the microphone too close to an air vent or airco. The airflow can disturb the measurement of the ambient noise level.
- Do not mounted the microphone fixed to a building. Building vibrations can disturb the measurement of the ambient noise level.

It is possible to use dynamic as well as condenser microphones. However, to prevent undesired microphone supervision errors take the following into account:

- The supply current for condenser microphones must be between 0.5 mA and 5 mA.
- The microphone impedance for dynamic microphones must be between 120 Ω and 1300 Ω.

If microphone supervision is enabled for the ambient noise sensing microphone (configuration software setting, see chapter 30) and AVC has been switched on, the AVC function remains operational as long as the supervised microphone is OK. If the supervised microphone fails, the amplifier volume is restored to the configured level without AVC attenuation (fail safe).

If microphone supervision is disabled for the ambient noise setting microphone (configuration software setting, see chapter 30) and AVC has been switched on, the AVC function remains operational irrespective of the availability of the microphone. Absence from the ambient sensing microphone or its cable or a fault in one of these then can result in maximum attenuation of the call level, because the AVC measures no ambient noise.

6.3.6 Connecting control inputs

Each type of power amplifier has 8 control inputs. The control inputs can receive signals from third party equipment that must trigger actions within the Praesideo system. It is possible to have the cables supervised for short-circuits and open connections (see figure 6.10 and figure 6.11). Whether a control input is actually supervised or not is defined in the configuration software (see chapter 30)

.

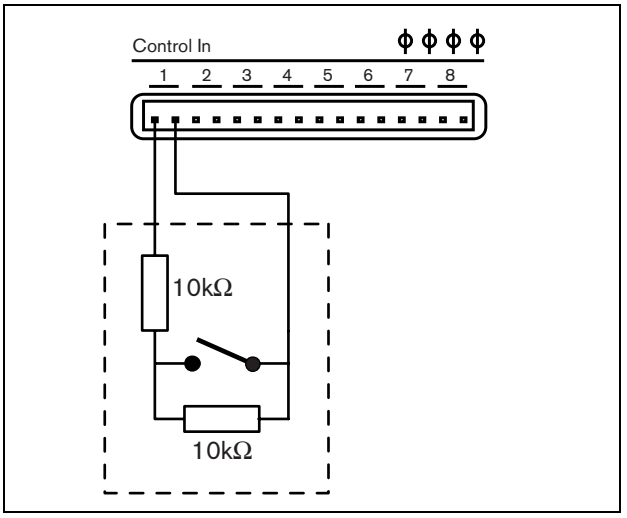


figure 6.10: Supervised control input

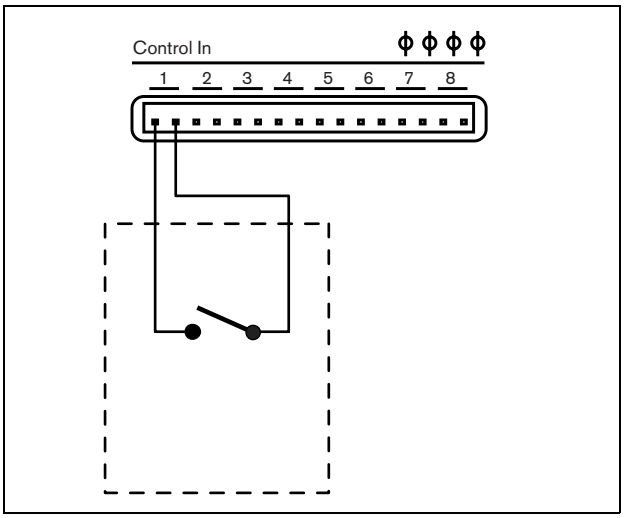


figure 6.11: Non-supervised control input

Warning
Do not connect DC or AC signals to the control outputs, otherwise the input circuit may be damaged.

6.4 Mounting

The power amplifier is suitable for either table-top or 19-inch rack mounted use. Four feet (for table-top use) and two mounting brackets (for rack-mounting) are supplied.

Note
The centre bracket positions can be used to secure the unit on a table or shelf. Also, it can be used to mount the unit vertically to a wall.

Caution
Due to the weight of the power amplifiers, it requires two persons to lift them.

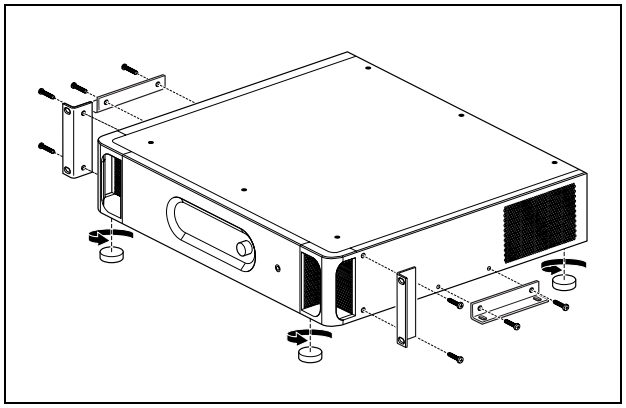


figure 6.12: Mounting the unit

Ensure there is enough space for the cool air flow to enter and the warm air flow to leave the power amplifier. Preferably, the power amplifiers are mounted in a closed 19" rack that has one cool air inlet protected with a dust filter (see figure 6.13) to prevent dust from entering the equipment.

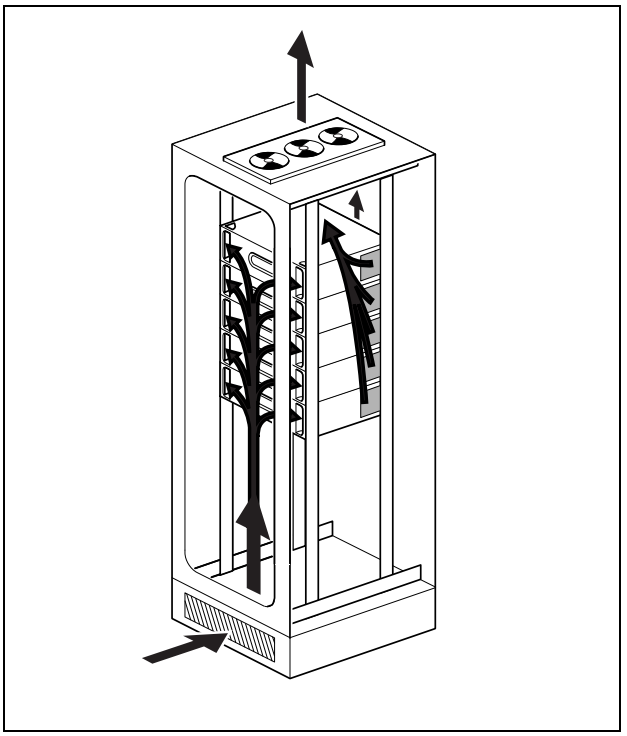


figure 6.13: Air flow in a 19" rack

6.4.1 Connecting back-up power

If a back-up power supply has been connected to the power amplifier, the power amplifier must be connected to earth in a correct way. See figure 6.14 for instructions on how to connect a rack-mounted power amplifier to earth and figure 6.15 for instructions on how to connected a non rack-mounted power amplifier to earth.

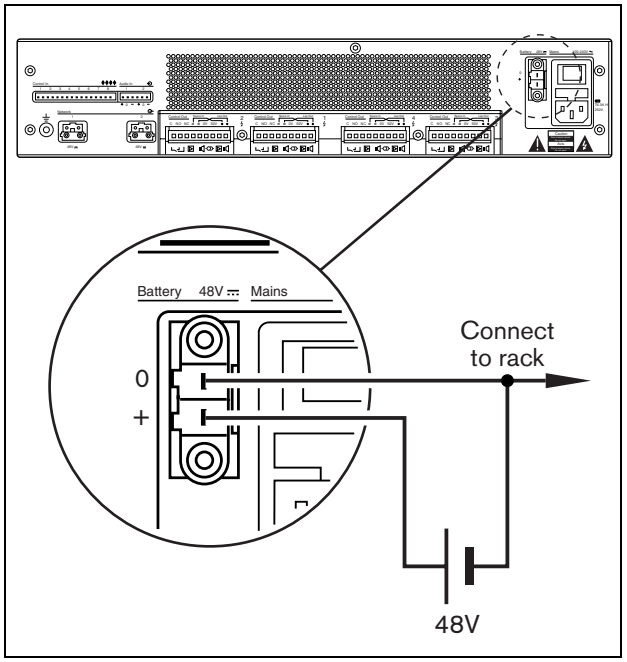


figure 6.14: Connecting power amplifier to earth (1)

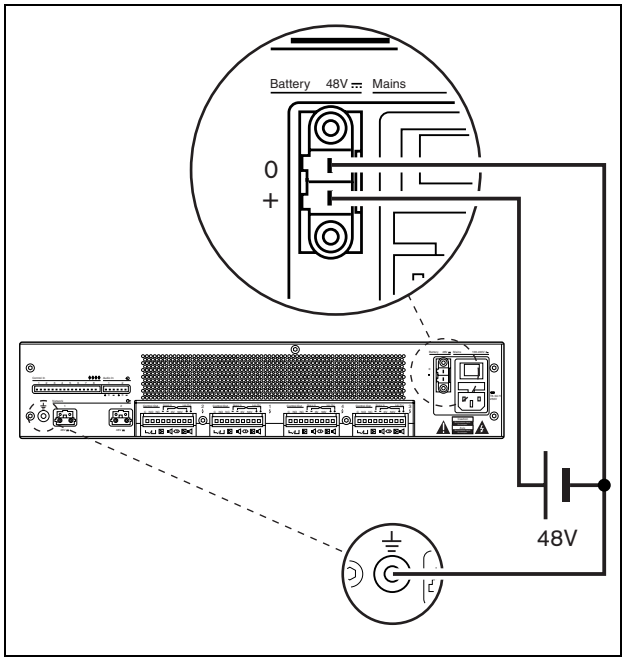


figure 6.15: Connecting power amplifier to earth (2)

6.5 Using the configuration menu

6.5.1 Overview

A number of power amplifier settings are available via an interactive menu, using a 2x16 LCD display and a 'turn-and-push' menu button. The next figure gives an overview of the menu structure.

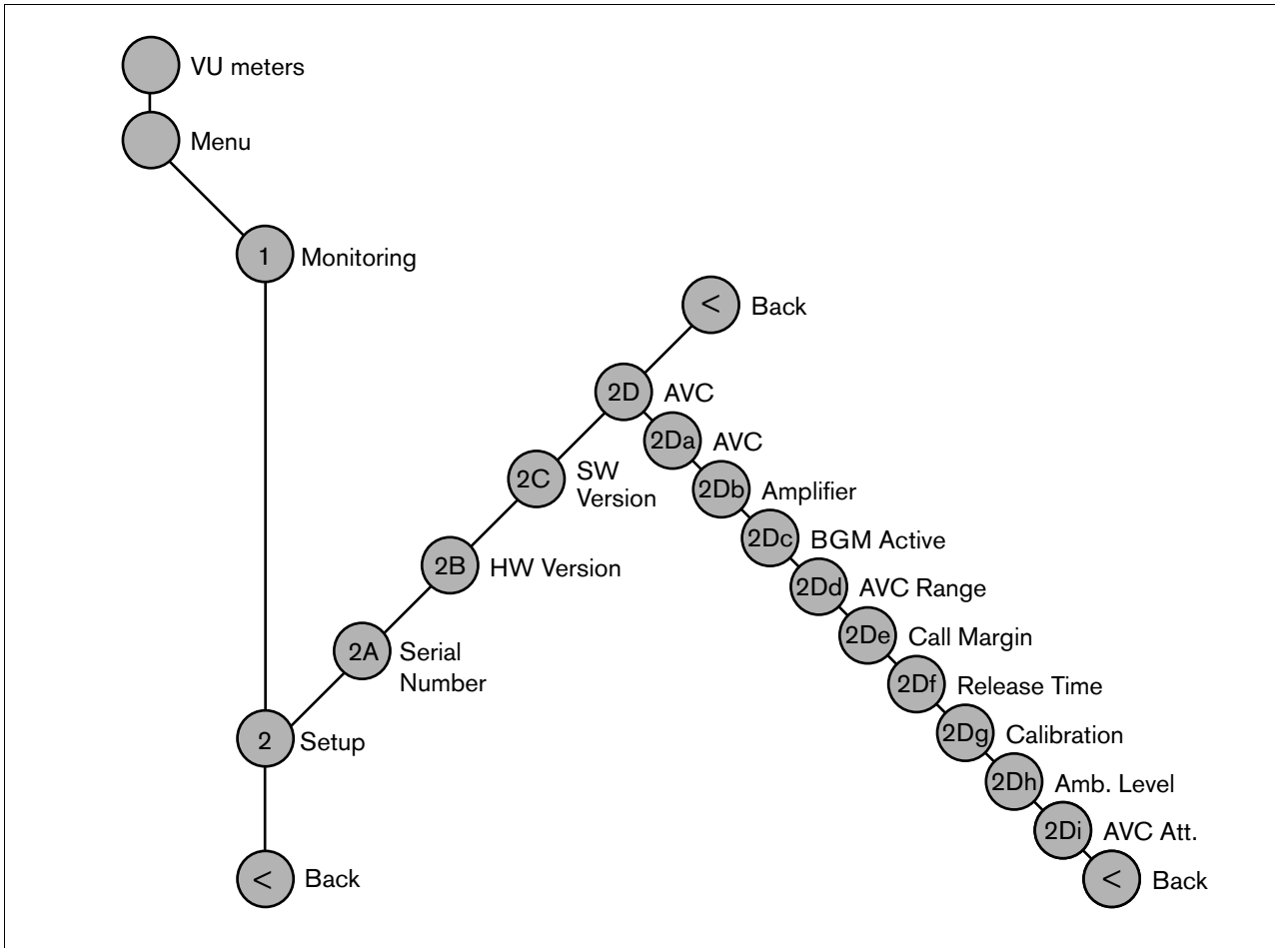


figure 6.16: Structure of the power amplifier front panel menu

Note
AVC is not possible for the LBB4428/00 8 x 60 W Power Amplifier. Therefore menu 2D is not available.

6.5.2 Navigate through the menu

Operating the menu is always a sequence of alternating turns and pushes:

Turn the button to:
- Cycle through the menu items within a menu (the menu item number and title on the first line is blinking).
- Go to a settable option within a menu item (a blinking cursor moves through the menu screen).
- Cycle through the available values for a settable option (the value is blinking).

Push the button to:
- Confirm a chosen menu item (the menu item number and title stops blinking, a blinking cursor appears).
- Go to a sub-menu (the sub-menu item character starts blinking).
- Confirm the selection of a settable option (the cursor disappears, the option value starts blinking).
- Confirm a selected value for a settable option (the value stops blinking, the cursor appears again).

Each menu is identified by a number (for the main menu) or by a number plus a character (for the sub-menus). The item identification can be found at the start of the first line and is used to navigate to and from the sub-menus. Most menu items have one or more settable options. The value of an option can be changed by selecting a value from a list of available values.

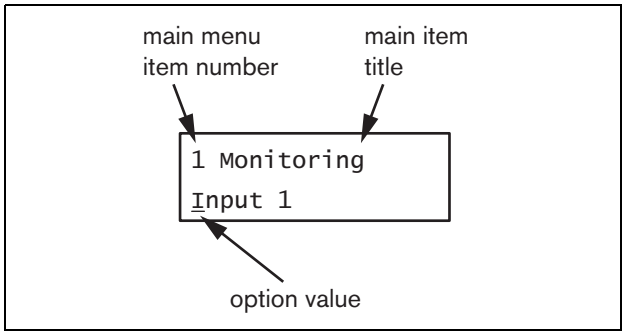


figure 6.17: Menu item screen elements

To navigate through the status screens:
1 Turn the button to move through the status screens (i.e. the *Name/ VU meters* and *Menu ...* screens).

To navigate through the main menu:
1 Navigate in the status screens to *Menu....*
2 Push the button to go to the main menu. The menu item number starts blinking.
3 Turn to select another menu item number.
4 Push to confirm the selection.

To jump to a sub-menu:
1 Navigate in the main menu to an item with three dots (e.g. *Setup...*).
2 Push the button to go to the sub-menu. The sub-menu item character starts blinking.
3 Turn to select another menu item number.
4 Push to confirm the selection.

To navigate through a sub-menu:
1 Turn the button to move the cursor to the sub-menu item character.
2 Push the button. The item character and title starts blinking.
3 Turn to select another sub-menu item character.
4 Push to confirm the selection.

To change option values:
1 Navigate to the applicable menu item.
2 Turn the button to move the cursor to the option value you want to change.
3 Push the button to activate the option. The option starts to blink.
4 Turn the button to select a new option value.
5 Push the button to confirm the new value. The option value stops blinking.
6 Turn the button to move the cursor to another settable option (when available) and repeat steps 3 to 5.

To jump back from a sub-menu to an item of the main menu:

1 Turn the button to move the cursor to the main menu item number.
2 Push the button. The item number starts blinking.
3 Turn to select another item number.
4 Push to confirm the selection.

OR

1 Turn the button to < *Back*.
2 Push to confirm.

To jump back from the main menu to the status screens:

1 Jump back to the main menu.
2 Turn the button to < *Back*.
3 Push to confirm.

Example:

Set the output that is available on the headphones output of the power amplifier. (This example assumes you start from the default screen):

```
Power Amp 4x125W
1_2_3_4_
```

1 Turn to the button to go to the *Menu ...* in the status screens:

```
Menu...
```

2 Push the button to confirm:

```
1 Monitoring
Off
```

3 Push the button to confirm:

```
1 Monitoring
Off
```

4 Turn the button to the *Monitoring* option:

```
1 Monitoring
Off
```

5 Push the button to confirm:

```
1 Monitoring
Off
```

6 Turn the button to change the audio output you want to listen to:

```
1 Monitoring
Output 3
```

7 Push the button to confirm:

```
1 Monitoring
Output 3
```

8 Turn to move the cursor to the menu number:

```
1 Monitoring
Output 3
```

9 Push the button to confirm:

```
1 Monitoring
Output 3
```

10 Turn to move to the < *Back* item:

```
< Back
```

11 Push the button to confirm:

```
Menu...
```

12 Turn the button to go to the default screen:

```
Power Amp 4x125W
1_2_3_4_
```

6.6 Configuration and operation

6.6.1 Introduction

The next sections give descriptions of the possible configuration options. Each description is followed by the relevant menu items with detailed instructions per menu option. The default values are indicated by an asterisk (*) when applicable.

6.6.2 Start-up

When the power amplifier is switched on, the display shows the name of the unit and VU meters for the outputs.

6.6.3 Status screen

The status screen (*VU meters,* see figure 6.16) provides general information about the status of the power amplifier.

6.6.4 Main menu

The *Menu ...* item provides access to the main menu.

table 6.6: Main menus

Menu item	Description
1 Monitoring	Go to the *Monitoring* submenu. See section 6.6.5.
2 Setup	Go to the *Setup* submenu. See section 6.6.6 (and further).

6.6.5 Set monitoring options

The *Monitoring* submenu is used to set which signal is sent to the monitoring headphones. It can be one of the audio outputs or no signal at all. It is not possible to set the volume of the audio outputs on the monitoring headphones. This means you always hear the audio output at the monitoring headphones at the same volume as it is broadcast.

table 6.7: Monitoring submenu

Menu item	Option	Value 1	Description
1 Monitoring	Source:		
	- *Output* nn	Output nr: *1* to *8*	The signal from audio output nn is available on the monitoring headphones output.
	- *Off**		The monitoring headphones output is off.

6.6.6 View version information

The *Serial Number*, *HW Version* and *SW Version* submenus are used to obtain version information about the power amplifier.

table 6.8: Version information menu items

Menu item	Value (read-only)	Description
2A Serial Number	e.g. *07.0.0025B*	Shows the hexadecimal serial number.
2B HW Version	e.g. *01.01*	Shows the hardware version.
2C SW Version	e.g. *2.00.1171*	Shows the version number of the application software

6.6.7 AVC setup

The *AVC Setup* submenu is used to set the AVC parameters of the power amplifier.

table 6.9: AVC Setup submenu

Menu item	Option	Value 1	Value 2	Description
2D AVC ...				Push the button to go to the submenu.
2Da AVC	- *Input* nn	*Disabled** *Enabled*		Enables AVC (*Enable*) or disables AVC (*Disable*) for the power amplifier. Even if AVC is disabled, the next menu items can be configured. They, however, do not become effective until AVC is enabled.
2Db Amplifier	- *Output* nn	Output nr: *1* to *4*	Status: *AVC Off** *AVC On*	Switches AVC on or off for audio output nn.
2Dc BGM Active			*AVC Disabled** *AVC Enabled*	Enables AVC (*AVC Enabled*) or disables AVC (*AVC Disable*) during BGM. Normally, AVC is only used for calls, but it is possible to enable AVC during BGM too. As BGM is normally on for a long time, AVC measures ambient noise during BGM. Therefore, BGM adds to the ambient level that is measured and care should be taken with the positioning of the sensing microphone with respect to the loudspeakers to avoid 'volume runaway'.
2Dd AVC Range		*0* to *20 dB* (*12 dB**)		Sets the AVC attenuation range.

table 6.9: AVC Setup submenu

2De Call Margin	*0* to*12 dB* (*6 dB**)	Sets the difference in level between the ambient noise and the call. This difference determines the threshold of the AVC function. If the ambient noise drops the specified number of dB below the nominal call level, AVC starts to attenuate the call as much as the ambient noise decreases.
2Df Release Time	*1* to *10 s* (*5* s*)	Sets the time between the end of a call and the start of measuring the ambient noise level.
2Dg Calibration	*Off** *On*	Switches calibration of the AVC function on or off.
2Dh Amb. Level	*0* to *140 dBSPL* *Overload* (*0 dBSPL**)	Used during calibration of AVC. See chapter 7.
2Di AVC Att.	*0* to *AVC Range*	Displays the actual AVC attenuation.

6.7 Technical data

6.7.1 Physical characteristics

Dimensions (H x W x D):
88 x 483 x 350 mm (19" mounting, with brackets)
92 x 440 x 350 mm (table-top, with feet)
Weight:
13 kg (LBB4421/00)
14 kg (LBB4422/00)
16.5 kg (LBB4424/00)
16 kg (LBB4426/00)
14.5 kg (LBB4428/00)

6.7.2 Climate conditions)

Temperature:
-5 to +55 °C (operating)
-20 to +70 °C (non-operating)
Relative humidity:
15 to 90%, non-condensing (operating)
5 to 95%, non-condensing (non-operating)
Air pressure:
600 to 1100 hPa

6.7.3 Electromagnetic compatibility

Emission:
EN55103-1/FCC-47 part 15B
Immunity:
EN55103-2

6.7.4 Mean time between failure

MTBF
32,000 hours at +55 °C (all types)

6.7.5 System bus

Connector (rear side):
Female proprietary connector
Preferred cable:
LBB4416/xx
Maximum cable length:
50 m (per system bus connector)
Data signal interface:
Plastic optical fibre
Network power consumption:
0 W

6.7.6 Power supply

Connector (rear side):
IEC male power inlet with fuse holder
Preferred cable:
Mains cord meeting CE standard
Voltage selector:
Autorange
Input voltage:
90 to 264 V(AC), 50-60 Hz
On/Off switch:
Located at the rear

6.7.7 Backup power

Connector (rear side):
2 x 2 pole for removable screw connector
Input voltage:
48 V(DC)
Input voltage range:
45 to 56 V(DC)
Maximum current:
12 A

6.7.8 Power consumption (LBB4421/00)

Stand-by:
6 W, 48 V(DC); 16 W, 120/230 V(AC)
Idle, no pilot tone:
21 W, 48 V(DC); 32 W, 120/230 V(AC)
Idle, with pilot tone 8 V:
26 W, 48 V(DC); 37 W, 120/230 V(AC)
P_{max} -6 dB with pilot tone 8 V:
182 W, 48 V(DC); 210 W, 120/230 V(AC)
P_{max} -3 dB with pilot tone 8 V:
330 W, 48V(DC); 370 W, 120/230 V(AC)
P_{max} with pilot tone 8 V:
520 W, 48 V(DC); 640 W, 54 V(DC); 720 W, 120/230 V(AC)

6.7.9 Power consumption (LBB4422/00)

Stand-by:
6 W, 48 V(DC); 16 W, 120/230 V(AC)
Idle, no pilot tone:
24 W, 48 V(DC); 38 W, 120/230 V(AC)
Idle, with pilot tone 8 V:
29 W, 48 V (DC); 44 W, 120/230 V(AC)
P_{max} -6 dB with pilot tone 8 V:
188 W, 48 V(DC); 214 W, 120/230 V(AC)
P_{max} -3 dB with pilot tone 8 V:
336 W, 48V(DC); 375 W, 120/230 V(AC)
P_{max} with pilot tone 8 V:
520 W, 48 V(DC); 640 W, 54 V(DC); 720 W, 120 V(AC)/230 V(AC)

6.7.10 Power consumption (LBB4424/00)

Stand-by:
8 W, 48 V(DC); 19 W, 120/230 V(AC)
Idle, no pilot tone:
37 W, 48 V(DC); 52 W, 120/230 V(AC)
Idle, with pilot tone 8 V:
46 W, 48 V (DC); 61 W, 120/230 V(AC)
P_{max} -6 dB with pilot tone 8 V:
200 W, 48 V(DC); 226W, 120/230 V(AC)
P_{max} -3 dB with pilot tone 8 V:
340 W, 48V(DC); 390 W, 120/230 V(AC)
P_{max} with pilot tone 8 V:
620 W, 48 V(DC); 670 W, 54 V(DC); 720 W, 120/230 V(AC)

6.7.11 Power consumption (LBB4426/00)

Stand-by:
8 W, 48 V(DC); 19 W, 120/230 V(AC)
Idle, no pilot tone:
37 W, 48 V(DC); 52 W, 120/230 V(AC)
Idle, with pilot tone 8 V:
46 W, 48 V(DC); 61 W, 120/230 V(AC)
P_{max} -6 dB with pilot tone 8 V:
116 W, 48 V(DC); 132 W, 120/230 V(AC)
P_{max} - 3 dB with pilot tone 8 V:
180 W, 48V(DC); 210 W, 120/230 V(AC)
P_{max} with pilot tone 8 V:
312 W, 48 V(DC); 330 W, 54 V(DC); 360 W, 120/230 V(AC)

6.7.12 Power consumption (LBB4428/00)

Stand-by:
16 W, 48 V(DC), 26 W, 120/230 V(AC)
Idle, no pilot tone:
53 W, 48 V(DC); 68 W, 120/230 V(AC)
Idle, with pilot tone 8 V:
64 W, 48 V(DC), 80 W, 120/230 V(AC)
P_{max} -6 dB with pilot tone 8 V:
230 W, 48 V(DC); 255 W, 120/230 V(AC)
P_{max} -3 dB with pilot tone 8 V:
360 W, 48V(DC); 415 W, 120/230 V(AC)
P_{max} with pilot tone 8 V:
680 W, 48 V(DC); 710 W, 54 V(DC); 790 W, 120/230 V(AC)

6.7.13 Analogue line inputs

Connector (rear side):
6 pole header (type ETB47-06-2-G1 (ECE)) for removable screw connector
Preferred cable:
Twisted pair, shielded
Maximum input signal level:
6 dBV
Input range:
-12 to 0 dB with respect to maximum input level
Input sensitivity setting:
Software
Frequency response:
-3 dB points at 50 Hz and 20 kHz (tolerance ± 1 dB
Input impedance:
22 kΩ
Signal/Noise ratio:
> 87 dB (rms unweigthed)
Common mode rejection ratio:
> 40 dB at 1 kHz
Input cross-talk:
< -80 dB at 1 kHz
<-70 dB at 10 kHz at -11 dBV input level
Distortion:
< 0.1%

6.7.14 Analogue microphone inputs

Connector (rear side):
6 pole header (type ETB47-06-2-G1 (ECE)) for removable screw connector
Preferred cable:
Twisted pair, shielded
Input range:
-65 dBV to -50 dBV
Input sensitivity setting:
Software
Frequency response:
100 Hz to 16 kHz
Input impedance:
1360 Ω
Signal/Noise ratio:
> 60 dB (rms unweigthed at -60 dBV)
Common mode rejection ratio:
> 40 dB at 1 kHz
Input cross-talk:
< -80 dB at 1 kHz at -60 dBV input level
< -70 dB at 10 kHz at -60 dBV input level
Distortion:
< 0.1%
Phantom supply:
12 V ± 1 V (max. 15 mA)

6.7.15 Loudspeaker outputs and spare inputs LBB4421/00

Connector (rear side): 1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with control outputs)
Voltage: 100 V, 70 V, 50 V (jumper setting)
Max. unloaded voltage: 200 V peak
Rated load resistance: 20 Ω (100 V); 10 Ω (70 V); 5 Ω (50 V)
Rated load capacitance: 250 nF (100 V); 500 nF (70 V); 1000 nF (50 V)
Rated output power: 500 W, distortion ≤ 1%
Alarm tone output power: 250 W, distortion ≤ 0.3%
Continuous output power: 25% of the rated output power at 1 kHz and an ambient temperature of 55 °C
Distortion: ≤ 0.3% at 1 kHz and 50% of the rated output power < 1% from 60 Hz to 19 kHz
Frequency response: 60 Hz to 19 kHz (- 3 dB) at -10 dB with maximum capacitive load and rated load resistance
Power bandwidth: 60 Hz - 19 kHz (-3 dB, distortion < 1%) at 50% of the rated output power
Signal/Noise ratio: > 85 dBA with pilot tone off
Channel cross-talk: < -80 dB at 1 kHz at nominal load < -70 dB at 10 kHz at nominal load
Amplifier output limiting: Soft clipping
Acoustical noise level: < NR35 at 1 m, fans at half speed, table-top < NR40 at 1 m, fans at full speed, table-top

6.7.16 Loudspeaker outputs and spare inputs (LBB4422/00)

Connector (rear side): 1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with control outputs)
Voltage: 100 V, 70 V, 50 V (jumper setting)
Max. unloaded voltage: 200 V peak
Rated load resistance: 40 Ω (100 V); 20 Ω (70 V); 10 Ω (50 V)
Rated load capacitance: 125 nF (100 V); 250 nF (70 V); 500 nF (50 V)
Rated output power: 250 W, distortion ≤ 1%
Alarm tone output power: 125 W, distortion ≤ 0.3%
Continuous output power: 25% of the rated output power at 1 kHz and an ambient temperature of 55 °C
Distortion: ≤ 0.3% at 1 kHz and 50% of the rated output power < 1% from 60 Hz to 19 kHz
Frequency response 60 Hz to 19 kHz (- 3 dB) at -10 dB with max. capacitive load and rated load resistance
Power bandwidth: 60 Hz - 19 kHz (-3 dB, distortion < 1%) at 50% of the rated output power
Signal/Noise ratio: > 85 dBA with pilot tone off
Channel cross-talk: < -80 dB at 1 kHz at nominal load < -70 dB at 10 kHz at nominal load
Amplifier output limiting: Soft clipping
Acoustical noise level: < NR35 at 1 m, fans at half speed, table-top < NR40 at 1 m, fans at full speed, table-top

6.7.17 Loudspeaker outputs and spare inputs (LBB4424/00)

Connector (rear side): 1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with control outputs)
Voltage: 100 V, 70 V, 50 V (jumper setting)
Max. unloaded voltage: 200 V peak
Rated load resistance: 80 Ω (100 V); 40 Ω (70 V); 20 Ω (50 V)
Rated load capacitance: 62 nF (100 V); 125 nF (70 V); 250 nF (50 V)
Rated output power: 125 W, distortion ≤ 1%
Alarm tone output power: 62.5 W, distortion ≤ 0.3%
Continuous output power: 25% of the rated output power at 1 kHz and an ambient temperature of 55 °C
Distortion: ≤ 0.3% at 1 kHz and 50% of the rated output power < 1% from 60 Hz to 19 kHz
Frequency response: 60 Hz to 19 kHz (- 3 dB) at -10 dB with max. capacitive load and rated load resistance
Power bandwidth: 60 Hz - 19 kHz (-3 dB, distortion < 1%) at 50% of the rated output power
Signal/Noise ratio: > 85 dBA with pilot tone off
Channel cross-talk: < -80 dB at 1 kHz at nominal load < -70 dB at 10 kHz at nominal load
Amplifier output limiting: Soft clipping
Acoustical noise level: < NR35 at 1 m, fans at half speed, table-top < NR40 at 1 m, fans at full speed, table-top

6.7.18 Loudspeaker outputs and spare inputs (LBB4426/00)

Connector (rear side): 1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with control outputs)
Voltage: 100 V, 70 V, 50 V (jumper setting)
Max. unloaded voltage: 200 V peak
Rated load resistance: 166 Ω (100 V); 82 Ω (70 V); 42 Ω (50 V)
Rated load capacitance: 30 nF (100 V); 60 nF (70 V); 120 nF (50 V)
Rated output power: 60 W, distortion ≤ 1%
Alarm tone output power: 30 W, distortion ≤ 0.3%
Continuous output power: 25% of the rated output power at 1 kHz and an ambient temperature of 55 °C
Distortion: ≤ 0.3% at 1 kHz and 50% of the rated output power < 1% from 60 Hz to 19 kHz
Frequency response: 60 Hz to 19 kHz (- 3 dB) at -10 dB with max. capacitive load and rated load resistance
Power bandwidth: 60 Hz - 19 kHz (-3 dB, distortion < 1%) at 50% of the rated output power
Signal/Noise ratio: > 85 dBA with pilot tone off
Channel cross-talk: < -80 dB at 1 kHz at nominal load < -70 dB at 10 kHz at nominal load
Amplifier output limiting: Soft clipping
Acoustical noise level: < NR35 at 1 m, fans at half speed, table-top < NR40 at 1 m, fans at full speed, table-top

6.7.19 Loudspeaker outputs and spare inputs (LBB4428/00)

Connector (rear side):
1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with control outputs)

Voltage:
100 V, 70 V, 50 V (jumper setting)

Max. unloaded voltage:
200 V peak

Rated load resistance:
166 Ω (100 V); 82 Ω (70 V); 42 Ω (50 V)

Rated load capacitance:
30 nF (100 V); 60 nF (70 V); 120 nF (50 V)

Rated output power:
60 W, distortion ≤ 1%

Alarm tone output power:
30 W, distortion ≤ 1%

Continuous output power:
25% of the rated output power at 1 kHz and an ambient temperature of 55 °C

Distortion:
≤ 0.3% at 1 kHz and 50% of the rated output power
< 1% from 60 Hz to 19 kHz

Frequency response:
80 Hz to 19 kHz (- 3 dB at -10 dB with max. capacitive load and rated load resistance

Power bandwidth:
80 Hz - 19 kHz (-3 dB, total harmonic distortion < 1%) at 50% of the rated output power

Signal/Noise ratio:
> 85 dBA with pilot tone off

Channel cross-talk:
< -80 dB at 1 kHz at nominal load
< -60 dB at 10 kHz at nominal load

Amplifier output limiting:
Soft clipping

Acoustical noise level:
< NR35 at 1 m, fans at half speed, table-top
< NR40 at 1 m, fans at full speed, table-top

6.7.20 Control inputs

Connector (rear side):
16 pole header (type Phoenix MC1,5/16-G-3,81) for removable screw connector (MC1,5/16-SWT-3,81)

Cable loop resistance:
max. 1000 Ω

External contacts:
Unpowered contacts (relay contacts, mechanical switches, mercury contacts etc.)

6.7.21 Control outputs

Connector (rear side):
1 x 9 pole header (type ETB 43-09-2-G1 (ECE)) with removable screw connector (shared with loudspeaker output and spare amplifier input)

Contact type:
Relay contact, single pole, change-over contact (SPDT)

Contact voltage:
24 V(DC)

Contact current:
1 A

Off state (unpowered):
C-NC is closed, C-NO is open

7 Automatic Volume Control

7.1 Introduction

Automatic Volume Control (AVC) improves the intelligibility of calls by adjusting the volume of a call related to the measured ambient noise. Normally, the system delivers sound pressure levels providing good intelligibility based on the expected ambient noise in that zone. However, the ambient noise is not constant. For example, it can be higher during rush hours and lower in the evening, or higher if a train enters a platform and lower if there are less train movements. When the ambient noise is less, the sound pressure level might be too high for comfortable listening and in such cases AVC can attenuate the call.

The AVC function of Praesideo continuously measures the ambient noise level, even during low volume, back ground music (BGM). At the moment a call is started via the channels of a power amplifier that have AVC enabled, the AVC attenuation is derived from the ambient sensing averaging filter. The volume of the call is set for the ambient noise level and remains constant during the whole call, even if the ambient noise level changes during the call.

In the Praesideo system, each power amplifier that is used for a zone requiring AVC needs an ambient noise sensing microphone. This microphone can be configured to work for any of the loudspeaker lines connected to the amplifier. Each power amplifier only accepts one ambient sensing microphone. Therefore, a large zone that uses multiple power amplifier needs multiple ambient noise sensing microphones, because ambient sound levels are not communicated between power amplifiers via the system.

Note
For large zones with multiple power amplifiers, using a single ambient noise sensing microphone with a microphone splitter is possible. The microphone cannot be supervised in this case.

7.2 Preparations

Before setting up AVC:

- Make sure the ambient sensing microphone is correctly connected to audio input 2 of the power amplifier (see section 6.3.5).
- Make sure the configuration software settings of audio input 2 are correct (see chapter 30).

Note
When AVC is enabled, the sensitivity settings for audio input 2 are overruled.

- Make sure that all loudspeakers in the AVC loudspeaker line are connected to the Praesideo system, set at the right power level, are aimed (if necessary) and are working.
- Adjust the nominal output level of all amplifier channels in the AVC zone to the level required to have the right speech intelligibility at maximum ambient noise level.

Note
If AVC is used in combination with remote (wall-mounted) volume controls for BGM, make sure that all volume controls are bypassed manually (set to maximum) during calibration. Although the Praesideo control outputs can be used for volume overrides during calls, they are not automatically activated during the AVC calibration.

7.3 Setup

Proceed as follows to setup AVC for a power amplifier:

Note
This procedure must be repeated for each power amplifier in the AVC zone.

1 Go to screen 2Da of the menu display to enable AVC for the power amplifier.

Note
See section 6.6 for information about the power amplifier menu display.

2 Go to screen 2Db of the menu display and switch AVC on for each output that requires AVC.

Note
As there is only one set of AVC parameters per power amplifier, AVC parameters are the same for all channels of a power amplifier that uses AVC. However, the nominal output level of each channel may be differently configured.

3 Go to screen 2Dd of the menu display and set the required AVC range. The default value of 12 dB is a practical value. A higher value results in lower volume calls when the ambient noise level decreases.
4 Go to screen 2De of the menu display and set the call margin. The default level of 6 dB is a practical value. A higher value results in a bigger difference in loudness between calls and ambient noise, but it requires more or bigger loudspeakers and more amplifier power to keep up this value at high ambient noise levels.
5 Go to screen 2Df of the menu display and set the release time. The default value of 5 s is a practical value. A short release time combined with a long reverberation time might cause a call level which is too high.
6 Go to screen 2Dg of the menu display and switch the calibration tone on.

Note
During calibration, none of the outputs of the power amplifier is available for calls. The outputs selected in step 2 are used to provide the calibration tone, whereas the other outputs are muted. The power amplifier is logged as a fault (*Unit missing*) in the diagnose part of the web interface (see chapter 39). After calibration, the power amplifier is automatically restarted and the fault is *Resolved* and should be acknowledged and reset by the installer.

7 Measure the calibration tone level at the position of the listeners who are to be addressed with a normal (portable) A-weighting SPL meter.
8 With the calibration tone still switched on, go to screen 2Dh of the menu display and set the level to the value measured with the SPL meter. This calibrates the AVC for different microphones and/or microphone positions.
9 Go to screen 2Dg of the menu display and switch the calibration tone off.
10 Go to screen 2Di of the menu display and check the performance of the AVC. The screen shows the actual attenuation of calls. When the ambient noise level decreases, the AVC attenuation (gain reduction) increases. When the ambient noise level increases, the AVC attenuation (gain reduction) decreases (eventually to 0 dB).