



# PLN-1P1000 Plena Power Amplifier



- ▶ 1000 W power amplifier in a 3U high housing
- ▶ 70 V / 100 V and 8 ohm outputs
- ▶ Dual inputs with priority switching
- ▶ 100 V input for slave operation on 100 V speaker line
- ▶ Temperature-controlled forced front-to-back ventilation, directly stackable
- ▶ Mains, battery back-up and pilot tone supervision

The PLN-1P1000 is a powerful 1000 W power amplifier in a 3U high 19" case for rack mounting or tabletop use. LEDs on the front panel show the status of the amplifier: power, audio output level, and supervised functions. This high-performance unit fulfills a wide range of public address requirements at a surprisingly low cost.

## Functions

### Dependability

The amplifier is protected against overload and short circuits. A temperature-controlled fan ensures high reliability at high output levels, and low acoustic noise at lower output levels. An overheat protection circuit switches off the power stage and activates an LED on the front panel, if the internal temperature reaches a critical limit due to poor ventilation or overload.

The unit operates both on mains power and on a 24 V battery power supply for emergency back up, with automatic switchover.

For emergency and evacuation use, the following functions are monitored: mains presence, battery present, pilot tone presence, amplifier operation. Front panel LEDs indicate the status of supervised functions. The of pilot tone supervision and battery status LEDs can be switched off for general public address use. Failsafe (normally

energized) relays are provided for each supervised function. These relays are always active regardless of the switches on the rear panel.

### Input

The system has two balanced inputs with priority control, each with a loop-through facility. This makes it easy to connect remote systems that require priority control. An additional 100 V line input can connect the amplifier to a 100 V loudspeaker line, to provide more power to remote locations.

### Output

The amplifier has 70 V and 100 V outputs for constant voltage loudspeaker systems, and a low impedance output for 8 ohm loudspeaker loads. A meter with LED-bar shows the output level.

The PLN-1P1000 has two separate priority controlled 100 V outputs for zones that only need announcements made via the priority input, and for zones that will not get any announcements made via the priority input.

### Controls and indicators

#### Front

- LED level meter
- Battery operation LED
- Overheat LED

#### Back

- Power button
- Mains switch

**Interconnections****Back**

- Priority line input 1 (XLR/balanced)
- Line loop-through 1 (XLR/balanced)
- Program line input 2 (XLR/balanced)
- Line loop-through 2 (XLR/balanced)
- Priority controlled loudspeaker outputs
- 24 VDC power supply terminal
- Three loudspeaker direct outputs
- Two 100 V slave inputs
- Input 1 enable control terminal
- Input 2 priority control terminal
- Earth connection screw
- Mains socket

**Certifications and Approvals**

Region	Certification
Europe	CE
Poland	CNBOP
Safety	acc. to EN 60065
Immunity	acc. to EN 55103-2
Emission	acc. to EN 55103-1
Emergency	acc. to EN 54-16 / EN 60849

**Parts Included**

Quantity	Component
1	PLN-1P1000 Plena Power Amplifier
1	Power cord
1	Set of 19" mounting brackets
1	Installation and User Instructions

**Technical Specifications****Electrical****Mains power supply**

Voltage	230 VAC, $\pm 10\%$ , 50/60 Hz
Inrush current	16 A
Max power consumption	2200 VA

**Battery power supply**

Voltage	24 VDC $+15\%$ / $-15\%$
Current max	48 A

**Performance**

Output power (rms/maximum)	1000 W / 1500 W
Power reduction on backup power	-1 dB

**Mains power supply**

Frequency response	50 Hz to 20 kHz ( $+1/-3$ dB at -10 dB ref. rated output)
Distortion	<1% at rated output power, 1 kHz
S/N (flat at max volume)	>90 dB
<b>Line inputs</b>	2 x
Connector	3-pin XLR, balanced
Sensitivity	1 V
Impedance	20 kohm
CMRR	>25 dB (50 Hz to 20 kHz)
Gain	40 dB

**100 V input**

Connector	Screw, unbalanced
Sensitivity	100 V
Impedance	330 kohm

**Line loop-through output**

Connector	3-pin XLR
Nominal level	1 V
Impedance	Direct connection to line input

**Loudspeaker outputs**

Connector	Screw, floating
Direct output	100 V, 70 V, 8 ohm
Priority only (from input 1)	100 V or 70 V internally selectable
Music (non-priority) only	100 V or 70 V internally selectable

**Power consumption****Mains operation**

Max power	2200 W
-3dB	1472 W
-6dB	1058 W
Pilot tone*	345 W
Idle	115 W

**24 VDC operation**

Max power	62 A (1500 W)
-3 dB	34 A (823 W)
-6 dB	25 A (597 W)
Pilot tone*	7.6 A (182 W)
Idle	1.5 A (36 W)

\* 20 kHz -20dB with maximum loudspeaker load

**Mechanical**

Dimensions (H x W x D)	145 x 430 x 430 mm (19" wide, 3U high, with feet)
Weight	Approx. 32 kg
Mounting	Standalone, 19" rack
Color	Charcoal

# Plena Power Amplifiers



Security Systems

en | Installation and User Instructions  
Plena Power Amplifier

**BOSCH**

## Important Safeguards

Prior to installing or operating this product, always read the Important Safety Instructions which are available as a separate document (9922 141 7014x). These instructions are supplied together with all equipment that can be connected to the mains.

Thank you for choosing a Bosch Security Systems product.

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# 1 Introduction

## 1.1 Purpose

The purpose of the Installation and User Instructions is to provide information that is required to install, configure and operate a Plena Power Amplifier.

## 1.2 Digital document

The Installation and User Instructions are also available as a digital document in the Adobe Portable Document Format (PDF). All references to pages, figures, tables, etc. in this digital document contain hyperlinks to the referenced location.

## 1.3 Intended audience

The Installation and User Instructions are intended for installers and users of a Plena system.

## 1.4 Related documentation

The following related documents are available:

- Plena Voice Alarm System Basic System Manual (9922 141 1036x).

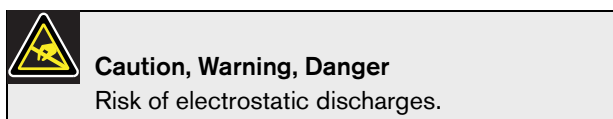
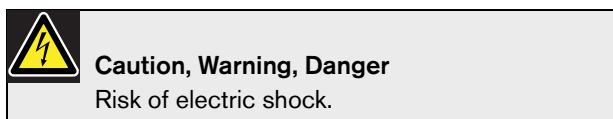
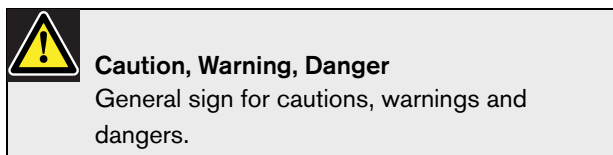
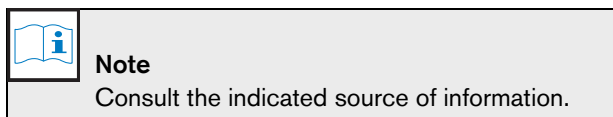
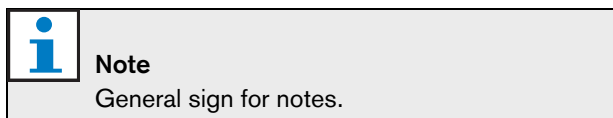
## 1.5 Alerts

In this manual, four types of alerts are used. The alert type is closely related to the effect that may be caused when it is not observed. These alerts - from least severe effect to most severe effect - are:

- **Note**  
Alert containing additional information. Usually, not observing a note alert does not result in damage to the equipment or personal injuries.
- **Caution**  
The equipment can be damaged if the alert is not being observed.
- **Warning**  
Persons can be (severely) injured or the equipment can be seriously damaged if the alert is not being observed.
- **Danger**  
Not observing the alert can result in death.

## 1.6 Signs

Except for note alerts, the nature of the effect that can be caused when the alert is not observed, is indicated using a sign. For note alerts, the sign provides more information about the note itself. In this manual, the following signs are used in combination with alerts:



## 1.7 Conversion tables

In this manual, SI units are used to express lengths, masses, temperatures etc. These can be converted to non-metric units using the information provided below.

*table 1.1: Conversion of units of length*

1 in =	25.4 mm	1 mm =	0.03937 in
1 in =	2.54 cm	1 cm =	0.3937 in
1 ft =	0.3048 m	1 m =	3.281 ft
1 mi =	1.609 km	1 km =	0.622 mi

*table 1.2: Conversion of units of mass*

1 lb =	0.4536 kg	1 kg =	2,2046 lb
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*table 1.3: Conversion of units of pressure*

1 psi =	68.95 hPa	1 hPa =	0.0145 psi
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**Note**

1 hPa = 1 mbar.

$$^{\circ}F = \frac{9}{5} \cdot ^{\circ}C + 32$$

$$^{\circ}C = \frac{5}{9} \cdot (^{\circ}F - 32)$$

## 2 System Overview

### 2.1 Plena

The Plena Power Amplifier is part of the Plena product range. Plena provides public address solutions for places where people gather to work, worship, trade or simply enjoy themselves. It is a family of system elements that are combined to create public address systems tailored for virtually any application. The range includes mixer, pre, system and power amplifiers, a source unit, digital message manager, feedback suppressor, conventional and PC call stations, an 'All-in-One' system and a voice alarm system. Each element is designed to complement all others thanks to matched acoustical, electrical and mechanical specifications.

All Plena Power Amplifiers are designed to comply with IEC 60849 compliant systems.



## 3 Amplifiers

### 3.1 Introduction

The Plena Power Amplifier range consists of four mono amplifiers:

- 120 W LBB1930/20: 2 units high
- 240 W LBB1935/20: 2 units high
- 480 W LBB1938/20: 3 units high
- 1000 W PLN-1P1000: 3 units high.

In this manual all illustrations show either the LBB1938 power amplifier that is 3 units high or the LBB1935 power amplifier that is 2 units high. All connections are the same between the different power amplifiers.

These power amplifiers have 70 V and 100 V constant voltage outputs and a low impedance output for 8 Ohm loudspeakers. Two inputs, priority and input 2 give priority and controlled outputs. A 100 V slave input gives connection to existing loudspeaker lines. The line inputs are balanced and have a loophrough facility.

The amplifiers have overload and short-circuit protection. A temperature controlled fan and overheat protection gives high reliability.

Battery operation with automatic switch-over from the mains supply is available.

### 3.2 Controls, connectors and indicators

#### 3.2.1 Front panel connectors and indicators

See figure 3.1 for an overview of the indicators:

- 1 **VU meter** - LED's for 20, 6, 0 dB and power ON.
- 2 **Pilot-Tone** - Supervised function that monitors a 20kHz pilot tone.
- 3 **Battery** - Supervised function to indicate battery operation.
- 4 **Mains** - Supervised function to indicate mains supply.
- 5 **Overheat** - Supervised function to give warning of overheating.
- 6 **Air inlet** - Cooling is made by a forced ventilation from front to back. Amplifiers can be stacked on top of each other. A supply of cool air from the front is necessary.

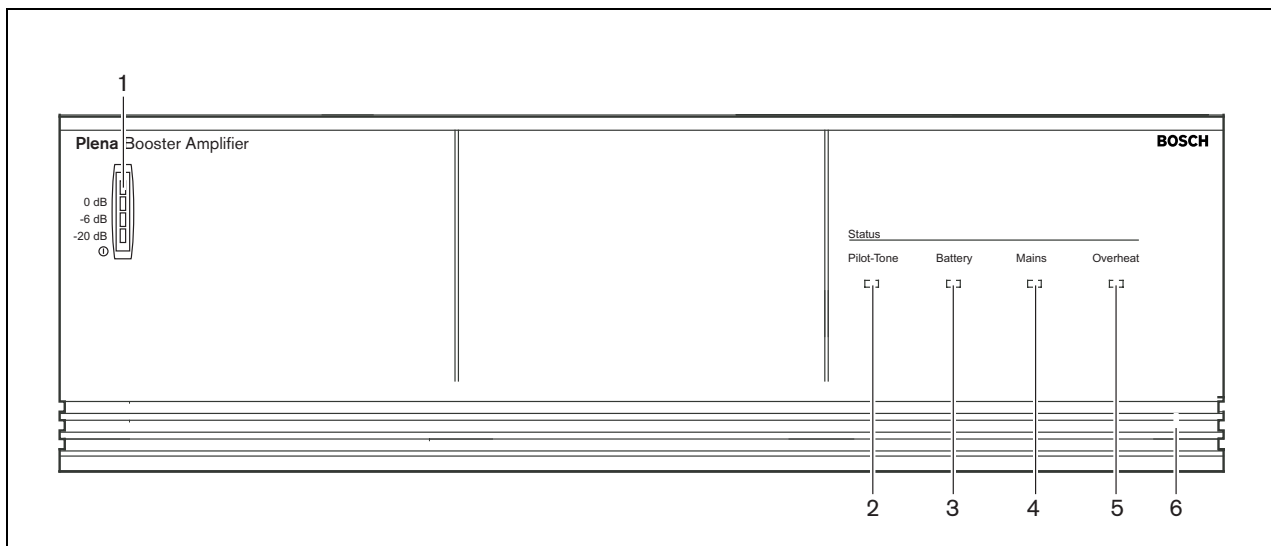


figure 3.1: Front panel LBB1938/20

### 3.2.2 Rear panel connectors and indicators

See figure 3.2 for an overview of the controls, connections and indicators:

- |   |   |
|---|---|
| 1 <b>Priority line</b> - input 1 (XLR/balanced)           | 12 <b>ON - OFF switch</b>                     |
| 2 <b>Level control</b> - input 1                          | 13 <b>Voltage selector</b>                    |
| 3 <b>Line loopthrough 1</b> (XLR/balanced)                | 14 <b>Loudspeaker direct</b> output terminals |
| 4 <b>Program line</b> - input 2 (XLR/balanced)            | 15 <b>Battery detection</b>                   |
| 5 <b>Level control</b> - input 2                          | 16 <b>Fault relay output</b>                  |
| 6 <b>Line loopthrough 2</b> (XLR/balanced)                | 17 <b>Pilot-Tone detection</b>                |
| 7 <b>Priority controlled loudspeaker</b> output terminals | 18 <b>100 V</b> slave input terminals         |
| 8 <b>24 Vdc</b> power supply terminals                    | 19 <b>Input 2 enable</b> control terminals    |
| 9 <b>Earth</b> connection screw                           | 20 <b>Input 1 priority</b> control terminals  |

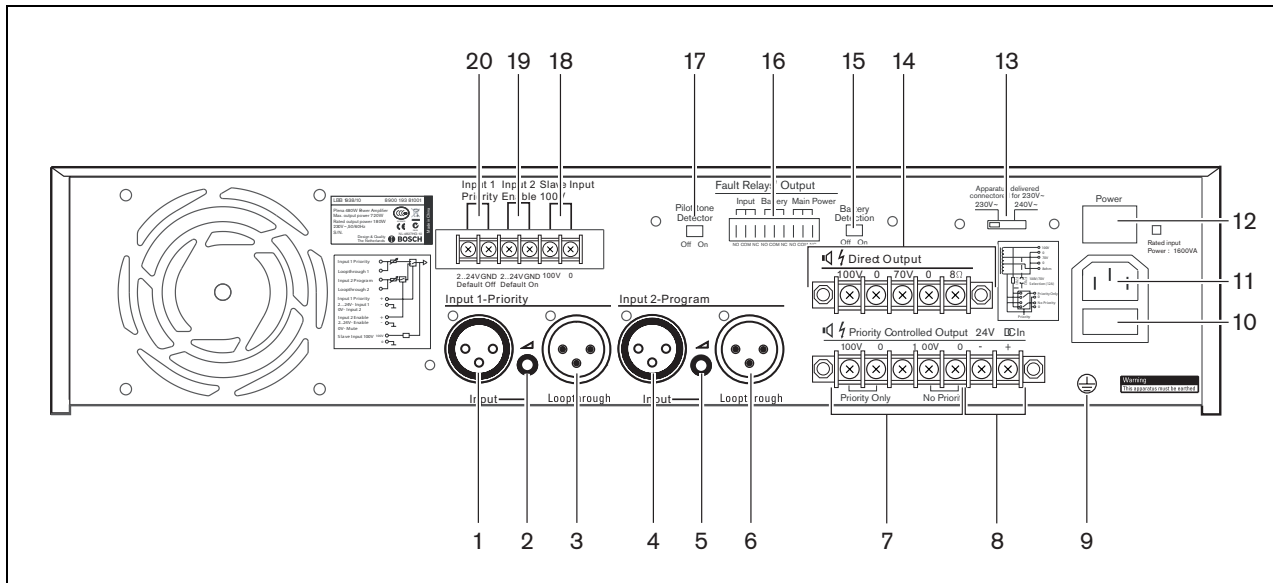


figure 3.2: Rear panel LBB1930/20, LBB1935/20

### 3.3 Internal setting

The output voltage of the priority controlled loudspeaker outputs can be set to 70 V or 100 V. A high power fuse inside the unit is used as a voltage selector. Insert the high power fuse into fuse holder F701 for 100 V selection (default setting), or into fuse holder F702 for 70 V selection. This selection does not affect the output voltage of the loudspeaker direct outputs. Refer to figure 3.3.

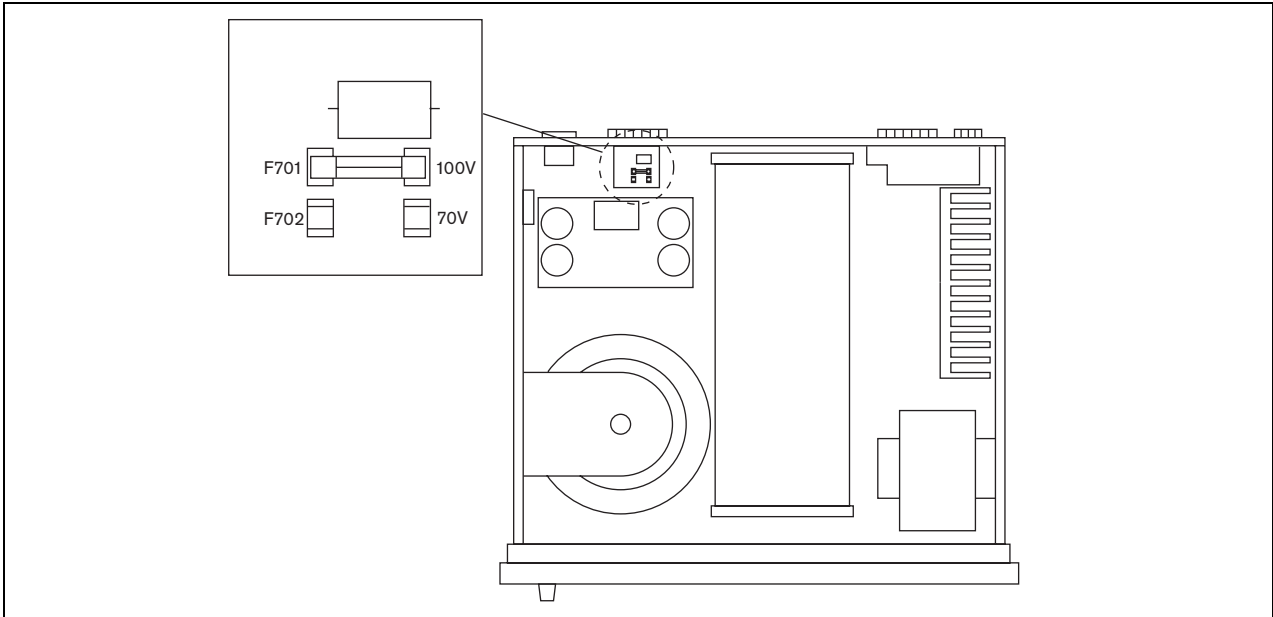


figure 3.3: Internal fuse setting LBB1930/20, LBB1935/20, LBB1938/20

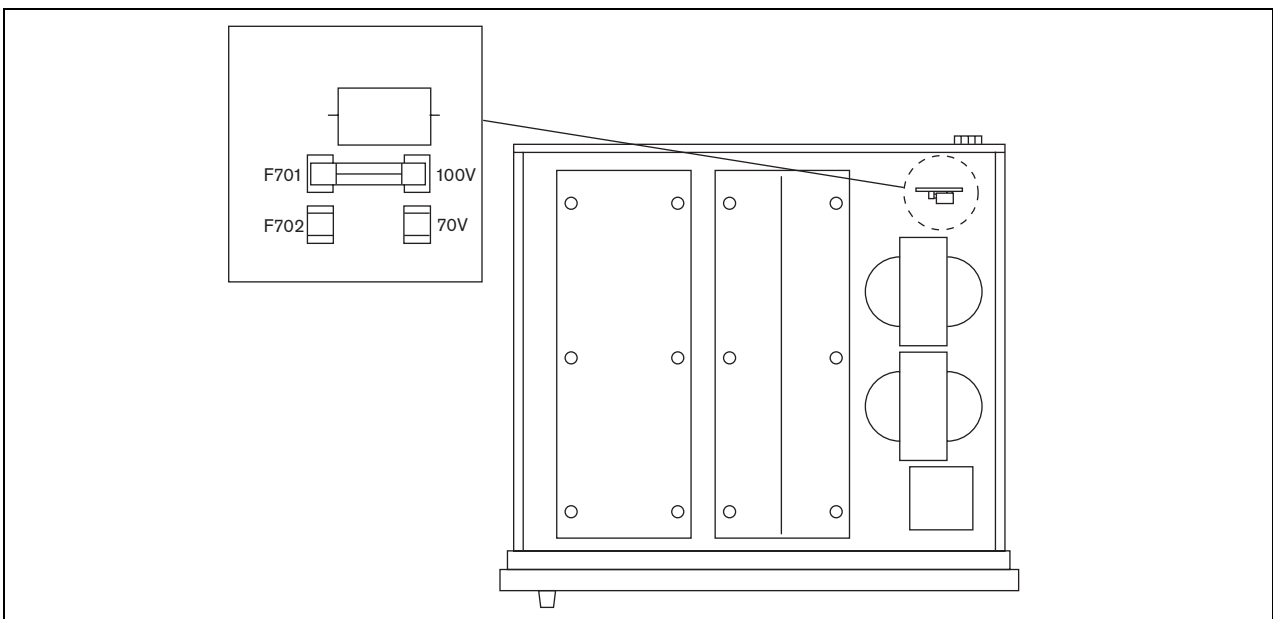


figure 3.4: Internal fuse setting 1P1000

## 3.4 Installation

The power amplifier is suitable for table-top and 19-inch rack-mounting installation. Two brackets for rack-mounting are supplied. See figure 3.5 for installation details.

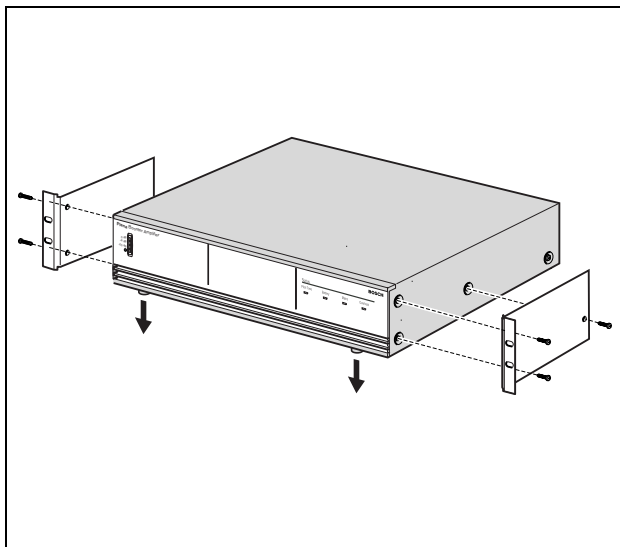


figure 3.5: Brackets for rack-mounting

The power amplifier has an internal fan regulated to keep the temperature inside the unit within the safe operating condition.

## 3.5 External connections

### 3.5.1 Connect the back-up power supply

The power amplifier has a 24 Vdc input (8) screw terminal to connect a back-up power supply. You must connect an earth (9) to the unit to increase the electrical stability of the system.

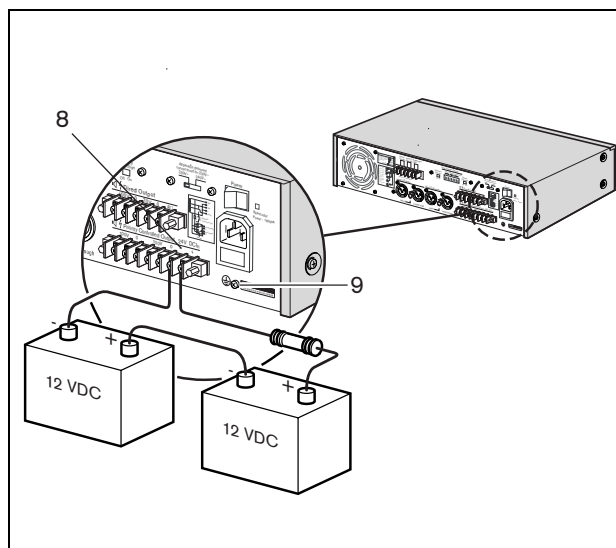


figure 3.6: Back-up power supply

### 3.5.2 Connecting line input and loopthrough

The power amplifier has a balanced line input for connection to a pre-amplifier or a mixer. Use the loopthrough connection to connect the power amplifier to another power amplifier if more power is needed.

Each power amplifier must be connected to its own set of loudspeakers. Do not connect power outputs to each other.

Use program line - input 2 (4) and line loopthrough 2 (6) for normal operation without priority.

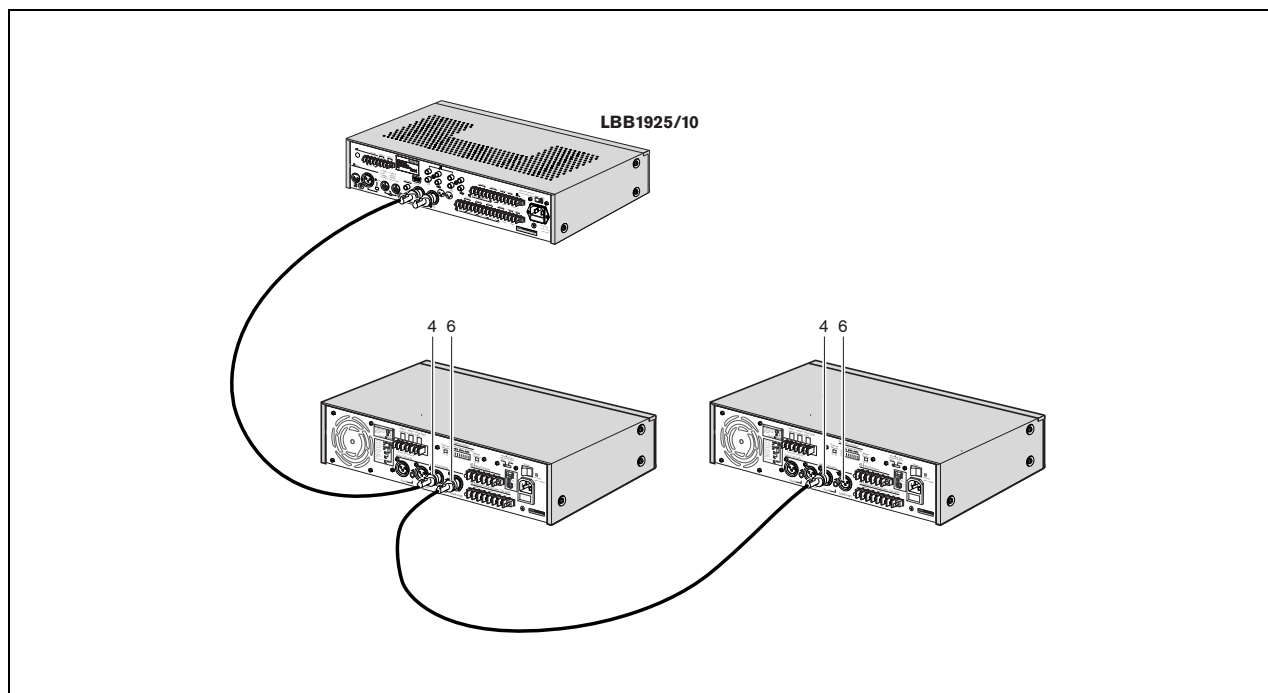


figure 3.7: Line input and loopthrough

### 3.5.3 Connecting the priority input and using the control terminals

The power amplifier is provided with a balanced priority input (Input 1-Priority) to connect to another pre-amplifier or mixer.

Apply a control voltage of 2...24 V to the input 1 priority control terminals (20) to switch ON the priority input (1) and mute the program input (4). A local music source can be connected to the *program input* and a remote emergency system to the *priority input*. The emergency source must be able to supply the 2...24 V control voltage to override the local music source. The program input can be remotely controlled by using a switch that is connected to the input 2 enable control terminals (19).

#### Application example for use of the power amplifier control terminals (see figure 3.8)

You can use up to 6 power amplifiers in combination with the Plena LBB1925/10 System Pre-amplifier to build a powerful multi-zone sound system. Zone switching of BGM and calls is done via the LBB1925/10 zone relays in combination with the power amplifier control terminals. The LBB1925/10 controls the background music by distributing 24 Vdc via the music zone relays to the input 2 enable control terminals (19). The LBB1925/10 controls the calls by distributing 24 Vdc via the call zone relays to the input 1 priority control terminals (20). Each power amplifier serves one loudspeaker zone. Each zone can be OFF, or receive music or a call.

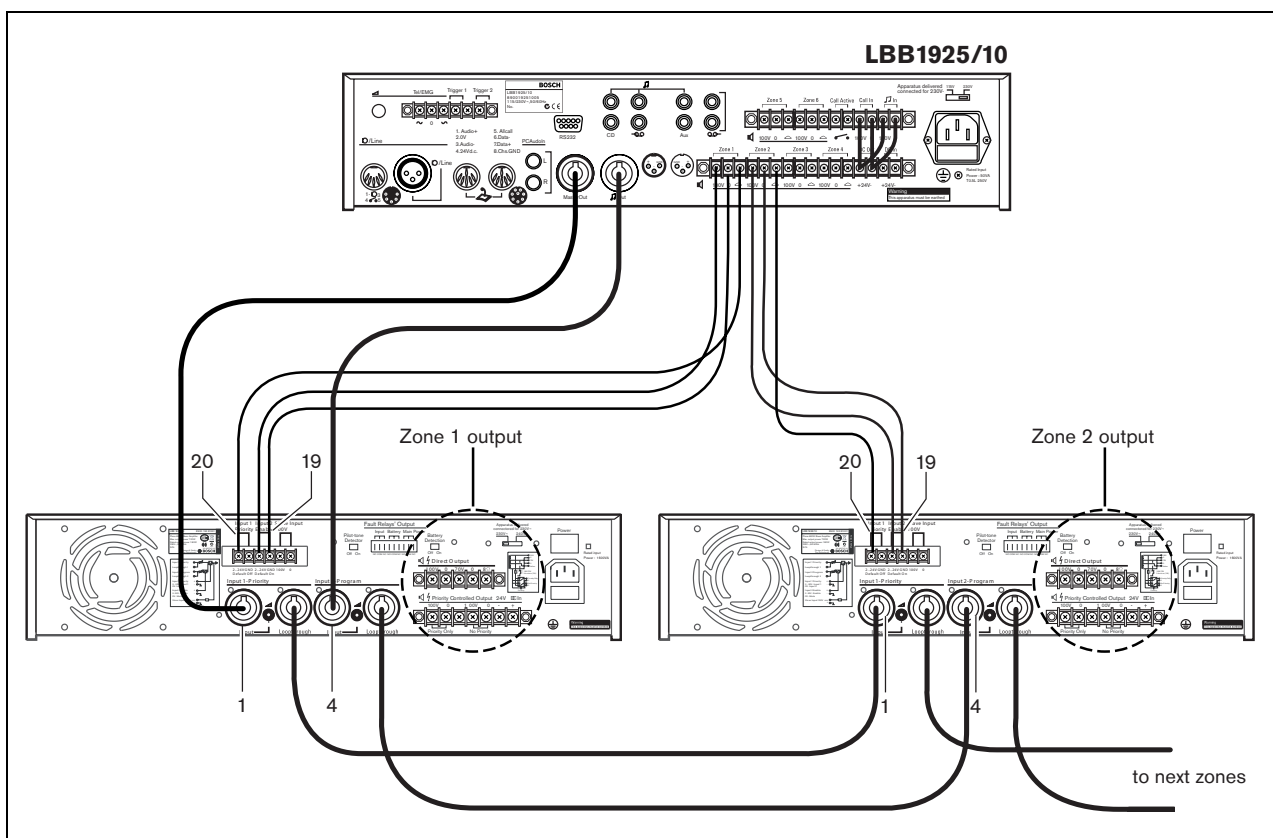


figure 3.8: Priority input and control terminals

### 3.5.4 100 V slave input

The power amplifiers have a 100 V slave input (18) that can be connected to an existing 100 V loudspeaker line. In this way it is easy to connect an additional power amplifier on a remote location for more output power. The 100 V input is not affected by the control terminals for input 1 priority (20) or input 2 enable (19).



#### Note

If the 100 V slave input is used, and the 0 V and 100 V are incorrectly connected, no pilot tone is detected on the power amplifier. Refer to section 4.1 for information.

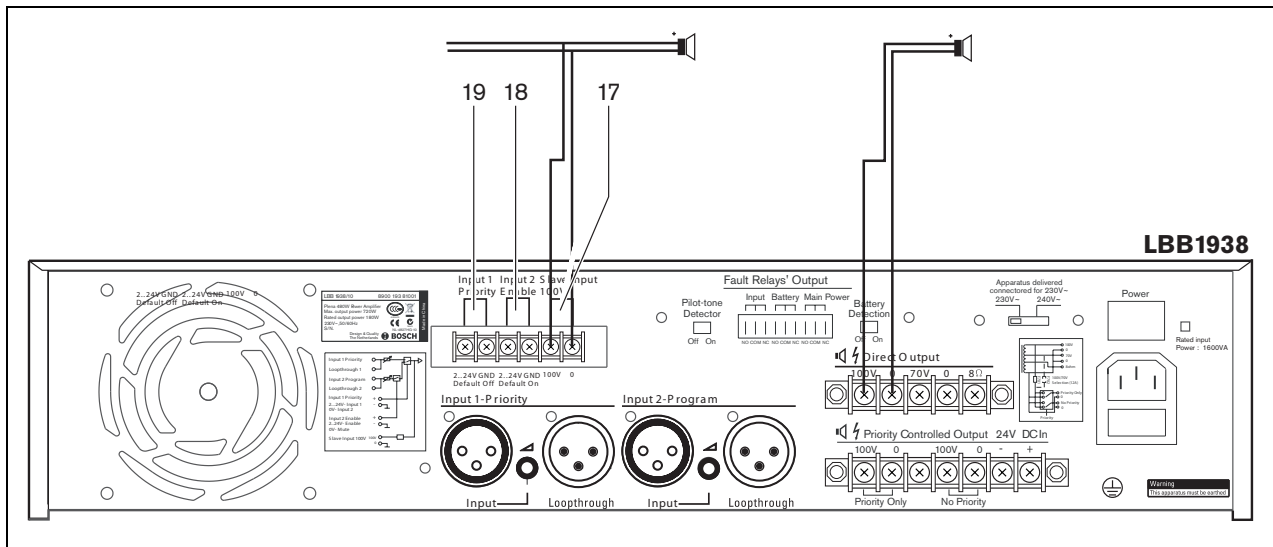


figure 3.9: 100 V slave input

### 3.5.5 Constant voltage loudspeakers

The power amplifier can drive 100 V constant voltage loudspeakers at full power (100 V) or half power (70 V). Connect the loudspeakers in parallel and check the loudspeaker polarity for in-phase connection. The summed loudspeaker power should not exceed the rated amplifier power.

### 3.5.6 Low impedance loudspeakers

Connect low impedance loudspeakers to the 8 Ohm/0 terminals. This output can deliver the rated output power into an 8 Ohm load. Connect multiple loudspeakers in a series/parallel-arrangement to make the combined impedance 8 Ohm or higher. Check the loudspeaker polarity for in-phase connection.

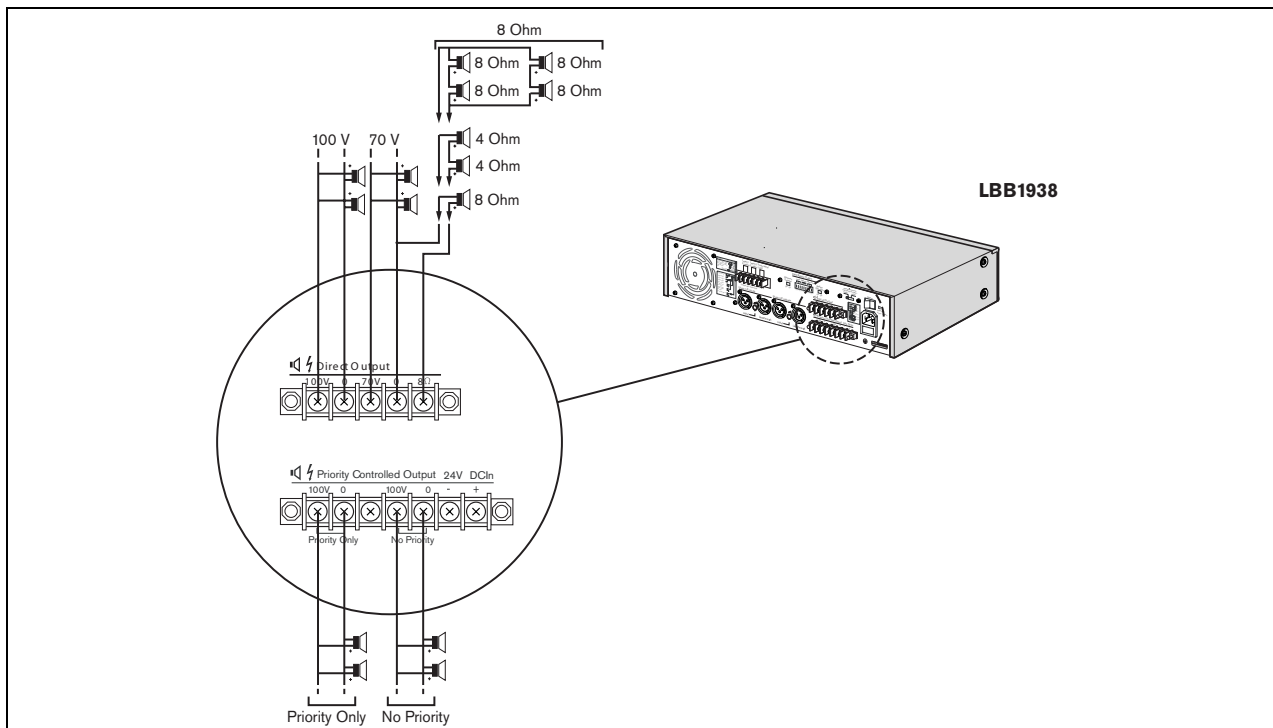


figure 3.10: Priority input and control terminals

### 3.5.7 Power

Use the mains lead to connect the amplifier to the power supply.

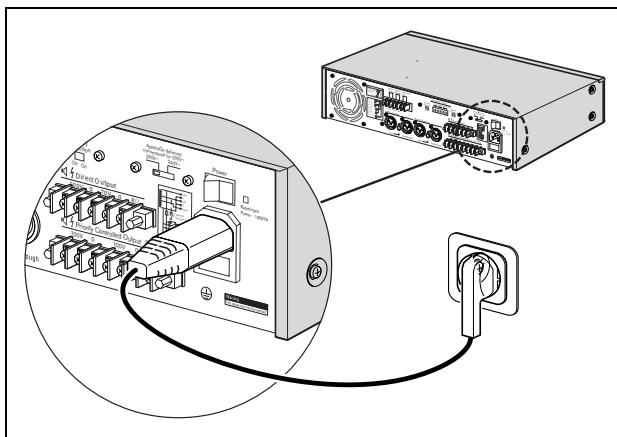


figure 3.11: Mains lead



## 4 Supervision

Supervision is provided for:

- Pre-amplifier and power amplifier function
- Battery and mains supervision

Relays are provided on the rear panel for the each supervised function and are normally energized (fail safe). Each relay has 3 contacts, normally open, common and normally closed.

If an application does not need supervision, the indicators on the front panel can be set to OFF with the switches next to each relay output. The relays always function and are independent of the indicator switch setting.

### 4.1 Input pilot tone

The pilot tone of 20 kHz at -20 dBV supervises the pre-amplifier, the connections between the pre-amplifier and the power amplifier and function of the power amplifier. If the input signal from the pre-amplifier stops, the mains and battery fail or the power amplifier stops for any other reason, the pilot tone stops, the Pilot-Tone fault indication shows on the front panel and a signal is given on the Input fault relay.

If the power amplifier stops through overheat, then the Overheat indicator shows on the front panel, the signal is given on the Input fault relay.

The Pilot-Tone detection indicator can be set to ON or OFF with the Pilot-Tone detection switch (17). The Pilot-Tone indicator on the front panel is set to OFF, but the fault relay switch still functions.

### 4.2 Battery supervision

The power amplifier supervises the availability of the back-up power supply.

If the battery supply fails the Battery fault indication shows on the front panel and a signal is given on the Battery fault relay.

The Battery Supervision indicator can be set to ON or OFF with the Battery detection switch (15). The Battery indicator on the front panel is set to OFF, but the fault relay switch still functions.

### 4.3 Mains supervision

The power amplifier supervises the availability of the mains supply. If the mains supply fails and the back-up power supply starts, a signal is needed to indicate the mains failure. The Mains fault indication shows on the front panel and a signal is given on the Mains fault relay.

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## 5 Operation

### 5.1 ON and OFF

#### 5.1.1 Switch on

Put the power switch on the rear of the power amplifier (see figure 5.1) in the I position.

If mains power or back-up power is available, the VU-bar (1) on the front of the power amplifier is lit and shows the output level of the amplifier (see figure 5.2). If the internal temperature reaches a critical limit due to poor ventilation or overload, an overheat protection circuit switches OFF the power stage. The Overheat indicator (5) shows on the front panel and a signal is given on the Input fault relay if the power stage is switched OFF by the overheat protection circuit.

The Battery operation indicator (3) lights up if the mains power supply is failing and the back-up battery is in use.

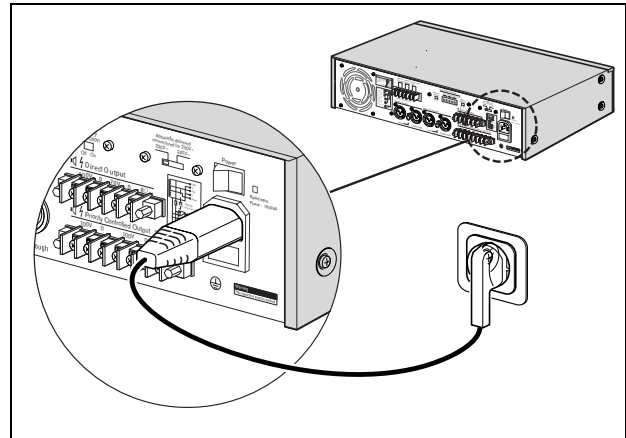


figure 5.1: Power switch

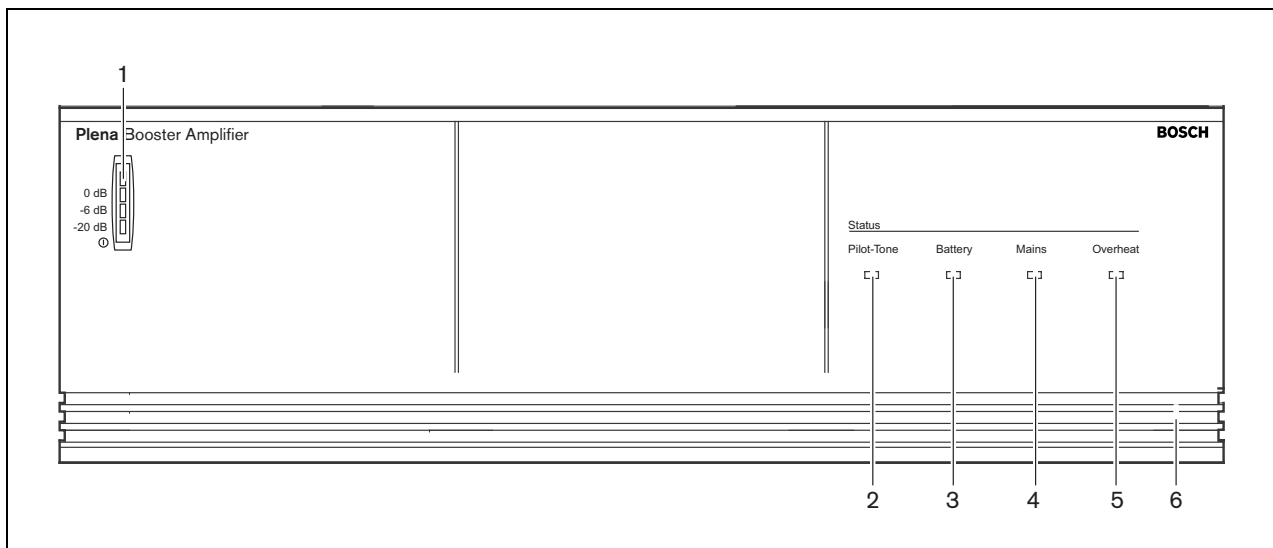


figure 5.2: Front panel LBB1938/20

#### 5.1.2 Switch off

Put the power switch of the power amplifier (see figure 5.1) in the O position.

## 5.2 Technical data

### 5.2.1 Electrical

**Mains voltage:**

230/115 V(AC),  $\pm 10\%$ , 50/60 Hz

**Rated power:**

LBB 1930/20 400 VA

LBB 1935/20 960 VA

LBB 1938/20 1600 VA

LBB 1939/20 3600 VA

**Battery voltage:**

20.0 to 26.5 V(DC)

### 5.2.2 Performance

**Frequency response:**

50 Hz - 20 kHz (+1/-3 dB @ -10 dB ref. rated output)

**Distortion:**

<1% @ rated output, 1 kHz

**S/N (flat at max volume):**

LBB 1930/20 > 80 dB

LBB 1935/20 > 85 dB

LBB 1938/20 > 90 dB

PLN-1P1000 > 90 dB

**Signal-to-noise ratio (flat at max. volume):**

> 85 dB

### 5.2.3 Inputs

**Line input, 3 pin XLR, balanced:**

Sensitivity 1 V

Impedance 20 kOhm

CMRR > 40 dB (50 Hz - 20 kHz)

**100 V input, screw unbalanced:**

Sensitivity 100 V

Impedance 330 kOhm

### 5.2.4 Loudspeaker outputs

**Line loopthrough output (3 pin XLR balanced):**

Nominal level 1 V

Impedance direct connection to line input

**Loudspeaker outputs:**
**Maximum rated output power**
**70/100 V output**

LBB 1930/20 180 W / 240 W

LBB 1935/20 360 W / 240 W

LBB 1938/20 720 W / 480 W

PLN-1P1000 1800 W / 1000 W

**8 Ohm output:**

LBB 1930/20 31 V 120 W

LBB 1935/20 44 V 240 W

LBB 1938/20 62 V 480 W

PLN-1P1000 88 V 1000 W

**Output power @ 24 V battery operations:**

-1 dB reference rated power

### 5.2.5 Environmental conditions

**Operating temperature range:**

-10 to +55 °C

**Storage temperature range:**

-40 to +70 °C

**Relative humidity:**

< 95%

### 5.2.6 General

**EMC emission:**

According to EN55103-1

**EMC immunity:**

According to EN55103-2

**Acoustic noise level of fan:**

< 45 dB SPL @ 1 m at maximum speed

**Dimensions:**

19" wide,

2 units: 100 mm high, 250 mm deep

3 Units: 145 mm high, 370 mm deep

**19" mounting brackets:**

included

**Weight:**

LBB 1930/20 10.5 kg

LBB 1935/20 12.5 kg

LBB 1938/20 25.0 kg

PLN-1P1000 27.0 kg

## 5.2.7 Power Consumption

		LBB1930	LB1935	LBB1938	PLN-1P1000
<b>230/115 V</b>	0 dB (Pmax)	274	451	987	2200
	- 3 dB	193	340	715	1472
	- 6 dB	143	244	508	1058
	- 20 dB (20 khz)	41	55	113	345
	- ∞ dB (idle)	18	16	25	115
<b>24 V</b>	dB (ref 230/115 V)	-2	-1	-2	-1
<b>A</b>	0 dB (Pmax)	7	12	32	48
	- 3 dB	6	11	26	34
	- 6 dB	4	8	18	25
	- 20 dB (20 khz)	1	2	4	8
	- ∞ dB (idle)	0,1	0,3	1	2
<b>W</b>	0 dB (Pmax)	168	289	761	1152
	- 3 dB	145	273	617	823
	- 6 dB	103	194	442	598
	- 20 dB (20 khz)	23	41	91	182
	- ∞ dB (idle)	2	6	17	36

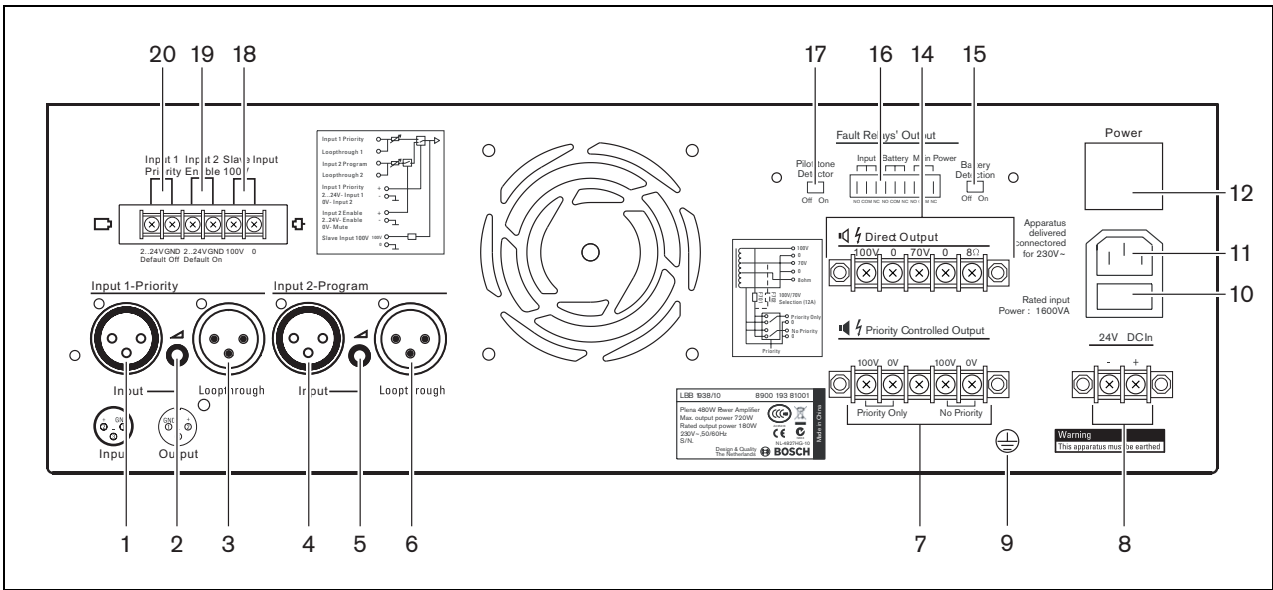


figure 5.3: Rear panel LBB1938

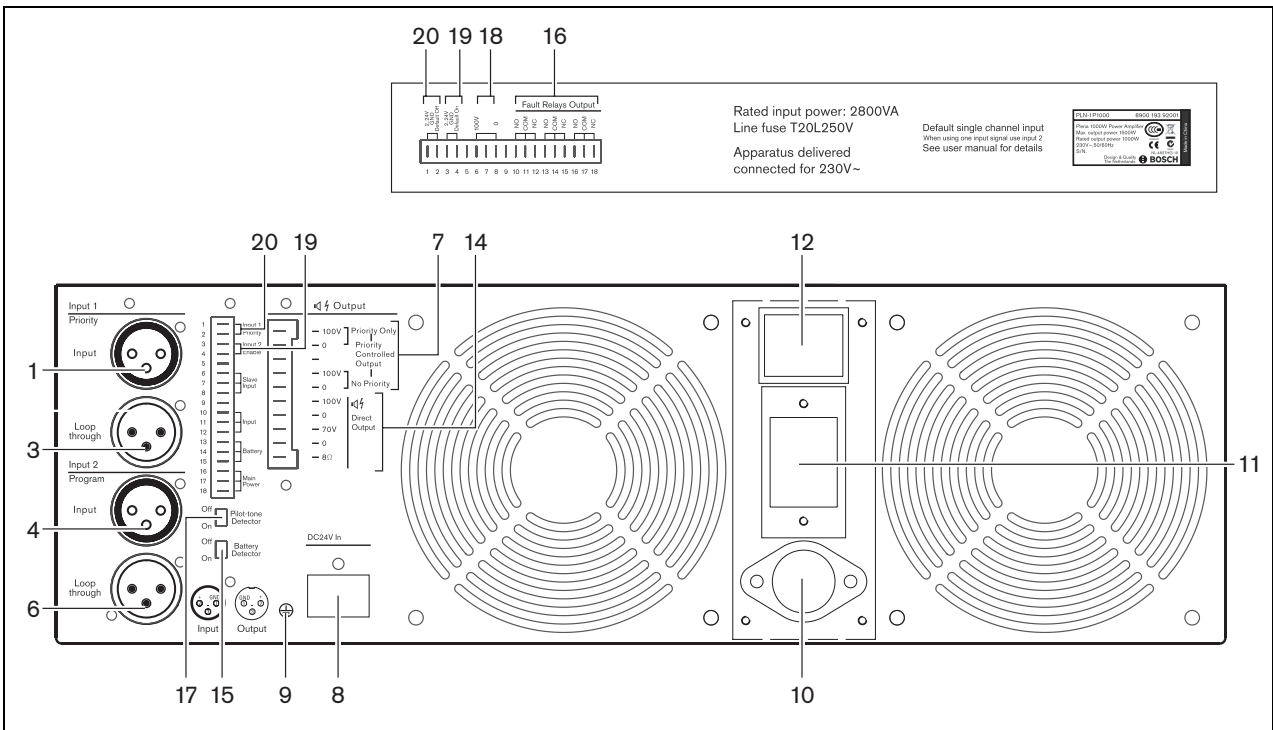


figure 5.4: Rear panel PLN-1P1000