

# LAB.GRUPPEN

## POWER AMPLIFIER

## LAB 4000

### FEATURES

- ◆ 2x1300 W into 8  
2x2100 W into 4  
2x2400 W into 2  
at clip level with two channels driven
- ◆ Compact design, 2 U high (88 mm)
- ◆ Low weight
- ◆ MLS™ switches for each channel offers power matching into different loads without increased power losses
- ◆ Electronically balanced inputs
- ◆ LED indicators show output voltage and headroom
- ◆ Output cooled by Intercooler®
- ◆ Two proportional speed fans
- ◆ Independent protection circuitry
- ◆ Short circuit protection manages long-term short-circuit operations
- ◆ DC protection
- ◆ Clip limiter
- ◆ VHF protection
- ◆ AFST™-limiter

The LAB 4000 is a compact (2 unit high) light-weight (10 kg) power amplifier designed for high quality touring sound systems and fixed installations.

The chassis is made of 2 mm black anodised aluminium, with a 4 mm thick front panel. The switch-mode power supply is placed just behind the front panel to ensure noise free operation. Both the power supply and the two output channels are cooled by two proportional speed fans with airflow from front to back.

The switch-mode power supply is the modern solution of the weight and size problem. With switch technology operating at a high frequency, it is possible to use ferrite transformers instead of heavy iron transformers and large electrolytic capacitors.

Switch-mode technology has been applied in power supplies in TV-sets during the latest 30 years. But in the LAB 4000 the power capacitvity is 20 times larger.

We have designed the LAB 4000 to obtain the same characteristics as a conventional power supply. Thanks to the switch-mode power supply it is easy to get the DC-rail voltage stabilised. This is made by controlling the magnetic energy in the ferrite transformer with a pulse width processor and magnetic "Flux Sense" windings.

The LAB 4000 has an upgraded version of the well known switch mode output stage from the LAB 2000. The power transistors are cooled by a solid copper cooler, called Intercooler(r), originally designed for our LAB 1300 power amplifier. Lab.gruppen's specially designed thermal feedback circuit protects against thermal breakdown.

**Short circuit protection;**

The LAB 4000 is completely short-

circuit protected -even in reactive loads. The LAB 4000 is equipped with Lab.gruppen's specially designed short-circuit protection, which permits very high peak-currents, but still holds the transistors within the so-called "Safe Operation Area" at the present operating voltage. This makes it possible to run loudspeakers with impedance variations, which are considerably lower than the lowest permitted impedance of the power amplifier.

Six more protection circuits, which are separate for each channel, protect the LAB 4000 and the loudspeakers: **DC protection;** There are two types of D.C. protection; Fuses on the supply branches of each channel (this is an IEC 65 requirement) and a Crowbar protection that shorts the output. **Thermal protection;** Protects the amplifier from over heating and causing damage to the output stages. The indicators come on before the signal is muted.

**Clip limiter;** Prevents severely clipped waveforms from reaching the loud speakers, but maintains full peak power. As a by product, when the amplifier comes out of a protect condition, the output level has a slow rise time. The effect is like turning the gain up slowly. **VHF(Very high frequency) protection;** Protects the loudspeaker against non-musical signals outside the audible area.

**AC protection;** shuts down the outputs if the line voltage is outside the operating voltage of the LAB 4000. AFSTm-limiter; Adaptive Fuse Saver, limits the mains current to a safe level according to the time lag of an 16 ampere slow blow fuse.

All electronics are mounted on four modules. The modules are easily accessible for replacement or repair, etc.

# SPECIFICATION

# LAB 4000

## MAX OUTPUT POWER <sup>1)</sup>

EIA at 1 kHz and 1% THD

	-5 dB	-4 dB	-2 dB	0 dB Full	IHF Peak power
MLS switch					20 ms
16 stereo	220 W	260 W	410 W	650 W	650 W
8 stereo	430 W	520 W	820 W	1300 W	1300 W
4 stereo	830 W	1000 W	1600 W	2100 W	2100 W
2 stereo	1660 W	2000 W	2200 W 3050 W <sup>2)</sup>	2400 W, 3200 W <sup>2)</sup>	3200 W
16 bridged	860 W	1040 W	1640 W	2600 W	2600 W
8 bridged	1660 W	2000 W	3200 W	4200 W	4200 W
4 bridged	3320 W	4000 W	4400 W	4800 W	6400 W

## SPEAKER PROTECTION

Each channel is fuse protected on the positive and negative power supply rails. Electronic short-circuit protection with a progressive characteristic. The output power is turned off at shorted output. The power amplifier can be run into short-circuits for a long time without damage, and is open circuit and mismatch proof.

## DISTORTION

THD 20 Hz-20 kHz and 1 W-1000 W	4 ohms	0.1%
THD at 1kHz and 2000W	4 ohms	0.04%
DIM 30 at 500 W	4 ohms	0.04%
CCIF (13 and 14 kHz) at 500 W	4 ohms	0.04%
SMPTE (60 Hz and 7 kHz) at 500 W	4 ohms	0.04%

## POWER BANDWIDTH <sup>3)</sup>

Slew rate 5 Hz-20 kHz

OUTPUT IMPEDANCE 1 kHz 0.06 ohm

HUM AND NOISE below max power <- 95 dBA

CHANNEL SEPARATION 1 kHz 90 dB  
10 kHz 80 dB

## PHASE AND DELAY

Deviation from perfect delay 150 Hz-20 kHz ± 2°  
Total delay input to output at 4 ohms 19 µs

## INPUTS

Sensitivity, switchable for full output into 4 ohms 92 V 0.775 or 3.2 Vrms  
Gain, switchable 41 dB or 29 dB  
Impedance 20 kohms, balanced  
Common mode rejection at 1 kHz 50 dB

## FRONT PANEL

Gain controls <sup>2)</sup>	(2) red + (10) green LED's	Channel A-B
Output display	(2) yellow LED's	Fast peak - slow release
Temp indicator	(2) yellow LED's	80°C at heatzink
VHF indicator	(2) green LED's	> 10 kHz at full power
On indicator	(1) green LED	DC rail voltage for channel A and B
Ac indicator	(1) yellow LED	AC mains present
AFS indicator		Fuse saver activated

## REAR PANEL

Input connectors	(2) XLR type 3 pin female (pin 2+), and (2) 1/4" jack
Output connectors	(2) Neutric 4-pole speakon connectors (pin 1+ output)
Switches:	
Gain	41 dB or 29 dB
Link	Tandem mono, channel A and B
Rev B	Phase reverse of channel B
Clip limiter A and B	On - Off
MLS	0, -2, -4, -5 dB

## POWER

Operation voltage	120 V - 270 V AC	Option 65 V-135 V AC
Minimum start voltage	190 V AC	95 V AC
Full output power	180 V -260 V AC	90 V-130 V AC

## OVERALL DIMENSIONS

mm (inch) 483 (19") W  
x 88 (3.5") H  
x 347 (13,7") D

## WEIGHT

10 kg (22 lbs)

## APPROVALS

CE Emission EN 55 103-1, E3  
Immunity EN 55 103-2, E3, with, S/N below 1%  
at normal operation level <sup>4)</sup>  
Safety EN 60 065, class I

1) Specifications measured with 230 V regulated AC  
2) Continuous power, one channel driven or peak power both channels driven. (Thermal protection may occur at high continuous power).

3) The VHF-protection turns off the channel for frequencies above 20 kHz at full power.  
4) Normal operation level 1/8 of full power or -9dB below clip point.

Lab.gruppen reserve the right to alter functions or specifications without prior notice.

Lab.gruppen AB, Gullregnsvägen 16, SE-434 44 Kungsbacka, Sweden.  
Tel. +46 300 168 23. Fax +46 300 142 46. www.labgruppen.se