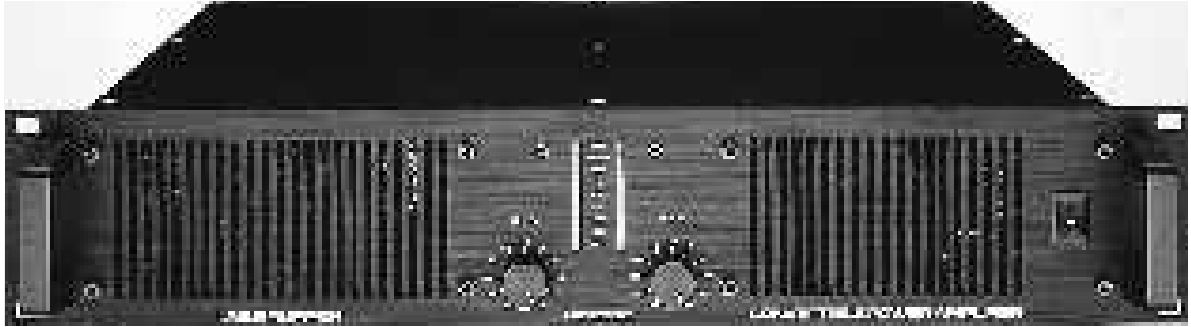


# LAB.GRUPPEN



## POWER AMPLIFIER

## LAB 2002

### FEATURES:

- ◆ 2x1000 W into 8  
2x1400 W into 4  
2x1400 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

The LAB 2002 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. Two proportional speed fans cool both the power supply and the two output channels 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 2002 the power capacitance is 20 times larger.

We have designed the LAB 2002 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 2002 has an upgraded version of the well-known switch mode output stage from the LAB 2000. A solid copper cooler, called Intercooler(r), originally designed for our LAB 1300 power amplifier cools the power transistors. Lab. gruppen's specially designed thermal feedback circuit protects against thermal breakdown.

### Short circuit protection;

The LAB 2002 is completely short-circuit protected -even in reactive loads. The LAB 2002 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 2002 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 bar 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 2002.

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

# SPECIFICATION

# LAB 2002

## 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	160 W	180 W	340 W	520 W	520 W
8 stereo	300 W	350 W	650 W	1100 W	1200 W
4 stereo	570 W	680 W	1100 W	1400 W, 1900 W <sup>2)</sup>	1900 W
2 stereo	1040 W	1200 W	1200 W, 1400 W <sup>2)</sup>	1400 W, 2900 W <sup>2)</sup>	2900 W
16 bridged	600 W	700 W	1300 W	2000 W	2000 W
8 bridged	1140 W	1360 W	2200 W	2800 W	3800 W
4 bridged	2080 W	2400 W	2400 W	2800 W	5800 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	0.08 %
THD at 1kHz and 1100W	4 ohms	0.03 %
DIM 30 at 500 W	4 ohms	0.02 %
CCIF (13 and 14 kHz) at 500 W	4 ohms	0.03 %
SMPTE (60 Hz and 7 kHz) at 500 W	4 ohms	0.08 %

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

Slew rate 5 Hz-20 kHz

20 V/ $\mu$ s

## OUTPUT IMPEDANCE

1 kHz 0.06 ohm

## HUM AND NOISE below max power

< -105 dBA

## CHANNEL SEPARATION

1 kHz 90 dB  
10 kHz 80 dB

## PHASE AND DELAY

Deviation from perfect delay 150 Hz-20 kHz  $\pm 2^\circ$   
Total delay input to output at 4 ohms 19  $\mu$ s

## INPUTS

Sensitivity, switchable for full output into 4 ohms 0.775 or 2,2 Vrms  
Gain, switchable 38 dB or 29 dB  
Impedance 20 kohms, balanced  
Common mode rejection at 1 kHz 50 dB

## FRONT PANEL

Gain controls (2) Channel A - B  
Output display (2) red + (10) green LED's Fast peak - slow release  
Temp indicator (2) yellow LED's 80 °C at heatzink  
VHF indicator (2) yellow LED's > 10 kHz at full power  
On indicator (2) green LED's DC rail voltage for channel A and B

## REAR PANEL

Input connectors (2) XLR type 3 pin female (pin 2+), and (2) 1/8" jack  
Output connectors (2) Neutric 4-pole speakon connectors (pin 1+ output)  
Switches:  
Gain 38 dB or 29 dB  
Link Tandem mono, channel A and B  
Polarity B Polarity reverse of channel B  
Clip limiter A and B On - Off  
MLS 0, -2, -4, -5 dB

## POWER

Operation voltage	130 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
Peak inrush current	4.5A	

## 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 the specifications without prior notice.

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