E SERIES

Dedicated installation **amplifiers**

- E 4:2
- E 8:2
- E 12:2

LAB.GRUPPEN

Operation Manual

1. Important safety instructions

Before using your E Series, be sure to carefully read the applicable items of this Operation Manual and the Safety Instructions.

1. Keep this manual for future reference.
2. Heed all warnings. Follow all instructions.
3. Do not use this unit near water.
4. Do not spill water or other liquids into or on the unit. Do not operate the unit while wet or standing in liquid.
5. Clean only with dry cloth.
6. Do not block the air intake or exhaust ports. Install the unit in accordance with the instructions.
7. Do not operate the unit near heat producing devices such as radiators, heat registers, stoves or other apparatus that produces heat. Always operate the unit with the chassis ground wire connected to the electrical safety earth. Do not defeat the safety purpose of a grounding-type plug. A grounding-type plug has two pins and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
8. Connect only to AC power outlets rated 100 -240 V, 50 - 60 Hz.
9. Do not use this unit if the power cord is broken or frayed. Protect the power cord from being walked upon or pinched, particularly at the plug and the point where it exits from the apparatus. Only use accessories specified by the manufacturer.
10. The unit is intended to use in a 19" rack. Follow the mounting instructions. When a rack on wheels is used, use caution when moving the loaded rack to avoid injury from tipping over. Unplug this apparatus during lightning storms or when unused for long periods of time.
11. Do not connect the unit's outputs in parallel or series with any other unit's output. Do not connect the unit's output to any other voltage source, such as battery, mains source, or power supply, regardless of whether the unit is turned on or off.
12. Do not run any of the unit's outputs back into another channel's input.
13. Refer all servicing to qualified service personnel. Servicing is re quired when the apparatus has been damaged in any way such as:
    a. Power-supply cord or plug is damaged.
    b. Liquid has been spilled into the unit.
    c. An object has fallen into the unit.
    d. The unit has been exposed to rain or moisture.
    e. The unit does not operate normally.
    f. The unit was dropped or the chassis is damaged.
14. Do not remove top or bottom covers. Removal of the covers will expose hazardous voltages. There are no user serviceable parts inside and removal may void the warranty.
15. An experienced user shall always supervise this professional audio equipment, especially if inexperienced adults or minors are using the equipment.
16. The mains plug is used as the disconnect device and shall remain readily accessible. If the mains plug is not readily accessible due to mounting in a 19" rack, then the mains plug for the entire rack must be readily accessible.

2. Approvals

This equipment conforms to the requirements of the EMC Directive 2004/108/EC and the requirements of the Low Voltage Directive 2006/95/EC.

Standards applied: EMC Emission EN55103-1, E3
EMC Immunity EN55103-2, E3, with S/N below 1% at normal operation level.
Electrical Safety EN60065, Class I

This equipment is tested and listed according to the U.S. safety standard ANSI/ UL 60065 and Canadian safety standard CSA C22.2 NO. 60065. UL made the tests and they are a Nationally Recognized Testing Laboratory (NRTL).

This equipment is tested and found to comply with the limits of a Class A device in part 15B of the FCC rules. UL made these tests.

3. Warnings

3.1 Explanation of Graphical Symbols

The lightning bolt triangle is used to alert the user to the presence of un-insulated "dangerous voltages" within the unit's chassis that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point triangle is used to alert the user to presence of important operating and service instructions in the literature accompanying the product.

3.1.1 Warning

To reduce risk of fire or electric shock, do not expose this apparatus to rain or moisture.
Do not expose this system/apparatus to dripping or splashing and ensure that no objects filled with liquids are placed on the apparatus.

L'appareil ne doit pas être exposé à des egouttements d'eau ou des éclaboussures et de plus qu'aucun objet rempli de liquide tel que des vases ne doit pas être placé sur l'appareil.

This apparatus must be connected to a mains socket outlet with a protective earthing (ground) connection.

Cet appareil doi t être raccordé á une prise de courant qui est branchée à la terre.

The mains plug is used as a disconnect device and shall remain readily operable.

Lorsque la prise du réseau d'alimentation est utilisés comme dispositif de déconnexion, ce dispositif doit demeuré aisément accessible.

3.1.2 Caution

To reduce the risk of fire or electric shock, do not remove screws. No user-serviceable parts inside. Refer servicing to qualified service personnel.
Français: Pour réduire le risque d'incendie ou de choc électrique, ne pas retirer les vis. Aucune pièce réparable par l'utilisateur. Confier l'entretien àpersonnel qualifié.

3.2 User responsibility

3.2.1 Mains connection grounding

Your amplifier must be connected to a grounded socket outlet.

3.2.2 Speaker output hazard

Power amplifiers are capable of producing hazardous output voltages. To avoid electrical shock, do not touch any exposed speaker wiring while the amplifier is operating. External wiring connected to the speaker terminals shall be installed by a qualified person, or ready-made leads or cords of appropriate capacity shall be used.

As the amplifier outputs produce high voltage, do not connect or disconnect speaker cables when the mains power is on.

3.2.3 Radio interference

A sample of this product has been tested and complies with the limits for the European Electro Magnetic Compatibility (EMC) directive. It also has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference from electrical equipment. This product uses radio frequency energy and, if not used or installed in accordance with these operating instructions, may cause interference to other equipment, such as radio receivers. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception (determined by turning the equipment on and off), the user may be able to correct the interference by one or more of the following measures:

- Check if the affected unit complies with the EMC limits for immunity, (CE-labeled). If not, address the problem with the manufacturer or supplier. All electrical products sold in the EC must be approved for immunity against electromagnetic fields, high voltage flashes, and radio interference.
- Consult the dealer or an experienced radio/TV technician for help.
- Reorient or relocate the antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

3.2.4 Speaker damage

Many loudspeakers can be easily damaged or destroyed by overpowering them. Always check the speaker's continuous and peak power capabilities. Although the amplifier's attenuators can be used to reduce the overall gain, an increase of the input signal can still result in full output power, which may cause damage to connected speakers.

All E Series amplifier are shipped with limiters set in "Lo-Z" mode. All models also support a "70 V" mode with peak output voltage of 100 V peak. Users must verify that connected loudspeakers can handle full output before changing the limiter setting; the "70 V" mode translates to very high instantaneous peak power when connected to a low impedance loudspeaker (e.g. up to 2500 W peak into 4 ohms).

3.2.5 Maintenance

For safe and reliable operation, any dust collected in the front panel should be removed regularly. In rare circumstances, accumulated dust could ignite due to high internal temperatures and a fire occur. If the front is clogged so that air cannot pass, then the unit will eventually go into thermal protection, any resultant problems will not be covered by the warranty.

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4. Welcome

4.1 Introduction

Thank you for choosing a Lab.gruppen E Series product built around Lab.gruppen's IDEEA, the IntelliDrive Energy Efficient Amplifier. This manual provides a comprehensive guide to the features and functionality of E Series model E 12:2, E 8:2 and E 4:2 amplifiers. Please read through this manual in its entirety to become fully acquainted with configuration options and protection circuitry.

To facilitate timely installation and use of this E Series product, we have included a Quick Guide Overview (section 6). This brief summary, in conjunction with Installation (section 5), contains the basic information needed to safely install the amplifier and place it in service. However, we highly recommend reading through this manual in its entirety, beginning with Main Features and Technologies and continuing through Operation and Performance. As you become thoroughly familiar with all aspects of operation, you may learn of features or options that will affect your choices on amplifier modes or loudspeaker system configuration.

Lab.gruppen E Series power amplifiers are designed and built specifically for the unique demands of permanent installation applications. By packing two channels of efficient reconfigurable power amplification into a 1U chassis, the E Series achieves a high power and channel density. The benefits include reduced rack space requirements and minimal heat build-up. The flexible output stages enable each amplifier channel to be set for either low impedance or "70 V"-constant voltage (70.7 Vrms = 100 V peak) mode.

Although E Series features and facilities are tailored for installation applications, each amplifier draws on the foundational engineering that has made Lab.gruppen the benchmark of quality for touring concert systems: exceptional sonic performance, rugged construction, proven reliability, and protection features that anticipate every unwelcome possibility.

This manual was created for the E Series E 12:2, E 8:2 and E 4:2 amplifier models. Any references to "E Series" in this manual refer to all models in the range.

4.2 Main features

Your new E Series amplifier incorporates a number of sophisticated technologies – many of them proprietary to Lab.gruppen – that ensure the best possible performance and years of reliable operation. Familiarizing yourself with these technologies will prove invaluable in setting up and optimizing your loudspeaker system.

4.2.1 Class D output stage and universal power supply with low current draw

All E Series amplifiers employ a unique Class D output stage that is ideally matched to the rated power output. To provide flexibility, each channel offers sufficient voltage swing and current capacity to drive either constant voltage ("70 V") or low impedance (2/4/8 or 16 ohms). In order to have low thermal losses as well as the voltage swing required to drive 70 V, the design is based on a permanently bridged output.

4.2.2 Amplifier sensitivity / gain

For ease of use in system integration, E Series have been designed with a fixed sensitivity of 4 dBu. Each model offers two operational modes individually selectable per channel:

* “70 V” – Optimized for constant voltage systems but also can be used when load impedance is 8 ohms or higher. Input signal of 4 dBu produces 70.7 Vrms output, for gain of 35.2 dB.

* “Lo-Z” – Optimized for driving loads with impedance below 16 ohms. Input signal of 4 dBu produces the rated burst power into 4 ohms; gain varies by model.

4.2.3 Protection and performance optimization

Appropriate and reliable power amplification is vital to any audio system. Inadequate or faulty power amplifiers could cause damage to loudspeakers, or in some cases to the power amplifiers themselves. To prevent damage or service interruptions, E Series amplifiers offer advanced features to protect both internal circuits and connected loads. These features include the mains current limiter that allows several amplifiers to be connected to a typical mains outlet.

Standard E Series protection features include:

- A CPL (Current Peak Limiter) ensures that the amplifier’s output does not exceed the safe current handling parameters of the amplifier components.
- Temperature protection ensures that the amplifier will not be damaged by exceeding thermal limits. A TEMP indicator LED flashes when the amplifier approaches thermal limits to allow user action before protective muting engages.
- A PAL (Power Average Limiter) limits the maximum average power consumption from the mains.
- DC protection ensures destructive DC signals will not appear at the amplifier outputs. If such conditions occur an internal fuse opens.

  Note! There is no open fuse indication on the amplifier. If a channel indicates signal presence but there is no sound, an open fuse could be the cause. If an internal fuse is blown, then the amplifier needs service.

- Under Voltage Limit - A temporarily low mains voltage will indirectly initiate limiting if a high output level is attempted. In most circumstances, depending on signal characteristics and level, the amplifier will remain operational. This limiting allows the amplifier to remain functional during sustained periods of lower mains voltage, as well as during temporary dips and when very long mains cords are used.
- Low inrush current ensures that the mains breaker will not trip when several power amplifiers are turned on simultaneously.

4.2.4 50 Hz high-pass filter

Each channel has a switchable 50 Hz high-pass filter. In the default full-range position the amplifier has a flat response with a -3 dB point at 2 Hz. When engaged, the filter rolls off low frequencies (12 dB/octave) for greater efficiency and reliability in, for example, 70 V high-impedance systems where the removal of very low frequency content may be desired. The filter can also be used if desired when the output channel is connected to low impedance loudspeakers that are unable to reproduce deep bass frequencies.

4.2.5 Auto Power Down / On (APD / APO) scheme

To comply with Energy Star 2.1 requirements, all E Series amplifiers incorporate an APD scheme with power consumption below 1 W in sleep/standby mode. The E Series will go to standby mode after 20 minutes without input signal.

E Series also incorporates an APO functionality that restores full operation less than two seconds after signal is applied to either of the inputs. Chapter 6.3 describes the threshold that is used.

4.2.6 General Purpose Input / Output (GPIO) facilities

The GPIO connections allow seamless interfacing with many third-party control and power sequencing systems. Functions are optional; the amplifiers will operate normally when GPIO is not connected.

The General Purpose Input (GPI) controls the power state via external contact closure as follows:

- It reacts to a transition from open to closed by forcing the unit to the on state. The APD function will still apply, and the on state will be retained after a power cycle.
- It reacts to a transition from closed to open by forcing the unit to the standby state. This will also disable the APO until it is turned on again.

The General Purpose Output (GPO) is an internal contact closure that, when closed, indicates the unit is on and both channels functional (neither muted due to high temperature). Open indicates that the amplifier is either in standby or protective mute is activated in one or both channels.

5. Installation

5.1 Unpacking

Carefully open the shipping carton and check for any noticeable damage. Every Lab.gruppen amplifier is tested and inspected before leaving the factory and should arrive in perfect condition. If any damage is discovered, please notify the shipping company immediately. Only the consignee may institute a claim with the carrier for damage incurred during shipping. Save the carton and packing materials for the carrier's inspection. Should you ever need to ship the amplifier, always use the original packaging materials.

5.2 Mounting

The amplifier is one rack unit high (1U) and will fit into a standard EIA 19" rack. The depth is 276 mm (10.9"). The weight is approximately 4.2 kg (9.3 lbs) depending on model type.

Free airflow from front-to-rear of the amplifier must be allowed. Therefore, no doors or rack-lids should be mounted in front of or behind the amplifiers.

Amplifiers may be stacked directly on top of each other. There is no need for spacing in between units, although spacing might enable more convenient installation of cabling on the rear panel.

5.3 Cooling

The E Series amplifiers have very low idle power draw and they are very efficient. However, to reduce the risk of engaging thermal protection, the amplifier has been designed with a forced-air cooling system (air flow from front-to-rear) that activates as needed. Front-to-rear airflow is preferred as cooler air is present at the front in nearly all installed applications, allowing higher continuous power levels without encountering thermal problems.) Never attempt to reverse the airflow.

Always allow adequate air supply in front of the amplifier, and ensure that the rear of the amplifier has sufficient space to allow exhaust to escape. If the amplifier is rack-mounted, do not use covers or doors on the front or rear of the rack.

Should a heat sink overheat, the temperature sensing circuits will mute the overheating channel. If the power supply overheats, another sensing circuit will mute all output channels until the power supply cools to safe operating temperature. An early warning before shut down will be indicated on the front-panel TEMP LED. Always make sure that the recessed dust grille in the front is clean to ensure maximum possible airflow as this will minimize the risk of thermal protection, any required repairs are not covered by the warranty.

To calculate the maximum heat emission value when installing the amplifiers in rooms with an air-conditioning system, please refer to the Current Draw and Thermal Dissipation specifications provided in the Appendix section.

5.4 Operating voltage

All E Series amplifiers have a universal power supply that accepts mains voltages from 100-240 V @ 50 or 60 Hz. The amplifier requires 85 V to start, but will remain in service with mains voltage dips down to 60 V; however, power output will be limited if it's less than 100 V. An IEC male receptacle is provided on the rear panel of all amplifiers. The IEC cord included with each amplifier has a male plug appropriate for the power receptacles in the country in which it was sold. If substituting a different IEC mains cord for use in another country, use only a cord that is grounded and approved for 3 A or more. Make sure it is connected to a grounded mains outlet.

Once a suitable AC supply is connected, the amplifier will go into standby as indicated by amber illumination of the "power" LED (front and rear panel).

When the amplifier is turned on it goes through a soft-start sequence as it self-checks its circuits. The "power" LED becomes green to indicate that the amplifier is on.

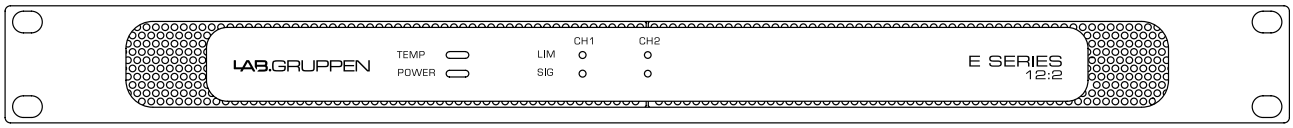
5.5 Grounding

E Series amplifiers have no ground lift switch or terminal. The signal ground is always floating, via a resistor, to chassis and therefore the grounding system is automatic.

In the interests of safety, never disconnect the earth (ground) pin on the AC power cord. Use balanced input connections to avoid hum and interference. If this is not possible; connect the "–" pin to signal ground.

6. Quick guide overview

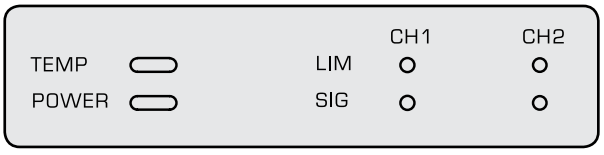
6.1 Front panel



The front panel presents six status indicators. The recessed air inlets have a metal grill to prevent objects or large dust particles from entering the amplifier. These openings can also serve as handles for pulling or lifting the amplifier.

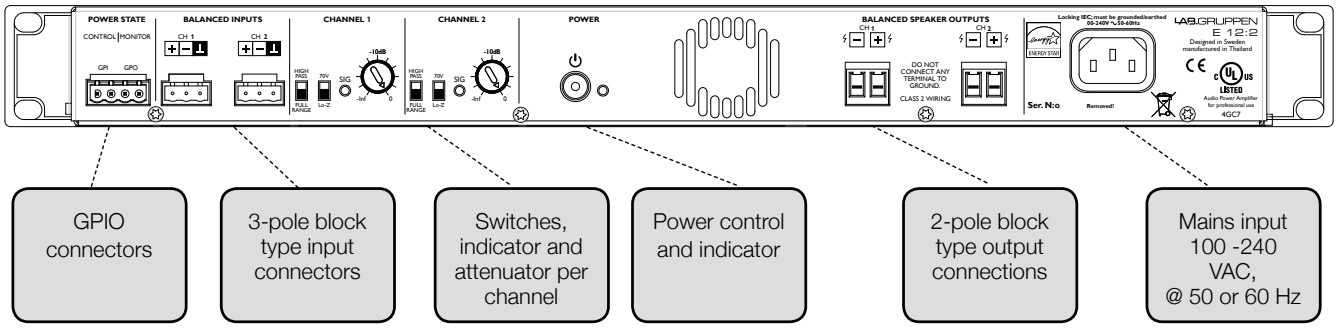
6.1.1 Front panel LEDs

The front panel LED area includes the following indicators:



- **Power** Indicates standby mode with amber and on mode with green.
- **Temp** (Temperature) – Flashes amber to for early warning if the temperature is high in either the PSU or one of the output channels. Dangerously high temperature initiates muting, as indicated with constant amber light.
- **Sig** (Input Signal Present) – Illuminates when the input signal level exceeds the Signal Present Threshold (SPT).
- **Lim** Illuminates when the amplifier is limiting the signal.

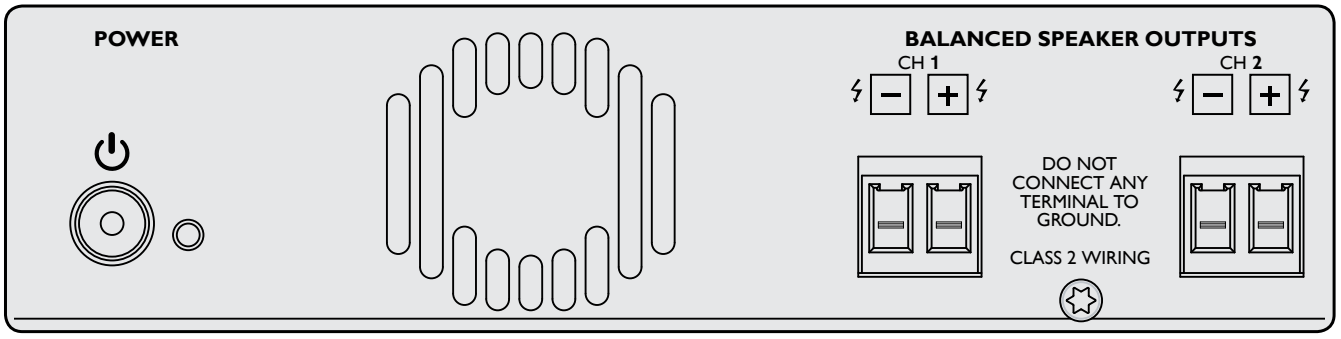
6.2 Rear panel



6.2.1 Power

The Power control button is located in the middle. When pressed momentarily it toggles the power state between standby and on.

The Power state indicator is located to the right of the button. It illuminates amber as soon as the amplifier reaches standby, and turns green when the amplifier is fully on.



6.2.2 Per channel control and monitoring

The following features are available per channel on the rear panel.

Attenuators – Individual attenuation for the two amplifier channels. Range is 0 dB to -infinity. The 12 o'clock position indicates -10 dB attenuation. The sensitivity for the amplifier is 4 dBu when the attenuator is at 0 dB and 14 dBu when the attenuator is at -10 dB.

SIG – The green indicator will be lit whenever the input signal is above the signal present threshold. Indication is the same as the front panel indicator.

High-pass / Full-range – Selects either flat down to 2 Hz or High Pass filter at 50 Hz.

70 V / Lo-Z – This switch defines the settings for the Rail Sensing Limiter (RSL).

* 70 V should be used for constant voltage systems and if full rated power into 8 or 16 ohms loads is required.

* Lo-Z should be used for rated power into 2 or 4 ohms loads. It can also be used to limit the maximum power into 8 or 16 ohms loads.

If more than half the total power is required for one channel driving an impedance of 4 ohms or higher, then the 70 V setting can be used for this channel.

Operation into 2 ohms is not recommended when using 70 V mode.

For more information on asymmetric loading see Section 7.4.3.

Output – The detachable output block connectors are designed and approved for 41 Arms (much more than the maximum capacity of the amplifiers). Cables up to 8 mm^2 (8 AWG) may be used. Please ensure that all leads are securely attached inside the connector to avoid short circuits. Also verify that the loudspeakers are connected with the same polarity to avoid low frequency cancellation losses.

GPIO – The amplifier comes with an Automatic Power On / Down APO / APD scheme triggered by the program material, so in many applications external power control is not necessary. If remote power control is desired, then an external relay can be connected to the GPI control port.

6.3 Input Signal Present Threshold (SPT)

As shipped the default input signal threshold is set at -56 dBu (-60 dB relative to 4 dBu, which is the sensitivity). This threshold applies to the input signal present indicators on the front and rear panels as well as to the Auto Power On / Down (APO / APD).

If this threshold is deemed too high or low, it can be trimmed by pressing and holding the power button for two full seconds. The amplifier will then sample the input signal and set the SPT threshold 6 dB above the sampled noise floor. The procedure should be done with all “front end” equipment on, but with no active signal input. Please ensure that no audio is accidently passed during this calibration as that can lead to a high SPT that in turn could generate and store an undesirable threshold for APD.

A typical scenario for changing the default would be when the source has a very high noise floor. In this case, adjusting the threshold prevents the noise from triggering a false APO. The calibration procedure detects the higher noise floor and sets the SPT threshold at 6 dB above it.

7. Operation and performance

7.1 Introduction

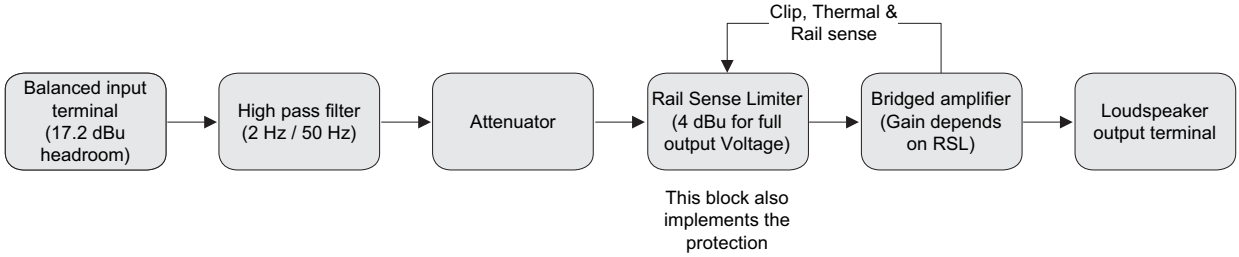
The following sections provide comprehensive information on amplifier connection, setup, operation, and performance. The detailed information included here is essential to realizing the full functionality of the E Series amplifiers.

7.2 Operating precautions

- Make sure that the amplifier is off or in standby mode before making any input or output connections.
- This amplifier is equipped with a Universal Power Supply that handles nominal voltages from 100 V to 240 V @ 50 - 60 Hz. It will turn on between 85 V – 264 V. For full power it requires 100 V or more, but it will remain functional at voltages above 60 V with reduced output power.

7.3 Signal flow and headroom

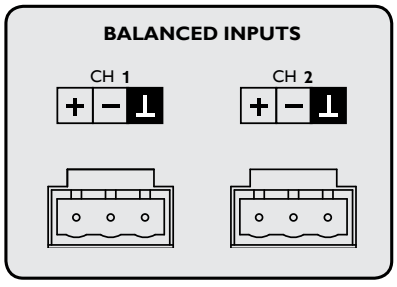
All E Series amplifiers have the same signal flow and feature set, differing only in the ability to deliver power to the loudspeakers.



On all E Series amplifiers, the input stage has a relatively high sensitivity of 4 dBu (1.23 Vrms) for full power. However, the input can handle signals up to 17.2 dBu without clipping the input signal path. The amplifier applies low-distortion limiting if the input signal exceeds what is required to deliver full power. If compression isn't desired, use the input attenuator to trim the sensitivity. E Series amplifiers easily achieve a high SPL when driven with sources capable of 10 or 20 dBu output, such as professional mixing consoles or DSP units. However, consumer sources such as a CD player or an MP3 player will have a lower output, typically -10 dBV or -7.8 dBu. This is not sufficient level to realize full power from an E Series amplifier. In this scenario, the user can get closer to maximum power output by putting the mode switch in the 70 V position without risk of delivering excessive power, even into a 2 or 4 ohm load.

7.4 Audio input and output connections, setup and features

7.4.1 Balanced / unbalanced Input connection



Electronically balanced, Phoenix-type inputs are provided on all channels. Follow the +,– and Ground labels when connecting the input signal.

If an unbalanced connection is desired this can be achieved by summing the minus ("COLD") and Ground terminals and using the + terminal as the "HOT" signal. For the best possible performance, the summing of ground and minus wires should be done at the source unit end of the cable (e.g. a CD player).

Connectors are supplied for attaching cables to the inputs. Compatible input connectors are Phoenix Contacts, Part number MSTB 2.5/3-STZ-5.08 , or Anytek OQ03545100CCG.

When linking the same source signal to several input channels, be aware that there is a limit to the number of channels an output source can "drive". A typical output source (e.g. a DSP crossover unit) can drive up to four amplifier channels before line-drivers would be required to boost the signal.

7.4.2 Output operation and connection

Detachable block-connectors with + and – poles are provided at each channel output for connection of the speakers. If more conectors are needed, then these are compatible:

Phoenix 1709047, or Anytek KT02015000CCG.

Make sure that the speaker cables are connected correctly and tightly, and that accurate polarity is maintained to all speakers in the system.

As the amplifier outputs produce high voltage, do not connect or disconnect speaker cables when the mains power is on.

7.4.3 Output bridge mode and asymmetric loading

The E Series is designed with inherently bridged outputs for a high voltage swing, with full headroom accessed in the 70 V mode. So, in some ways the amplifier is a 4 channel amplifier with permanently bridged outputs which turns it into a 2 channel amplifier. This design also accommodates asymmetric loading, wherein only one channel can be connected and draw all power from the power supply. Alternatively, one channel can be connected and configured as a “high power” channel while another is connected and configured as a “low power” channel. For example, a 4 ohm loudspeaker could draw all the power available from the power supply in one channel when it is the only loudspeaker connected to the amplifier. If another channel is connected, any power used by this second “low power” channel will limit the “high power” channel from using all available power.

The power available in each channel is determined by the setting of the RSL switch and the impedance of the connected load. Power available per channel in some typical applications is shown in the following sample tables. Note that because the two channels are identical, the channels given below are reversible. (If settings of channel 2 are same as for channel 1 shown below, then options for channel 1 are same as for channel 2 below.) From one perspective, the functionality of asymmetric loading is very intuitive: essentially, power not used in one channel is available through the other channel, but within limits determined by the load impedances for each channel and the setting of the RSL switch. However, the possible combinations are many, and performance limitations may apply in some scenarios.

The tables below illustrate power levels available in different scenarios with different amplifiers. These are not complete, but given only to illustrate the concept; more complete data for all three amplifiers is given in Appendix 8.3.

System example A: 70 V systems on both channels

Channel 1				Channel 2		
Model	**RSL switch**	**Load type**	**Power available**	**RSL switch**	**Load type**	**Power available**
E 4:2	70 V	70 V	50 W	70 V	70 V	350 W
E 4:2	70 V	70 V	200 W	70 V	70 V	200 W
E 8:2	70 V	70 V	100 W	70 V	70 V	700 W
E 8: 2	70 V	70 V	0 W	70 V	70 V	800 W
E 12:2	70 V	70 V	200 W	70 V	70 V	1000 W

System example B: 70 V system channel 1 plus one 8 ohm subwoofer (or other cabinet) channel 2

Channel 1				Channel 2		
Model	**RSL switch**	**Load type**	**Power available**	**RSL switch**	**Load type**	**Power available**
E 4:2	70 V	70 V	50 W	70 V	8 ohms	350 W*
E 4:2	70 V	70 V	300 W	Lo-Z	8 ohms	100 W
E 8:2	70 V	70 V	200 W	70 V	8 ohms	600 W
E 12: 2	70 V	70 V	900 W	Lo-Z	8 ohms	300 W
E 12: 2	70 V	70 V	600 W	70 V	8 ohms	600 W

System example C: 70 V system channel 1 plus two 8 ohm subwoofers (or cabinets) in parallel for 4 ohms channel 2

Channel 1				Channel 2		
Model	**RSL switch**	**Load type**	**Power available**	**RSL switch**	**Load type**	**Power available**
E 4: 2	70 V	70 V	100 W	70 V	4 ohms	300 W*
E 8:2	70 V	70 V	300 W	70 V	4 ohms	500 W*
E 8:2	70 V	70 V	400 W	Lo-Z	4 ohms	400 W
E 12:2	70 V	70 V	400 W	70 V	4 ohms	800 W*
E 12:2	70 V	70 V	600 W	Lo-Z	4 ohms	600 W

System example D: Two 8 ohm cabinets in parallel for 4 ohms channel 1 and one 8 ohm subwoofer (or cabinet) channel 2

Channel 1				Channel 2		
Model	**RSL switch**	**Load type**	**Power available**	**RSL switch**	**Load type**	**Power available**
E 4 2	Lo-Z	4 ohms	200 W	70 V	8 ohms	200 W*
E 8:2	Lo-Z	4 ohms	400 W	70 V	8 ohms	400 W
E 8:2	Lo-Z	4 ohms	200 W*	70 V	8 ohms	600 W
E 12:2	Lo-Z	4 ohms	600 W	70 V	8 ohms	600 W
E 12:2	70 V	4 ohms	900 W*	Lo-Z	8 ohms	300 W

*: Use of external limiter recommended with these examples. Otherwise, depending on the program material, the amplifier may temporarily try to deliver more power with resulting pumping.

7.4.4 Constant Voltage 70 V system setup and operation

When using E Series amplifiers to drive constant voltage (high-impedance) speaker systems at 70 Vrms or 100 V peak, in most cases you can simply connect the speakers to the amplifier output terminals, select the 70 V RSL setting, and place the amplifier in service.

Limiters - Limiting is applied to avoid distortion at the selected voltage limit threshold and to avoid hitting the rail if it has sagged below the selected threshold.
Limiting also may be applied when maximum output current has been reached or when the mains voltage is too low to maintain required rail voltage. Limiting activity is shown by the front panel Limiter LED.

7.4.5 Output Current Peak Limiter (CPL)

The Current Peak Limiter (CPL) ensures that the amplifier will not be damaged by trying to deliver current to the outputs exceeding the physical limitations of the output devices. The CPL keeps the amplifier within the Safe Operating Area. The CPL is non-adjustable and has different limit values depending on model type. The maximum output current values for the three E Series models are:

- E 12:2, 18 Arms per channel
- E 8:2, 16 Arms per channel
- E 4:2, 14 Arms per channel

8. Appendix

8.1 Maintenance

During normal operation your E Series amplifier will provide trouble-free service. The only user maintenance required is to periodically vacuum clean the air inlets in the front.

In some extreme cases it may be necessary for authorized service personnel to clean the inside of the amplifier in order to safely remove dust or other build ups which may occur during prolonged normal usage. If you are using your amplifier in a heavy duty application, it is recommended to have your amplifier cleaned inside every 3 years purely as a preventative action.

8.2 Current draw and thermal dissipation

E 4:2

Level	Load	Rated power		Line Current *2)		Watt *1)			Thermal Dissipation	
				120 VAC	230 VAC	In	Out	Dissipated	BTU/hr	kCal/hr
				Amp (I)						
Standby					0.32	0.7	0	0.72	2.5	0.6
				0.016		0.4	0	0.38	1.3	0.3
Power on, Idling					0.186	21.5	0	21.5	73.3	18.5
				0.306		22.4	0	22.4	76.6	19.3
				Amp (I)		Watt				
Pink Pseudo Noise (1/8)	70 V / Ch.	200	x 2		0.7	80	50	30	101	26
	70 V / Ch.	200	x 2	1.1		86	50	36	123	31
	16 ohms / Ch.	200	x 2		0.7	80	50	30	101	26
	16 ohms / Ch.	200	x 2	1.1		85	50	35	118	30
	8 ohms / Ch.	200	x 2		0.7	81	50	31	105	26
	8 ohms / Ch.	200	x 2	1.1		87	50	37	125	32
	4 ohms / Ch.	200	x 2		0.8	89	50	39	133	34
	4 ohms / Ch.	200	x 2	1.2		92	50	42	144	36
	2 ohms / Ch.	200	x 2		0.8	98	50	48	165	42
	2 ohms / Ch.	200	x 2	1.3		100	50	50	172	43

*1) The amplifier's PSU operates as a non-resistive load, so the calculation "Volts x Amps = Watts" would not be correct. Instead, measured and specified here is what is known as the "Active Power" in the amplifier providing useful, real-world values of power consumption and heat dissipation.

*2) Current draw figures measured at 230 V as well as 120 V. The efficiency is similar, but not identical for the two scenarios. The efficiency for 100 V mains is very similar to that of 120 V.

E 8:2

Level	**Load**	**Rated power**		**Line Current *2)**		**Watt *1)**			**Thermal Dissipation**	
				120 VAC	230 VAC	In	Out	Dissipated	BTU/hr	kCal/hr
				Amp (I)						
Standby					0.033	0.72	0.0	0.7	2.5	0.6
				0.019		0.38	0.0	0.4	1.3	0.3
Power on, Idling					0.183	20.7	0.0	20.7	70.5	17.8
				0.315		21.9	0.0	21.9	74.7	18.8
				Amp (I)		Watt				
Pink Pseudo Noise (1/8)	70 V / Ch.	400	x 2		1.2	139	100	39	134	34
	70 V / Ch.	400	x 2	2.1		148	100	48	163	41
	16 ohms / Ch.	310	x 2		0.9	112	78	35	119	30
	16 ohms / Ch.	310	x 2	1.8		118	78	41	140	35
	8 ohms / Ch.	400	x 2		1.2	141	100	41	140	35
	8 ohms / Ch.	400	x 2	2.0		148	100	48	164	41
	4 ohms / Ch.	400	x 2		1.3	149	100	49	166	42
	4 ohms / Ch.	400	x 2	2.1		155	100	55	187	47
	2 ohms / Ch.	400	x 2		1.4	172	100	72	244	61
	2 ohms / Ch.	400	x 2	2.3		174	100	74	254	64

*1) The amplifier's PSU operates as a non-resistive load, so the calculation "Volts x Amps = Watts" would not be correct. Instead, measured and specified here is what is known as the "Active Power" in the amplifier providing useful, real-world values of power consumption and heat dissipation.

*2) Current draw figures measured at 230 V as well as 120 V. The efficiency is similar, but not identical for the two scenarios. The efficiency for 100 V mains is very similar to that of 120 V.

E 12:2										
Level	**Load**	**Rated power**		**Line Current *2)**		**Watt *1)**			**Thermal Dissipation**	
				120 VAC	230 VAC	In	Out	Dissipated	BTU/hr	kCal/hr
				Amp (I)						
Standby					0.032	0.70	0.0	0.7	2.4	0.6
				0.019		0.31	0.0	0.3	1.1	0.3
Power on, Idling					0.183	20.7	0.0	20.7	70.5	17.8
				0.315		21.9	0.0	21.9	74.7	18.8
				Amp (I)		Watt				
Pink Pseudo Noise (1/8)	70 V / Ch.	600	x 2		1.8	210	150	60	205	52
	70 V / Ch.	600	x 2	2.9		223	150	73	248	62
	16 ohms / Ch.	33	x 2		1.1	128	83	45	154	39
	16 ohms / Ch.	33	x 2	1.8		136	83	54	183	46
	8 ohms / Ch.	600	x 2		1.8	209	150	59	202	51
	8 ohms / Ch.	600	x 2	2.9		219	150	69	237	60
	4 ohms / Ch.	600	x 2		1.9	222	150	72	245	62
	4 ohms / Ch.	600	x 2	2.9		226	150	76	259	65
	2 ohms / Ch.	600	x 2		2.0	249	150	99	337	85
	2 ohms / Ch.	600	x 2	3.1		252	150	102	349	88

*1) The amplifier's PSU operates as a non-resistive load, so the calculation "Volts x Amps = Watts" would not be correct. Instead, measured and specified here is what is known as the "Active Power" in the amplifier providing useful, real-world values of power consumption and heat dissipation.

*2) Current draw figures measured at 230 V as well as 120 V. The efficiency is similar, but not identical for the two scenarios. The efficiency for 100 V mains is very similar to that of 120 V.

8.3 Asymmetric loading data

Pages 22-24 following list possible settings and load combinations for asymmetric loading. For an explanation of asymmetric loading, please see Section 7.4.3.

For values followed by an asterisk (*), use of an external limiter may be required for optimum performance.

All values assume amplifier is being driven by a signal from a professional mixing console or DSP unit. Values will differ if driven by a consumer device, such as an iPod, with significantly lower output (2.71 dBu instead of the required 4 dBu).

E 4:2

Channel RSL switch		Channel load		Power output	
Ch. 1	Ch. 2	Ch. 1	Ch. 2	Ch.1	Ch. 2
70 V	70 V	70 V	70 V	0 W @ 70 V	400 W @ 70 V
70 V	70 V	70 V	70 V	50 W @ 70 V	350 W @ 70 V
70 V	70 V	70 V	70 V	100 W @ 70 V	300 W @ 70 V
70 V	70 V	70 V	70 V	150 W @ 70 V	250 W @ 70 V
70 V	70 V	70 V	70 V	200 W @ 70 V	200 W @ 70 V
70 V	Lo-Z	70 V	2 ohms	100 W @ 70 V	300 W @ 2 ohms*
70 V	Lo-Z	70 V	2 ohms	50 W @ 70 V	350 W @ 2 ohms*
70 V	Lo-Z	70 V	4 ohms	350 W @ 70 V	50 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	300 W @ 70 V	100 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	250 W @ 70 V	150 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	200 W @ 70 V	200 W @ 4 ohms
70 V	70 V	70 V	4 ohms	150 W @ 70 V	250 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	100 W @ 70 V	300 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	50 W @ 70 V	350 W @ 4 ohms*
70 V	Lo-Z	70 V	8 ohms	350 W @ 70 V	50 W @ 8 ohms*
70 V	Lo-Z	70 V	8 ohms	300 W @ 70 V	100 W @ 8 ohms
70 V	70 V	70 V	8 ohms	250 W @ 70 V	150 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	200 W @ 70 V	200 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	150 W @ 70 V	250 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	50 W @ 70 V	350 W @ 8 ohms*
70 V	Lo-Z	70 V	16 ohms	375 W @ 70 V	25 W @ 16 ohms*
70 V	Lo-Z	70 V	16 ohms	350 W @ 70 V	50 W @ 16 ohms
70 V	70 V	70 V	16 ohms	300 W @ 70 V	100 W @ 16 ohms*
70 V	70 V	70 V	16 ohms	200 W @ 70 V	200 W @ 16 ohms*
70 V	70 V	70 V	16 ohms	90 W @ 70 V	310 W @ 16 ohms
70 V	Lo-Z	4 ohms	16 ohms	375 W @ 4 ohms*	25 W @ 16 ohms*
70 V	Lo-Z	4 ohms	16 ohms	350 W @ 4 ohms*	50 W @ 16 ohms
70 V	70 V	4 ohms	16 ohms	300 W @ 4 ohms*	100 W @ 16 ohms*
Lo-Z	70 V	4 ohms	16 ohms	200 W @ 4 ohms	200 W @ 16 ohms*
Lo-Z	70 V	4 ohms	16 ohms	90 W @ 4 ohms*	310 W @ 16 ohms
Lo-Z	Lo-Z	4 ohms	16 ohms	200 W @ 4 ohms	50 W @ 16 ohms
70 V	Lo-Z	4 ohms	8 ohms	350 W @ 4 ohms	50 W @ 8 ohms*
70 V	Lo-Z	4 ohms	8 ohms	300 W @ 4 ohms*	100 W @ 8 ohms
70 V	70 V	4 ohms	8 ohms	250 W @ 4 ohms*	150 W @ 8 ohms*
70 V	70 V	4 ohms	8 ohms	225 W @ 4 ohms*	175 W @ 8 ohms*
Lo-Z	70 V	4 ohms	8 ohms	200 W @ 4 ohms	200 W @ 8 ohms*
Lo-Z	Lo-Z	4 ohms	8 ohms	200 W @ 4 ohms	100 W @ 8 ohms
70 V	Lo-Z	4 ohms	4 ohms	300 W @ 4 ohms	100 W @ 4 ohms*
70 V	Lo-Z	4 ohms	4 ohms	250 W @ 4 ohms*	150 W @ 4 ohms*
Lo-Z	Lo-Z	4 ohms	4 ohms	200 W @ 4 ohms	200 W @ 4 ohms
70 V	70 V	8 ohms	16 ohms	300 W @ 8 ohms*	100 W @ 16 ohms*
70 V	Lo-Z	8 ohms	16 ohms	200 W @ 8 ohms*	200 W @ 16 ohms*
Lo-Z	70 V	8 ohms	16 ohms	100 W @ 8 ohms	300 W @ 16 ohms
70 V	70 V	8 ohms	8 ohms	200 W @ 8 ohms*	200 W @ 8 ohms*
70 V	Lo-Z	8 ohms	8 ohms	300 W @ 8 ohms*	100 W @ 8 ohms
70 V	Lo-Z	8 ohms	8 ohms	350 W @ 8 ohms*	50 W @ 8 ohms*
Lo-Z	Lo-Z	2 ohms	16 ohms	350 W @ 2 ohms*	50 W @ 16 ohms
Lo-Z	Lo-Z	2 ohms	8 ohms	300 W @ 2 ohms*	100 W @ 8 ohms
Lo-Z	Lo-Z	2 ohms	4 ohms	200 W @ 2 ohms*	200 W @ 4 ohms*
Lo-Z	Lo-Z	2 ohms	2 ohms	200 W @ 2 ohms*	200 W @ 2 ohms*
70 V	unused	16 ohms	unused	310 W @ 16 ohms	unused
70 V	unused	8 ohms	unused	400 W @ 8 ohms*	unused
70 V	unused	4 ohms	unused	400 W @ 4 ohms*	unused
Lo-Z	unused	2 ohms	unused	400 W @ 2 ohms	unused
70 V	Lo-Z	16 ohms	16 ohms	310 W @ 16 ohms	50W @ 16 ohms
70 V	70 V	16 ohms	16 ohms	200 W @ 16 ohms*	200 W @ 16 ohms*

E 8:2

Channel RSL switch		Channel load		Power output	
Ch. 1	Ch. 2	Ch. 1	Ch. 2	Ch.1	Ch. 2
unused	70 V	unused	70 V	unused	800 W @ 70 V
70 V	70 V	70 V	70 V	50 W @ 70 V	750 W @ 70 V
70 V	70 V	70 V	70 V	100 W @ 70 V	700 W @ 70 V
70 V	70 V	70 V	70 V	150 W @ 70 V	650 W @ 70 V
70 V	70 V	70 V	70 V	200 W @ 70 V	600 W @ 70 V
70 V	70 V	70 V	70 V	300 W @ 70 V	500 W @ 70 V
70 V	70 V	70 V	70 V	400 W @ 70 V	400 W @ 70 V
70 V	Lo-Z	70 V	2 ohms	200 W @ 70 V	600 W @ 2 ohms
70 V	Lo-Z	70 V	2 ohms	300 W @ 70 V	500 W @ 2 ohms*
70 V	Lo-Z	70 V	2 ohms	400 W @ 70 V	400 W @ 2 ohms*
70 V	Lo-Z	70 V	2 ohms	500 W @ 70 V	300 W @ 2 ohms*
70 V	Lo-Z	70 V	4 ohms	600 W @ 70 V	200 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	500 W @ 70 V	300 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	450 W @ 70 V	350 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	400 W @ 70 V	400 W @ 4 ohms
70 V	70 V	70 V	4 ohms	300 W @ 70 V	500 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	200 W @ 70 V	600 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	150 W @ 70 V	650 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	100 W @ 70 V	700 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	50 W @ 70 V	750 W @ 4 ohms*
70 V	Lo-Z	70 V	8 ohms	700 W @ 70 V	100 W @ 8 ohms*
70 V	Lo-Z	70 V	8 ohms	600 W @ 70 V	200 W @ 8 ohms
70 V	70 V	70 V	8 ohms	500 W @ 70 V	300 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	400 W @ 70 V	400 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	300 W @ 70 V	500 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	200 W @ 70 V	600 W @ 8 ohms
70 V	Lo-Z	70 V	16 ohms	750 W @ 70 V	50 W @ 16 ohms*
70 V	Lo-Z	70 V	16 ohms	700 W @ 70 V	100 W @ 16 ohms
70 V	70 V	70 V	16 ohms	650 W @ 70 V	150 W @ 16 ohms*
70 V	70 V	70 V	16 ohms	600 W @ 70 V	200 W @ 16 ohms*
70 V	70 V	70 V	16 ohms	490 W @ 70 V	310 W @ 16 ohms
70 V	Lo-Z	4 ohms	16 ohms	750 W @ 4 ohms*	50 W @ 16 ohms*
70 V	Lo-Z	4 ohms	16 ohms	700 W @ 4 ohms*	100 W @ 16 ohms
70 V	70 V	4 ohms	16 ohms	650 W @ 4 ohms*	150 W @ 16 ohms*
70 V	70 V	4 ohms	16 ohms	490 W @ 4 ohms*	310 W @ 16 ohms
Lo-Z	70 V	4 ohms	16 ohms	400 W @ 4 ohms	310 W @ 16 ohms
Lo-Z	Lo-Z	4 ohms	16 ohms	400 W @ 4 ohms	100 W @ 16 ohms
70 V	Lo-Z	4 ohms	8 ohms	700 W @ 4 ohms*	100 W @ 8 ohms*
70 V	Lo-Z	4 ohms	8 ohms	600 W @ 4 ohms*	200 W @ 8 ohms
70 V	70 V	4 ohms	8 ohms	500 W @ 4 ohms*	300 W @ 8 ohms*
70 V	70 V	4 ohms	8 ohms	450 W @ 4 ohms*	350 W @ 8 ohms*
Lo-Z	70 V	4 ohms	8 ohms	400 W @ 4 ohms	400 W @ 8 ohms*
Lo-Z	Lo-Z	4 ohms	8 ohms	400 W @ 4 ohms	200 W @ 8 ohms
70 V	Lo-Z	4 ohms	4 ohms	600 W @ 4 ohms*	200 W @ 4 ohms
70 V	Lo-Z	4 ohms	4 ohms	500 W @ 4 ohms*	300 W @ 4 ohms*
Lo-Z	Lo-Z	4 ohms	4 ohms	400 W @ 4 ohms	400 W @ 4 ohms
70 V	70 V	8 ohms	16 ohms	620 W @ 8 ohms	180 W @ 16 ohms*
70 V	70 V	8 ohms	16 ohms	490 W @ 8 ohms*	310 W @ 16 ohms
70 V	70 V	8 ohms	8 ohms	400 W @ 8 ohms*	400 W @ 8 ohms*
70 V	Lo-Z	8 ohms	8 ohms	600 W @ 8 ohms	200 W @ 8 ohms
Lo-Z	Lo-Z	2 ohms	8 ohms	600 W @ 2 ohms	200 W @ 8 ohms
Lo-Z	Lo-Z	2 ohms	4 ohms	400 W @ 2 ohms*	400 W @ 4 ohms
Lo-Z	Lo-Z	2 ohms	2 ohms	400 W @ 2 ohms*	400 W @ 2 ohms*

E 12:2

Channel RSL switch		Channel load		Power output	
Ch. 1	Ch. 2	Ch. 1	Ch. 2	Ch.1	Ch. 2
unused	70 V	70 V	70 V	unused	1200 W @ 70 V
70 V	70 V	70 V	70 V	100 W @ 70 V	1100 W @ 70 V
70 V	70 V	70 V	70 V	200 W @ 70 V	1000 W @ 70 V
70 V	70 V	70 V	70 V	300 W @ 70 V	900 W @ 70 V
70 V	70 V	70 V	70 V	400 W @ 70 V	800 W @ 70 V
70 V	70 V	70 V	70 V	500 W @ 70 V	700 W @ 70 V
70 V	70 V	70 V	70 V	600 W @ 70 V	600 W @ 70 V
70 V	Lo-Z	70 V	2 ohms	600 W @ 70 V	600 W @ 2 ohms
70 V	Lo-Z	70 V	4 ohms	1000 W @ 70 V	200 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	900 W @ 70 V	300 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	800 W @ 70 V	400 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	700 W @ 70 V	500 W @ 4 ohms*
70 V	Lo-Z	70 V	4 ohms	600 W @ 70 V	600 W @ 4 ohms
70 V	70 V	70 V	4 ohms	400 W @ 70 V	800 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	300 W @ 70 V	900 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	200 W @ 70 V	1000 W @ 4 ohms*
70 V	70 V	70 V	4 ohms	100 W @ 70 V	1100 W @ 4 ohms*
70 V	70 V	unused	4 ohms	unused	1200 W @ 4 ohms
70 V	Lo-Z	70 V	8 ohms	1050 W @ 70 V	150 W @ 8 ohms*
70 V	Lo-Z	70 V	8 ohms	900 W @ 70 V	300 W @ 8 ohms
70 V	70 V	70 V	8 ohms	800 W @ 70 V	400 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	700 W @ 70 V	500 W @ 8 ohms*
70 V	70 V	70 V	8 ohms	600 W @ 70 V	600 W @ 8 ohms
70 V	Lo-Z	70 V	16 ohms	1125 W @ 70 V	75 W @ 16 ohms*
70 V	Lo-Z	70 V	16 ohms	1050 W @ 70 V	150 W @ 16 ohms
70 V	70 V	70 V	16 ohms	1000 W @ 70 V	200 W @ 16 ohms*
70 V	Lo-Z	70 V	16 ohms	950 W @ 70 V	250 W @ 16 ohms*
70 V	Lo-Z	70 V	16 ohms	890 W @ 70 V	310 W @ 16 ohms
70 V	Lo-Z	4 ohms	16 ohms	1100 W @ 4 ohms*	100 W @ 16 ohms*
70 V	Lo-Z	4 ohms	16 ohms	1050 W @ 4 ohms*	150 W @ 16 ohms
70 V	70 V	4 ohms	16 ohms	1000 W @ 4 ohms*	200 W @ 16 ohms*
70 V	70 V	4 ohms	16 ohms	890 W @ 4 ohms*	310 W @ 16 ohms
Lo-Z	70 V	4 ohms	16 ohms	600 W @ 4 ohms	310 W @ 16 ohms
70 V	Lo-Z	4 ohms	* ohms	1000 W @ 4 ohms*	200 W @ 8 ohms*
70 V	Lo-Z	4 ohms	* ohms	900 W @ 4 ohms*	300 W @ 8 ohms*
70 V	70 V	4 ohms	8 ohms	800 W @ 4 ohms*	400 W @ 8 ohms*
70 V	70 V	4 ohms	8 ohms	700 W @ 4 ohms*	500 W @ 8 ohms*
Lo-Z	70 V	4 ohms	8 ohms	600 W @ 4 ohms	600 W @ 8 ohms
Lo-Z	Lo-Z	4 ohms	8 ohms	600 W @ 4 ohms	300 W @ 8 ohms
70 V	Lo-Z	4 ohms	4 ohms	900 W @ 4 ohms	300 W @ 4 ohms
70 V	Lo-Z	4 ohms	4 ohms	800 W @ 4 ohms	400 W @ 4 ohms
70 V	Lo-Z	4 ohms	4 ohms	700 W @ 4 ohms	500 W @ 4 ohms
Lo-Z	Lo-Z	4 ohms	4 ohms	600 W @ 4 ohms	600 W @ 4 ohms
70 V	70 V	8 ohms	16 ohms	620 W @ 8 ohms	310 W @ 16 ohms
70 V	70 V	8 ohms	8 ohms	600 W @ 8 ohms	600 W @ 8 ohms
70 V	Lo-Z	8 ohms	8 ohms	600 W @ 8 ohms	300 W @ 8 ohms
Lo-Z	70 V	2 ohms	8 ohms	600 W @ 2 ohms	600 W @ 8 ohms
Lo-Z	Lo-Z	2 ohms	4 ohms	600 W @ 2 ohms	600 W @ 4 ohms
Lo-Z	Lo-Z	2 ohms	2 ohms	600 W @ 2 ohms	600 W @ 2 ohms
70 V	70 V	16 ohms	16 ohms	310 W @ 16 ohms	310 W @ 16 ohms

9. Technical specifications

Model	E 12:2	E 8:2	E 4:2
Number of channels	2	2	2
Peak total output all channels driven	1200 W	800 W	400 W
Peak output voltage per channel	100 V / 70 Vrms	100 V / 70 Vrms	100 V / 70 Vrms
Max. output current per channel	18 Arms	16 Arms	11 Arms
Max. Output Power Per ch. (all ch.'s driven)			
2 ohms (Lo-Z mode)	600	400	200
4 ohms (Lo-Z mode)	600	400	200
8 ohms (Hi-Z mode)	600	400	200
16 ohms (Hi-Z mode)	310	290	200
70 V (Hi-Z mode)	600	400	200
8 ohms (Lo-Z mode)	300	200	100
16 ohms (Lo-Z mode)	150	100	50
Performance			
THD 20 Hz - 20 kHz for 1 W	<0.1%	<0.1%	<0.1%
THD at 1 kHz and 1 dB below clipping	<0.05%	<0.05%	<0.05%
Signal To Noise Ratio	>112 dBA	>112 dBA	>112 dBA
Channel separation (Crosstalk) at 1 kHz	>70 dB	>70 dB	>70 dB
Frequency response	2 Hz - 40 kHz	2 Hz - 40 kHz	2 Hz - 40 kHz
Input impedance	20 kOhm	20 kOhm	20 kOhm
Common Mode Rejection (CMR)	50 dB	50 dB	50 dB
Output impedance	25 mOhm	25 mOhm	25 mOhm
Gain, Sensitivity and Limiters			
Limit and gain switch (per channel)	2 pos: Lo-Z and Hi-Z	2 pos: Lo-Z and Hi-Z	2 pos: Lo-Z and Hi-Z
VPL for Hi-Z mode	100 V	100 V	100 V
VPL for Lo-Z mode	69.3 V	56.6 V	40.0 V
Sensitivity for 70 V out in Hi-Z mode	4 dBu	4 dBu	4 dBu
Sensitivity for full power into 4/8/16 ohms in Lo-Z mode	4 dBu	4 dBu	4 dBu
Gain in Hi-Z mode	35.2 dBu	35.2 dBu	35.2 dBu
Gain in Lo-Z mode	32.0 dB	30.3 dB	27.2 dB
Level adjustment (per channel)	Rear panel potentiometer, detented from -inf to 0 dB		
Connectors and switches			
Input connectors (per ch.)	3-pin detachable screw terminals, electronically balanced		
Output connectors (per ch.)	2-pin detachable screw terminals		
High pass filter	Fixed at 35 Hz, switchable per channel		
Power control	Can be used to go between standby and ON		
GPI (power control input)	Contact closure type, 2-pin detachable screw terminal, controls the power state		
GPO (power state output)	Contact closure type, 2-pin detachable screw terminal, for external monitoring of the power state		
Cooling	Single fan, front to rear airflow, no filter required, temperature controlled speed		
Power			
Nominal voltage	100 - 240 VAC	100 - 240 VAC	100 - 240 VAC
Operating voltage	70 - 265 VAC	70 - 265 VAC	70 - 265 VAC
Standby consumption	<1 W	<1 W	<1 W
Mains connector	IEC inlet		
Dimensions	W: 483 mm (19"), H: 44 mm (1 U), D: 276 mm (10.9")		
Weight	4.2 kg (9.3 lbs.)	4.1 kg (9 lbs.)	4 kg (8.8 lbs.)
Finish	Dark grey aluminium front and black steel chassis		
Approvals	CE		
Warranty	3 years, components and factory workmanship. See full warranty statement.		

All specifications are subject to change without notice.

10. Warranty

General
This product is manufactured by Lab.gruppen, and it is warranted to be free from any defects caused by components or factory workmanship, under normal use and service, for a period of three (3) years from date of purchase from an authorized Lab.gruppen dealer.

If the product fails to perform as specified during the warranty period, Lab.gruppen will undertake to repair, or at its option, replace this product at no charge to its owner, provided the unit is returned undamaged, shipping prepaid, to an authorized service facility or to the factory.

This warranty shall be null and void if the product is subjected to: repair work or alteration by a person other than those authorized by us; mechanical damage including shipping accidents; war, civil insurrection, misuse, abuse, operation with incorrect AC voltage, incorrect connections or accessories; operation with faulty associated equipment; or exposure to inclement weather conditions. Damage due to normal wear and tear is not covered by the warranty. Units on which the serial number has been removed or defaced will not be eligible for warranty service.

Lab.gruppen shall not be responsible for any incidental or consequential damages. Lab.gruppen's responsibility is limited to the product itself. Lab.gruppen takes no responsibility for any loss due to cancellation of any events, or rent of replacement equipment or costs due to a third party's or customer's loss of profit, or any other indirect cost or losses however incurred.

Lab.gruppen reserves the right to make changes or improvements in design or manufacturing without assuming any obligation to change or improve products previously manufactured.

This warranty is exclusive, and no other warranty is expressed or implied. This warranty does not affect the customer's statutory rights.

International warranties
Please contact your supplier or distributor for this information, as rights and disclaimers may vary from country to country.

11. Service

International
If your Lab.gruppen product requires repair, contact your Lab.gruppen dealer or distributor. Find your local distributor or sales representative via http://labgruppen.com/distributors/. A full listing of service centre is available at http://labgruppen.com/support/find_service_centre/.

Factory service
In the event a Lab.gruppen product requires factory service, you may contact Lab.gruppen's service department for return instructions and a Return Authorization number.

Please note for product return:
1. Use the original packing.
2. Include a copy of the sales receipt, your name, return address, phone and fax number, email address and description of the defect.
3. Mark the Return Authorization number on the outside of the packing.
4. Ship the product prepaid to:

Lab.gruppen AB Faktorvägen 1
SE-434 37 Kungsbacka
Sweden
Phone: +46 300 56 28 00
Fax: +46 300 56 28 99

service@labgruppen.com www.labgruppen.com

LAB.GRUPPEN

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WWW.LABGRUPPEN.COM

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