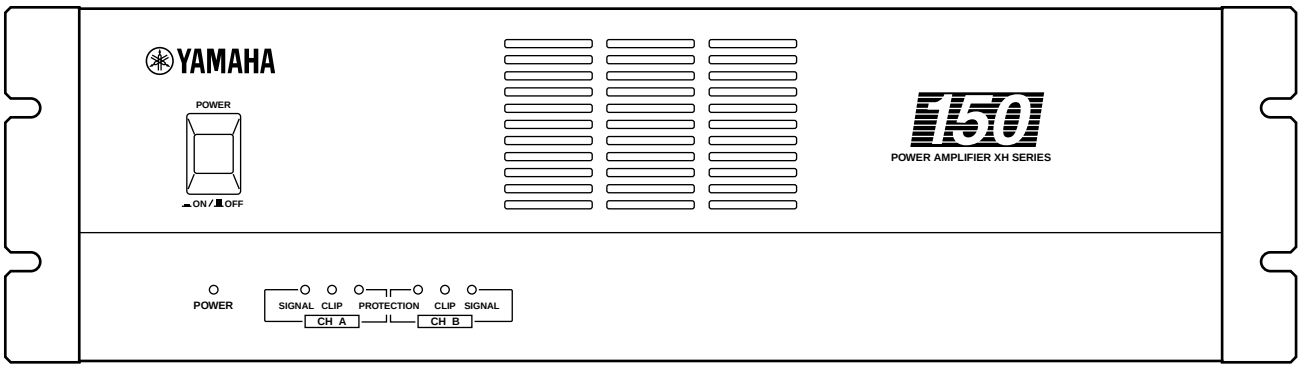
YAMAHA

POWER AMPLIFIER
XH150

Owner's Manual



E

Introduction

Thank you for purchasing a Yamaha XH150 power amplifier.

The development of the XH150 was enriched by Yamaha's wealth of experience in building PA equipment and its tradition of precision circuit design technology. This amp is dedicated to driving high-impedance speakers, and feature high power and superb quality together with superior reliability and stability, guaranteeing the highest possible audio performance.

Main features of the XH150:

- *The unit is equipped with two types of inputs (balanced XLR and barrier strip) and one barrier strip output.*
- *The voltage line is switchable between 100 V and 70 V, and output is rated at 150 W. The high-impedance design makes the unit most suitable for driving multiple speaker systems simultaneously in a facility.*
- *Independent low-cut/high-cut filters are provided for channels A and B. These filters allow you to change cut-off frequencies.*
- *A SIGNAL indicator and CLIP indicator is provided for each channel.*
- *The PROTECTION indicator shows the status of protective circuitry such as power-on/off protection, output muting, and the DC detection circuit.*
- *Variable-speed low-noise fan(s) ensures high reliability even under demanding conditions.*

In order to take full advantage of your XH150 and enjoy long and trouble-free operation, please read this owner's manual carefully before use.

WARNING: THIS APPARATUS MUST BE EARTHED

IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW :	EARTH
BLUE :	NEUTRAL
BROWN :	LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured GREEN and YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured GREEN and YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

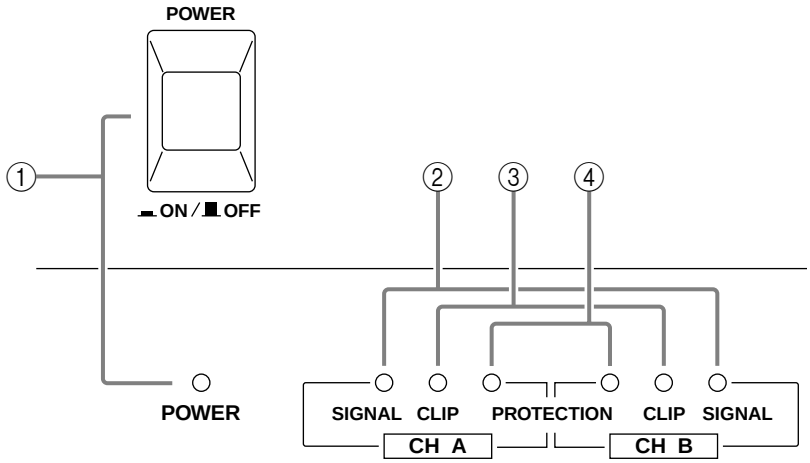
* This applies only to products distributed by YAMAHA KEMBLE MUSIC (U.K.) LTD.

Precautions

- Connect this unit's power cord only to an AC outlet of the type stated in this Owner's Manual or as marked on the unit. Failure to do so is a fire and electrical shock hazard.
- Do not allow water to enter this unit or allow the unit to become wet. Fire or electrical shock may result.
- Do not place heavy objects, including this unit, on top of the power cord. A damaged power cord is a fire and electrical shock hazard. In particular, be careful not to place heavy objects on a power cord covered by a carpet.
- Do not scratch, bend, twist, pull, or heat the power cord. A damaged power cord is a fire and electrical shock hazard.
- Do not remove the unit's cover. You could receive an electrical shock. If you think internal inspection, maintenance, or repair is necessary, contact your dealer.
- Do not modify the unit. Doing so is a fire and electrical shock hazard.
- If the power cord is damaged (i.e., cut or a bare wire is exposed), ask your dealer for a replacement. Using the unit with a damaged power cord is a fire and electrical shock hazard.
- If you notice any abnormality, such as smoke, odor, or noise, or if a foreign object or liquid gets inside the unit, turn it off immediately. Remove the power cord from the AC outlet. Consult your dealer for repair. Using the unit in this condition is a fire and electrical shock hazard.
- Should this unit be dropped or the cabinet be damaged, turn the power switch off, remove the power plug from the AC outlet, and contact your dealer. If you continue using the unit without heeding this instruction, fire or electrical shock may result.
- Hold the power cord plug when disconnecting it from an AC outlet. Never pull the cord. A damaged power cord is a potential fire and electrical shock hazard.
- Do not touch the power plug with wet hands. Doing so is a potential electrical shock hazard.
- This unit has ventilation holes at the front, rear and sides to prevent the internal temperature rising too high. Do not block them. Blocked ventilation holes are a fire hazard.
- Allow enough free space around the unit for normal ventilation. This should be: 10 cm at the sides, 30 cm behind, and 20 cm above.
  These distances should also be adopted when rack-mounting the unit. For normal ventilation during use, remove the rear of the rack or open a ventilation hole. If the airflow is not adequate, the unit will heat up inside and may cause a fire.
- To mount several of these units in an EIA-compliant rack, refer to the rack mounting instructions on page 9.
- Use only speaker cables when connecting speakers to amplifier outputs. Using other types of cables is a fire hazard.
- Do not use this amplifier for any purpose other than driving loudspeakers.
- XLR-type connectors are wired as follows:
  pin 1: ground, pin 2: hot (+), and pin 3: cold (–).
- Using a mobile telephone near this unit may induce noise. If noise occurs, use the telephone away from the unit.
- Clean the contacts of the phone plug before connecting it to the SPEAKERS jack of this unit. Dirty contacts may generate heat.

Contents

■ Front Panel



① **POWER switch and indicator**
This is the main POWER switch. Press to power ON the amplifier. Press again to power OFF. The POWER indicator lights up when the amplifier is powered ON.

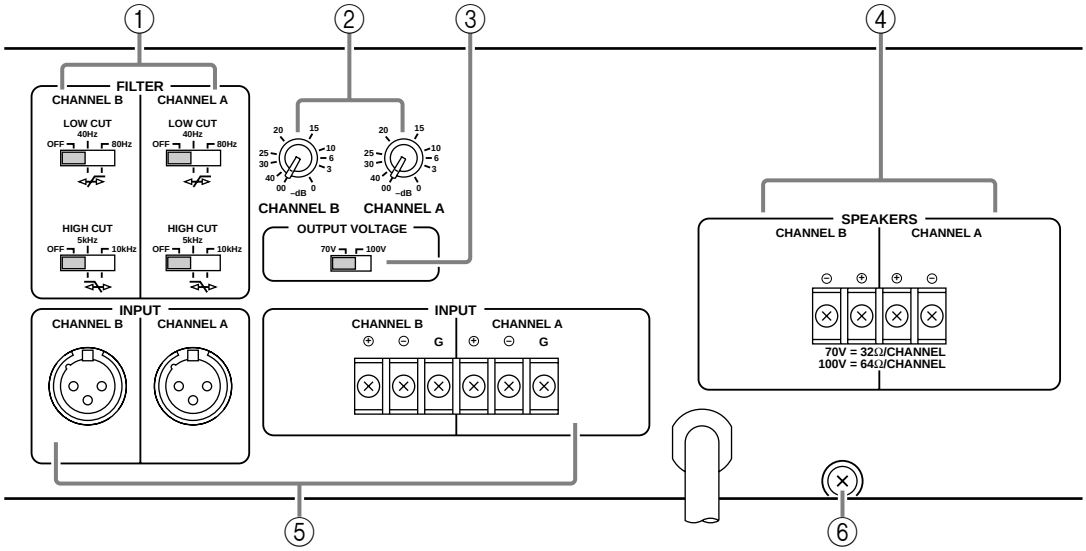
② **SIGNAL indicators**
These green LED indicators light up when the respective channel's output signal exceeds 4 Vrms.

③ **CLIP indicators**
These red LED indicators light up when the respective channel's output signal distortion exceeds 1% (i.e. clipping). Output signal clipping is usually due to excessive input signal levels.

④ **PROTECTION indicators**
These LED indicators light up to indicate that the protection circuit is working. The speaker system is disconnected from the amplifier outputs and no sound is output from the speakers.
The protection circuit is activated in the following situations:

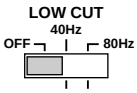
- **When the amplifier is powered on:**
  The protection circuit is activated for approximately 3 seconds when the amplifier is powered on. After 3 seconds, the protection system is deactivated automatically, and the amplifier is ready to use.
- **If a DC voltage is present at the amplifier's outputs:**
  If the DC voltage problem is corrected, normal amplifier operation resumes.
- **If overheating occurs:**
  Turn off the power to the amplifier to cool down the unit and consult the Precautions section of this manual to improve the vent condition, if necessary. Turn the power on to the amplifier after it cools down.

■ Rear Panel



① **FILTER switches (CHANNEL A, B)**
Independent low-cut/high-cut filters are provided for channels A and B. These filters allow you to change cut-off frequencies.

- **LOW CUT switch**



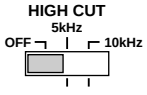
80Hz ..... Cuts the frequency range of 80 Hz by 12 dB/octave.
Normally, use at this position.

40Hz ..... Cuts the frequency range of 40 Hz by 12 dB/octave.
Only use this position if you have verified that the speaker transformer you will use secures an adequate low-frequency characteristic.

OFF ..... Turns the low-cut filter off.
Only use this position if you have verified that the signal input to the power amp has its low frequencies cut.

Note: If low frequency is applied to the power amp, the speakers, speaker transformers, and amp may be damaged by speaker transformer core saturation.

- **HIGH CUT switch**



10kHz .... Cuts the frequency range of 10 kHz by 6 dB/octave.

5kHz ..... Cuts the frequency range of 5 kHz by 6 dB/octave.

OFF ..... Turns the high-cut filter off.

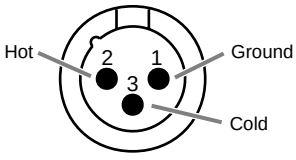
② **Volume controls (CHANNEL A, B)**
These knobs enable you to adjust the output level of Channels A and B in the range between –∞ dB and 0 dB.

③ **OUTPUT VOLTAGE switch**
This switch toggles between 100 V and 70 V voltage line.

④ **SPEAKERS terminals (CHANNEL A, B)**
Barrier strip terminals are available. They are wired as follows:
Hot (⊕), Cold (⊖)
Refer to “Connecting speakers” on page 6 for more information on the impedance of the speaker systems you can connect here.

⑤ **INPUT terminals (CHANNEL A, B)**
Two types of balanced terminals for channels A and B are provided.

- **XLR-3-31 type connector**
They are wired as follows (IEC 60268):
Pin 1–ground
Pin 2–hot (⊕)
Pin 3–cold (⊖)

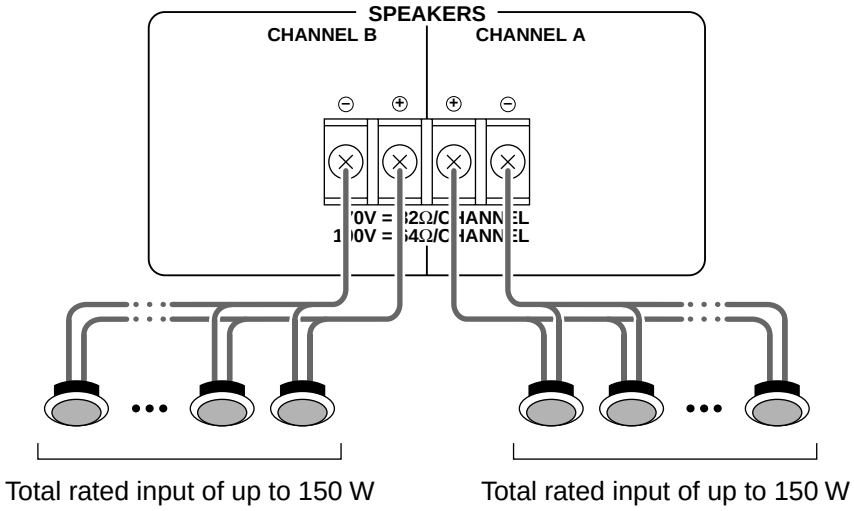


- **Barrier strip**
Hot (⊕), Cold (⊖) and Ground (G).

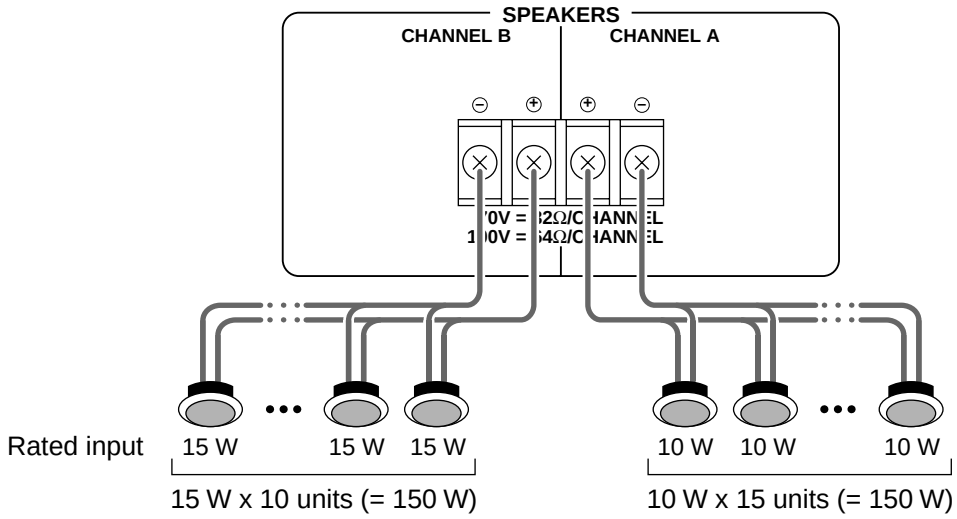
⑥ **GND terminals**
This is the grounding screw terminal. If hum or noise occurs, ground (earth) the unit via this jack, or try connecting it to the chassis of the mixer or preamp, etc.

■ Connecting Speakers

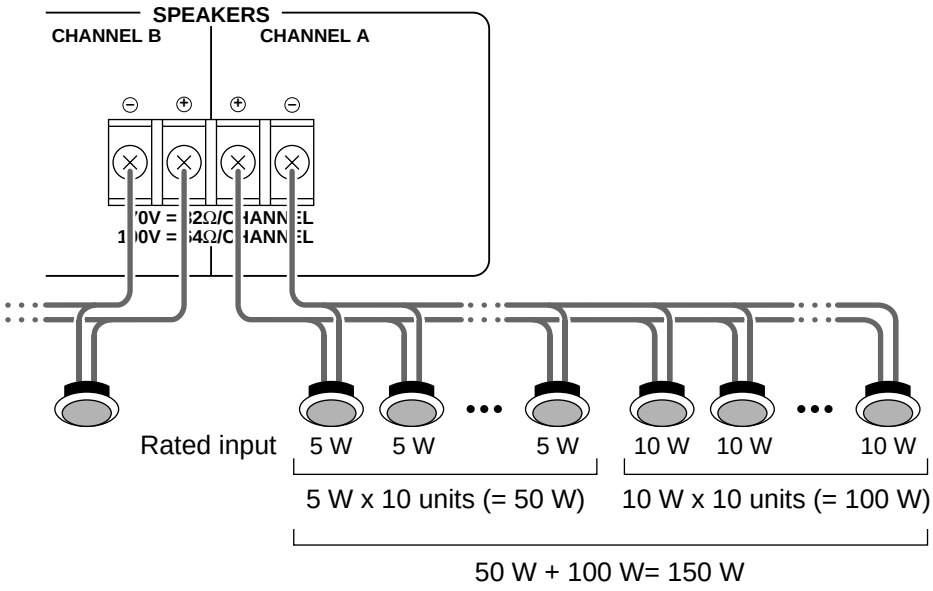
The XH150 series enables you to connect multiple high-impedance speakers in parallel that support 70 V or 100 V line output. The number of speakers that can be connected varies depending on the speakers' rated input. You can connect speakers with a total rated input per channel of up to 150 W.



For example, if you are using speakers with a rated input of 15 W, you can connect up to ten speakers. If you are using speakers with a rated input of 10 W, you can connect up to 15 speakers. You may also connect speakers with a different rated input for each channel, as shown below:



You can also connect multiple speakers with a different rated input to a single channel. For example, you can connect ten speakers with a rated input of 5 W and ten speakers with a rated input of 10 W (total 150 W), as shown below:



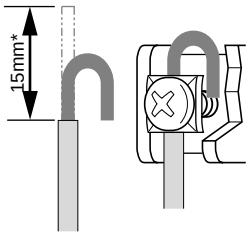
Note: Be sure to use speakers that support the XH150's line-out voltage (70 V or 100 V).

Note: You cannot connect a low-impedance speaker directly to the XH150. In this case, be sure to use a speaker transformer (such as the Yamaha ST15). Follow the instruction guide that came with the speaker transformer to avoid excessive loads.

Caution for Connection

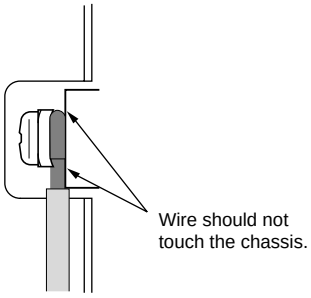
1. Turn off the POWER switch.
2. Remove the cover attachment screws and remove the protective cover from the speaker terminals.

3. After removing approx. 15 mm of insulation from the ends of the speaker cables, bind the bare ends of the speaker wires in the corresponding speaker terminals and tighten the terminals to securely clamp the wires. Refer to page 5 for speaker porality.



* Shown actual size.

At this time make sure that the bare ends of the speaker cables do not extend from the terminals in such a way that they touch the chassis.



4. Reattach the protective cover over the speaker terminals.

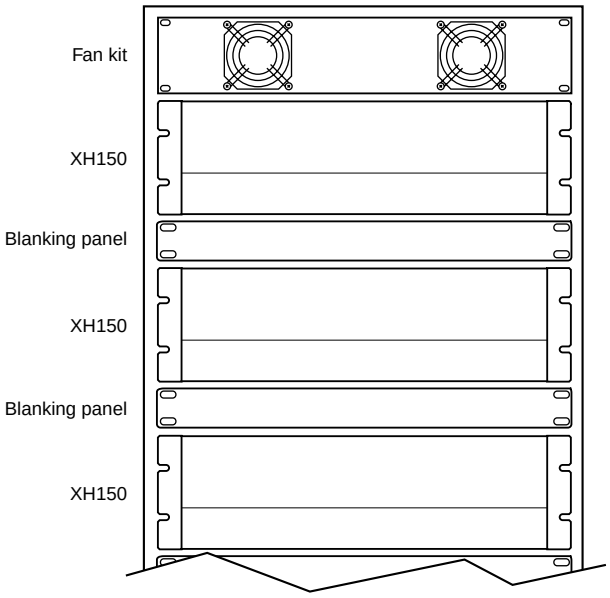
■ Mounting in an EIA standard rack

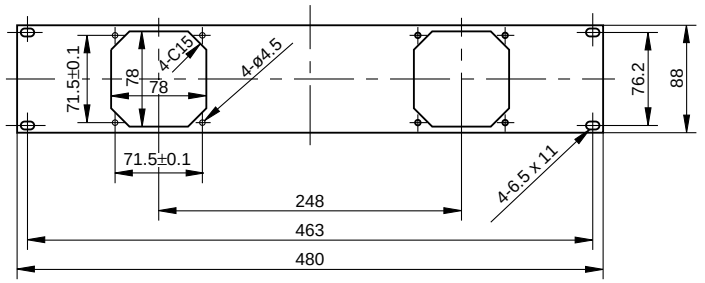
If multiple high-power amp units are mounted in a rack with poor ventilation, the heat from the amps will cause the interior of the amp to become very hot, causing the performance of the amps to be impaired. In particular, when mounting in a rack whose back can not be left open, mount according to the following instructions.

Rack: Leave a gap of 10 cm or more between the rear panel of the rack and the rear panel of the amplifier.
Fan: Use a fan with 1.5 m^3/min or more maximum wind and 5 mmH_2O or more maximum static pressure.
Mounting: Install the fan kit on the top slot or the top panel of the rack and install a blanking panel between two amps.

Example of mounting

The figure on the left below shows an example of a fan kit (panels and two fans) on the top slot of the rack. The fans are Minebia 3115PS-12T-B30 (with 0.9 m^3/min maximum wind and 5 mmH_2O maximum static pressure).
The figure on the right below is a dimensional diagram of a panel on which two 3115PS-12T-B30 are installed.





Unit: mm

Specifications

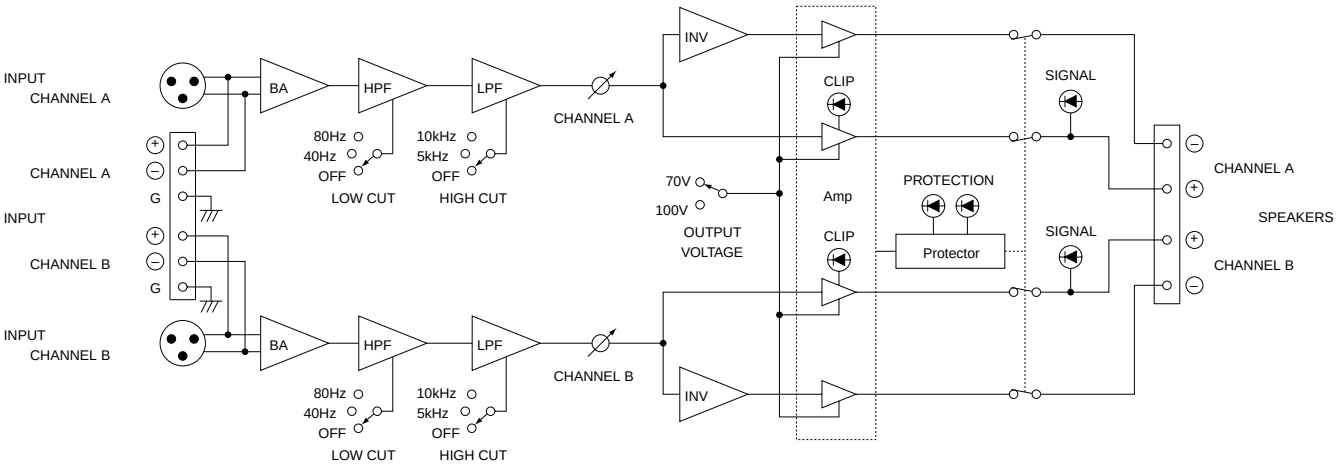
■ General Specifications

Power Output Level (Rated Power) 20 Hz~20 kHz, THD+N= 0.1%		150 W + 150 W R_L= 64Ω/100 V, R_L= 32Ω/70 V
Power Bandwidth	Half Power	10 Hz~40 kHz (THD+N= 0.1%)
Total Harmonic Distortion (THD+N) 20 Hz~20 kHz, Half Power		0.1%
Frequency Response		+0.5, –1 dB f= 20 Hz~50 kHz
Intermodulation distortion (IMD) 60 Hz:7 kHz, 4:1, Half Power		0.1%
Channel Separation	Half Power Vol. max., input 600Ω shunt	≥65 dB, 20 Hz~20 kHz
Residual Noise Vol. min.	12.7 kHz LPF	≤ –65 dB
SN Ratio		100 dB
Slew Rate		±35 V/μs
Sensitivity (Vol. max.) Rated Power		+4 dBu/100 V, +1 dBu/70 V
Voltage Gain (Vol. max.)		38.2 dB
Input Impedance		30 kΩ/Balanced, 15 kΩ/Unbalanced
Controls	Front Panel Rear Panel	POWER switch (ON/OFF) Volume (31 position)x 2 Mode switch (100 V/70 V) Filter switch LOW CUTx 2 (–12 dB/oct.) HIGH CUTx 2 (–6 dB/oct.)
Connectors	Input Output	Barrier strip terminal XLR-3-31 type Barrier strip terminal
Indicators	POWER PROTECTION CLIP SIGNAL	Green x 2 (Red) x 2 (Red) x 2 (Green)
Protection Circuits		POWER switch ON muting, DC detection, Temp. detection (heatsink temp. ≥ 90°C)
Fan Speed		Low/~50°C, Variable/50~70°C, High/70°C~
PC limiter		R_L ≤ 16Ω
Power Requirements	US & Canada Europe Other	120 V, 60 Hz 230 V, 50 Hz 240 V, 50 Hz
Power Consumption Idling 1/8 output power, 32Ω Maximum output, 32Ω		350 W/450 VA 45 W 350 W 850 W
Dimensions (W x H x D)		480 x 132 x 319 mm
Weight		16 kg

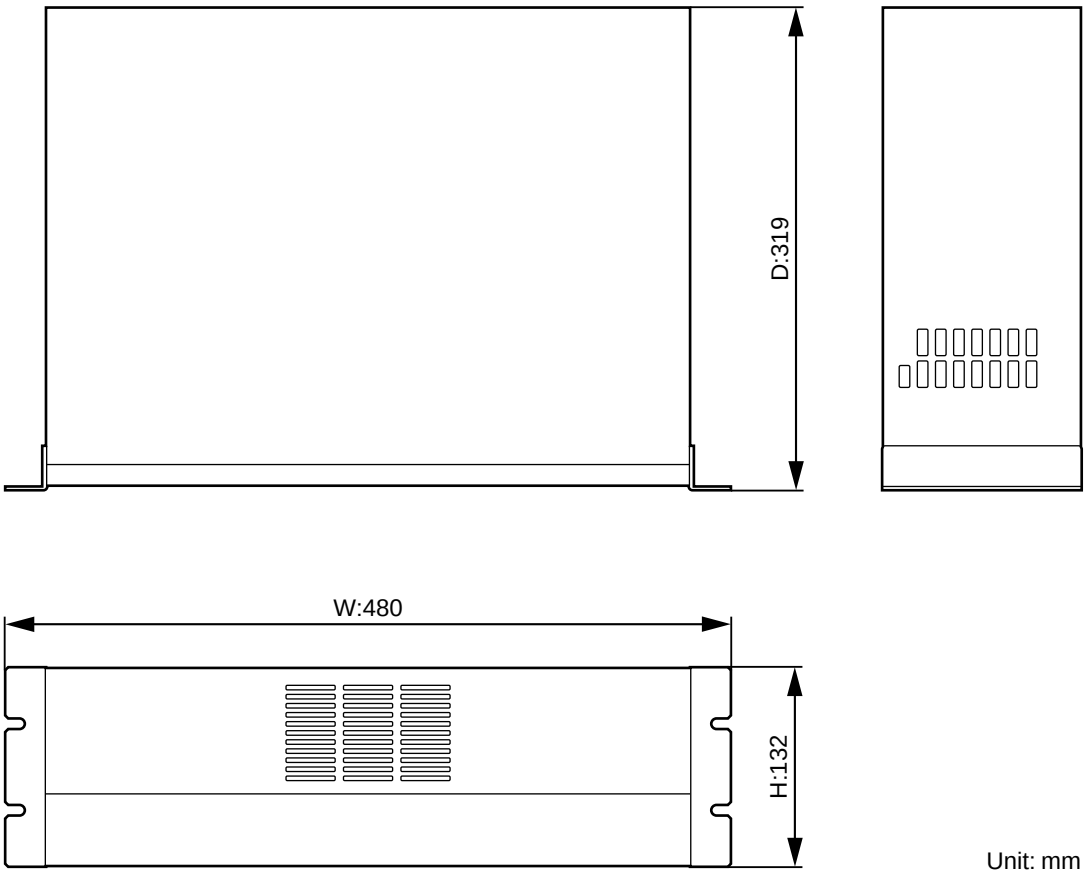
0 dB=0.775 Vrms, Half Power=1/2 Power Output Level (Rated Power)
Specifications subject to change without notice.

For European Model
Purchaser/User Information specified in EN55103-1 and EN55103-2.
Inrush Current: 20A
Conformed Environment: E1, E2, E3 and E4

■ Block Diagram



■ Dimensions



Unit: mm

Troubleshooting

The following table lists the main causes of abnormal operation and the corrective measures required, as well as the protective circuit operation in each case.

Indicator	Probable Cause	Remedy	Protection Circuit
CLIP indicator lights.	There is a short at a speaker terminal, amplifier terminal, or wire.	Locate and correst the cause of the short.	The PC limiter circuit operates to protect the power transistors.
	The amplifier load is excessive.	Set the speaker impedance to 32Ω or higher with the OUTPUT VOLTAGE switch set to 70 V, or to 64Ω or higher with the OUTPUT VOLTAGE switch set to 100 V.	
PROTECTION indicator lights.	The heat sink temperature has exceeded 90°C.	Check the amplifier ventilation conditions and take appropriate measures to improve airflow around the amplifier.	The thermal protection circuit operates to protect the power transistors.
	A DC voltage of ±2 V or greater was generated in the power amplifier's output circuit.	Consult your dealer or nearest Yamaha service center.	The relay operates to protect the speaker system.

V294640 R2 1 IP 16

NP Printed in Taiwan

YAMAHA CORPORATION
Pro Audio Division, #18/3
P.O. Box 3, Hamamatsu, 430-8651, Japan