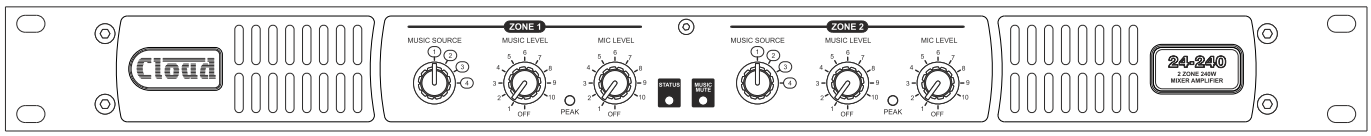
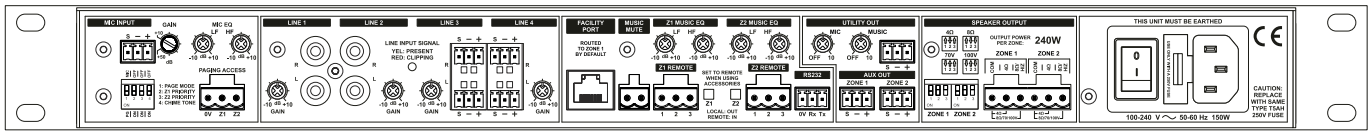
# CLOUD 24 Series Two Zone Mixer-Amplifiers

Clearly better sound

## Models: 24-120 and 24-240




Front panel view (24-240 illustrated; 24-120 is functionally identical)




Rear panel view (24-240 illustrated; 24-120 is functionally identical)

## General Description

The Cloud 24 Series is a two zone mixer-amplifier intended to provide a complete audio solution for Houses of Worship, retail outlets, hotels, licensed premises and other spaces where music, announcements and/or flexible paging are required. Catering for up to four music sources, it provides independent source and level control of music in each zone with microphone mixing as required, with full paging facilities. Each zone includes a mono power amplifier and the unit occupies only 1U of rack height.

There are two models in the 24 Series, with different output power ratings:

24-120: 2 x 120 watts
24-240: 2 x 240 watts

Cloud 24 Series mixer-amplifiers have four stereo line inputs for music sources, two unbalanced and two balanced, plus a balanced microphone input. The microphone input has its own rear panel sensitivity and EQ controls; the front panel has a mic gain control for each zone. Each line input has a rear panel sensitivity control; the required music source and music level in each zone being adjusted by front panel rotary controls. In each zone, the selected music source is mixed with the mic signal before being fed to the power amplifier stage. The front panel also provides a PEAK LED for each zone to warn of excessive signal level; further LEDs indicate power status and Music Mute activity (see below). The power status LED is bi-colour and also indicates various fault states.

The 24 Series is compatible with the Cloud PM1 single-zone paging microphone, and may also be used for two of the zones supported by the Cloud PM4/8/12/16/4-SA/8-SA multizone paging microphones. Alternatively, the mic input may be configured to suit most OEM paging systems; paging is activated by a per-zone short-to-ground access connection. An internally-generated pre-announcement chime may also be enabled at installation. The mic input may be selected to have automatic priority over the selected music source, and additionally Line Input 4 may be set to have priority over any other input selected, to facilitate connection of a digital sound store or similar device.

The power output stages are entirely independent for each zone. They are transformerless, and are capable of driving 70/100 V-line loudspeaker distribution systems directly. Rear panel DIP switches allow the output voltage and impedance for each zone to be selected, permitting the amplifier to be used to either drive low-impedance (4 or 8 ohm) loudspeakers or 70/100 V-line systems. **Additionally, Model 24-120 utilises the "power sharing" concept introduced in Cloud's CV Series amplifiers: in high–impedance mode (70/100 V-line operation) the maximum power output of 240 W (2 x 120 W nominal) may be shared unequally between the two zone outputs, allowing the amplifier's power capability to be shared between zones of significantly different sizes more efficiently**.

In addition to the main Zone outputs, 24 Series mixer-amplifiers also have a balanced Utility output, which carries its own mix of mic and music signals, set with rear panel controls. This is ideal for driving a hearing loop amplifier. The music source at this output can be configured (by internal jumper) to follow that currently selected for Zone 1, or to be Line Input 1 at all times. There are two further Auxiliary outputs, taken from the input to the power stages of Zones 1 and 2: these are balanced at line level (0 dBu) and may be used to connect additional, external power amplifiers or for any other purpose.

A particularly useful feature of the 24 Series is the Facility Port; this allows a remote input module from the Cloud LM-2 Series (for wired sources) or BT-1 Series (for Bluetooth wireless sources) to be connected via easy-to-install screened Cat 5 cable. Microphones, and/or line sources such as radio mics, DJ mixers, MP3 players, laptops or other audio sources - including Bluetooth-equipped laptops, tablets and smartphones - can then be connected at remote locations, simplifying the use of the area for presentations where portable audio sources are in use. By default, the Facility Port routes audio only to Zone 1, but an alternative routing option of 'both zones' is available by moving an internal jumper. The Facility Port is equipped with a fixed threshold noise gate to eliminate background noise in the absence of an input signal. Note that LM-2 modules also provide remote control of music level and music source selection.

## General Description *(continued)*

The mixer-amplifiers are compatible with standard Cloud RL-1 and RSL-4 (or RSL-6) Series remote control plates: the RL-1 provides control of music level in each zone; the RSL-4 provides both music level and source selection in each zone. More extensive remote controls options are available via the RS-232 serial port, allowing the mixer-amplifiers to be integrated with third-party AV control systems. The serial protocol offers both global functions such as global mic muting, Music Mute and unit power down, and per-zone functions such as mic muting, music level, and music source selection.

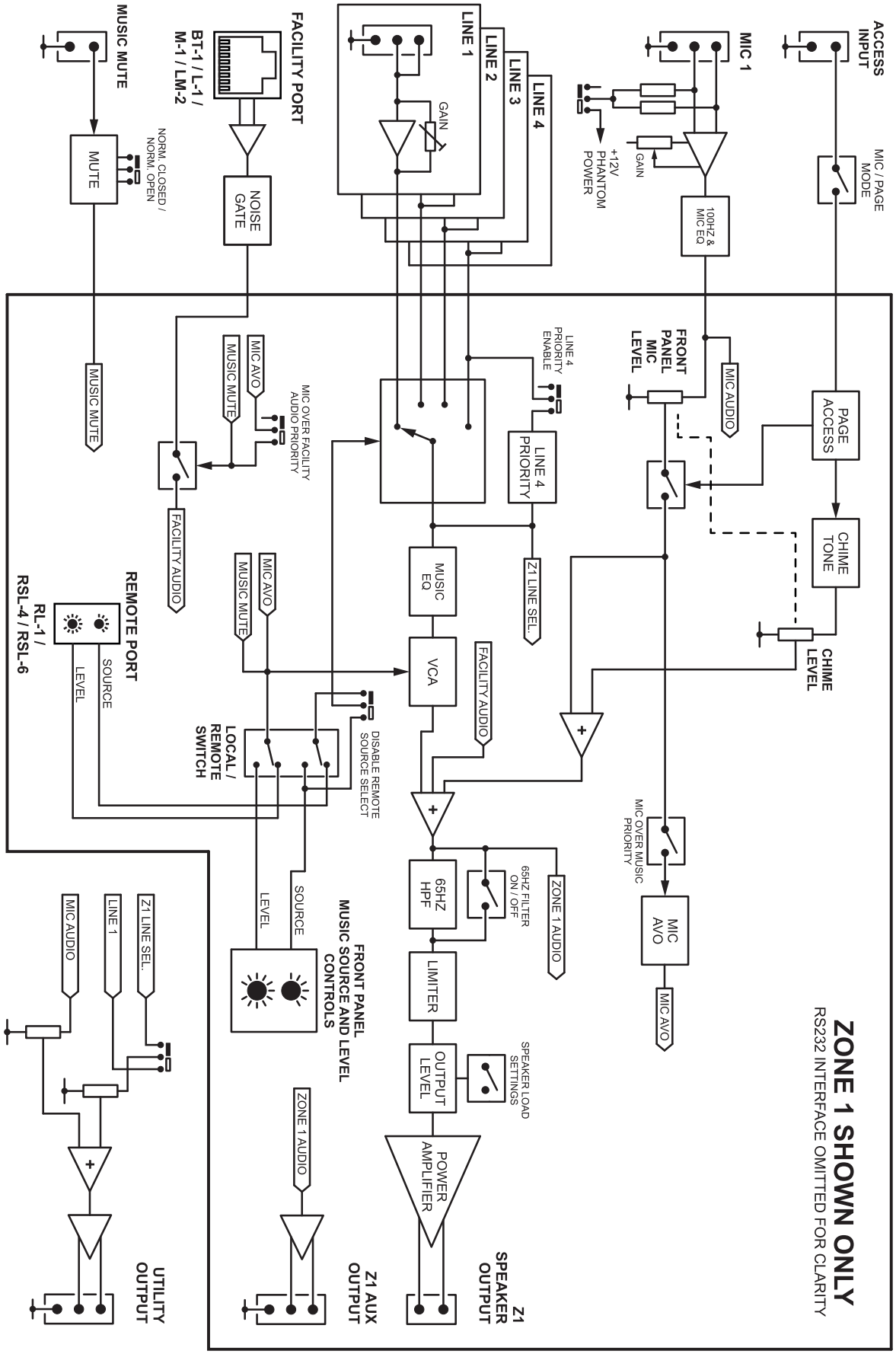
In common with most Cloud products, a Music Mute Input is provided, which may permit compliance with local Fire Authority regulations; the microphone inputs remain active when the Music Mute is applied.

Cloud 24 Series mixer-amplifiers are very energy-efficient and draw very little power in a quiescent state. A user-selectable automatic power-down function puts the mixer-amplifier into an ultra-low-current standby mode after a preset period with no signal. The bicolour front panel STATUS LED indicates this mode.

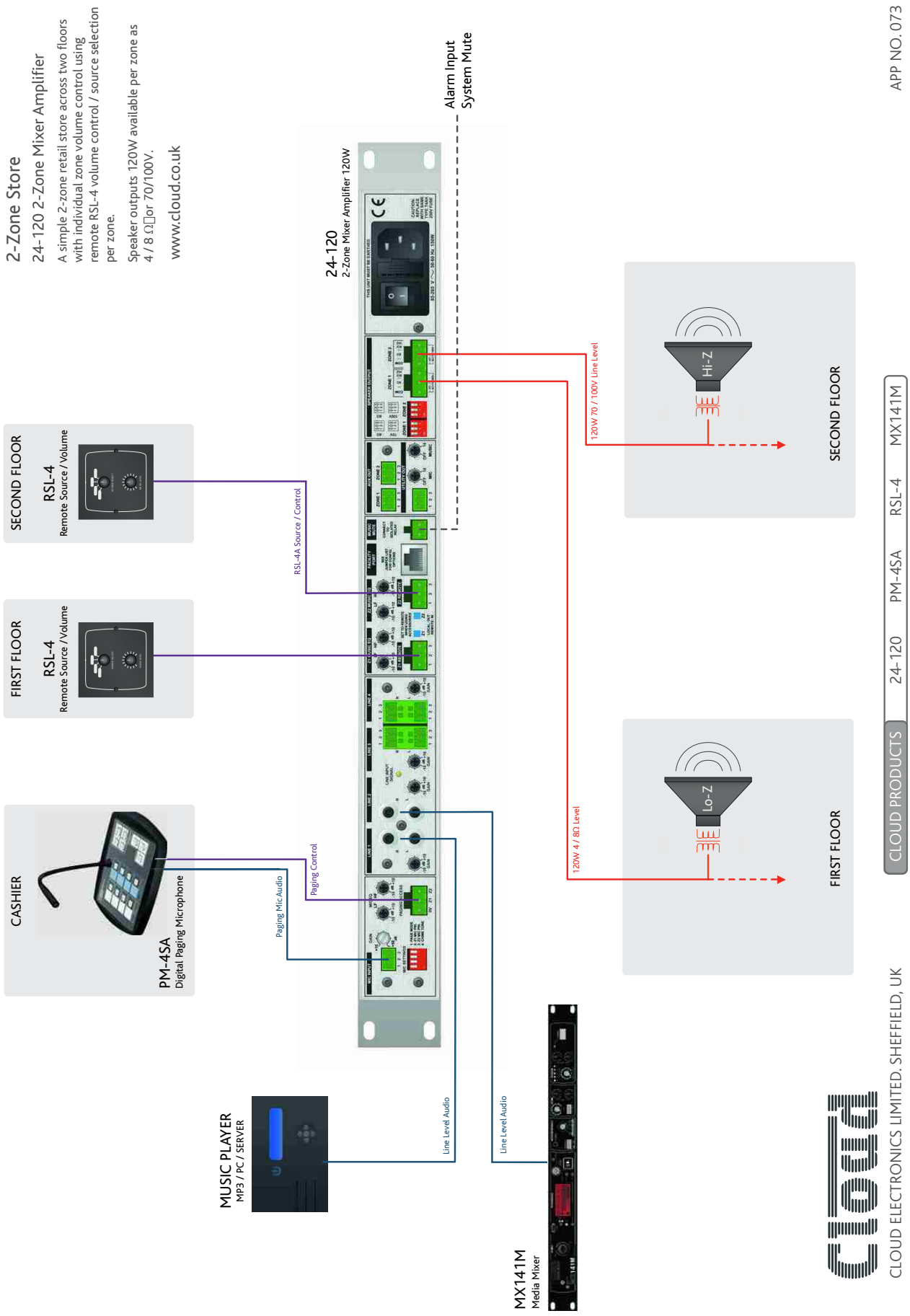
## Key features

- Provides amplification for two zones, with simple per-zone control of music, mic sources and paging in a single unit
- Available in two versions, with output power ratings of 120 or 240 W
- Transformerless output stages: can be configured to drive either 70/100 V-line systems directly, or low impedance loudspeakers (4/8 ohms)
- Model 24-120 permits power sharing in Hi-Z mode: maximum available power of 240 W may be shared as required between the two channels
- Front panel controls for music source, music level and mic level in each zone
- Two unbalanced and two balanced stereo line inputs, with individual gain trim controls
- Balanced mic input; 12 V phantom power available
- Fixed 100 Hz hi-pass mic channel filter
- Separate microphone limiter circuit to prevent power stage limiter from ducking music signal in the presence of high mic levels
- Separate HF/LF EQ adjustments (rear panel) for mic signals and music source
- Paging control of Mic input via short-to-ground access connection for each zone
- Selectable VOX mic-over-music priority
- Selectable LINE 4 priority
- Selectable pre-announcement chime
- Music Mute control input (N/O and N/C) for interface to an emergency system
- Facility port for connection of LM-2, L-1 or M-1 remote input modules via screened Cat 5 cable; LM-2 also allows remote control of music level and line input selection
- Facility Port supports BT-1 Bluetooth input module
- Compatible with standard Cloud remote control plates: RL-1 Series (music level) and RSL-4/RSL-6 Series (music level and source selection)
- RS-232 serial control port; protocol includes global and pre-zone functions
- Power amplifier protection circuitry
- Power amplifier input limiters
- Switchable 65 Hz high-pass filter (per-zone): reduces transformer saturation in 70/100 V-line systems
- Balanced Utility output with separate rear panel controls for music/mic mix: music source can follow Zone 1 selection or be permanently LINE 1
- Per-zone auxiliary output from pre-amp (balanced, line level)
- Automatic power-down function (user-selectable)
- Thermostatically-controlled forced-air cooling
- 1U 19” rack mounting unit

# Block Diagram



# Application Example



# Technical Specifications

| | | | | |
|---|---|---|---|---|
| **Line Inputs** | | | | |
| Frequency Response | 20 Hz to 20 kHz, ±1 dB | | | |
| Sensitivity | 195 mV (-12 dBu) to 2.0 V (+8 dBu) | | | |
| Input impedance | >10 kohm (balanced/unbalanced) | | | |
| Headroom | 12 dB | | | |
| Noise | <-90 dB (22 kHz bandwidth) | | | |
| Equalisation | HF: ±10 dB @ 10 kHz; LF: ±10 dB @ 50 Hz | | | |
| **Microphone Input** | | | | |
| Frequency Response | -3 dB @100 Hz (fixed filter) to 20 kHz, ±1 dB | | | |
| Sensitivity | 2.45 mV (-50 dBu) to 245 mV (-10 dBu) | | | |
| Input Impedance | 3.3 kohms (balanced) | | | |
| Phantom Power | 12 V, selectable by jumper | | | |
| Headroom | 16 dB | | | |
| Noise (EIN) | <-126 dBu | | | |
| Equalisation | HF: ±10 dB @ 5 kHz LF: ±10 dB @ 100 Hz | | | |
| **Facility Input** | | | | |
| Frequency Response | 20 Hz to 20 kHz, ±1 dB | | | |
| Sensitivity | 0.775 V (0 dBu) | | | |
| Input impedance | 10 kohms (balanced) | | | |
| Headroom | 18 dB | | | |
| Noise Gate | -60 dB | | | |
| **Main Outputs** | | | | |
| Output Power (1 kHz continuous sine wave) | 24-120 | 120 watts per zone nominal; 240 W total available in Power Sharing mode | | |
| | 24-240 | 240 watts per zone maximum | | |
| Minimum load | Low-Z output | 4 or 8 ohms | | |
| | High-Z output | 70 V-line | 24-120 | 41 ohms |
| | | | 24-240 | 20.5 ohms |
| | | 100 V-line | 24-120 | 66 ohms |
| | | | 24-240 | 33 ohms |
| Frequency response | Low-Z output | 20 Hz to 20 kHz, ±1 dB | | |
| | High-Z output | 20 Hz to 20 kHz, ±1 dB (65 Hz filter off) | | |
| THD + N | < 0.05% @ 1 kHz | | | |
| Protection | Fixed level signal limiter: DC, over-current and over-temperature protection | | | |
| **Utility and Auxiliary Outputs** | | | | |
| Nominal output level | 0 dBu (0.775 Vrms), balanced | | | |
| Noise | <-90 dB, 22 kHz bandwidth | | | |
| **General** | | | | |
| Power Input | Universal type, 85 to 265 VAC, 45 to 65 Hz | | | |
| Fuse details | 24-120 | 5 x 20 mm, time delay, T4A | | |
| | 24-240 | 5 x 20 mm, time delay, T5A | | |
| Normal operating temperature | 0 °C to 35 °C (Note: performance and specifications cannot be guaranteed outside of this range) | | | |
| Cooling | Forced air cooling (front to side) | | | |

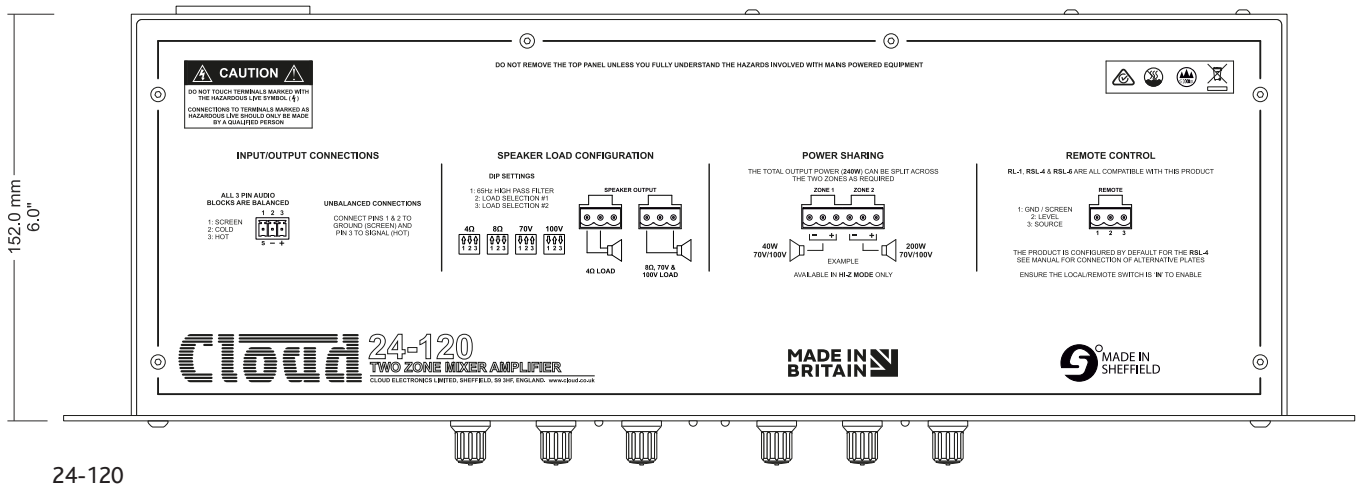
## Technical Specifications (continued)

| | | | |
|---|---|---|---|
| Power consumption | Standby[1] | 24-120 | 5.74 W (15.48 VA) |
| | | 24-240 | 5.88 W (24.92 VA) |
| | Idle[2] | 24-120 | 17.12 W (28.49 VA) |
| | | 24-240 | 18.74 W (36.11 VA) |
| | 1/8th Power[3] | 24-120 | 56.46 W (65.88 VA) |
| | | 24-240 | 90.79 W (108.99 VA) |
| | 1/3rd Power[4] | 24-120 | 106.17 W (114.90 VA) |
| | | 24-240 | 183.96 W (207.16 VA) |
| Heat Loss | Standby[1] | 24-120 | 20.67 kJ/hr (19.6 BTU/hr) |
| | | 24-240 | 21.17 kJ/hr (20.07 BTU/hr) |
| | Idle[2] | 24-120 | 61.63 kJ/hr (58.45 BTU/hr) |
| | | 24-240 | 67.46 kJ/hr (63.98 BTU/hr) |
| | 1/8th Power[3] | 24-120 | 102.71 kJ/hr (97.40 BTU/hr) |
| | | 24-240 | 124.17 kJ/hr (117.75 BTU/hr) |
| | 1/3rd Power[4] | 24-120 | 136.95 kJ/hr (129.88 BTU/hr) |
| | | 24-240 | 179.81 kJ/hr (170.52 BTU/hr) |
| Dimensions (w x h x d) | Net | 24-120 | 482.6 mm x 44 mm (1U) x 152 mm<br>19" x 1.75" (1U) x 6.0"<br>(less connectors & knobs) |
| | | 24-240 | 482.6 mm x 44 mm (1U) x 230 mm<br>19" x 1.75" (1U) x 9.06"<br>(less connectors & knobs) |
| | Shipping (Gross) | 545 mm x 160 mm x 330 mm (21.5" x 6.3" x 13.0") | |
| Weight | Net | 24-120 | 2.35 kg (5.26 lb) |
| | | 24-240 | 3.05 kg (6.83 lb) |
| | Shipping | 24-120 | 3.4 kg (7.62 lb) |
| | | 24-240 | 4.1 kg (9.2 lb) |

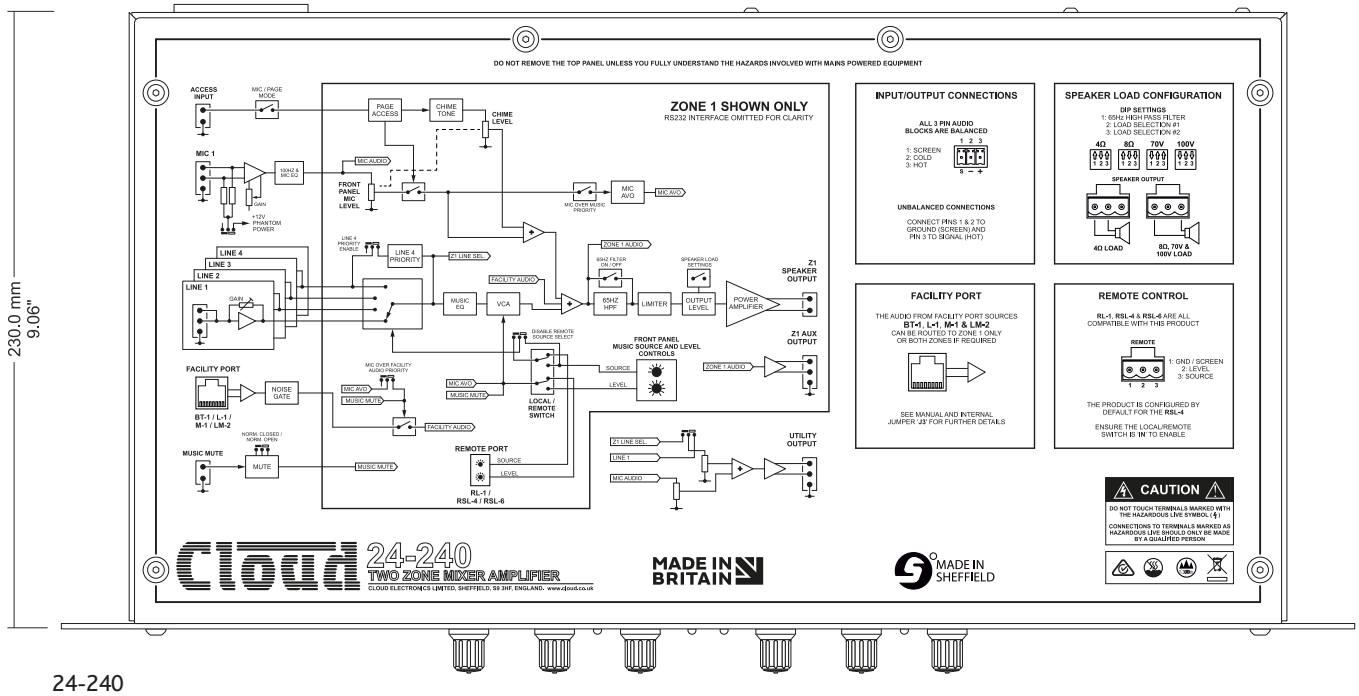
Notes re Power Consumption and Heat Loss measurements:
All measurements at 230 VAC 50 Hz power input

1. Standby: amplifier in standby state (**STATUS** LED steady red)
2. Idle: amplifier not in standby state (**STATUS** LED steady green), but no audio output
3. 1/8th. Power: constant sound level at one-eighth rated power output (audio mainly clean, only occasional clipping)
4. 1/3rd. Power: constant sound level at one-third rated power output (audio beginning to become compressed, limited or heavily clipped)

# Dimensions: 24 Series

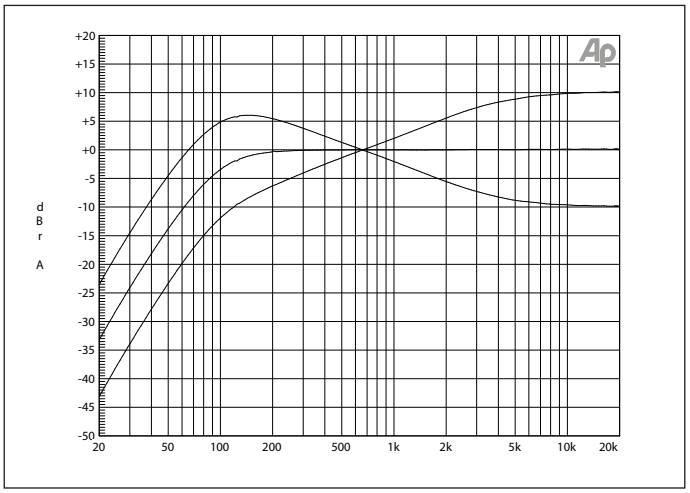



24-120

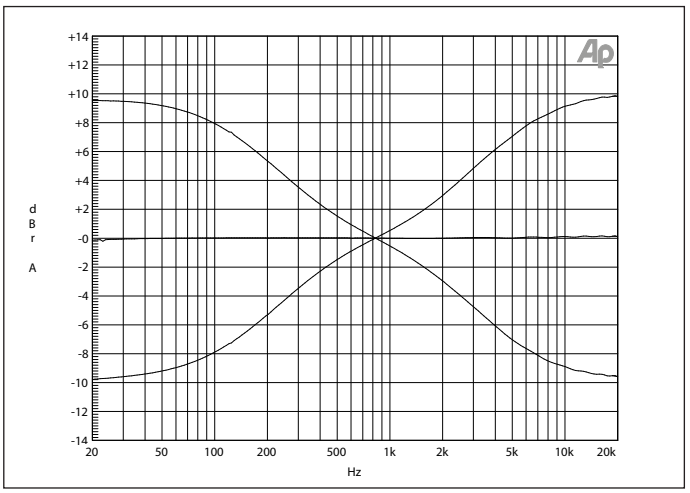



24-240

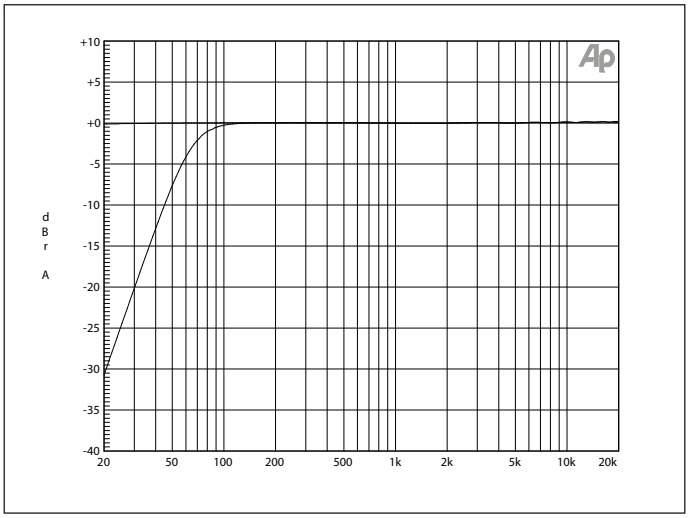
# Performance Graphs (applicable both models)



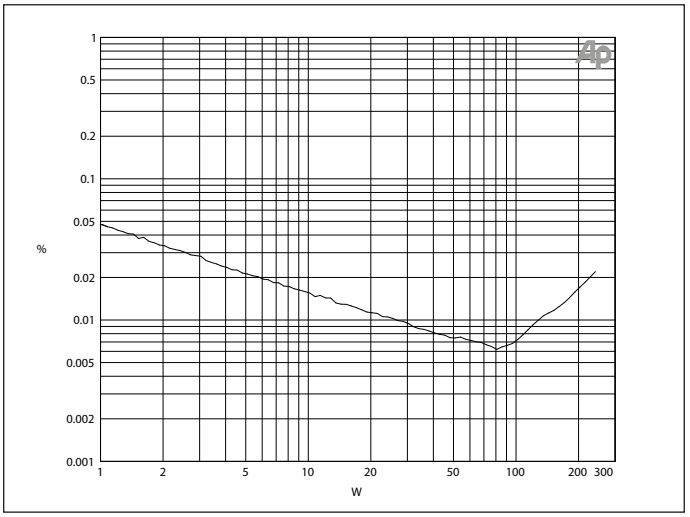

Frequency response of the Mic input,
including the maximum EQ adjustment available




Frequency response of the Line inputs,
including the maximum EQ adjustment available




Frequency response of the 65 Hz high pass filter
(available to speaker outputs only)




THD+N vs Output Power.
Bandwidth limited to 10 Hz - 22 kHz

# Architect's and Engineer's Specification

The two-zone, mono mixer-amplifier shall be equipped with two balanced stereo music inputs, two unbalanced stereo music inputs and a balanced microphone input; all balanced inputs shall be via removable screw-terminal connectors and unbalanced inputs via phono sockets (RCA jacks). The music input to be used in each zone shall be selectable by a four-position front panel rotary switch. The music inputs shall be suitable for signals in the range -12 dBu to +8 dBu. The mic input shall be summed with a mono (L+R) sum of the selected music input. The mic input shall have its own front panel level controls and it shall be possible to control the level of the music source independently of the mic level in each zone. Each music input and each mic input shall also have a rear panel gain control. Two-band equalisation adjustment shall be provided independently for the mic input and the selected music source; it shall be possible to adjust the music signal equalisation independently in each zone.

A control input shall be provided to activate the mic input by external contact closure and route it to either or both zones; it shall be possible to configure the mixer-amplifier such that this function is overridden so that the mic input is always active. It shall be possible to configure the mixer-amplifier to perform the following additional functions: i) detection of a signal on the mic input will automatically reduce the music level by 25 dB, ii) one line input will automatically override all others, even if unselected.

Optional remote control panels shall be available to permit control of music level only or music level and input selection in either or both zones; it shall be possible to retrofit these to the mixer-amplifier at any time. An external control input shall be provided to allow muting of the music source by a fire alarm or other external emergency system. The mixer-amplifier will include a chime generator circuit triggered by applying an external short circuit to a rear panel connector; it shall be possible to disable/enable this function without removing the unit's lid. The chime volume shall also be adjustable; this adjustment may be made internally.

The mixer-amplifier shall be equipped with a control port able to transmit and receive serial data conforming to standard RS-232 protocols. The set of received commands shall include music level control, music source selection and muting of the microphone input in each zone; further commands shall activate/de-activate the emergency music mute control input, place the mixing amplifier into its quiescent mode and mute the microphone input in all zones simultaneously. This command set shall be regarded as a minimum requirement.

The microphone mixer stage shall include a high-pass filter to remove background LF noise below 100 Hz (-3 dB). A second high-pass filter shall be included to remove LF content below 65 Hz (-3 dB) from the mixed music and mic signals to minimise transformer saturation in 70/100 V-line systems; this filter shall be by-passable without removal of the unit's lid. Two separate internal fixed limiter circuits shall be fitted; these shall be located at i) the output of the microphone mixer stage and ii) at the input of the power amplifier stage. Operation of either limiter shall be indicated by a front panel LED. The mixer-amplifier shall incorporate protection circuitry that operates i) in the event of DC being detected at the amplifier output, ii) if excessive current is taken by the output load, or iii) if the temperature of either the power amplifier stage or power supply unit (PSU) exceeds 85°C (185°F).

The mixer-amplifier shall be available in two models, with output powers of 120 W or 240 W per zone. Each zone output shall be capable of driving either low impedance loads of four ohms or greater, or 70 V-line or 100 V-line systems: the output stage design shall be transformerless. It shall be possible to optimise the output stage in low-impedance mode for operation with four or eight ohm loads. It shall be possible to select any of the output options without removal of the unit's lid. There shall be a single output connector for each zone. The 120 W version shall employ a power sharing principle when configured to drive 70 V-line or 100 V-line systems, such that the total amplifier power of 240 W may be intelligently shared between the two zones to permit the connection of a different load in each zone.

The mixer-amplifier shall provide a balanced line level output taken from the output of the power amplifier input limiter stage; the signal at this output shall be a mix of music and mic and it shall be possible to configure the music component of the signal to be i) the music source selected on the front panel or via an external remote control, or ii) permanently set to one of the music inputs. The music level and the mic level at this output shall be independently adjustable, the means of adjustment shall be external. There shall be two further balanced line level outputs, which shall carry the same signals that are present at the main speaker outputs for each zone.

The mixer-amplifier shall be provided with a multi-function control port using a connector of the RJ45 type. Optional active input modules shall be available which may be wired to this connector using standard screened Category 5 cable. One version of active module shall enable external mic and/or line level signals to be routed to the zone from a remote location and also to select music source and music volume via this control port. An alternative version of module, which shall also connect using standard Category 5 cable, shall permit stereo audio to be routed to the control port using Bluetooth wireless connectivity. The multi-function control port shall also permit the direct connection of a balanced audio source, and provide DC power for the remote modules. A signal applied to this port shall be routed to Zone 1 by default, but it shall be possible to configure the mixer-amplifier so that the signal is applied to both zones.

The mixer-amplifier design shall incorporate circuitry for protection of the power output stages and connected loudspeakers: the mixer-amplifier shall cease to pass audio and disconnect the loudspeakers in the event of excessive internal temperature or detection of DC or excessive current at the outputs. The mixer-amplifier shall automatically enter a quiescent mode if no input signals are received for either 15 minutes, and in this state the power consumption shall not exceed 6 W; the unit shall return to its normal operating state on the re-application of an input signal in less than 2 seconds. Quiescent mode shall be visually indicated on the front panel.

The mixer-amplifier shall be built in a 1U steel chassis for mounting in a standard 19" rack. Forced-air fan cooling with front-to-rear airflow shall be employed. The amplifier will be fitted with a rear-panel power switch. The front panel shall provide visual indication of amplifier power status, with the following modes displayed: i) amplifier non-operational but power applied; ii) amplifier in normal operational state; iii) amplifier's protection mode triggered by a fault condition.

The mixer-amplifiers shall be the Cloud 24-120 (120 W output per zone) and the Cloud 24-240 (240 W output per zone). The remote control plates shall be the Cloud RL-1 Series (music level only) and the Cloud RSL-4 or RSL-6 Series (music level and source selection). The optional active modules shall be the Cloud LM-2 Series (mic/line input plus music level control and music source selection) and the Cloud BT-1 Series (Bluetooth audio input).