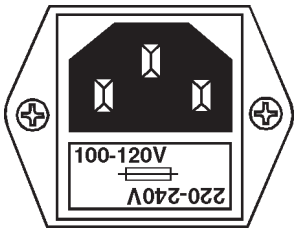
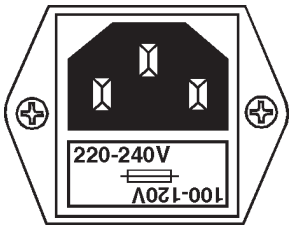
Early ISC Control Unit/Speaker Processor Information Sheet

IMPORTANT* - *PLEASE READ THIS FIRST

Apart from very early units with fixed power cables, these are dual voltage units. It is essential that you check that the voltage on the fuseholder cover below the AC connector on the rear of the chassis is set correctly before connecting it to AC power.



THIS IS SET FOR 100 V AC TO 120 V AC OPERATION



THIS IS SET FOR 220 V AC TO 240 V AC OPERATION

To change, pull fuseholder out and rotate 180º, then push in again. Do not insert power cable into unit until voltage has been correctly set. Do not plug power cable into AC power until voltage has been correctly set

INTERNATIONAL LIMITED WARRANTY DISCLAIMER

All these products are out of warranty. The information contained in these notes is given in good faith to the best of our knowledge, and believed to be accurate, BUT NO GUARANTEE OF ITS ACCURACY IS EITHER EXPRESSED OR IMPLIED. Many units may also have been modified by their owners over the years from their original specifications, and that should be kept in mind when using these products.

You're on your own.

!!! Check carefully at each stage for correctness of wiring and function before powering up !!!

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER OR BACK OF UNIT
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED PERSONNEL

WARNING

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

ATTENTION

RISQUE DE CHOC ÉLÉCTRIQUE - NE PAS OUVRIR

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Introduction

These notes have been compiled for the benefit of owners of older ART/ARX speaker processors. Please pay *close* attention to the section on connecting the I.S.C. leads to the processor. The colour code and channel selection is particularly critical when putting the system together for the first time. *Severe speaker damage* can be caused by incorrect wiring. So please, take it easy and check things as you go.

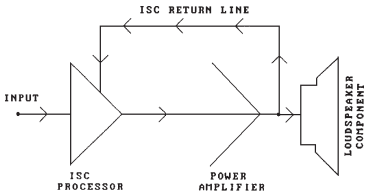
What is I.S.C?

I.S.C stands for ***Interactive System Control***, ARX's innovative Speaker and Electronics Interface.

ISC monitors the output of the power amplifier driving each set of Loudspeaker components and compares this signal with an internal model of the SOA (safe operating area) of the driver. When the signal applied to the driver tries to exceed that SOA, the signal is limited or held at a level which is safe for the driver to reproduce. As the driver signal forms part of a feedback style loop this SOA can never be exceeded.

Why monitor the outputs of the amplifiers?

What interests us is the actual power being applied to loudspeaker components, not the signal being applied to the input of the Power Amplifier. To measure this accurately and allow the user their personal choice in Power Amplifiers we have to access the outputs of the amplifier. This is used as the reference.



ISC SYSTEM PROTECTION

What size amplifier do I need?

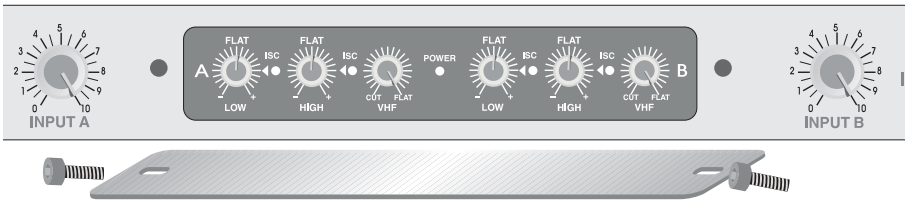
ARX quote a "recommended minimum amplifier size" - we don't quote power handling. The ISC processor determines the amount of power supplied to each speaker, ensuring this remains within the SOA of the driver. By recommending the minimum amplifier size we are indicating that this is the *least* amount of available power required for ISC to operate in the way it was designed by ARX engineers.

For example: If you operated a system from, say, a 100 watt per channel amplifier, and the ISC processor was designed to begin operation at around the 200 watt level you would find the 100 watt amplifier completely squared off into clipping (gross overload distortion) before the ISC processor was aware that any action was required, thus for all intents and purposes cancelling out the system protection.

Where do I put the processor?

The processor is mounted with the Amplifiers in the amp rack. In most applications once the main frequency response balance is set, system equalization is achieved by a Graphic or Parametric Equalizer, so there is no need to constantly access the processor.

Part A - Two Way Systems



TYPICAL FRONT PANEL CONTROLS

Channel A level trim

These controls let you adjust the input level to the unit. During normal operation it is set at the maximum (10) position. Note: this is an attenuator only, not a gain control. Setting this level too low may reduce the headroom in the preceding equipment.All remaining controls are recessed behind an acrylic security cover. Unscrew the knurled nut at each end of the cover and lift off to make adjustments.

Low control

This control determines the Low Frequency output of your system. During normal operation it is set at the 0dB (unity) position (12 o'clock). It also provides up to +6 dB of gain past unity.

Low ISC LED

This LED indicates that the ISC protection circuitry is operating on the Low output. During normal operation this LED will light up on transients or peaks if the system is being used to achieve high SPL. This is normal, and should not be taken as an indication that the system is being overdriven. However, if this LED is on for the majority of the time, then the Low level is too high and should be reduced.

High control and High ISC LED

Same as for Low but applicable to High

VHF level trim control

This control determines the Very High Frequency energy output of your system. It provides control from -12 dB (Hard LEFT) through to 0 dB/unity (Hard RIGHT). It should be set in the 0 dB position for a flat response, but for a more musical response you can rotate it anti-clockwise until the desired roll off is achieved.

Connecting the ISC leads

--- Early Models with Red and Black leads

The Red and Black ISC leads, on 4 pin XLR connectors, plug into the corresponding sockets on the rear of the Control Unit. The RED leads connect to the OUTPUTS of the LOW amplifiers, in parallel with the leads going to the LOW speakers. The BLACK leads connect to the Outputs of the HIGH amplifier, in parallel with the leads going to the HIGH speakers.
Pin configuration is Pins 1 and 2 - Red (Low), Pins 3 and 4 Black (High)

- Connect both RED leads to the LOW amp outputs, and both BLACK leads to the HIGH amp outputs. They are not polarity sensitive and don't mind whether they are connected to + or –.
- Make sure you don't get these mixed up as you will end up with the LOW ISC controlling the HIGHs, and vice versa, which can cause major speaker damage to the HIGH drivers.
- Make sure that the Channel A ISC leads are connected to the Channel A amplifiers, and Channel B leads to the Channel B amplifiers, or you will end up with the Channel A ISC controlling Channel B and vice versa, which can give very strange results AND CAN OVERDRIVE THE SYSTEM.
  NOTE: If your amplifier has Black and Red output terminals, don't attach one Black ISC lead to a Black terminal and a Red one to a Red terminal. It won't work and may cause damage.
- Work slowly and carefully, and take the time to get it right. It's a good idea to mark all leads as you go, so you can visually check all connections before powering up.

Also note that inputs and outputs on early processors, in keeping with the accepted standards of the time, were wired Pin 3 + (Hot), Pin 2 – (Cold), and Pin 1 Audio Ground

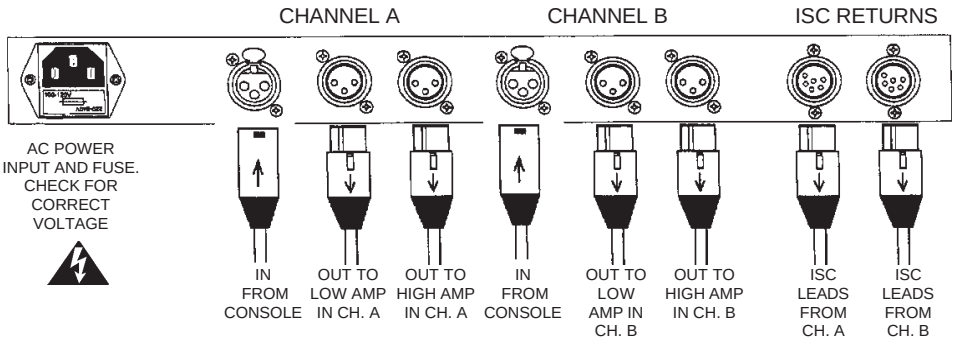
--- Later Models with White and Blue leads

The White and Blue ISC leads, on 6 pin XLR connectors, plug into the corresponding sockets on the rear of the Control Unit. The WHITE leads connect to the OUTPUTS of the LOW amplifiers, in parallel with the leads going to the LOW speakers. The BLUE leads connect to the Outputs of the HIGH amplifier, in parallel with the leads going to the HIGH speakers.
These leads allow the Control Unit/Processor to monitor the output of the amplifiers, and to activate the protection circuits if the power exceeds the maximum safe operating area of the speaker. *These units won't turn on until you make these connections!*

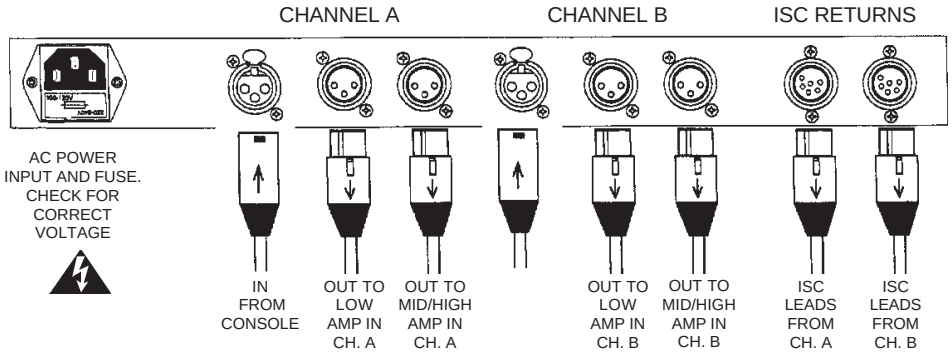
The White and Blue ISC leads, on 6 pin XLR connectors, plug into the corresponding sockets on the rear of the Control Unit. The WHITE leads connect to the OUTPUTS of the LOW amplifiers, in parallel with the leads going to the LOW speakers. The BLUE leads connect to the Outputs of the HIGH amplifier, in parallel with the leads going to the HIGH speakers.
Pin configuration is Pins 1 and 2 - White (Low), Pins 3 and 4 Blue (High), Pins 5 and 6 trigger a relay to activate the Control Unit, and to turn it off if the leads are removed

- Connect both WHITE leads to the LOW amp outputs, and both BLUE leads to the HIGH amp outputs. They are not polarity sensitive and don't mind whether they are connected to + or –.
- Make sure you don't get these mixed up as you will end up with the LOW ISC controlling the HIGHs, and vice versa, which can cause major speaker damage to the HIGH drivers.
- Make sure that the Channel A ISC leads are connected to the Channel A amplifiers, and Channel B leads to the Channel B amplifiers, or you will end up with the Channel A ISC controlling Channel B and vice versa, which can give very strange results AND CAN OVERDRIVE THE SYSTEM.
  NOTE: If your amplifier only has Neutrik Speakon output terminals, you will need to connect the ISC leads to the speaker cables by splicing them into the speaker cable after the connector, or by making up a Y connector, so that one Speakon goes to the ISC leads, and the other goes to the speaker cable.
- Work slowly and carefully, and take the time to get it right. It's a good idea to mark all leads as you go, so you can visually check all connections before powering up.

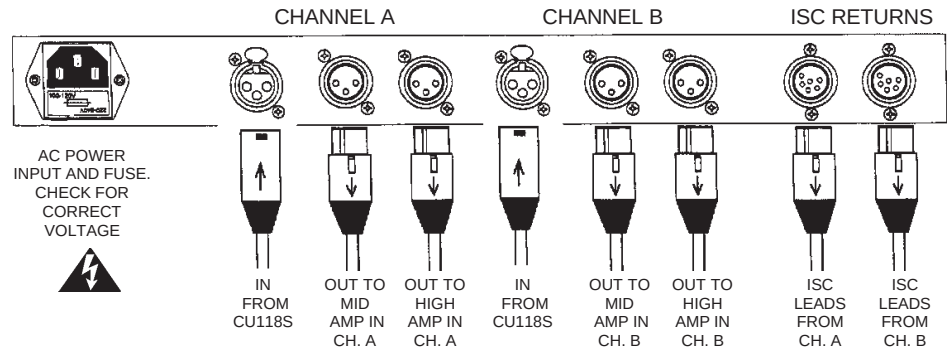
Rear Panel Configurations



CU 215S REAR PANEL



CU 912/922S REAR PANEL



CU 212S REAR PANEL

Part B - Sub Bass Systems

Channel A level trim

This control lets you adjust the input level to the Channel A circuitry. During normal operation it is set at the maximum (10) position. This is an attenuator only, not a gain control. Setting this level too low may reduce the headroom in the preceding equipment.

Normal/Reverse LEDs

These LEDs indicate the status of the Phase Reverse switch. Also, either one lit up indicates that the Control Unit is connected to the AC power.

Phase Reverse switch This switch changes the Low Frequency output phase of the CU 118s by 180º

Normal/Sub switch

In the Normal position, the CU 118s covers Low frequencies from 250 Hz downwards. In the Sub posiion, it covers Low frequencies from 90 Hz downwards. Use Normal position when using it in conjunction with the CU 212s control unit, and Sub position when using it for Low frequency enhancement of other systems.

Level control

This control determines the Low Frequency output of your system. During normal operation it is set at UNITY,the 0 dB nominal operating position (12 o'clock). It also provides up to +6 dB of gain past unity.

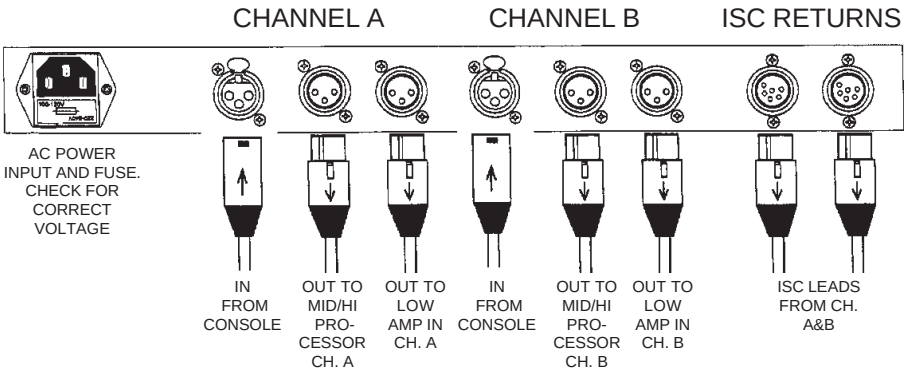
ISC LED

This LED indicates that the Interactive System Control protection circuitry is operating on the Channel A output. During normal operation this LED will light up on transients or peaks if the system is being used to achieve high SPL. However, if this LED is on for the **majority** of the time, then the Low level is too high and should be reduced accordingly.

Connecting the ISC leads

The White and Blue Interactive System Control leads, on 6 pin XLR connectors, plug into the corresponding sockets on the rear of the Control Unit. The WHITE leads connect to the OUTPUTS of the LOWamplifier Channel A, in parallel with the leads going to the speakers. The BLUE leads connect to the Outputs of the LOW amplifier Channel B, in parallel with the leads going to the speakers.

These leads allow the Control unit to monitor the output of the amplifiers, and to activate the speaker protection circuits if the power exceeds the maximum safe operating area of the speaker. The Control Unit won't turn on until you make these connections.



Pin configuration is Pins 1 and 2 - White (Channel A), Pins 3 and 4 Blue (Channel B), Pins 5 and 6 trigger a relay to activate the Control Unit, and to turn it off if the leads are removed

- Connect both WHITE leads to the LOW amp Channel A outputs, and both BLUE leads to the LOW amp Channel B outputs.
- Make sure you don't get these mixed up - make sure that the Channel A ISC leads are connected to the Channel A amplifiers, and Channel B leads to the Channel B amplifiers, or you will end up with the Channel A ISC controlling Channel B and vice versa, which can give very strange results.
- Work slowly and carefully, and take the time to get it right. It's a good idea to mark all leads as you go, so you can visually check all connections before powering up.

NOTE: If your amplifier only has Neutrik Speakon output terminals, you will need to connect the ISC leads to the speaker cables by splicing them into the speaker cable after the connector, or by making up a Y connector, so thet one speakon goes to the ISC leads, and the other goes to the speaker cable.

Special Note for Early units

Early 118 processors used a 4 Pin XLR connector with different colour ISC leads: RED for Channel A, BLACK for Channel B. So in the above instructions, substitute RED for WHITE, and BLACK for BLUE.

Also note that that inputs and outputs on early processors, in keeping with the accepted standards of the time, were wired Pin 3 + (Hot), Pin 2 – (Cold), and Pin 1 Audio Ground

Pin configuration is Pins 1 and 2 - Red (Channel A), Pins 3 and 4 Black (Channel B)

Part C - Passive Systems - CU303s, CU306, PowerPro, MicroPro

These systems use a passive crossover inside the speaker cabinet, and a single pair of ISC leads control each channel. These leads allow the Control unit to monitor the output of the amplifiers, and to activate the speaker protection circuits if the power exceeds the maximum safe operating area of the speaker.

Early Systems - Red and Black ISC leads

Both RED leads connect to the OUTPUT of Amp Channel A, in parallel with the speaker leads.

Both BLACK leads connect to the OUTPUT of Amp Channel B, in parallel with the speaker leads.

Both YELLOW leads connect to the OUTPUT of the SUB Amp, in parallel with the speaker leads.

Very early models had 4 Pin XLR connectors; later models had the ISC leads hard wired to the rear of the Control/Unit/ Processor

Note that early processors, in keeping with the accepted standards of the time, were wired Pin 3 + (Hot), Pin 2 – (Cold), and Pin 1 Audio Ground

Later Systems - White and Blue ISC leads

Both WHITE leads connect to the OUTPUT of Amp Channel A, in parallel with the speaker leads.

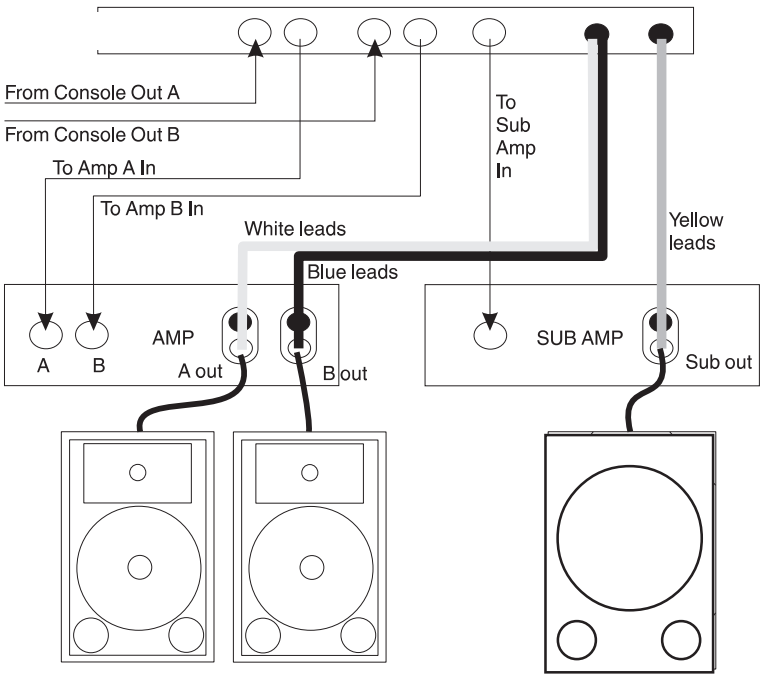
Both BLUE leads connect to the OUTPUT of Amp Channel B, in parallel with the speaker leads.

Both YELLOW leads connect to the OUTPUT of the SUB Amp, in parallel with the speaker leads. The ISC leads are hard wired to the rear of the Control/Unit/Processor

Check this wiring ***very*** carefully. Don't get them mixed up, otherwise you will have the output of Channel A controlling the input level of Channel B and vice versa.

NOTE: If your amplifier only has Neutrik Speakon output terminals, you will need to connect the ISC leads to the speaker cables by splicing them into the speaker cable after the connector, or by making up a Y connector, so that one Speakon goes to the ISC leads, and the other goes to the speaker cable.

System connection diagram



Typical Specifications

CU212s

Input Impedance
Balanced 20 Kohms
Unbalanced 10 Kohms
Input Headroom
+21 dB
CMRR
>50dB, 20 Hz - 20 KHz
Output Impedance
150 ohms
Output Level (Max)
+20 dB
Filter Type
Linkwitz-Riley state variable
24dB per Octave
Frequency Response
20 Hz to 20 KHz.
Note: RFI filter -6dB 100KHz
Signal to Noise Ratio
-90dB Unweighted
-93dB A weighted
Distortion
.004% @ 0dB, 1 KHz
Dynamic Range
111dB
Input Connectors
Female XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Output Connectors
Male XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Power Requirements
220/240 - 100/120 V AC 50/60 Hz, 8 watts (8 VA)
Weight
5 lb/2.2 Kg
Dimensions
19"W x 1¾"H x 6"D
482 x 44 x 155 mm

CU118s

Input Impedance
Balanced 20 Kohms
Unbalanced 10 Kohms
Input Headroom
+21 dB
CMRR
>50dB, 20 Hz - 20 KHz
Output Impedance
150 ohms
Output Level (Max)
+20 dB
Filter Type
Linkwitz-Riley state variable
24dB per Octave
Frequency Response
200 Hz to 20 KHz.
Note: RFI filter -6dB 100KHz
Signal to Noise Ratio
-90dB Unweighted
-93dB A weighted
Distortion
.004% @ 0dB, 1 KHz
Dynamic Range
111dB
Input Connectors
Female XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Output Connectors
Male XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Power Requirements
220/240 - 100/120 V AC 50/60 Hz, 8 watts (8 VA)
Weight
5 lb/2.2 Kg
Dimensions
19"W x 1¾"H x 6"D
482 x 44 x 155 mm

PowerPro

Input Impedance
20 Kohms electronically balanced
Maximum Input Level
+20dB
CMRR
>50 dB, @ 1 KHz
Output Impedance
300 ohms electronically balanced
Maximum Output Level +22dB
Signal to Noise ratio
90 dB, unweighted
Dynamic Range
110 dB
Distortion (THD)
.008% @ +4 dB, 1 KHz
Crossover Frequency
-3dB @100Hz (to SUB out)
HighPass Filters (-3dB point)
35 Hz SUB output
60 Hz A/B outputs
ISC Returns
Differential Inputs,
22 KOhms impedance,
hard wired to chassis
Input Connector type
Balanced 3 pin XLR
Output Connector type
Balanced 3 pin XLR
Power Requirements
100/120 - 220/240 V AC, 50/60 Hz, 8VA (8 watts)
Weight
5 lbs/2.2 Kg
Dimensions
19"W x 1¾"H x 6"D
482 x 44 x 155mm

CU912/9222s Specifications

Input Impedance
Balanced 20 Kohms
Unbalanced 10 Kohms
Input Headroom
+21 dB
CMRR
>50dB, 20 Hz - 20 KHz
Output Impedance 150 ohms
Output Level (Max)
+20 dB
Filter Type
Linkwitz-Riley state variable
24dB per Octave
Frequency Response
20 Hz to 20 KHz.
Note: RFI filter -6dB 100KHz
Signal to Noise Ratio
-90dB Unweighted
-93dB A weighted
Distortion
.004% @ 0dB, 1 KHz
Dynamic Range
111dB
Input Connectors
Female XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Output Connectors
Male XLR; Pin 1 Ground,
Pin 2 + (Hot) Pin 3 - (Cold)
Power Requirements
220/240 - 100/120 V AC 50/60 Hz, 8 watts (8 VA)
Weight
5 lb/2.2 Kg
Dimensions
19"W x 1¾"H x 6"D
482 x 44 x 155 mm

It's worthwhile noting that early processors, in keeping with the accepted standards of the time, were wired Pin 3 + (Hot), Pin 2 – (Cold), and Pin 1 Audio Ground However, older units may have been modified by users to the current Pin 2 + Hot standard as listed here

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