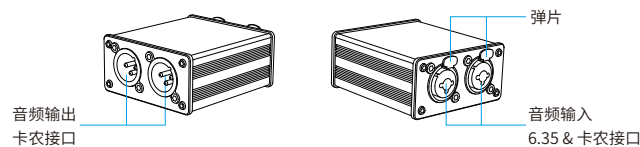


音频隔离保护器 说明书

Audio Isolation Protector

AI230-D

产品外观



产品功能

- 消除音频设备异相线、不同点接地等情况下的不等感应电位产生的电位差。
- 将非平衡信号转换为差分卡农线传输的平衡信号。(前者传输距离<20米,电子干扰严重的场所距离更短;后者传输距离可达到100多米。)
- 电脑接了投影机或者LED显示屏等场景下,消除50Hz交流电流声;演出场景下更换乐器,避免调音台拉低音量,避免切换线路、切换乐器时电流冲击杂音;电视台或其它转播机构输送信号等专业场景下,电气隔离和电路保护。

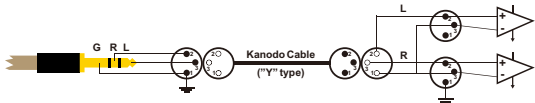
操作说明

- 直接插连音频设备之间,即可使用,无需配置或调节。
- 端口支持大二芯、大三芯、卡农、RCA、3.5mm。

1. 接线方式:Y型线输入连线方式

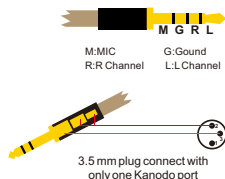
用3.5端子转双6.35端子或卡农公的Y型线直连调音台(如下图)。

此方式可以直连调音台,但不是平衡传输,卡农线传输的为非平衡音频信号,如线路过长,易受干扰,出现噪音;如需远距离传输音频信号,需将信号转为平衡方式的卡农线连接调音台。



2. 接线方式:3.5立体插头转单卡农接口

如果只采用一个卡农头,须左右声道插头端并接,如右图。推荐将音源L线路与R线路并接卡农2脚(推荐同时串接2~4.7K电阻),信号负极接3脚,可减小输入信号,防止调音台输入过大信号削波失真。



3. 接线方式:与调音台连接

本设备兼容了平衡接线方式与非平衡接线方式,输入信号根据使用目的的不同,可由调音台的主输出(MAIN)、编组输出(GROUP)或辅助输出(AUX)送给本机输入接口A IN、B IN。

各种场景说明

1. 典型场景 - 摄像机和调音台之间



- 摄像机和调音台采用外接电源时,电源之间存在压差,需要使用隔离器消除噪音以及保护调音台不被烧坏;
- 可以断开市电电池供电,但如有连接视频控台等设备,必须加音频隔离保护器保护设备安全。

2. 典型场景 - 转播车和调音台之间



- 转播车采用柴油机自发电;调音台采用市电供电,两者可能存在巨大电位压差,会产生电流声或冲击电势击毁设备。为确保安全,需使用音频隔离保护器。

3. 典型场景 - 乐器和调音台之间



- 演出时,有源乐器与调音台的线缆长度如超过10米,极易遇到不可控干扰,需要使用隔离保护器。(无源乐器采用ID盒)
- 隔离保护器在此场景下有两个用途:1.) 将电吉他的非平衡式的高阻抗接口转换为适合接入调音台的平衡式低阻抗接口,阻抗匹配避免了低音信号的损失。非平衡转平衡传输,避免了过长线缆所带来的噪声问题。2.) 保障前后级设备不存在地电位差的电流冲击,预防了电声乐器的插拔信号线的冲击。

4. 典型场景 - LED大屏、电脑和调音台之间



- 大屏幕内部采用开关电源,开关电源有Y电容分别接在火线与地与地,零线与地之间,带有电压,接地电阻不为零,就构成了设备间的地电位压差。由于大屏幕和电脑视频线相连,将出现拔插冲击声或电流声。
- 此场景,如先插调音台后插电脑,极易产生打火冲击,造成电脑烧毁。此时,需使用音频隔离保护器预防电流声形成。

5. 典型场景 - 电脑和调音台远距离链接



- 电脑3.5mm接口采用非平衡传输,容易受到外部电子设备和无线电干扰。(例如:电源线,如果它们靠近非平衡的线缆,则会产生嗡嗡的噪音。老式非LED的舞台灯光也可能增加信号的干扰。)
- 此时,可在电脑侧增加隔离保护器,将非平衡信号转换为平衡信号,保证长距离传输不会受干扰。

6. 典型场景 - 酒店宴会厅场景,灯光控台信号与调音台之间连接



酒店宴会厅,演出舞台场景中,调音需要连接灯光控制台。

而灯光设备对于供电的要求非常复杂,不同灯光设备,需要不同的工作电压。复杂的升压电路极易造成各设备,各电路之间地电位存在巨大差异。此时需要使用隔离器对信号进行隔离,不仅可以消除可能的电流声,而且可以保护调音台不被灯光电路的高电位烧毁。

主要参数

项目	参数
通道数	2
频响范围	20Hz-20KHz,
初次级比例	600:600
传输增益	1:1
频响偏差	-0.006dB(@50Hz); -0.001dB(@1KHz); +1.326dB(@15KHz)
失真度	0.048%(@1.8mV); 0.00144%(@1V); 0.013%(@10V)
损耗衰减	0.00337%(@50Hz); 0.00156%(@1KHz); 0.0005%(@15KHz)
核心器件	屏蔽高精度变压器器件

参考说明

1) 隔离器工作原理

工程中,每个设备采用不同相电源供电,造成其零线电流不同,导致设备外壳安全地的感应电压存在差异。音频扩声系统一般采用音频线进行串接:信号线、零线、地线形成交流50Hz正弦波的物理环境,从而构成交流声产生的条件。所以调音台、功放处理的就是有50Hz交流的低噪信号,输出尖锐杂音。

如果采用“直接切断地线”方式解决电流底噪问题,会破坏设备外壳的安全地功能。万一设备漏电了,变成非常危险。

隔离器的应用,可以把信号通道的直联变成磁耦合信号,相当于将50Hz的闭环电路物理隔离,后级系统出来的是干净的音频信号。

2) 地环与压差:

a. 地回路/地环干扰:由于音频线缆的两个线端之间的不同电势产生。

由于音频线缆选择不同的音频信号参考地电位,从而引起的交流电流回路干扰,主要出现在音频线缆的屏蔽层及音频设备的外壳上。

b. 通常情况下,屏蔽层的电压为0V,在音频信号传输距离超过100米的情况下,极易产生较高的接地环路电压,设备间的屏蔽层会产生压差,严重的将导致音频信号失真并伴有电流声噪音等干扰现象,甚至会产生打火导致设备被烧毁。

注意事项

注意1:由于手机输入时,正极存在2~3V偏置电压,接手机时候,不建议热插拔。

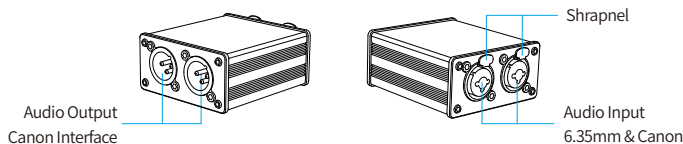
注意2:如果卡农线进调音台电平太高,需要先将卡农母转接6.35平衡线。(表现为拔插冲击声或电流声)

Manual

Audio Isolation Protector

AI230-D

Product Instructions



Feature

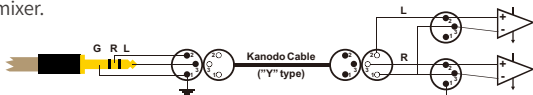
- Eliminate potential differences caused by unequal induced potentials when audio equipment has out-of-phase lines or is grounded at different points.
- Convert unbalanced signals into balanced signals by differential XLR lines.
- When the computer is connected to a projector or LED display screen, eliminate the 50Hz AC current sound; when changing instruments during a performance, avoid current impact noise when switching lines and instruments; when TV stations or other broadcasting agencies transmit signals, electrical isolation and circuit protection are required.

Operation Instructions

- Plug directly between audio devices and it's ready to use, no configuration or adjustments required.
- The input terminal supports 2-pin, 3-pin, and XLR interfaces; the output terminal supports XLR interfaces.

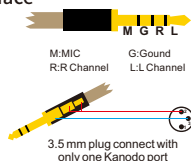
1. Wiring method: Y-type line input connection method

Use a 3.5 terminal to dual 6.35 terminal or a male XLR Y-shaped cable to connect directly to the mixer (as shown below). This method can be directly connected to the mixer, but it is not a balanced transmission. The XLR cable transmits unbalanced audio signals. If audio signals need to be transmitted over long distances, the signal needs to be converted to a balanced XLR cable to connect to the mixer.



2. Wiring method: 3.5 stereo plug to single XLR interface

If only one XLR connector is used, the left and right channel plugs must be connected in parallel, as shown on the right. It is recommended to connect the L line and R line of the audio source in parallel to pin 2 of the Canon (and connect a 2~4.7K resistor in series at the same time), and the negative signal to pin 3, which can reduce the input signal and prevent clipping and distortion of the excessively large signal input to the mixer.



3. Wiring method: connected to the mixer

This device is compatible with balanced wiring and unbalanced wiring. Depending on the purpose of use, the input signal can be sent to the input interface A of the machine from the main output (MAIN), group output (GROUP) or auxiliary output (AUX) of the mixer. IN, B IN.

Various Scene Descriptions

1. Typical scene - between camera and mixing console



- When the camera and mixer use external power supplies, there is a voltage difference between the power supplies, and an isolator needs to be used to eliminate noise and protect the mixer from being burned out;
- You can disconnect the mains power and use battery power, but if you connect a video console and other equipment, you must add an audio isolation protector to protect the safety of the equipment.

2. Typical scene - between the OB truck and the mixing console



- The OB truck uses an engine to generate its own power; the mixer uses mains power supply. There may be a huge ground potential voltage difference between the two, which may cause current sound or impact potential to destroy the equipment. To ensure safety, use an audio isolation protector.

3. Typical scene - between instrument and mixer



- If the length of the cable between the active musical instrument and the mixing console exceeds 10 meters, it is easy to encounter uncontrollable interference and requires the use of an isolation protector. (Passive musical instruments use ID boxes)
- Two purposes: 1.) Convert the unbalanced high-impedance interface of the electric guitar to a balanced low-impedance interface to avoid the noise problem of long cables. Impedance matching avoids loss of bass signal. Unbalanced to balanced transmission, 2.) protects front and rear stage equipment and prevents the impact of plugging and unplugging signal lines of electro-acoustic instruments.

4. Typical scene - between LED screen, computer and mixer



- The switching power supply inside the large screen has Y capacitors connected between the live wire and the ground, and between the neutral wire and the ground, with voltage, and the ground resistance is not zero, which forms the ground potential voltage difference between the equipment. Since the large screen is connected to the computer video cable, there will be an impact sound or current sound.
- In this scenario, if you plug in the mixer first and then the computer, sparking may easily occur. This device is needed to prevent the computer from burning down.

5. Typical scenario - long-distance link between computer and mixer



- The computer 3.5mm interface uses unbalanced transmission and is susceptible to external electronic equipment and radio interference. (If they are close to unbalanced cables, they can create buzzing noise. Older non-LED stage lights may also add interference to the signal.)
- Add an isolation protector on the computer side to convert unbalanced signals into balanced signals to ensure that long-distance transmission will not be interfered with.



In this scenario, the sound mixing needs to be connected to the lighting console. Different lighting equipment requires different operating voltages. The complex boost circuit can easily cause huge differences in ground potential between various devices and circuits. At this time, an isolator is needed to isolate the signal, eliminate the current sound, and protect the mixer from being burned.

Parameters

Items	Parameters
Channels	2
Freq. Response	20Hz-20KHz,
Primary to Secondary Ratio	600:600
Gain	1:1
Freq. Response Deviation	-0.006dB(@50Hz); -0.001dB(@1KHz); +1.326dB(@15KHz)
Distortion	0.048%(@1.8mV); 0.00144%(@1V); 0.013%(@10V)
Loss Attenuation	0.00337%(@50Hz); 0.00156%(@1KHz); 0.0005%(@15KHz)
Core Device	High-precision transformer components

Notes

Note 1: Since there is a 2~3V bias voltage at the positive pole, hot swapping is not recommended when connecting the mobile phone.

Note 2: If the level of the XLR line entering the mixer is too high, you need to first connect the XLR female to a 6.35 balanced line.

Note 3: Working principle of isolator

In the project, each device is powered by a different phase power supply, resulting in different neutral currents, resulting in differences in induced voltages at the safety ground of the device shell. Audio sound reinforcement systems generally use audio lines for serial connection: signal lines, neutral lines, and ground lines form a physical environment of AC 50Hz sine waves, thus forming the conditions for the generation of hum. Therefore, the mixer and power amplifier process low-noise signals with 50Hz AC and output sharp noise. If the "directly cutting off the ground wire" method is used to solve the current noise problem, the safety ground function of the equipment shell will be destroyed. If the equipment leaks electricity, it becomes very dangerous. The application of the isolator can turn the direct connection of the signal channel into a magnetically coupled signal, which is equivalent to physically isolating the 50Hz closed-loop circuit. The output of the subsequent system is a clean audio signal.