

General

To properly connect devices that require 24 Vac power sources, certain precautions must be followed. Usually the system must be analyzed as a whole to determine if any ground type faults will occur. Most devices that require 24 Vac power supplies actually convert the AC power to DC power using either a half-wave rectifier circuit or a full-wave (bridge) rectifier circuit. Depending on the type of rectifier circuit used, each device will require different interconnection and grounding techniques.

Installation

For snap track mounted devices, simply mount the power supply in an approved cabinet using two screws through the base of the snap track. The PCB may be removed from the snap track for easier installation, ensure the screw heads do not contact the PCB. Devices with enclosures may be mounted by using screws through the base of the enclosure. All devices should be mounted to ensure optimum ventilation as power supplies generate heat that may effect other devices.

Wiring

Ensure power is disconnected before wiring. Make sure all wiring conforms to electrical codes and the wiring diagrams. Always check the device label first to verify the type of supply (half or full wave) and the ratings.

Snap track mounted devices are supplied with screw connectors that are clearly marked as to AC input and DC output wiring. Remove the cover from devices in enclosures to access the terminal block and note that the 120 Vac is wired to terminals marked LINE, NEUT and GND and the DC output is marked plus and minus. Use ring type connectors to make all connections.

Operation

The power supplies are factory calibrated to output either 12 or 24 Vdc as indicated on the label, these values may be adjusted by rotating the potentiometer on the circuit board while monitoring the output with a voltmeter. All power supplies are fuse protected and the replacement fuse rating is clearly marked on all devices.

System Configurations

The wiring configuration of two half-wave devices sharing a 24 Vac transformer is shown in figure 1. This is the most common and the safest configuration when properly connected. Many half-wave devices can be connected in this same manner as long as the transformer rating is not exceeded. The important aspect of this configuration is that all device Commons are connected together and may also be connected to the Equipment Ground and/or the transformer ground. Note that a half-wave device has a common input and output line.

Ground problems will occur if the wrong secondary terminal of the transformer is grounded or if a device input is reversed with respect to the common. When either fault occurs a short circuit is created in the circuit which typically results in blown fuses or damaged devices.

A second configuration is when all devices have full-wave rectified power supplies. The safe connection of these types of devices is shown in figure 2. It can be seen that full-wave or bridge rectified devices do not have a common input and output line, therefore only one point in the system can be grounded. It should be noted that, since bridge type devices have symmetrical inputs, the 24 Vac input connections can be reversed on one device with respect to another. One common error in this type of system is the connection of a ground to one side of the transformer. If the controller or another device is also grounded, a short circuit will result across a diode in the bridge causing damage to devices or a fuse to blow. If the transformer must be grounded in this case, the only solution is to disconnect the equipment ground from the controller.

A third configuration includes devices with both types of power supplies, full-wave and half-wave rectified, as shown in figure 3. A common mistake is to connect the circuit as shown with both devices connected to the same transformer. In this configuration, the secondary of the transformer will be shorted during one-half of the AC cycle. This connection is never safe and will result in blown fuses or device damage. In no case can devices with different type rectifier circuits be connected to the same transformer when their signal commons are connected together. Either both devices must have separate transformers or an isolation device must be used to isolate the signal commons.

