JENEsys Edge 534 Power Considerations

The JENEsys Edge 534 controller is a high-performance, small foot-print product intended for smaller applications and equipment controls. To ensure it performs at its expected level it is important there is clean consistent 24 V power available.

The power source available to the Edge controller must be maintained at 24 V +/-10%. If the power source is not capable of maintaining this requirement the following actions can be considered:

- Install a 5 W/5 Ω 1% resistor inline with the 24 Vac input to the Edge controller
  - Lynxspring part # CP00055R000JE14 is available
  - Also available at www.mouser.com and www.digikey.com
- Use an appropriately sized 24 Vdc power supply
  The following dc power supplies are available from Lynxspring:
  - HDR-30-24 DIN Rail Power Supply 36W 24 V 1.5A Class II
  - HDR-60-24 DIN Rail Power Supply 60W 24 V 2.5A Class II
  - HDR-100-24 DIN Rail Power Supply 92W 24 V 3.83A Class II
- Install a 24 Vac:24 Vdc isolation transformer
  - Lynxspring part # DCP-1.5-W is available
- Replace existing ac power supply with an ac power supply that operates within the Edge controller specifications (<26.4 Vac). It is also possible the primary power is operating above expected voltage.

Why install a 5W/5Ω 1% resistor in-line with the 24 Vac input to the Edge controller

A reboot issue can be due to the 24 Vac rating on a transformer, this rating is stated as the RMS (root-mean-square) voltage. RMS voltage is an effective way to state equivalent waveform ac voltage to dc voltage.

When ac power is directed to a rectifier, the characteristics of the diodes will pass the true Peak-to-Peak voltage. Peak voltage can be up to >1.4 times higher than the RMS voltage. This increase in the rectified voltage can cause the down-stream regulator to reset if the current increases passed a certain level.

Peak voltage can be related to the absolute maximum rating of the JENEsys Edge 534 of 30 V. It is possible RMS voltage supplied to the JENEsys Edge 534 at 26.4 V may exhibit a maximum voltage up to 37 V. In this instance it is possible the Edge controller will “reboot” due to the over-voltage condition.

We can limit the voltage potential to an acceptable range using an inline resistor. Installing an “inline” resistor at the secondary side of the ac power supply effectively drops the RMS voltage and also dropping the peak voltage preventing the Edge controller from a reboot.

Why use a dc power supply and what is the advantage?

Building automation devices today require clean consistent power. A dc (direct current) power supply provides four major components:

1. Voltage Transformation
   a. Reduces the input voltage to the required 24 V. This can be accomplished by a linear or switch mode power supply. A linear transformation is accomplished by a traditional transformer with

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windings. A switch mode power supply incorporates a switching regulator to convert electrical power efficiently, switching low-dissipation 'full on' and 'full off' states to achieve the correct voltage. The ac power is then converted into dc power with a rectifier.

2. Rectification
    a. Typically, this is accomplished with a bridge rectifier consisting of diodes which pulse to provide the 24 Vdc power.
3. Filtering
    a. This power is then filtered by a capacitor which holds the charge between half cycles providing consistent dc power.
4. Voltage Regulation
    a. The final step is regulation of the dc voltage. A linear regulator provides a consistent output voltage even with variations on the input. It also reduces voltage ripple created in the ac to dc process. The end result is clean consistent 24 Vdc power for the control device.

This consistent power source provides less variation in analog outputs and universal inputs. Most dc power supplies have autosensing voltage inputs, which allow for a range of voltage input power sources. They also have options for internal protection should overload occur.

Why use a 24 Vac:24 Vdc isolation transformer?

An isolation transformer can be used in the case where the secondary of the primary controls transformer is required to be grounded. Due to the internal power requirements and reduced size of the JENEsys Edge 534, we use a full-wave rectifier. However, the drawback of this approach is that if the secondary of the power transformer is tied to a common ground with the common of the inputs/output points (IO), it will create a dead short; 24 V to ground. To eliminate this short, an isolation transformer can be used to provide separation from the common ground via a set of inductors assembled in a 1:1 ratio.

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