

How Staging Can Avoid Power Source and Load Capacity Issues

By: Watlow - November 12, 2021



As the demand for energy increases, industrial systems are growing. Whether the need is petroleum, natural gas or other sources to generate electricity, more is needed today than ever before. As heaters grow in size and power controllers become larger, the thirst for more energy sources will only grow. A company drawing 100,000 liters of natural gas per year a decade ago may be using 200,000 liters annually today.

Likewise, 10 years ago, Watlow's most powerful power controller switched 500 amps. Today, the ASPYRE® DT SCR power controller (<https://www.watlow.com/products/controllers/power-switching-devices>) can handle an incredible 2,100 amps.

As power sources have ramped up, the demand on power controllers has increased. For systems that constantly switch power on and off to stay within a specific range, this is especially difficult on the generator. One question that is not asked often enough is: What happens to the source of electricity in the system as it draws larger amperages at pulse? In short, it can be detrimental to the system and the power source, leaving your operation in a brownout or worse, and that downtime equals lost man-hours, lost revenue and costly repairs.

Staging the Heater

If your system pulls a large amount of voltage in one big chunk as it switches on, it is hard on the system. Think about it as a massive light switch. When the light switch is flipped up, the light bulb is instantly drawing energy. If you need to switch the light on and off repeatedly over the course of days or months, eventually, that light bulb will fail because pulsing the switch on-off creates stress on the filament. In the case of an industrial heating application, the stress is placed on the generator.

Staging is a solution to ease the stresses placed on the generator or generators. A concept that was popular at one time, staging is not used as frequently today. However, by staging the heater—that is, to use several smaller heaters to achieve the results of one large heater—you can reduce the stress on the source of power.

Silicon-controlled rectifiers (SCRs) and contactors may be a solution to stage the heater. Perhaps the SCR will pulse the system from zero to 25% power. The system is still pulsing very quickly, but it is a fraction of the overall scope of the system. At 25% power, the SCR is released, and a contactor takes over, as the system pulses up to 50% power. The contactor serves as the base load, so the system is pulsing only a smaller portion. The process continues until the system is at 100% power.

There are many different ways this example can play out; increasing the load by 25% is just one example. However, the result is a solution that is as gentle on the power supply source as possible while still achieving the desired result.

Location, Location, Location

Staging a heater is much more energy-efficient. Sometimes, it is necessary based on the location of the operation. Remote locations are especially prone to the source versus load capacity issues.

Think about an oil rig in the middle of the Gulf of Mexico. Generators are built on the rig. However, with limited space, the generators can only be so big. Some rigging operations will use different styles of generators, such as diesel and turbo generators. As the operators bring the system up, they will switch over to the more powerful generator. Switching from one generator to the other requires both generators to have matching engine speeds so the transmission can safely transition from one to the other.

If the rig has a significant heater load, the power controller will pulse to keep a stable temperature. Unfortunately, this likely means the two generators will never match engine speeds. Staging the heater and utilizing base loads are vitally important to maintaining functional operations in this scenario.

What Happens if I Don't Stage the Heater?

Staging the heater is a more efficient method of bringing it up to temperature. It is also safer in many applications. Failing to stage the heater can lead to brownouts or, in worst-case situations, destroyed generators. In either situation, the operation experiences downtime. That means lost man-hours, lost production, lost revenue and costly repairs.

How do I Know if I Need to Stage my Heater?

Unfortunately, there is no calculation to say when it is necessary to stage a heater. The need for staging a heater is dependent on the system setup and the percentage of power used compared to the capabilities of the power source. If your system is using 75% to 80% of the power available from the source, it may be time to consider staging.

At Watlow®, our experts will walk you through the pros and cons while considering the many facets of your system. Contact our team ([https://www.watlow.com/contact-us?](https://www.watlow.com/contact-us?adgroupid=41999941434&gclid=CjwKCAjwqeWKBhBFEiwABo_XBvuPvdERIDgH9lHXK8lhXw99iBwt1SvsSqank_UmmuopC7mTqKdsNhoCMh8QAvD_BwE&adgroupi)

[adgroupid=41999941434&gclid=CjwKCAjwqeWKBhBFEiwABo_XBvuPvdERIDgH9lHXK8lhXw99iBwt1SvsSqank_UmmuopC7mTqKdsNhoCMh8QAvD_BwE&adgroupi](https://www.watlow.com/contact-us?adgroupid=41999941434&gclid=CjwKCAjwqeWKBhBFEiwABo_XBvuPvdERIDgH9lHXK8lhXw99iBwt1SvsSqank_UmmuopC7mTqKdsNhoCMh8QAvD_BwE&adgroupi) today, and we will help you determine if you need to stage your heater.