TUTCO HEATING SOLUTIONS GROUP

TUTCONNECT

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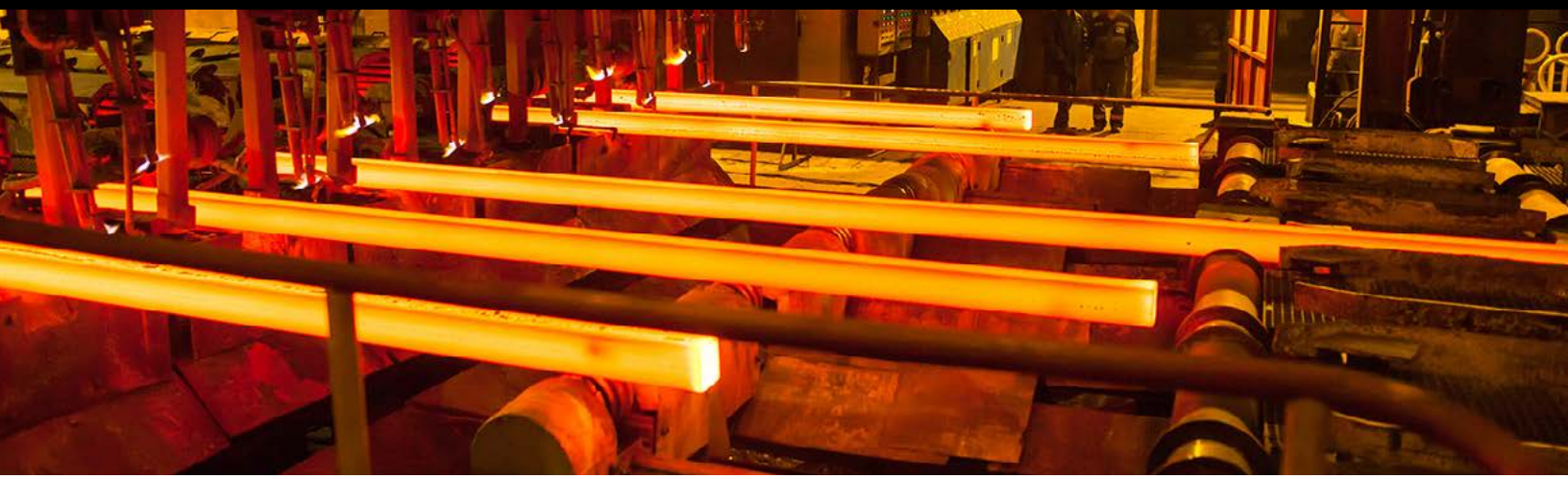


Electrification and Decarbonization

Revolutionizing Steel Manufacturing: The Rise of Green Steel

Green Steel has emerged as a cutting-edge technology thanks to both government funding and carbon reduction mandates. At the forefront of this green revolution, TUTCO SureHeat is playing a crucial role by providing a large electric heating system that utilizes renewable energy sources. This system heats a blend of hydrogen and other gases, marking a departure from the traditional method that relies on burning natural gas in the presence of iron ore, producing CO2 as a byproduct. In the new process, hydrogen is heated electrically, resulting in the byproduct of water, a much more environmentally friendly outcome.

The implications of this movement extend far beyond the steel industry, holding the potential to make a profound impact on global carbon emissions. Currently, steel production accounts for approximately 7% of global carbon dioxide emissions. In the United States alone, the industrial sector, which includes steel production, contributed to 30% of greenhouse gas emissions in 2021. TUTCO SureHeat's contribution to the transition to green steel manufacturing aligns with broader environmental goals, offering a promising solution to address these alarming statistics.

TUTCO SureHeat's electric process air heaters are a linchpin in the shift towards green steel. By replacing traditional gas-fired heaters with electric alternatives, these advanced heaters contribute significantly to reducing the industry's reliance on fossil fuels and curbing carbon emissions. Known for their high efficiency, TUTCO SureHeat electric air heaters not only support environmental sustainability but also enhance overall operational performance.

The adoption of TUTCO SureHeat's electric process air heaters represents a technological leap forward for the steel industry. Their precision temperature control, accelerated heating times, and enhanced flexibility in the manufacturing process empower steel manufacturers to produce higher quality steel while fostering innovation and product development.

This electrification and decarbonization of the steel manufacturing signifies the industry's commitment to a cleaner, greener future. With the potential to reshape the landscape of steel production and significantly reduce carbon emissions, TUTCO SureHeat's role in this transformative endeavor is nothing short of revolutionary.

To learn more about energy transition, click here.

> *At TUTCO, we are extremely sensitive and conscious in achieving sustainability. Our work in green steel is helping create a more sustainable future for the environment through electrification.*
>
> —**DANE OWEN**
> TUTCO VP and GM

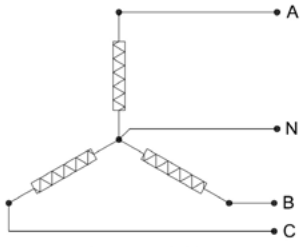
3-Phase Power Systems
and how to know that you have wired them correctly

by Ian Renwick

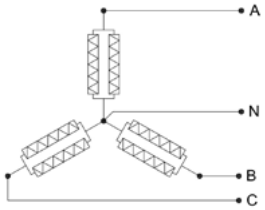
There are countless articles on-line describing the two varieties of 3-phase power systems and why one is more beneficial over the other based on your application. The 3-phase systems are called 3-phase delta and 3-phase wye and this document will explain how to connect your single phase heaters to such a system, and more importantly, how to check that it's done correctly with a few simple resistance measurements.

First, you've got to determine the type of system you're working with. If your electrical system has no neutral wire, you're probably working with a 3-phase delta system where the legs of the system are connected in a triangle. Delta gets its name for the Greek upper case letter delta (Δ) which resembles a triangle. If you do have a neutral wire, you're probably working with a wye system. Just think of the letter Y because all the lines are connected to a central node. It's good to confirm the type of system you have by checking an ID plate or other documentation you have regarding your 3-phase system. The use of the word 'probably' above is used because there are exceptions to every rule. Though rare in the case of 3-phase power systems, it's still best to check. If you have three heaters of equal resistance you're ready to go. If you have six heaters, that'll work too. Any multiple of 3 heaters is what you need in these types of systems.

For a 3-phase wye system with three single phase heaters, connect one lead of each heater to the central node and the other lead of each heater to one of the 3-phase nodes. If you have a multiple of 3 heaters, connect them in equal groupings in parallel. Maybe a few diagrams will help.



3 HEATERS IN A
3-PHASE WYE CONFIGURATION



6 HEATERS IN A
3-PHASE WYE CONFIGURATION
WITH 2 HEATERS IN PARALLEL
ON EACH LEG

As you can see the 3 nodes for each leg are labeled A, B and C, which is typical. They might be labelled 1, 2 and 3. In a 3-phase Wye configuration you have the fourth node that's labeled N or Neutral.

When checking that you've connected the heaters correctly you should measure the resistance between each leg (A, B and C) and the Neutral leg. They should all measure about the same, within the resistance tolerance of the heaters you're using. You should also check the resistance from leg to leg. Check from A to B, A to C and B to C. Each resistance across those connections should be double that of a single leg, again, within the resistance tolerance of the heaters. When you take those measurements, you're measuring the resistance of two legs connected in series, ignoring the third (unmeasured) leg. The term 'single leg' or 'leg' is used instead of a heater because there might be multiple heaters in parallel across each leg. Just make sure you know the resistance that should be present on each leg.

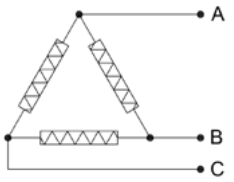
If R is the resistance for a single heater, and P is the number of heaters in parallel you have across each leg then the total number of heaters in your setup should be 3 x P and the resistance from each A, B or C to N should be R/P. The resistance from A to B, A to C and B to C should be 2 x R / P.

If you check your system and all the resistances are as described you can be very confident that everything is wired correctly.

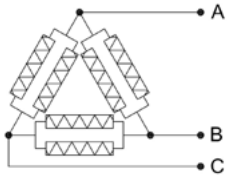
Continued on next page.

3-Phase Power Systems (continued)

When it comes to a delta configuration, the math is a little tricker and it's easy to see why. There's no neutral node so the resistance checks must be made between nodes A, B and C. In that case you're measuring a single leg which is in parallel with the two other legs that are connected in series. Connect your single phase heaters as shown in the diagrams below, depending on the number of heaters you're using.



3 HEATERS IN A
3-PHASE DELTA CONFIGURATION



6 HEATERS IN A
3-PHASE DELTA CONFIGURATION
WITH 2 HEATERS IN PARALLEL
ON EACH LEG

Sparing you the trouble of how to calculate the values, you should read the resistance of one leg divided by 1.5 or R / 1.5 where R is the resistance of one heater when using one heater on each leg . In other words, if you have three 50Ω heaters connected in a 3-phase delta configuration you should measure 33.3Ω from A to B, A to C and B to C.

When there is more than one heater connected in parallel on each leg of a 3-phase delta configuration, the resistance between a pair of legs is R/(1.5 x P) where R is the resistance of a single heater and P is the number of heaters in parallel on each leg.

Six 150Ω heaters in a 3-phase delta configuration where there are 2 heaters connected in parallel on each leg should give you a resistance of 50Ω from A to B, A to C and B to C.
In a crazy example of 18 heaters measuring 650Ω each, in a 3-phase delta configuration, the resistance between legs should read 650/(1.5 x 6) = 72.2Ω.

To Summarize, using R as the resistance of a single heater and P as the number of heater connected in parallel on each leg of a 3-phase circuit,
…..the resistance across any two nodes of a 3-phase wye configuration is 2 x R / P.
…..the resistance across any two nodes of a 3-phase delta configuration is R / (1.5 x P).

One additional thing to watch out for in a 3-phase wye system that must be mentioned is the voltage present across each leg. If the 3-phase system is labeled as a 480V 3-phase wye system, the voltage across each lead is only 480/√3 or 277 volts. Whatever a 3-phase wye system may be labeled (call it V), the heaters are going to be subjected V/√3 or V/1.732.
That's not the case in a 3-phase delta system. A heater across a leg of a 480V 3-phase delta system will be subjected to 480 volts. There is no adjustment necessary with a 3-phase delta system.

This should help you to be able check your 3-phase wye or delta configuration with confidence.

READ MORE ASK IAN

Honey Application Finds Sweet Solution with TUTCO

TUTCO was approached by a customer with a unique requirement for heaters to be integrated into portable equipment designed for honey harvesting in remote areas where beekeepers manage their hives. The primary goal was to optimize the performance of the working tools used during honey harvesting.

In response to this specific need, TUTCO engineered a tailored solution in the form of the HT Mica strip heater. The design of the HT Mica strip heater was meticulously crafted to seamlessly integrate into the portable equipment, providing a practical and dependable heating solution. With mica insulation known for its excellent thermal efficiency, this heater ensures uniform heat distribution across the working tools.

Uniform heating is paramount for maintaining the tools at the necessary temperature, ensuring a consistent and successful honey harvesting process. The HT Mica strip heater, with its customized design, perfectly aligns with the customer's application requirements, empowering them to conduct beekeeping activities confidently even in remote locations.

The heaters' capability to bring the working tools to the optimal temperature significantly enhances the efficiency and productivity of honey harvesting operations in the field. TUTCO's commitment to meeting unique customer needs is exemplified in this tailored heating solution, supporting beekeepers in their work in diverse and often challenging environments.

MORE THINKING OUTSIDE THE BOX

Feature Application

Process Heaters in Contaminated Soil Clean Up

In Environmental Ground Applications, TUTCO heating solutions stand out as a transformative and indispensable component in the quest to address soil contamination and environmental challenges. Leveraging cutting-edge thermal heat technologies, our solutions play a crucial role in innovative soil remediation processes, particularly in methods such as thermal desorption and soil vapor extraction.

The application of thermal heat technologies in these processes involves the controlled elevation of soil temperatures, strategically designed to enhance the removal or degradation of hazardous substances. TUTCO heating products become catalysts for change, facilitating the release of contaminants from the soil. This, in turn, allows for their efficient capture or destruction, contributing significantly to the overall effectiveness of environmental cleanup efforts.

By embracing thermal heat solutions in the environmental cleanup of the ground, TUTCO is actively contributing to the advancement of efficient and sustainable approaches to soil remediation. This commitment aligns with the broader goals of electrification and decarbonization, marking a progressive shift towards cleaner and more environmentally friendly practices in the remediation industry.

As a dedicated process heat provider for environmental applications, TUTCO not only recognizes but actively participates in the expanding role of electrification in our world. With a rich history of performance and unwavering reliability, our heating solutions have become indispensable tools for environmental companies grappling with the multifaceted challenges posed by pollutants in diverse mediums. TUTCO Farnam remains committed to pioneering solutions that foster a cleaner and healthier planet, addressing environmental concerns with innovation and a steadfast commitment to excellence.

READ MORE ON ENVIRONMENTAL CLEAN UP

Feature Video

TUTCO Farnam's Process Air Heaters

TUTCO Farnam process air heaters are essential components in various industrial and commercial processes. While customers may recognize that they need a process heater, deciding on the correct one for their application may be a challenge. In this video, AJ Nidek, TUTCO Farnam's National Sales Manager looks at our complete line of process air heaters. Learn about the Flow Torch®, ideal for applications demanding a high-flow low-pressure heater, the Heat Torch®, a low-flow high-pressure heater, and the Cool Touch®, which mirrors the features of the Heat Torch® but is a triple-pass heater, designed to minimizes the skin temperature of the heater, contributing to enhanced safety by protecting individuals and products from exposure to hot surfaces.

WATCH THE VIDEO