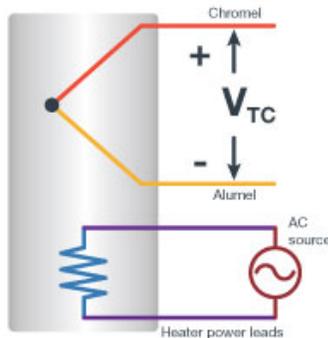


# The Blind Spots in Industrial Temperature Sensing Systems

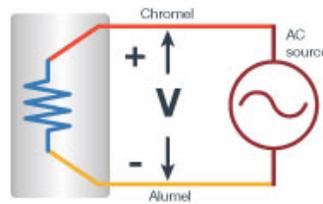
By: Watlow - November 18, 2022

## Integrated TCH Junction Temperature Control

Traditional Heater and Thermocouple Junction



ATS™ Thermocouple Heater (TCH) Junction



### Features and Benefits

#### Measure temperature without a separate sensor

- Lowers sensor and integration costs
- Enables closed loop control for better performance
- Saves space
- Reduces complexity due to fewer wires

#### Thermocouple integrated into heater

- Improves sensing reliability



Convert heater power leads into a thermocouple junction

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Typically, temperature sensing systems are not something you think about unless they are on the fritz. You may not realize that, even when these systems show green lights across the board, they might be a source of unseen trouble in your operation. Many fail to identify these issues, and the associated blind spots can hurt companies in ways that sometimes go under the radar. In particular, current temperature sensing often represents a compromise— a compromise based on space, budget or precision. It is now time to revisit those compromises and embrace what new technology can enable.

## Issues with Current Temperature Sensing Systems

As much as we do not want to admit it, modern temperature sensing systems are often the children of compromise. They are often created after the majority of design work for the underlying equipment is complete, which means thermal systems must conform to the constraints of the underlying system. In different situations, that issue emerges in different ways.

Sometimes, it is the budget that limits the thermal system's potential. Companies cannot always get the sensor or heater density that they want to ensure that the project is completed within the budget. They can save a lot of money by reducing the number of sensors they employ but at the cost of losing a complete picture of their entire system.

Of course, space also plays a role. Heaters and sensors take up space, and the wiring that connects them grows in lock step with each addition to the system, requiring more space...which may not be possible in all setups. Companies respond to this issue by wiring their heaters in series, reducing the wiring and space requirements. However, in doing so, they give up the ability to fine-tune their system. And that has effectiveness and efficiency implications.

The danger of these compromises is that they may impact daily operations in ways that are not always apparent at first glance. Companies might be running their heaters too much or too little, with product yield or quality implications...and do so without even realizing it. And even when detected, it can cause a lot of head scratching as engineers attempt to pinpoint the problem.

## **Introducing Watlow's Thermocouple Heater (TCH) Control**

What if you could live in a world where you didn't have to make those kinds of compromises? Creative use of an older technology can make this happen.

Thermocouples are nothing new. Essentially, they consist of two dissimilar conductors forming an electrical junction. The setup is extremely sensitive to temperature changes, which can be measured by the change in voltage that flows through the thermocouple. Where Watlow's thermocouple heater (TCH) control stands out from the pack is its placement. When integrated into a heater's power leads, it can provide temperature sensing without needing a discrete sensor.

No discrete sensor means no sensor wires must be run to the system, saving on cost and space. Plus, they are mounted close or even within the heaters themselves, providing precise measurements in precise locations and giving you the most complete view of your system's performance.

Thermocouples' relatively low cost makes having a one-to-one ratio of sensors to heaters an affordable possibility. The thermocouple only needs about a 5-millisecond window to take a temperature reading so that your heater can run nearly uninterrupted.

## **How TCH Fits into Watlow's Adaptive Thermal Systems® (ATS™)**

Of course, a new temperature sensor is only a small part of the change that is needed in industrial temperature sensing. More advances are necessary to take advantage of the TCH's space-saving design and in-line temperature sensing capabilities.

### **The Harness**

Watlow's Adaptive Thermal Systems® (ATS™) technologies are an edge-to-edge thermal management suite that include the TCH. While the harness that holds wiring for heaters and sensors is not always the first thing we think of when we think of innovation, the harness in ATS is worth highlighting. Featuring a standardized connector, the harness makes it easy to wire different heaters into the same system, and halves the number of connections required from two to one.

### **The Controller**

Ofcourse, you need a smart system that can handle the data the system produces. Watlow's new EZ-ZONE® RMT controller can stand alone or port data through EtherCAT® into the system while providing closed-loop temperature control (<https://www.watlow.com/blog/posts/what-is-a-closed-loop-temp-control>) of every heater in a system. That means you can wire systems as though they are in series but control them like they are in parallel, giving you unparalleled control and data for your system.

The EZ-ZONE RMT controller is also agnostic to the input voltage, delivering the exact voltage needed by its heaters, regardless of the input. That makes it a plug-and-play solution for systems all over the world. Plus, it is TCH-ready and can help you aggregate and make sense of the data in near real-time.

## How to Get Started With ATS

The right solution for an industrial temperature sensor system is never "off-the-shelf," but the wrong custom solution can leave you with blind spots that hurt the bottom line. ATS is revolutionary in large part because it is the best of both worlds. Each part provides part of the template, which can then be customized to the client's exact needs. Because the technologies enhance each other's value when they are working together, they can provide incredible value without commanding an astonishing price.

Curious to learn more about temperature control, or about ATS in general? We recommend the following resources:

Our white paper on Watlow's thermocouple heater (TCH) control ([https://www.watlow.com/-/media/documents/white-papers/wp\\_thermal-control-with-tch\\_0822.ashx](https://www.watlow.com/-/media/documents/white-papers/wp_thermal-control-with-tch_0822.ashx)).

Our white paper on Adaptive Thermal Systems (ATS) ([https://www.watlow.com/-/media/documents/white-papers/wp\\_what-is-ats\\_0422.ashx?](https://www.watlow.com/-/media/documents/white-papers/wp_what-is-ats_0422.ashx?la=en&hash=1E7D7E203B0D3AA80EEC2991D69B9AD73C275980&hash=1E7D7E203B0D3AA80EEC2991D69B9AD73C275980)

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