Signal Conditioners: The Translational Heroes

Technology is constantly changing and advancing how we do our jobs. The process industry is no stranger to this changing technology. It was technology, after all, that made industrial automation and process control possible. Engineers were able to take small, repeating processes and make them bigger, more complex, more efficient, and safer. To do this, however, various types of instruments, analyzers, and sensors needed to be able to communicate with one another. That's where signal conditioners come in.

Think of signal conditioners like your cable box: a digital signal comes from the cable company through a wire and into the cable box where that digital signal of ones and zeroes is turned into images and sounds in the form of a picture on your TV. Signal conditioners take jumbled information in an industrial process and make it understandable for the system as a whole. In other words, signal conditioners convert one type of electronic signal into another type of signal. This paper will explain the importance of signal conditioners, their many capabilities, and the technological progress that's been made in the past 20 years.

A long journey

Signal conditioners were merely pens on a chart recorder and analog panel meters just 20 years ago. These signal conditioners still work in the same way today's instruments work. In the past, a current or voltage output – the electrical signal – was transmitted to the signal conditioner. That output was then translated through the chart pen on the chart recorder onto a piece of paper or onto an analog panel meter for the needle indicator to be manually observed or recorded at the signal conditioner's physical location. Today's panel meters still use that same electrical signal output, but they're smaller, digital, smart, and interactive instruments that can even transmit data wirelessly to the cloud.

The incremental leaps of technology in the world of digital and computer electronics have allowed signal conditioners to perform at new levels not experienced in the past. There are various types of signal conditioners, and each serves a purpose, ranging from a simple display to intelligent units controlling pumps, valves, or motors. There are units that process sensor data from multiple instruments and send the data via wireless transmission, Ethernet, or other communication protocols to the cloud.

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Seeing is believing

Some signal conditioners' sole purpose is to provide a look inside a complex process being measured in order to better manager that process. A measurement device, or multiple measurement devices, can be wired to a single signal conditioner that will translate the signal or signals to one display. For example, VEGA's VEGASCAN 693 can power up to 15 sensors on one cable in HART multi-drop mode, combine the sensors' data, and share this information via Ethernet to customer control systems with Modbus TCP.

A setup like this one can save customers tens of thousands of dollars on installation and wiring costs. The ability to run smaller conduit and use less wire can help justify the ROI on new level measurement and inventory management capital projects. Additionally, this signal conditioner includes a built-in webpage to view the measured values and health status of the sensors in real-time. A built-in e-mail server allows the customer to program and send critical high and low level events, time-based reports with level measurement, and inventory information. In the event that something stops working correctly, there's an added bonus of remote support and troubleshooting over the customer network, all the way down to the individual sensor. These are all features that allow operators to more efficiently manage their process.

Another set of "eyes"

Preventing overfill and running out of material in an industrial process are two more jobs that fall into the realm of signal conditioning. There may be a switch, a level device, or both tracking the level in a vessel, but the information in the signals from those devices are translated into an actionable item inside the signal conditioner. Depending on the process, a signal conditioner can start, stop, slow down, or speed up a process, based on the information it receives from a sensor or sensors.

The VEGATOR 121 can be used in tandem with a high level switch for liquids, and not only can it ensure a proper level is maintained within the vessel, but the signal conditioner can also run a function test on the switch electronics, replacing an annual wet test to save time and money. Throughout the year, the signal conditioner can also monitor the switch for failure and monitor the wiring for open or short circuited conditions.

Making the unsafe safe

Some processes can be hazardous or explosive in nature, and regulations put restrictions on the amount and type of power to any instruments monitoring those processes. This is, once again, where signal conditioners come to the rescue. This type of signal conditioner can reliably separate intrinsically safe and non-intrinsically safe circuits.

VEGA's VEGATRENN series of signal conditioners can provide an optimum supply of power to the connected sensors. These signal conditioners can take universal voltage sources (20-230Vac or 24-65Vdc) in the facility and translate it into a safe, low voltage electricity in the hazardous area that will not allow arcs or sparks.

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Bluetooth bonus

The most recent technological leap for signal conditioners is integrated Bluetooth. VEGA's PLICSCOM with Bluetooth increases operator safety and convenience, all while keeping plant data safe and secure. Bluetooth allows operators to wirelessly connect to devices from a smartphone or tablet instead of lugging a laptop and cable from device to device. Once connected, adjustments are made easy with the VEGA Tools App, which has an interface that resembles PACTware and the DTM software. Users can check measured values of a particular vessel and make minor adjustments safely from the ground with their smart device.

Instruments as far back as 2003 are even being brought into the present with VEGA's new technology. The PLICSCOM with Bluetooth can retrofit onto older VEGA instruments, transporting them to the cloud and the world of IIoT. It can do all of this safely and securely as it's armed with two shields of data security: a PIN that syncs an individual device with the VEGA Tools App and encryption software that keeps unapproved users from accessing data.

Conclusion

Technology is constantly changing and touching every aspect of our lives. This includes the world of process engineering and signal conditioners. It wasn't long ago, signal conditioners were recording data on paper for a single instrument, and today's signal conditioners are recording data for multiple instruments in the cloud and costing less in installation, wiring, and expenses. With the improvements signal conditioners have seen in such a short time, it will be exciting to see what signal conditioning looks like in the next decade.

Related products


VEGADIS 81


VEGASCAN 693


VEGATRENN 141


VEGATOR 121

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