

Process Controller Communication Protocols

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Temperature, process and power controllers have become highly sophisticated devices. Essential to thermal system operation and running a seamless process, controllers are communication tools capable of monitoring systems, switching power, logging and recording data and enforcing safety limits. But not all controllers are equal, and not all controllers speak the same language.

Without a standardized protocol, different industries have developed their own to meet the specific needs of their industry. Unfortunately, the specialization of these protocols limits the crossover benefits that could be realized with a uniform protocol. However, today's protocols are the backbone to the promising future of Industry 4.0 (<https://campaign.watlow.com/right-data-right-place-right-now>), the Fourth industrial Revolution, in which the devices within a system are able to work smarter and more autonomously, thanks to data sharing and machine learning.

Protocols, interfaces and services, oh my!

Controller communications consist of protocols, interfaces and services. These elements define how the controller will communicate, in what language it will communicate and the output of that communication.

- A **protocol** is a communication method. For example, the web page on which you are reading this article uses HyperText Transfer Protocol Secure, commonly known as HTTPS. Other

protocols used in thermal system controllers include EtherNet/IP™, EtherCAT®, PROFINET and Wi-Fi.

- An **interface** is the avenue in which the information is communicated. For example, a cell phone may connect to a car's audio system using a Bluetooth® interface or a computer's USB connection to download content. Controllers have similar capabilities to communicate with other devices in a system, and interfaces include, but are not limited to USB, Ethernet and Bluetooth®.
- **Services** on controllers are additional methods in which the data and information can be shared. Going back to the example above, HTTPS uses a web page to display the information. Controllers are capable of sharing information through email, text message, file transfer protocol (FTP), virtual private network (VPN), a web page and more.

Watlow has controllers that incorporate a variety of protocols, interfaces and services. Each controller is unique in what it offers to consumers. While this article is focused on a controller's protocol and ability to talk to other devices in the system, be sure all your requirements are met in terms of interface and services.

How to make your systems talk to each other

Ensuring the devices within a system can communicate with each other is critical to ensuring proper operation of the system and maximizing benefits, such as data logging. Unfortunately, system designers and integrators are often left frustrated by incompatible devices using a variety of communication protocols.

When selecting devices, it is important to understand the protocol(s) and interface with which each device is compatible. In some cases, gateways can translate between two incompatible devices. Gateways are devices that read the protocol from one controller and deliver it to another device in a different protocol. However, gateways are not universal in their ability to read and/or translate all protocols. At least, not yet. Industry 4.0 may change that soon.

What is Industry 4.0?

Industry 4.0 is also known as Factory 4.0, the Industrial Internet of Things (IIoT), Industry X Revolution and other names. It is the use of data and machine learning with smart and autonomous systems to enhance the third industrial revolution. Industry 3.0, which began in the 1950s, was defined by incorporating computers and automation into manufacturing. It is often referred to as the Digital Revolution.

One of the major platforms of Industry 4.0 is to create one standard that all systems speak or to develop a single standard that speaks many different languages to allow systems to work together seamlessly. Think of it like Google Translate, but better. Where Google Translate may not understand

context, expression and satirical communication patterns of humans, a protocol designed to allow systems to speak would not include the human variance of speech. In fact, Industry 4.0 is ushering an age in which connected computers communicate and make decisions without human interference.

What protocols are used by Watlow controllers?

Watlow designs and manufactures industrial heaters, temperature sensors, controllers and supporting software, as well as assemblies – all the components of a thermal system. The company partners with its customers to optimize thermal performance, decrease design time and improve efficiency of their products and applications.

Watlow is a leading supplier of controllers (<https://www.watlow.com/products/controllers>) compatible with a wide variety of protocols, interfaces and services. When selecting a controller, confirming that it is compatible with the rest of your system will save you time and hassle. Our team of experts can help you “measure twice and cut once” to make sure your project stays on track with the right controller the first time.

Contact a Watlow product specialist (<https://www.watlow.com/contact-us>) to discuss your unique needs, and we will help you find the best solution by identifying the type of controller that would fit the unique needs of your system.

The matrix below summarizes all communications protocols, interfaces and services currently supported by Watlow’s complete line of process controllers. **Click the image to download the Excel document.**

Product	DeviceNet (server)	EtherNet/IP (server)	EtherCAT	Modbus RTU on serial 232 or 485 (client)	Modbus RTU on serial 232 or 485 (server)	Modbus TCP on Ethernet (client)	Modbus TCP on Ethernet (server)
ASPYRE DT	no	yes	no	no	yes	no	yes
CLS200	no	no	no	no	yes	no	no
EZ-ZONE PM 1/32 DIN	via RUI, RMAP	via RUI, RMAP	no	no	485	no	via RUI, RMAP
EZ-ZONE PM 1/16 DIN Integrated	yes	yes	no	no	yes	no	yes
EZ-ZONE RMA original	yes	yes	no	no	yes	no	yes
EZ-ZONE RMA PLUS	Build 3	Build 31	no	yes	yes	no	yes
EZ-ZONE RMC	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RME	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RMF	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RMG	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RMH	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RML	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RMS	via RMA, RMAP	via RMA, RMAP	via RMZ	no	485	no	via RMA, RMAP
EZ-ZONE RMZ	yes	no	yes	future	future	no	no
EZ-ZONE ST	via RUI, RMAP	via RUI, RMAP	via RMZ	no	485	no	via RUI, RMAP
F4T / D4T	no	yes	no	no	yes	no	yes

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