SIEMENS

Controlling on the edge: **from factory processes to the cloud**

Your industrial data, when and where you need it

From their corner of the processing plant to the cloud, new level controllers make gathering, accessing, and analyzing your data easier than ever. Apps customized to your process specifics, plus edge computing best practices, form a winning combination—all stemming from a versatile controller with big plans for the future of industrial process monitoring.

Working away in your facility are sensors, controllers and other analytic devices all processing one of the most valuable—and plentiful—commodities you create: data.

According to the International Data Corporation (IDC), the world will see 55.7 billion connected Internet of Things (IOT) devices by 2025, altogether generating nearly 80 zettabytes (ZB) of data.[i] That's 80, followed by 21 zeroes—or a lot of data.

But what's the point of generating all that data if you're not going to put it to good use?

First, however, said data needs to come from an accurate, reliable source. From basic level control to complex pumping routines, solutions like Sitrans LT500 do exactly that. Not only does the controller deliver continual process optimization and precise datalogging, but the device also can drive edge computing in your plant, bringing with it benefits many users have yet to tap. Let's take a look.

Sitrans Probe LU240 ultrasonic level transmitter with Hart 7 can be connected to the Sitrans LT500 controller, which in turn is integrated into a plant's control system and then into Siemens cloud solutions. Not only does the controller add remote configuration and display to the transmitter, but the integration into this system allows operators to monitor echo confidence with ease.

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Apps customized to your process specifics, plus edge computing best practices, form a winning combination.

Connecting to the control room or to the cloud

Where that data goes once it leaves your industrial devices is up to you: whether it's being sent to the control room or then up to the cloud—each has its advantages and ways you can make your data work for you.

- **To the control room:** hundreds of process instruments and analytic devices, the eyes and ears of the process plant, are connected to the brains of Siemens Simatic PCS 7. With information from across a facility, the distributed control system allows operators to analyze more comprehensive data than ever before—from the comfort of the control room.
- **To the cloud:** for an average application, a Siemens gateway solution typically connects to the PLC via Ethernet, and now your data can move to the cloud. And accessing it is easy: similar to apps you use every day on your phone to perform certain tasks, you can create, customize or use an off-the-shelf Siemens app to collect, trend, or chart data and provide visual representation of it to easily identify issues or opportunities.

What kind of apps are possible? Truly, the sky's the limit. But here are a few ideas:

Echo quality over time: monitoring hour-by-hour echo quality or during fill cycles to better predict signal quality issues or more accurate trending data.

Build-up monitoring: watching signal quality over time during periods when a tank is empty to see if build-up is forming on the sensor.

Managing inventory: tracking raw material use and sending that information directly to suppliers and re-order points so operations aren't waiting on materials and you don't need to store as much onsite.

Predictive maintenance: managing maintenance cycles for all of your instruments with built-in timers that alert operators and even schedule tasks accordingly.

Just a few ideas to get you thinking, but you can also visit Siemens Insights Hub for out-of-the-box, ready-made applications to jumpstart powerful data analytics in your plant.

Use case: simplifying filter bed levels

A wastewater treatment plant uses a Sitrans Probe LU240 to monitor levels in its filter beds. The plant has fast sand filter beds using wash water troughs and compressed air. However, the influent trough pipe located above and between the wash water troughs leaves a very narrow gap in between them.

While previous solutions used guided wave radar in this application, organic material would accumulate on most of the guided wave radar transmitters' cables, causing periods of intermittent high-level indication.

Sitrans Probe LU240 ultrasonic level transmitter, ready for digitalization with Hart 7, is first connected to the Sitrans LT500 controller, which in turn is integrated into the treatment plant's control system and then into Siemens cloud solutions. Not only does the controller add remote configuration and display to the transmitter, but the integration into this system allows operators to monitor echo confidence with ease.

With the environmental industry's ever-increasing digitalization efforts, level information interconnected with Siemens apps in the cloud provides users with data analysis, governmental reporting, and process monitoring—accessible anytime, anywhere. Not to mention curated and displayed in an app that works best for your operators' needs—putting data to work in ways more convenient for your staff.

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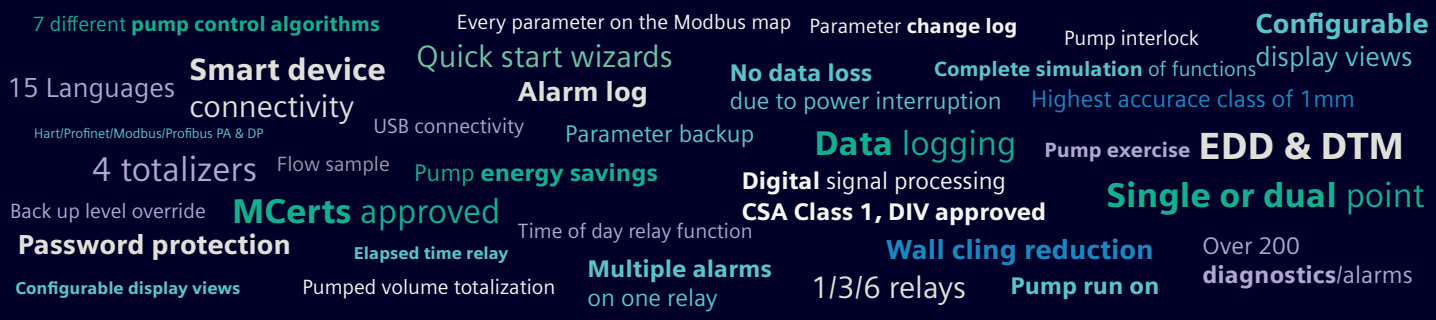


Alternate routes to control or the cloud

But despite the endless opportunities from cloud computing, what happens when all that data slows down a system? Stable, fast connectivity is critical for much of what we just covered. Poor connectivity or latency issues can thwart your best data analytics intentions at best—and disrupt operations at worst.

Luckily, a level, flow, and pump controller like Sitrans LT500 can take over the management and processing of all that data—creating essentially a "mini" control system for this portion of your operations —through what's known as edge computing.

Put simply, edge computing means processing and analyzing data where it's actually being generated, rather than transmitting it to a central location for analysis like a control room.

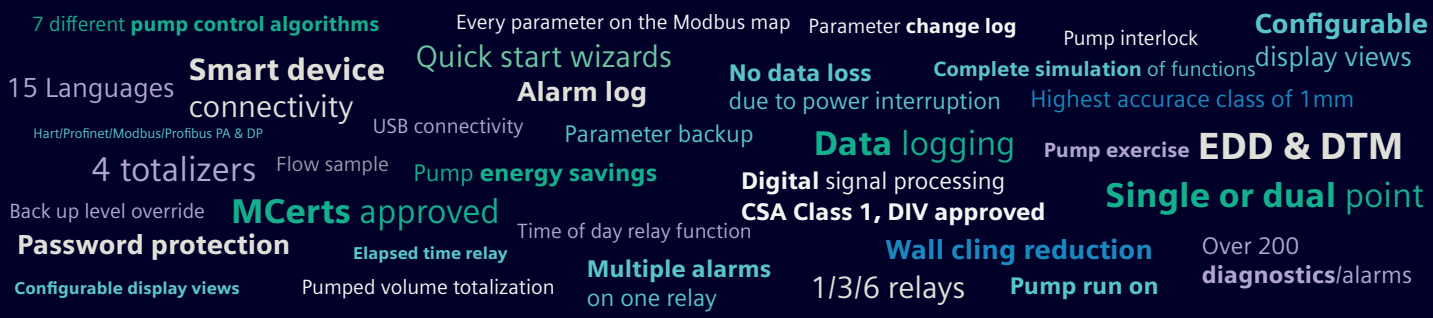
Let's see this in action.

In a tank or vessel, a radar or ultrasonic transmitter feeds measurements to a Sitrans LT500 controller. From there, edge computing offers a couple different options.

To the control room: the Sitrans LT500 processes information from each of the instruments and sends that data in parallel to the control system through fieldbus optional communications. Rather than each instrument individually transmitting to the control system, this secondary channel helps lighten the system's processing load, since the Sitrans LT500 acts as a hub for initial data analysis.

To the cloud: the Sitrans LT500 can also connect to a cloud gateway using Modbus or Hart (or in the case of Profibus, an additional GSD file, containing information about the basic capabilities of the device). The next step would be to configure the gateway into any cloud web-based provider. And from there, create or use an app to extract the insights you need to improve processes, increase productivity, boost predictive maintenance routines, and more .

The gateway establishes this second data channel, which makes field level data that was previously hidden available to the user—without needing to tap into the computing power of existing control technology. This system creates a direct connection between the field device and the cloud, able to read not just basic process values but also configuration and diagnostics parameters.



Why edge computing?

This type of system "offers you a lot of advantages regarding the isolation of what you want to do, a really small footprint and easy exchangeability, usable across hardware—so all of this combined makes it a lot easier than people may think."[ii] By freeing up the control system for these data processing tasks, the Sitrans LT500 acts as a microcontroller for a small, contained process.

The Sitrans LT500 can handle controlling that corner of the plant while the PLC can keep its focus on more critical tasks across the overall facility, without getting bogged down in its communication cycle or with mundane tasks that eat up computing time. Another plus is freeing up IO space in your cabinets to allow for expansion and growth down the road.

And while many solutions exist for cybersecurity of a plant's control system, this type of edge computing can be part of your overall cybersecurity strategy: separating different tasks so that the entire plant isn't compromised if a breach happens.

The edge of future cloud computing

While trends in many industries come and go, the benefits delivered by cloud computing combined with digitalization-ready devices like Sitrans LT500 are here to stay.

Offering flexible data analytics right at the source—while letting your control system focus on the big picture—the edge computing possibilities using this controller are endless.

So, what data are you going to make work for your operations today?

i IDC, "Future of Industry Ecosystems: Shared Data and Insights". Available: https://blogs.idc.com/2021/01/06/future-of-industry-ecosystems-shared-data-and-insights/. Accessed October 20, 2023.

ii Felix Kretschmer, Siemens Digital Industries, "Talking Digital Industries" podcast. Available: https://www.siemens.com/global/en/company/stories/industry/industrial-edge.html. Accessed October 21, 2023.

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