

The Siemens logo is displayed in a bold, teal, sans-serif font.

Ingenuity for life

A lifeline to safety:

Accident prevention with point level instruments

It's a plant manager's worst nightmare: your company making the headlines—not for local economic contributions or product innovation, but because of a fire. Thick, black smoke billowing from your facility, emergency response personnel swarming the scene.

The cause of the UK's high-profile Buncefield oil storage depot explosion in 2005? Overflow during remote filling of a storage tank. Disasters like this led to process industries adopting strict safety and environmental regulations, which you are likely quite familiar with.

But some problems in the life of a plant manager aren't always severe enough to reach international news headlines. However, even overflowing a tank with a fairly benign material can cause major headaches for a company.



The true cost of not using point level

Say you manage a processing plant. In your fuel storage tanks, you typically have anywhere from 1,000 to 1,500 liters of fuel.

Your delivery has arrived, and as operators are filling one of the tanks, your continuous level device provides a false level reading—leading to overfilling and a spill.

Suddenly you have 20 liters of fuel per second overflowing the tank. Operators rush to shut off filling, but with that much liquid escaping that quickly, you now have a big problem.

What kind of costs are you now facing?

- **Loss of product:** with liters and liters of fuel per second spilling from your tank, how many seconds does it take operators to stop filling? How much is each liter of fuel worth?
- **Cleanup costs:** one company that experienced a similar spill estimated business and environmental cleanup costs at nearly US\$50,000—how does that fit into your annual budget?

- **Regulatory agency fine:** depending on the severity of the spill, these penalties can start at US\$10,000-15,000, not to mention the business interruption costs while authorities investigate the accident.

Add these up and you're looking at tens of thousands of dollars for this one incident—as well as the negative publicity and decreased public trust after this accident reaches the local news.

What's more, this was just a smaller spill where no one was injured. Can you imagine the ramifications if this happened with a hazardous or corrosive chemical or if workers were unable to get out of the way?

Had you outfitted your storage tanks with point level backup in the form of an RF capacitance switch or vibratory fork, once the material reached your high-level alarming point, the switch would have immediately sent a signal to your control system and local indicator and the filling would have stopped.

Although many plant managers see point level instrumentation as optional or auxiliary devices, in reality, these switches are inexpensive tools that save you money and can protect worker and environmental safety.

Testing... testing?

In applications where point level instruments are used for backup high- or low-level alarming, your reliable continuous level instrumentation likely means that point level devices are rarely called upon.

That being said, you do need to ensure that these safety systems always work if something goes wrong. But how much time would it take to send an operator to each and every device in your plant? A large tank farm could have hundreds of high- and low-level switches—testing each one to ensure ongoing reliability is quite the time commitment and a safety concern to the operator doing the testing.

With remote testing, however, operators no longer need to directly access the device to check that it is functioning properly. From a convenient location via local push button testing—a single- or two-channel remote test signal conditioner—or from the comfort of the control room, for example, you can check that your SITRANS LVL200 vibrating fork is working well.

Returning to the Buncefield disaster, the high-level switch at the root of the problem had been installed for overfilling prevention but was unintentionally left deactivated after a previous test.

With proper procedures, this could have been avoided: an integrated control system or remote testing with SITRANS SCSC—a remote signal conditioner for testing the vibrating fork at ground level with a simple push button functional test—would catch a deactivated instrument.

Increasing safety in your facility by adding an extra layer of protection in case the primary level system faults. No spill, no cleanup—just the initial cost of the point level instruments coupled with convenient remote testing—at an absolute fraction of what you might spend if a spill occurred.

SIL: back to basics

So, we have determined that safety is one of the most important factors in your process. In order to maximize safety, you may consider ensuring your instrument meets the SIL standard to allow them to be effectively installed in your safety system.

A safety integrity level (SIL) is defined in IEC 61508-4 as “the probability of a safety-related system satisfactorily performing the required safety functions under all stated conditions within a stated period of time. The higher the level of safety integrity, the lower the probability that the safety-related system will fail to carry out the required safety functions.”

Such standards, combined with intelligent diagnostics and reliability, is where plant safety begins. A few examples of instruments that meet the SIL standard:

- **SITRANS LVL200** is able to continuously monitor its status through vibratory monitoring and will provide an indication should the unit detect excessive corrosion or other malfunction of the device. Keeping an eye on its own performance and alerting your control system, this device will detect emerging conditions before reliability is affected.
- **Pointek CLS** capacitance level switch also does this but even more effectively: digital versions of the switch provide Profibus communications advanced diagnostics, remote configuration, and remote testing directly from the control room.
- And **SITRANS LPS** has a continuous rotation monitoring solution that ensures reliability of the paddle switch, as motor rotation is monitored through a magnetic pulse sensor.

Ideally, you can find all these instruments from a single supplier. Siemens provides end-to-end automation solutions—sensors and analytics to control systems and beyond—with safety integrated into all aspects of your applications.



With options for high temperatures, extreme pressures, remote testing, and covering your SIL application requirements, these switches provide solutions for most industries.

RF capacitance products can handle solids, liquids, slurries, foams, and interface detection all with one product, making it the true universal point level solution.

SITRANS LPS200 rotary paddle switch brings reliable and safe point level detection to a range of applications.

Technology guide for every day savings and efficiencies

But my level instruments haven't malfunctioned before—and my operators are always watching closely while filling, so what are the chances of this happening in my plant?

Of course, we all hope that spills are not an everyday occurrence. By adding point level instruments to your processes, though, it's not only accident prevention that you gain.

Manual measurements—operators climbing tanks—put your staff in the application environment, increasing the risk of an accident and exposes them to the potential hazardous fumes from the open vessels.

For high- or low-level detection, interface, or dry run protection—point level switches will reduce your maintenance, downtime, and equipment replacement costs. But how to choose the correct technology for your application? Let's take a look:

The technology: rotary switch

One of the only paddles available with functional safety SIL2 options, SITRANS LPS200 rotary paddle switch brings reliable and safe point level detection to a range of solids applications.

How it works: The instrument's motor continuously rotates its paddle—when the bin or tank is empty, the paddle rotates freely. When solids material reaches the switch, it stops the paddle from moving, blocking its rotation. This activates an output switch in the device's electronics and sends a signal to the control system (or indicator lights, alarm, etc.).

Where it's best suited: Bulk solids, from low-density aerated powders to high-density aggregates.

Where you've seen it before: In a busy UK flour mill, SITRANS LPS200

level paddle switches monitor high and low levels on a small stainless-steel hopper containing gluten.

When this fine powder reaches the low level, gluten is added to the hopper from the main gluten storage silo, which then stops filling the hopper once material reaches the high level. From here the gluten is dosed into the main finished product flour stream according to each recipe.

Previously the mill used a different level switch, but the clutch assembly inside the rotary switches broke down fairly quickly. The SITRANS LPS200 switches, however, have been in service for years without any problems. The device's unique friction clutch design ensures reliability by preventing damage from any falling material impacting the instrument. And with its added rotation monitoring features, the instrument constantly self-monitors against failure.

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Ingenuity for life

Protect your investments




People, processes, equipment and business. Certifications like SIL, internal monitoring and remote testing provides peace of mind.

 **Simplify your life**
The source for your complete integration from sensor to cloud

Engineered for process industries.

SITRANS point level switches

 **Conquer harsh and tough conditions**

Engineered to perform in your most difficult applications

Evolve your business

Digitalization brings the critical field data where it is needed, unlocking hidden and unknown opportunities



We have a solution for any application

Solids, liquids, slurries or interface?

Configurations with approvals and options for your application needs



The technology: vibratory switch

With options for high temperatures, extreme pressures, remote testing, and covering your SIL application requirements, these switches provide solutions for most industries.

How it works: The tuning fork is piezoelectrically energized and vibrates at its mechanical resonance frequency between 90 and 1400 Hz. When solid or liquid material touches the fork, the frequency of vibration changes, and the instrument sends a signal to the control system or alarm.

Where it's best suited: High, low, and demand levels in solids and liquids applications; ideal for extremely low bulk density applications; the solids version works well in dry conditions and applications with limited buildup.

Where you've seen it before: A Scandinavian oil recovery center uses SI-TRANS LVL100 vibrating level switches on its process vessels in which heat and chemicals separate contaminants from slop oil. The switches are programmed to alarm if oil reaches a set low level in the process vessel.

Since oil is pumped from container to container, operators need to know if there is not enough oil in a certain vessel, as they don't want pumps to run dry. The point level devices keep operations running efficiently and prevent costly equipment repair from a lack of oil in a vessel's pumps.

The technology: inverse frequency shift capacitance

Capacitance switches' robust aluminum or chemically resistive plastic enclosures last in harsh and abrasive environments, guaranteeing a long service life and low cost of ownership. RF capacitance products can handle solids, liquids, slurries, foams, and interface detection all with one product, making it the true universal point level solution.

Where it's best suited: Dusty, turbulent, or vaporous environments or applications with foam or product buildup; excels at interface measurements.

How it works: The switch responds to the presence of any material with a relative dielectric constant of 1.5 or more by detecting a change in capacitance, which is registered as a change in oscillating frequency. Regardless of tank wall material, there is no requirement for a reference electrode. The unit is so sensitive it can detect even the approach of material or detect material from the outside of a plastic vessel in case a non-contact installation is preferred.

Where you've seen it before: A North American cement plant uses Siemens Pointek CLS300 capacitance level switches mounted at the top of their kiln dust baghouse hoppers, where they provide high-level alarming. If material reaches a certain point in the hopper, an alarm alerts technicians to the problem before buildup reaches a critical level.

The price of doing (safe) business

Plant managers around the globe have discovered the true benefits of Siemens point level, realizing that these inexpensive devices are critical for your plant's safe operation. Integrating into your plant's control system and digital initiatives, these instruments give you critical field data when and where it is needed.

Not to mention that when it comes to the safety of your workers and equipment, even one not-so-disastrous spill so vastly outweighs the cost of purchasing and installing these devices that you simply cannot afford *not* to have them working for you across your plant.

With options as simple or sophisticated as you need them to be, point level devices are your answer for cost-effective demand level, dry run protection, and critical safety backup applications.

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