

SIEMENS

Process Instrumentation and Analytics

Process control for energy-efficient operations

Wastewater



Answers for industry.

Process control for energy-efficient operations

Wastewater treatment process technologies continue to improve. To take advantage of their full potential, they require process measurement and control as robust and long-lasting as they are. Our cost-effective process instrumentation gives you the reliability, seamless integration and automation you need to deliver the best treatment efficiency, optimized energy consumption and safe processes, whether you are modernizing existing treatment plants or developing new ones.

Wastewater treatment plants require efficient process control to make sure that effluent is treated cost-effectively while also meeting environmental regulations. Partnering with Siemens provides the reassurance of best-in-class products, and the precision, integration and reliability in process automation to help you deliver optimum efficiency and productivity.

Our technology provides solutions to the challenges of wastewater treatment, where constant change in flow rates, rapid changes in level, chemical dosing and storage and remote locations are common place. Reliability in arduous applications is paramount, and Siemens products are designed to meet the challenge.

Higher process efficiency through

- Precise inventory and dosing of expensive chemicals
- Seamless and easy integration into various digital networks and control systems
- Better process transparency

Improved energy efficiency through

- Accurate control of energy-intensive pumping systems based on ultrasonic level monitoring technology
- Precise control of inlet, process and outlet flows to keep pumping to a minimum
- Monitoring of sludge inlet, Return Activated Sludge flow, and air flows to diffusers

Efficient asset management through

- Quick, easy installation and commissioning
- Predictive maintenance features reducing breakdown and preventative maintenance costs
- Higher availability of instrument life cycle data



Spotlight on Warsaw's Czajka wastewater treatment plant:

Integrated automation solution for a new wastewater treatment plant in Warsaw, Poland

In order to ensure that Warsaw's growth remains healthy, a new wastewater treatment plant is being built so that all of the city's wastewater can be treated. The plant is equipped entirely with Siemens automation technology. This massive construction project will not only be the largest but also the most modern wastewater treatment plant in all of Poland.

This new project will treat the wastewater of the roughly 2.1 million inhabitants and will greatly improve the water quality of the Vistula, Poland's longest river, as well as increase the quality of life for the people who live nearby. The 52.7 ha facility also includes a thermal processing plant that generates power and heat from the sludge.

The process automation for the whole plant is based on the SIMATIC PCS 7 process control system. A redundant architecture with highly available SIMATIC S7-400 systems and communications via PROFIBUS provides the required plant availability and offers room for functional enhancements.

In the final installation, process data will be captured by the SIMATIC PCS 7 automation system, which is networked with process instrumentation and analytic devices via PROFIBUS. More than 200 Sitrans flowmeters, more than 100 MultiRanger continuous level controllers and Pointek level switches, and numerous ULTRAMAT gas analyzers are installed in the plant. All the parameterization of these instruments was done via SIMATIC PDM (Process Device

Manager) which is a universal, vendor-independent tool for the configuration, parameter assignment, commissioning, diagnostics and servicing of intelligent field devices (sensors and actuators) and field components such as remote I/Os. Devices can be easily integrated into PDM by importing their EDDs (Electronic Device Descriptions). Communication is possible on HART, PROFIBUS PA / DP, Modbus, Ethernet, or FOUNDATION Fieldbus, and PCS 7 integrates the process control system's asset management. This solution from Siemens saved investment costs, training expenses and maintenance costs.

In fact, even during the plant's construction, Siemens COMOS plant engineering software was used. COMOS is a software solution for the entire plant life cycle. Siemens is the only supplier worldwide to carry out integrated plant asset management projects over the entire life cycle of an industrial plant, assimilating planning and operating environments.

Scan to watch the Czajka wastewater plant video



Solutions to match your needs

From wastewater collection to wastewater treatment and bio-solids (sludge) treatment facilities, we have process instrumentation and analytic solutions to meet your needs. The following pages will provide you with the best instrumentation solution for your application. To find more about our key products for the wastewater industry, including case studies, references and interactive process charts, please visit:

www.siemens.com/sensors/water



1 Optimal pump station control

The monitoring of water level in the wet well and controlling the fixed speed of the variable frequency-driven pumps is demanding. Level, volume, flow and the pump need to be controlled continuously.

Preferred device: **Ultrasonic level controller SITRANS LUT430 and Echomax XPS transducers**

- Real-time clock with energy-saving algorithms to reduce pump operating costs
- Local user interface, push buttons and graphical wizards for quick and intuitive start-up
- Patented digital receiver provides reliable and robust performance in tough applications
- Advanced diagnostics provides echo profiles and process-variable trending on the display and auto-false echo suppression eliminates false echoes

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2 Open-channel flow monitoring

Plant operators require logs of highly accurate data of influent flow into and effluent flow out of the wastewater treatment to meet regulatory demand.

Preferred device: **SITRANS LUT 440 with Echomax XRS-5 transducer and external temperature sensor TS-3**

- Accuracy of ± 1 mm within 3m (10 feet) range
- Built-in datalogger for alarms, process-variable and open-channel flow
- External temperature sensor TS-3 for faster response to changing ambient temperatures
- Fast commissioning through 13 preconfigured primary measuring devices

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3 Return Activated Sludge (RAS) and Waste Activated Sludge Flow Rate Control (WAS)

Part of the activated sludge settled in the secondary clarifier RAS is returned back to the aeration tank and WAS is sent to the bio-solids treatment facility. The ratio of RAS to WAS is critical and is controlled using electromagnetic flowmeters.

Preferred device: **SITRANS F M Mag 5100W and SITRANS F M MAG 5000/6000 transmitter**

- Various liners and electrode materials
- Accuracy up to $\pm 0.2\%$ of the flow rate reading
- Available from sizes DN15 to DN2000 (1/2" to 78") with varieties of process connections
- SENSORPROM unit automatically uploads calibration and settings values for easy commissioning
- Patented in-situ verification with the verifierator
- HART, FOUNDATION Fieldbus, PROFIBUS PA/DP, Modbus

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4 Optimal filtration control

The filtration is a final separation process before the wastewater is sent to disinfection. The filter back-wash operation is carried out using head loss measurement across the filters using differential pressure transmitter.

Preferred device: **SITRANS P DS III**

- Highly reliable and accurate long-term performance
- Wetted parts are made of high-grade materials
- Quick and simple 3-push button local programming
- Supports HART, Wireless HART, PROFIBUS PA, and FOUNDATION Fieldbus
- Replace electronics and sensors at site without recalibration

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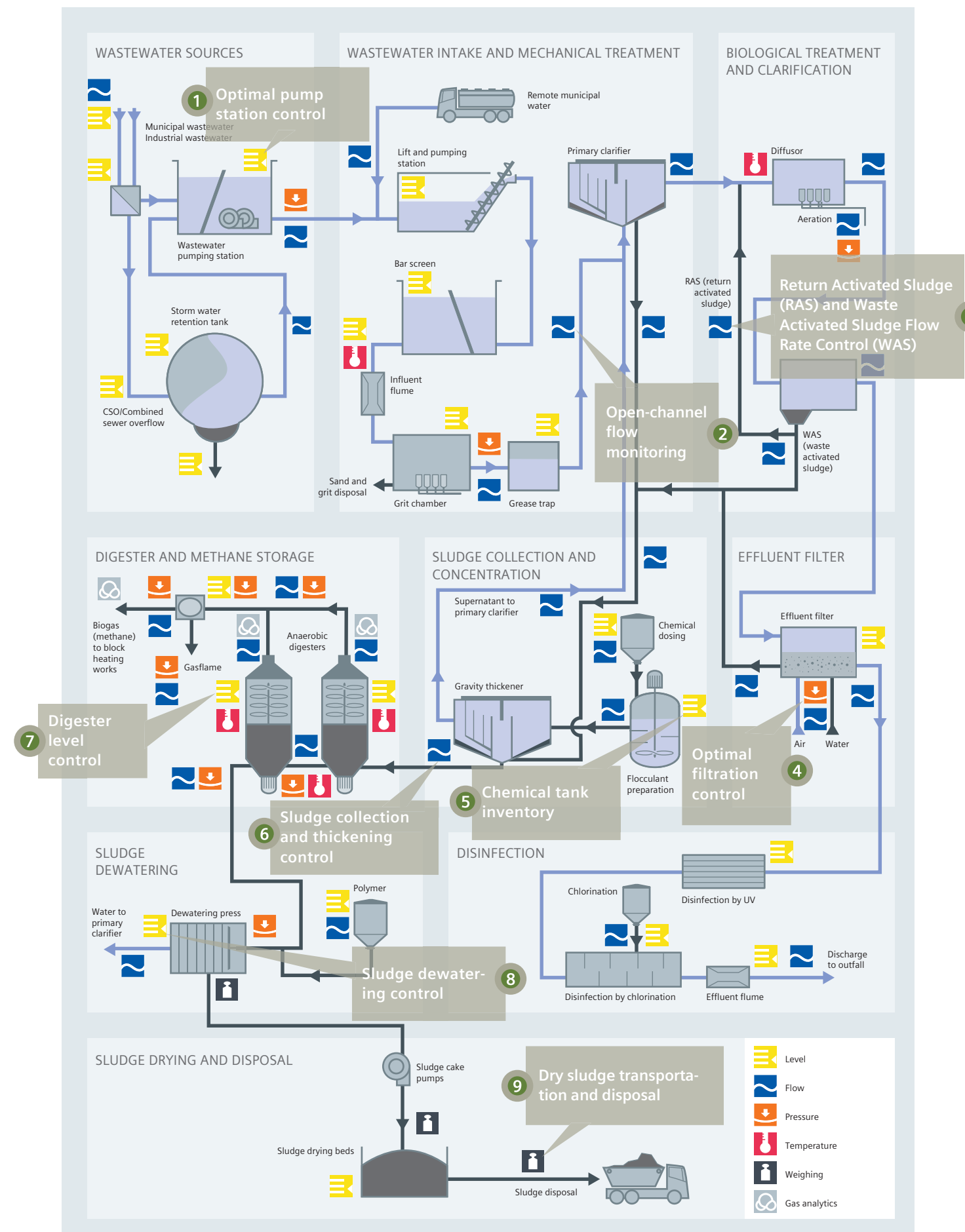
5 Chemical tank inventory

The inventory level of chemicals used for the wastewater process is monitored and the dosing is controlled. The wastewater is disinfected using chlorine, ozone or ultraviolet and is discharged safely into the environment.

Preferred device: **SITRANS LR250 PVDF**

- Fully insulated PVDF antenna is compatible with corrosive and aggressive chemicals
- 25-GHz high-frequency pulse radar with 2" (DN 50) threaded connection
- Patented Process Intelligence software for continuous reliable measurements
- Graphical local user interface for quick and easy start-up. Echo profile on display
- Communication with HART, PROFIBUS PA and FOUNDATION Fieldbus
- Hazardous area approvals

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6 Sludge collection and thickening control

This process thickens the sludge coming from primary and secondary clarifiers and reduces its volume. It is then sent to the sludge stabilizing process. Flocculent inventory and dosing control as well as the supernatant water flow monitoring back to the wastewater treatment plant are crucial for the operation.

Preferred device: **SITRANS F M MAG 1100 and transmitter SITRANS F M MAG 5000/6000**

- SITRANS F M MAG 1100 is suitable for all applications with highly corrosive and aggressive chemicals, pulsating and/or low flows from dosing pumps with superior accuracy of 0.2%
- Designed for the patented in-situ verification with the verifierator
- Automatic reading of SENSORPROM data for easy commissioning
- Communication modules for HART, FOUNDATION Fieldbus, PROFIBUS PA/DP, Modbus

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7 Digester level control

The sludge from the thickening process, consisting of solids and bio-solids, is stabilized to reduce pathogens, and eliminate the offensive odors. One of the stabilization processes is the anaerobic digestion. Level control in the digester is critical.

Preferred device: **SITRANS LR200, Pointek CLS200**

SITRANS LR200

- 5.8-GHz (6.3-GHz in USA) radar tolerates condensation, and is not affected by the presence of methane gas and carbon dioxide in the digester
- Patented sliding wave guide antenna enables in-situ installation or removal of the radar
- Hazardous area approvals

Pointek CLS200

- Detects foam and prevents overspill of foam
- Highly tip-sensitive probe not affected by build-up and condensation
- Hazardous area and overspill protection approvals

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8 Sludge dewatering control

Stabilized sludge from the digester still contains about 90–95% of its water. Dewatering is typically a mechanical process, like filter belt press, in which the sludge level must be controlled to prevent damage to the press.

Preferred device: **SITRANS Probe LU**

- 2-wire loop-powered ultrasonic level transmitter for easy installation
- Choice of ETFE or PVDF transducers for chemical compatibility
- The active face provides self-cleaning and is not affected by condensation
- Auto-false echo suppression feature eliminates false echoes
- Level-to-volume or level-to-flow conversion
- Hazardous area approvals

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9 Dry sludge transportation and disposal

The sludge from the dewatering press is transported via belt conveyors, monitored by belt scales or by a screw conveyor, protected by motion sensors.

Preferred device: **Milltronics MSI belt scale, MFA-4P and MSP-12 probe**

MSI belt scale

- Unique parallelogram load cell design for exceptional accuracy and repeatability
- Accurate operation under uneven loadings and fast belt speeds, suitable for retrofit applications
- Various communication protocols including PROFIBUS, PROFINET, Modbus TCP/IP, EtherNet/IP

Motion sensor

- Heavy duty-general-purpose motion probe
- Quick and easy mounting of flanged probe with locknut
- Switch detects over or under speed

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A comprehensive Portfolio for all Applications

Siemens process instrumentation has a comprehensive, proven product portfolio. This overview shows the entire spectrum of our process instrumentation and analytics portfolio for the wastewater industry.

Level

Whether you are measuring liquids, slurries, or bulk solids in wastewater collection, wastewater treatment, and bio-solids treatment, Siemens provides level measuring technology for both continuous and point level measurements. Siemens offers a comprehensive range of ultrasonic, radar, guided wave radar, capacitance, hydrostatic, differential pressure, and electro-mechanical type level measuring technologies.



Flow

Siemens offers a wide range of electronic flow measuring technologies based on principles of Electromagnetic, Coriolis, In-line Ultrasonic, Clamp-on Transit time and Doppler, Differential Pressure, Vortex and Variable Area to measure liquids, slurries, gases and steam flows. Electromagnetic flow measuring technology is the most used technology to measure flow in the wastewater industry.



Pressure

Siemens offers a comprehensive range of pressure transmitters to measure absolute, gauge, differential and hydrostatic pressure for level, flow, pressure and head loss measuring applications in wastewater industry. The product highlight is SITRANS P DS III that has outstanding accuracy, robust long-term performance and large installed base in the wastewater industry.



Temperature

Siemens temperature transmitters SITRANS T covers head, rail and field transmitters. They support all common RTDs, thermocouples, resistance and millivolt-sensors and specific sensors to match all applications in the wastewater industry.



Weighing

The comprehensive Siemens weighing portfolio includes belt scales, weighfeeders, solids flowmeters and static weighing. Milltronics MSI belt scales are a preferred solution for continuous weighing of in-line sludge transportation for optimizing truck loading operation in sludge disposal facilities across the world.



Process protection

A wide range of rugged and reliable process protection devices such as motion sensors ensures that mechanical equipment like screw conveyors in sludge disposal facilities maintain their set speed, informing operators in case of breakdown or failure, helping improve availability of assets.



Gas analysis

Siemens offers a comprehensive range of products and systems for process analytics. It includes continuous gas analyzers for stand-alone and system solutions.



WirelessHART communication components

Our WirelessHART portfolio includes battery-powered transmitters, adapters as well as a gateway. With our WirelessHART solutions, users profit not only from lower total cost of ownership but also from significantly improved process diagnostics, productivity and security.



Remote Data Manager

The remote data manager SITRANS RD500 is equipped with Ethernet, GSM / GPRS as well as cellular or landline connectivity. It provides integrated web access, alarm handling and data capture for instrumentation.



Find out more:

www.siemens.com/pia-portal

Learn more about our process instrumentation products for your industry in the PIA Life Cycle Portal, the tool for engineering, ordering, installation and operation. Just click on "Selection by Industry."

Scan to explore the PIA Life Cycle Portal



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