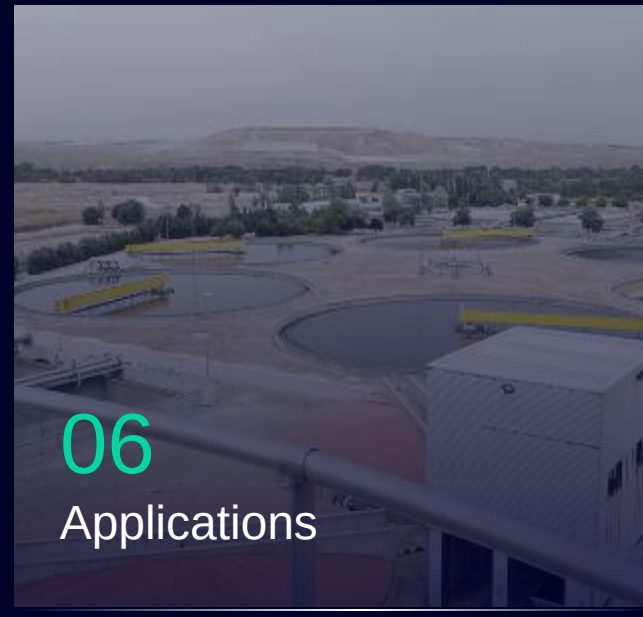
Water Industry
Process Instrumentation Expertise

www.siemens.com/sensors/water

SIEMENS

Every drop counts …



SIEMENS

Introduction

Go easy on resources, optimize energy consumption, avoid water losses, prevent flooding, perform predictive servicing and maintenance …

There are many challenges facing the water industry. And they will only increase with the trend toward urbanization and the transition to a new energy mix.

Digitalization

By 2020, the digital universe will reach **44 zettabytes** – a 10-fold increase from 2013[1]

- Impact on all industries

Demographic change

The earth's population will increase from 7.3 billion[2] people today to **9.6 billion**[3] in 2050. Average life expectancy will then be 83 years[2]

- Impact on pharmaceutical and F&B industry

Climate change

According to scientists, in the summer of 2015, earth's atmosphere had the **highest CO_2 concentration** in 800,000 years[4]

- Impact on water industry

Urbanization

By 2050, **70 percent of the world's population** will live in cities (2014: 54 percent)[3]

- Impact on water and glass industry

Globalization

The **volume of world trade** nearly **doubled** between **2000 and 2014**[5]

Sources:
1. IDC, The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things, April 2014
2. United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP.241
3. United Nations, World Urbanization Prospects: The 2014 Revision, New York, published 2015
4. SCRIPPS INSTITUTE OF OCEANOGRAPHY, The Keeling Curve. November 11, 2015
5. UNCTAD Statistics, Values and shares of merchandise exports and imports from 1948 to 2014. November 10, 2015

01

Digitalization

- Increased flexibility in volatile, heterogeneous, global markets.
- Seamless integration of the engineering along the entire life-cycle.
- Optimized productivity, energy and resource efficiency.
- Vertical integration and networked production systems for continuous, safe and reliable operations.
- Mitigation of demographic change.

02

Digitalization

Digital plant design, tools and processes by

Integrating engineering information and processes in one data model with interfaces to different engineering and automation systems.

Production excellence by

Execution of operation and maintenance tasks without media breaks thanks to a seamless transition and the consistent data flow between engineering and plant operation.

Benefits:

Lower CAPEX and Optimal OPEX with …

- Optimum efficiency
- Increased reliability
- Higher quality
- Smarter decisions
- Greater flexibility in optimization

SW Solutions

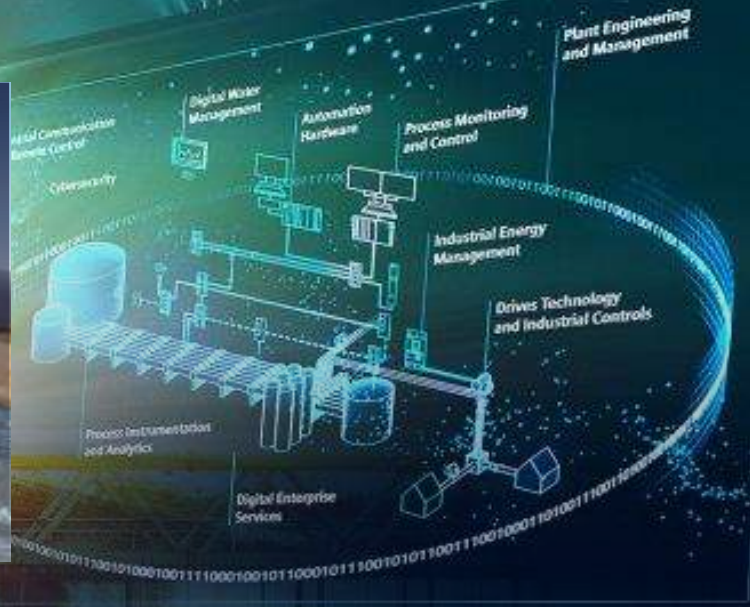
Apps to make smart use of plant data

SITRANS IQ

The apps provide life lists, diagnostic data, and change and knowledge management. They display operation patterns and monitor limits.

Our apps use the data obtained from field level, combine it, and generate valuable KPIs that help you with plant optimization.

- SITRANS serve IQ
- SITRANS store IQ
- SITRANS mobile IQ
- SITRANS SCM IQ



Server-based application for the collection of measurement data from distant measuring points.

03

SW Solutions

Apps to make smart use of plant data

SITRANS IQ

The apps provide life lists, diagnostic data, and change and knowledge management. They display operation patterns and monitor limits.

Our apps use the data obtained from field level, combine it, and generate valuable KPIs that help you with plant optimization.

- SITRANS serve IQ
- SITRANS store IQ
- SITRANS mobile IQ
- SITRANS SCM IQ

Easily implement cloud-based real-time (inventory) monitoring and lay the foundation for effective inventory management.

SW Solutions

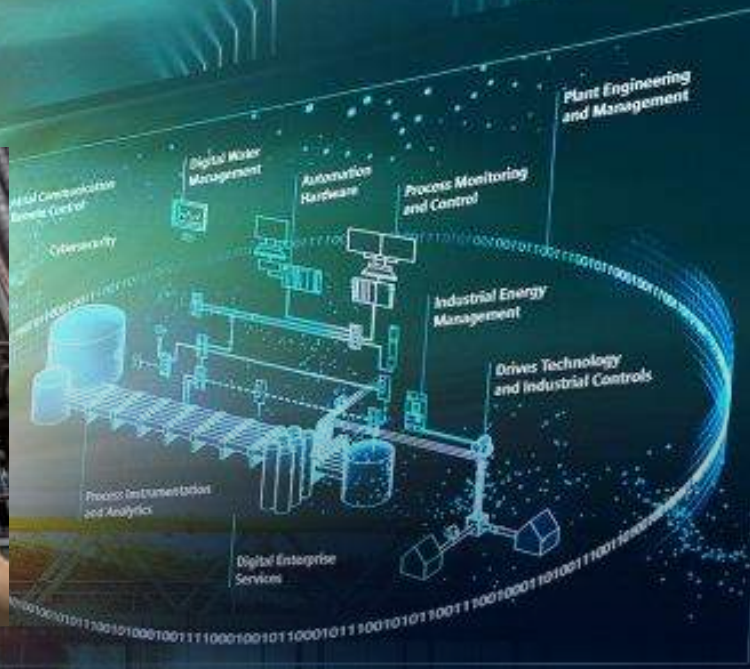
Apps to make smart use of plant data

SITRANS IQ

The apps provide life lists, diagnostic data, and change and knowledge management. They display operation patterns and monitor limits.

Our apps use the data obtained from field level, combine it, and generate valuable KPIs that help you with plant optimization.

- SITRANS server IQ
- SITRANS store IQ
- SITRANS mobile IQ
- SITRANS SCM IQ



An app that gives you easy access to field devices from your smartphone or tablet. Via a Bluetooth connection, supported field devices in the environment can be easily and quickly commissioned, parameterized and monitored.

SW Solutions

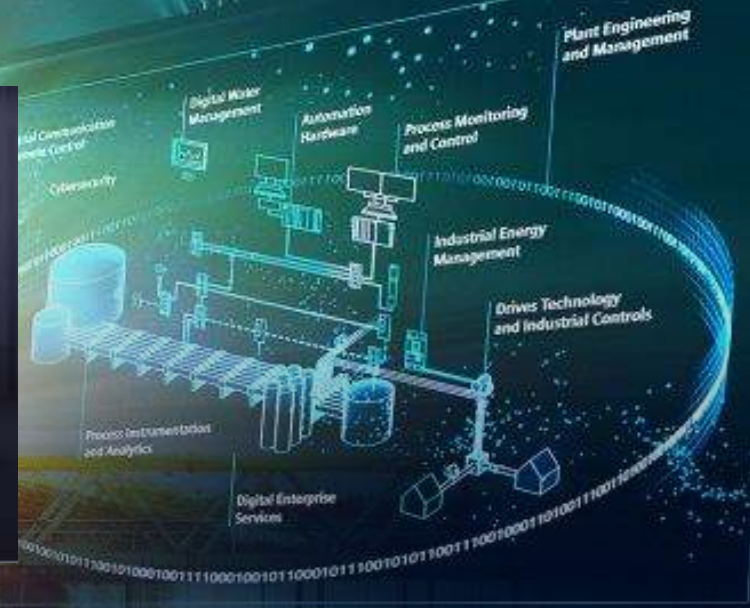
Apps to make smart use of plant data

SITRANS IQ

The apps provide life lists, diagnostic data, and change and knowledge management. They display operation patterns and monitor limits.

Our apps use the data obtained from field level, combine it, and generate valuable KPIs that help you with plant optimization.

- SITRANS server IQ
- SITRANS store IQ
- SITRANS mobile IQ
- SITRANS SCM IQ



IIoT multisensors timely detect impending equipment failures thanks to AI-based anomaly detection at your pump stations, improving plant performance by avoiding major shutdowns.

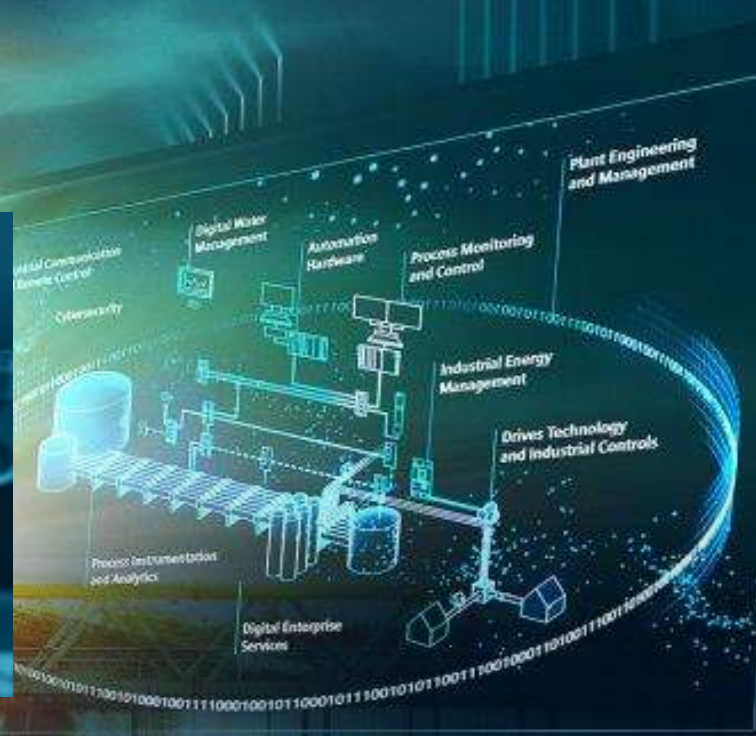
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



SIWA Leak detects larger and creeping leaks in water transport pipelines.

SIWA Leak Plus is an innovative solution for leak detection in water distribution networks based on AI.

As a supplement to existing control and automation systems, providing information on the status of the water pipeline.

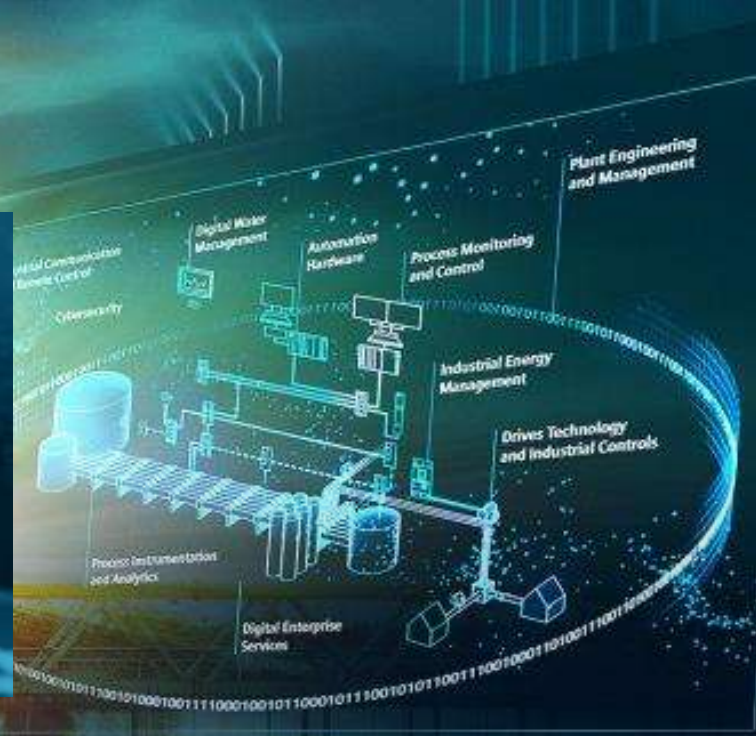
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



SIWA Burst analyzes high-frequency pressure fluctuations using intelligent algorithms. Detected pressure anomalies are classified in order to identify pipe breaks in real-time. Damaged areas can be detected and localized with an accuracy of 20 to 50 meters.

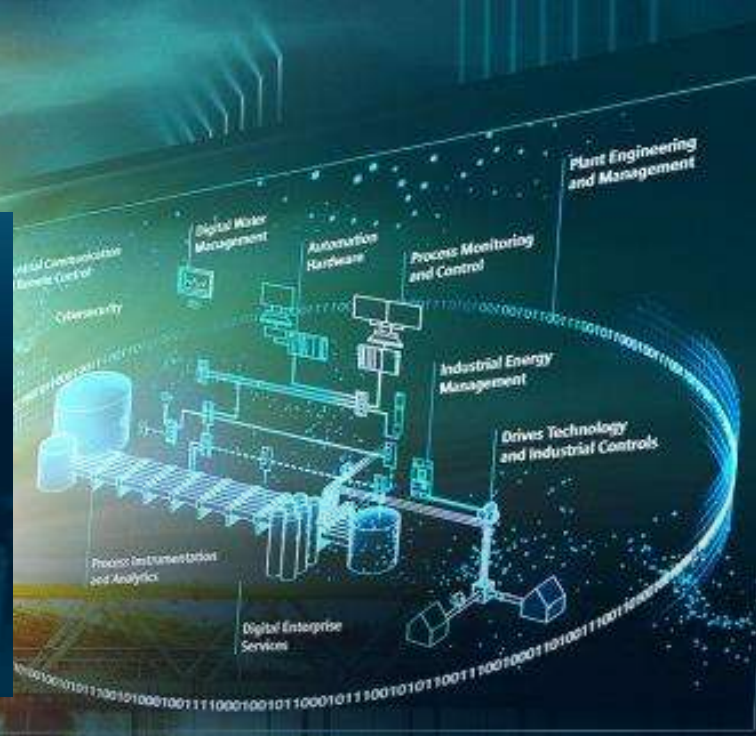
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



SIWA Optim is a solution for the intelligent, energy-optimized control of pumps and valves based on the latest system data and demand forecasts as well as daily updated energy prices. It allows operators to reduce energy consumption by up to 15 percent and ensure optimal security of supply.

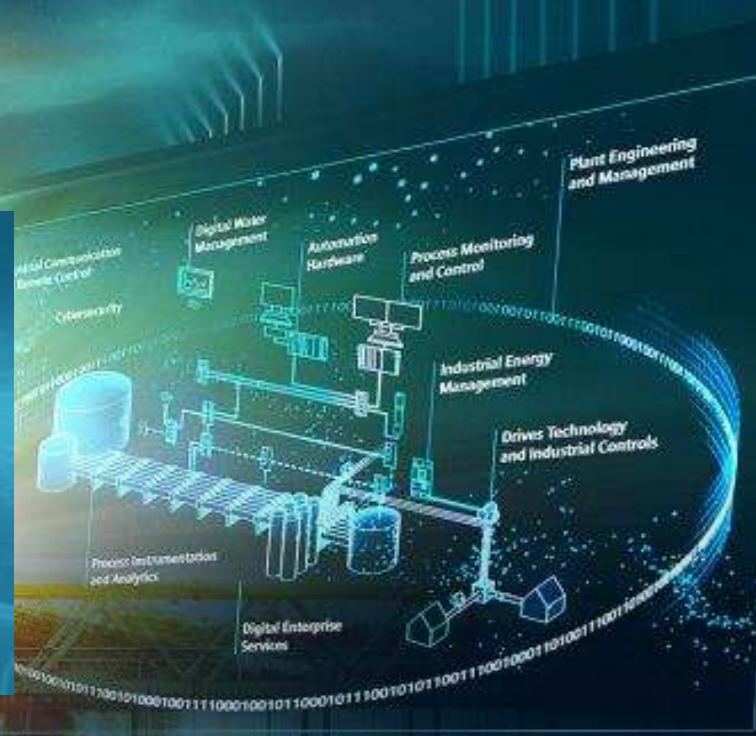
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



SIWA Sewer ensures optimum utilization of the sewer network, thereby preventing waste water from being discharged into natural waters.
Optimizing water treatment performance by stabilizing the inflow to the treatment plant so that the operator can run the facility more efficiently.

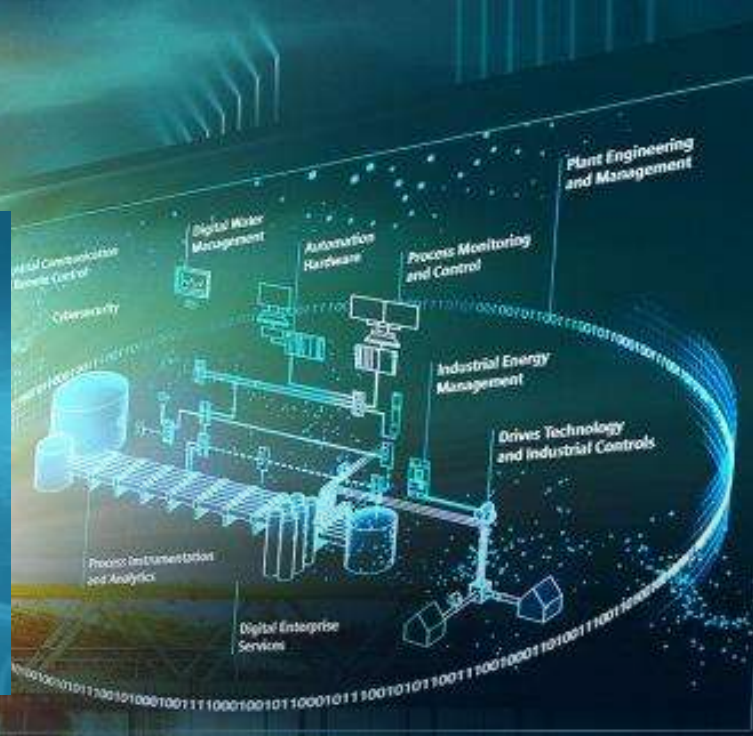
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



SIWA Blockage Predictor, a Siemens MindSphere solution, evaluates combined sewer overflow behavior in real-time, providing a better understanding of the system's performance and provide advanced warning of abnormal behaviour indicative of a blockage or forming blockage.

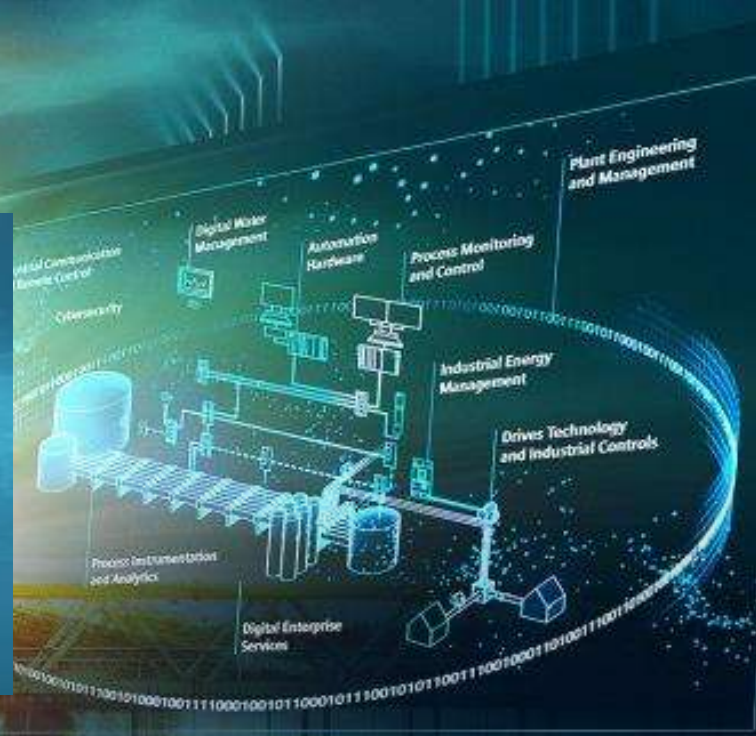
SW Solutions

Smart apps for greater efficiency and security of supply

SIWA Suite

Developed for the water and waste water industry to optimize energy efficiency, avoid water loss, reduce contamination of water bodies and take predictive maintenance measures.

- SIWA Leak / Leak Plus
- SIWA Burst
- SIWA Optim
- SIWA Sewer
- SIWA Blockage Predictor
- SIWA Pump Guardian



The SIWA Pump Guardian is a secure IoT solution that prevents blockages and makes the performance of pumps and pumping stations completely transparent.

The solution helps detect and prevent clogged impellers, blocked pipeworks, and blockages due to single events.

Product Portfolio

Measuring everything that matters

Siemens Process Instrumentation offers you innovative, single-source measurement solutions to increase plant efficiency and enhance product quality.

Our intelligent instruments are designed for seamless interplay with the larger world of industrial automation and control systems enabling greater process transparency and smarter decisions for your business.

Regardless of your industry, maintaining high efficiency and quality is only possible when you start at the field level with precise, transparent process measurements.

Pressure

Temperature

Weighing

Level

Flow

Continuous Gas Analyzers **(CGA)** and Laser Gas Chromatographs **(GC)**

04

Pressure portfolio

Every process in your plant brings with it specific requirements.

That’s why SITRANS P pressure transmitters are your complete range of measuring products with different levels of performance, varying load capacities and types of materials.

From hygienic requirements to heavy industry in harsh conditions, SITRANS P has the right instrument for every application.

Temperature portfolio

A device for every requirement.

Siemens temperature portfolio includes sensors, transmitters for head, rail and field mounting and complete measuring points.

Combine that with an entire range of communications options, giving you complete integration of field devices into your plant.

Highly accurate, flexible, fully supported: SITRANS T temperature sensors and transmitters do everything you need them to.

Weighing portfolio

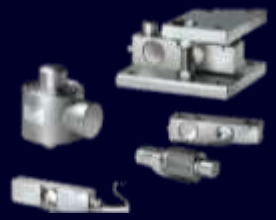
SIWAREX offers a broad range of weighing electronic systems for nearly every weighing task in every industry.

With SIWAREX DB each individual load cell in your application can be monitored and potential downtimes can be reduced with remote diagnostics for the individual channels.

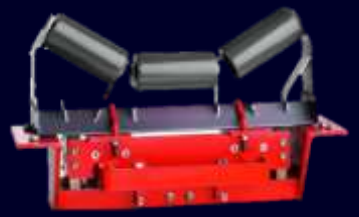
With a track record for consistent performance in harsh environments, our conveyor belt scales combine simple, drop-in installation, low maintenance (no moving parts) and repeatable accuracy for productive operations.

SIWAREX weighing electronics for SIMATIC
Real integration of all weighing applications into the SIMATIC automation environment.

SIWAREX & BW 500 standalone electronics
Proven load cell balance function eliminates matching of cells with advanced PID function.



SIWAREX load cells
Bending and shear beam, s-type and compression cells. Nominal loads from 0.3kg to 500t.



Belt weighing
Featured with simple mounting and low maintenance requirements – isolated from lateral forces – minimal hysteresis & max. linearity.

Flow portfolio

The right flowmeter for every application.

When it comes to boosting your productivity, choosing the right flowmeter can make all the difference.

That's why the Siemens flow portfolio includes a wide range of measurement technologies along with all the options you need to fully customize and optimize your installation.

Our innovative flow sensors, transmitters and systems are tailor-made to meet your needs – and exceed your expectations.

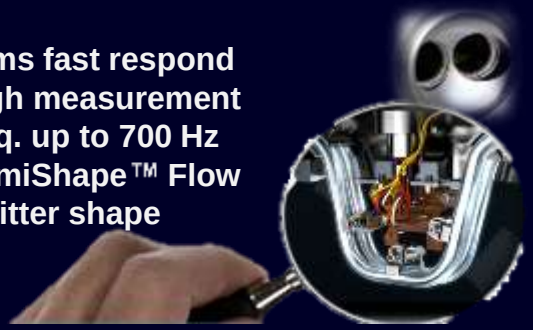
SITRANS FM

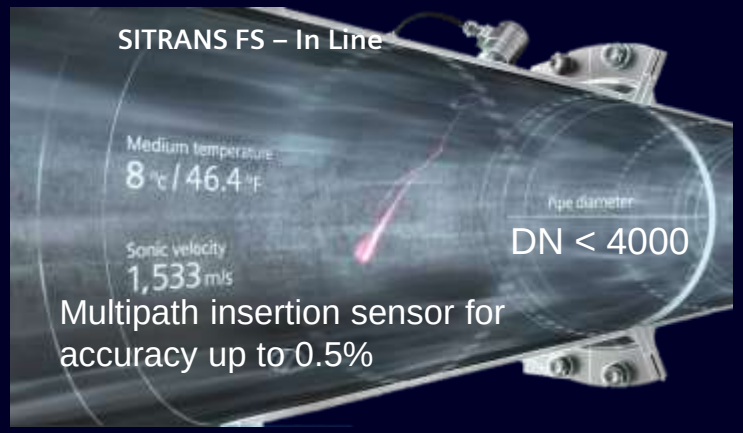
0.2%

Plug-in Comm
Compact/remote

SITRANS FC

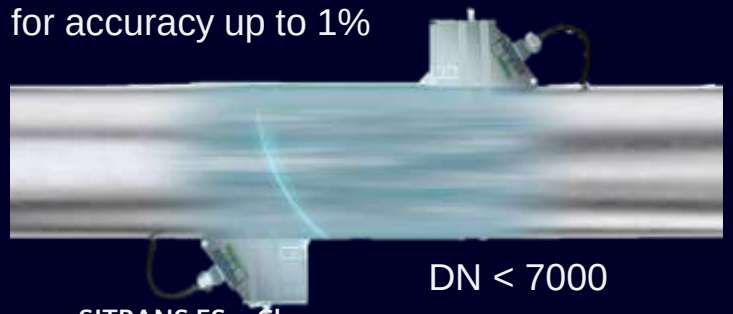
- ✓ 10ms fast respond
- ✓ High measurement freq. up to 700 Hz
- ✓ HemiShape™ Flow splitter shape





Multipath insertion sensor for accuracy up to 0.5%

Wide beam clamp on for accuracy up to 1%



DN < 7000

SITRANS FS – Clamp on

SITRANS FX

- ✓ 0,75% Liquids, 1% Steam & Gases
- ✓ Built in temp. sensor and pressure optional
- ✓ New 2 wired smart transmitter

Level portfolio

A new level of experience in all of your applications.

Built on global experience in the field, Siemens provides a complete range of level measurement devices for every application.

With the knowledge that no single technology can address the needs of all industrial challenges, offering a full range of contacting and non-contacting instrumentation for continuous and point level measurement.

This is what experience buys: installing Siemens level technology is like sitting beside the smart kid in class.

- Ultra compact
- Sensguard probe
- No sensitivity to buildup
- Multiple outputs

Point Level Switches
Various technologies available for extremely reliable and accurate point level measurement.

- High accuracy open channel.
- Single & Dual point level
- Combine Radar & Ultrasonic sensors

Level Controllers
Diverse choices for most of level and flow applications with easy configuration.

- Low energy start up
- Self cleaning face
- Sonic Intelligence®
- Bluetooth wireless & Mobile IQ App.

Ultrasonic Technology
Our devices easily connect into your SCADA & can provide critical data about your processes.

- Enhance performan-ce for liquid storage
- Low sensitivity to turbulence, buildup and foam
- Bluetooth wireless & Mobile IQ App.

Radar Technology
Level measurement for liquids or solids with diverse frequencies and beam angles.

Gas portfolio

Efficient gas analysis

The analysis of process gases is very complex. To obtain exact results on the composition of the gases, the measurement results must be very precise.

Whether innovative analysis technology, tailor-made plant construction, or in-depth knowledge of your application – we support you when it comes to efficient process analysis in compliance with strict legal requirements.

Choose from our comprehensive range of products and systems for process and quality optimization: From the single device to a custom system solution, you get an entire range of innovative and proven devices for a wide variety of applications.

SIPROCESS GA700

The latest generation of gas analyzers makes it possible to combine up to two modules in one housing:

- Wall and rack housing
- IP 65 with ATEX and IEC Ex approval
- Ambient Temp. up to 50 °C (122 °F)

ULTRAMAT 23

Multi-component design with UV and NDIR technology

- O2 and H2S measurement
- UV photometer
- Integrated automatic calibration

SERIES 6

Multi-component design with infrared technology

- CO, CO2, NO, SO2 and CH4 Hydrocarbons
- Up to 2 infrared-active components per device
- Low detection limits & at concentrations

SIPROCESS UV600

UV gas analyzer that can measure up to three components simultaneously.

- NO,NO2, SO2 and HS2
- NO and NO2 simultaneous
- UVRAS technology for low cross sensitivity
- Calibration Manual/Automatic

LDS 6

In-situ gas analyzer for one or two signals form up to 3 measuring points.

- O2, NH3, HF, H2O, CO2, CO, HCl
- Little installation effort
- Rugged design
- Real-time measurement

Treatment process

Discover your process in detail

Our process instrumentation and analytics portfolio has the right solution for any measurement task in the water industry, whether it is making processes more efficient or complying with regulatory guidelines and quality standards.

All measurements can be transmitted wirelessly.

Use our interactive process charts for the different subsegments to find the right solution for your application.

05

Water Intake

Natural water resources are potentially useful, those could come from:

- Surface water such as rivers, lakes, reservoirs, oceans etc.
- Ground water such as wells

Recycling water, traditional sources are:

- Urbanization often involves large and diverse types of discharges which can contain normal sewage known as grey water.
- Industrialization or heavily polluted water (black water) with chemicals, nitrogen, etc.

Treatment and Clarification

Biological treatment is used to remove any material remaining after the primary treatment in the water intake.

The methods can generally be divided into anaerobic and aerobic processes.

Clarification processes removes mineral and organic suspended solids from raw water and also removes the portion of dissolved organic matter that can be coagulated.

Digester and Methane Storage

Biodigesters work on the principle of anaerobic digestion. The process entails waste moving into different chambers where the screened sewage is processed using gas and bacteria.

The process produces an inflammable biogas.

Biodigesters have three chambers: the grease interceptor, a biological digester, and a soak pit.

The sludge digester aids in the decomposition of organic solids, resulting in more stable sludge.

Disinfection

Disinfection provides both bacteriostatic protection against bacterial regrowth as well as a bactericidal effect against low level and occasional pollution affecting the mains network at the same time.

Disinfection blocks the development of micro-invertebrates which could have passed through the plant in resistant (endospores) or reproductive forms (cysts).

Sludge drying and Disposal

Sludge treatment technologies that are used for thickening or dewatering the sludge have two products: the thickened or dewatered sludge, and a liquid fraction which is called liquors.

This liquid requires further treatment as it is high in nitrogen and phosphor, particularly if the sludge has been anaerobically digested.

Phosphorus recovery from sewage sludge or from sludge dewatering streams is receiving increased attention as fertilizer to feed a growing world population.

Water Supply and Distribution

After having treated raw water in water and wastewater treatment plants, the final stage of the water supply scheme is the distribution of water to consumers.

The distribution system is a network of pipelines inside the municipal limit, for transporting purified water to consumers.

Bulk Metering and Leakage Monitoring

Big users are the main water consumers on which water companies could recover up to 60% of the return of the expenses used to produce water, therefore an accurate CT meter is traditionally required.

Water networks traditionally are aged, cracks and holes can be a source of water loss. This precondition asks for an accurate quantification of the amount of water going into the network. A reliable monitoring of pipeline sectors is crucial in order to detect leakages.

Applications

The water industry is undergoing big changes, because new challenges worldwide are demanding consistent approaches and prompt solutions.

The latest innovations from Siemens provide impressive, technologically sophisticated answers to critical questions.

Discover how the powerful and innovative technical solutions from Siemens are contributing to the smooth, reliable, and totally sustainable operation of water supply and waste water systems worldwide.

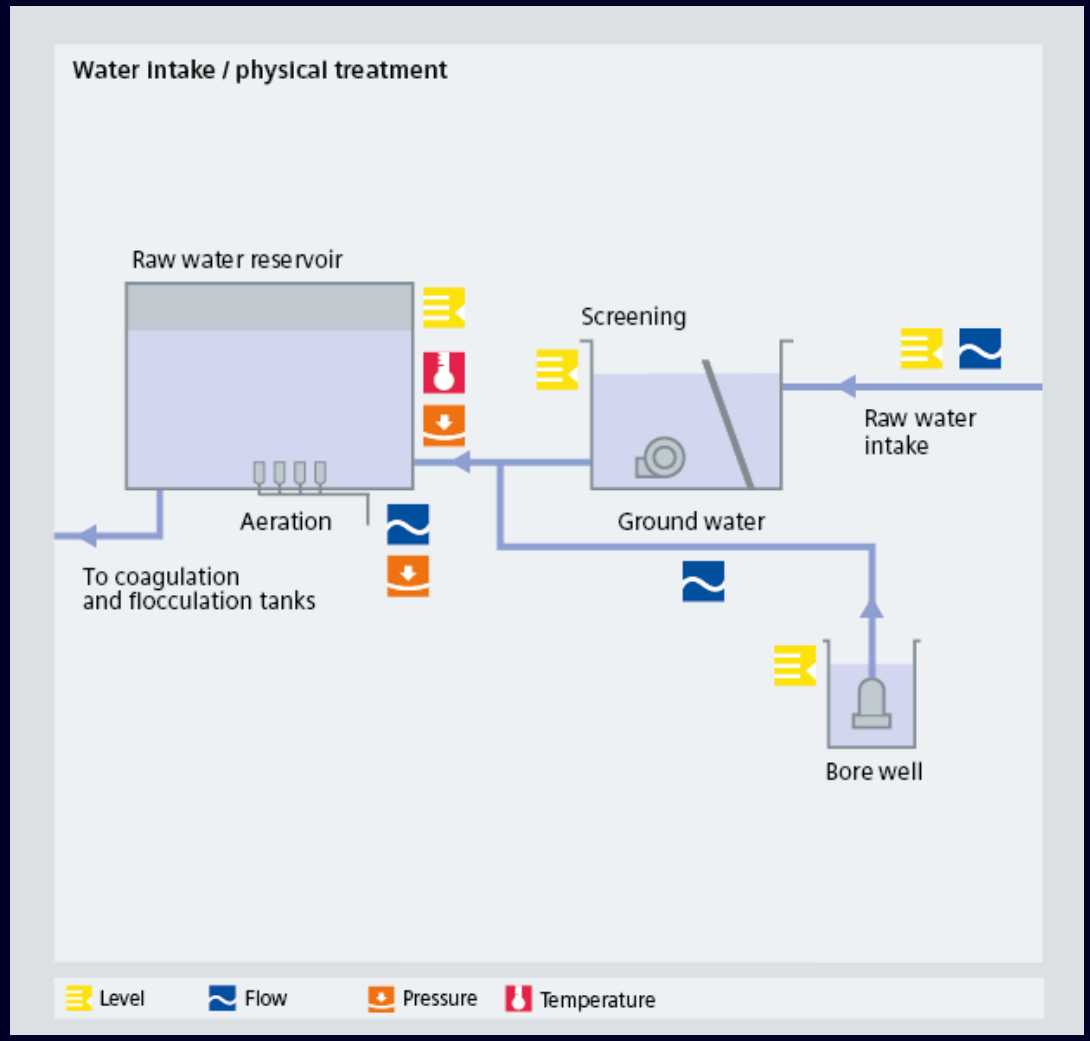
06

Application:
Raw water intake

SITRANS FM MAG 5100W/6000
Electromagnetic flow meter with high performance in diverse environments and mechanical installations.

Customer Benefits

- Available from DN15-2000 (½" - 80")
- EPDM/Ebonite liners and Hastelloy C
- MAG 6000 with 0.2% accuracy and excellent repeatability
- RTU telemetry and in-situ verification.

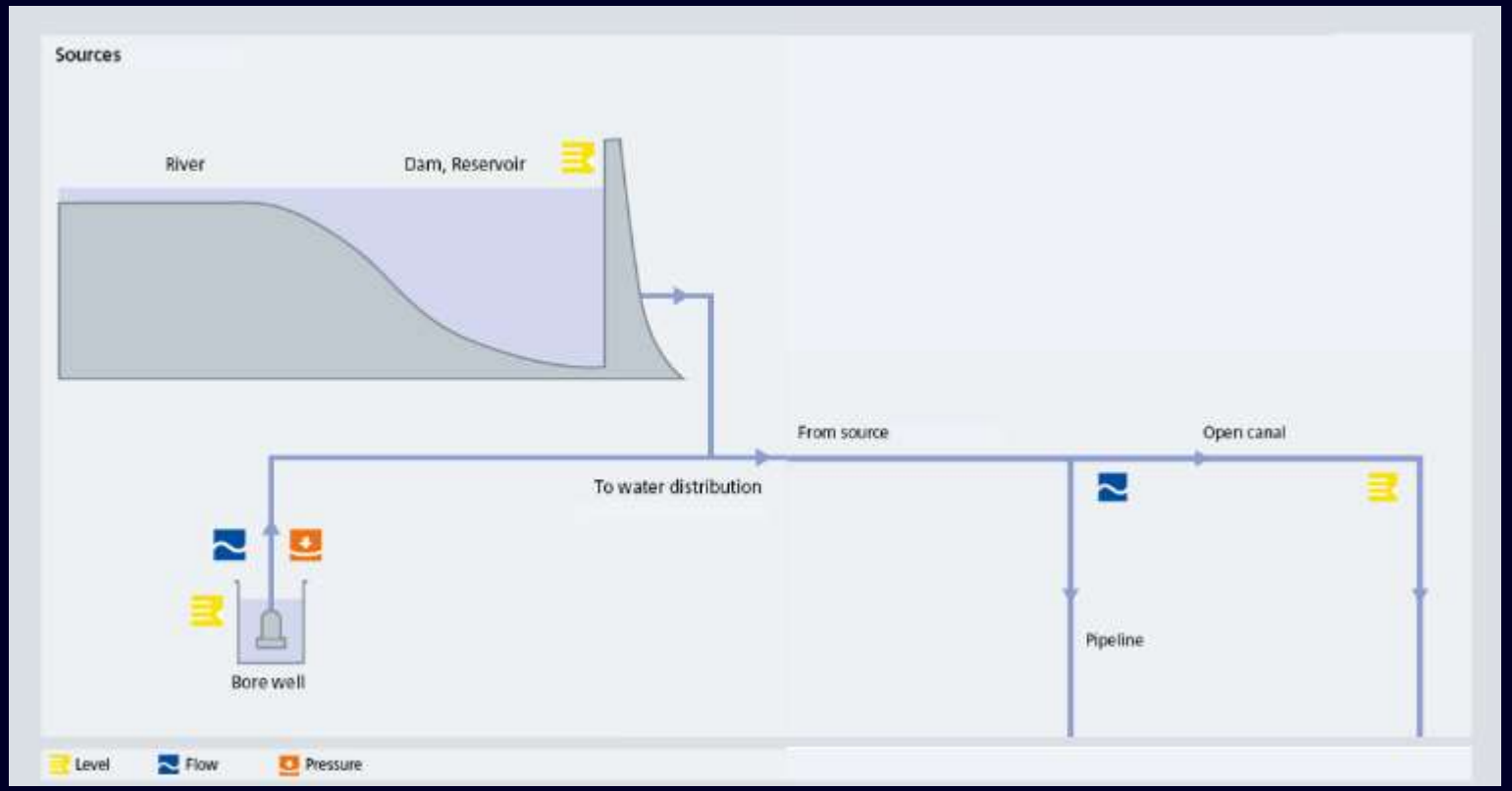


Application:
Inlet/Outlet open channel

Multiranger HMI, SITRANS LUT 420 / LT 500 with Echomax XRS 5 (LR 110)
Contactless flow measurement, recommended upstream distances from flumes or weirs in channels

Customer Benefits

- High accuracy & repeatability level controller with up to ±1mm accuracy and data logging
- Fast and easy start-up with local user interface
- Supports standard flumes, weirs, round pipe algorithm and universal break-points, avoids velocity sensor requirements
- External temperature sensor input TS-3 for faster response to changing ambient temperatures
- Ultrasonic or radar sensor technology transmitter for flexible applications

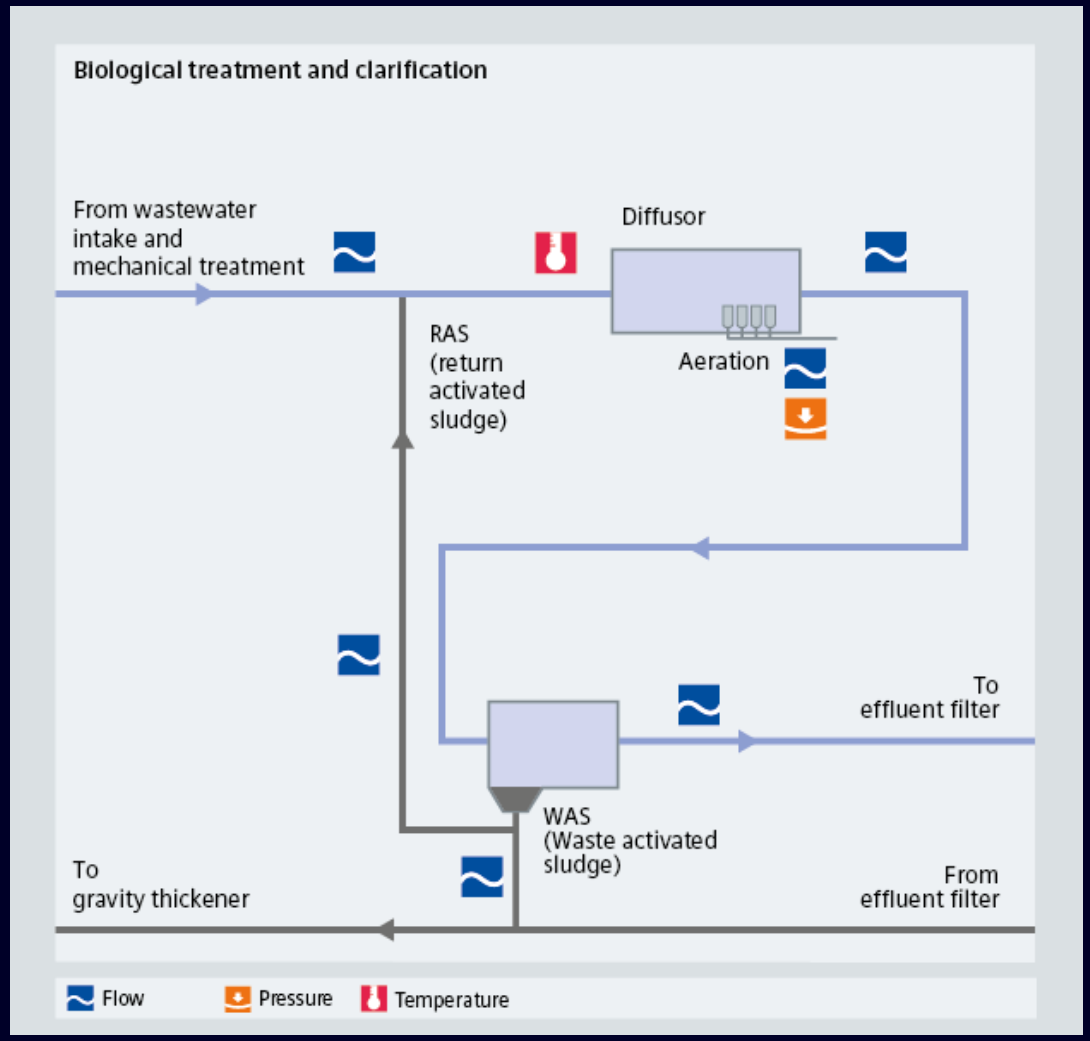


Application:
Pump control collection

Hydro Ranger 200 HMI with Echomax, LT 500 with LU240 or LR 120, wet-well level, volume, pump control and flow monitoring.

Customer Benefits

- Advanced pump control and pump modifiers reduce well buildup and maintenance costs, and prevent false readings
- Submergence shield prevents flooding of the chambers, provides safe operation, reduces risk
- Hazardous area Cl.1. Div.1 approvals for all Echomax sensors or LR120
- Communication: Modbus, Profibus DPV1 through Smartlinx cards

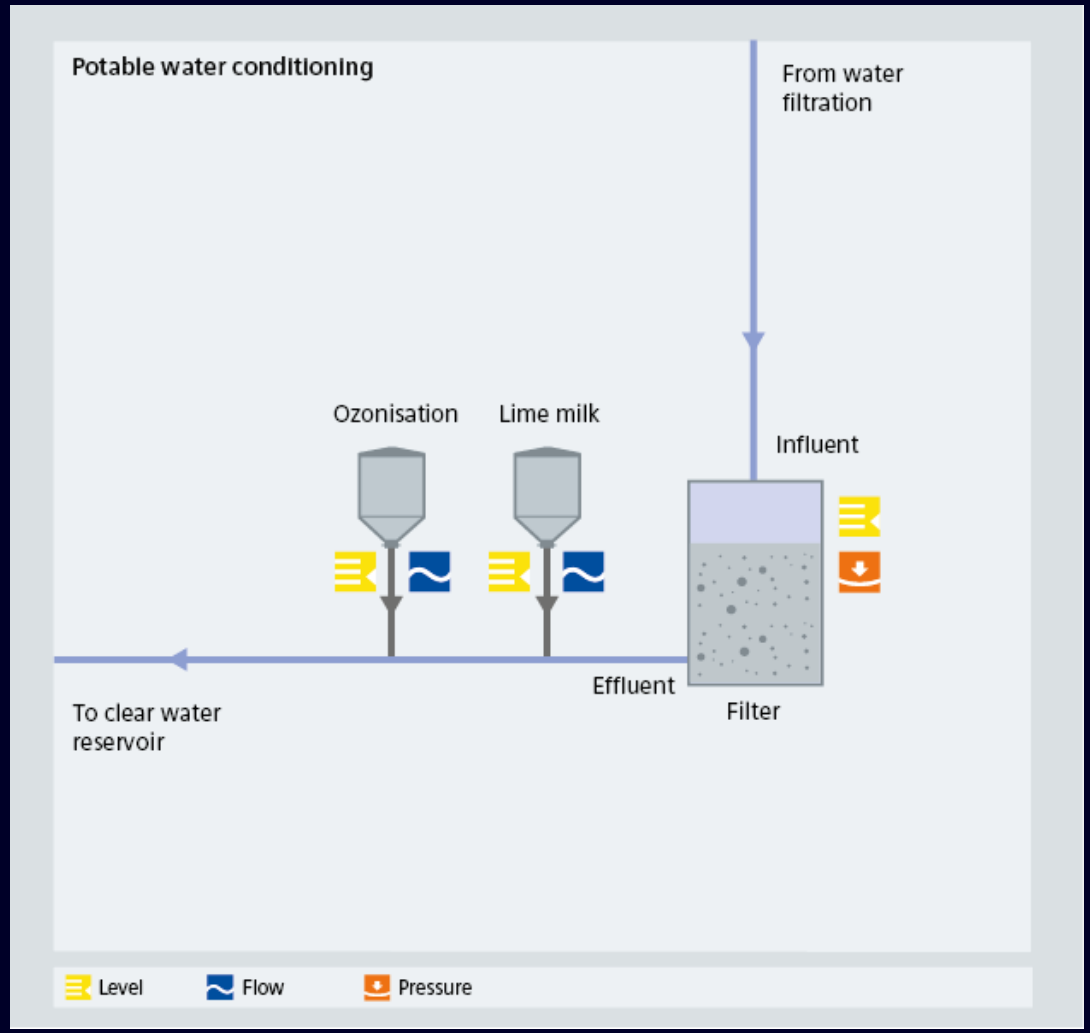


Application:
Water conditioning

SITRANS LUT 400, LT 500, LU 240, LR 120, Pointek CLS 100/200
Diverse level solutions ultrasonic and/or radar for storage tanks or mixing tanks with complex atmospheric conditions and capacitive safety point level.

Customer Benefits

- Hazardous area ATEX / Cl.1. Div.1 approvals for all Echomax sensors and LR 120 series
- 80 GHz frequency provides very narrow beam
- Auto cleaning sensor membrane
- Robust design with potted construction
- Insensitive to product buildup due to high frequency oscillation

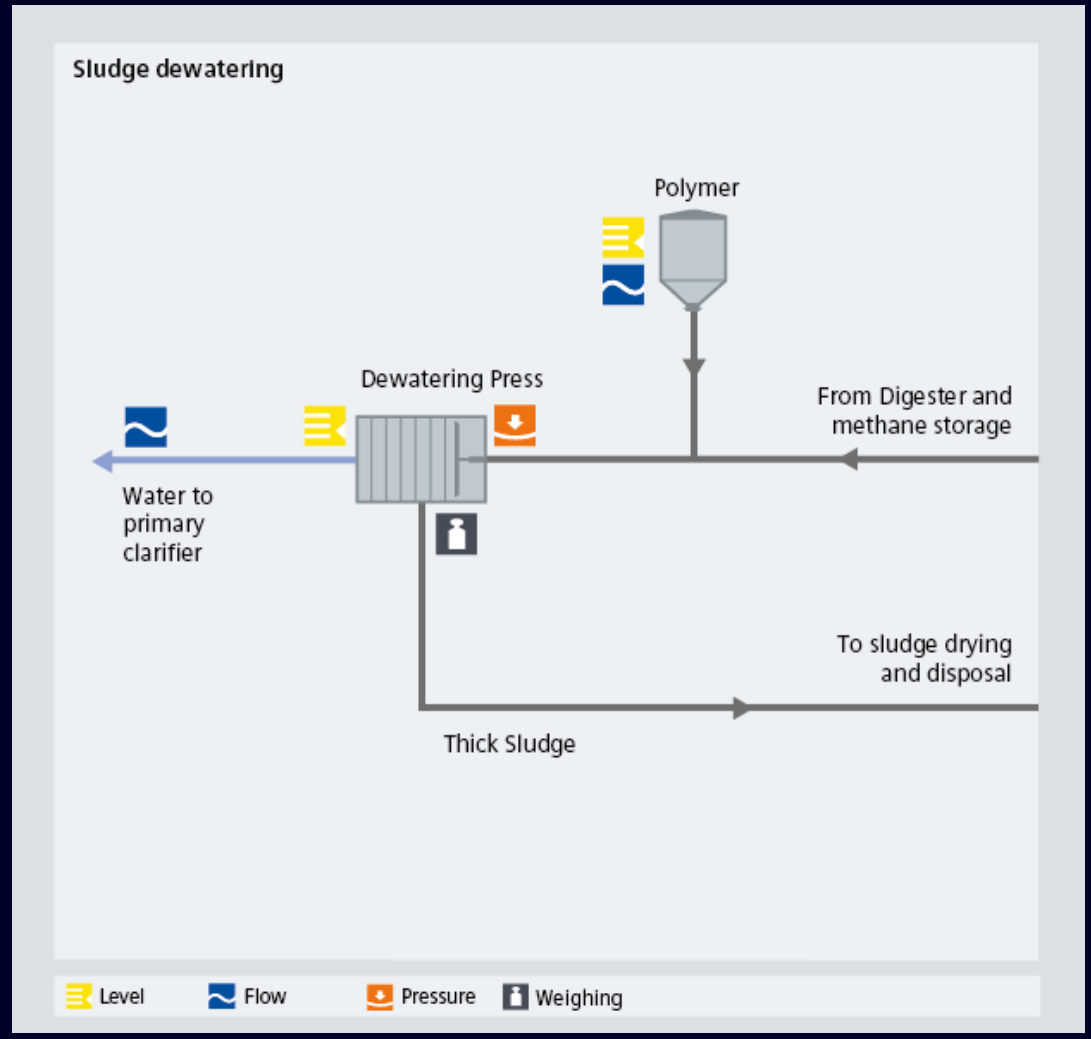


Application:
Sludge management

SITRANS TRANSMAG 2
High power electromagnetic meter to handle the dewatered sludge when moved to the collection vessel.
MSI belt scale with BW 500
Belt conveyor to monitor the bulk sludge transferred from dewatering facility to the disposal location

Customer Benefits

- Accurate & repeatable flow reading (0.5% and 0.1%) even for high concentrations
- Unique pulse AC technology → strong electromagnetic field with auto zero adjustment
- Unique parallelogram load cell design for exceptional accuracy & repeatability
- Accurate operation under uneven loadings and fast belt speeds

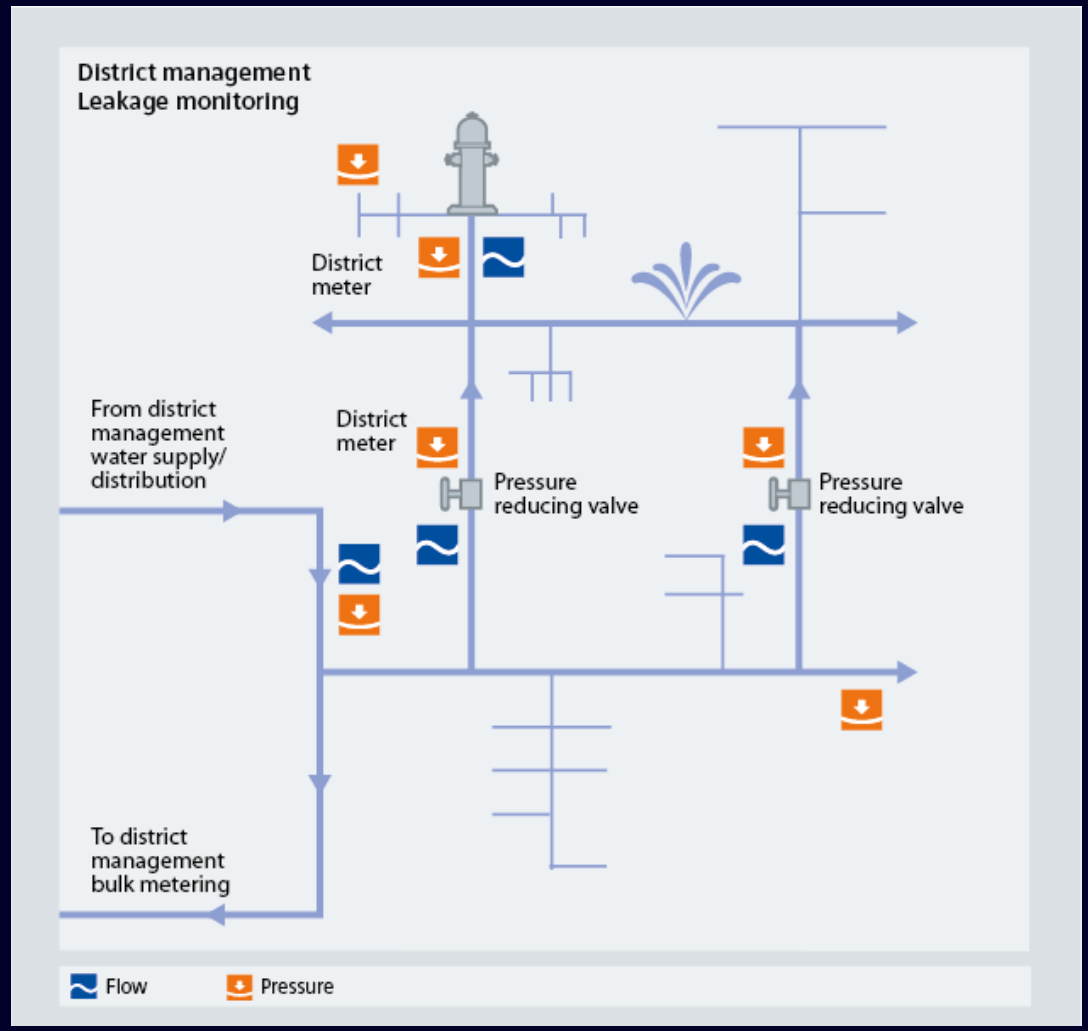


Application:
Leakage monitoring

SITRANS FM MAG 8000 3G
Battery-operated meter for any pipe where no flow measurement is in place but is required.

Customer Benefits

- Wide range of sizes up to DN1200 (72”)
- Dedicated EPDM liner and Hastelloy C electrodes → best performance for water applications
- 0D up/downstream length installations allowed
- Excellent accuracy of 0.2% or 0.4% with 0.1% repeatability
- Latest 4G LTE IoT NB, enables reporting via FTPS and e-mail encrypted
- In-situ and remote verification ensures long-term accuracy and optimal meter condition



Thanks for your attention.

www.siemens.com/sensors/water

SIEMENS