

# Measurement and control solutions for tank farms, terminals and bulk storage facilities

Process instrumentation and analytics



## Oil & Gas and Chemical Industries

Answers for industry.

**SIEMENS**



# Reliable solutions from Siemens for process industries

**Siemens instruments and analytics for process automation combine innovative technologies with solutions for any and all applications – from customized single installations to comprehensive system solutions.**

Increasing competitive pressure, investment security, high system availability, quality conformity, environmental standards and regulations, safe and cost favorable operation, harsh ambient conditions – the requirements within the industrial sector are complex and many.

With Siemens, you have a competent partner who has an expert knowledge of the specific requirements of your sector and will help you to meet these. Teaming up with Siemens means that you are teaming up with one of the technology leaders in the sector, providing you with the best technological solutions.

Decades of experience in the measurement, analysis, regulation and control of industrial processes form the basis for an unmatched know-how in all fields of process engineering. We are the technology leader in many fields and have set new standards with our products.

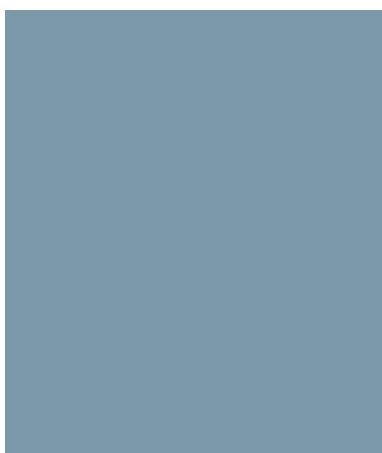
Innovative design, excellence in engineering and maximum lifetime value are denominators common to all components, products, systems and services of the Siemens portfolio for Oil & Gas and Chemical industries. By combining our competence and strengths, we can together achieve the winning performance to get ahead – and stay there.

## Understanding the requirements of the tank storage industry

Safety has become the most important factor for tank farms that store chemicals and petroleum based liquids in recent years. Intelligent instrumented monitoring and control systems from Siemens help companies to comply with current regulations of the tank storage industry and ensure reliable and safe operations.

Siemens provides products and solutions that meet the requirements of the tank storage industry and help to achieve your goals:

- High degree of **operation safety** – through maximum process transparency and back-up technologies
- Optimal resource **efficiency** – through innovative platform concepts
- Lower **total cost of ownership** – through products that require low maintenance and enable effective asset management
- Greater **availability** – through global service and support concepts
- High long-term **investment security** – through continuous innovation and maximum compatibility



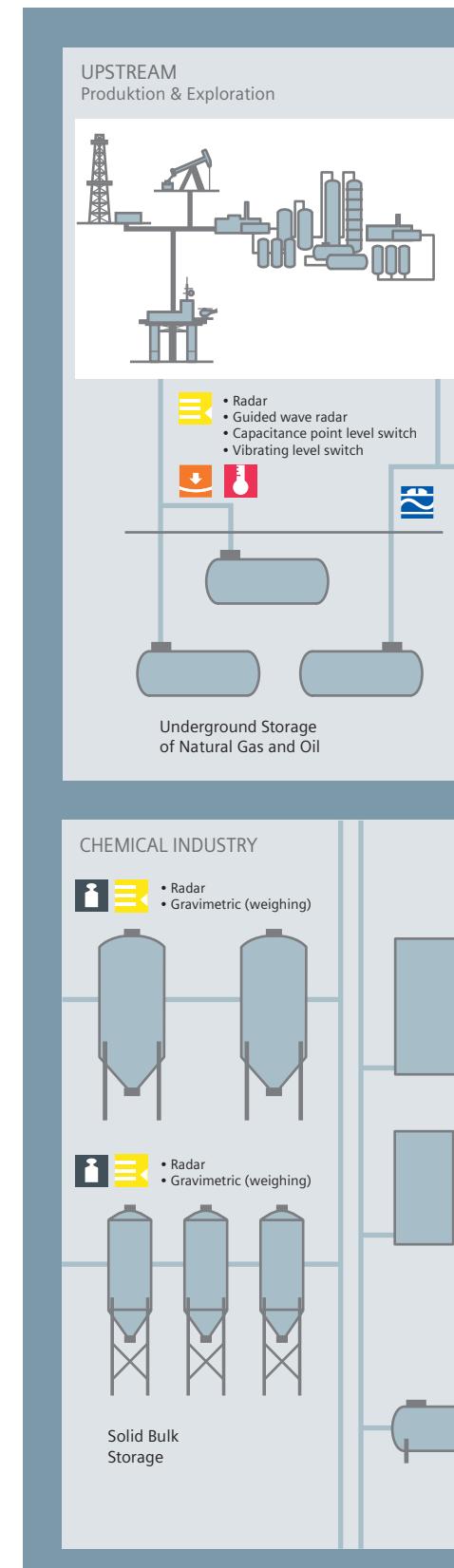
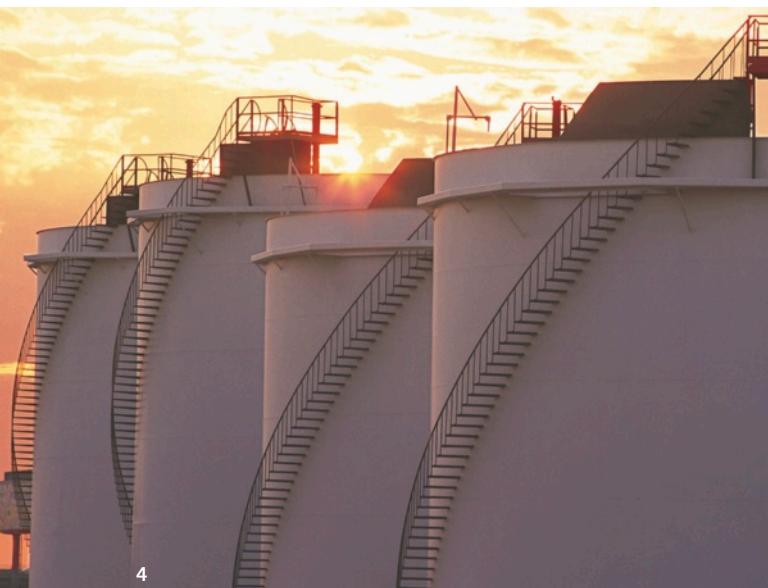
# Numerous applications – task-oriented solutions

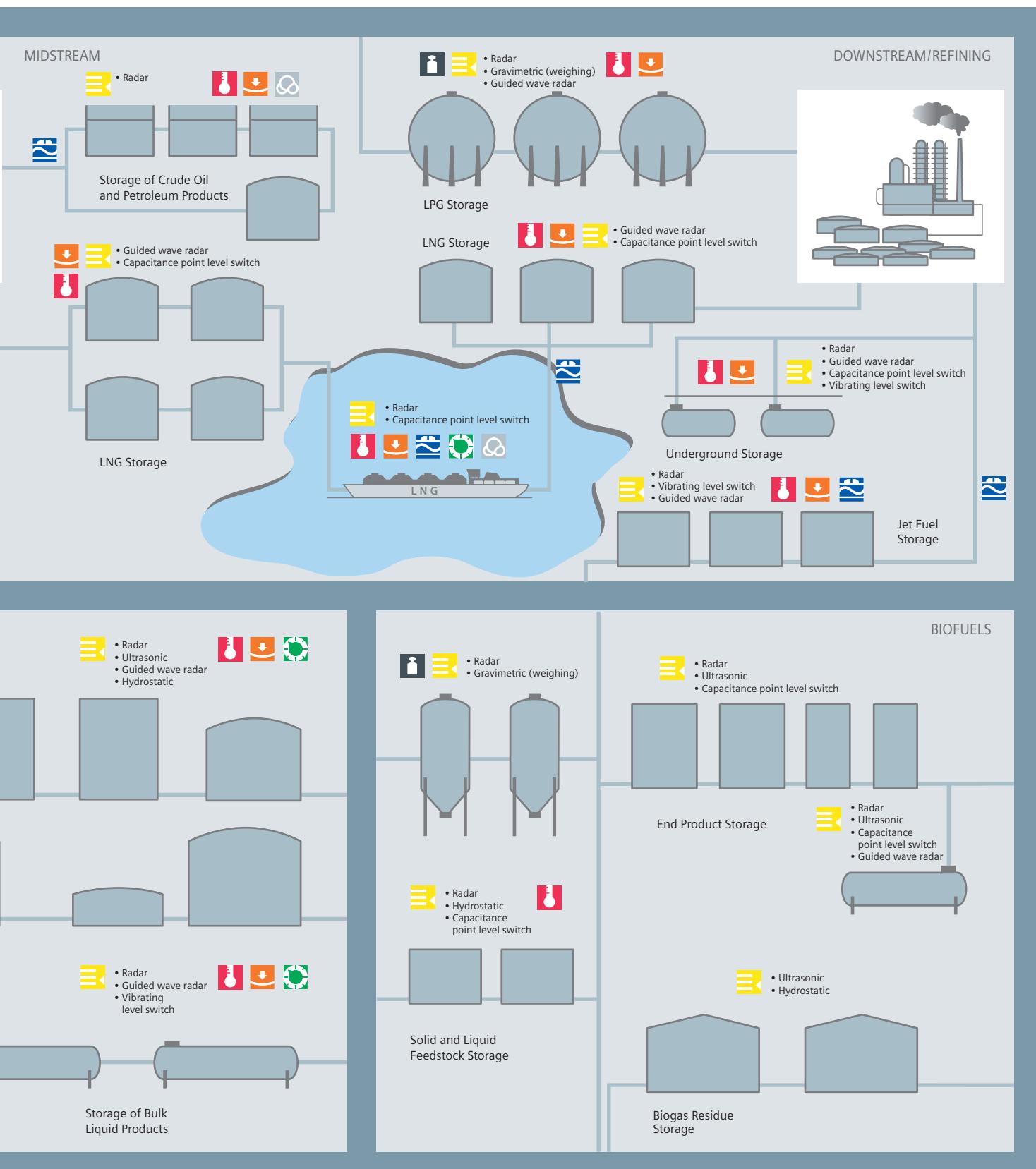
Bulk storage facilities are integral to Oil & Gas, Petrochemical and Chemical industries. Their number and capacity are growing with the increasing global demand for oil, refined petrochemical, chemical products, and biofuels.

Inventory monitoring, overspill protection and loss control, emission monitoring, leak detection and location as well as fiscal metering – these are the tasks that any bulk storage facility deals with everyday.

Siemens offers a wide range of instrumentation and analytical systems for monitoring and controlling bulk storage facilities. This includes technologies for level, flow, pressure and temperature measurement, valve control and analytical equipment for emission monitoring and control.

We can configure a system that will serve all kinds of applications in your storage facility – from simple tasks like level measurement and product interface detection in a tank or localizing a leak in a pipe to complex monitoring and control of the complete storage facility.





# Our process instrumentation and analytics product range for applications in tank terminals and bulk storage facilities



## Level Measurement



### SITRANS LR250

**Applications:** Level monitoring of liquids and slurries to a range of 20 m (66ft) in storage tanks of all types incl. vertical, horizontal and spherical tanks, cryogenic and underground tanks as well as floating roof tanks with a stilling well

**Technology:** 2-wire, 25 GHz pulse non-contacting radar

**Benefit:** High performance radar level measurement independent of material (ideal for low dielectric media), works in high temperatures and pressure

### SITRANS LR200

**Applications:** Level measurement in small and large vertical storage tanks with liquids and slurries

**Technology:** 2-wire, 6 GHz pulse non-contacting radar

**Benefit:** Low cost radar level solution for products with vapors, in high temperatures and pressure

### SITRANS LR400

**Applications:** Continuous monitoring of liquids and slurries in storage vessels including high temperature and high pressure, to a range of 50 m (164 ft); ideal for low dielectric media, such as LPG

**Technology:** 4-wire, 24 GHz FMCW radar level transmitter

**Benefit:** Features robust enclosure, flange and horn components, built-in diagnostics and self-calibration with internal reference; easy installation and commissioning and low maintenance



### SITRANS LG200

**Applications:** Level monitoring, overfill protection and interface detection in liquids, slurries and bulk solids

**Technology:** Guided wave radar

**Benefit:** Advanced loop-powered radar for materials with a dielectric of 1.4 or higher and reliable measurement in extreme conditions from -195 to 427 °C (-320 to 800 °F) and from full vacuum to 431 bar g (6250 psi g)

### SITRANS LVL/LVS

**Applications:** Detecting high, low, and demand levels in liquid or solid applications and liquid/solid interface

**Technology:** Electromechanical vibratory switch

**Benefit:** Proven and reliable measurement technology, also suitable for materials with a low bulk density

**SITRANS LR560**

**Applications:** Continuous monitoring of solids in storage vessels to a range of 100 m (328 ft)

**Technology:** 2-wire, 78 GHz FMCW non-contacting radar

**Benefit:** 78 GHz high frequency provides very narrow beam, virtually no mounting nozzle noise, and optimal reflection from sloped solids. Rugged stainless steel design for industrial applications and lens antenna that is highly resistant to product build-up

**SITRANS LR460**

**Applications:** Continuous monitoring of solids in storage vessels with extreme dust and high temperatures to 200 °C (392 °F)

**Technology:** 4-wire 24 GHz FMCW non-contacting radar

**Benefit:** Provides Process Intelligence – advanced echo processing for unparalleled performance

**SITRANS Probe LU**

**Applications:** Continuous level measurement for tanks with chemical liquid bulk storage and slurries

**Technology:** 2-wire ultrasonic, non-contacting

**Benefit:** Reliable measurement in liquids and sludges with improved signal-to-noise ratio and accuracy

**SITRANS LC500**

**Applications:** Level and interface detection in liquids, solids and foam under extreme operational conditions.

**Technology:** Inverse Frequency shift capacitance transmitter with active shield

**Benefit:** Performs in liquids, solids, interfaces, and foam and is unaffected by vapors, product deposits, dust, or condensation; highly resistant to toxic and aggressive materials

**Pointek CLS**

**Applications:** Overfill protection and interface detection in dusty, turbulent, and vaporous environments or applications with product build-up

**Technology:** Inverse Frequency shift capacitance point level switch

**Benefit:** Provides accurate, reliable, repeatable and cost-effective limit level detection with diagnostics to determine if probes need to be cleaned



## Weighing Technology



**SIWAREX WL270 and SIWAREX U**  
**Applications:** Gravimetric measurement of level for loads rated up to 280 t, truck weighing in loading areas

**Technology:** Load cells and built-in components without any contact with material

**Benefit:** Very high accuracy of up to 0.005 % independent of ambient conditions and material properties; applicable independent of agitators and container shape; can be easily integrated in SIMATIC/PCS7; eligible for legal-for-trade measurements



## Pressure and Hydrostatic Level Measurement



### SITRANS P DSIII

**Applications:** Pressure and hydrostatic level measurement directly or by remote seals on open or closed containers

**Technology:** Gauge, absolute and differential pressure

**Benefit:** Applicable in hazardous zones; designed with local push-buttons for setup and numerous diagnostics functions; extremely resistant to chemical and mechanical loads as well as electromagnetic interference



## Temperature Measurement



### SITRANS TH series and Sensors

**Applications:** Temperature measurement throughout surface and underground storage facilities and on LNG carriers

**Technology:** Universal design supports various types of sensors

**Benefit:** High accuracy across entire ambient temperature range



## Valve Control



### SIPART PS2 Valve Positioner

**Applications:** Valve control on pipes throughout tank storage facilities and on LNG carriers

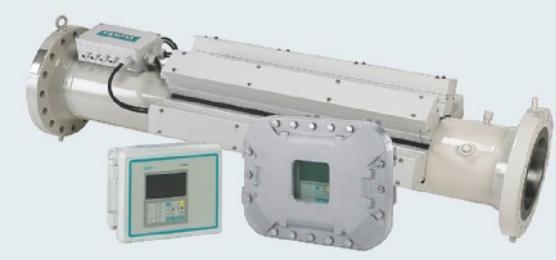
**Technology:** Intelligent electro-pneumatic positioner that uses piezo-technology

**Benefit:** Can be used for valves from almost all manufacturers. It features negligible air consumption and numerous diagnostic capabilities to detect a variety of abnormalities, such as pneumatic leaks or deposits in pipelines or

fittings. Additionally, the partial stroke testing capability ensures proper valve performance and increases safety



## Flow Measurement



### SITRANS FUT1010

**Applications:** Custody transfer in hydrocarbon liquids pipelines; check metering, transmix metering and product identification in tank terminals.

**Technology:** WideBeam ultrasonic, spool meter that combines insert and clamp-on flowmeter technologies featuring TransLoc mounting system

**Benefit:** Provides increased precision with WideBeam ultrasonic signal processing and automatic zero drift correction, calibrated to custody transfer accuracy, has no pressure or energy

drop, allows easy transducer inspection and easy maintenance with no moving parts to foul or wear, and is available in a wide range of sizes.

### SITRANS F US clamp-on ultrasonic flowmeters

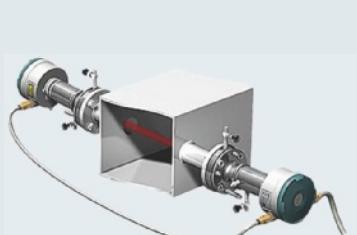
**Applications:** Gas and hydrocarbon liquids metering as well as interface detection in pipes throughout storage facilities and in loading stations

**Technology:** WideBeam ultrasonic, clamp-on

**Benefit:** Bi-directional flowmeters provide zero stability and additional diagnostics at low installation costs as no pipe penetration and no system shutdown are required. Additionally, it features piping correction algorithm, excellent turndown and has no pressure limits.



## In-situ continuous process gas analytics



### LDS6

**Applications:** Immediate and intrinsic save (Ex i) concentration measurement in combustible gases like CO and CH<sub>4</sub> or oxygen monitoring in tanks, pipes, FCCs, flares.

**Technology:** In-situ diode laser gas analyzer

**Benefit:** The measurement is performed non-intrusively and in real-time – without any disturbance or delay due to gas sampling or gas conditioning. This analyzer has extremely rugged design and requires little installation effort and minimum maintenance.

### SITRANS SL

**Applications:** Explosion safety monitoring – oxygen or carbon monoxide monitoring in tanks, pipes, FCCs, flares.

**Technology:** In-situ diode laser gas analyzer

**Benefit:** Suitable for fast and non-contact measurement of gas concentrations. The sensors (transmitter and receiver) are meant to be mounted directly on the process with no need of sampling systems and will operate under harsh environmental conditions.

### Sitrans CV gas chromatographs

**Applications:** analytical process monitoring and control on LNG tankers, fiscal metering, calorific value measurement

**Technology:** online micro process gas chromatograph

**Benefit:** Compact and modular design permits simple installation directly at the sampling point. It provides faster analysis with unsurpassed accuracy and allows user-friendly remote operation. Further features are low consumption of power and carrier gas as well as low operational costs



Pointek CLS level switch for overspill protection or interface detection

Emission monitoring with LDS6 gas analyzer in a tank terminal

# Special applications in terminals and bulk storage facilities

## Overspill protection

In addition to high performance level measurement technologies like radar, Siemens offers a range of point level switches. These should be installed as a safety back-up to monitor the tank level and automatically shut off the feed to the tanks if the level reaches the high limit. This independent overspill protection increases the level of safety in your facility and helps to avoid potential hazards, loss in production and regulatory fines.

In addition to back-up applications point level switches can be used for dry run pump protection and process flow/no flow applications. Siemens point level switches use ultrasonic, rotating, vibrating, and inverse frequency shift capacitance technologies. The broad selection of switches provides a cost-effective solution for practically all liquids and solids applications.

## Interface detection

For applications that require interface detection in tanks and pipes in terminals and tank storage facilities Siemens offers multiple technologies and options.

Our portfolio includes point and continuous level measurement devices for interface applications such as capacitance instruments SITRANS LC500 and Pointek CLS or SITRANS LG200 that uses guided wave radar technology. They deliver high-precision interface measurement on liquids, solids and foam, are unaffected by vapors, product deposits, dust, or condensation, and are highly resistant to toxic and aggressive materials.

Another option for extremely reliable and precise interface detection is the SITRANS FUH1010 clamp-on ultrasonic interface detection meter from Siemens. It calculates multiple variables such as sonic velocity, rate of change, and pressure as well as temperature compensation to detect gasoline, crude oil or multi-product interface in pipes. Interfaces are detected through the direct measurement method that results in substantial savings, both in means of equipment and slop oil treatment.

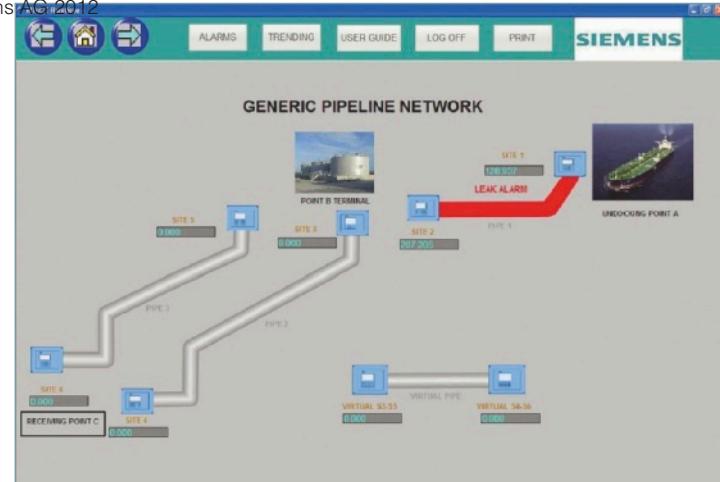
### SITRANS FUH1010 interface meter is also ideal for applications such as:

- Product identification
- Auto batching control
- Detection of entrained water and gas in all products
- Scraper ("pig") detection

## Emission monitoring

To increase the safety level of the tank storage facility and protect from explosion, the oxygen concentration must be monitored continuously. The measured concentration values are used to immediately start preventive measures at the occurrence of a critical gas composition such as nitrogen purge, alarm activation or worst case emergency shutdown.

The ideal solution for this application is an in-situ continuous gas analyzer LDS6 that uses principle of laser spectroscopy. Unique features of this gas analyzer are integrated reference cell and lifetime stability. Furthermore, LDS 6 is the only device on the market that never has to be recalibrated.



## Leak detection and location

Pipeline systems stretch through tank terminals and bulk storage facilities and connect them to the remote loading and off loading areas. To increase pipeline control, provide protection against theft or ensure regulatory compliance, Siemens offers SITRANS FUS-LDS clamp-on ultrasonic leak detection system that offers a number of distinct benefits:

- Low-maintenance external sensors
- Extreme sensitivity
- High accuracy
- Proven reliability
- Continuous robustness

While most leak detection suppliers offer only the software portion of a leak detection system, the Siemens FUS-LDS is a comprehensive system that includes all hardware and software. From an operational perspective, this eliminates the potential for third-party instrumentation outages that could impact the ability of the FUS-LDS to monitor a pipeline. This benefit also extends to the customer service experience, as Siemens is responsible for the entire system and serves as the singular contact for all support requests.

Siemens leak detection system features recently updated master station software. The Microsoft® Windows®-based SIMATIC WinCC has now been integrated to provide a dynamic graphic user interface (GUI) for the FUS-LDS. The upgraded software allows the user to visually identify pipeline locations on a map and highlight specific flowmeters or line segments. SIMATIC WinCC significantly decreases the amount of training required for pipeline operators to utilize the system effectively and offers the necessary alarm audit logs to meet regulatory requirements.

### Key features at a glance

- Complete software and hardware solution
- Real-time detection of small and large product releases (including product theft)
- Easily accessible pipeline performance data
- Operation unaffected by changes in liquid properties
- Easy system installation and optimization

## Custody transfer

Siemens offers a flow measurement solution for custody transfer of hydrocarbon liquids and gases within the Oil & Gas industry. SITRANS FUT1010 clamp-on ultrasonic flowmeter is a perfect match for the requirements of the hydrocarbon industry.

Featuring WideBeam transit-time technology, it achieves highly accurate flow measurement. And with the TransLoc™ mounting system, the sensors are permanently mounted on the outside of the pipe, eliminating contact with the medium. The result is no cavities or clogging by high-paraffin liquids found in many hydrocarbon applications.

TransLoc allows for custody transfer accuracy in a wide array of applications in and around tank terminals, including:

- Pipeline balancing
- Terminal transmix metering
- Airport facility management
- and more

### Trusting performance

Being that the performance of SITRANS FUT1010 meets the strict requirements of OIML R117 and API, it is perfectly suitable for all types of high-precision custody transfer applications. The inclusion of WideBeam technology further enhances this capability by providing stable performance that enables continuous operation in applications where the measured media is contaminated by water or gas.



# Communication and software

From simple monitoring to complete transparency

**For process instruments Siemens offers a range of communications options. Whether you are monitoring one device or many instruments, Siemens gives you the option of seeing only process variables or being able to drill right down to the instrument to view complete diagnostics.**

## Simple monitoring

For simple monitoring applications, we have the SITRANS RD series of monitors. The RD100 and RD200 remote displays allow you to view one 4 – 20 mA single device. The SITRANS RD500 is your complete remote monitoring solution for viewing variables from many instruments by Internet, cell, email, Modbus TCP, world wide web, Ethernet, GSM/GPRS/3G, or land line.



SITRANS RD100



SITRANS RD200



SITRANS RD500

## System integration

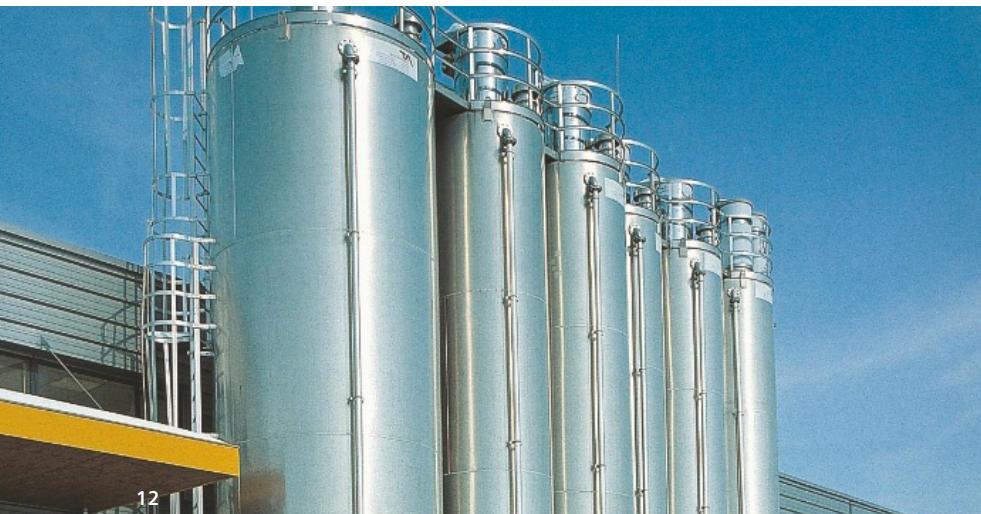
For full transparency of instruments, Siemens offers field devices with modern fieldbus communication capabilities such as HART, PROFIBUS and FOUNDATION Fieldbus.

Our field devices have been perfectly integrated into the Totally Integrated Automation (TIA) concept. With TIA, Siemens provides a comprehensive, integrated product and system spectrum for the efficient automation of the entire production process. Thanks to the uniquely integrated qualities of TIA, companies are able to optimize their production processes, accelerate time to market, and reduce production costs – while maintaining a high level of investment security and minimizing overall project complexity.

## Benefits of using PROFIBUS for monitoring

When an instrument fails it can cause increased maintenance time, lost production, cleanup costs, and regulatory fines. PROFIBUS instruments combined with either an S7 PLC or Siemens HMI with a soft-PLC make alerting the user possible before there is a problem and allow maintenance people to troubleshoot the instrument over the network.

This is not possible with 4 – 20 mA instruments, but is effortless and efficient with PROFIBUS.



## SIMATIC PDM software

SIMATIC PDM (Process Device Manager) is a manufacturer independent software tool for the operation, configuration, parameterization, maintenance, and diagnosis of intelligent field instruments. It allows the user continuous access to all of the field devices in the plant.

## WirelessHART

Wireless technology opens up new perspectives and has enormous potential for monitoring and controlling physically separated plants and facilities. WirelessHART offers the first industrial standard for wireless field communication that fully meets the requirements of the process industry.

Based on our in-depth experience in process automation and industrial wireless technology, we offer a range of first-class WirelessHART products as part of a unique portfolio for the process industry. This includes wireless remote monitoring and control systems, and a comprehensive instrumentation product portfolio:

Battery-powered WirelessHART transmitters are ideal for remote measurements, for deployment in harsh environments, for temporary ad hoc measurements and for the expansion and replacement of field devices.



SITRANS AW200



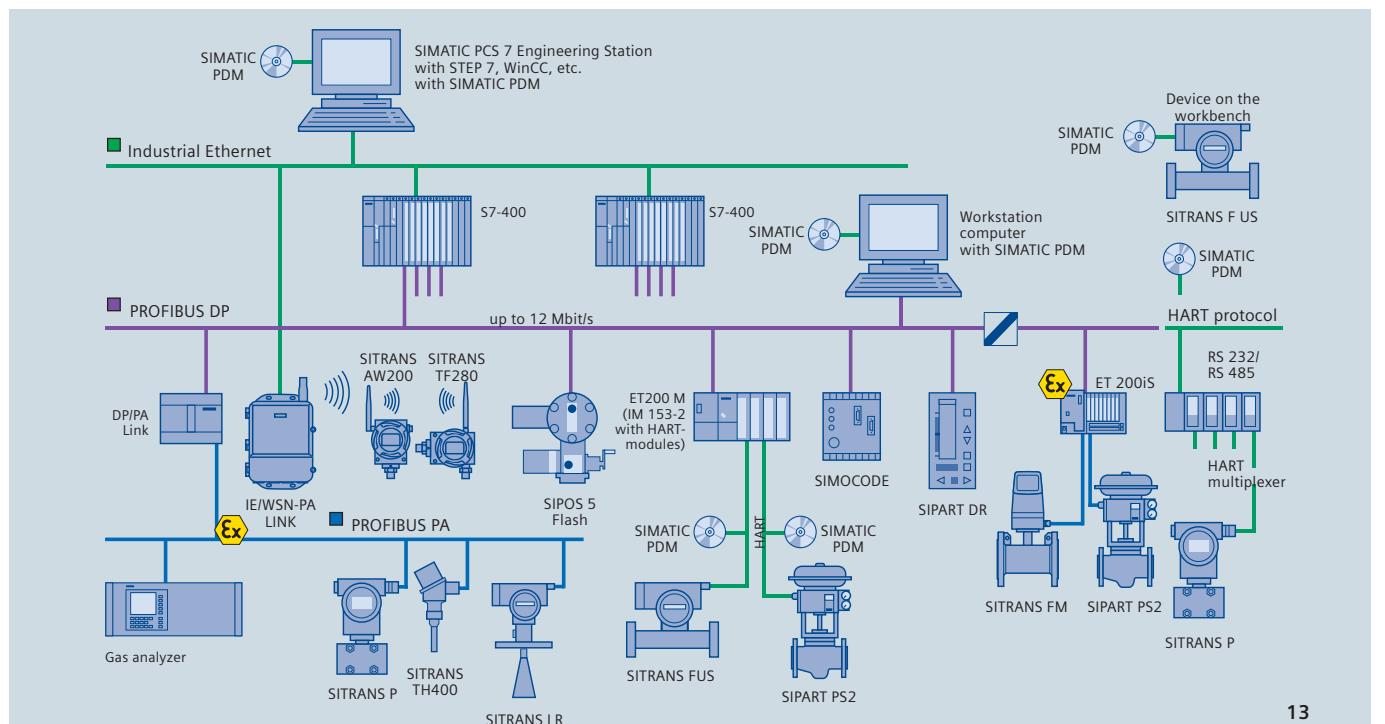
SITRANS P280



SITRANS TF280

WirelessHART adapters provide wireless communication capability for existing wired HART devices.

The WirelessHART gateway reliably gathers all field information, manages network and establishes connection to the higher level automation system – for example to the SIMATIC control system or to systems of third-party suppliers, etc.



# Service and Support

Siemens offers field-proven concepts for process instrumentation and analytics from a single source, providing you with development continuity and a high level of security.

Our services range from consulting and engineering through to connection onto the control system and comprehensive after-sales services:

- Plant engineering and scheduling by an experienced project management team.
- Specialists assist you in the selection and use of the field instruments.
- SIPLAN C/E is state-of-the-art software available for effective plant engineering and order processing.
- This program is also very useful for providing actual customer documentation.
- Plant documentation comprises:
  - Basic documentation, including device specifications, product and use lists.
  - Higher-level documentation, including plant, process, identification and grounding concepts.
  - Mechanical documentation, including setup and installation diagrams, hookups, cable routings.
  - Electrical documentation, including circuit and wiring diagrams, cable lists.

- Specification and delivery of all required process instruments.
- Intensive preparation for installation.
- Reliable supply of installation material.
- Installation and/or installation supervision.
- Commissioning and/or commissioning supervision.
- Comprehensive after-sales service.

Siemens is a global company that reacts locally. The Siemens network of specialists is available to you right around the world, whether you require consulting or quick delivery and installation of new devices.

Regardless of the solution we offer you, the focus is always on customer value.



## For additional information, please visit:

[www.siemens.com/processinstrumentation](http://www.siemens.com/processinstrumentation)

[www.siemens.com/processanalytics](http://www.siemens.com/processanalytics)

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