



PROCESS INSTRUMENTATION

Drill down to **higher profitability**

Lifecycle solutions for upstream oil & gas

usa.siemens.com/pi-oilgas

SIEMENS



Lower your production costs, not your standards

In the face of a volatile market characterized by fluctuating oil prices, the upstream oil and gas industry must find ways to minimize exploration and production expenses while maximizing yields.

For today's upstream operators, efficiency is the key to profitability. Innovative yet cost-effective process instrumentation from Siemens can help you to do more with less by improving the efficiency of every application – from separators and filters to storage tanks and chemical trucks.

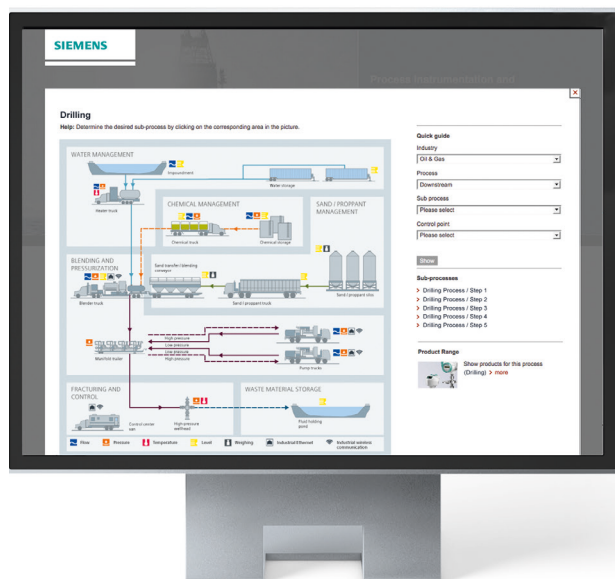
Accurate and reliable performance. Enhanced process control. Low to no maintenance. Easy installation and configuration. These are the qualities that upstream applications require from measurement technology, and the qualities that define our entire product portfolio. By choosing Siemens, you'll also gain access to a broad range of solutions designed to complement and optimize our process instrumentation – including weighing and batching systems, analyzers, motors and drives, industrial communication components and process controllers – along with an extensive technical support network covering every corner of the globe.

Robust instrumentation designed with flexibility in mind

- Built to conform with the most rigorous industry standards, ensuring full compliance with increasingly strict environmental and safety regulations
- Maintain exceptional accuracy even in harsh conditions
- Customizable selection of process connections, materials of construction and mounting options to meet the widely varying demands of upstream installations

Everything you need from a single supplier

- Comprehensive product portfolio to improve operational performance and increase productivity for more cost-effective operations
- Seamless integration of all Siemens process instrumentation, analytics and industrial communication into automation systems

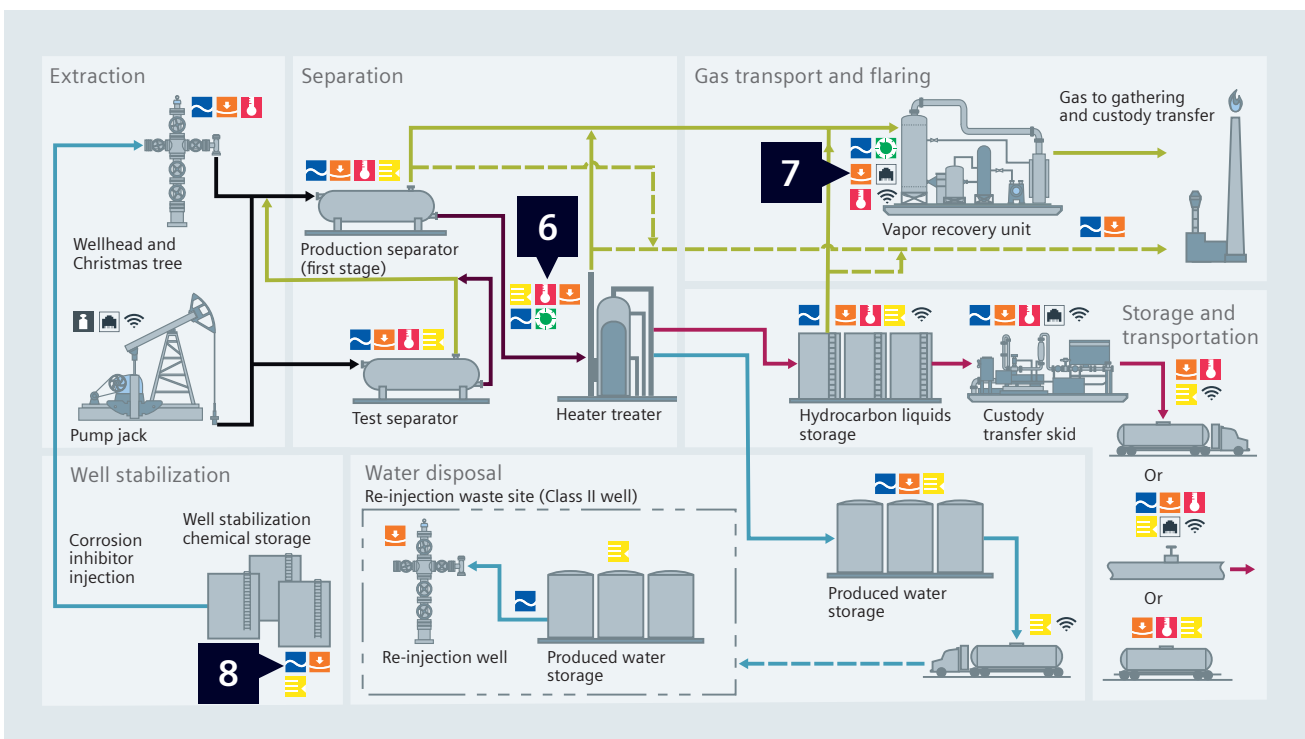
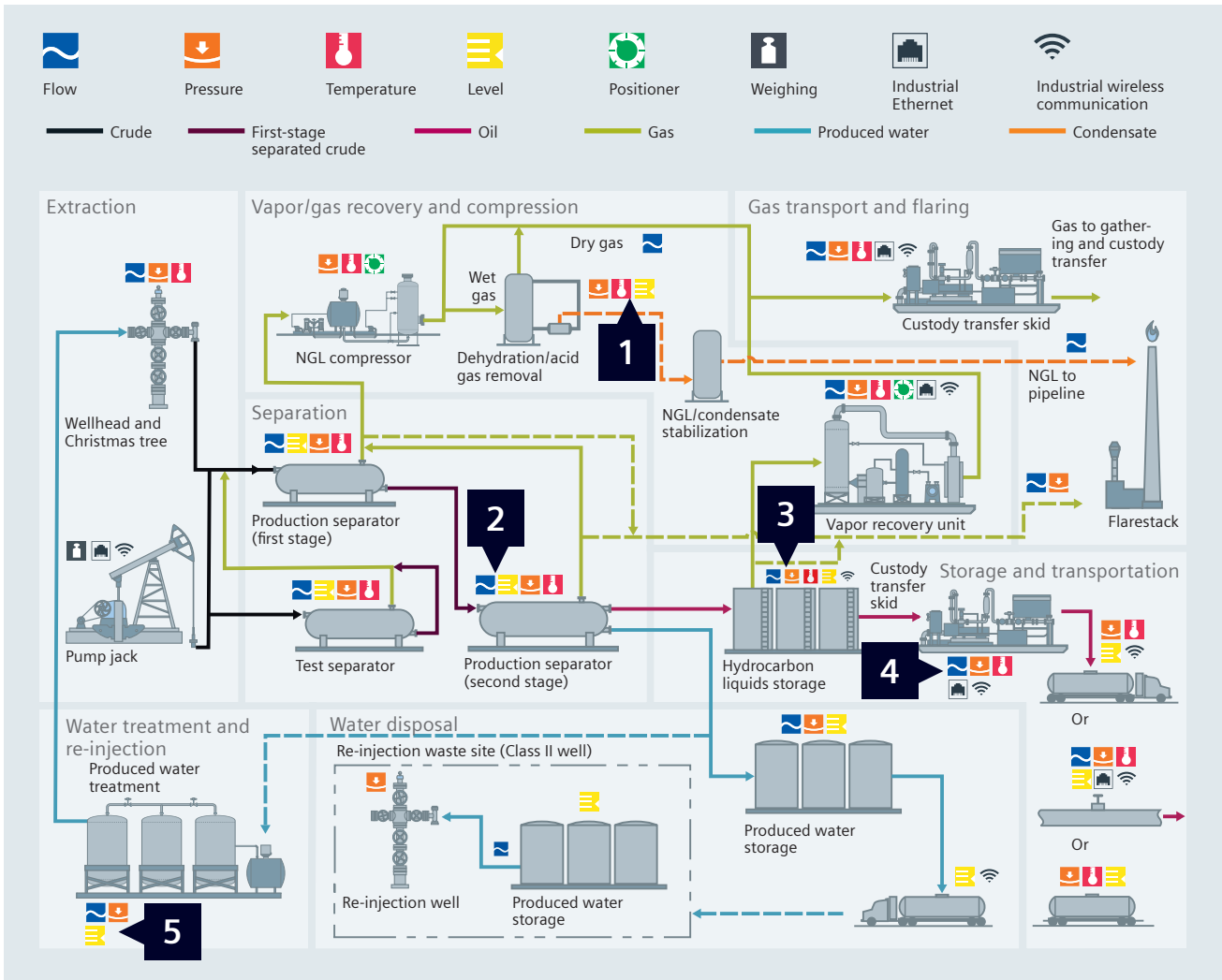


Siemens is your ideal partner for process instrumentation. Our comprehensive product selection fulfills the demands of any upstream oil and gas application and offers you the reassurance of virtually effortless incorporation into a wide variety of automation systems.

To configure a product for your individual specifications, visit the PIA Selector:

[siemens.com/piaselector](https://www.siemens.com/piaselector)

Onshore oil and gas



1**Dehydration/acid gas removal**

Maintaining control over process variables during dehydrator operation is a crucial factor in achieving the best possible product quality, complying with environmental standards and ensuring that the system functions safely. Whether measuring in the separator, contactor, flash tank or regenerator, Siemens has your needs covered with a comprehensive portfolio of instrumentation.

Temperature: SITRANS TS Series

- SIL 2/3 rated for utmost process safety
- Wide range of sensors and transmitters for any application

Level: SITRANS LG250

- Perfect for side-pipe/bypass tube installations, with a wide selection of process connections, rod, cable and coaxial probe types and materials
- High-temperature and high-pressure configurations available

3**Hydrocarbon liquids storage**

The ability to continuously monitor product in your tanks and during material transfers offers you greater insight into your inventory, eliminates the threat of costly spills and damage to the environment, and ensures the highest levels of safety by removing employees from the tops of vessels and other hazardous areas.

Flow: SITRANS FC440

- Exceptional accuracy accounts for every drop of hydrocarbon being transferred from site to pipeline, truck or tanker
- Compact and remote-mount options for installation flexibility
- Communication options including Hart, Profibus and Modbus guarantee excellent performance and flexible configuration in the field or from the control room

Pressure: SITRANS P320

- Total flexibility for all of your tank storage pressure needs, e. g. gauge, absolute, differential pressure or flow and level
- Ability to perform local configuration via 4 push buttons means you can leave the laptop in your bag

Level: SITRANS LR100 series / LR500 series

- Ruggedized high-frequency, non-contact radar perfect for outdoor installations in the toughest environments, any time of the year
- Siemens-patented Process Intelligence for fast commissioning, reliable performance and remote communications under the most difficult process conditions

2**Production/test separators**

Liquids and liquid interfaces must be supervised continuously for optimal separator performance. Directing these valuable natural resources into the correct process streams results in maximum product quality and system efficiency. Siemens instrumentation functions in virtually any horizontal, vertical or spherical configuration and remains precise even when faced with rapidly changing process conditions.

Flow: SITRANS FC440

- Simultaneous monitoring of density, flow and temperature with high-speed signal update
- Insensitive to entrained gases and aeration up to 20%

Level: SITRANS LG250

- Guided wave radar technology ensures reliable level tracking of oil and water level interfaces, with Modbus communication or with dedicated 4-20 mA output for each
- Advanced communications, enhanced diagnostics and 100,000-point configurable datalogger for repeatable performance year after year

4**Custody transfer skid**

The singular goal of hydrocarbon and natural gas custody transfer measurement is to determine the delivered amount of energy and therefore value. Minimize uncertainties and feel confident with cutting-edge Siemens instrumentation integrated into a SCADA or automation system.

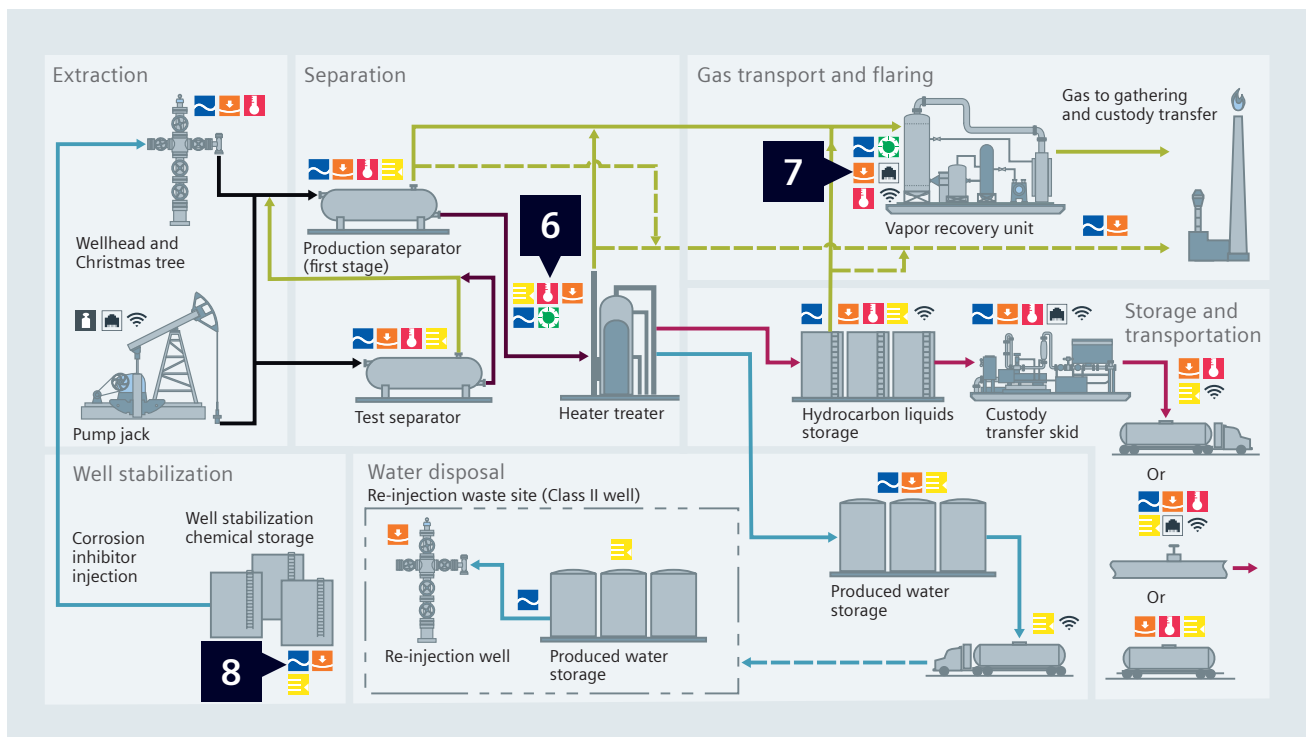
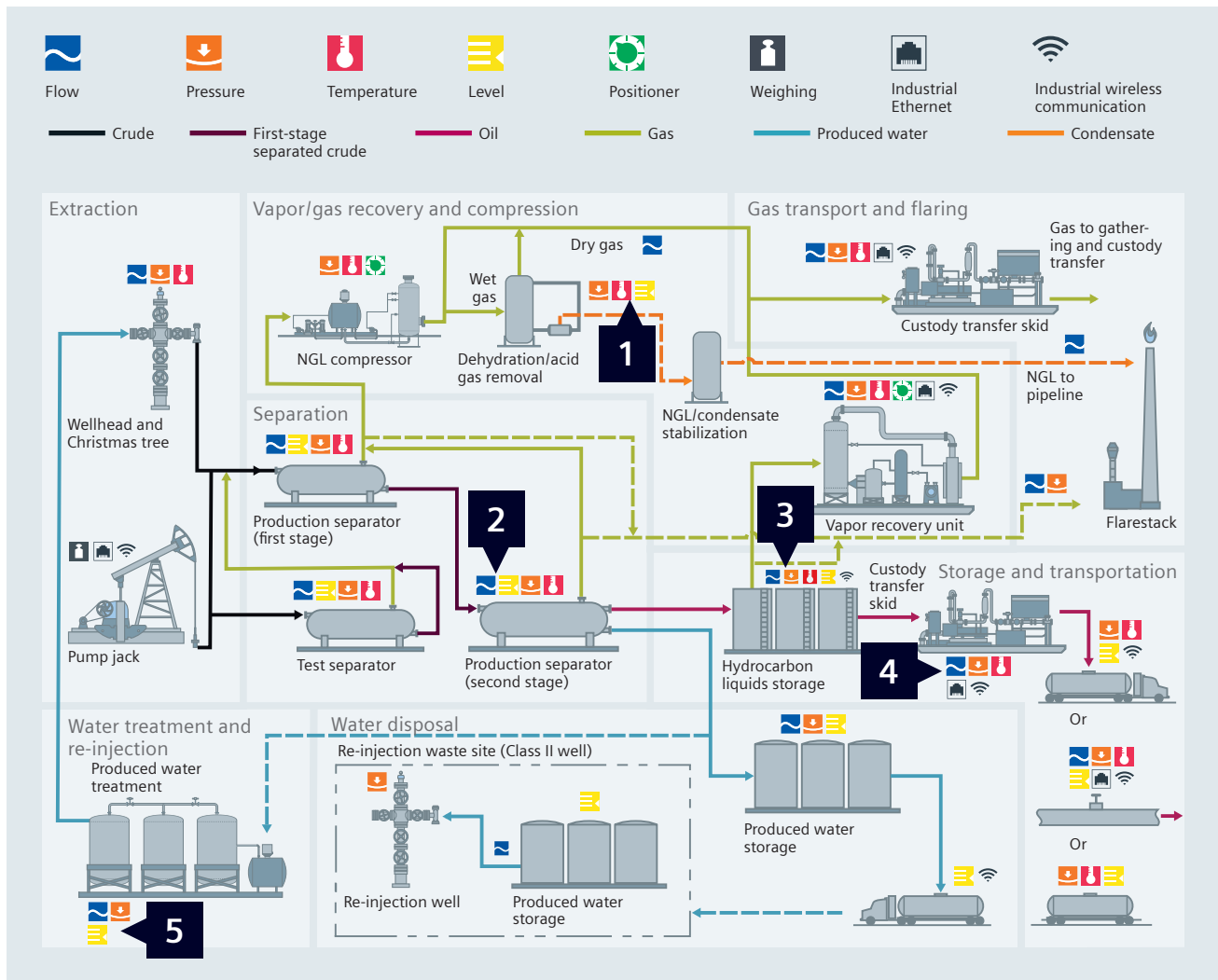
Pressure: SITRANS P420

- High accuracy and repeatability as well as long-term stability over a wide turndown range
- Straightforward operation despite numerous setting options and extensive functionality

Temperature: SITRANS TF Series

- Field transmitter for harsh industrial applications
- Intrinsically safe two-chamber enclosure in die-cast aluminum or stainless steel with IP67 and SIL 2/3
- Integral smart displays simplify installation and reduce commissioning costs

Onshore oil and gas



5

Produced water treatment



Overseeing and reporting the billions of gallons of produced water extracted in the oil fields each year is a monumental task. Management of this immense waste stream requires careful oversight to minimize environmental risk and maximize the profitability of each individual well. Versatile measurement devices from Siemens support the management of produced water, ensuring compliance with all industry regulations.

Flow: SITRANS F M MAG 3100/MAG 6000

- High-temperature and high-pressure configurations available
- Custody transfer approvals available including OIML R117 and PTB

Pressure: SITRANS P320

- Wide variety of material and pressure options to provide long-term stability
- Local transmitter operation via 4 push buttons without a "hot work" permit or over the relevant communications interface

Level: SITRANS LR100 Series

- These radar transmitters exceed typical application requirements, efficiently managing liquids and slurries. With zero blanking distance, they measure up to the sensor, preventing costly overfilling. These transmitters are 4 to 20 mA loop-powered with optional HART or 4-wire Modbus RTU, offering accurate level measurement up to 98 ft.
- They can also measure non intrusively through plastic vessel tops, ensuring easy installation. Instrument set-up is convenient via Bluetooth and the SITRANS mobile IQ app or locally with an optional HMI

7

Vapor recovery unit



Seamless functioning of vapor recovery systems maximizes the capture of hazardous VOCs while minimizing the loss of valuable and saleable resources. Siemens enables you to reduce emissions to government-mandated levels and earn an attractive return-on-investment in the process.

Pressure: SITRANS P200

- Compact design with a wide operational range
- Simple and cost-effective installation

Pressure: SITRANS P320

- High-accuracy performance even at low pressures
- Local display and programming in a rugged, industrial enclosure

6

Heater treater



Responding quickly to changes in heater treater operation is critical for optimizing system performance and ensuring a quality end product. It is also imperative for protecting the safety of your processes and, most importantly, your personnel. The Siemens portfolio of instrumentation keeps you fully in control of your system.

Temperature: SITRANS TS Series

- Wide range of process connections, advanced communication options and materials of construction
- Local display, field-changeable electronics and remote mount options available

Level: Pointek CLS200/CLS300

- Perfect for side- and top-mount installations, with a wide selection of process connections, probe types and materials
- High-temperature and high-pressure configurations available

8

Chemical injection



Accurate measurement of chemicals during injection helps to optimize chemical usage, which in turn enhances a variety of processes including well cleaning, corrosion prevention, pipeline flow and enhanced oil recovery. Backed by decades of experience in chemical process monitoring, Siemens offers a comprehensive range of solutions to meet the needs of every application.

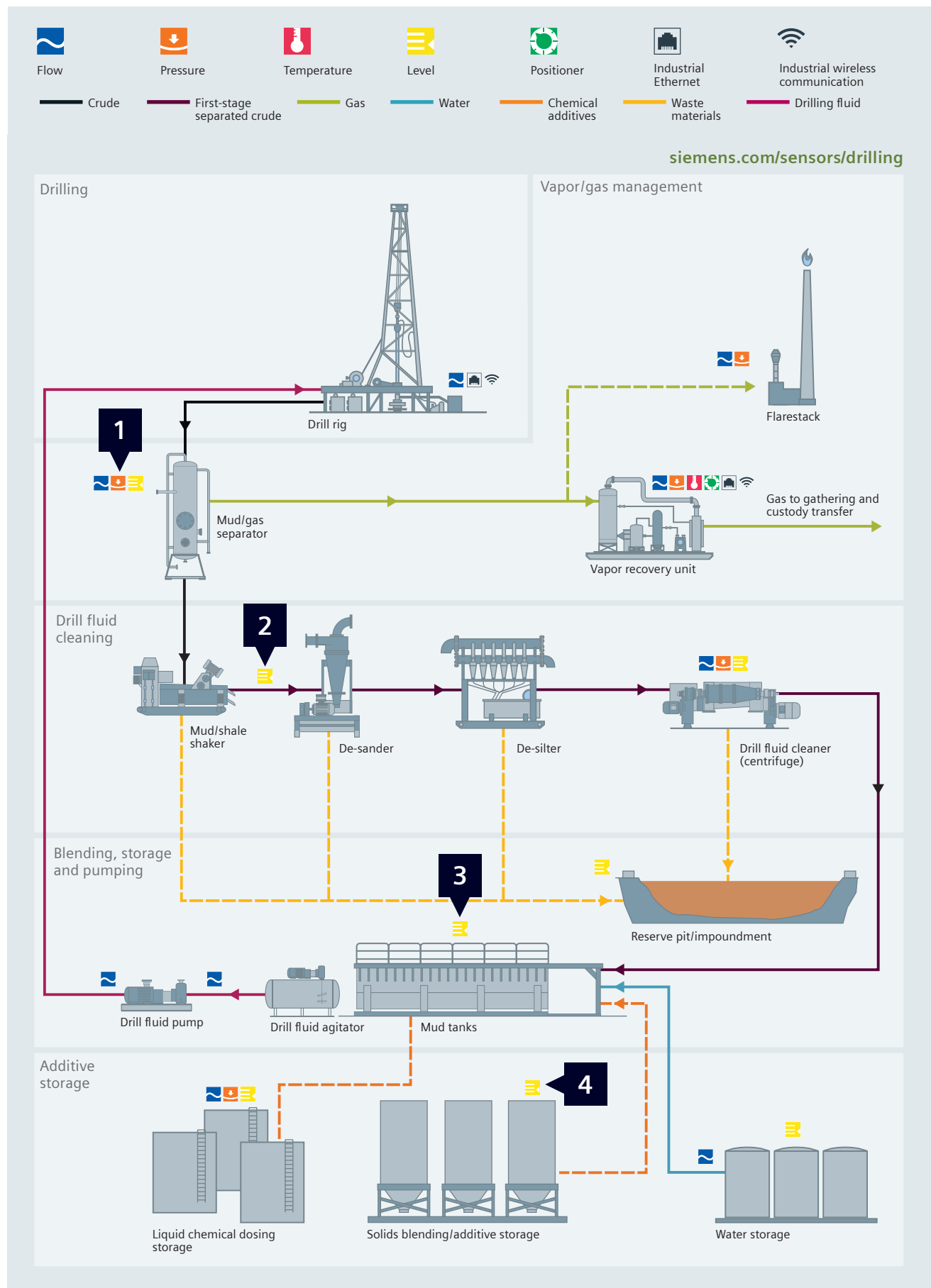
Flow: SITRANS F M MAG 3100/MAG 6000

- Constructed of materials suitable for virtually any chemical
- High-accuracy performance under specific flow range conditions

Flow: SITRANS FC440

- Multiparameter measurement capability ensures precise dosing
- High operating frequency eliminates the effects of electromagnetic interference and mechanical vibrations on accuracy levels

Drilling



1**Mud/gas separator**

The mud/gas separator is that critical piece of safety equipment within your drilling or workover operations that must be working within normal parameters at all times. Siemens instrumentation provides you with a clear picture of your system's effectiveness and ensures that you have plenty of time to react when unforeseen events (e. g. kicks) are imminent.

Flow: SITRANS FC440

- Measures both gases and liquids with high precision and repeatability
- High accuracy performance on liquids with of entrained gas

Pressure: SITRANS P320

- One-stop shop for all your pressure needs, including hydrostatic level, differential, gauge and absolute pressures plus volume/mass level and flow
- Hazardous area classifications with intrinsically safe and explosion-proof options

3**Mud tanks**

Careful monitoring of mud tank operations allows for more precise drill fluid management and makes it easier to achieve the required fluid compositions. By continuously tracking mud tank levels, Siemens instrumentation also safeguards personnel and operations during potential upset conditions.

Level: SITRANS Probe LU240

High level of accuracy even in dirty mud or slurry applications

- Insensitive to fast-moving and turbulent material surfaces

Level: SITRANS LR100 series

- Strong performance in challenging open- and closed-loop systems where vapors and buildup are concerns
- Simple local configuration via a text-based, menu-driven display or remotely via SITRANS mobile iq and Bluetooth Technology

2**Mud/shale shaker**

Maximizing material separation optimizes shaker operations and results in high-quality drilling fluid, which enhances the performance of the entire drill fluid management system. Consistent measurement in the face of extreme vibrations is a difficult undertaking for most technologies, but with many years of experience, Siemens has successfully overcome this challenge.

Level: SITRANS Probe LU240

- Rugged design capable of operating in environments with vibrations up to 20 G's
- Proven in use with more than a decade of installation experience

4**Solids blending/additive storage**

Tight control over the amount of material added during drilling operations is critical for optimizing fluid composition in order to compensate for changing well properties. Overseeing solids and powdered additives requires equipment specially designed to address the challenges of solids material measurement. As a global leader in this field, Siemens brings the products and the knowledge to you, our customers.

Level: SITRANS LR550/580

- High-frequency radar technology ensures material tracking in the presence of extreme dust and with fluctuating material surfaces
- Convenient and easy to install thanks to extremely narrow beam angle of only 3° and Bluetooth Technology

Hydraulic fracturing

1 Heater truck

Maintaining control over water temperature and feed rate is crucial to the performance and safety of your downstream operations. The Siemens portfolio of flow and temperature equipment is well suited to the challenges faced by your heater truck operations.

Flow: SITRANS F M MAG 5100 / FM520

- Easy commissioning and servicing with the removable SENSORPROM unit to get you operational quickly
- Custody transfer approvals available for direct billing usage

Temperature: SITRANS T Series

- Compact configuration perfectly suited for use on mobile equipment
- Sensors and transmitters for head, rail and field mounting offer total installation flexibility

2 Impoundment

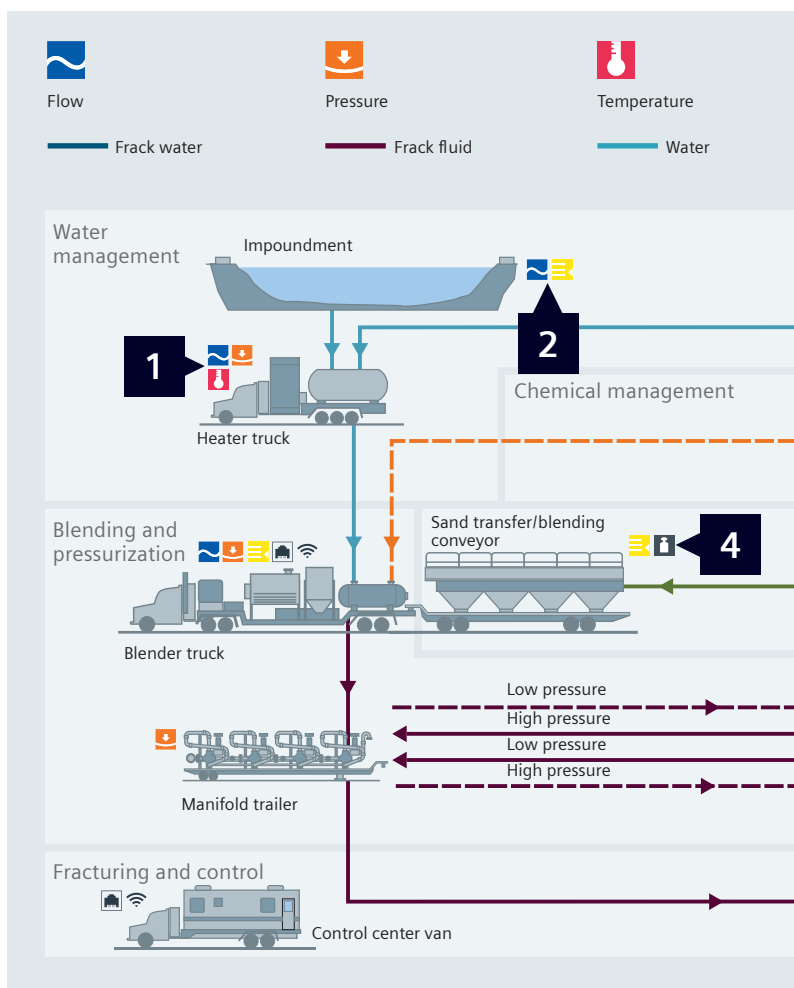
Close monitoring of water usage is the best way to confirm that you always have enough water to service your operations and satisfy legislative mandates. Siemens has a strong portfolio of instrumentation for water and environmental applications and the experience to go along with it.

Flow: SITRANS F M MAG 5100 / FM520 / MAG 8000

- Suitable for direct burial or continuous flooding applications with optional battery power
- Custody transfer approvals available for accurate inventory monitoring and direct billing

Level: SITRANS LH100

- Perfect for hydrostatic level measurement where mesh covers are deployed for evaporation control
- Fast, simple deployment and commissioning, with a 4-20 mA output corresponding to level



3 Chemical truck (transport/dosing)

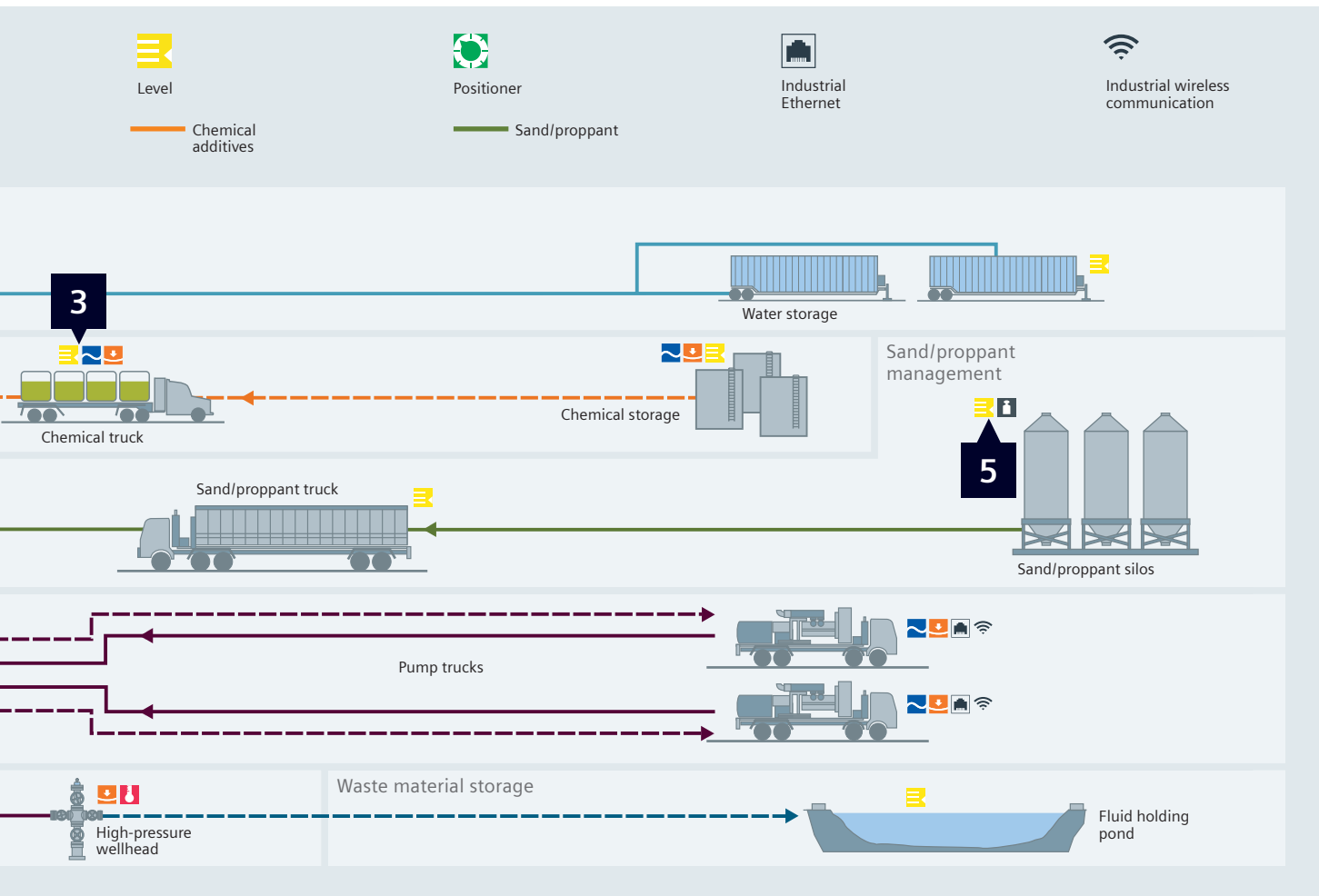
Being able to track your inventory of chemicals in transport or on-site ensures that you always have the right amount of material when and where you need it, while full visibility into your chemical usage safeguards the accuracy, repeatability and traceability of the dosing process. Siemens has proven technology for all of your mobile and static chemical needs.

Flow: SITRANS FC440

- Various mounting and communications options including local display, remote design and direct to PLC via HART, Profibus and Modbus
- Very compact Coriolis flowmeter, making it easy to fit into the tight spaces that characterize most mobile applications

Level: SITRANS LG250

- Range of process connections and probes that can be customized and even cut to length onsite to meet all your level measurement needs
- Compact, 2-wire, loop-powered electronics are a perfect fit for mobile installations or remote locations where availability of power is always a challenge



4 Sand transfer/blending conveyor

Feeding the right amount of sand and proppant into your blending equipment is key to obtaining the right mix of frack fluid, which will help meet the unique needs of your well. Siemens is the only instrumentation supplier in the world that can provide continuous, real-time, accurate batching of solids materials with our comprehensive line of dynamic and static batch weighing equipment.

Weighing: MSI Beltscale/BW500 Integrator

- Beltscales and integrators for conveying sand from silos or shipping containers to blending equipment
- Designed for operation in harsh environments while maintaining accuracy up to 0.125 %

5 Sand/proppant silos

Sustaining your on-site inventory levels of sand and proppant is critical for safeguarding against operational interruptions. It is a real challenge to provide continuous level measurement in the face of dust, sloped surfaces and materials with poor reflective properties or low dielectrics – a challenge Siemens is well equipped to face.

Level: SITRANS LR550/580

- 80 GHz technology makes it possible to measure accurately even in difficult conditions
- With lens antenna and integrated aiming flange for solids to a range of 394 ft. The design includes an aimer feature for optimal performance and air purge connection that can be used with extreme dusty application where build up is possible

Weighing: SIWAREX WP231

- Built-in batch control functionality allows you to customize your blend on-site to match the proppant mix precisely to the well structure
- Easily integrated into a compact mobile platform as a stand-alone solution or into an existing PLC and control system

Offshore oil and gas

1

Free water knockout

Downstream process issues including corrosion, hydrate formation and tight emulsions can be prevented by optimizing separation in your free water knockout vessel. Siemens offers you the ability to continuously monitor level and other process variables, allowing the vessel to operate within its ideal water interface level where maximum separation performance is achieved.

Level: SITRANS LG250

- Interface detection with a dedicated 4-20 mA output for both upper and lower medium levels
- Remote-mountable electronics and/or display for ease of installation and ability to program up to 50 m (164 ft) away

Level: Pointek CLS200/CLS300/CLS500

- Capable of interface detection even in the presence of an emulsion or rag layer
- Large selection of process connections and mounting options for greater installation flexibility

2

Coalescer

Meticulous oversight of pressure and material levels is necessary not only to verify that proper separation is occurring, but also to identify when application issues such as coalescer media plugging arise. Siemens instrumentation provides fast, accurate detection of process conditions to make sure you know just how well your coalescer is performing.

Pressure: SITRANS P320

- Variety of installation and mounting options to meet the unique needs of every application
- Local display, programming and diagnostics for the industry's best on-site usability

Level: SITRANS LG250 GWR or Pointek CLS300

- Wide range of functionality including measurement of interface levels, interface detection and point-level monitoring of the upper medium
- Long-term stability and capacity for operation even with moderate build-up



Flow



Pressure

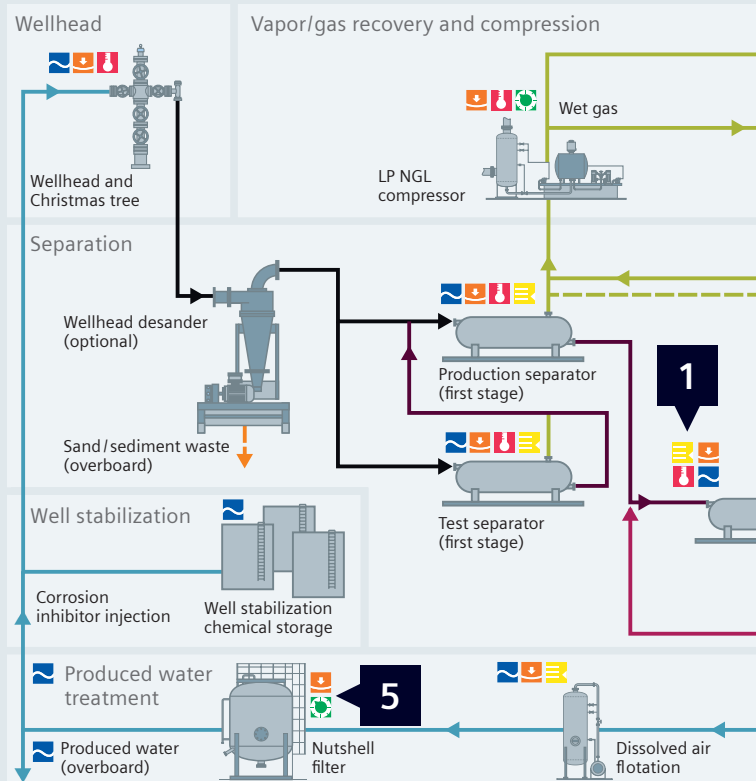


Temperature

Crude

First-stage separated crude

Oil



3

De-salter

Removing salt and sediment from crude requires very precise interface detection to ensure that the oil and fresh water flowing through the de-salter remain strictly segregated. Siemens level devices detect the passing of interfaces to provide full visibility into your system, while our flow, pressure and temperature solutions help to maintain strict control over this vital step in the refinement process.

Flow: SITRANS F M MAG 6000

- High-accuracy measurement of water, even under low-flow conditions
- Large selection of liner and electrode materials as well as compact and remote-mountable electronics options available for standard and high-pressure applications

Level: SITRANS LG250

- Two measurements from a single rod or cable means only one vessel entry
- High availability even under difficult process conditions where slight emulsions may occur



Level



Positioner



Industrial Ethernet

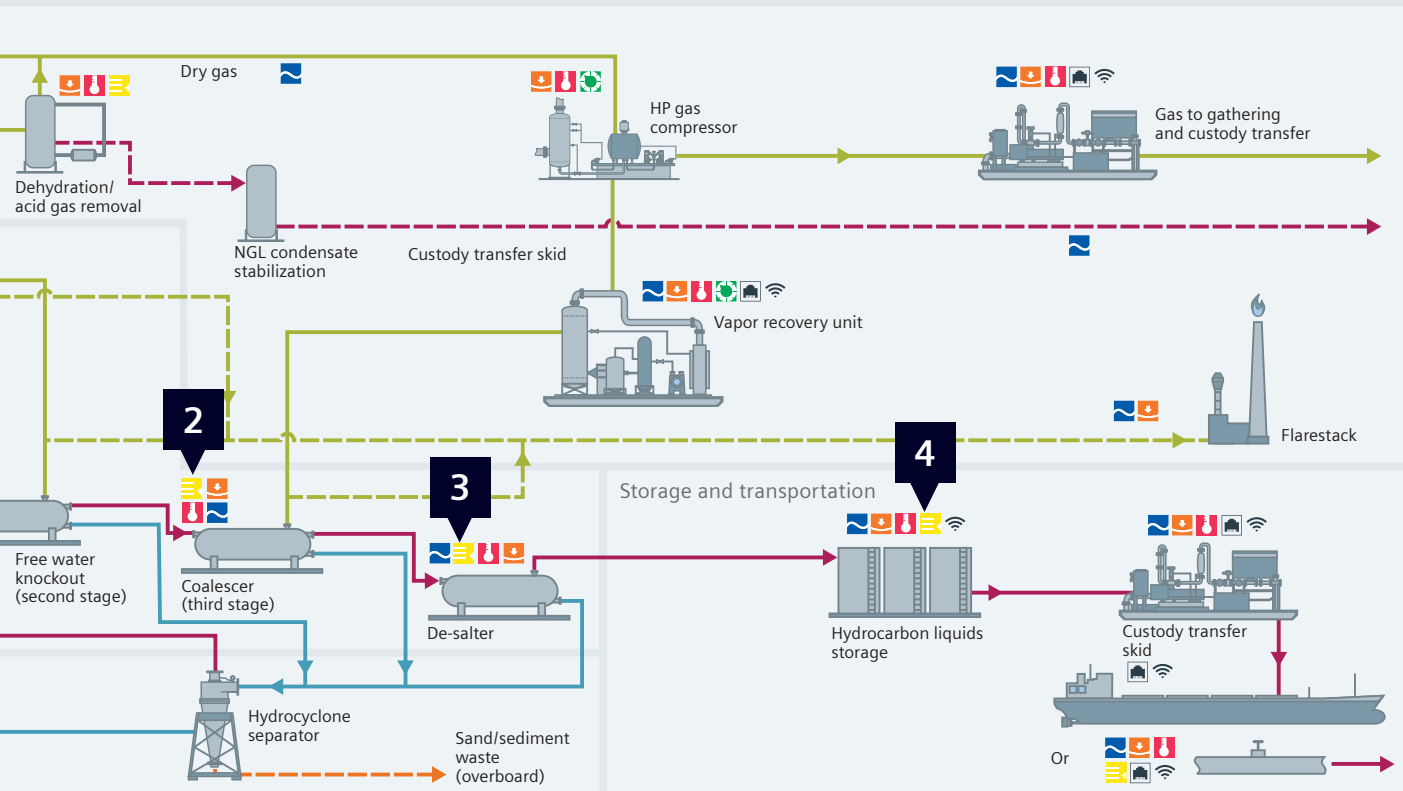


Industrial wireless communication

Gas

Produced water

Condensate



4

Hydrocarbon liquids storage (hull or leg)



Monitoring product in storage tanks presents several difficulties even in traditional setups, but move storage into the hull of a floating vessel or the legs of an offshore platform and suddenly the challenges are multiplied. Siemens' broad portfolio of instrumentation gives you the options you need, no matter where your storage is.

Level: SITRANS LR510 / LR530

- With lens and flanged encapsulated antennas these advanced radar level transmitters are designed to handle simple and demanding applications.
- Convenient and easy to install thanks to extremely narrow beam angle of only 3° and Bluetooth Technology

Level: SITRANS LG250

- Modular and comprehensive portfolio of enclosures, probes and materials of construction, all with the necessary marine approvals
- Ability to detect interface so you know just how much water is in your storage tanks and when

5

Nutshell filter



When system pressure drops, it is a clear indicator that nutshell filter media plugging has occurred and a backwash cycle is required. With differential pressure equipment and pneumatic valve positioners from Siemens, you can trust that your backwash process is automated and triggered precisely when it is needed.

Pressure: SITRANS P320

- Large selection of process seals, materials of construction, mounting options and communications protocols for maximum installation flexibility
- Excellent long-term stability and ability to measure very small positive or negative pressures





Positioner: SITRANS PS2


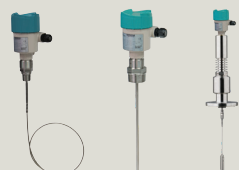


- Ultra-low air consumption during operations, giving it one of the lowest costs of ownership on the market
- Adaptable to hundreds of different configurations of rotary, rotary vane and linear actuators from dozens of manufacturers

Our portfolio has you fully covered

Siemens brings you a broad spectrum of process instrumentation, analytics and communication solutions suitable for the harsh conditions that often characterize upstream oil and gas applications.

Flow			
Electromagnetic	Coriolis	Clamp-on ultrasonic	Vortex
			
<p>Our reliable flowmeters are capable of meeting even the toughest challenges by monitoring gases and liquids of varying consistencies. Pictured: SITRANS F M MAG 3100 P, SITRANS FC440, SITRANS FS220, SITRANS FS230, SITRANS FX330.</p>			

Pressure		Temperature	
Transmitters	Remote seals	Sensors	Transmitters
			
<p>Siemens offers a wide range of accurate, robust and intuitive devices for all types of pressure measurement. Pictured: SITRANS P500, SITRANS P320, SITRANS P220, SITRANS LH100, flange-designed diaphragm seal, projecting tube diaphragm seal.</p>		<p>Siemens temperature devices are designed to support all common RTDs, thermocouples, resistance and millivolt sensors. Pictured: SITRANS TS500, SITRANS TF320/420, SITRANS TH420.</p>	


Level			
Radar	Guided wave radar	Point level	Ultrasonics
			
<p>Whether you need to detect liquids, slurries, bulk solids, foam or interfaces, Siemens provides the right level measuring technology for all types of applications. Pictured: SITRANS LR500 series, SITRANS LR100 series, SITRANS LG250 flex cable, SITRANS LG250 rigid rod, SITRANS LG270, SITRANS CLS300, SITRANS LVS100, SITRANS LVL200, SITRANS LU240.</p>			



Positioner



Weighing




		Static weighing	Dynamic weighing	Integrators
				
<p>The SIPART PS2 electropneumatic valve positioner offers easy integration as well as extensive diagnostic functions and very minimal loss of process air.</p>		<p>Our SIWAREX PLC-based weighing electronics allow for direct integration into the Siemens range of PLCs, providing unparalleled flexibility and ease of use. Pictured: SIWAREX WL270, Milltronics MSI, SIWAREX WP231, Milltronics BW500.</p>		



Process protection







Gas analysis

Acoustic sensors	Motion sensors	Continuous gas analytics
		
<p>SITRANS AS100 sensors help operators to detect blockages in pneumatic conveying systems, while our motion sensors ensure that mechanical conveying systems maintain their set speed.</p>		<p>Gas analysis tools from Siemens cover a wide range of measuring tasks and are the ideal solution for process and quality control. Pictured: SIPROCESS GA700 family.</p>



Industrial communication

Switching & routing	Wireless communication	Remote communication	Security
			
<p>Siemens' industrial-grade communication solutions enable secure, reliable and high-availability network connectivity in harsh environments. Pictured: RUGGEDCOM 19" Ethernet switches, SCALANCE X204-2FM, SCALANCE XM408-4C, RUGGEDCOM RS900 family, RUGGEDCOM WIN 5100 and 7200 series, SCALANCE W786, SIMATIC S7-1200 communication solution, SCALANCE S modules.</p>			

Measuring everything that matters:

usa.siemens.com/pi

Siemens Process Instrumentation offers best-in-class measurement and seamless integration into your automation system. We are the total solution provider for flow, level, pressure, temperature, weighing, positioners and more.

Legal Manufacturer

Siemens Industry, Inc.
100 Technology Drive
Alpharetta, GA 30005
United States of America
Telephone: +1 (800) 365-8766
usa.siemens.com/pi
Order No. PIBR-00026-0624

This document contains a general description of available technical options only, and its effectiveness will be subject to specific variables including field conditions and project parameters. Siemens does not make representations, warranties, or assurances as to the accuracy or completeness of the content contained herein. Siemens reserves the right to modify the technology and product specifications in its sole discretion without advance notice.