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EXCELLENCE.

PRESSURE MONITORING FOR OIL & GAS  
EXPLORATION & PRODUCTION INCLUDING SUBSEA

**STS**  
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# RELIABLE PRESSURE MEASUREMENT DEMANDS A STRONG CORE TECHNOLOGY

A carefully produced pressure sensor is the best prerequisite for accurate measurement results over the entire product life. Pressure transmitters using piezoresistive semiconductor technology are characterized by their high sensitivity and reliability, which is why pressures even in the mbar range can be recorded with great precision. However, when using the appropriate silicon, pressure ranges of > 20,000 psi or 1,500 bar are equally achievable with the same high accuracy and performance. Procedures such as the compensation of temperature based errors ensure the highest measurement accuracy. Our pressure transmitters are also extremely reliable demonstrated by the high overpressure specification.

## The strengths of our core technology at a glance:

### High precision, low total error

Temperature errors are already compensated during production. Each product is optimized for its respective application.

### Overpressure (Proof Pressure)

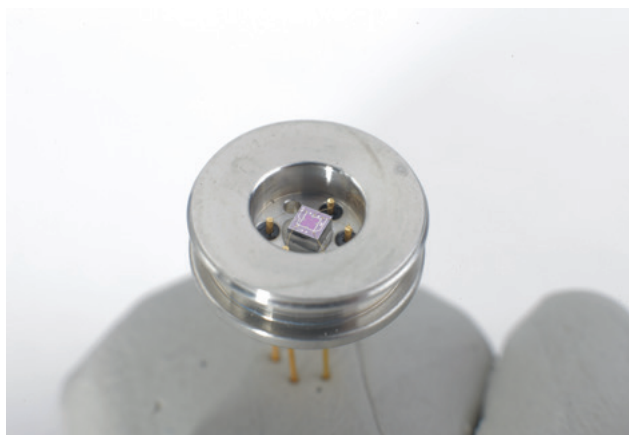
Our standard pressure transmitters can typically tolerate three times the measurement range without suffering any damage or effecting the calibration. The overpressure can also be customized to the application.

### Pressure hysteresis and non-repeatability of negligible value

Pressure hysteresis and non-repeatability are measurement errors which can not be compensated. However, due to the high quality of the STS production processes, these remain extremely low. The error caused by non-repeatability and hysteresis is typically 0.01% FS.

### Excellent long-term stability

STS produces only high quality measuring cells. To achieve outstanding long-term stability, these are thermally treated through temperature cycling and other proprietary procedures. This reduces measurement errors to a minimum and significantly reduces the measurement uncertainty.



The silicon sensor element inside the glass-to-metal seal

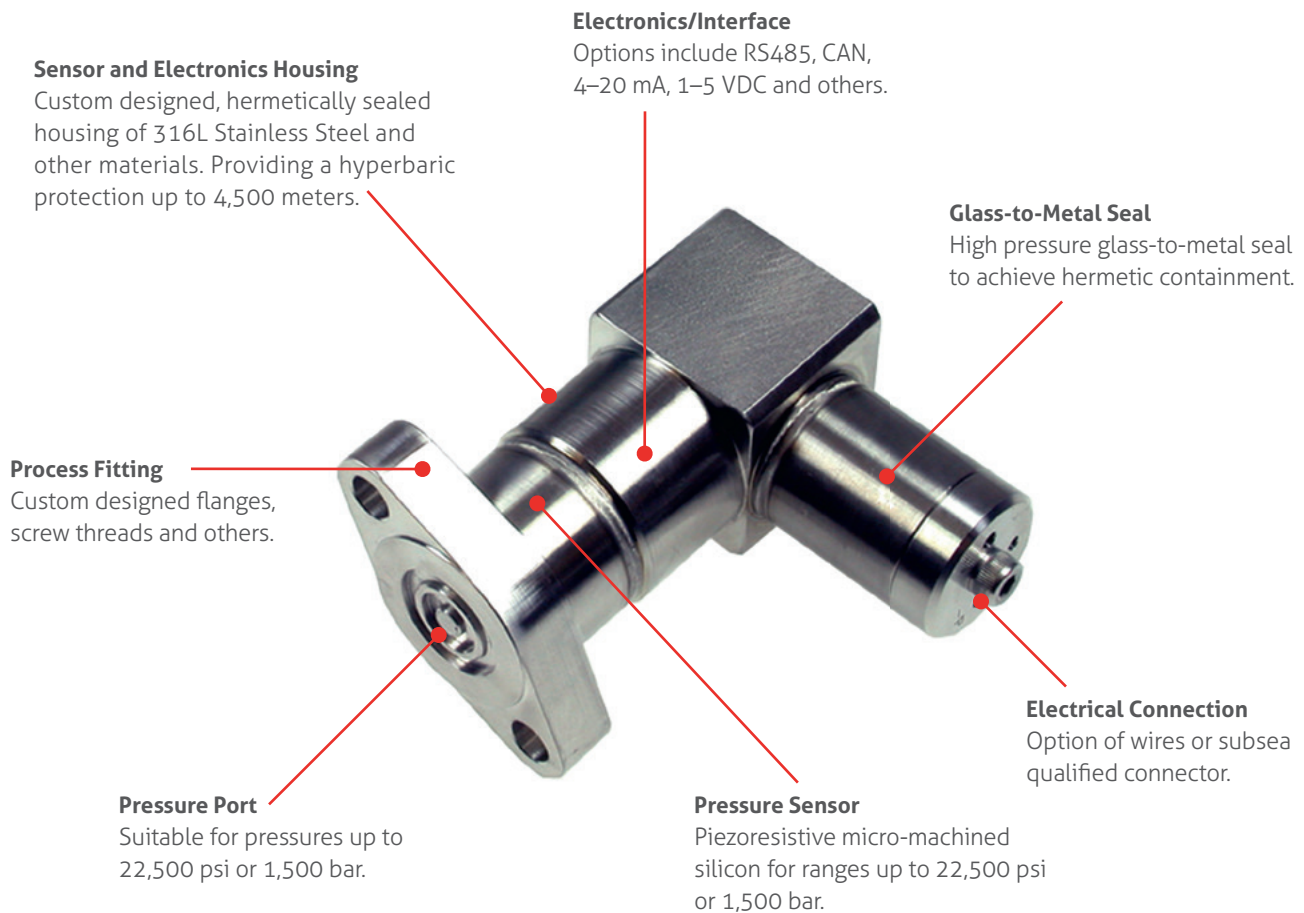


Core technology: Piezoresistive measuring cells

# RELIABLE PRESSURE MEASUREMENT

## HYDRAULIC CONTROL POD SENSOR FOR SUBSEA

Below is a breakdown of a typical subsea sensor highlighting the design and performance specifications.



### Sensor Specifications

- Pressure: Up to 22,500 psi or 1,500 bar
- Absolute, Gauge or Sealed Gauge
- Proof pressure: Typical 1.5x Full Scale
- Hyperbaric Tested: Up to 4,500 meters
- Accuracy: Up to 0.1% capability
- Operating Temperature Range: –30 to 50°C/–22 to 122°F
- Storage Temperature Range: –40 to 85°C/–40 to 185°F
- Design Life: MTBF exceeds 30 years
- Wetted Material: 316L Stainless Steel, Nitronic 50, Superduplex 1.4501 and others
- Material Traceability: 3.1 to BS EN 10204:3.1
- Environment Stress Screening: ESS according to API-17F
- Welding Standard: ASME IX
- Analog Outputs: 4–20 mA or 1–5 VDC
- Digital Outputs: RS485 or CAN
- Accreditations include: ATEX, FM, FMC, IECEx, CE



# DRILLING & EXPLORATION

There are many very demanding pressure measurements made during the drilling and exploration process in the Oil and Gas industry. Some examples of these are shown alongside. In general, pressure transmitters are required to work at relatively high temperatures and often in high vibration environments. STS has developed products to suit both of these parameters and with their custom packaging capabilities and reputation for long-term installations, should be the company of choice for new applications.

One such application is monitoring the Drilling Mud which performs a number of critical functions including cooling and lubrication of the drilling tools and also removing debris. It is also the communication medium for down hole Measurements While Drilling (MWD).

The measurement of these high static and dynamic pressures are critical to the drilling function. Such transmitters selected for this application must therefore provide high accuracy, fast response and also withstand external shock and vibration levels encountered. This is a requisite for selecting an STS transmitter.

In addition to operating at high temperatures and vibration, features of the STS transmitters which are ideally applicable are a rugged thick walled housing, NACE compatible materials and intrinsically safe approvals such as ATEX and FM.



## Terms used in exploration for which STS transmitters are suitable:

- Fracking
- MWD
- Power tongs
- Torque turns
- Mud pumping
- Hook loads
- Standpipe pressure
- GEO steering
- Downhole tools
- Choke manifold pressure
- Directional drilling
- Horizontal drilling

### Hydraulic Pressure Monitoring

General purpose digital pressure transmitter suitable for many drilling applications with very high reliability for pressures up to 22,500 psi or 1,500 bar.



### Mud Pressures

Suitable for static pressures associated with Drilling Mud.



### High Temperature Pressures

Suitable for process temperatures up to 150°C or 300°F.



# TOPSIDE AND LAND BASED PRODUCTION

Land based and topside production is generally more mature than the offshore industry. High performance monitoring systems continue to be introduced to improve efficiency and reduce production costs.

The infrastructure supporting the extraction process includes the distribution of products from offshore locations. For example, this may include intercontinental pipelines and associated compressor stations.

STS has developed an extensive range of high performance pressure transmitters for use in the many aspects of land based production and distribution operations.

To satisfy the rugged environment of the Oil & Gas production process, and continuing to provide cost effective pressure measurements, a wide choice of performance levels and packaging is available, including NACE compatibility and 316L Stainless Steel construction.

STS pressure transmitters provide high accuracy and reliability and exceptionally good long-term stability, thus minimizing maintenance and cost of ownership.

Many of the STS transmitters for these applications can be found in our extensive catalog which due to the modular construction offer fast and reliable delivery in a wide range of configurations.



## Applications in topside or land based production where STS transmitters are appropriate:

- Wellhead measurements
- Subsea pressure measurement
- BOP controls
- Sucker rod
- Submersible pumps

### Pipeline Pressures

Oil and gas pressure measurements for transfer and processing.



### Production Process Monitoring

Water injection pressures featuring titanium construction.



### Wellhead Monitoring

High pressure oil and gas monitoring, certified for hazardous area use.



# SUBSEA

The illustration alongside shows a typical offshore installation for an operating extraction system. Such installations can be installed on the sea bed as deep as 3,500 meters (11,500 feet).

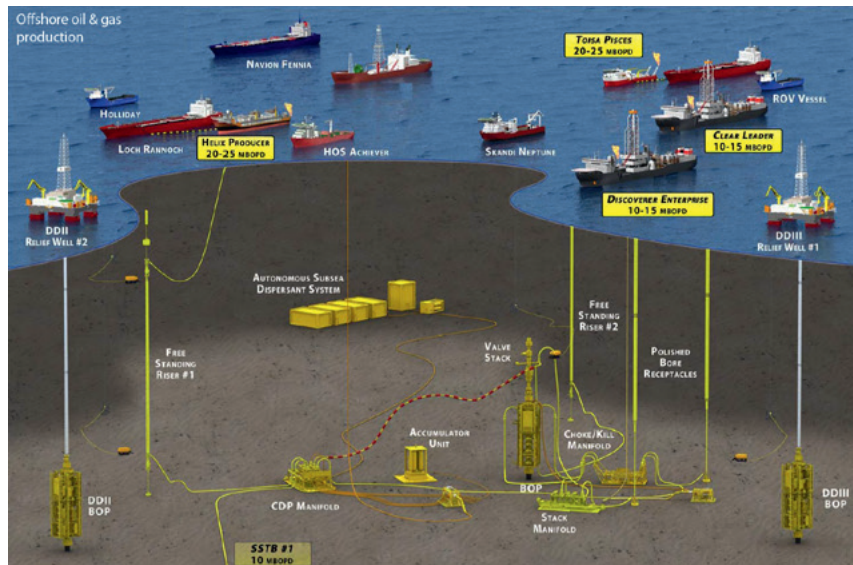
The equipment selected will be exposed to seawater for a very long period and therefore integrity of construction and long-term reliability will be of prime importance.

STS has more than 20 years experience in providing high performance precision subsea pressure transmitters which have been customized and used for both control systems and direct mounting onto wellheads.

In addition, the STS transmitters are also suitable for Remotely Operated Vehicles (ROV) where they are not permanently installed.

By far the most important feature of a subsea pressure transmitter is for it to remain operational throughout the life of the installation which could exceed 20 years.

To provide the highest level of sensor stability so that the calibration remains within the original specification, STS selects and verifies the components and construction through a rigid manufacturing process. The result is a proven product which will remain in specification over an extremely long period ideally suited to subsea applications.



## Applications in subsea, exploration and production for which STS transmitters are suitable:

- Subsea Wellhead Transmitters
- Remotely Operated Vehicles
- Wellhead Control Systems
- Depth
- Submersible pumps
- Fracking

**Contact STS experienced engineers for much more information.**

### Subsea Wellhead Transmitters

High pressure, flange mounted and certified for use in subsea applications.



### Remotely Operated Vehicles

STS submersible sensors are suitable for use in hydraulic control in depth measurement.



### Wellhead Control Systems

Hydraulic control valve mounted transmitter with high external pressure containment.



# ADVANCED PRESSURE SENSING TECHNOLOGY FOCUSED ON THE OIL & GAS INDUSTRY



Calibration of subsea transmitters



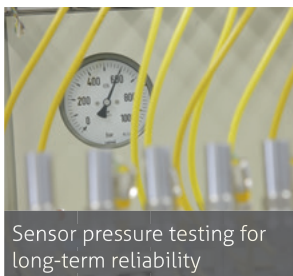
Qualification of the subsea components



Examples of sensing elements



Functional testing of pressure transmitters



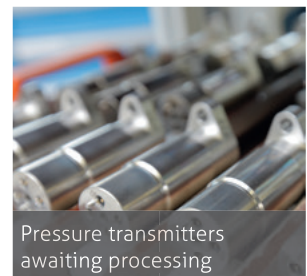
Sensor pressure testing for long-term reliability



Customizing components



Multichannel glass-to-metal seals



Pressure transmitters awaiting processing

## YOUR COMPETENT PARTNER FOR CUSTOMIZED PRESSURE MONITORING SOLUTIONS

For more than 30 years, STS has been producing customer-specific applications and solutions according to the motto "pressure measurement technology from engineers for engineers".

### Why STS is the ideal partner for your oil & gas pressure monitoring:

#### Solutions that exactly meet your specifications

Consider our sales engineers as competent sparring partners to help you develop the ideal pressure measurement solution for your project.

#### In-house production ensures high quality standards

Thanks to our own production of measuring cells, we can guarantee the high quality of our core technology. We also develop, manufacture and test the solution that meets your requirements in-house.

#### We advise you on-site

With our global sales and technical network, we can provide you with competent advice on-site. Our know-how, built up over 30 years, is always there where you need it.

#### Certifications

STS maintains relevant certifications appropriate for its products to be used in hazardous and other locations within the stringent demands of the oil and gas and especially subsea applications. These include:

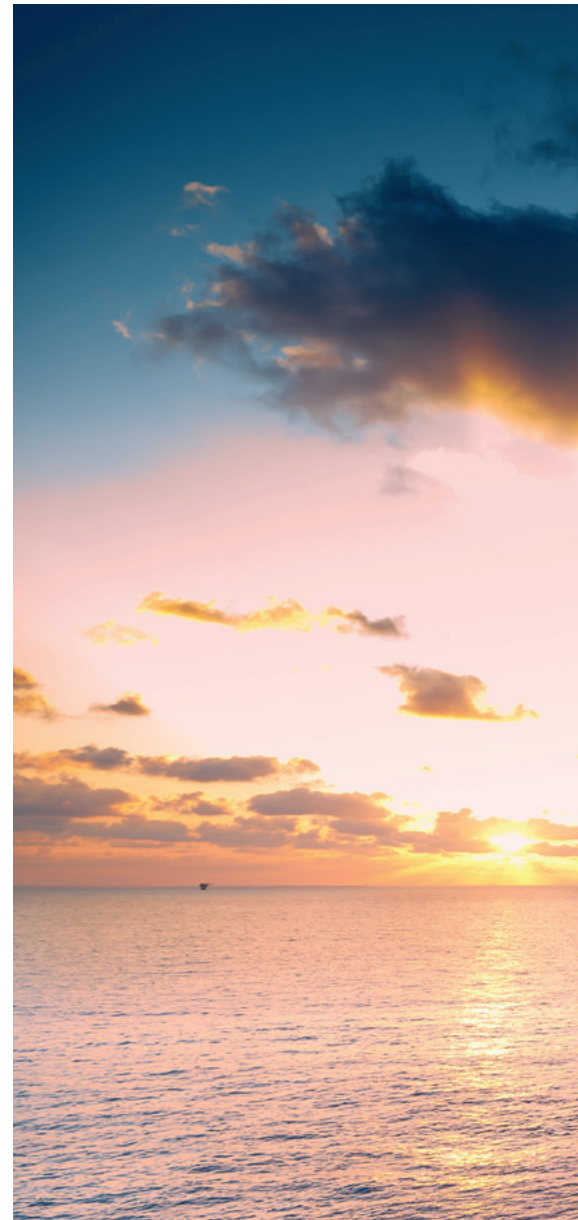






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