

# Subsea

## Pressure Sensors for Sub-Sea Applications

Today's sub-sea technology employed in the offshore production of oil and gas requires pressure measurement instrumentation combining long term stability, reliability and an operating life in excess of 25 years.

In addressing these market needs, Lucas Control Systems has developed a range of type test/qualified Pressure Sensors for operation both inside Sub-Sea Control Modules and for installation directly on Sub-Sea Production Manifolds and Xmas Trees.

Within the offshore industry Lucas' participation began in 1981-2 supplying Schaevitz™ Sub-Sea Pressure Transmitters for production platform launch and

positioning systems to Marathon Oil for Brae 'A' and Brae 'B', Elf Aquitaine, Norge for Heimdal and to B.P. Norway for the U.L.A. platforms. During this period the P480 series potential was realized for sub-sea use, on production manifolds to measure process and water injection pressures.

A.C.B. France evaluated the P480 series alongside other manufacturers sensors on the SKULD diverless installed production manifold. From the results of their evaluation the Schaevitz™ range of Sub-Sea Pressure Transmitters were selected for Elf Aquitaine, Norge's - East Frigg and Totals - North Alwyn systems.

## Subsea P900/P1220 Series

### Control Module and Solenoid Control Valve Pressure Sensor



#### Field Proven

Pressure Ranges: 0-100 to 15,000 psi (0-7 bar to 1035 bar)  
Accuracy  $\leq \pm 0.2$  or  $\leq \pm 0.1\%$  FRO

These special versions of the well proven P900/P1220 series have been designed for use inside oil filled Subsea Control Modules to depths of 3,280 ft (1000 meters).

The pressure sensors transductive element is unique, comprising of a 4 arm-thin foil gauged bridge, bonded to a double cantilever beam, which in turn is coupled via a force rod to the pressure diaphragm. This provides a positive overrange protection of typically 5 times its rated output. The pressure capsule is of electron beam welded construction manufactured from either 17-4PH stainless steel or Inconel 625 for very corrosive media and NACE compatibility. Isolation of the transductive element from the diaphragm also provides good thermal insulation from temperature transients with excellent long term stability.

#### Features

- For operation inside oil filled control modules to 9,850 ft (3000 meters) water depth**
- High overrange capability**
- Hydraulic pressure or process pressure measurements**
- Flange or male/female process connections**
- mV; volt or mA signal output via cable/in line electrical connection**
- Field proven design with excellent stability and reliability**
- Stainless steel electron beam welded construction**
- Pressure containment system to 11,600 psi (800 bar); 18,000 psi (1245 bar) optional**

# Subsea P480/PX480 Series

## Wellhead Pressure Transmitters

The P480 Series is designed for direct installation on subsea oil production manifolds to measure oil/gas process and water injection pressures. Integral 2 wire transmission provides 4-20mA signals via customer specified cable or subsea mateable connector assemblies back to the control system.

Manufactured from high corrosion resistant alloys to meet NACE and other requirements, the sensor and casing is of electron beam and T.I.G. welded construction, hyperbarically tested, ensuring reliable operation to depths of 2500 metres with an operating life in excess of 25 years. In the unlikely event of the pressure diaphragm rupturing, secondary containment is provided within the pressure capsule to 11,600 psi (800 bar). As a mandatory requirement, an additional containment (tertiary) has been added which is pressure tested and verified to 15,000 psi (1035 bar) on each unit during manufacture.

### Features

- ❑ **Designed for long term seawater immersion to depths of 8,000 ft (2500 meters)**
- ❑ **Pressure connection API. 6A or 17D. Process Flange manufactured from Duplex, Super Duplex (BX ring with Inconel 625 inlay optional)**
- ❑ **Designed to API requirement PR1; product specification Level PSL3 and suitable for class of service up to and including API. Class 'F'**
- ❑ **Dual output and dual redundant options**
- ❑ **Operational life in excess of 25 years**
- ❑ **Verifiable pressure containment system to 15,000 psi (1035 bar)**
- ❑ **High over-range capability**
- ❑ **Electrical termination via. customer specified cable penetrator or subsea connector**
- ❑ **Low profile "Flush Diaphragm" versions available for applications where waxing and hydrate formation is a possibility**



### Field Proven

Pressure Ranges from 1,500 to 15,000 psi (100 to 1035 bar)  
Accuracy  $\pm 0.1\%$  FRO  
Flush diaphragm versions available

# Subsea PTX480 Series

## Sub-Sea Wellhead Pressure/Temperature Transmitter

The PTX480 Series provides two measurements at one location. It's design is based on the 'field proven' P480 series but supplied with a flush pressure diaphragm situated adjacent to a temperature sensor at the end of it's thermowell nose. Integral amplifiers provide independent 2 wire 4 to 20 mA outputs for each measurement via customer specified subsea mateable connector or cable penetrator.

To meet the mandatory requirements for equipment installed on subsea production manifolds, the PTX480 design provides a process containment system which is verified to 15,000 psi (1035 bar) on each unit during manufacture.

High overvoltage capability of the PTX480 enables the manifold/tree to be pressure tested with the transmitter installed without damage to the pressure capsule.

Designed to API requirement PR1; Product Specification Level PSL3 and suitable for class of service up to and including API Class F the PTX480 casing is manufactured from high corrosion resistant Duplex Stainless Steel for sea water immersion to 8,000 ft (2500 meters) with an operational life in excess of 25 years.

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Pressure Ranges from 1,500 to 10,000 psi (100 to 700 bar)  
Temperature Ranges from -40°F to 272°F (-40°C to 150°C)  
Accuracy <±0.10% FRO

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### Features

- ❑ ***Flush diaphragm pressure capsule to eliminate the risk of waxing and hydrate formation impairing the performance of the sensor***
- ❑ ***A.P.I. 6A or 17D. Process flange manufactured from Duplex, Super Duplex or 17-4 PH. Stainless steel (BX ring with Inconel 625 inlay optional)***
- ❑ ***Designed for long term, seawater immersion to depths of 8,000 ft (2500 meters)***
- ❑ ***Pressure containment system verified to 15,000 psi (1035 bar)***
- ❑ ***Designed to API requirement PR1; product specification Level PSL3 and suitable for class of service up to and including API. Class 'F'***