

# **MAXIMATOR®**

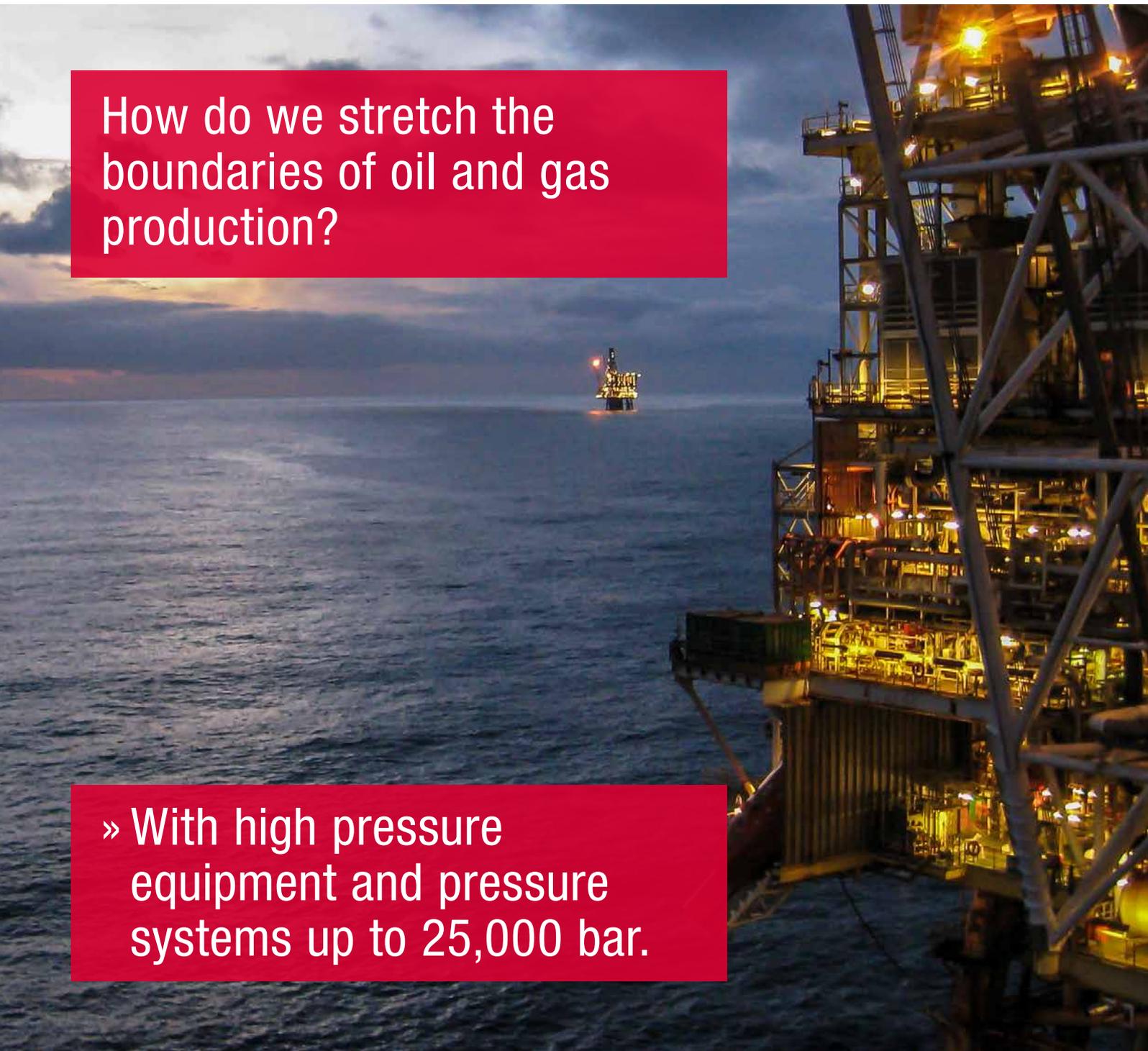
## **Maximum Pressure.**



High Pressure Technology • Testing Equipment  
Hydraulics • Pneumatics

How do we stretch the boundaries of oil and gas production?

» With high pressure equipment and pressure systems up to 25,000 bar.



# Maximum safety for oil and gas production



As a specialist for high-pressure technology for up to 25,000 bar, we make the extraction of crude oil and natural gas efficient and safe – with high-performance products and high-pressure systems for testing and production purpose in surface and subsea applications.

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## Your engineering expert for high pressure testing and production Control System equipment

Maximator GmbH has developed and produced high-pressure and testing technology, hydraulics and pneumatics for more than 50 years. We supply high-pressure components as well as innovative and customized system solutions that meet the strict standards typical for the industry.

Our flexible organizational structure means that we are able to realize complex projects in an efficient and professional way. We are also equipped to accommodate time-critical modifications resulting from

changes to standards and laws, because as a manufacturer with wide-ranging engineering experience in numerous sensitive industries, we are very familiar with these issues.

Our interdisciplinary solution competence, our systems and our products push the limits of technical feasibility ever further. With more than 700 employees across the globe, we offer support to reputed international companies from the following sectors: oil and gas, automotive and suppliers, chemicals, mechanical engineering and energy.

## Your production success is our goal

Continuous, and above all, safe volume flows are the top priority when pumping and processing crude oil and natural gas. As an experienced technology leader, Maximator produces products and systems that are ideally equipped for this:

Hydraulic control systems for wellhead equipment and for subsea production systems through to high-pressure testing equipment - we develop made-to-measure solutions to make your processes and your applications more efficient, more reliable and safer.

All systems are designed for maximum reproducibility of the results, simple operation, speed and efficiency – even in difficult environments. We consistently train our employees and we implement intelligent safety concepts in our systems and in our technical solutions, because human and environmental safety is one of our main priority.

# Overview of competencies



In every phase, your projects profit from our specific engineering expertise - from the quotation phase, to the delivery – including engineering phase.

- **Project management:**

Our workflows achieve prompt results due to efficient and organized work processes.

- **Services, research and development:**

To ensure everything matches your project, we carry out tests and modifications in line with your guidelines for your products and systems, be they standard or customized developments, flexibly on our own high-pressure testing systems in our service centers.

- **Engineering and programming:**

We can fall back on more than 70 engineers, technicians, PC and PLC programmers to realize well thought-through efficient solutions with intelligent safety concepts.

- **Production:**

Mechanical processing, electrics and mechatronics - whatever the discipline, our team of more than 140 specialists offers first rate support for the construction of optimized and reliable systems.

- **Global service:**

We support you around the world with our services that include commissioning, maintenance, on-site installations or repairs. More than 50 employees at 20 international sites are on hand to help you.



# How is the rigging of oil and gas production plants made a surefire thing?

» With valves, fittings and tubing up to 10,500 bar.

Reliable and high-quality components made of high-strength materials are essential elements of the equipment for high-pressure applications. Valves, fittings and tubing from Maximator for onshore and offshore production projects are designed for productivity and secure system operation.

#### **Suitable for surface and subsea applications**

We supply components for surface applications – for instance, for hydraulic control systems or injection systems for corrosion inhibitors – as well as for subsea applications, for instance in subsea control modules or testing equipment.

Our high-pressure valves, fittings and tubing are suitable for pressure and function testing systems for subsea control modules or for flushing and pressure testing systems for subsea umbilical.

#### **Components from the manufacturer – for all requirements**

As a system manufacturer of testing and production systems for high pressures up to 25,000 bar, we concentrate on quality and durability in every production phase – from the milling centers through to the final assembly stage and functional tests of the parts.

Our portfolio of standard components for high-pressure applications both surface and subsea is available in a number of versions. These include valves and fittings with NTP or BSP-connections up to 1,050 bar, components of the Medium Pressure series (up to 1,550 bar – 22,500 psi), the High Pressure series (up to 4,500 bar – 65,000 psi) and the Ultra High Pressure series (up to 10,050 bar – 152,000 psi). We also supply an entire series for applications with H<sub>2</sub>S (up to 2,070 bar – 30,000 psi), ball valves, valve actuators as well as adapters and accessories.

With our experienced engineering team and state-of-the-art production systems, we realize development requests flexibly and also test new products in our own service centers under a variety of conditions.



**Valves, fittings and tubing up to 10,500 bar (152,000 psi):**

- Needle valves, fittings and pipes (1/4– 1")
- 2-way and 3-way ball valves (1/4– 9/16")
- Anti-vibration collet gland assemblies, filters and check valves
- Pneumatic and hydraulic actuated high pressure needle valves
- Adapters and couplings (NPT, BSPP, JIC, etc.)
- Test and Product Certification (GOST, 3.1, etc.)

**Special products**

- Special valves made to specifications
- Special material available (Duplex, Super Duplex, Inconel, Hastelloy, etc.)
- Special configuration (needle, ball and needle, shut-off and relief valves (1x and 2x), etc.)
- API flange connections available





How do you keep your hydraulics safe at high pressure levels?

» With high pressure units and components for fluids.

High-pressure pumps and systems from Maximator allow reliable testing of pressurised hydraulic equipment and components in oil and gas drilling and production operations. The compact units and systems also assume functions such as the calibration of pressure measuring instruments, the supply of pressure to hydraulic control systems for well equipment or chemical injection.

**Safe under extreme conditions: Maximator high-pressure pumps**

Our high-pressure pumps generate hydraulic pressure levels of up to 7,000 bar – with oil, water or special media – extremely safe and cost efficient. They are easy to handle and are also very versatile, even in explosive areas. The design is based on an oscillating pressure intensifier, they run extremely stably with compressed air (1-10 bar).

**High-pressure systems for fluids – also as rental units**

Compact high-pressure systems for specific tasks and demanding test procedures: Our mobile Liquid Power Packs and individually configurable hydraulic systems guarantee process stability and very high pressure levels. The high-quality machines comprise optimally aligned quality components „made in Germany“: Valves, fittings and tubing – primarily produced by our company and designed to satisfy even the strictest of safety standards.

A high-quality stainless steel frame surrounds the compressed air powered Power Packs, so that they work to the optimum even under the toughest of operating and environmental conditions. The clearly structured control panel, with a logical design, will ensure simple operation. Additional safety is provided by the sturdy bulkhead fitting connections.

We also supply an extensive array of high-pressure systems for fluids as rental units. Just contact us!



**Pumps – performance and features:**

- 17 different construction series for pressure levels up to 7,000 bar and flow capacities up to 48 l/min
- Compressed air drive allows operation in explosive areas
- Alternative drive media possible
- Optionally, also suitable for use with media containing H<sub>2</sub>S
- Standstill when the set final pressure is reached without energy consumption

**Power Packs – safe grades:**

- Only high-quality materials are used for maximum resistance
- No electrical connection required for operation
- Control panels with logical design ensure safe operation
- Compact design with line connection or including a tank
- Lightweight, ideal for mobile applications





How do you hit high gas pressure levels safely on drilling platforms?

» With high pressure units and components for gas.

Imperative for the oil and gas production, often a challenge in practice: compressing technical gases. Maximator high-pressure gas boosters and booster stations set the fluids exactly to the process requirements and generate high gas pressure levels up to 2,400 bar reliably - directly on site.

#### **Smart from the drive to the cooling**

Our oscillating gas boosters of the DLE series compress technical gases and gas mixtures up to 2,400 bar, hydrogen up to 1,000 bar and oxygen up to 350 bar. With the innovative drive that is operated with compressed air or other technical gases (1 to 10 bar), they are suitable for a variety of environments, even where there is a risk of explosion. The separation of the drive and process gas and the effective cooling ensure absolute efficiency and safety.

#### **Powerful series and customised systems:**

##### **Booster stations for gases**

The Maximator Gas Power Packs are a series of high-performance booster stations to meet the high demands of onshore and offshore applications. All our know-how as a specialist for very high gas pressure levels has gone into these systems: The weight-optimised, individually configurable machines also work extremely safely even under the toughest of conditions. Their control panels with logical design allow simple control at all times.

The Gas Power Packs are ideally protected by the high-quality stainless steel frames, and also have line filters and an optional auxiliary cooler. The features improve availability and reduce wear.

Above and beyond the compact booster stations, we also design and produce customized systems. We produce systems to customer specifications, depending on requirements, mounted on base plates, frame or in outdoor casings, as well as manual or automatic control systems.



**High-pressure booster of the DLE series – performance range:**

- Compressed air driven booster for compressing technical gases such as argon, helium, oxygen, hydrogen and nitrogen up to 2,400 bar
- Effective gas compression thanks to broad-based product range (single-acting, double-acting and 2-stage booster)
- High level of safety thanks to the physical separation of the drive and process gas and also additional connections for flushing the booster with inert gases for applications with critical media

**Booster stations - equipment**

- Control panels with logical design ensure safe operation
- High system availability thanks to integrated filtration
- Automatic shut-down, pressure accumulators, adapters, high-pressure hoses, quick couplings and pressure regulators available
- Stainless steel version (316 alloy) for extreme application and ambient conditions



# How do turbo compressors supply your gas in a safe process?

## » With supply systems for mechanical seals.

Gas or liquid sealed: mechanical seals keep pumped media safely in the system for numerous processes in the oil and gas production sector. Supply units guarantee that the dynamic seals function to the optimum under tough conditions by cooling, flushing, applying pressure and compensating leaks – on drill platforms and on FPSO ships, as well as in subsea production systems.

### **Protect the production process**

Maximator supply systems offer specific solutions for mechanical seals in crude oil, multiphase and water injection pumps, gas pumping and boosting as well as on FPSO ships in cooling, heating or fire extinguishing pumps. The systems remain extremely stable even when alternating process media are used or under temperature fluctuations. They also ensure that the seals have long service lives and guarantee extremely efficient operating times.

### **Achieve more performance**

Thanks to our in-depth engineering expertise in pressure generation and control of fluids and gases, we realise high-quality, excellently processed supply systems for mechanical seals. Reputed pump and compressor manufacturers in the oil and gas industry use our first rate systems out of conviction.

We supply customers with top quality standardised supply systems and accessories. We also supply customised solutions for large projects, such as our Seal Gas Conditioning Skids, for the supply of natural gas to turbo compressors during start up and shutdown that significantly improve the capacity of natural gas production systems.

We effectively satisfy the specifications of the relevant standards and guidelines of the oil and gas industry (e.g. NACE MR0175, NORSOK, ASME, DNV, PED and ATEX). We procure and process special stainless steels (e.g. 6Mo, Duplex, Inconel, 316Ti). We test and certify our systems in compliance with the latest standards and special customer requirements.



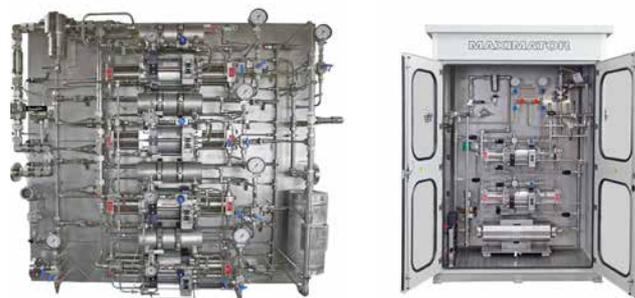
**Maximator solutions for liquid sealed mechanical seals:**

- Central feed-in units for several mechanical seals in compliance with API 53b, Atex-conform with redundant pressure generation
- Air and water cooler in compliance with API 53b with a high cooling output thanks to laser-welded ribbed tubing with low flow resistance
- External circulation system acc. to API 54
- Thermosyphon vessels, nitrogen booster stations and emergency supply systems in compliance with API 53a



**Maximator solutions for gas sealed mechanical seals:**

- Booster stations for increasing the pressure in compliance with API 74 with redundant pressure generation and proportional pressure control
- Monitoring, distribution and pressure control stations acc. to API 74
- Individually configurable Seal Gas Conditioning Skids to supply turbo-compressors for transporting natural gas
- ATEX certified
- Tubing or Welding Pipe





How can you show that your sub-sea technology is fit for the future?

» With high pressure workshop testing equipment.

Thanks to innovative technologies, the oil and gas industry now exploits sources which until recently seemed totally inconceivable. For suppliers of on- and offshore exploration production systems first rate test equipment is the key to success: it allows them to provide reliable proof of the safety, durability and performance of their technologies under operational conditions.

#### **Solutions for every testing requirement**

Maximator test equipment allows the quality to be verified for numerous exploration and production products in compliance with national and international standards. Test parameters and test processes can be adjusted flexibly to specific requirements, and test records can be designed individually for tests on Hydraulic Power Units and also components.

#### **Safe testing of the equipment**

Our test systems significantly reduce the test effort and supply ideally documented and conclusive results. We develop the smart technologies based on our 50 years of experience in the high-pressure and testing technology, hydraulics and pneumatics fields, whilst also concentrating on the best possible features.

We always orient the design of the systems on the respective requirements: for instance, a compact design, an integrated test device or a modular system with separate control and pressure generation unit. In terms of the functions, we can realise almost any wishes by integrating several pressure circuits with various media in one system. In addition, our systems are also sound insulated for use in workshops, they are equipped with a digital process data recording system and the components and line equipment have nominal widths that are optimised to very short testing times. We guarantee maximum safety for the users by means of intelligent technical elements, such as signaling or colour-coded pressure circuits.



**Our solutions for testing systems:**

- HPU (Hydraulic Power Unit) for leak and pressure tests
- Pressure generation systems for hyperbaric chambers
- Hydraulic systems for pressure fatigue tests
- Hydraulic systems and booster stations for leak tests
- Standard and stainless steel flushing systems (for oil and water glycol fluid)

**We are testing:**

- Wellhead, Xmas Tree and BOP
- Hydraulic Power Units (HPU)
- Subsea Control Modules
- Subsea Umbilical
- Pressure control and shut-off equipment
- Well equipment



# How can you operate wellheads with a flick of the switch?



## » With standard surface control panels.

Blowout preventer and wellhead equipment allows specific access to subsea production facilities – to remove crude oil or natural gas as well as to inject fluids or gases. Our MAXIMATOR Surface Control Panels allow users to control, in a safe way, all the hydraulic or pneumatic functions installed on the Wellhead / Xmas Tree.

### **Reliable control of the valves**

Wellheads are equipped with fail-to-safe safety valves, whose design varies depending on the system. Standard features include a Surface Safety Valve (SSV) and a Surface Controlled Subsurface Safety Valve (SCSSV) for the process control and safety shutdown. These safety valves are controlled via the Surface Control Panels – and in an emergency, the Emergency Shutdown Panels assume the control function.

### **Expand functions modularly - depending on the application**

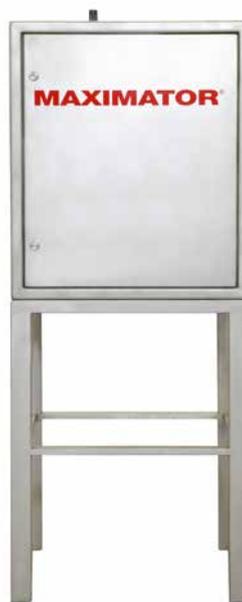
The hydraulic functions can be combined for the sequential closing in compact units via the modular Maximator Surface Control Panels. Our innovative series comprising three modules allows control functions to be adapted easily. A hydraulic manifold block acts as a basic module via which the communication with the Emergency Shutdown Panels and the control unit of the SSV is realised. It also has a pressure switch for monitoring the pressure, pressure accumulation and measuring instruments, compressed air and manual operated low-pressure and high-pressure pumps as well as a hydraulic tank. Additional control systems can be integrated: with a second module for further SSVs and a third module for a SCSSV up to 10,000 psi.

The Surface Control Panels made of high-quality 316 steel in a sturdy block design have impressed many of our customers across the world. The durable and reliable equipment can be operated easily due to the logical design of the modules. Maximator high-pressure pumps offer a real added value as they can be operated manually or with compressed air, thereby allowing automation.

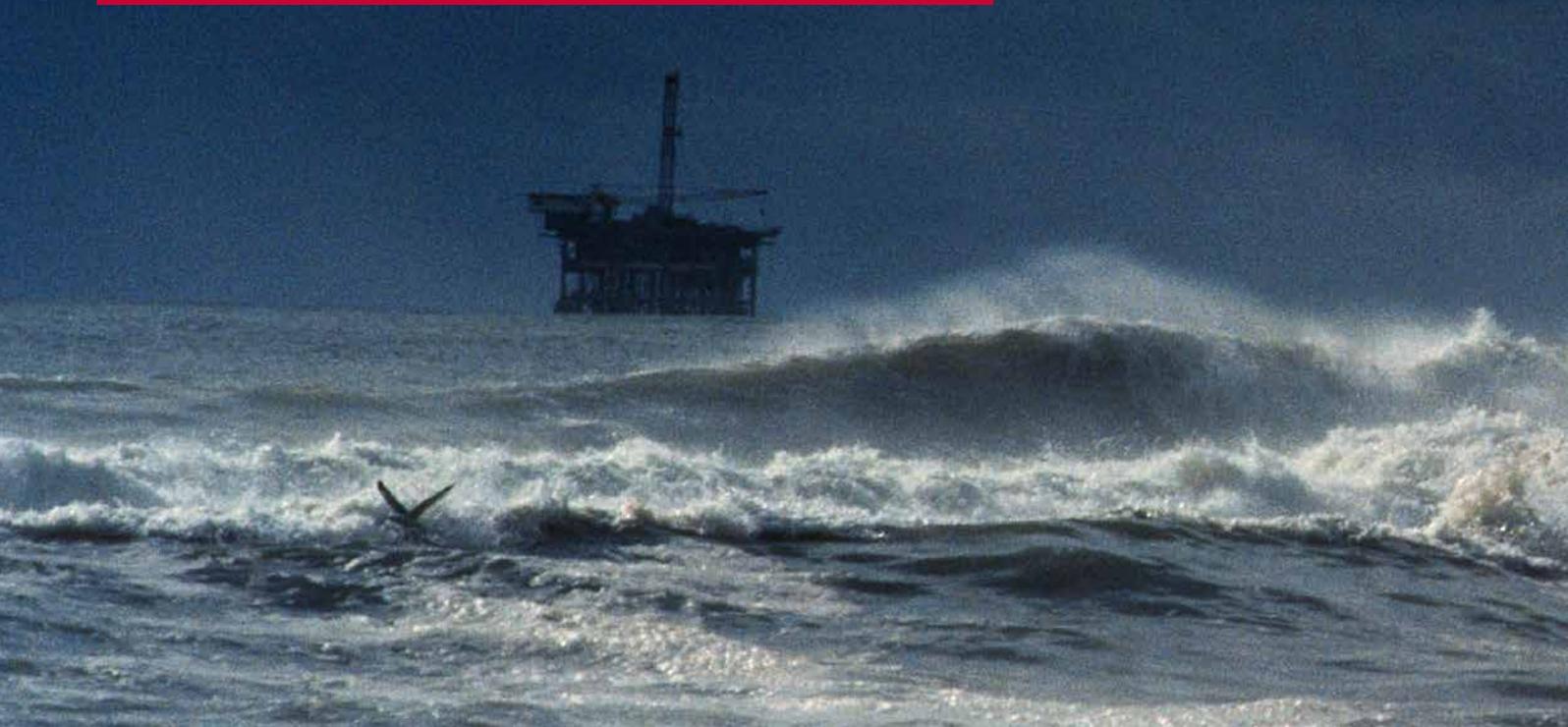


**Performance of our Standard Surface Panels:**

- Standard Surface Panels for up to three hydraulic functions
- Maximum operating pressure: 5,000 psi for SSVs and 10,000 psi for SCSSV
- Hydraulic interlocks to ensure correct opening and closing sequences
- Manifold Block design reduces potential leak areas and the quantity of fittings
- Modular design allows simple extension and interchangeability of the control panel from 1 to maximum 3 hydraulic functions.
- High-pressure pumps can be operated both manually and also automatically via compressed air
- Stainless steel frame (316SS) for extreme ambient conditions
- Stand mounted



# How can you operate wellheads at 3000 metres below sea level?



## » With customised control systems.

Maximator Customized Control Systems allow the complex structure of the wellhead equipment to be controlled at deep sea levels – a fundamental requirement for oil and gas production in difficult-to-access reservoirs and complex exploration processes.

### **Control every detail**

We adapt the Customized Control Systems to suit the requirements at the installation site, and to accommodate the functions that need to be controlled, the communication with the production systems and the applicable standards and guidelines. In the design process, we take into particular account the size of the wellhead equipment, especially for reasons of safety. The design is based on application techniques to ensure that our Customized Control Systems are equipped for the respective tasks - also for mobile applications.

### **Powerful equipment for safe functions**

Our Customized Control Systems incorporate a Hydraulic Power Unit with compressed air or electrical operated high-pressure pumps for generating the pressure. The backup power supply is supplied by the integrated hydraulic accumulator and manual operated Maximator high-pressure pumps. The user operates the hydraulic control unit securely using the logical panel design. The emergency shutdown is realised via optional Emergency Shut-down Panels – either manually or automatically. Acoustic or visual warnings from various safety systems reliably indicate malfunctions.

We have successfully applied our engineering know-how of Customized Surface Control Panels in numerous projects – for instance for calculations and certifications, e.g. DNV 2.7-1 with FEA, stress tests, tests of welded joints etc. We also have extensive experience in the acceptance field – both for inspections by customers and also external audits by e.g. TÜV, American Bureau of Shipping (ABS), German Lloyd or Lloyds Register of Shipping.



**Our services for Customized Control Systems:**

- Customized Control Systems to control multiple hydraulic functions on BOPs and Xmas Trees during wireline or workover operations
- Remote controlled ESD Panels with pneumatic timers for sequential shut-down
- Pneumatic, Electric or manual high-pressure pumps
- Frame: Stainless steel version or offshore coating
- Compact design with semi-automatic and automatic hose reels for the hydraulic hoses
- DNV 2.7-1 certification
- ATEX Zone 1 certified
- Full bank of accumulator to ensure a quick closing of the BOP in case of energy failure





# How are hydraulic supplies for the Arctic and the oceans made as reliable as a Swiss watch?

## » With topside equipment for sub-sea applications.

A clean hydraulic system is imperative for constant and precise valve performance in subsea production systems. Hydraulic Power Units (HPU) provides an optimised power supply – even for kilometre-long umbilical and subsea distributor stations. Installed on onshore and offshore platforms or FPSO vessels, the units secure the production operations.

Maximator develops and produces HPUs for direct or multiplexed subsea production systems. Standard or customised HPUs are used for installation, for testing and for flushing applications. The units work independently with pressure circuits for low-pressure from 200 to 350 bar and high-pressure from 700 bar to 1,050 bar. Redundant electric and pneumatic high-pressure pumps generate the pressure for the subsea operations.

### **Cleanliness for durable components**

Depending on the required volume flow, we manufacture our HPUs with integrated or separate piston accumulator systems. Additional heating systems can be fitted for Arctic or harsh environments. Maximator HPUs have dual redundant filter systems with electrical clogging indicator. The units have separate storage tanks for effective separation of clean and soiled fluids for the supply and return lines.

Our installations ensure that the hydraulic systems achieve maximum purity (e.g. AS4059 D Class 6 B-F). This in turn increases the service life of all hydraulic components. With the embedded PLC, the units work independently so that the operating effort by the user is low. The integrated components are made of 316ss stainless steel – on request, we can also use special materials. When handling the various media, such as mineral oils, water/glycol mixes or also environmentally friendly biodegradable synthetic oils, we have extensive experience and will be glad to advise you.



#### Performance of the Maximator HPUs:

- Offshore-proven components
- Redundant pressure generation with electrical or pneumatic pumps
- Standard and individual solutions
- Integrated or remote control (PLC)
- Protected from environmental influences (IP Rating)
- Combined low and high-pressure circuits
- Suitable for operation in areas with gas atmospheres or as an open frame version (Skid-Design)
- ATEX Zone 1 certified
- Designed for 20 years operation

#### Maximator HPU solutions:

- HPU for subsea production systems
- HPU for surface production systems
- HPU for wells intervention
- HPU for testing and flushing applications





How can you use high pressure to concentrate on your core competencies?

» With our service and testing know-how.

#### **Service for your production technologies**

Our team of more than 50 service professionals at 20 international sites is on hand with their equipment and engineering know-how to help you round the clock with your system from the commissioning phase through to operator training courses and maintenance. We also supply original spare parts for your production equipment.

With the focus on transparency, we demonstrate the working principle of the technologies in product briefings so that you can save time and money right from the start: Safe and competent handling during operation and maintenance helps to extend the service life of all components and reduce unnecessary standstills, thereby securing your investment in the long term.

Maximator service and maintenance contracts guarantee regular maintenance and servicing of your system. We make your day-to-day business easier by organising the inspection schedules and planning and executing the continuous maintenance work to ensure that the performance of your machine remains at the highest level.

#### **An overview of our services:**

- Commissioning, maintenance and on-site repairs
- Software modifications and adjustments
- System modernisation and relocation
- Installation of medium/high-pressure tubing
- Service and maintenance contracts
- Original spare parts supply
- Technical support for immediate assistance on the telephone, optimisation and remote maintenance
- High pressure training
- Inspection of pressure measuring instruments





### Testing for all situations

Our experienced test engineers and technicians test the applications in the prototype phase under real conditions so that you know what your products are capable of before you use them. In our test laboratories MAXIFES (Germany) and MAXIMATOR Test LLC (USA), we carry out innovative and cost-efficient services to solve your high-pressure testing tasks. We carry out static and dynamic pressure, bursting pressure tests and pressure fatigue and lifecycle tests quickly and securely, as well as our autofrettage services.

As a specialist for high-pressure testing procedures, we will support you with a wide range of contract testing procedures that we carry out in our excellently equipped high pressure testing laboratories. Our test services are carried out in our laboratories on high-tech equipment, even in environments ranging from  $-40^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$ .

### An overview of our services:

- Pressure fatigue and life cycle tests (4,500 bar/15Hz)
- Pressure, leak and bursting pressure tests (up to 15,000 bar)
- Autofrettage (up to 15,000 bar)
- Tests with various temperature range ( $-40^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$ )



# We systematically achieve goods results.



## Your partner for safe and efficient oil and gas exploration

With Maximator you are in the best of hands for equipment for complex exploration projects: Reputed petrochemical and offshore companies trust our years of experience. They profit from our unique interdisciplinary know-how that we, as the market leader for specialised high-pressure and testing technologies up to 25,000 bar, and hydraulic and pneumatic equipment, have gained in many industries. We have offices at 20 locations worldwide. Feel free to contact us.

### Reliable high-pressure solutions from the market leader

Our product portfolio comprises high-pressure pumps and gas boosters as well as valves and fittings. Thanks to the broad focus from the components through to the system, we are able to supply extensive solutions that are ideally suited for hard operating conditions – including

high-quality Maximator high pressure equipment and intelligent control systems. Within this process, we combine our component expertise with our application know-how for systems.

### Smart technologies and global service

Be it systems or components – our solutions are highly safe and easy to use. They are designed for maximum efficiency so that goals can be reached quickly even under difficult working conditions.

We and our international partner companies across the world are on call to assist you.

You can find our international locations on our website at: [www.maximator.de/worldwide+distribution](http://www.maximator.de/worldwide+distribution).

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### Full check before delivery

- Check to ensure that the system is complete
- Check of the functions

## MAXIMATOR MULTI-STAGE-ENGINEERING

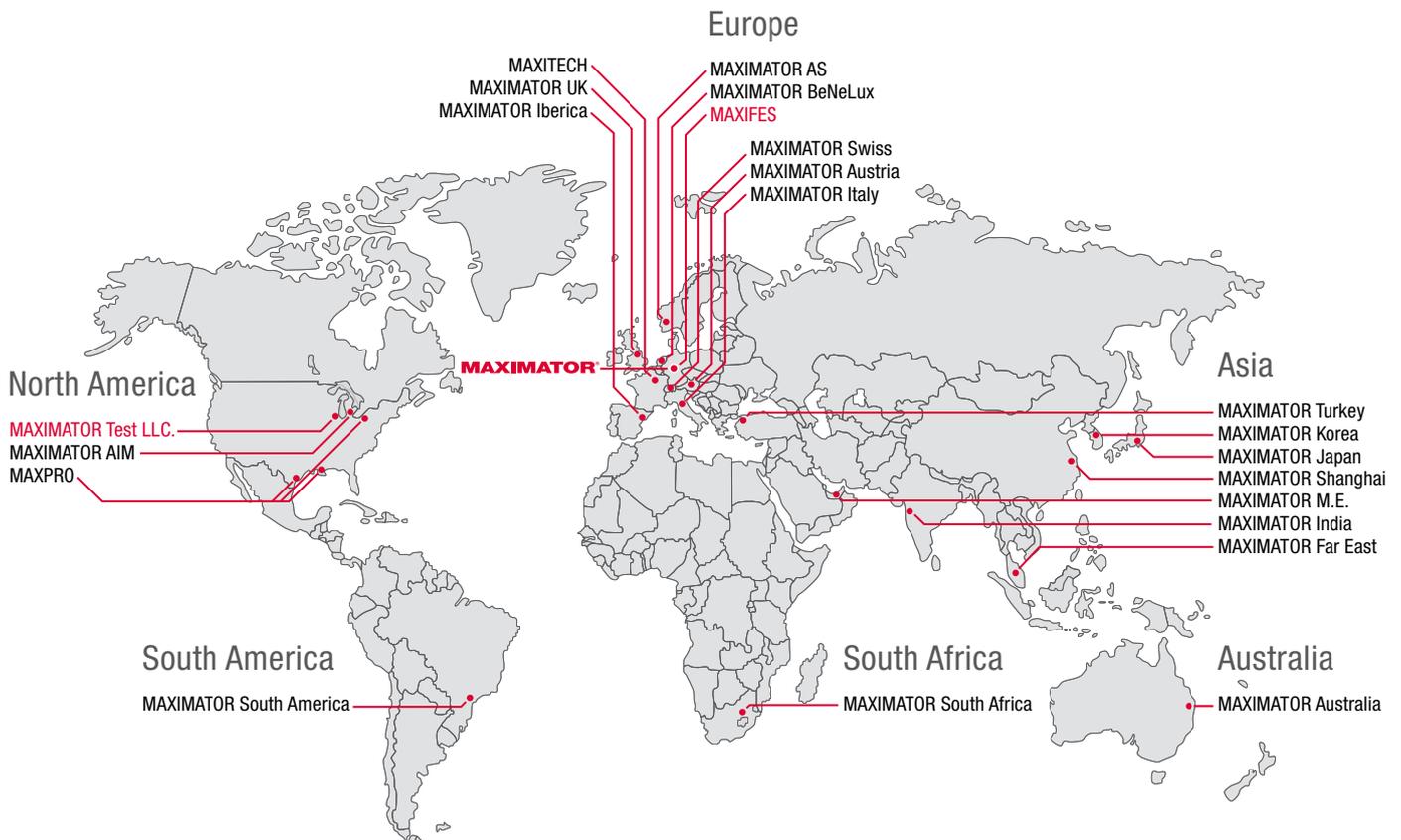


### Manufacture of your system

- Production of high pressure components and system assembly
- Programming and set-up of the system

### Optimum system availability

- Checking and optimisation of the system parameters, staff training
- Global support: Maintenance, inspection, retooling, repair, spare parts service



» Visit our website:  
[www.maximator.de](http://www.maximator.de)