

Oil and gas

Solutions for production, transport, and processing



Passionate about your industry Customized complete solutions

In order to ensure the safety and productivity of your systems sustainably, our oil and gas industry experts – with many years of technical experience, a worldwide sales network, and passion – focus on the challenges you face. Excellent products which are intelligently combined to form innovative systems are at the heart of our solutions. Extended with industry-specific characteristics, we develop solutions for the oil and gas industry in proven Phoenix Contact quality, which are rounded out by engineering, servicing, and training services.



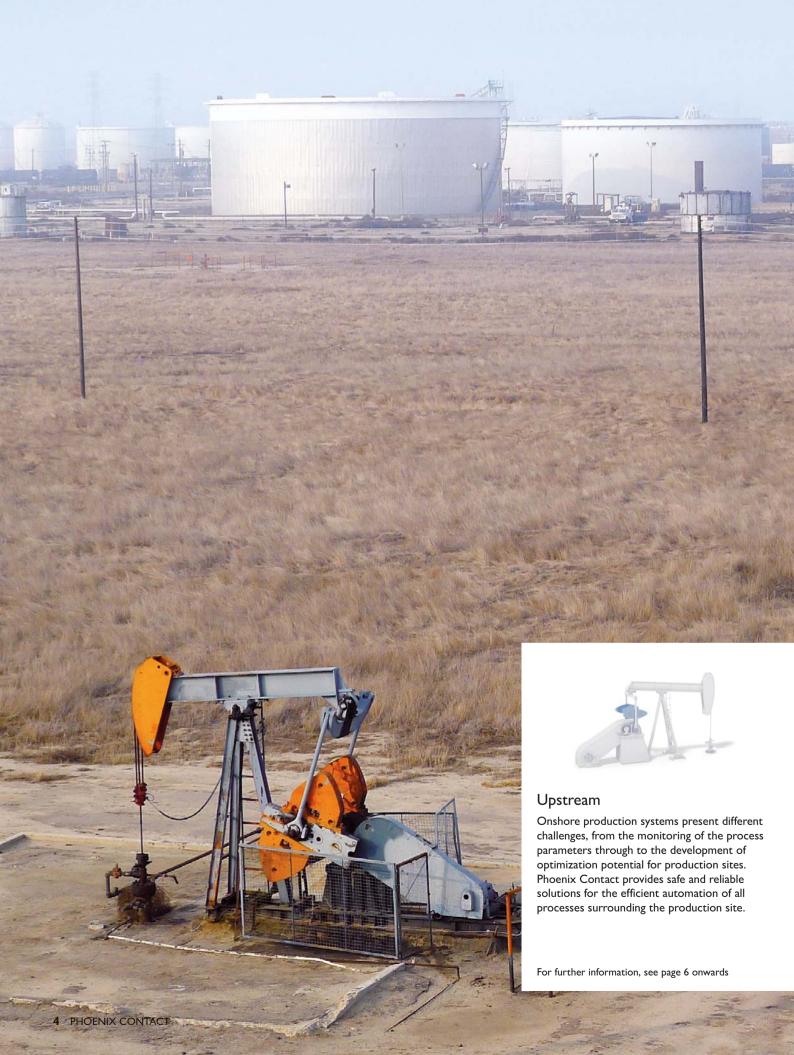
"The oil and gas industry is changing: both producers and operators need to increase the efficiency of their systems. Phoenix Contact offers a comprehensive portfolio of interfaces between the control and field level for the future-proof automation of the sometimes outdated installations involved in the production, transport, and processing of oil and gas. You can improve the efficiency of your production and minimize downtimes with turn-key solutions which support flexible expansion and include control technology, security, safety and Ex i components, surge protection, and industry-specific software."

Thomas Perschke, Global Industry Manager



Contents

Solutions for oil and gas	4
Solutions for upstream	6
Production sites	8
Solutions for midstream	10
Pipelines and transport	12
Solutions for downstream	14
Refineries	16
Networks in process engineering	18
Solutions for offshore	20
Drilling platforms	22
FPSOs and platform suppliers	24
Quality is no coincidence	26
Engineering and control cabinet solutions	28
Our expertise for your safety and security	30
Service und support	32
Inspiring industry solutions thanks to excellent products	34







Midstream

Pipelines and storage systems are the backbone of the oil and gas industry. For this reason, they require integrated communication systems with a large number of connection options. We support our midstream customers in monitoring the systems as well as the accurate monitoring of the production quantities.

For further information, see page 10 onwards



Downstream

Absolute failsafe performance is the most important factor when operating a downstream application. Phoenix Contact provides robust I/O systems, redundant control systems, and a number of components for functional safety in order to guarantee an error-free process.

For further information, see page 14 onwards



Offshore

In the case of offshore systems, the focus is on both the systematic failsafe performance and the material robustness of the technology. Here, Phoenix Contact is the right contact for redundant network and control solutions for monitoring and alarms.

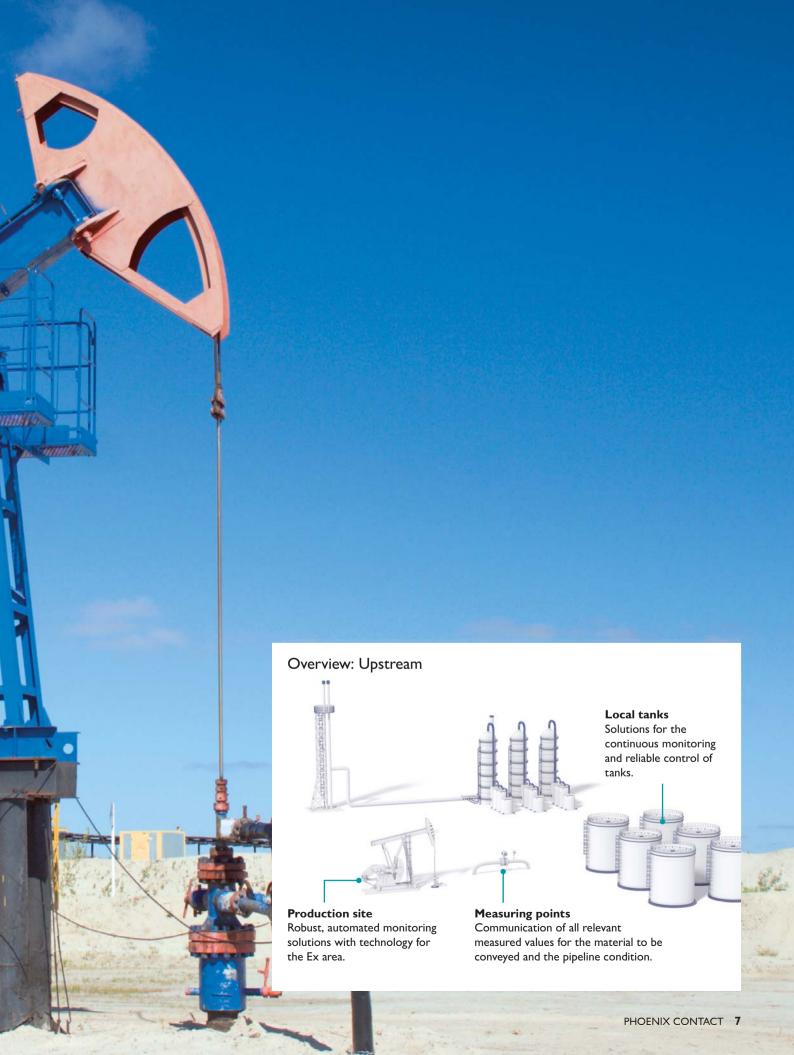
For further information, see page 20 onwards

Solutions for upstream

Robust monitoring and communication solutions are required for all upstream applications, from the production site to the pipeline, right through to storage in local tanks. Typical regions for production sites are characterized by large temperature differences, and often a lack of infrastructure.

Some signals are acquired from Ex areas and need to be transmitted reliably over hundreds of kilometers. With its broad range of products and industry experience, Phoenix Contact provides numerous solutions here. Robust components for extended temperature ranges, network technology for the widest range of transmission methods, and I/O systems for all common sensor signals form the basis for this.





Solutions for upstream

Production sites

Production sites for oil or gas can be very different depending on the geology, geography, the material to be conveyed, and size. In addition, they can be located several kilometers from one another: often, neither cables nor GSM networks are available. Older production sites are not usually equipped with monitoring systems, and this results in expensive servicing. Phoenix Contact provides robust complete solutions for the digitalization of the oil field, either for retrofitting (brownfield) or for new installations (greenfield). This allows reliable and cost-effective monitoring and diagnostics, even over large distances.





Production site monitoring

Remote terminal units (RTUs) are an essential aspect for the remote monitoring of production sites. With complete solutions from Phoenix Contact, you will improve your access to pump stations considerably, for example. The production and availability of the system is therefore more transparent because maintenance can be performed based on needs.



Secure networks

Depending on the technical and geographical demands of your production site, Phoenix Contact provides you with reliable and, above all, secure solutions for data transmission to and from the control room: from wireless systems with proprietary protocols, through 3G modems with security router and VPN technology, right through to SHDSL modems if the infrastructure has cables available.



Remote diagnostics

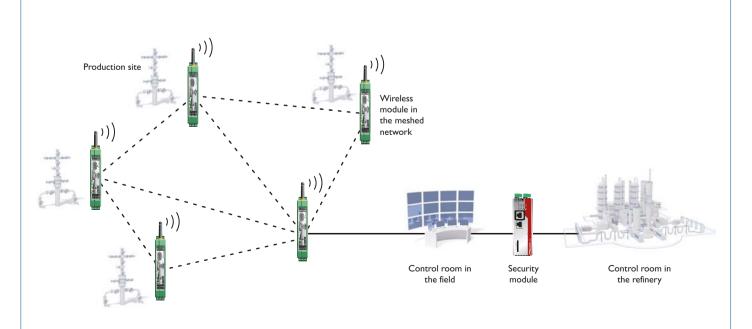
Access your production site from any location and at any time for flexible diagnostics of the system state. For example, you can use the Visu+ mobile app with an Ex-area-approved tablet or smartphone to access information from your production site. This provides efficient operating and monitoring solutions for your service personnel.

Networking the digital oil field

Production sites often constitute an extensive and widely meshed network. Phoenix Contact provides communication solutions based on Radioline wireless

modules for reliable data transmission. even over several kilometers. Radioline also allows the fast setup of meshed networks, directly at the device via a thumbwheel

or USB stick. In the event of a fault, the failure of a wireless module is compensated immediately.



Solutions for midstream

Pipelines stretching over several hundreds of kilometers need high-performance monitoring solutions in order, for example, to accurately and promptly detect and localize leaks or even fractures. At the same time, it is essential to be able to accurately determine the valve position for inspection and for cleaning with pigs. It is also necessary to avoid overvoltages both in the pipe systems and the tanks, in order to protect the electronics against damage.

Phoenix Contact provides complete solutions for midstream applications, based on surge protection, wireless technology, and technology for functional safety, through to solutions for the reliable monitoring of remote facilities.





Solutions for midstream

Pipelines and transport

Digitalize your transport paths and communicate consistently from the pipeline sensor through to the control room. You will also benefit from our expertise in monitoring and remote control technology, and will be able to monitor your systems reliably, irrespective of the infrastructure available.

We provide complete solutions for the automation of pig traps for servicing and inspection with pigs. We also provide a wide range of lightning protection devices for the reliable dissipation of harmful overvoltages.





Pressure protection system (HIPPS)

Overpressure in system areas increases operating risks.

By using a highly integrated pressure protection system, the discharge of hazardous materials can be prevented by means of needs-based component deactivation.



Valve position monitoring

A valve position monitoring system based on NAMUR sensors provides an overview of your system at all times. Existing mechanical valves can also be retrofitted into this system. The relevant valve position is transmitted reliably to your control room via a wireless system.



Surge protection for pipelines

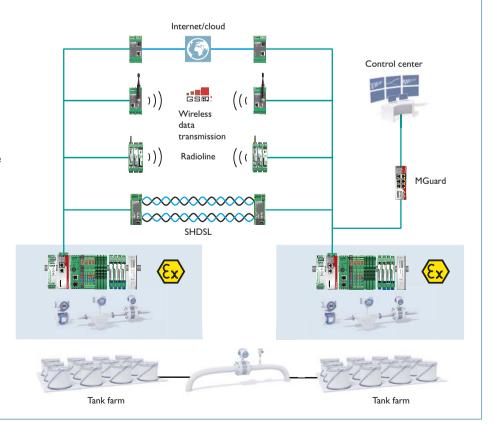
Overvoltages caused by lighting strikes can destroy pipe flange seals, sometimes causing irreparable damage. With isolating spark gaps from Phoenix Contact, you ensure reliable protection of your pipelines at every pipe transition point, and also longer maintenance intervals and operating times.

Leak detection

Regardless of the sector in which the pipeline is used, the discharge of hazardous materials is always a particular challenge for companies

Phoenix Contact provides a variety of solutions for the automatic detection of leaks. The rapid-response systems are designed for different materials and diameters.

Various communication systems provide the basis for tailored communication ranges.



Ethernet SHDSL

General connection

Solutions for downstream

Converting oil or gas into their respective derivatives requires complex processes. Processes in which up to 10,000 signals are generated quickly, which must be marshalled intelligently. Various signal types, even from potentially explosive areas, are acquired and made available to the process control system. At the same time, the main focus is on the absolute availability of the refinery.

Phoenix Contact provides innovative solutions for the downstream area, beginning with the Termination Carrier for efficient signal marshalling, right through to redundant control systems for failsafe applications in the refinery.







RefinerySolutions for marshalling signals and boxes for field connection via PROFIBUS PA and FOUNDATION Fieldbus.

Networks in process engineering

Failsafe solutions for system networks, also based on SIL and ATEX components.



Solutions for downstream

Refineries

System availability is the key factor when integrating fieldbus systems for automation in process control systems. This applies both to PROFIBUS PA and FOUNDATION Fieldbus. As your partner with industry experience, Phoenix Contact provides you with scalable solutions. Solutions that increase your system availability by minimizing the results of an error in the segment. You can, for example, replace or extend signal conditioners during an ongoing process without affecting the communication to the fieldbus nodes.





lunction boxes

Junction boxes are our ready-to-install control boxes for realizing a variety of connections at the field level.

Junction boxes are either prefabricated and can be specifically adjusted by you or are fully equipped with all signal conditioners and completely wired. They are also suitable for use in the Ex area.



Solutions for PROFIBUS PA and FOUNDATION Fieldbus

Phoenix Contact provides ready-wired solutions for reliable and seamless communication via FOUNDATION Fieldbus and PROFIBUS PA. This allows you to save time during installation and ensures availability of the system, thanks to the hot-swap capability of the components. Versions with 24 V DC distribution are also available for 4-conductor fieldbus devices.



Termination Carrier

Up to 10,000 signals are generated in process technology systems. This increases the demand for efficient options for fast and error-free marshalling.

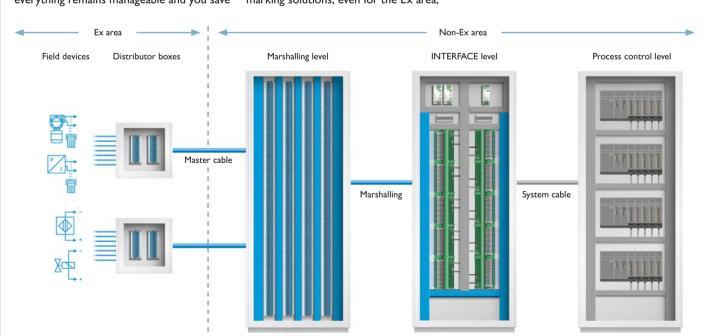
Termination Carriers from Phoenix Contact are the ideal wiring solution for the save-spacing and manageable connection of a large number of signals to the process control system.

Marshalling setup for intrinsically safe signals

Reduce the number of control cabinets by increasing the signal and packing density. With our solutions for signal marshalling, everything remains manageable and you save

space - from the Ex area, through cross marshalling with interface modules, right through to I/O cards of the DCS. Innovative marking solutions, even for the Ex area,

round off the package.



Solutions for downstream

Networks in process engineering

In process engineering systems, the result depends on a continually controlled process. It is therefore important to monitor every part of the process precisely and to ensure seamless and failsafe data transmission from the sensor through to the control center. Phoenix Contact is synonymous with quality between the control level and the field. That means: acquiring, transmitting, converting, connecting, isolating, amplifying, and switching analog, binary, and digital signals reliably. Redundant network solutions ensure that this information is always available at the right place.





Intrinsically safe I/O systems

With the wide range of control and I/O systems, you can design a tailored automation solution for your process engineering system. You can also process a large number of signals from the Ex area. In addition, it is also possible to integrate modules for functional safety and therefore cover areas where IECEx and ATEX apply.



Redundant networks

Irrespective of which transmission medium you use in your process, we have the right network components to allow you to set up a failsafe communication solution, for example with RSTP (Rapid Spanning Tree Protocol) or MRP (Media Redundancy Protocol). High-performance Gigabit switches, modems, controllers, and media converters form the basis for this.

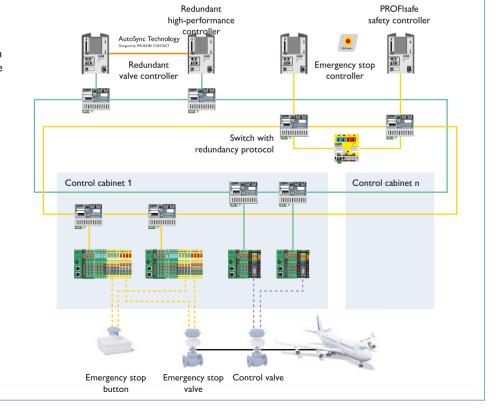


Redundant power supplies

If the energy supply to system parts or even individual components is briefly interrupted, this can lead to long and therefore costly production failures as a result of long process shutdown and startup times. Phoenix Contact provides consistent redundant auxiliary voltage supplies from the mains through to every load.

Redundant control for airfield refueling

A redundant control system monitors and controls the refueling process via PIT kerosene hydrants at the aircraft parking bays (in this case, 34). If a hydrant signals an alarm, this and the neighboring hydrants are shut down. The intelligent emergency stop system is SIL-2-certified. Combined with redundant PROFINET communication, safe control of the refueling process is ensured at all times.





Marine-typical certification is essential on ships in the offshore industry such as FPSOs (Floating Production Storage and Offloading Units) and platform suppliers. Absolute failsafe performance is just as important, since expensive ships must always be in operation so that they do not interrupt the production of oil and gas.

Life-support systems on ships, the essential services such as drives and fire protection systems, are of a redundant design, in order to ensure 24/7 safe function. Phoenix Contact provides tested and reliable solutions for virtually all automation tasks in the offshore field.





Solutions for offshore

Drilling platforms

Drilling platforms combine maritime requirements with requirements on technology for the Ex area. Automation systems must be able to process signals from the Ex area and be certified in accordance with GL, DNV or ABS. This places demands on the systematic design of a solution as well as on the robustness of the components used. With many years of experience in the offshore industry and a wide range of maritime and Ex i technology, Phoenix Contact is an expert partner for high-performance solutions on drilling platforms.





Energy generation

Monitor the energy requirement on the platform and connect additional diesel generators as required. With a modular control and I/O system and CAN connection, you can implement an energy management solution to ensure that the energy supply on the platform is always in line with requirements. The modular design of the system allows the solution to be extended at any time.



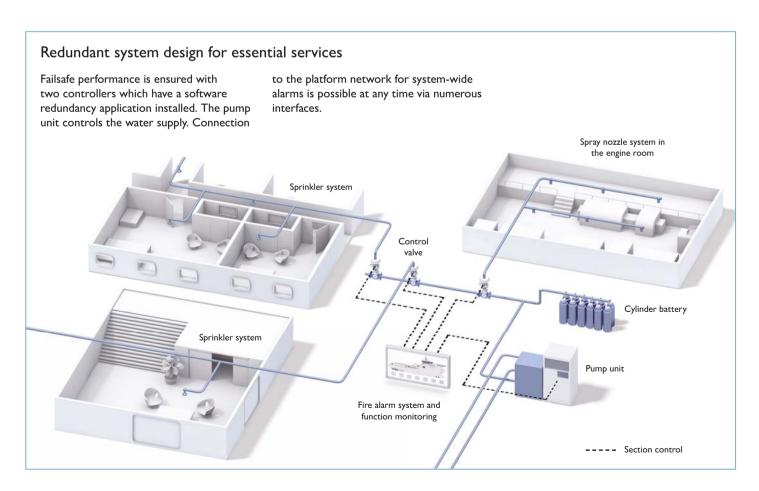
Surge protection

The high towers of a drilling platform, including the derrick, are at risk from lightning strikes. The complex technology for driving the drilling pipe must be protected against damage from overvoltages at all times. Phoenix Contact provides high-performance solutions for surge protection based on POWERTRAB and FLASHTRAB arrester devices for this.



Fire extinguishing systems

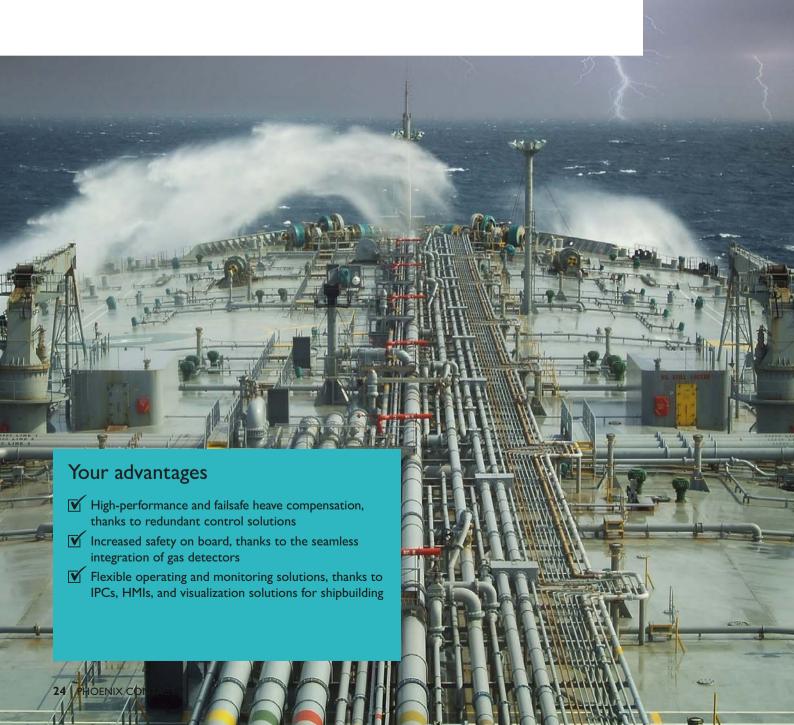
With a redundant automation solution consisting of a control and monitoring system, you always have an overview of the function of the fire extinguishing system. Using flow monitors, you are able to check accurately whether all lines are supplied with water. This allows a fast response in the event of an emergency.



Solutions for offshore

FPSOs and platform suppliers

Efficient automation can be a decisive competitive advantage for cost-intensive oil production with FPSOs. The trend here is towards the remote maintenance of onboard systems and reducing the number of technical personnel, while increasing the size of vessels. At the same time, maritime certificates and protocols such as SAE J1939, NMEA 2000, RS-323/485, GL or ABS are important. The hardware must be able to withstand the harsh conditions and include specific functions such as 100 percent dimmable displays. Phoenix Contact is your experienced partner for reliable automation solutions above and below deck.

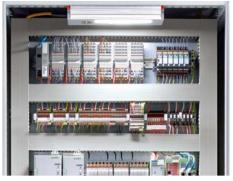




Solutions for heave compensation

With an automation solution based on applicative system redundancy, you ensure that the heave compensation always ensures the correct position of the ship. For example, when dynamic positioning is no longer sufficient due to high seas.

Secure communication within the network is ensured with mGuard security routers and VPN technology.



Gas detection

Particularly in the oil and gas industry, various gases pose a danger to people and machinery. With a solution from Phoenix Contact, you can integrate a sniffer into your communication system seamlessly. The redundant design ensures immediate alarms and countermeasures in the event of an emergency.

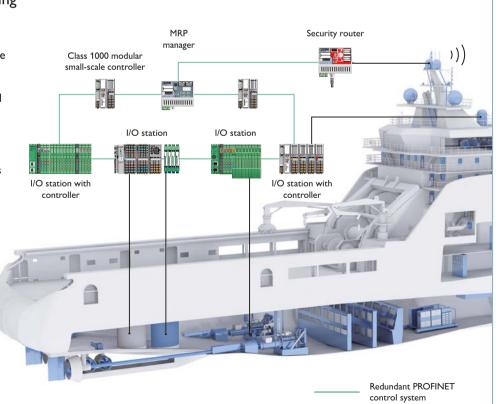


Redundant multi-client visualization

With our operation and monitoring solutions, you can ensure that the right information is available at the right place. With these solutions, the clients access a redundant server. You determine the access rights. and which subsets each client should have. using a central industrial PC. This is based on hardware and software that is tailored specifically to shipbuilding.

Redundant alarms and monitoring

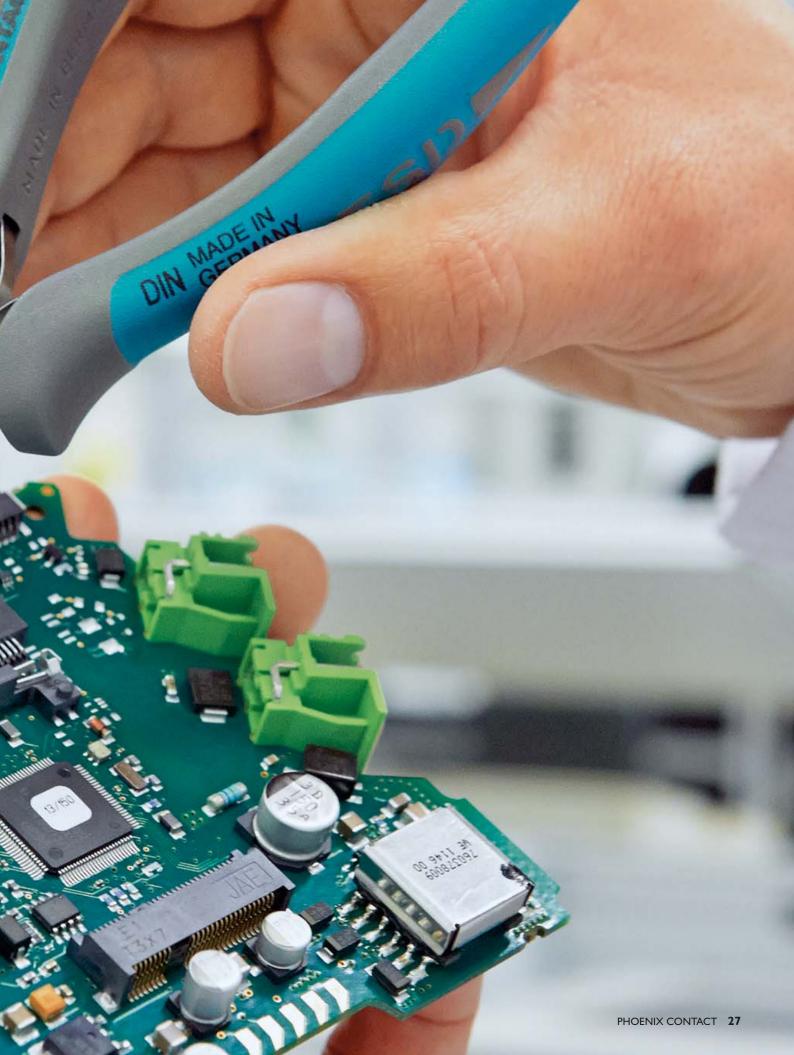
The essential services on board include systems such as the ship's drive system, energy generation, rudder systems and fire detection systems. If they fail, there is a danger to the crew and the ship. In order to be notified of critical situations in good time, redundant alarms and monitoring systems are installed based on robust control and network technology. In addition to the essential services, the system also reports on general conditions such as the level of ballast water or fuel tanks and drinking water supplies.



Quality is no coincidence

It is only possible to ensure the quality of the entire product by keeping an eye on the smallest detail. For this reason, we not only manufacture our screws ourselves, but also develop tailor-made software and offer engineering services from industry professionals.

This allows us to secure our commercial and technological independence and gives us the freedom to develop new industrial solutions. You benefit from this because, for example, we are able to offer you pre-assembled control cabinet solutions. These are specially tailored to your industry and have all the necessary certification and approvals. For us, "Made by Phoenix Contact" means: the best quality in every product, in every discussion, for the entire solution.



Quality is no coincidence

Engineering and control cabinet solutions

We set the highest standards for your industry solution: everything is tested and certified, from a prewired and preprogrammed control cabinet solution through to engineering services. Our industry experts advise you during every phase of your project cycle and, if required, take over the engineering of your system.

All Phoenix Contact components undergo intensive testing in the independent and accredited Phoenix Testlab. Control cabinet solutions are designed and engineered in accordance with the required standards and directives. You can therefore be sure that our finished solution products meet the highest demands.





Engineering

Based on the typical phases of an oil and gas project, we provide support by working with you at each stage. Simply provide us with an outline of the application you would like to implement and we will provide you with a technical concept that includes suitable hardware and software:

- Configuration
- Programming
- Visualization
- Coaching



Control cabinet solutions

Working together with our customers, we develop control cabinet solutions which, depending on the requirements, are ready to use or already prewired so that you can carry out final installation.

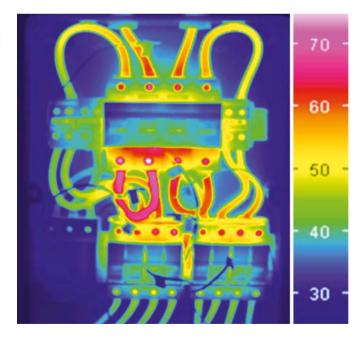
With a network of partners made up of proven control cabinet manufacturers, we can create industry solutions that satisfy the most stringent requirements.

This means that high quality is ensured at every step of the development process. A process-oriented, integrated management system based on the international standards DIN EN ISO 9001 and 14001 ensures that legislation and standards such as EC directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS) as well as customer specifications are taken into consideration during product manufacturing.

Quality from planning through to production

During the preliminary development clarification, all departments work closely with the customer. Following preliminary clarification and the design phase, a prototype undergoes specific tests. The knowledge gained is integrated into product optimization.

As a part of the project process, we provide support for the development of solutions: from initial planning and configuration, through the layout and design, right through to assessing and verifying the specified standards, as well as providing documentation and EPLAN-based circuit diagrams. Production planning and control then follows and, where appropriate, series production.























Quality is no coincidence

Our expertise for your safety and security

Phoenix Contact provides a comprehensive portfolio of services in the field of functional safety, ICS security, and industrial communication technology. We know and understand the expectations and demands placed on automation and network technology in your oil and gas projects. We will therefore provide you with advice, evaluate and plan on the basis of your application, and implement the necessary measures.



Our range of services

Functional safety

Consultation

We provide advice in the planning and implementation of your system.

- Design of the safety lifecycle: standards and their implementation
- · Machinery Directive
- · Changes to machinery and systems

Engineering

To assess the safety integrity, we determine the SIL of the safety functions with the help of your technical documentation. These must be sufficiently robust to withstand random errors. In the case of Machinery Directive requirements, we implement the entire safety lifecycle process.

Seminars

Functional safety in the process industry in accordance with EN 61511:

- · Risk analysis
- · Safety lifecycle
- Creation of PLT safety functions



We will accompany you through the entire safety lifecycle for your applications

Safety application software:

- · Demands on safety-related software
- Specification of safety requirements and software
- · Realization of safety functions
- Development of function blocks



Our experts are available with solid technical expertise

Product support

We will provide support regarding any Phoenix Contact safety hardware and software questions. You can contact our support team regarding anything – from the preliminary technical clarification, through planning and implementation, right through to operation.

24-hour Safety Hotline: +49 5271 946-2777 E-mail: safety-service@phoenixcontact.com

ICS security and industrial communication technology

Evaluation and planning

We offer you more than just a one-size-fits-all solution. In order to achieve your protection targets, we analyze your requirements and adapt them in accordance with relevant standards and directives. We will analyze your network and present optimization options for ensuring high availability.

Implementation

We will expose vulnerabilities in your security and your network to ensure greater transparency. We will support and advise you with regard to technical restructuring, or new demands on your system, from the field level to the company level.

Maintenance and support

Stable and reliable processes are essential for productivity, quality, and delivery reliability. With our support in the areas of security and Industrial Ethernet, we safeguard your production and thus minimize downtimes.

Seminars

Due to attack dynamics, awareness is becoming increasingly important. With our Cyber Security Center of Excellence in Berlin, we also have in-depth expertise in the area of industrial cyber security. We would be happy to convey this knowledge in our seminars:

- · Ethernet basics
- Security principles and awareness
- · Product training
- Customized workshops





We will support you in the creation of your customized protection level

Quality is no coincidence

Service and support

Implement your oil and gas projects even more quickly and efficiently. Irrespective of whether you operate, plan, produce or maintain systems - Phoenix Contact provides telephone and online service support as well as industry experts on site. Numerous seminars are available for training your employees, either at the Phoenix Contact headquarters or on site at your company. As part of our after sales service, we provide expert advice regarding any aspect of your products and solutions.





Customer-specific solutions

From a slight adjustment through to a completely new development - the Phoenix Contact service team is geared to your requirements. With many years of experience in the oil and gas industry, we will support you step-by-step in creating an individual solution.



Knowledge and information

Phoenix Contact provides the training programs that you need: whether compact evening seminars, expert seminars over several days, webinars or e-learning. Classification into Basic, Advanced and Individual simplifies assignment.



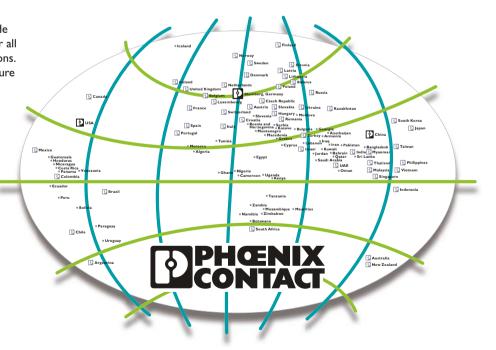
After sales

Our service network will assist you during installation, startup, and operation at all times. Contact us on the free hotline for 24 hr product support. In the event of an emergency, we can provide you with replacement parts outside of office hours.

Hotline: +49 5281 946-2888

Local expertise

Phoenix Contact supports you worldwide with professional service and support for all aspects of products, services, and solutions. Depending on the requirements, we ensure the fast replacement of products or support you in the event of problems by patching into your system. Our experts are familiar with the regional conditions and specific challenges of your industry. We will be happy to provide support all over the world with our close network of automation experts. Contact us for more information.



Quality is no coincidence

Inspiring industry solutions thanks to excellent products

Phoenix Contact offers innovative solutions for the automation of all processes surrounding oil and gas production, transport, and processing. The basis for these solutions is the wide range of connection and automation technology. Intelligently combined, these products become systems for a variety of functions such as for control, remote monitoring or measurement recording. Inspiring industry solutions are created, thanks to industry expertise, longstanding experience, and consideration of special requirements.



Excellent products

Innovative systems

Excellent products



Wireless data communication

Whether pipeline valves or tank farms - with wireless technology, you can network your systems easily and reliably, even over large distances. For example, with Radioline wireless modules.



Industrial communication technology

Record signals from Ex areas and transmit them via wireless or cable or via standardized protocols such as HART or WirelessHART.



Measurement and control technology

We offer a comprehensive range of signal conditioners, such as the compact MACX EX modules, for all signal acquisition applications in potentially explosive areas.



Controllers

Modular small-scale controllers for manageable automation, for example, at production sites, right through to high-performance controllers for redundant applications in the downstream area.



Power supplies

We provide uninterruptible power supplies and redundancy modules for the maximum availability of your processes in the field of oil or gas processing.



Fieldbus components

Save costs with ready-wired control cabinets for field connection via PROFIBUS PA or FOUNDATION Fieldbus. You will also find further fieldbus systems on our homepage.



I/O systems

Wherever signals need to be recorded and issued, our I/O systems are the right solution: modular or in block design, for the control cabinet or the field, for the Ex area and safety.



Inspiring industry solutions



mGuard security routers

The security router satisfies the high hardware demands of the process industry, such as a temperature range of -40°C to +70°C, and with IECEx- and ATEX Zone-2 approvals. The software includes mGuard security functions and supports OPC and NAT.

In dialog with customers and partners worldwide

Phoenix Contact is a globally present, Germany-based market leader. Our group is synonym for future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation. A global network across more than 100 countries, and 16,500 employees ensure a close proximity to our customers, which we believe is particularly important.

The wide variety of our innovative products makes it easy for our customers to find future-oriented solutions for different applications and industries. We especially focus on the fields of energy, infrastructure, process and factory automation.

| Canada | Polaria | Polar

You will find our complete product range at: phoenixcontact.com

PHOENIX CONTACT GmbH & Co. KG Flachsmarktstraße 8 32825 Blomberg, Germany Phone: +49 52 35 3-00

Fax: +49 52 35 3-4 12 00 E-mail: info@phoenixcontact.com

phoenixcontact.com

