Your Partner for Offshore Floating Production
Sulzer, with 180 years of experience and expertise, is a world leader in the oil and gas industry. We provide state-of-the-art pumping solutions for oil and gas production, transportation, refining, and petrochemical processing.

**Expertise**
- Sulzer has extensive knowledge in the Oil & Gas market. Our highly skilled engineers have an excellent track record in implementing effective solutions to meet the needs for increased pressures and flow rates in the Offshore Floating Production field.

**Customer service**
- Our engineers work closely with each customer to ensure their pumps meet the specific needs of the project.
- Sulzer supports the customer as a sole-source supplier with a vast range of products and a global network of service centers.

**Reliability**
- With the increases in remote and under-developed production locations, pump reliability is vital to the success of projects.
- Sulzer’s pumps have a reputation for being reliable in the most challenging of locations which makes us the right partner for Offshore Floating Production projects.
Decades of world records in oil and gas

1975  WORLD’S FIRST DUPLEX INJECTION PUMPS.  
      Algeria — 13 units

1977  WORLD’S LARGEST INJECTION PUMPS.  
      15.7 MW — 2 units

1978  WORLD’S LARGEST CRUDE OIL PIPELINE.  
      Saudi Arabia — 33 units

1978  WORLD’S LARGEST OIL PIPELINE PUMPS.  
      Saudi Arabia 11.2 MW — 33 units

1981  WORLD’S LARGEST INJECTION PUMPS.  
      Alaska — 18.8 MW — 2 units

1984  WORLD’S LARGEST OFFSHORE INJECTION PUMP.  
      Abu Dhabi — 14.2 MW — 1 units

1985  WORLD’S LONGEST PIPELINE.  
      Canada — 100 units

1992  WORLD’S LARGEST VERTICAL INJECTION PUMPS.  
      Norway — 6.7 MW — 2 units

1994  WORLD’S LARGEST LNG SEND OUT PUMPS.  
      Turkey — 2,121 m — 5 units

1999  WORLD’S LARGEST OFFSHORE MULTIPHASE PUMPS.  
      North Sea — 4.5 MW — 2 units

2000  WORLD’S LARGEST MULTIPHASE PUMPS.  
      Siberia — 6.0 MW — 4 units

2001  WORLD’S HIGHEST PRESSURE INJECTION PUMPS.  
      Gulf of Mexico — 605 Bar — 4 units

2002  WORLD’S LARGEST INJECTION PUMPS.  
      Caspian Sea — 27 MW — 4 units

2007  WORLD’S LARGEST LNG SEND OUT PUMPS.  
      Netherlands — 1.43 MW — 3 units

2008  WORLD’S LARGEST OIL PIPELINE PUMPS.  
      Russia — 14.5 MW — 24 units

2011  WORLD’S HIGHEST PRESSURE INJECTION PUMP.  
      Gulf of Mexico — 2 units

2012  WORLD’S HIGHEST POWER SUBSEA MULTIPHASE PUMP.  
      3.2 MW — 1 unit
Gas turbine string testing

One of the Sulzer differences is our unique in-house gas turbine string test facility in Leeds, UK. Having supplied hundreds of gas turbine driven pumps, we are aware of the need to run the full train prior to shipment. The GT test facility in Leeds can string test with gas turbines up to 30 MW. The other test loops in Leeds can test to even higher MW using motors and Variable Frequency Drive (VFD). Our other facilities have similar variety of test facilities to test pumps they build.

Subsea testing

Sulzer, together with FMC Technologies, a leading provider of subsea production and processing systems, have developed a powerful new subsea multiphase pressure boosting system. These systems combine field proven pump hydraulics from Sulzer and both permanent magnet motor technology and world leading subsea processing system integration from FMC Technologies.

State-of-the-art testing capabilities

All Sulzer manufacturing plants have advanced testing facilities, capable of demonstrating pump performance and proving the ancillary equipment to ensure smooth commissioning and start-up.
Whatever the Process, We Have the Pumping Solutions

You set out the challenge, we present the solutions.

- Crude shipping pumps
- Injection pumps
- Fire fighting pumps
- Seawater lift pumps
- Multiphase pumps
- Auxiliary pumps

- Subsea multiphase, single phase and hybrid pumps

- Crude oil booster and pipeline pumps

- Injection pumps
- Salt water transfer pumps
- Multiphase pumps
- Auxiliary pumps

Production
- **Oil production**: pumps for injection, main oil line, seawater lift, fire-fighting, subsea and associated auxiliary applications

- **Floating Production, Storage and Offloading (FPSO)**: pumps for injection, firewater, seawater lift, offloading, process and auxiliary

- **Pipelines**: booster pumps and main line pipeline pumps for upstream and mid-stream applications: crude oil, diluted bitumen, diluent, Natural Gas Liquids (NGL), refinery products and petro-chemicals (gasoline, diesel, Liquefied Petroleum Gas (LPG), super critical ethylene, etc.)

- **Gas (LNG)**: ultra-high pressure send out pumps for the latest generation of LNG terminals

- **CO₂**: CO₂ pipeline transportation and high pressure injection pumps

- **Pump services**: diagnostic and consulting, maintenance and support, technical and economic optimization through retrofits

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**Petrochemical**

- Process pumps
- Booster pumps
- Cooling water pumps
- Low-pressure auxiliary pumps

**Pipeline**

- Booster and pipeline pumps

**Refining**
Offshore Floating Production

The complex processes performed on a typical FPSO rely on the performance of dozens of pumps handling a variety of liquids under widely varying process conditions. Sulzer offers pumps in full compliance with the latest ISO13709 (API610) and ANSI standards as well as pumps designed for general industrial applications.

Whatever the process or auxiliary application, Sulzer has a selection optimized to deliver economic and reliable performance for:
- Water Injection
- Firewater Systems
- Seawater Lift
- Crude Oil Off-Loading
- Flow Assurance
- Seawater Treatment
- Process and Auxiliary Systems
A Solution for Every Application

**Water injection**
Reliable water injection is critical to modern oil production processes and is dependent upon efficient pumps that can operate for extended periods before needing maintenance. As the search for oil leads to the development of ever more extreme fields in terms of depth or geographical remoteness, the pumps selected become critical to the fields’ practical operation and viability. Sulzer manufactures four pump ranges specifically tailored for injection applications. Re-injecting produced water is an extremely abrasive application and would be detrimental to a pump’s performance, which can be evident in as early as a few weeks. Sulzer has developed coating technology that will greatly extend the pump life. Sulzer Pumps reputation is second to none for delivering ground breaking designs that keep the ‘state of the art’ ahead of the demands of these new developments.

**Firewater systems**
Firewater pumps lie at the heart of a FPSO firefighting system. The ability to run reliably under extreme conditions for extended periods of time is a key customer requirement. Sulzer’s self contained hydraulic drive fire pump system delivers optimal firefighting performance coupled with features to ensure minimum maintenance is required during long periods on standby. Conventional shaft drive fire sets are also available. Both options are fully packaged and tested by Sulzer to meet exacting customer needs.

**Seawater lift**
Provision of seawater for cooling and other service requirements demand efficient, compact pumping solutions. Sulzer’s range of vertical axially split pumps are ideally suited to this application. Mounted inside the hull and taking suction from the sea chest, their compact dimensions minimize space. For seawater lift pumps specified mounted inside a caisson, Sulzer is able to provide vertical solutions with electro-submersible motor and traditional line-shaft.
Crude oil off-loading
Depending on the FPSO design, a booster pump is often required to export crude oil delivered to deck level by the FPSO cargo system. These pumps need to take the available output from the cargo pumps and boost it to sufficient pressure to allow transportation to an offloading tanker or pipeline to shore. Through utilization of expertise gained in years of experience in designing pumps for transcontinental pipelines, Sulzer produces engineered solutions specifically tailored to individual customer requirements.

Flow assurance
Sulzer BB3 and BB5 pumps are also used for flow assurance service – sometimes referenced as dead oil or hot oil circulation. Though they are usually electric motor driven, sometimes they are specified with diesel engine drivers. These pumps are critical to maintain oil production in cold deep water.

Seawater treatment
Enhanced oil recovery methods mean that prior to injection Sea Water will be treated to remove or reduce salt content. Sulzer pumps are employed to deliver sea water to the RO membrane rack to achieve this. Configuration of the sea water treatment module will determine which pump type is selected. BB2 pumps are usually designated for this application; however, multistage BB3 and BB5 pumps will be specified when higher pressure is required at the membrane.

Process and auxiliary systems
The complex processes performed on a typical FPSO rely on the performance of dozens of pumps handling a variety of liquids under widely varying process conditions. The pumps are available in full compliance with the latest ISO13709 (API610) and ANSI standards as well as designed for general industrial applications. Whatever the process or auxiliary application, Sulzer has a selection optimized to deliver economic, reliable performance.
Offshore Floating Production

**Floating Liquefied Natural Gas (FLNG)**

Floating above an offshore natural gas field, the FLNG facility will produce, liquefy, store and transfer natural gas (LNG) at sea before carriers ship it directly to markets.

**Semi-submersible floating platform**

A semi-submersible is a specialised marine vessel with good stability and seakeeping characteristics. The semi-submersible vessel design is commonly used in a number of specific offshore roles such as for offshore drilling rigs, safety vessels, oil production platforms and heavy lift cranes.

**Floating Production Unit (FPU)**

Floating production units will usually be barge shape or platform type semi-submersible. As the name implies, these units have limited or no storage capacity.

**Tension Leg Platform (TLP)**

A TLP is a floating platform suitable for deepwater oil and gas field development. The platform is moored to the seabed by high tensile strength steel tubes which allow very little vertical motion.

**Floating Storage and Off-Loading (FSO)**

A vessel used only to store oil without processing it is referred to as a floating storage and offloading vessel (FSO).

**SPAR**

A SPAR platform is a type of floating oil platform typically used in very deep waters. SPAR production platforms have been developed as an alternative to conventional platforms.
Meeting Your Most Demanding Needs

Reliable and cost-effective Offshore Floating Production begins with the selection of the right equipment and continues with the constant life cycle monitoring. Drawing on our extensive portfolio of products and services, we work with our customers to select and customize pumps to comply with your requirements.

<table>
<thead>
<tr>
<th>Applications</th>
<th>Floating Production and Offloading (FPSO)</th>
<th>Floating Production Unit (FPU)</th>
<th>Floating Storage and Off-Loading (FSO)</th>
<th>Semi-Submersible Floating Platform</th>
<th>Tension Leg Platform (TLP)</th>
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Product Overview

OH1
CPT END SUCTION SINGLE STAGE CENTRIFUGAL PUMP ANSI B73.1 OH1

FEATURES AND BENEFITS
• Exceeds standard requirements of ANSI/ASME B73.1 standards
• Suitable for the most demanding industrial applications
• Unique, patented and superior design features minimize life-cycle costs
• Quick and easy installation, safe operation, easy maintenance and service

KEY CHARACTERISTICS
| Capacities  | up to 1,600 m³/h / 7,000 USgpm |
| Heads       | up to 220 m / 720 ft           |
| Pressures   | up to 26 bar / 375 psi         |
| Temperatures| up to 260°C / 500°F            |

APPLICATIONS
• Arduous process and auxiliary applications

OH2
OHH/OHHL OVERHUNG SINGLE STAGE PUMP ISO 13709 / API 610 OH2

FEATURES AND BENEFITS
• Finned bearing housing and fan cooling for long bearing life
• Broadest range map in the industry for ISO 13709 (API 610) type OH2 pumps
• Heavy duty baseplates with 2x ISO 13709 (API 610) nozzle load option
• ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
• Electric motor, VFD, engine and steam turbine drivers

KEY CHARACTERISTICS
| Capacities  | up to 2,250 m³/h / 10,000 USgpm |
| Heads       | up to 400 m / 1,500 ft          |
| Pressures   | up to 76.5 bar / 1,110 psi      |
| Temperatures| up to 425°C / 800°F             |

APPLICATIONS
• Process and boosting applications

OH3
OHV/OHLVL OVERHUNG VERTICAL INLINE PUMP ISO 13709 / API 610 OH3

FEATURES AND BENEFITS
• Finned bearing housing and fan cooling for long bearing life
• Broadest range map in the industry for ISO 13709 (API 610) type OH3 pumps
• Heavy duty baseplates with 2x ISO 13709 (API 610) nozzle load option
• ISO 21049 (API 682) cartridge type mechanical seals for reduced emissions
• Electric motor, VFD, engine and steam turbine drivers

KEY CHARACTERISTICS
| Capacities  | up to 1,450 m³/h / 6,800 USgpm |
| Heads       | up to 350 m / 1,150 ft         |
| Pressures   | up to 51 bar / 740 psi         |
| Temperatures| -160 to 340°C / -256 to 650°F  |

APPLICATIONS
• Process and boosting applications
BB1

**HSB HORIZONTAL AXIALLY SPLIT SINGLE STAGE BETWEEN BEARING PUMP**  
*ISO 13709 / API 610 BB1*

**FEATURES AND BENEFITS**
- Staggered vane, double suction impeller on larger sizes for reduced vibration
- Custom hydraulics to meet both current and future requirements with a simple rotor / volute changes
- Ball-ball, sleeve-ball and sleeve-pivot shoe bearings are available
- High-speed designs available for remote gas turbine-driven applications

**KEY CHARACTERISTICS**

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<th>Specification</th>
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<td>Capacities</td>
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<td>Pressures</td>
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<td>Temperatures</td>
<td>up to 205°C / 400°F</td>
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</table>

**APPLICATIONS**
- Crude oil pipelines
- Heavy duty auxiliary applications

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SMH AXIALLY-SPLIT SINGLE STAGE PUMP  
*ISO 13709 / API 610 BB1*

**FEATURES AND BENEFITS**
- Between bearing design for reliability at high flow rates
- Broad hydraulic coverage at 50 and 60 Hz speeds
- Axially split casing for ease of repair
- Vertical shaft (SMHv) for limited deck space applications

**KEY CHARACTERISTICS**

<table>
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<tr>
<th>Feature</th>
<th>Specification</th>
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<td>Capacities</td>
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<tr>
<td>Heads</td>
<td>up to 200 m / 650 ft</td>
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<tr>
<td>Pressures</td>
<td>15 to 26 bar / up to 380 psi</td>
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<td>Temperatures</td>
<td>up to 150°C / 300°F</td>
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**APPLICATIONS**
- Onshore cooling water
- Offshore seawater
- FPSO

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SMHv VERTICALLY MOUNTED AXIALLY-SPLIT SINGLE STAGE PUMP  
*ISO 13709 / API 610 BB1*

**FEATURES AND BENEFITS**
- With grease lubricated thrust bearing at the drive end and product lubricated proven design bearing at the non-drive end
- Interchangeable casing with the horizontal arrangement

**KEY CHARACTERISTICS**

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<tr>
<td>Capacities</td>
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<tr>
<td>Temperatures</td>
<td>up to 150°C / 300°F</td>
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</table>

**APPLICATIONS**
- Seawater lift
- Ballast water
BB2

BBS AND CD BETWEEN BEARINGS SINGLE STAGE PUMP ISO 13709 / API 610 BB2

FEATURES AND BENEFITS

- Centerline support for reduced thermally induced misalignment
- Double suction impeller for low NPSH3
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2 times API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost

KEY CHARACTERISTICS

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<th>Characteristics</th>
<th>Values</th>
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<td>Capacities</td>
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<tr>
<td>Heads</td>
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<td>Pressures</td>
<td>up to 50 bar / 740 psi</td>
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<tr>
<td>Temperatures</td>
<td>up to 425°C / 800°F</td>
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</tbody>
</table>

APPLICATIONS

- Booster as well as high speed crude shipping services
- Sulfate removal

BBT/BBT-D 2 STAGE RADially SPLIT PUMP ISO 13709 / API 610 BB2

FEATURES AND BENEFITS

- Centerline support for reduced thermally induced misalignment
- BBT-D double-suction impeller for low NPSH3
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2x API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load baseplates for reduced installation cost

KEY CHARACTERISTICS

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<th>Characteristics</th>
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<td>Capacities</td>
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<td>Heads</td>
<td>up to 740 m / 2,500 ft</td>
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<td>Pressures</td>
<td>up to 100 bar / 1,480 psi</td>
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<td>Temperatures</td>
<td>up to 425°C / 800°F</td>
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APPLICATIONS

- Seawater and crude oil boosting applications

BB3

MSD AND MSD2 AXially SPLIT MULTISTAGE PUMP BB3

FEATURES AND BENEFITS

- Broadest hydraulic coverage of any BB3 type multistage pump in the market
- Axially split casing means rotor balance is not disturbed when rotor is installed
- Opposed impellers balance axial thrust, saving lube system costs on most applications
- Double suction, first-stage available on most sizes for reduced Net Positive Suction Head (NPSH)
- High speed option for gas turbine drive

KEY CHARACTERISTICS

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<td>Pressures</td>
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<td>Temperatures</td>
<td>up to 200°C / 400°F</td>
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APPLICATIONS

- Pipelines
- Water injection
- CO₂ pipeline and injection
BB5

CP VOLUTE STYLE BARREL PUMP ISO 13709 / API 610 BB5

FEATURES AND BENEFITS
• Opposed impellers balance axial thrust, with no lube system needed on smaller pumps
• Axially split inner case means rotor balance is not disturbed when installed in the pump
• Dual volute inner case balances radial loads for longer service life
• Twist lock barrel closure reduces maintenance time on lower temperature services
• Cartridge design on larger pumps can speed up pump repair time
• Volute inner case with lower erosion wear on abrasive services

KEY CHARACTERISTICS
- Capacities: up to 1,000 m³/h / 4,400 USgpm
- Heads: up to 7,000 m / 23,000 ft
- Pressures: up to 425 bar / 6,250 psi
- Temperatures: up to 425°C / 800°F

APPLICATIONS
• High pressure oil transport
• Onshore water injection
• Offshore crude oil shipping
• LPG pipelines

GSG DIFFUSER STYLE BARREL PUMP ISO 13709 / API 610 BB5

FEATURES AND BENEFITS
• Least costly form of ISO 13709 / API 610 Type BB5 high-pressure barrel pumps
• Direct drive options to 6 MW
• Back-to-back rotor stack allows up to 16 stages on low-density fluids
• Multiple sizes cover a broad hydraulic range
• Low-pressure, high-pressure, twistlock, and high-temperature designs suit many applications

KEY CHARACTERISTICS
- Capacities: up to 900 m³/h / 4,600 USgpm
- Heads: up to 2,600 m / 10,000 ft
- Pressures: up to 300 bar / 4,500 psi
- Temperatures: up to 425°C / 800°F

APPLICATIONS
• Onshore or offshore water injection
• Offshore crude oil shipping
• LPG pipelines

HPcp DIFFUSER STYLE HIGH ENERGY PUMP ISO 13709 / API 610 BB5

FEATURES AND BENEFITS
• Inline or back-to-back rotor stack designs for rotordynamic stability
• Forged Carbon Steel, Duplex SS, HIP’d and Overlaid barrel construction
• Twist Lock or bolted barrel closure with Superbolts™
• Sleeve, pocketed, or tilt pad bearings
• Grouted, ungrouted and offshore 3- or 4-point support baseplates

KEY CHARACTERISTICS
- Capacities: up to 4,500 m³/h / 20,000 USgpm
- Heads: up to 8,000 m / 26,300 ft
- Pressures: up to 1,100 bar / 16,000 psi
- Temperatures: up to 200°C / 400°F

APPLICATIONS
• Water injection
• Offshore crude oil shipping
• Remote pipeline services
FEATURES AND BENEFITS

- No lineshaft couplings or bearings to maintain
- Low, medium and high voltage submersible motors available to 2 MW (2,700 hp)
- Water/glycol filled environmentally friendly motor for improved efficiency
- Variety of materials available from stainless steel to super duplex steel
- Two configurations available: standard (motor below pump) and inverted for low NPSHa applications (pump below motor)

KEY CHARACTERISTICS

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<td>Heads</td>
<td>up to 230 m / 750 ft</td>
</tr>
<tr>
<td>Pressures</td>
<td>up to 40 bar / 600 psi</td>
</tr>
<tr>
<td>Temperatures</td>
<td>up to 80°C / 180°F</td>
</tr>
</tbody>
</table>

APPLICATIONS

- Offshore seawater lift
- Offshore diesel genset firewater
- Offshore ballast water
- Onshore municipal pressure boosting

Fire Fighting Systems

SJT AND JTS VERTICAL TURBINE PUMP VS1

FEATURES AND BENEFITS

- Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance, mechanical seal is optional
- Rubber-lined product-lubricated bearing in bowls and columns for long maintenance-free periods, other bearing materials are also available
- Spacer coupling allows servicing of the seal and thrust bearing as required
- Full pull-out design available for semi-open impellers and bowl diameter sizes > 50” to ease dismantling and maintenance

KEY CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacities</th>
<th>up to 62,000 m³/h / 270,000 USgpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heads</td>
<td>up to 110 m per stage / 350 ft per stage</td>
</tr>
<tr>
<td>Pressures</td>
<td>up to 64 bar / 930 psi</td>
</tr>
<tr>
<td>Temperatures</td>
<td>up to 50°C / 122°F</td>
</tr>
</tbody>
</table>

APPLICATIONS

- Cooling water circulation
- Water supply
- Booster service
- Offshore firewater and service water

DIESEL HYDRAULIC DRIVEN PUMPING UNIT FOR FIREFIGHTING VS1

FEATURES AND BENEFITS

- Self-contained, containerized or skid module supports a diesel drive, booster pump, hydraulic power unit or angular gear box and lineshaft, fuel system, and all other systems required to operate the unit
- Minimum maintenance is required even during long periods on standby
- Available as container based and as open skid, and in duplex and super-duplex stainless steels
- Extremely robust

KEY CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacities</th>
<th>500 to 3,500 m³/h / 2,200 to 15,500 USgpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heads</td>
<td>up to 200 m / 650 ft</td>
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<tr>
<td>Pressures</td>
<td>up to 25 bar / 360 psi</td>
</tr>
<tr>
<td>Temperatures</td>
<td>up to 50°C / 122°F</td>
</tr>
</tbody>
</table>

APPLICATIONS

- FPSO
- Production platforms
- Drill ships
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Our expertise and commitment always deliver reliability, responsiveness, rapid turn-around and innovative solutions.