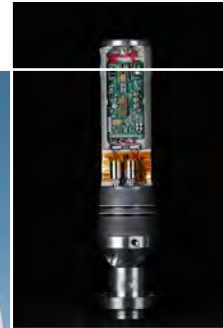


Schlumberger



Electric Submersible Pumps

Reliable technology for every oilfield environment

ESP Systems

Maximize production in any well and all environments

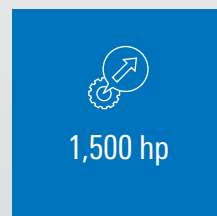
The comprehensive ESP solutions from Schlumberger maximize production through optimal technology and global expertise. A worldwide network ensures efficient distribution and a customized approach to well management from start to finish.

Diverse ESP solutions for maximum production

From simplifying installation to meeting temperature and viscosity demands, Schlumberger has the right ESP to meet conventional, unconventional, high-temperature, intervention-constrained, and offshore requirements. Maximize production, increase run life, and ultimately reduce system life cycle costs with a selection of fit-for-purpose ESP systems designed for any well.

Local support for a customized approach

Access to Schlumberger engineering expertise further optimizes ESP well performance. Conveniently located assembly, repair, and testing (ART) centers provide quick delivery and assistance in all major basins. Artificial Lift Surveillance Centers (ALSCs) monitor alarms 24/7/365 for rapid diagnostics, recommendations, and troubleshooting.



ESP Product Suite Environments and Features

Environment	REDA* Maximus* ESP System	REDA Hotline* HT ESP Systems	MaxFORTE* High-Reliability ESP System	TPS-Line* ESP System
Conventional reservoirs	■	◆	◆	■
Unconventional reservoirs	■	◆	◆	◆
Offshore and deep water	◆	◆	■	◆
High temperature	◆	■	◆	◆
Shallow water	■	◆	■	◆

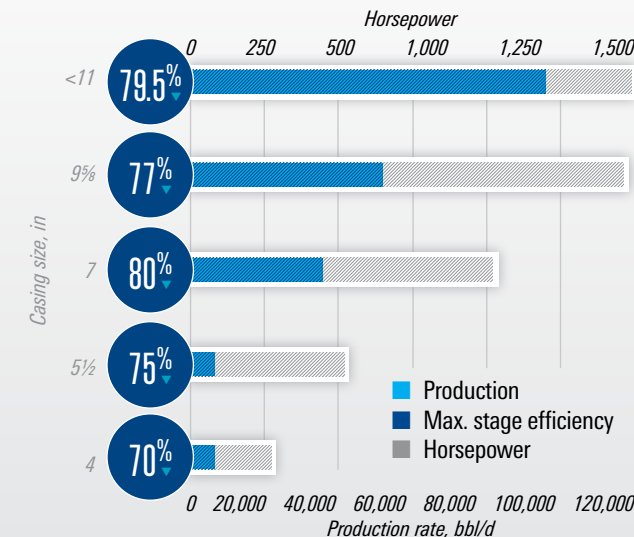
Features

Shaped rotor bars	●	●	●	●
Plug-in motor lead extension (MLE)	●	●	●	●
GVF up to 90%	●	●	●	●
Lift IQ* production life cycle management service integration	●	●	●	●
High corrosion resistance	▲	▲	▲	▲
MaxJoint* ESP flange connection technology	●	◆	●	◆
No rig required for servicing	●	●	●	◆
Trident* extreme-conditions MLE	●	◆	●	◆
Enhanced compression design stages	●	●	●	◆
Metal bellows	◆	●	●	◆
Extreme temperature survival	◆	●	◆	◆
High tier quality assurance	◆	◆	●	◆

■ Environment
● Feature
◆ Not available
▲ Optional

Extensive ESP operating range for any application

The Schlumberger ESP suite of products is capable of handling technical requirements up to 1,500 hp, 96,000 bbl/d at 60 Hz, and up to 90% gas volume fraction. This wide horsepower and production range allows Schlumberger to optimize the selection of an ESP for any well environment.



REDA Maximus

ESP system for any well environment

Enhance reliability and run life

For conventional, unconventional, and shallow water conditions, the REDA Maximus ESP system is engineered to create synergies that exceed conventional component-based artificial lift performance and improve reliability and run life. With modular designs combining fit-for-purpose protectors, motors, stages, and other components, the Maximus system has operational and economic flexibility to suit any oilfield application.

Reduce rig time, costs, and risks

To simplify and expedite installation, some operations traditionally done onsite, such as protector shimming and oil servicing of motors and protectors, are instead performed in the controlled environment of Schlumberger manufacturing and service centers. Factory-filled components arrive at the wellsite ready for faster and easier installations, minimizing risks and failures caused by human error.

Improve performance with information

To further extend system performance and run life, the Maximus system is compatible with the optional Phoenix xt150* high-temperature ESP monitoring system, which assesses downhole pressure, temperature, current leakage, and vibration. With state-of-the-art, high-temperature microelectronics, and reliable digital telemetry, this add-on system provides fast, reliable, accurate information to ensure ESP system integrity and well performance.

Applications

- Conventional reservoirs
- Unconventional reservoirs
- High temperature wells
- Shallow water wells

Benefits

- Improves performance, reliability and run life
- Reduces rig costs
- Eliminates requirement for field servicing during installation

Features

- Surface equipment suited for all-weather installations
- Bolt-on single and tandem motor designs
- Bolt-on modular protectors
- MaxJoint* ESP flange connection technology
- Plug-and-play components and pothead
- Self-lubricating polymer-lined bushings



The carefully engineered features of the REDA Maximus ESP system simplify installation and maximize survivability in all applications, including remote locations and surface environments with severe weather conditions.

MaxFORTE

High-reliability ESP system

Maximize run life in challenging environments

Designed for offshore wells where the cost of intervention has traditionally limited the use of ESPs, MaxFORTE* high-reliability ESP system improves run life with exceptional engineering, component synergies, and quality assurance. Increased reliability, improved production, and higher levels of manufacturing and installation quality yield unrivaled performance for unprecedented run life.

Every MaxFORTE system is precisely tailored to the well it will service, using robust subsea components and telemetry systems. In addition, continuous monitoring captures changes in well performance for rapid updates and remedial actions to optimize functionality in changing well conditions and extend system run life.

Applications

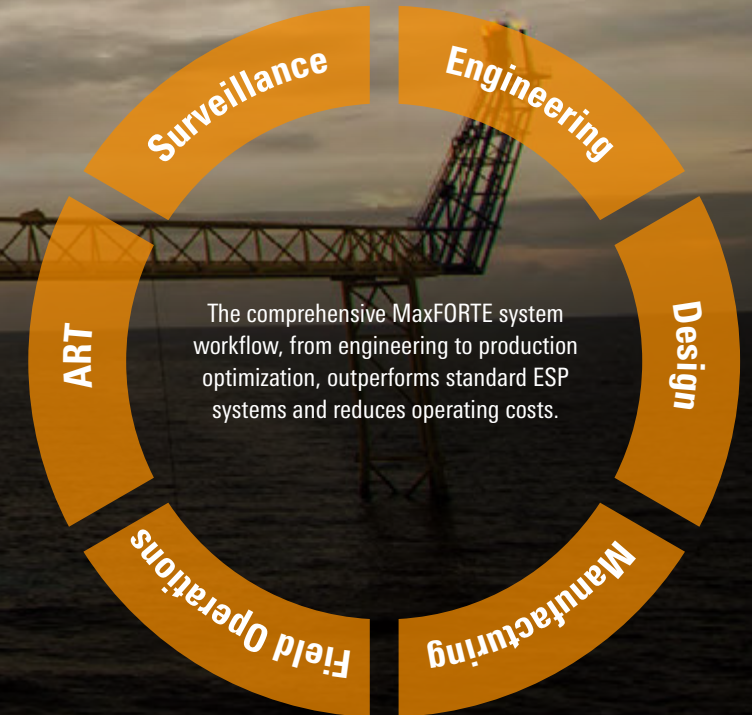
- Offshore and subsea wells
- Remote or difficult-to-access locations

Benefits

- Extends run life compared to standard ESP systems
- Eliminates early failures
- Improves well-by-well net present value
- Maximizes uptime with dedicated real-time surveillance

Features

- Detailed application engineering using DesignPro* ESP design software, PIPESIM* steady-state multiphase flow simulator, and transient simulation
- Industry-leading technology and premium materials
- Defect-free system
- Rigorous quality and inspection processes



REDA Hotline

High-temperature ESP systems

Extend lifetime in extreme environments

The REDA Hotline high-temperature ESP systems are based on the field-proven, high-performance Maximus system but with rugged components engineered for synergies in extreme and variable conditions. With more than 2,800 high-temperature units installed in more than 260 active wells worldwide and a record run life exceeding 6.5 years, these systems have become the lift method of choice in heavy-oil and gassy wells and other extreme-heat environments.

Optimize performance as conditions change

Hotline systems are engineered for oil thermal recovery applications, including steam-assisted gravity drainage (SAGD), steamflooding, cyclic steam injection (huff 'n' puff), and other high-temperature, gassy, and hot-running applications. They are designed to tolerate wide swings in temperature and to operate in corrosive environments and wells with unstable flow rates.

Monitor performance to maximize uptime

Hotline systems are also compatible with the Phoenix xt150 high-temperature ESP monitoring system, which assesses downhole pressure, temperature, current leakage, and vibration to ensure ESP system integrity and well performance.

Applications

- Oil thermal recovery
- High-temperature wells
- Hot-running applications

Benefits

- Extends run life
- Reduces human error at the wellsite
- Reduces rig costs
- Increases production and recovery
- Improves reservoir drainage and production in infill-drilled wells

Features

- Design rated to 250-degC [482-degF] bottomhole and fluid temperature
- Internal motor rated to 300-degC [572-degF] continuous operating temperature
- Single prefilled, sealed motor
- Redundant seals
- Plug-in pothead
- Thermally compensated compression pumps and gas-handling devices



Engineered for oil thermal recovery applications, REDA Hotline systems tolerate wide variations in temperature and flow rate and corrosive environments.

TPS-Line

Russia-compliant ESP systems

Proven ESP design

The TPS-Line Russia-compliant ESP systems are designed to maximize production from conventional reservoirs using selected technologies from the Maximus ESP system while adhering to Russian production standards. These engineered systems have been proved in more than 3,000 installations, demonstrating their success in commonly encountered Russian well environments.

TPS-Line systems comply with Russian technical requirements and are designed based on metric dimensions. They are produced in Russia at facilities built in accordance with the latest standards and lean principles, delivering high quality, competitive economics, and reduced delivery time.

The Schlumberger Tyumen Product Center consists of approximately 10,000 m² of state-of-the-art ESP manufacturing space and uses lean principles for ensured product quality.

Applications

- Conventional oil wells with casings 5.5 in and larger
- High-water-cut wells

Benefits

- Optimizes run life and economics for common well conditions in Russia
- Reduces cost and delivery time with production at local facilities
- Minimizes energy consumption
- Decreases cost and delivery time due to local production facilities

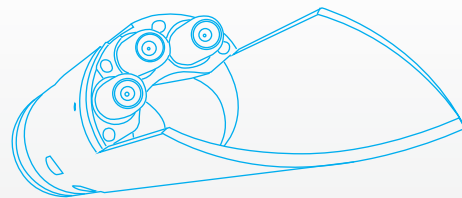
Features

- Metric dimensions
- Clockwise rotation
- Standard and high-temperature modification of motors and protectors
- Modular design of protectors
- Compatibility with artificial lift downhole monitoring systems
- Russian specification standard



Enabling Technologies

Schlumberger compatible technologies further push ESPs to optimal production. From data acquisition and secure transmission to alternative deployment and production life cycle management, Schlumberger has well performance covered from end to end.

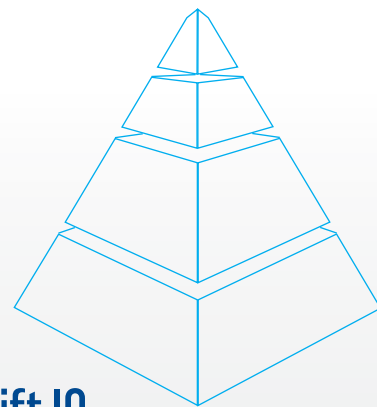


ZEiTECS Shuttle

Rigless ESP replacement system

The plug-and-play design of the innovative ZEiTECS Shuttle* rigless ESP replacement system enables any standard ESP assembly to be retrieved and redeployed without a rig—using wireline, coiled tubing, or sucker rods. This rigless ESP replacement system reduces operating cost, minimizes deferred production, eliminates disruption to operations, and reduces HSE exposure and risk.

slb.com/zeitecs

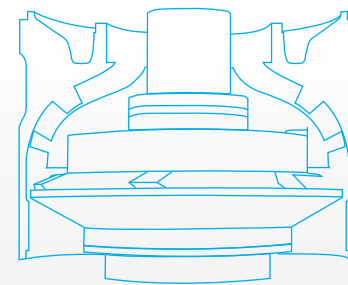


Lift IQ

Production life cycle management service

The Lift IQ production life cycle management service is the premiere monitoring and surveillance platform for artificial lift systems. It provides real-time analytics and optimization with four convenient levels of coverage. From operations in a single well to an entire field, the Lift IQ service taps into Schlumberger engineering, manufacturing, and surveillance expertise with access to service centers 24 hours a day and strategic locations across the globe.

slb.com/liftiq

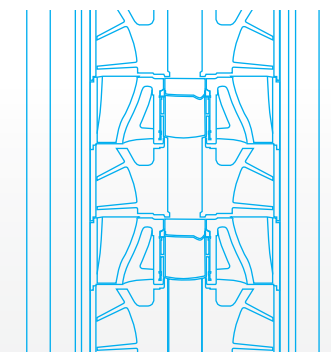


REDA Continuum

Unconventional extended-life ESP stage

The REDA Continuum* unconventional extended-life ESP stage is engineered for unconventional flow behavior and challenging environments. Its optimized geometry, architecture, and material selection enable the pump to operate at high efficiency through a wide operating range, improving recovery and reliability at low rates, in transient flow, and in gassy and abrasive environments.

slb.com/continuum

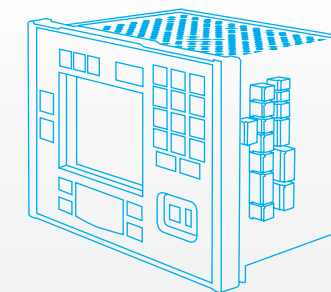


MGH

Multiphase gas-handling system

The MGH* multiphase gas-handling system enables efficient handling of higher percentages of free gas. The system can be installed in conjunction with a gas separator when gas can be vented into the casing, or it can be installed with a standard intake if all the produced gas must go through the pump.

slb.com/mgh



Instruct

All-in-one acquisition and control unit

Employing a highly modular design, the Instruct* all-in-one acquisition and control unit facilitates variable configurations and enhances serviceability. The unit is designed for the SpeedStar* variable speed drive family, low-voltage variable speed drive, stand-alone downhole monitoring, and SCADA systems. It supports advanced functions such as smart gas lock control and rocking start and provides remote access and multilanguage support.

slb.com/instruct

Footprint Matters

Schlumberger operates a global network of assembly, repair and testing (ART) centers to keep ESP systems running at peak performance. Each ART center follows a quality control plan developed by Schlumberger engineers to ensure zero artificial lift product defects. ART centers are located in the major basins to provide regional distribution along with the inventory and equipment needed to minimize production downtime.

- 90 years of experience and technology leadership
- Distinction in research and engineering; manufacturing; operations; application engineering; dismantle inspection failure analysis; and quality, health, safety, and environment (QHSE) reporting
- Multidisciplinary collaboration and support across Schlumberger
- Access to InTouchSupport.com* online support and knowledge management system, and QHSE reporting systems, best practices, case studies, and knowledge base repository

- Artificial Lift Surveillance Centers
- Assembly, Repair, and Testing (ART) Center
- Technology and Manufacturing Center



NISKU, CANADA

Temperature	401 degF [205 degC]
Pump setting depth	1,565 ft [477 m]
Casing size	9 5/8 in
Casing weight	36 lbm/ft
Motor OD	5.62 in [14.27 cm]
Pump OD	6.75 in [17.15 cm]

Background

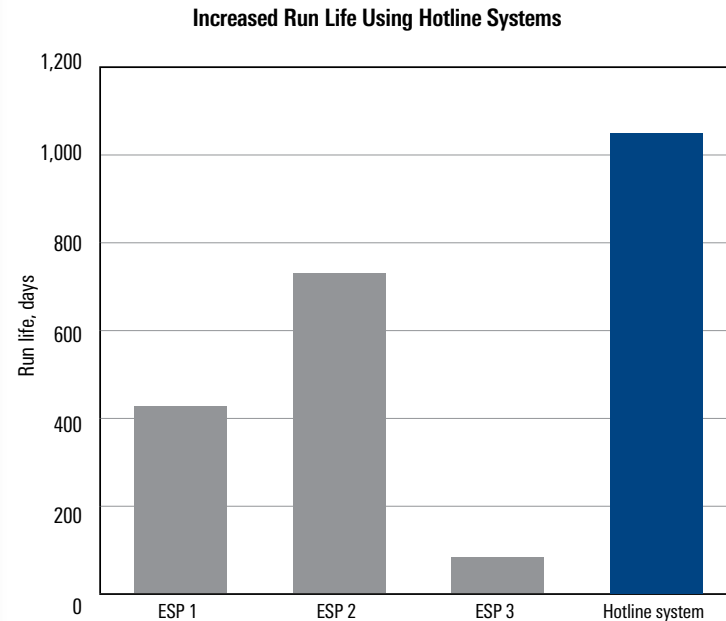
An operator in Canada needed to perform a SAGD operation to produce from a well with high fluid viscosity. However, the high temperatures generated during the operation had caused other ESPs to fail earlier than expected. With production dependent on high injection temperature, the operator asked Schlumberger for a high-reliability, high-temperature solution that would effectively produce without compromising run life.

Technologies

- REDA* Hotline* high-temperature electric submersible pump systems
- Bottom-feeder gas separator
- High-temperature integrated gauge
- J12000N pump

REDA Hotline System Increases Run Life by an Average of 149%

ESP system enhances production in high-temperature, steam-assisted gravity drainage (SAGD) well



Schlumberger installed the Hotline ESP system with a high-temperature, non-weather-dependent integrated motor with a downhole monitoring gauge. The motor features a full protector and compensation system configured for immediate deployment in the well, eliminating human error and saving rig time during assembly. The system was installed with a bottom-feeder gas separator along with a high-temperature pump.

The Hotline system increased run life by an average of 149% and is still running. This improved the customer's total cost of ownership by eliminating unnecessary workovers and deferred production.

OFFSHORE BRAZIL

JUBARTE FIELD

Operator	Petrobras
Application	Subsea, deep water
Operation depth	1,400 m [4,593 ft] below sea level
Temp., reservoir	80 degC [176 degF]
Temp., seabed	4 degC [39 degF]
No. of wells	15 production

Background

Petrobras chose Schlumberger to design and develop 15 reliable, high-horsepower ESP systems to meet the dramatic pressure and temperature swings of the Jubarte deepwater wells and minimize offshore installation operations.

Technologies

- MaxFORTE* high-reliability ESP system
- Trident* extreme-conditions motor lead extension (MLE)
- Phoenix* artificial lift downhole monitoring systems
- Lift IQ* production life cycle management service

MaxFORTE System Delivers Jubarte Field's Highest Production Rates

Deepwater wells produce more than 100 million bbl of fluid after start-up and an average of 137,000 bbl/d



A 1,500-hp MaxFORTE system was designed for extended run life in the Jubarte wells. As part of the system design, a Trident MLE was connected to the wet-mate connectors onshore, eliminating the splices and stresses that shorten run life in conventional systems. Lift IQ service provides expert control and constant monitoring of downhole parameters to maintain efficient operation, eliminating the need for time-consuming shutdowns and restarts.

Location	Bakken Shale
Temperature	184 degF [84.44 degC]
Pump setting depth	8,860 ft [2,700 m]
Casing size	7 in [17.8 cm]
Casing weight	32 lbm/ft [47.6 kg/m]
Well depth (MD)	15,200 ft [4.63 km]
Motor OD	4.56 in [11.58 cm]
Pump OD	4.00 in [10.16 cm]

Background

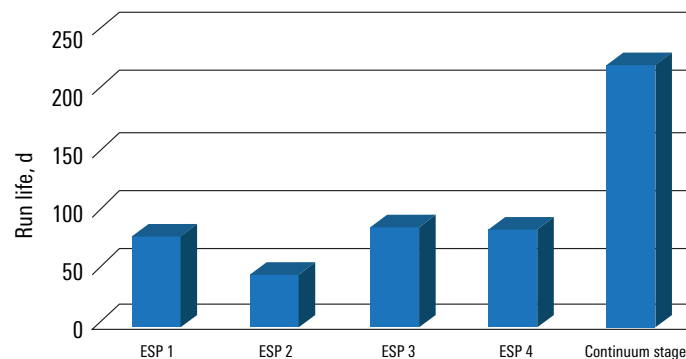
After multiple ESP system failures in an unconventional well, a customer needed to extend run life while improving production. With high solids content and transient flow, the environment challenged conventional ESP systems, which achieved only 20% to 40% of the expected run life.

Technology

- REDA* Maximus* electric submersible pump system
- REDA Continuum* unconventional extended-life ESP stage
- MGH multiphase gas-handling system
- Phoenix xt150* high-temperature ESP monitoring system

REDA Maximus ESP System with REDA Continuum Stages Increases Run Life by 500% in the Bakken Shale

Customer experiences continuous production down to 200 bbl/d using one ESP system



A Maximus system was engineered for the well with Continuum stages, fit-for-purpose motor and protector, helicoaxial MGH system, and Phoenix xt150 system with gauge. The system was preconfigured and ready for immediate installation at the wellsite, saving rig time and mitigating the risk of motor contamination or human error during equipment assembly.

The system improved run life more than 500% and continued operating even as production declined to 200 bbl/d, avoiding four workovers and the associated costs of new equipment and deferred production.

Location	Bakken Shale
Well 1: Temperature	180 degF
Pump setting depth	8,680 ft
Well 2: Temperature	190 degF
Pump setting depth	8,630 ft
Well 3: Temperature	182 degF
Pump setting depth	8,611 ft
Well 4: Temperature	180 degF
Pump setting depth	8,432 ft

Background

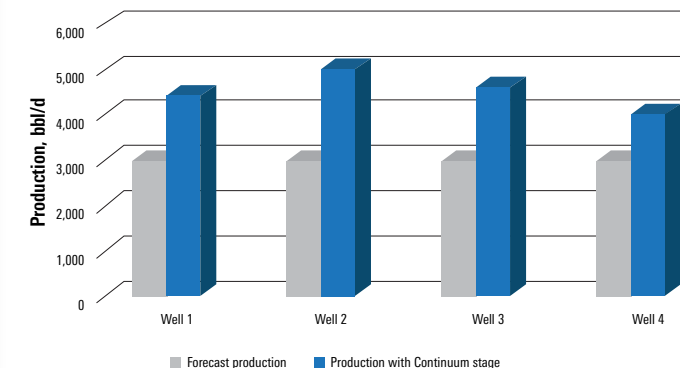
Four wells in the Bakken Shale were initially expected to produce 3,000 bbl/d. Although most ESPs are available with stages for this flow rate, the steep production decline, solids and gas production, and initial high flow rate made it a challenging environment for conventional ESPs.

Technologies

- REDA Maximus* electric submersible pump system
- REDA* Continuum* unconventional extended-life ESP stage
- Phoenix xt150* high-temperature ESP monitoring system
- Vortex* gas separator

REDA Maximus Systems with REDA Continuum Stages Increase Production by 70% in the Bakken Shale

Customer increases production while avoiding ESP replacement and related costs



Due to their wide operating envelope and ability to handle production decline, Continuum stages were used in the all-weather Maximus systems. The rest of the completions included the motor and protector, a gas handler, Vortex gas separator, and a Phoenix xt150 system multisensor gauge. The systems were configured for immediate installation at the wellsite, eliminating the risk of motor contamination and human error during equipment assembly.

Production increased 36%–70% compared with the initial forecast, and the Maximus systems with Continuum stages enabled more than 70% pressure drawdown. They continued operating beyond their recommended flow range, saving rig time while handling high solids and increasing gas/liquid ratio.

Electric Submersible Pumps

Full life cycle artificial lift solutions

With a global footprint throughout every major hydrocarbon basin, Schlumberger offers specialized expertise and complete equipment packages for all artificial lift technology at every flow rate, including rod lift, progressing cavity pumps (PCPs), hydraulic stroking units, electric submersible pumps (ESPs), horizontal pumping systems, and gas lift.



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