

MaxFORTE

High-reliability ESP system

APPLICATIONS

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

BENEFITS

- Extends run life
- Reduces early failures
- Eliminates nonproductive time
- Achieves high system uptime through enhanced surveillance

FEATURES

- Detailed application engineering using DesignPro* ESP design software, PIPESIM* steady-state multiphase flow simulator, and transient simulation
- 10¾-in POD with 8kV penetrator connectors for subsea installations
- Installation in capsules for seabed skids
- Tandem protector configuration with metal bellows construction or elastomer construction
- Fully field-testable Trident* extreme-conditions motor lead extension
- High-temperature mine duty motor winding
- Phoenix xt150* high-temperature ESP monitoring system for motor-winding temperature
- Dedicated manufacturing facility with full screening of parts
- Extensive system integration test prior to leaving the facility
- Secure transportation in vibration-monitored shock- and bend-proof shipping boxes
- Dedicated field crews using specific installation checklists and procedures based on aviation methodology
- Installation equipment with cable spooling system for continuous electrical measurements while run in hole
- Dedicated monitoring and surveillance with fast response time to critical events

The MaxFORTE* high-reliability ESP system integrates several Schlumberger technologies for thermal, deepwater, and hostile environments in one system that outruns conventional offshore ESPs. Designed to address the needs of the intervention-constrained market, the MaxFORTE system provides adaptability, consistency, and reliability in unpredictable environments.

Optimum design for maximum production

Every element, from engineering design to manufacturing, field operations, and ongoing surveillance, has been enhanced for the MaxFORTE system. Taking advantage of breakthroughs in technology designed for hostile environments, the MaxFORTE system features robust, high-reliability components that continue functioning in even the harshest conditions. Dedicated qualification and reliability engineers validate both the hardware design and manufacturing process. After verification, component- and system-level qualifications are conducted to stress the equipment to the extremes of operating temperature and load.

Rigorous testing processes

The MaxFORTE system is subjected to frequency and operation range sweeps to mimic varying pumping regimes. Numerous start and stops are made to stress bearings, shafts, and compensation systems to ensure that the equipment can reliably withstand even continuous field restarts and intermittent operation.

Advanced manufacturing and assembly

Components are manufactured and tested in a dedicated environment using advanced processes and state-of-the-art machinery. Equipment is assembled following a rigorous quality plan, fully screened and audited to arrive defect-free. Following final assembly, every MaxFORTE system undergoes a rigorous 72-hour system integration test prior to shipping.

Secure shipping with reduced vibration

MaxFORTE system equipment is shipped from the manufacturing center to the wellsite in specially designed shipping boxes that reduce vibration levels by more than 50%. In addition to the increased shock and bend resistance, real-time vibration logging is done on each component during transit, with the loggers analyzed on receipt to ensure that the MaxFORTE system is ready for use.

Dedicated installation technicians

Installation is done through an approach of detailed standard work instructions and checklists. With the system safely commissioned, it is handed over to our real-time surveillance center, where round-the-clock monitoring ensures trouble-free operation through the system's long life.

Monitored continuously for extended run life

Continuously changing well environments can be detrimental to the health of an ESP system. All MaxFORTE systems are monitored 24/7 by a team of dedicated engineers in the Schlumberger Artificial Lift Surveillance Centers across the globe. Next-generation workflows and customized surveillance protocols, developed specifically for MaxFORTE systems, significantly increase uptime and extend run life.



MaxFORTE systems are assembled and fully tested in the dedicated assembly area prior to shipment.

MaxFORTE System Specifications

General Specifications	562 Series	738/862 Series
System temperature rating, degF [degC]	302 [150]	302 [150]
Maximum pressure rating, psi [kPa]	5,000 [34,474]	5,000 [34,474]
Minimum casing size (S series), (H series), (M series), in [cm]	7 [17.78], 7.625 [19.37]	10.75 [27.305]
Housing metallurgy	Redalloy* high-nickel alloy, carbon steel	Redalloy high-nickel alloy
Pump Specifications		
Available pump models	S8000RX, S11000RX, H13500RX, H15500RX, H22500RX	862 series M520, M675
Frequency range, Hz	40–60	40–60
Stage metallurgy	5530	Ni-Resist™
Bearing construction	Full bearing housing	Full bearing housing
Bearing type	Silicon carbide keyless bearings	Tungsten carbide or SiCG keyless bearings
Shaft	High-strength INCONEL® 718	High-strength INCONEL 625+
Gas Handler Specifications		
Available AGH* advanced gas-handling device models	S70-100, H 100-250	862 series M190-350 Integral in pump
Available MGH* multiphase gas-handling system models	S50-90	862 series M 90-470
Stage metallurgy	5530	Ni-Resist
Bearing type for AGH device	Silicon carbide keyless bearings	Tungsten carbide or SiCG keyless bearings
Bearing type for MGH system	Tungsten carbide keyless bearings	Tungsten carbide keyless bearings
Shaft	High-strength INCONEL 718	High-strength INCONEL 625+
Protector Specifications		
Upper protector type	Bag parallel bag series labyrinth (BPBSL)	738 series LSBPB, LSBPBPB
Lower protector type	Metal bellows parallel metal bellows parallel metal bellows series labyrinth (MPMPMSL)	738 series LSBPB
Single protector type		738 series BPBSBSB, 738/862/738 MPMSMSM
Shaft	High-strength INCONEL 718	High-strength INCONEL 718
Shaft seals	Precision-lapped silicon carbide INCONEL metal bellows	John Crane type-2
Number of shaft seals	6	4 with tandems, 3 with single
Motor Specifications		
Motor range at 60 Hz, hp	338–1,050	738 series, 750 hp single, 1500 hp tandem
Rotor bearing type	SLK-DP4	Tungsten carbide, cobalt, bronze
Winding type	High-temperature mine duty winding	High-temperature mine duty winding
Construction	Snap ring per rotor	Snap ring per rotor
Shaft	High-strength 4340 solid	High-strength 4340 solid
Sensor connection	Gauge-ready base with factory-installed motor-winding thermocouple	
Pothead connection	#4 Trident extension	#1 Trident extension MLE, 8kV, MONEL® armor
Field pothead pressure testable connection	Yes	Yes
Sensor		
Sensor type	Phoenix xt150 system Type 1	Phoenix xt150 system Type 1
Measured parameters	Pump intake pressure, pump discharge pressure, pump intake temperature, motor-winding temperature, vibration, current leakage	Pump intake pressure, pump discharge pressure, pump intake temperature, motor-winding temperature, vibration, current leakage
Discharge pressure connection, in [cm]	0.25 [0.63]; hydraulic line	0.25 [0.63]; hydraulic line
Cable		
Cable construction	5 KV, EPDM, REDA Lead* ESP electrical power cable with lead barrier	8 KV, EPDM, REDA Lead ESP electrical power cable with lead barrier
Conductor size	1 AWG, 2 AWG	1 AWG
Armor	Galvanized armor or MONEL	Double galvanized armor
Conductor temperature rating, degF [degC]	400 [204]	400 [204]

Note: These are typical specifications and variations can be requested