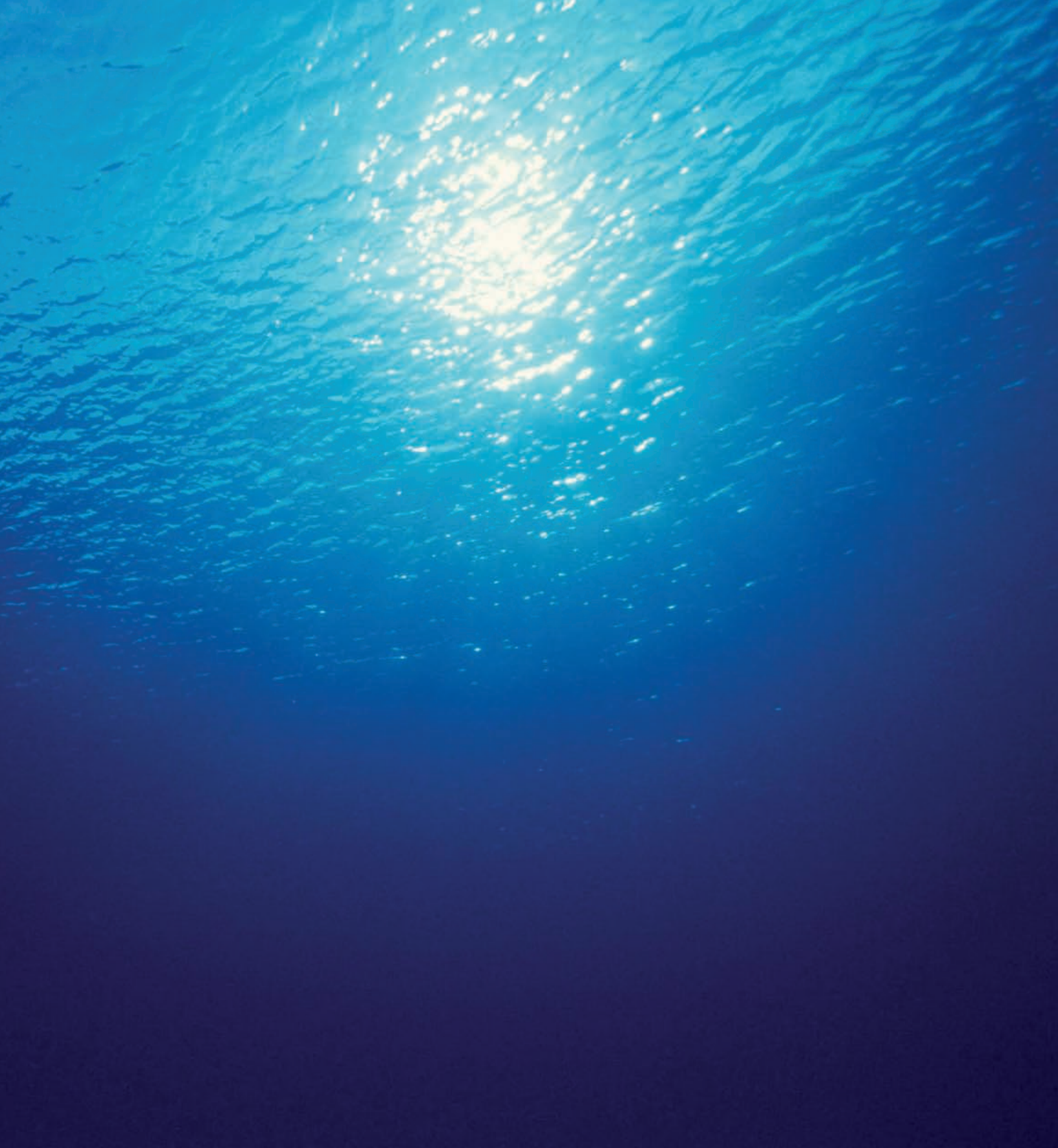


## SenTURIAN

Large-bore subsea landing string electrohydraulic operating system

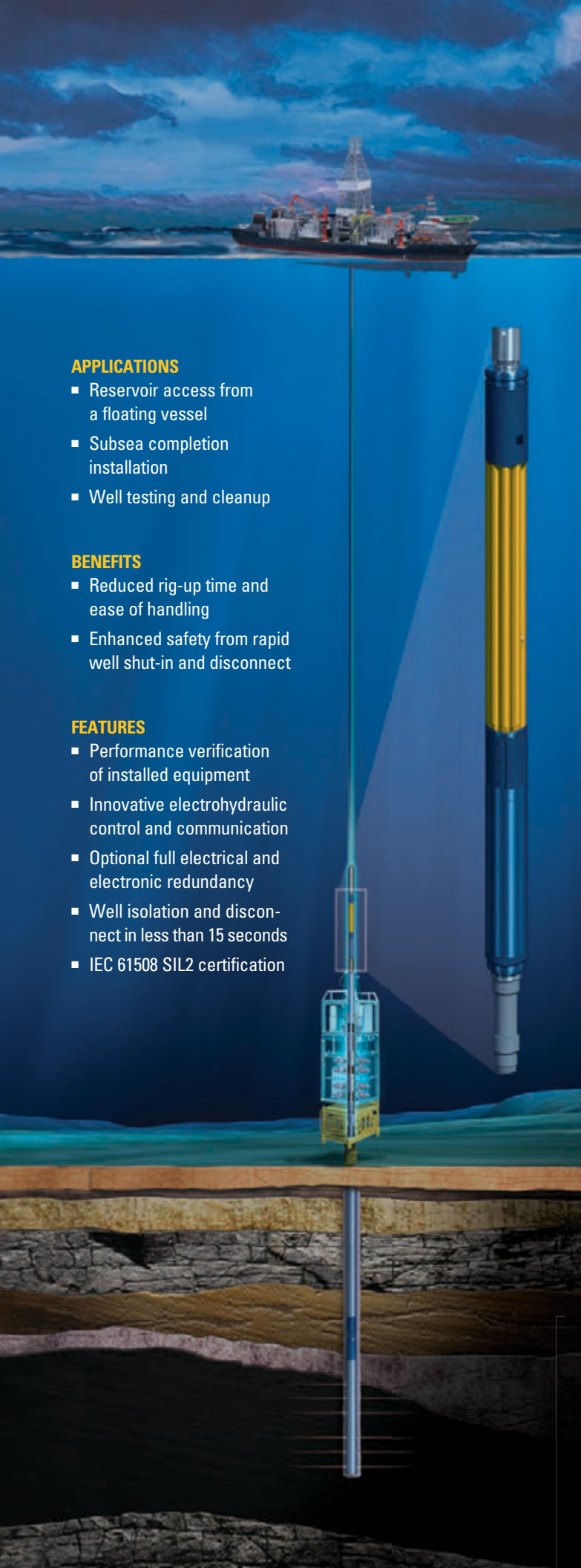


**Challenges** encountered during subsea exploration and appraisal, development, and production demand certainty in equipment performance. Today's offshore operations include longer and more complex completions, deeper waters, and ever-changing weather conditions that emphasize the importance of verifying subsea equipment performance. Gaining access to deepwater reserves requires more-effective, less-complicated technology to reduce costs and increase protection for personnel and the investment. **The SenTURIAN\* large-bore subsea landing string electrohydraulic operating system delivers reliable subsea verification of equipment installation and well control with a simplified design for increased offshore operational efficiency.**



## **Verification**

The SenTURIAN system enables verification of the integrity and functionality of subsea and downhole equipment using real-time monitoring and telemetry feedback throughout subsea operations.



#### APPLICATIONS

- Reservoir access from a floating vessel
- Subsea completion installation
- Well testing and cleanup

#### BENEFITS

- Reduced rig-up time and ease of handling
- Enhanced safety from rapid well shut-in and disconnect

#### FEATURES

- Performance verification of installed equipment
- Innovative electrohydraulic control and communication
- Optional full electrical and electronic redundancy
- Well isolation and disconnect in less than 15 seconds
- IEC 61508 SIL2 certification

## Efficiency

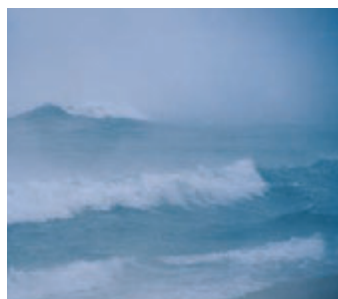
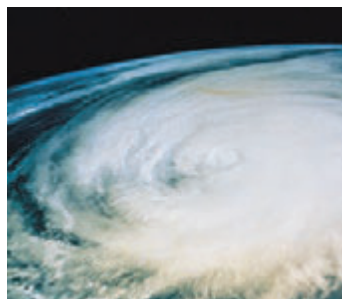
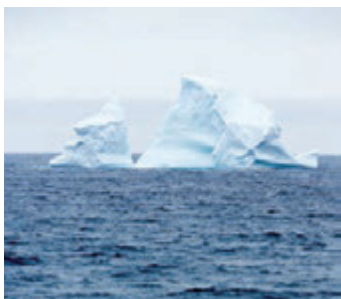
The SenTURIAN system's compact design enhances safety and ease of handling during operations from dynamically positioned vessels, resulting in overall rig-time reduction. Its reduced length makes it ideal for operations in single-activity rigs where derrick height might be an issue. The system's innovative direct electrohydraulic control lessens the number of lines and reduces the diameter of the umbilical, minimizing running time. In addition to the added convenience of a simply configured umbilical, compact assemblies ease hardware installation and reduce makeup time.

The system is compatible with all Schlumberger subsea landing string systems. The operating system is ideally suited for installation landing string applications, providing telemetry feedback and verification of subsea and downhole equipment functionality and integrity. It can also be used for cleanup landing string operations during exploration and appraisal or development, providing full well control and equipment verification.



*Click above or go to [www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN) to gain insight into the SenTURIAN system from the Schlumberger development team.*

The system's modularity and reduced subsea and topside equipment complexity results in less preparation and makeup time, easier maintenance, and added safety.



*During extreme weather conditions, the SenTURIAN system provides increased security with programmable emergency shutdown levels for quick well isolation and disconnect.*

## Reliability

Extreme weather can appear quickly, and a fast, reliable method of securing and disconnecting your well is crucial in protecting your people and your investment. In the event of an emergency, an integrated emergency shutdown (ESD) program allows full control of the well. The SenTURIAN system's programmable ESD levels allow complete well isolation and disconnect in less than 15 seconds by using direct control signals transmitted subsea through the surface-to-subsea umbilical.

Electronic redundancy provides an independent electrical path to control the solenoid valves in the subsea control module. Reduced numbers of subsea components and associated interconnections also reduces the risk of equipment failure during operations. The SenTURIAN system is the only in-riser operating system certified in accordance with IEC 61508 SIL 2. This independent third-party certification provides recognized assurance of system reliability and associated safety benefits.

### Access

The SenTURIAN system is part of the subsea landing string, which provides timely access to key reservoir data throughout testing and cleanup operations.



**Schlumberger**

**SenTURIAN**  
Large-bore subsea landing string electrohydraulic operating system

*Click above to view the SenTURIAN operating system animation, which highlights the system's efficiency, reliability, and innovative features, or go to [www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN).*

# Innovation

The SenTURIAN system's innovative design delivers the optimum balance between reliability and maintainability without compromising functionality. The system is customizable to meet project-specific requirements and enables full compliance with ISO 13628-7 standards by providing electronic redundancy and pressure readout for each subsea function.

## INTERCHANGEABLE MANDRELS

The system is highly adaptable, enabling changes in pressure and tensile rating to fit the specifications of your project. A simple switch of mandrels allows upgrades from 10,000- to 15,000-psi operating pressures and 1,000,000- to 1,200,000-lbf tensile ratings.

## SIMPLIFIED ELECTRICAL SYSTEM

The SenTURIAN system features an electrical arrangement with intuitive operator controls. This electrical arrangement eliminates active subsea electronics for safety critical systems to improve reliability, operations, and diagnostics. The subsea electronics module (SEM) is mounted externally on the subsea control module for ease of maintenance and replacement.

## OPTIONAL ELECTRICAL SYSTEM REDUNDANCY AND TELEMETRY FEEDBACK

The electronic redundancy feature provides a completely independent electrical path for control of the solenoid valves in the subsea control module, enhancing system reliability. The telemetry feedback feature provides multiple pressure transmitter and flowmeter data to allow triple-point verification of valve actuation. The combination of electrical contact, pressure reading, and flow measurement confirms the correct installation and functionality of installed equipment.

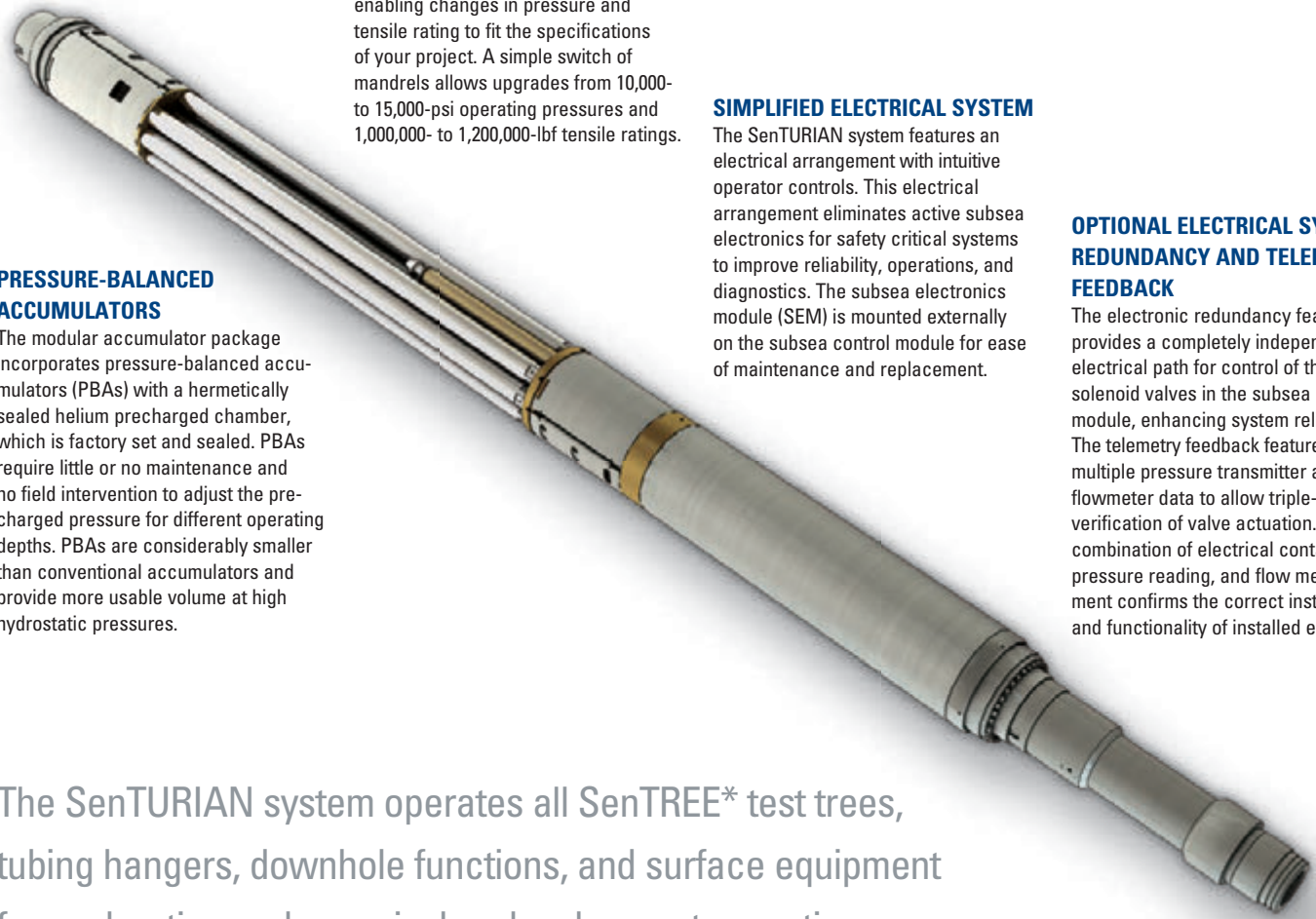
## PRESSURE-BALANCED ACCUMULATORS

The modular accumulator package incorporates pressure-balanced accumulators (PBAs) with a hermetically sealed helium precharged chamber, which is factory set and sealed. PBAs require little or no maintenance and no field intervention to adjust the pre-charged pressure for different operating depths. PBAs are considerably smaller than conventional accumulators and provide more usable volume at high hydrostatic pressures.

The SenTURIAN system operates all SenTREE\* test trees, tubing hangers, downhole functions, and surface equipment for exploration and appraisal or development operations.

## Control

The SenTURIAN system's electrohydraulic actuation circuitry enables the closing of all subsea test tree valves and the disconnect of a subsea landing string. This capability aids in the speedy evacuation of rigs required by uncontrollable circumstances such as inclement weather and rig drive-off or drift-off.





## Related Information

*Click below or visit  
[www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN)  
to view documents.*

### **Product sheet**

## Related Products

*Click below or visit  
[www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN)  
to view documents.*

### **SenTREE 7**

7 $\frac{1}{2}$ -in 10,000-psi subsea test tree (SSTT) system for completion installation, intervention, and well testing

### **SenTREE HP**

6 $\frac{3}{4}$ -in 15,000-psi high-performance subsea test tree (SSTT) system for completion installation, intervention, and well testing

### **SenTREE 3**

3-in 15,000-psi subsea test tree (SSTT) system for well testing

## Multimedia

*Click below or visit  
[www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN)  
to view multimedia*

### **Technical presentation**

The Product Champion highlights the benefits and features of the SenTURIAN subsea landing string electrohydraulic operating system.



### **Animation**

Highlights of the SenTURIAN system's efficiency, reliability, and innovative features

### **Video**

Discussion with the SenTURIAN development team on the benefits of the system

[www.slb.com/SenTURIAN](http://www.slb.com/SenTURIAN)

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