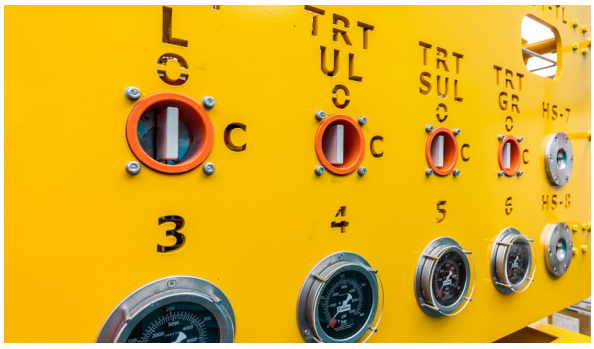
Subsea Well Access

Riserless Well Intervention System (RWIS)

Deployed from a dynamically positioned monohull vessel, the Riserless Well Intervention System (RWIS) provides a reliable solution for carrying out cost-effective intervention and abandonment operations on all types of subsea wells.

The RWIS is modular in design, allowing the system to be tailored to specific job requirements. A range of equipment options are available including a well re-entry module where production barriers can be placed in the event of tree valve failures or a bore selector to eliminate the cost associated with multiple runs to enable access to the annulus bore.

It features a unique, field-proven shear and seal valve design with a Shear Seal Gate Valve (SSGV) included to shear and seal against tool strings. This requires significantly less control fluid to operate than conventional systems, resulting in fewer subsea accumulators which reduces the overall weight.



Features and benefits

- 7 3/8” bore and 10K PSI maximum working pressure rated system. Provides access to conventional and horizontal Xmas Trees (XT)
- Can be used in water depths up to 2,200m
- Well access for the deployment of wireline or slickline tool strings up to 22m. Bore selector can provide mechanical access to the annulus
- SSGV capable of cutting tool strings
- Modular lubricator riser to support up to 22m long wireline tool strings
- Lighter than conventional Light Well Intervention (LWI) stacks
- Allowing access to ageing subsea trees
- Can be used for temporary suspension or abandonment of wells
- Modular design offers greater operational flexibility
- Can be run from more agile DP intervention vessel offering increased productivity, total recovery, and the life span of assets

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1. Upper Stackable Lightweight Intervention Connector (SLIC) Connector

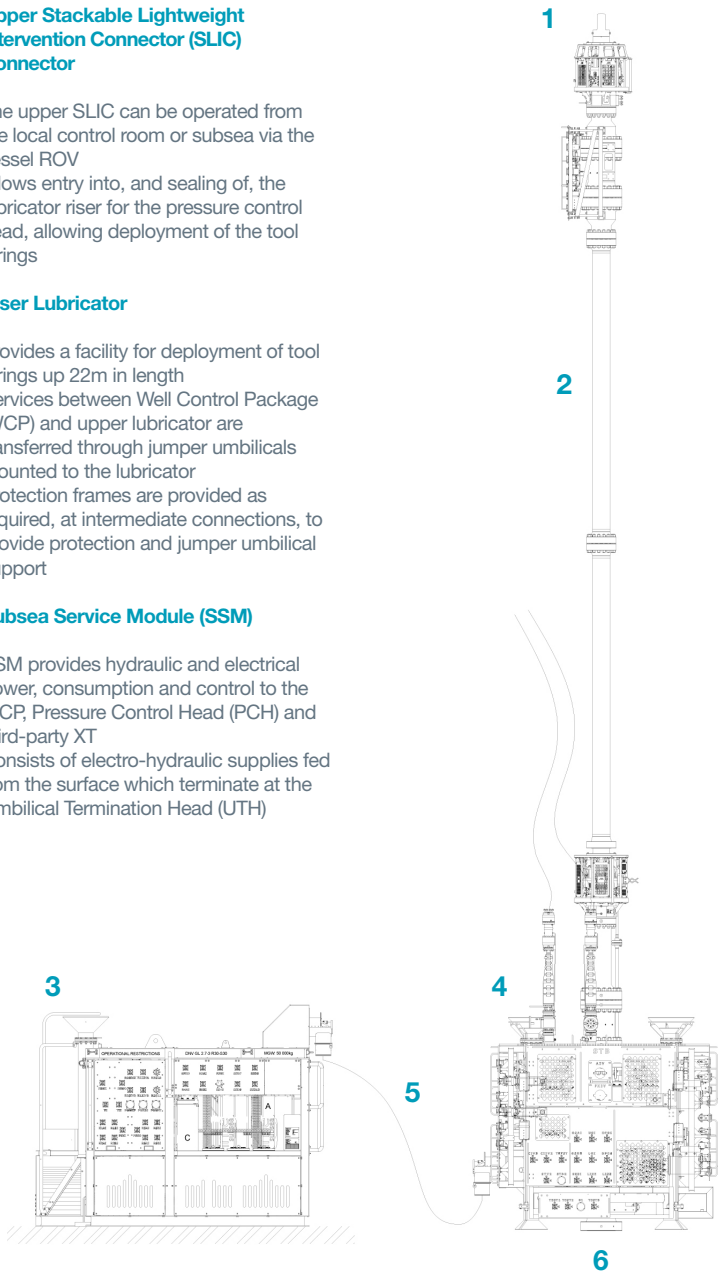
- The upper SLIC can be operated from the local control room or subsea via the vessel ROV
- Allows entry into, and sealing of, the lubricator riser for the pressure control head, allowing deployment of the tool strings

2. Riser Lubricator

- Provides a facility for deployment of tool strings up 22m in length
- Services between Well Control Package (WCP) and upper lubricator are transferred through jumper umbilicals mounted to the lubricator
- Protection frames are provided as required, at intermediate connections, to provide protection and jumper umbilical support

3. Subsea Service Module (SSM)

- SSM provides hydraulic and electrical power, consumption and control to the WCP, Pressure Control Head (PCH) and third-party XT
- Consists of electro-hydraulic supplies fed from the surface which terminate at the Umbilical Termination Head (UTH)



4. Well Control Package (WCP)

- The WCP consists of a series of shear and seal valves that are capable of shearing slickline and other tool strings during emergency situations
- Primary safety barrier installed on top of the third-party XT
- Provides pressure containment, preventing unintentional flow from the wellbore within the RWIS during operations

5. Flying Leads

- Utilized to connect all power, signal, grease, hydraulic functions and flushing supply and return functions between the SSM and the WCP as well as between the SSM and the third-party XT
- Compatible with ROV deployment

6. Lower Connector

- The lower connector is mounted below the Subsea Safety Gate Valve (SSGV) and consists of a female High Angle Release (HAR) connector. The HAR is utilized for connecting the necessary project equipment below the WCP such as: bore selector, temporary abandonment plug spool, tree running tool, and XT interface adapter

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Well Control Package (WCP)

The Well Control Package (WCP) is a lightweight system (42T) with a 7 3/8" bore size with 10,000psi working pressure and consists of series of shear and seal valves capable of shearing wireline and other tool strings during emergency situations and sealing the wellbore.

The WCP is the primary safety barrier installed on top of the subsea Xmas Tree (XT) and provides pressure containment preventing unintentional flow from the wellbore within the RWIS during operations.

The WCP dual isolation ball valves are designed to fail close automatically using stored hydraulic fluid from the accumulator banks during any emergency shut down or emergency disconnect process.

Features and benefits

- To provide a primary safety system to isolate well pressure with dual barrier isolation.
- To facilitate chemical injection directly into the lubricator via a dual sealing / backflow valve arrangement, using an injection inlet located at the upper Stackable Lightweight Intervention Connector (SLIC) connector and above the Shear Seal Gate Valve (SSGV).
- To accommodate internal passage of associated well isolation plugs, downhole tooling, and instrumentation, etc.
- Provides WOCS capability to provide XT control in conjunction with the Subsea Safety Module (SSM).
- Can interface with open water bore selector for dual bore applications, tree running tools, temporary abandonment plug spool and XT interface adapter
- Expro Temporary Abandonment Plug Spool (TAPS) can be deployed providing a mechanical barrier in the system for safe release from the wellbore.
- Flushing supply and return lines are connected to WCP from the SSM via a quick disconnect connector providing a conduit for flushing fluids when isolated from the wellbore and receiving returned fluids back to the vessel.
- Offers the ability to bull head.

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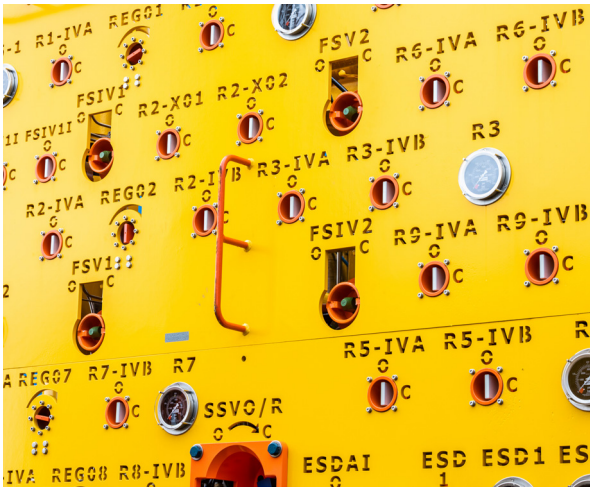
Subsea Service Module (SSM)

The Subsea Service Module (SSM) provides hydraulic and electrical power, communication, and control to the Well Control Package (WCP), Pressure Control Head (PCH) and Xmas Trees (XT). The SSM consists of electro-hydraulic supplies fed from the surface which terminate at the umbilical termination head (UTH).

The SSM is designed for extended subsea immersion as it is fitted with a single lifting point to allow deployment over the side via the vessel subsea crane. Designed for multiple deployment methods, the SSM can be landed on set on the seabed or suspended mid-water in case of a congested seabed or due to seabed conditions by the vessel subsea crane and is connected to the main umbilical from the vessel via the UTH.



Features and benefits

- Six 500 L (132 gal) capacity depth compensated reservoirs for hydraulic oil fluid and grease are connected to their respective pump and header for distribution to the WCP / PCH and XT when in operation. Equipped with a variable speed drive that controls each pump and can deliver up to 10,000 psi (689 bar) of hydraulic control pressure.
- Flying leads are utilized to connect all power and hydraulic functions between the SSM and WCP as well as the SSM and third-party XT.
- Connected to client XT via stab plates to allow the flying leads to disconnect from SSM in the event of an emergency.
- Up to 20x hydraulic controls with electrical interface to control the XT.
- Dual pumps and flying leads offer 100% redundancy.