

Wellhead Control Panel (WHCP)



Frames Multi Wellhead Control Panel

Product Definition

A wellhead control panel (WHCP) is the main part of a safety system on a production platform or production location. The panels enable safe and reliable operation of the Xmas tree valves by providing hydraulic power and controls, and in some cases pneumatic controls. The Xmas tree valves are in most cases on-off valves with a hydraulic or pneumatic actuator.

The following Xmas tree valves are typically controlled by a wellhead control panel:

- Sub-Surface Controlled Safety Valve (SSCSV)
- Master Valve (MV)
- Wing Valve (WV)
- Choke Valve
- Riser ESD Valve

Product Description

Frames Wellhead Control Panels can be executed as a single wellhead, typically found in onshore locations, or a multi wellhead control panel, which are typically found in offshore locations. The main purpose of the wellhead control panel is to ensure controlled opening and closing of the Xmas tree valves in the event of an emergency shutdown or process shutdown.

Control of the wellhead control panels is often part of the plant control (ESD/PCS) system. However, for remote areas Frames can provide standalone systems which include solar power, batteries, Telemetry and an E&I control panel.

Our systems are custom designed to match client specifications, and are, where required, compliant with international and local regulations such as IECEx, ATEX, CE, CSA, UL, NR13, ASME, and PED.

A typical layout of a wellhead control panel will show multiple sections to facilitate logical operation of the panel. These sections are grouped as follows:

- HPU
- Wellhead control module
- Process valve controls

HPU

A typical wellhead control panel HPU consists of multiple hydraulic pressure sections, depending on the working pressure of the Xmas tree actuated valves. Working pressures range from 3000 psi for control and well valves up to 20,000 psi for downhole valve control. Frames can incorporate a hydraulic or pneumatic logic header in the design of the wellhead control panel, in case low pressure logic control and/or fusible plug loop is required.

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Wellhead control module section

Controls for each Xmas tree are normally grouped in one functional module, which can be a drawer or fixed type. This section can range from one up to over 30 modules, depending on the number of wells. Well control module logic is either executed by a logic controller or by using conventional hydraulic or pneumatic logic, providing hydraulic integrated timer functions and hydraulic interlocks.

Opening and closing of the Xmas tree valves is performed either locally or from a remote location. The local controls can either be hydraulic logic-actuated or activated by an electrical pushbutton. In many cases, wireline override is required for well intervention, which is provided for by installing three-way valves with remote indication on the front or back of the panel, allowing the WHCP control logic to be overridden.

Process valve controls

This section provides controls for operation of ESD/ROV/Choke valves, and provides pressure indication for each valve. Actuators are operated using solenoid valves which can either have local or remote control facilities.

For remote areas, Frames can provide a standalone WHCP, which operates on a solar panel array with battery back-up, communicating with the central control room through Telemetry unit. All activities related to solar power calculations and communications design are performed by in-house Frames specialists.



Powerpack Instrumentation

Process Description

A hydraulic supply reservoir is sized to provide sufficient storage for hydraulic control fluid. One or more pumps provide hydraulic pressure for each pressure section. Pumps can be electrically driven, pneumatically driven, or manually operated. Filters, monitoring and control instruments are installed downstream of the pumps.

In order to maintain continuous operation and prevent the pumps from having to run continuously, a set of hydraulic accumulators is installed at the hydraulic headers. These accumulators are sized to open all of the valves.



Walk-in Type Wellhead Control Panel

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In order to enable the operator to monitor the header pressure, the front panel of the unit will have pressure gauges and transmitters to provide for local pressure monitoring of the hydraulic headers.

The hydraulic power section provides hydraulic power to operate the control section of the panel responsible for opening and closing the actuated valves.

The well control section is designed to operate the hydraulically controlled Xmas tree valves. The wellhead control panel automatically closes the Xmas tree valves in response to alarm conditions requiring shut-in. Xmas tree valves can be shut down manually or automatically, either from the front panel of the unit, or via the remote-control signal. Panels can include hydraulic or electrical logic, enabling the wells to be controlled by an ESD safety system, fusible plug loop or a high/low-pressure pilot valve.

Sequential opening/closing operation of the valves is optional and can be fully automated, including an adjustable time-delay sequence setting.

The wellhead control panel can monitor the status of the high/low process pressure in the flow line and automatically ensures shut-in of the well during emergency conditions.

Project Management

At Frames, we understand that success depends on sharp project management. As our client, we are driven to support your business, with our dedicated project team always on hand for one-on-one contact, providing you with the best possible service.

From concept through to design, production, testing and delivery, our project team will know your operating environment, and will use the latest technology to precisely meet your needs.

We are solution-oriented, understand your industry and always use strict document control and professional planning to exercise tight process control and meet all delivery deadlines. Our global office network, international supply chain and partnerships with leading vendors mean we are always able to supply the best possible systems and meet all of the local requirements and regulations.

Technical Details

- Output pressure up to 20,000 psi
- Suitable for hydraulic oil or water/glycol-based hydraulic fluids
- Extensive range of pump types and flow rates
- Design suitable for hazardous areas
- Bladder or piston accumulators in various sizes and materials
- Recirculation system and state-of-the art filters to maintain cleanliness of the hydraulic fluid
- Fittings are double-ferrule or high-pressure cone-and-thread type and available in various sizes and materials.

Added Value Frames

- Optimization of plot space
- Custom fit and build design
- Very high pressure available on request
- Exotic materials for tubing, piping, fittings and valves
- 3D modeling design before assembly, resulting in a compact design
- Reliability and availability study

References

- KiSS Locations, Nederlandse Aardolie Maatschappij B.V., onshore, the Netherlands
- EA field FPSO Shell, offshore, Nigeria
- D18a-A Platform, GDF SUEZ E&P Nederland B.V, offshore, the Netherlands
- P61, Petrobras, offshore, Brazil
- Valhall Flank North, BP Norge, offshore, Norway

Contact

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Frames Family Tree



Onshore

Offshore

Floaters

Oil & Water



- Multiphase Separation**
 - Production Separators (High & Low Pressure)
 - Test Separator
 - Degasser & Knock-Out Drum
 - Water Oil Separator (WOSEP)
- Compact Inline Separation**
 - SwirlSep
- Electrostatic Coalescers**
 - Dehydrator
 - Desalter
- Produced Water Treatment**
 - Deoiling & Desanding Hydrocyclones
 - Gas Flootation
 - Media Filtration
 - Solids Removal & Cleaning
 - Stripping
- Separation Internals**
- Heat Exchangers**

Gas



- Gas Separation**
 - Demisting
 - Scrubbers
 - Filters
 - SwirlSep
- Heat Exchangers**
 - Shell & Tube Heat Exchangers
- Air-Cooled Coolers**
- Gas Sweetening (H₂S & CO₂)**
 - Amines
 - Thiopaq O&G
 - Solid Bed Scavenger
 - Membrane
 - Molecular Sieve
- Gas Dehydration**
 - Glycol (TEG)
 - Molecular Sieve
- Dew Point Control**
 - Low Temperature Separation (LTS)
 - Solid Desiccant
- Hydrate Inhibition**
 - MEG/DEG Recovery
 - Methanol Recovery
 - MEG/DEG Desalination
- Light Hydrocarbon Recovery**
 - Condensate Stabilization
 - Fractionation
- Fuel Gas Treatment**

Flow Control & Safeguarding



- Hydraulic Systems**
 - Wellhead Control
 - Subsea Hydraulic Power Units
 - Hydraulic Power Units
 - IWOCs (Intervention Workover Control Systems)
 - TUTU (Topside Umbilical Termination Unit)
 - Cargo Ballasting Systems
- Safety Instrumented Systems**
 - High Integrity Protection Systems (HIPS)
- Chemical Injection**
 - Chemical & Methanol Injection Systems
 - Chemical Distribution Systems
 - Seawater Electrochlorination Systems
- Valve Automation Center**
 - Actuators and Actuated Valve Packages
 - Control Systems
- Automation**
 - Buoy Control
 - Tank Farm Control & Safeguarding

Services



- Asset Life Cycle Management**
- Maintenance & Field Services**
- Commissioning**
- Spare Parts**
- Operator Training**
- Engineering Studies**
 - Conceptual
 - FEED and Basic

Integrated Solutions



- Total Plant Solutions**
- Industrial CO₂ Modules**
- Early Production Facilities**
- Wellsite Packages**
- Biogas**