

## WELL COMPLETIONS | INTELLIGENT COMPLETIONS

# Turing® electro-hydraulic control system

Advanced electro-hydraulic control system, with bidirectional choking and built-in position sensors for fast and accurate flow control in platform and subsea applications

## FEATURES

- Bidirectional valve movements
- Built-in, high-resolution sensors enable increased number of choke positions
- Three control lines (two hydraulic and one electric) support up to 12 downhole devices
- First Halliburton electro-hydraulic control system suitable for subsea applications
- Modular design simplifies installation and logistics
- Compatible with Fuzion® suite of downhole wet-mate tools
- Uses same control line for DataSphere® gauges
- Onboard health diagnostics provide early insight into potential issues

## BENEFITS

- Fast installation and bidirectional actuation reduce rig time and production deferment
- Reduce risks associated with closing valves compared to single-direction actuations
- Supports more accurate valve positioning to reduce uncertainty
- Flexible completion design — no need for specific control line or electrical configurations for zone placement
- Monitor zones to help respond promptly to changing conditions

## Overview

Turing®, electro-hydraulic multidrop SmartWell® intelligent completion control systems help provide efficient and dependable, bidirectional zonal control of up to 12 zones. It operates using only three control lines, two hydraulic and one single-wire tubing encapsulated conductor (TEC).

Operators may remotely and selectively adjust zonal ICV positioning in seconds. Built-in high-resolution sensors, increase fidelity and choke positions. Provides more precise bidirectional control of the ICVs enables flow control from or in each zone without closing the ICV. This capability supports routine and active well optimization, enables adoption of fully automated, data driven well optimization technology.

The single TEC line communicates with other downhole sensors such as DataSphere® gauges, without requiring additional wellhead penetrations.

## Applications

This is the first electro-hydraulic system capable of bringing 12-zone completions using three lines in subsea applications. It is suitable for any SmartWell intelligent completion installation, including subsea, dry tree, extended reach, multi-lateral, water/gas injection, and CCUS.

This system helps improve reliability and reduce OPEX and CAPEX, by simplifying installation, logistics and design.

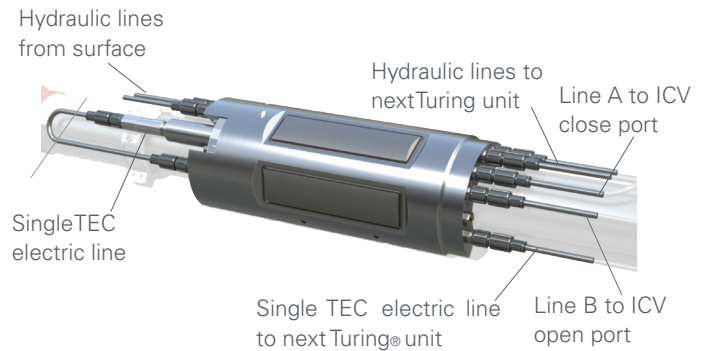
The Turing electro-hydraulic control system includes built-in health diagnostics. This offers early indications of potential issues.



Turing® electro-hydraulic control system

## Specifications

- Maximum temperature rating: 135°C
- Minimum temperature rating: 4°C
- Maximum working pressure: 15,000 psi
- Maximum hydraulic chamber rating: 10,000 psi
- Oil-based and water-based fluids for valve actuations
- API 19E Qualified Electronics
- Available sizes: 2 7/8 in., 3 1/2 in., 4 1/2 in., 5 1/2 in.



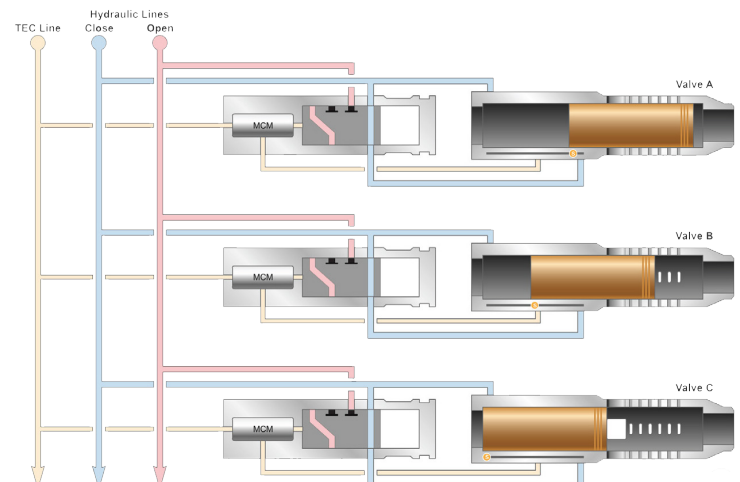
Turing® electro-hydraulic control system manifold

## Operations

The Turing® electro-hydraulic control system uses an active electrical-switch design.

Each valve pairs with an actuator module, which allows selective remote control of each valve. Hydraulic lines supply the motive power to adjust the ICV choke position.

Three control lines—one electrical and two hydraulic—run from the surface and connect to each Turing system module.



Turing® electro-hydraulic control system layout

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