PETRONIC
The smartest Ergonomic & Innovative Solution

Electric Subsea Torque Tool
APPLICATIONS:

- MANIFOLDS
- X-MAS TREES
- CHOKES VALVES
- PROCESS CONTROL VALVES
- ISOLATION VALVES
- PIPELINE & BRANCH VALVES
- PIPELINE END TERMINATION PLET
- PIPELINE END MANIFOLD PLEM
- SUBSEA PROCESSING SYSTEMS
- LONG DISTANCE TIE-BACKS
- WATER INJECTION WELLS
- CONVERSION OF EXISTING SYSTEMS
- ROV VEHICLES

Electric Rays are known for being capable of producing an electric discharge, ranging from as little as 8 volts up to 220 volts depending on species. They are found from shallow coastal waters down to at least 1.000 metres depth. Electric rays have patches of modified muscle cells called electro-plaques that make up an electric organ. These generate an electric gradient, similar to the normal electric potential across most cell membranes, but amplified greatly by its concentration into a very small area. The electricity can be stored in the tissues, which act as a battery. The battery can be discharged in pulses.
FOREWORD:
The worldwide trend for extracting oil and gas at increasing water depths, under higher pressures and temperatures, continues demanding innovative technologies. Subsea exploration is finding new fields at thousands of feet below the surface reaching water depths that one time were considered out of limits due to high costs and existing technology gap.

Extracting at these ultra deep waters is now more convenient then in the past and consequently suitable valves and actuators are demanded.

Apart from high pressure (15000 psi and 20000 psi) and high temperature subsea valves there is a new challenge facing subsea actuation.

During last decades the only subsea power source available had been the hydraulic power supply which leaded necessarily to install sophisticated, rather than expensive, surface hydraulic power units and subsea umbilical systems.

At ultra deep water depths (15,000ft+) the use of hydraulic pressure supply is extremely expensive and, in some cases, even impracticable.

Therefore a new alternative power source for subsea actuation has now become reality: the electricity.
AN ELECTRIC SOLUTION FOR ALL SUBSEA VALVES

SUBSEA ELECTRIC ACTUATION BENEFITS

- Environmental Friendly - No leaks, zero discharge
- Overall Cost Reduction - No hydraulic umbilicals and no HPU
- Power Efficiency - avoiding hydraulic pressure drops and Power Consumption Optimization
- Advanced diagnostic - Continuous Monitoring, Partial Stroking Test, Torque Limiting, ...
- Safety First - Overall Risk Mitigation of the Plant
- Reliability Strategy - 25 years of operational life - SIL 2 in High Demand Mode

AN ELECTRIC SOLUTION FOR ALL SUBSEA VALVES

Ball Valves
Check Valves
Slab Gate Valves
Double Expanding Gate Valves

SUBSEA ELECTRIC ACTUATOR PRODUCT RANGE

SbSTRONIC®
PVTRONIC®
PETRONIC®

PETRONIC® PATENT PENDING
ELECTRIC SUBSEA TORQUE TOOL MAIN FEATURES

SMART CONTROL CHARACTERISTICS
- Start/Stop torque control
- Continuous positioning
- Speed setting and control
- Max output torque limiting device
- Feed-back control position
- Speed control shaping to power consumption optimization

EXECUTION
- Standalone

INTERCONNECTIONS UTILITIES
- Serial connection for test bench interface
- Communication system SILS level 2: CANBUS, CANOPEN (fault tolerant)

ENVIRONMENTAL CONDITIONS
- Pressure compensated electronic design: 300 bar (tested up to 450 bar) for 12,000 cycles
- Working temperature from -10°C to +65°C

DIAGNOSTIC CHARACTERISTICS
- Continuous voltage and current supply monitoring and control
- Partial stroking test
- Motor high temperature self-protection

ELECTRICAL CHARACTERISTICS
- Nominal voltage 24 VDC (range 12 - 36 VDC)
- Stand-by power consumption: 16W
- Different output torque on request

MECHANICAL CHARACTERISTIC
- Nominal torque: 2700Nm ISO 13628-8
d: 8 mm (diameter 8 mm)
- Nominal motor torque: 10 Nm
- Nominal motor speed: 1000 rpm

DIFFERENT SIZES AND PERFORMANCES TO MEET EVERY REQUIREMENT

PETRONIC electric subsea torque tool is ergonomic, modular designed and fully customizable.
Different model sizes are available to meet project specifications and Client’s requirements.
SUBSEA ELECTRIC ACTUATORS SOFTWARE INTERFACE

Communication Protocols
- CANbus (SIIS LEVEL2 - FAULT TOLERANT) CANopen
- MODBUS
- TCP/IP
- SERIAL (for factory test)

Displayed Info:
1. Link Status
2. Actual Input Voltage
3. Actual Input Current
4. Standby Signal
5. Valve OPEN
6. Valve CLOSE
7. Valve Stroking

Operational Data:
8. PETRONIC® Output Torque
9. Gear Output Torque
10. Motor Torque
11. Motor Speed
12. Motor Turns Counter
13. Valve Speed
14. Actual Valve Position

Commands:
15. Self Tuning
16. Close
17. Open
18. Partial Stroking Test
19. Endurance Test
20. Motor Speed Command

Optional Features:
21. Motor Temperature
22. Battery Charge

PETRONIC® Control Panel

Multiple PETRONIC® Plugs

PETRONIC® Plugs

PetrolValves

PetrolValves PATENT PENDING
PERFORMED QUALIFICATION TESTS - 12,000 cycles @ 450 bar

SAFETY INTEGRITY LEVEL
Safety Integrity Levels for high demand mode of operation (IEC 61508-1 Table 3)

<table>
<thead>
<tr>
<th>Safety Integrity Level</th>
<th>Probability of a Dangerous Failure per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL 4</td>
<td>( &gt; 10^{-9} ) to ( &lt; 10^{-8} )</td>
</tr>
<tr>
<td>SIL 3</td>
<td>( &gt; 10^{-8} ) to ( &lt; 10^{-7} )</td>
</tr>
<tr>
<td>SIL 2</td>
<td>( &gt; 10^{-7} ) to ( &lt; 10^{-6} )</td>
</tr>
<tr>
<td>SIL 1</td>
<td>( &gt; 10^{-6} ) to ( &lt; 10^{-5} )</td>
</tr>
</tbody>
</table>

Table 2 "Safety Integrity Levels for high demand mode of operation"
SUBSEA ELECTRIC ACTUATORS ORDERING MATRIX

General Information

Valve type:
- Ball
- Axial Flow
- Check
- Slab Gate
- Doble Expanding Gate
- Choke
Valve Size:
Valve Rating:
Max DP for Act. sizing:
Valve Torque / Thrust figures:
Safety Factors
Safety Factors

Main Features

Power Supply:
- 24 V DC
- 110 V DC
- Other
Max Power Consumption:
Stroking times (OPEN / CLOSE):
Communication Protocol:

Optional Features

Partial Stroking Test
Speed Setting Control
Torque Limiting Device
Self-Tuning Feature
Start / Stop Control
Battery Backup
Current & Voltage monitoring
Serial connection for test bench (ATE)
Dirty Box
Position Feedback Control

Additional Requirements
1.
2.

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