Schlumberger

Ora intelligent wireline formation testing platform

Aligned with United Nations Sustainable Development Goals:
12—Responsible consumption and production,
13—Climate action,

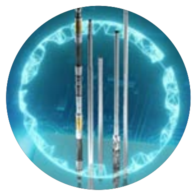
Revolutionizing dynamic reservoir characterization by combining new digital hardware with cloud-native collaborative software for unprecedented performance and insights in all conditions

Emissions Reduction:
reduces carbon emissions up to 96% in deepwater environments via deep transient testing (DTT) capability†

Energy Consumption Reduction:
reduces energy consumption >50% on average because of higher operational efficiency of downhole fluid analysis and sampling operations compared with other wireline formation testers

Pressure:
35,000 psi [241 MPa]

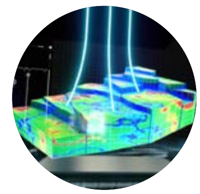
Temperature:
392 degF [200 degC]



Digital hardware
Laboratory-accuracy downhole metrology

Intelligent planning
All data—integrated and updated—to optimize acquisition

Operations control
Wellsite automation leveraging edge technologies



Contextual insights
Interactive real-time visualization in reservoir context

Applications

- Derisking of reserves uncertainty and maximizing production with real-time data and model integration to determine hydrocarbon in place, connectivity, and deliverability and to assess flow assurance risks
- Formation pressure measurement and contact identification
- Fluid properties and efficient determination of fluid gradients
- Fluid sampling at the highest purity in an unprecedented broad range of conditions
- Downhole PVT measurements
- Deep transient testing on wireline
- Formation testing in conditions where not previously possible: HPHT environments, tight or unconsolidated formations, or near-critical fluids
- Integrated customized evaluation of reservoir fluid geodynamics (RFG)

How it works

Rated to 392 degF [200 degC] and 35,000 psi [241 MPa] with dual-flowline architecture, laboratory-accuracy metrology, and smart downhole automation, the Ora* platform's hardware represents a new benchmark in wireline formation testing capability. Flow management options from 0.05 to 108 bbl/d in combination with focused radial probes and a dual-inlet dual-packer system perform focused sampling in virtually all conditions and bring deep transient testing operations to wireline. The efficient, reliable, and flexible performance of the Ora platform not only improves on existing standards, but also makes formation testing a reality where not previously possible, including HPHT conditions, tight or unconsolidated formations, and challenging fluids.

The platform's digital infrastructure delivers intelligent planning for optimized acquisition, live operations control, and contextual insights for faster and better decision making.

How it enables reserves booking with reduced carbon emissions

DTT on wireline was developed to bridge the gap between transient wireline formation testing and drillstem testing (DST), providing a more sustainable and economical solution for evaluating exploration and appraisal wells globally.

The Ora platform includes DTT capability by design: The platform's dual-inlet dual packer, highest-flow-rate pump in the industry, and patented fluid-handling technology enable DTT on wireline with minimal or no flaring required. The pump's capacity of up to 108 bbl/d lets you to pump higher volumes, while unique fluid-handling technology enables active hydrocarbon circulation to surface for well control, so you can test longer. And with advanced sensor technology, you can see deeper into your reservoir.

The Ora intelligent wireline formation testing platform effectively integrates new digital hardware in a shorter toolstring for reliable performance even in HPHT conditions.

The DTT service of the Ora platform is a proven, alternative solution for determining minimum hydrocarbon in place and zonal deliverability in reservoirs where DST is restricted because of cost, time, emissions, or environmental regulations. DTT on wireline is also used to optimize DST design and operation, further minimizing DST emissions.

In a deepwater oil well, the Ora platform DTT operation reduces carbon emissions by up to 96% compared with a conventional DST.†

How it achieves objectives with reduced energy consumption

On average, the Ora platform performs downhole fluids analysis and sampling at more than 50% higher operational efficiency, reducing energy consumption and carbon emissions while quickly acquiring the cleanest fluids—with contamination below laboratory detection limits.

How digital capabilities improve reservoir evaluation

- **Intelligent planning** brings together all relevant information for designing the optimal hardware configuration and data-acquisition strategy.
- **Operations control** gives your team members, wherever they are located, collaborative access to operations and results.
- **Contextual insights** provides detailed 2D and 3D visualizations of the data acquired in reservoir context on a customized interactive dashboard for making real-time informed decisions.

Smart hardware

At the heart of the Ora platform is hardware built on 90 years of pacesetting technical expertise and innovation. The valves, gauges, and hundreds of other key system components of the Ora platform have smart controls that are AI ready and can intercommunicate, enabling downhole automation of complex workflows. This ensures that data can be reliably integrated into the reservoir context in real time for quick, informed decision making.

Rapid acquisition of representative formation fluids

- The focused radial probe with its large fluid inlet area self-seals to the wellbore to acquire fluid circumferentially from the reservoir, instead of funneling fluid to a single constricted acquisition point. The automated probe-setting process uses a feedback loop between the probe and flow manager to accelerate the inflation process.
- High-precision flow rate control and the focused radial probe design actively divert mud-filtrate invasion into the guard inlet while pure reservoir fluid flows into the sampling inlet and flowline.
- The parallel flow of fluids in the sample and guard flowlines of the dual-flowline architecture results in a shorter string and simultaneous fluid analysis on both flowlines with the same hardware.

The flow manager precisely governs the broad dynamic range of the wideband downhole pump for highly sensitive and effective control of the flow rate, with options from 0.05 to 108 bbl/d [0.1 to 200 cm^3/s] and up to 8,000-psi [55-MPa] differential pressure.

Having a dedicated pump for both the sample and guard flowlines means that the flow manager software can precisely and independently control both the rate and pressure of each line for fast fluid cleanup in all conditions. Regardless of formation complexity, the fine pump control unlocks fluid access: In loose formations, sanding exposure is reduced whereas in tight, low-mobility rock, excessive pressure drawdown is avoided to keep fluids in single phase.

Reduced operational risk

The systems integration, dual-flowline architecture, and material selection of the Ora platform result in a toolstring that is significantly shorter and lighter than conventional wireline formation testing tools. The intelligent conveyance system further reduces the required cable tension—and the likelihood of sticking. For deep transient testing, where high pump volumes are expected, active hydrocarbon circulation ensures well control without the need for flaring or fluid disposal at surface.

Laboratory-accuracy metrology

The advanced downhole fluid analysis (DFA) system fills two roles for the Ora platform. The first is sample assurance, in which the purity of the acquired reservoir fluid is quantified in situ by multiple sensors, including data from the dual-flowline 24-channel spectrometer; fluorescence, resistivity, and density sensors; and pressure and temperature gauges.

Second, once the presence of representative fluid has been verified, further analysis can be conducted by extensively profiling fluid properties with a suite of high-precision, high-accuracy measurements including oil, water, and gas volume fractions; gas/oil ratio (GOR); hydrocarbon composition; CO_2; calibrated resistivity; density; viscosity; and fluid color. All gauges and DFA components are fully rated to 200 degC.

Automated capture of representative fluids

PVT sample capture is conducted with a six-bottle sample chamber system, which can be deployed in multiples in a single descent. Starting at the probe, scavenging of various trace elements, such as H_2S, is minimized because of low exposure to oil-based mud filtrate as a result of the focused-acquisition process. All material in the flow path is low scavenging, seals are minimally exposed, and dead volumes are eliminated to maintain the sample.

The flow path between the main flowlines and the sample bottles is flushed downhole with formation fluid as part of the sample acquisition process prior being filled. This technique saturates the bottle heads and seals and preserves the trace elements in the sample after filling. Samples can be acquired directly behind the inlet as well as farther up in the toolstring, downstream of the pump.

†In an oil well, 2 d flowing at 3,000 bbl/d with DST vs. 6 h flowing at 100 bbl/d with Ora platform DTT

Ora

Ora Platform Performance Specifications	
Temperature rating	392 degF [200 degC]
Pressure rating	Standard: 20,000 psi [138 MPa] High pressure: 35,000 psi [241 MPa] High-pressure deep transient testing: 25,000 psi [172 MPa]
Radial probe maximum differential pressure	8,000 psi [55 MPa]
Borehole size—min.	7.88 in [20.02 cm]
Borehole size—max.	13.5 in [34.29 cm]
Tool body outside diameter	Standard: 4.5 in [11.43 cm] High pressure: 5 in [12.7 cm]
Packer and conveyance diameter for 7.88- to 9.5-in [20.02- to 24.13-cm] boreholes	Packer: 7 in [17.78 cm] Conveyance accessory: 7.25 in [18.42 cm]
Packer and conveyance diameter for 9.88- to 13.5-in [25.1- to 34.29-cm] boreholes	Packer: 9 in [22.86 cm] Conveyance accessory: 9.2 in [23.37 cm]
Sample volume	N_2-compensated PVT: 400 cm^3 Noncompensated PVT: 675 cm^3
Length†	107 ft [33 m]
Weight†	3,300 lbm [1,500 kg]
Tension‡	Electronic cartridge: 50,000 lbf [222,411 N]
Compression‡	Electronic cartridge: 16,700 lbf [74,285 N]
Combinability	Integrates with most Schlumberger wireline logging tools below the platform§
Special applications	Low-H_2S-scavenging flow path Nonreactive with Hg
DTT on wireline	Circulation rate—latched: 1,000 L/min Circulation rate—unlatched: 2,200 L/min Adjustable interval length: from 1.8 m to 15 m Extended flow rate: from 0.1 cm^3/s to 200 cm^3/s

† Typical value, depends on platform configuration per objectives
‡ Minimum component rating
§ Temperature rating decreased to 350 degF [177 degC]

Ora Platform Metrology Specifications	
Pressure gauge	
Accuracy	>100 degC and 0–20,000 psi: 1.8 psi <100 degC and <15,000 psi: 2 psi
Resolution	>70 degC: 0.005 psi <70 degC: 0.003 psi
Contamination monitoring uncertainty	3% uncertainty below 10%
Oil, water, and gas volume fractions real-time accuracy	<10%: 2% 10%–30%: 5% >30%–<70%: 10% 70%–90%: 5% >90%: 2%
Composition	C_1, C_2, C_3, C_4, C_5, C_{6+}, CO_2 Uncertainty: 3 wt %
Fluid resistivity	0.01–20 ohm.m: ±5% accuracy
Fluid density	0.05–1.6 g/cm^3: ±0.006 g/cm^3
Fluid viscosity	0.2–150 cP: ±10% accuracy
Color (24 channels)	Optical density range: 0.1–3.5 Accuracy = ±0.01 Resolution = 0.0005

Contextual Insights Products

Standard	Advanced	Expert
Composition	Asphaltene onset pressure (AOP)	Upscaled connected hydrocarbon in place (HIP)
Contamination	Compressibility	Upscaled IPR
Density	Equation-of-state (EOS) modeling	Well deliverability
Fluid fraction	Hydrocarbon column height	Wellbore dynamics
Fluorescence	Interval inflow performance relationship (I-IPR)	Zonal IPR
Formation volume factor (FVF)	Lateral connectivity—dynamic	Zonal minimum connected HIP
Gas/oil contact (GOC), gas/water contact (GWC), and oil/water contact (OWC)	Lateral connectivity—reservoir fluid geodynamics (RFG)	
GOR	Minimum horizontal stress	
Optical density	Permeability thickness (k_h)	
Pressure and temperature (PT)	Radius of investigation	
Sample assurance	Vertical connectivity—dynamic	
Viscosity	Vertical connectivity—RFG	
Water resistivity and salinity	Vertical permeability (k_v)	

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