

# subC-racs

## Flexible riser integrity monitoring

### APPLICATIONS

- Continuous monitoring of gas volume and liquid level in the annulus
- Continuous monitoring of gas diffusion rate
- Real-time detection of damage to the riser outer sheath
- Detection of restriction to gas flow in the annulus or vent port
- Sampling port for analysis of vent gas

### BENEFITS

- Delivers continuous, detailed information for integrity assessment
- Eliminates the need for vacuum tests
- Accurately identifies trends before fatigue damage occurs
- Reduces maintenance requirements

### FEATURES

- Remote monitoring in real time via operator network using standard TCP/IP connectivity, collaboration, and information systems
- Alerts and measurements available to external platform systems
- Independent measurements of annulus gas diffusion rate and annulus free volume
- Integrated water trap, sampling, and purge system

One of the main concerns regarding flexible pipe integrity is annulus condition. A flooded annulus can lead to excessive corrosion, reducing the fatigue life of the armor layers. subC-racs\* flexible riser integrity monitoring is an automated system that provides integrity data for flexible risers, enabling real-time trend evaluation.

### Characterization of annulus condition

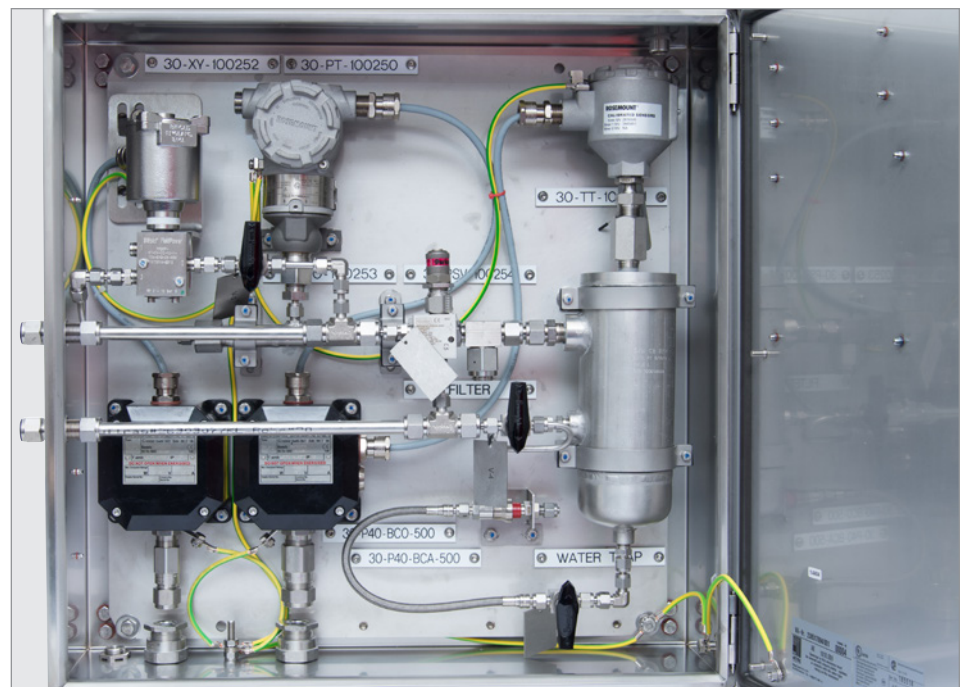
Conventional annulus vent-gas monitoring does not provide reliable information on gas flow rates or water vapor emissions. Additionally, annulus inspection is a cost-intensive operation that is performed intermittently without the possibility of continuous monitoring.

subC-racs monitoring delivers detailed information in real time for integrity assessment and removes the need for vacuum tests. Schlumberger expertise in flow measurement and interpretation of the reservoir is applied to the flexible riser annulus environment, enabling detailed information about fluid content and connectivity.

This monitoring uses controlled venting of the annulus gas, together with high-accuracy pressure, temperature, and flow rate measurements, to independently calculate the diffusion rate of gas and the volume of liquid (i.e., vapor condensation and water) that may have entered the riser annulus.

### Real-time monitoring

By providing comprehensive and continuous surveillance, subC-racs monitoring quickly identifies emerging trends in the riser annulus system before significant fatigue damage occurs. Real-time monitoring and alarms provide the earliest indication in the event of a breach in the flexible riser's sheath. The trapped water and vent-gas composition can be tested to further support integrity and operational assessments.



*subC-racs monitoring enables efficient management of flexible pipe integrity.*

## Integrated deployment

subC-racs monitoring is integrated into floating production facilities and connected to the annular space of flexible risers. The system can be deployed at a significant distance from the riser-end fitting for simple deck layout arrangement.

## Data interpretation

The engineering data and alarms provided by subC-racs monitoring can be directly transmitted to the control system of the floating facility. Additional data supplied from the system is available for specialist interpretation by experts for a periodic and holistic assessment of the riser system.

The data associated with gas sampling collected by subC-racs monitoring enables advanced remodeling of armor-layer fatigue life. This makes it possible to plan, in detail, replacement operations or asset life extension, if necessary.

### Measurement Specifications

Range	0–106 galUS/h [0–400 L/h]
Accuracy	1% if gas composition is known
Acquisition rate	1 Hz
Annulus free volume accuracy	3%
Computation rate	
Alarm	10 s
Volume	6 to 12 h (typical)

### Hardware Specifications

Dimensions (riser unit box)	23.62 × 23.62 × 8.27 in [600 × 600 × 210 mm]
Weight (per riser unit)	115 lbm [52 kg]
Process material	316 and 904L stainless steel
Material, cabinet, and external fittings	Design for offshore service: 316 stainless steel; painting available upon request
Power supply	24 V DC; 80 W for 8 risers plus remote I/O unit
Acquisition and control system	PC-based SCADA for up to 16 risers <sup>†</sup>
Communications	Modbus <sup>®</sup> RTU, Modbus TCP/IP or open platform communications (OPC) data delivery <sup>†</sup>

### Environmental Specifications

Gas temperature	32–176 degF [0–80 degC]
Ambient temperature	41–113 degF [5–45 degC] <sup>†</sup>
Operating pressure	Configurable; 8.7–14.5 psi [0.6 to 1 bar] typical
Relief valve setting pressure	Configurable; 21.8–29.0 psi [1.5–2 bar] typical
Design pressure	43.5 psi [3 bar]
Test pressure	72.5 psi [5 bar]
Hazardous area compliance	Atmosphères Explosibles (ATEX) and IEC Certification for Explosive Atmospheres (IECEX) Zone 1 for riser units and remote I/O unit

<sup>†</sup>Specification can be extended upon request.