

AquaWatcher Surface

Water salinity sensor

APPLICATIONS

- Inline continuous water conductivity measurements in wet gas and multiphase flows
- Salinity determination (NaCl equivalent)
- First water detection
- Monitoring salinity changes resulting from water injection
- Identification of the origin of produced water
- Optimization of well cleanup and flowback
- Hydrate inhibitor injection minimization

BENEFITS

- Continuous tracking of salinity instead of periodic values delivered by discrete sampling
- Early warning of hydrate formation to mitigate risk
- Operating cost reduction by eliminating manual water sampling and analysis
- Communication with Vx Spectra* surface multiphase flowmeter to automatically update water properties

FEATURES

- Water conductivity measurement for the full range of the gas volume fraction (GVF)
- High-accuracy, high-resolution water conductivity measurement
- Water detection at very low water levels (as low as 50 ppm)
- Easy field calibration and maintenance
- Permanent and mobile configurations
- ATEX/IECEx and NEC/CSA versions
- NACE MR0175:2015 compliant
- CE marking
- Compact, robust design of instrumented flange and electronic module
- No intrusive components
- Seamless hardware and software integration with Vx Spectra flowmeter

Inline water salinity determination for multiphase flow

The AquaWatcher Surface* water salinity sensor is the latest-generation microwave sensor technology for inline continuous water conductivity measurement in wet gas and multiphase (water-continuous) flow that provides real-time data output of water salinity.

The high-accuracy, high-resolution measurement of salinity across the full range of the gas volume fraction enables the detection of water property changes in multiphase and wet gas flows for identification of the origin of produced water.

Stand-alone installation of the mobile version of the AquaWatcher Surface sensor downstream from the separator during well cleanup or flowback operations to monitor change in the water type helps in optimizing the duration of the well cleanup process.

First water detection

First water can be detected by the AquaWater Surface sensor in very low concentrations both in wet gas and multiphase conditions. The sensor's reliable detection of water droplets in the flow provides critical information for flow assurance purposes to help prevent hydrates and minimize the occurrence of scaling and corrosion that triggers the need to inject chemical inhibitors. Where hydrate inhibitors are used, the AquaWatcher Surface sensor measures the concentration ratio of hydrate inhibitor to water in the flow for water management optimization.

Automatic update of water properties for accurate flow rate calculation

The AquaWatcher Surface sensor's full integration capability with the Vx Spectra flowmeter enables continuous updating of water properties to eliminate the need of manual sampling, especially for remote locations and unmanned operations.



AquaWatcher Surface water salinity sensor integrated with the Vx Spectra surface multiphase flowmeter.

AquaWatcher Surface

Specifications

	Instrumented Flange Size [†] , in		
	4	6	4 Mobile
Max. working pressure, psi [MPa]	5,000 [34.47]	5,000 [34.47]	5,000 [34.47]
Process temperature rating, degF [degC]	-40 to 250 [-40 to 121]	-40 to 250 [-40 to 121]	-40 to 250 [-40 to 121]
Service	NACE MR0175/ISO 15156:2015	NACE MR0175/ISO 15156:2015	NACE MR0175/ISO 15156:2015
Salinity range (equivalent max. NaCl), ppm	0-260,000	0-260,000	0-260,000
Water/liquid ratio, %	Water transition point (WTP) to 100	WTP to 100	WTP to 100
Gas volume fraction, %	0 to 99.9	0 to 99.9	0 to 99.9
Max. flow capacity			
Liquid flow rate, bbl/d [m ³ /d]	21,000 [3,340]	55,000 [8,745]	21,000 [3,340]
Gas flow rate, MMscf/d [MMm ³ /d]	50 [1.42]	130 [3.68]	50 [1.42]
Acidity resistance [‡]	pH < 7	pH < 7	pH < 7
Accuracy (water conductivity)	±0.5 S/m or ±5%	±0.5 S/m or ±5%	±0.5 S/m or ±5%
Repeatability (water conductivity), %	±1	±1	±1
Resolution (water conductivity), %	±2	±2	±2
Water detection level			
GVF ≥ 95%, ppm	50 to 100	50 to 100	50 to 100
70% < GVF < 95%, ppm	200	200	200
Interface connections	4-in compact flange	6-in compact flange	4-in Grayloc or Techlok hub
Dimensions (L × H × W), ft [m]	1.90 × 1.13 × 0.98 [0.579 × 0.343 × 0.303]	2.13 × 1.13 × 1.05 [0.650 × 0.343 × 0.320]	4.50 × 3.95 × 3.97 [1.375 × 1.203 × 1.211]
Weight, lbm [kg]	95 [43]	145 [66]	1,543 [700]
Hazardous area classification			
ATEX/IECEX	Ex d IIB T4	Ex d IIB T4	Ex d IIB T4
NEC/CSA	CLASS 1, ZONE 1, A Ex d IA, IIB T4 Gb	na	CLASS 1, ZONE 1, A Ex d IA, IIB T4 Gb
Ingress protection	IP 66	IP 66	IP 66
Power supply, V DC, W	24, 20	24, 20	24, 20
Communication interface	Ethernet TCP/IP Modbus or RS485 Modbus	Ethernet TCP/IP Modbus or RS485 Modbus	Ethernet TCP/IP Modbus or RS485 Modbus
Ambient working temperature, degF [degC]	-4 to 140 [-20 to 60]	-4 to 140 [-20 to 60]	-4 to 140 [-20 to 60]
Ambient storage temperature, degF [degC]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]
CE marking	CE marked	CE marked	na
Compatibility	4-in Vx Spectra flowmeter	6-in Vx Spectra flowmeter	Diligens Spectra* mobile multiphase production testing unit PhaseTester* portable multiphase well testing equipment

na = not applicable

[†] Additional sizes available on request

[‡] Not resistant to hydrofluoric (HF) or Hydrochloric (HCl) acid

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