

# WaterCut Meter

## LowCut (LC) and HighCut (HC) models

Roxar's Flow Measurement solutions offer world-class Watercut Meters (WCM) characterized by:

- Continuous real time measurement
- Unmatched sensitivity and long-term stability
- Full bore or by-pass in-line installation
- No moving or exposed parts
- Extensive range of standard sizes, ratings and materials
- Customer specified size, rating and material upon request
- Automatic compensation for process temperature
- AutoZero function providing automatic correction for changing fluid properties (optional)
- Coriolis interface for two-phase flow measurement (optional)
- User-friendly, menu based configuration software

The Roxar WCM LC and HC models are characterized by:

- Measurement ranges: 0 – 15 % (LC) / 0 – 50 % (HC)
- Sensor spool piece diameter: 1" – 36"
- Maximum design pressure: Limited only by customer spec.

### Operating principle

The Roxar WCM LC and HC models use a unique, patented microwave resonance technology to measure the permittivity of a oil/water mixture with an extremely high level of accuracy and sensitivity. The % Water is calculated by relating the permittivity of the mixture to the permittivities of dry oil and water respectively.

### Simple system and configuration

The Roxar WCM basically consists of a sensor spool piece and a control unit. The sensor is a passive device and contains no electronics or moving parts. The control unit is housed in an explosion proof enclosure. It generates and processes microwave signals from the sensor and transmits the measured % Water to the data collection system and/or local display.

The only configuration required to operate the Roxar WCM is the dry oil density and water conductivity. With the optional AutoZero function, even this is not required. A final in-line calibration may be performed to fine tune the Roxar WCM for optimum performance.

### The unique AutoZero function

All water-in-oil analyzers are sensitive to variations in the fluid properties (e.g. changes in hydrocarbon density).



Through extensive research and testing, Roxar have proven a close correlation between the density and the permittivity of a dry hydrocarbon liquid. This patented relationship is being applied by the Roxar WCM for the optional AutoZero function, which enables the Meter to continuously compensate for changes in the hydrocarbon liquid composition by automatically adjusting the zero point of the Meter. The AutoZero function requires a line density input to facilitate an iteration routine which will calculate both the % Water and the Dry Oil Density.

### Two-phase flow meter

With the additional flow and density inputs from a Coriolis meter, the Roxar WCM may also be turned into a powerful two-phase flow meter, automatically adapting to changing process conditions, and even compensating for small amounts of gas.



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MODELING



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## Specifications

### System performance and characteristics

<b>Measurement range:</b>	LowCut version (LC): 0-15% water HighCut version (HC): 0-50% water LC/HC plus TopCut: 0-100% water (requires line density input)
<b>Accuracy:</b>	
In-line calibration:	0-1% water: $\pm 0.05\%$ absolute 20% water: $\pm 5\%$ of reading 20-50% water: $\pm 1$ absolute
Density method:	0-50% water: $\pm (0.3\% + 5\%$ of reading) – max 1% abs.
Top Cut	50-100% water: $\pm 5\%$ absolute
Repeatability:	0.01%
Sensitivity:	0.005%
Response time:	0.25-0.40s
Flow conditions:	Well mixed
Pressure drop:	Less than 0.2 bar (3 psi)
Effect of temperature variations:	Automatic temperature compensation
Effect of oil density variations:	+ 0.027% water per + 0.001 g/cm <sup>3</sup> (Automatic compensation with AutoZero)
Effects of pressure variations:	Approximately + 0.00017% water per + 1 psi (Automatic compensation with AutoZero)

### Input/output

#### Analogue 4-20 mA inputs

Input signals: Up to 3 (temperature, mixture density, flow rate, pressure)

#### Frequency inputs

Input signals: Up to 2 (mixture density and flow rate)

#### Analogue 4-20 mA outputs:

Output signals: Up to 5 (temperature, % water, oil flow rates, water flow rates, etc)

#### Digital I/O

RS232/422 serial ports, user selectable baud rates

Number: 2 (ASCII-string or Modbus)

Transmission distance: 15 m (RS232) / 1000 m (RS422)

### Software

The Roxar WCM comes fully equipped with all necessary software. This facilitates basic configuration, calibration and configuration of inputs and outputs, selection of measurement units, in-line calibration etc. The menu system is accessed via the serial port of any PC with MS Windows.

### Mechanical and electrical

#### Meter body spool piece

<b>Materials:</b>	Stainless steel 316, carbon steel, duplex, other materials on request
<b>Weather protection:</b>	IP66
<b>Connections:</b>	Rating and size to customer specifications
<b>Temperature:</b>	Standard up to 150°C (300°F), higher on request
<b>Hazardous area approval:</b>	Simple apparatus.
<b>Electronic housing:</b>	
<b>Materials:</b>	Stainless steel (ATEX) / painted aluminium (NEC)
<b>Weather protection:</b>	IP66 / NEMA 7
<b>Mounting:</b>	Field-mounted, maximum 2 m from sensor
<b>Ambient temperature:</b>	-20°C – 60°C (-4 – 140°F)
<b>Weight:</b>	Approx. 70 kg (ATEX) / 88lb (NEC)
<b>Voltage supply:</b>	100-240V AC, 50 - 60 Hz / 24 DC
<b>Power consumption:</b>	Max. 32 W, typically 25 W
<b>Hazardous area approval:</b>	EEx de [ia] IIB T5 and Class 1, Div 1, Group C
<b>Temperature transmitter:</b>	EEx d IIC T6 (IS as option) and Class 1 Div 1, Group B C D



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