

LWC-300

HOT-WIRE LIQUID WATER
SENSOR



OVERVIEW

This tiny sensor measures liquid water content (LWC) from 0.05 to 3 g/m³. It can be easily mounted on manned or unmanned aircraft, cooling towers, and spray rigs. It is ideally suited for applications where the precise measurement of LWC is needed.

HOW IT WORKS

The hot-wire liquid water sensor features a coiled wire that is maintained at 150° C. This coil acts as a variable resistance in one arm of a Wheatstone Bridge circuit. The resistance of the sensing coil decreases as the wire temperature decreases. Temperature decreases can be caused by vaporization of water droplets or by convective heat losses to air that flows past the sensor. Heat losses by conduction from the ends of the master coil are minimized by slave coils that are maintained at the same temperature as the master coil and are located at each end of the master.

NEW FEATURES

The LWC-300 offers several advantages over earlier LWC sensors:

- » Improved electronics that extend sensor lifetime
- » Reduced background noise
- » Improved frequency response
- » RS-422 serial communication

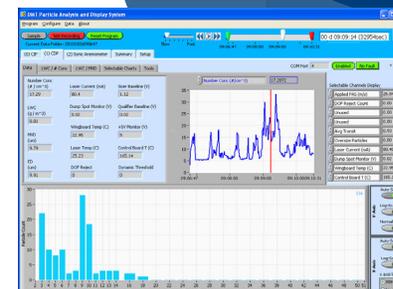
The resistance of the sensing coil is directly proportional to its temperature; therefore, the control circuit maintains the sensor at constant temperature by maintaining it at constant resistance. A Wheatstone bridge is formed of four resistances, of which the master coil sensor is one. The power dissipated by the sensor is the product of the current through the sensor and the voltage drop across it.

Once the power dissipated by the sensor is known, the effects of convective heat losses are estimated. The power dissipation due solely to vaporization can then be estimated, which in turn gives an estimate of liquid water content.

SOFTWARE

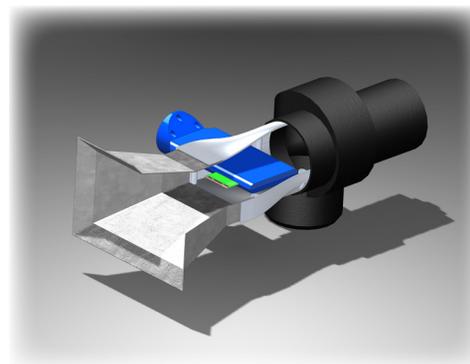
The Particle Analysis and Display System (PADS) is optional software that displays a user-friendly virtual instrument panel. PADS allows the user to control the LWC and display and log data. In particular, the program enables the user to do the following tasks:

- » Start data recording and sampling
- » Automatically estimate LWC from convective heat losses, wire temperature, air density, and various constants and intermediate values
- » Estimate convective heat losses using direct measurements or an empirically derived method



PADS Software System

OPTIONAL ASPIRATOR



DMT has developed an aspirator for ground-based LWC applications. The system, pictured at left, is a self-contained unit that includes the fan. An external flow indicator provides easy access to airflow readings.

INCLUDED ITEMS

- » Instrument (sensor strut and electronics box)
- » Interconnect cable
- » Operator manual
- » Email and phone technical support

HOW TO ORDER

Contact DMT for pricing or more information:
+1.303.440.5576,
customer-contact@dropletmeasurement.com.

LWC-300

SPECIFICATIONS

Measured Parameters	Liquid water content
Measurement Range	0-3 g/m ³
Output Type	RS-422 Serial Communication
Air Speed Range	0 - 200 m/sec
Calibration	Not required
Special Features	<ul style="list-style-type: none">» Interchangeable circuit card sensor» Pulse width modulation control (avoids overheating of the power transistor and hotwire coil)
Mounting	2.5-inch diameter B.C. Rosemount pattern mounting
Frequency Response	> 25 Hz
Power Requirements	<ul style="list-style-type: none">» System power: 28 VDC, 7.5 A max» Anti-ice power: 28 VDC, 8.0 A
Weight	Electronics box 500 g, sensor strut 600 g
Dimensions	<ul style="list-style-type: none">» Sensor strut with strut mount: 11.5 cm W x 6.4 cm L x 19.5 cm H (4½" W x 2½" L x 7¾" H)» Electronics box: 12.1 cm W x 12.1 cm L x 6.7 cm H (4¾" W x 4¾" L x 2¾" H)» Electronics box mounting plate: 9.7 cm W x 15.3 cm L x 0.3 cm H (3.8" W x 6.0" L x 0.1" H)
Operating Limits	0 - 12 km altitude, -40 to +40 °C, 0 - 100% RH

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2545 Central Avenue
Boulder, Colorado, USA 80301
www.dropletmeasurement.com
ph: 303-440-5576, fax: 303-440-1965