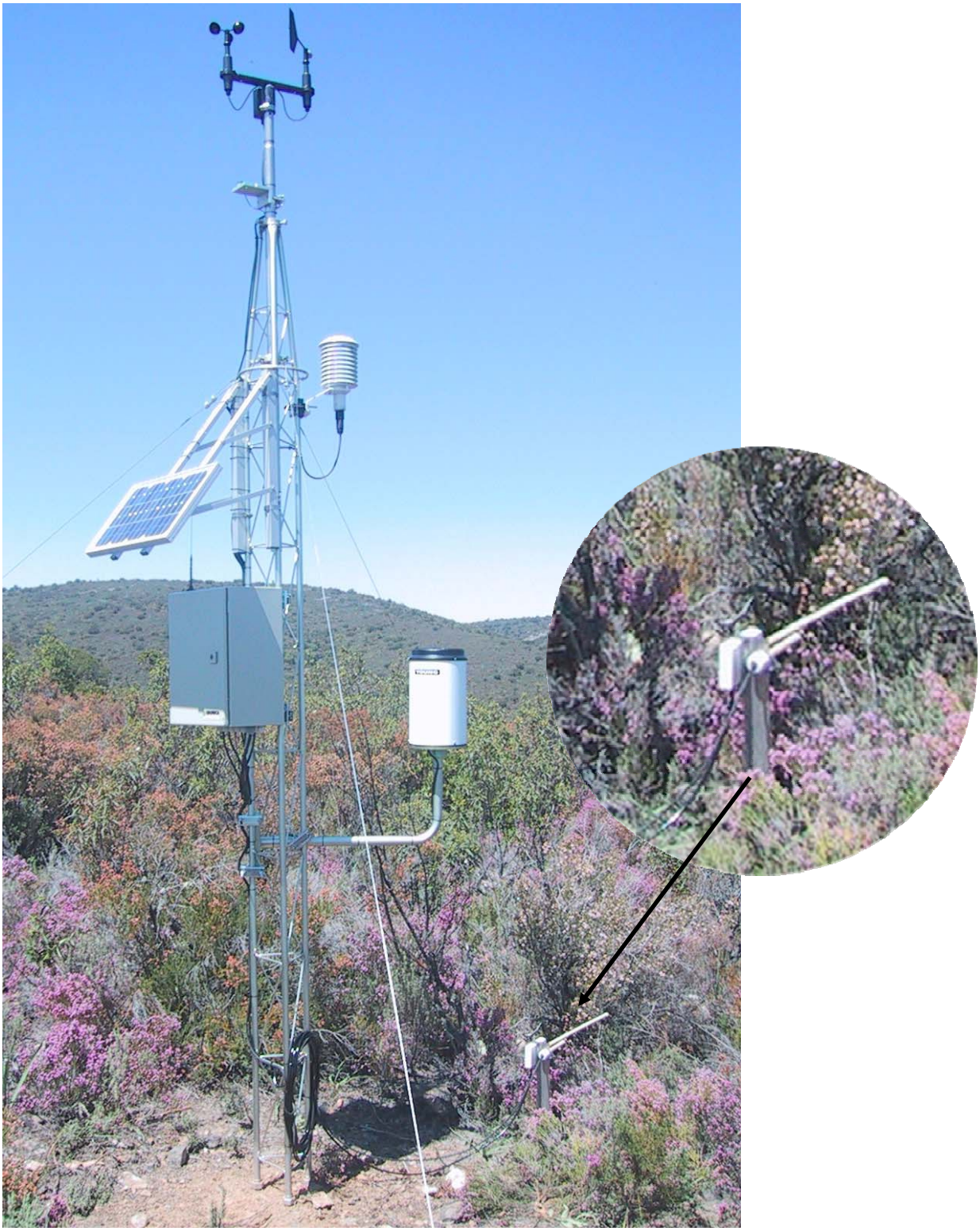
MOISTURE AND FUEL TEMPERATURE SENSORS



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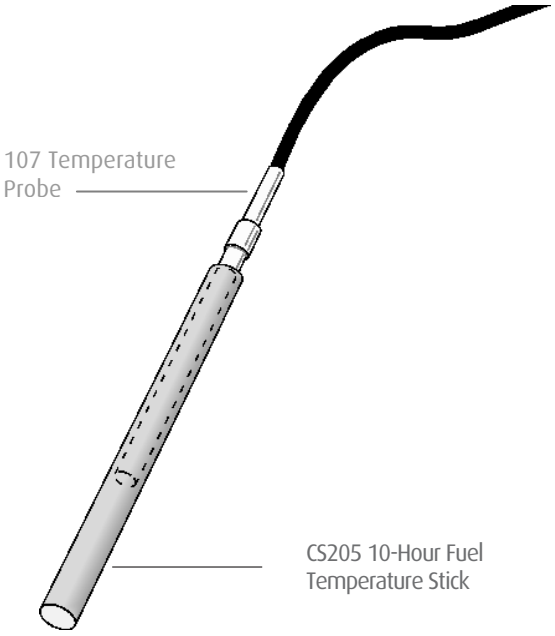
CS205/107, CS505, CS515

10 Hour Fuel Temperature / Moisture Sensors

GEONICA, S.A. offer sensors that emulate and measure the moisture content and temperature of similarly-sized twigs on the forest floor. These 10-hour fuel moisture and fuel temperature sensors are often incorporated in our pre-configured or custom fire-weather stations. When connected to a datalogger with telemetry capability, the user can automatically monitor changing fuel conditions without having to visit the measurement site. The fuel moisture and fuel temperature sensors are compatible with our METEODATA-2000/3000C dataloggers. Compatible telemetry options include spread spectrum radios, narrow-band radios, cellular phones, and satellite transmitters.



A transparent view shows a 107 temperature probe inserted inside of the CS205 10-hour Fuel Temperature Stick.

CS205/1 07 Fuel Temperature

To measure fuel temperature, both the CS205 Fuel Temperature Stick and a 107 Temperature Probe are required. The CS205 provides a ponderosa pine dowel that is fabricated to USFS specifications. A hole is bored into one end of the dowel, where our thermistor-based 107 probe is inserted. The 107 measures the temperature inside of the dowel. The CS205 and the 107 are sold separately.

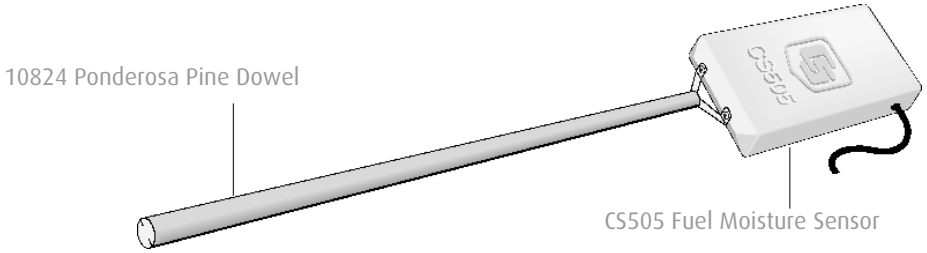
Fuel Moisture

CS505 Fuel Moisture Sensor

Our fuel moisture sensor, the CS505, reports the status of small-diameter (10-hour) forest fire fuels as percent moisture by weight (1%= 1 g). It consists of an epoxy-encapsulated electronics package that uses Time Domain Reflectometry (TDR) technology to measure the moisture content of the 10824 10-hour Fuel Moisture Stick. The sensor produces a ±2.5-Vdc square-wave frequency that is read using an analog or pulse channel on a METEODATA datalogger. The datalogger then converts the frequency measurement to percent fuel moisture via a quadratic calibration.

10824 10-Hour Fuel Moisture Stick

The 10824 10-hour Fuel Moisture Stick consists of a ponderosa-pine dowel fabricated to USFS specifications. It has a 1/2" diameter and a 20" length; the same dimensions as those used on the traditional weighing fuel moisture racks. Each dowel has undergone two additional sorts to optimize probe-to-probe repeatability and to allow probe interchangeability without individual calibration. The response of the CS505 sensor is similar to the traditional weighing racks because the entire dowel surface is exposed for moisture exchange



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10974 Fuel Moisture/Temperature

Mounting Stake

The 10974 Mounting Stake is often used to mount the sensors in the ~eld. This stake places the CS505/10824 and the CS205/107 probes twelve inches above the forest floor. Because the probes are mounted parallel to each other, shadowing is minimized. Cable ties are included for securing the cables to the side of the stake.

CS51 5 Fuel Sensors for METEODATA Stations

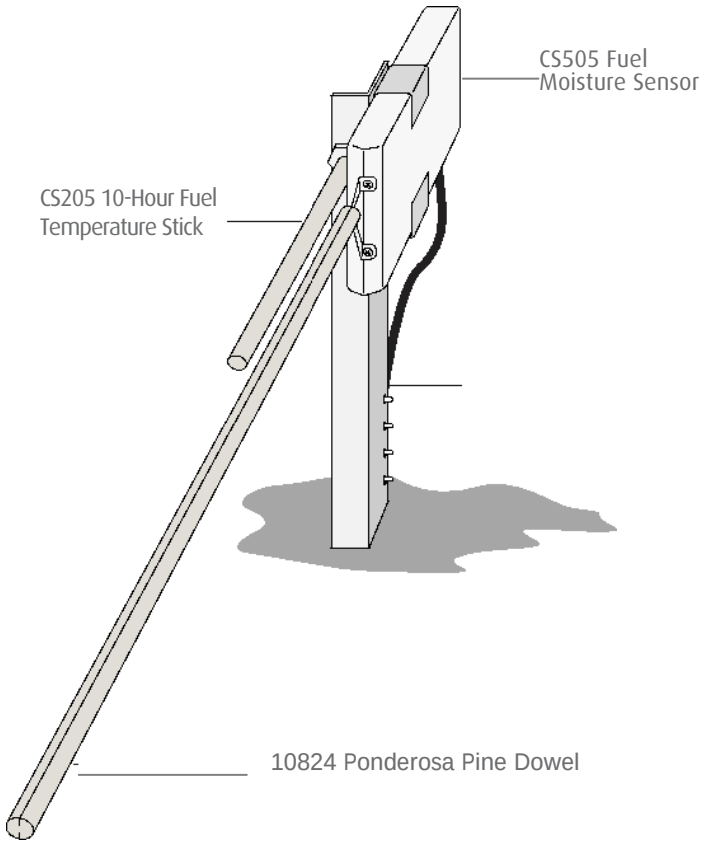
The CS515-QD and CS515-LQ are intended for our Remote Automated Weather Stations (METEODATA). They consist of a CS505 Fuel Moisture Probe, a 10824 10- hour Fuel Moisture Stick, a CS205 Fuel Temperature Stick, and a 107 Thermistor mounted on a 10974 Fuel Moisture/Temperature Mounting Stake.

CS515-QD

With the CS515-QD, the cables for the CS505 and 107 probes have a 12' length and are ~tted with a military-style connector instead of pigtails. The connector attaches to the enclosure of a METEODATA Quick Deployment Fire Weather Station.

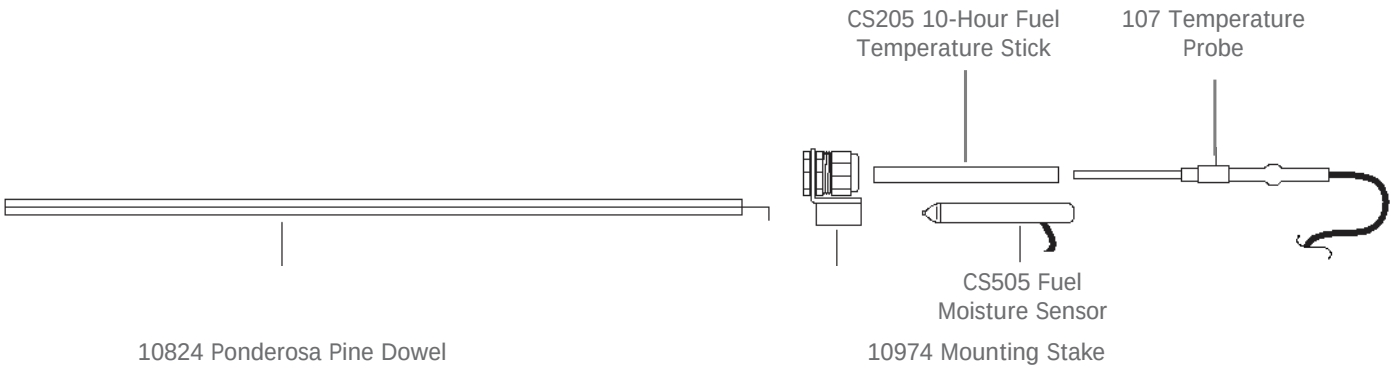
CS515-LQ

With the CS515-LQ, the cables for the CS505 and 107 probes are also ~tted with a military-style connector, but the cables have a user-speci~ ed lead length. The CS515-LQ is intended to be used with the METEODATA Permanently Mounted Station.



The 10974 is available for mounting the CS505/1 0824 and CS205/1 07 10-hour fuel moisture sensors. The CS51 5-QD and CS515-LQ include the 10974, CS505, 10824, CS205, and 107.

Top View of Fuel Sensors Assembly



This exploded view shows how the CS505 Fuel Moisture Sensor, 10824 10-Hour Fuel Moisture Stick, CS205 10-Hour Fuel Temperature Stick, and 107 Temperature Probe ~ t into the 10974 Fuel Moisture/Temperature Mounting Stake.

Replacement Dowels

The dowels of the fuel moisture stick (p/n 10824) and fuel temperature stick (model CS205) are easily replaced in the ~eld with a Phillips screwdriver and an adjustable wrench. Customers should replace the dowels each spring; more frequent replacements may be required in some environments. The more wet/dry cycles the dowels experience; the more frequently they will need to be replaced.

The dowels can be easily replaced using a Phillips screw-driver and an adjustable wrench.

Ordering Information

Fuel Temperature

Model	Description
You must order both a fuel temperature stick and a temperature probe. Typically the fuel temperature stick/probe is measured along side a fuel moisture sensor/stick (at right). The sensors can be mounted side-by-side on a Fuel Moisture & Temperature Mounting Stake (see below).	
CS205	10-hour Fuel Temperature Stick (requires a 1 07-L or 1 07-LC temperature probe; see below)
Temperature Probes (-35° to +50°C)	
107-L	Temperature Probe (-35° to +50°C) with user-speci~ed lead length.
107-LC	Temperature Probe (-35° to +50°C) for MetData1 Weather Station.

Fuel Moisture

Model	Description
You must order both a fuel moisture stick and a moisture probe. Typically the fuel moisture stick/probe is measured along side a fuel temperature sensor/stick. The sensors can be mounted side-by-side on a Fuel Moisture & Temperature Mounting Stake.	
10824	10-hour Fuel Moisture Stick (requires a CS505-L or CS505-LC probe; see below)
Fuel Moisture Probes	
CS505-L	Fuel Moisture Sensor/10-hour Fuel Moisture Stick with user-specified lead length.
CS505-LC	Temperature Probe (-35° to +50°C) for Met-Data 1 Weather Station.

Mounting Stake and Replacement Dowels

Model	Description
10974	Fuel Moisture & Temperature Mounting Stake
Replacement Dowels	
Dowel replacement is recommended every spring; more frequent replacement may be required in some environments (i.e., those with a large number of wet/dry cycles)..	
10824	10-hour Fuel Moisture Stick
CS205	10-hour Fuel Temperature Stick

Fuel Sensors for RAWS METEODATA Stations

Model	Description
CS515-QD	Fuel Moisture & Temperature Sensor for the RAWS-F Quick Deployment Fire Weather Station. Sensors have a 12' lead length and are mounted on the 10974 mounting stake.
CS515-LQ	Fuel Moisture & Temperature Sensor for the RAWS-P Permanently Mounted Station. The sensors are mounted on the 10974 mounting stake. 10-hour Fuel Temperature Stick

Specifications

CS205 10-Hour Fuel Temperature Stick

Material: Ponderosa Pine

Length: 11.4 cm

Diameter: 1.3 cm

Weight: 9.07 g

107 Temperature Probe

Sensor: BetaThererm 100K6A1 Thermistor

Temperature Measurement Range: -35° to +50°C

Interchangeability error:
Typically <±0.2°C over 0° to 50°C range

Length: 10.4 cm

Diameter: <0.5 cm

10824 10-Hour Fuel Moisture Sticks

Material: Ponderosa Pine

Diameter: 1.3 cm

Length: 21.3 cm

Weight: 45 g

CS505 10-Hour Fuel Moisture Sensors

Operating Range: 0 to 70% moisture content

Fuel Moisture Accuracy:

range	worst case	rms error
0 to 10%	±2%	±1%
10 to 20%	±3%	±1.5%
20 to 30%	±5%	±2.2%
30 to 40%	±8%	±2.4%
40 to 70%	±12% (est.)	

Power Supply: 9 to 18 Vdc

Enable Voltage: 1.3 to 20 Vdc

Current Use: 70 mA active; 10 µA quiescent

Output Signal: ±2.5 Vdc square wave with an output frequency of 600 to 1500 Hz