

# User's Guide

# **EXTECH**<sup>®</sup>

**INSTRUMENTS**

A FLIR COMPANY

## Moisture Content Meter

*Plus Dew Point, Wet Bulb, and Thermocouple Temperature functions*

*SD Card real-time datalogger*

### Model SDL550



## Introduction

Congratulations on your purchase of the Extech SDL550 Moisture Content Meter. This meter displays and stores Moisture Content readings, Air Temperature, Dew Point Temperature, and Wet Bulb Temperature. Logged data readings are stored on an SD card for transfer to a PC. In addition, an RS232 port allows data streaming to a PC. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

## Safety

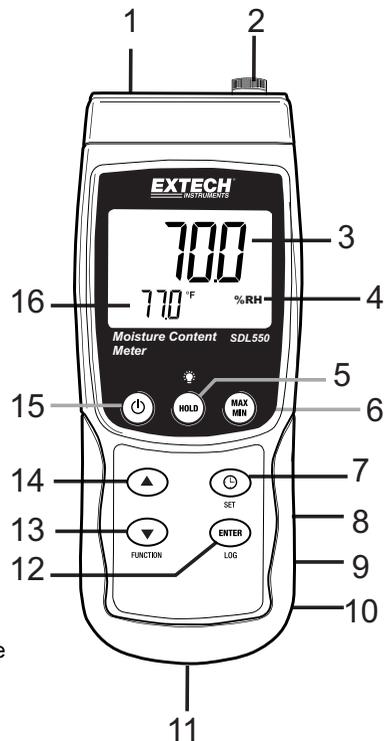
### International Safety Symbols



This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.

## Meter Description

1. Thermocouple Temperature Probe input jack
2. Moisture Sensor input jack
3. Primary LCD Display digits
4. Unit of Measure for Primary Display
5. HOLD and Backlight  key
6. MAX-MIN key
7. SET and Clock  key
8. PC interface jack
9. Reset button
10. Power Adaptor jack
11. SD card slot
12. ENTER and LOG key
13. Down arrow  / FUNCTION key
14. Up arrow  key
15. Power ON-OFF  key
16. Secondary LCD Display digits with unit of measure

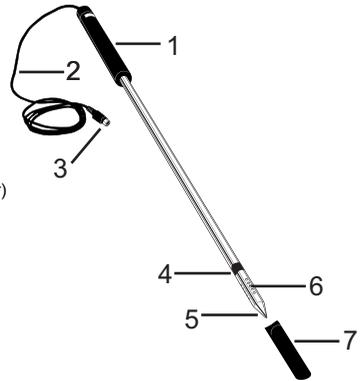


**Notes:** Items 8, 9, and 10 are located behind the snap-off compartment cover on meter's right side. Battery compartment, tilt stand, and tripod mount are located on the rear of the instrument

## Moisture Probe Description

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1. Probe Handle
2. Probe connecting cable
3. Probe-to-meter input plug
4. Probe collar (probe sensor unscrews from here to access filter)
5. Moisture Sensor penetrating tip
6. Sensor port openings
7. Protective cap (slides off of sensor tip)



## Basic Operation

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### Power ON-OFF

- Power the meter by pressing and holding the power button  for at least 1.5 seconds.
- Press and hold the power button for at least 1.5 seconds to power OFF the meter.
- This meter is powered by six (6) 1.5VDC 'AA' batteries or by optional AC adaptor.

### Display Backlight

To turn the display backlight ON or OFF, press and hold the backlight  button for at least 1.5 seconds. The meter will beep when switching the backlight ON or OFF unless the beeper is disabled.

### Moisture Content Sensor

The supplied Moisture Content sensor connects to the meter via the DIN jack at the top right of the meter. Note that the utility end of the sensor is located beneath the protective cap; use great caution when removing the cap and when handling the sensor as the sensor head is extremely sharp. The sensor uses an internal filter and when the filter becomes soiled or defective the readings take longer to stabilize. Contact Extech for replacement filters.

### Temperature (Thermocouple) Sensor

A type J or K thermocouple (optional) can be connected to the meter via the thermocouple input jack at the top left of the meter for measuring air temperature. Note that the temperature range of the meter extends up to 1300°C (2372°F), however thermocouple ranges vary greatly; be sure to select a thermocouple rated for the expected temperature measurement ranges.

## Selecting Meter Functions

The SDL550 can measure Moisture Content (%RH), Dew Point Temperature (°C/°F), Wet Bulb Temperature (°C/°F), and Thermocouple Temperature (°C/°F). Press and hold the FUNCTION button for 1.5 seconds to begin scrolling through the functions. Release the FUNCTION button when the desired function is displayed. Refer to the table below.

Functions	Primary display	Secondary display	Unit of measure
Moisture Content	Relative Humidity	<b>rh</b> briefly displayed then the Moisture Probe Temperature	RH% and °C or °F
Dew Point	Temperature*	<b>dp</b> display icon	°C or °F
Wet Bulb	Temperature*	<b>_et</b> display icon	°C or °F
Air Temperature	Thermocouple Temperature	<b>tp</b> briefly displayed	°C or °F

## Measurements

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### Moisture Content Measurements

1. Connect the Moisture probe to the jack at the top of the meter on the right
2. Switch the meter ON by pressing and holding the power button for 1.5 seconds
3. Press and hold the FUNCTION button to select the Moisture Content mode. When the Moisture Content mode is selected, the display icon **rh** is briefly shown
4. Carefully remove the protective cap from the moisture probe. The probe tip is extremely sharp, use caution
5. Insert the probe tip into the material under test far enough to cover the sensor's openings
6. The meter will now display moisture content in %RH on the primary (upper) LCD digits
7. The secondary (lower) LCD digits will show the temperature measured by the moisture probe's built-in temperature sensor. Use the Setup mode to change the temperature units of measure
8. Note that the probe uses a built-in filter. When the filter needs replacing (becomes soiled or defective), the measurement readings require a longer stabilization time. Please contact Extech for replacement filters

### Dew Point and Wet Bulb Temperature Measurements

1. Connect the Moisture probe to the jack at the top of the meter on the right
2. Switch the meter ON by pressing and holding the power button for 1.5 seconds
3. Press and hold the FUNCTION button to select the Wet Bulb or the Dew Point mode. When the Dew Point mode is selected, the display icon **dp** is shown on the secondary display area. When the Wet Bulb mode is selected, the display icon **\_et** is shown on the secondary display area.
4. Carefully remove the protective cap from the moisture probe. The probe tip is extremely sharp, use caution
5. Insert the probe tip into the material under test far enough to cover the sensor's openings
6. The meter will now display the Dew Point Temperature or Wet Bulb Temperature on the primary (upper) LCD digits. Use the Setup mode to change the temperature units of measure

## Thermocouple Temperature Measurements

1. Note that the temperature range of the meter extends up to 1300°C (2372°F), however thermocouple sensor ranges vary greatly; be sure to select a thermocouple rated for the expected temperature measurement ranges.
2. Connect a Thermocouple Temperature sensor (not supplied) to the jack at the top of the meter on the left
3. Switch the meter ON by pressing and holding the power button for 1.5 seconds
4. Press and hold the FUNCTION button to select the Thermocouple Temperature mode. When the Thermocouple Temperature mode is selected, the display icon **tp** is briefly shown. The thermocouple type (J or K) will be shown on the left side of the LCD. Use the Setup mode to change the thermocouple type
5. Hold the thermocouple sensor tip in the air to be measured
6. The meter will now display thermocouple temperature on the primary (upper) LCD digits. Use the Setup mode to change the temperature units of measure

## Data Hold

To freeze a displayed reading on the LCD, momentarily press the HOLD button (the **HOLD** icon will appear above the reading). To exit the Data Hold mode, press the HOLD button again.

## Max-Min Reading Record

For a given measurement session, this meter can record the highest (MAX) and the lowest (MIN) readings for later recall.

1. Press the MAX-MIN button momentarily to access this mode of operation (REC icon appears)
2. The meter is now recording the MAX and MIN readings.
3. Press the MAX-MIN button again to view the current MAX readings (MAX icon appears). The readings on the display are now the highest readings encountered since the REC icon was switched on (when the MAX-MIN button was first pressed).
4. Press the MAX-MIN button again to view the current MIN readings (MIN icon appears). The readings on the display are now the lowest readings encountered since the REC icon was switched on (when the MAX-MIN button was first pressed).
5. To exit the MAX-MIN mode, press and hold the MAX-MIN button for at least 1.5 seconds. The meter will beep, the REC-MAX-MIN icons will switch off, the MAX-MIN memory will clear, and the meter will return to the normal operating mode.

# Setup Mode

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## Basic settings at a glance

To view the current configuration of the meter with regard to time, date, and datalogging sampling rate press the SET button momentarily. The meter will now display the configuration in quick succession. If the information is missed on the first try, simply press the SET button again until all of the information is noted.

## Accessing the Setup mode

1. Press and hold the SET button for at least 1.5 seconds to access the Setup menu.
2. Press the SET button momentarily to step through the available parameters. The parameter type is shown on the bottom of the LCD and the current selection for that type is shown above it.
3. When a parameter is displayed that is to be changed, use the arrow keys to change the setting. Press the ENTER button to confirm a change.
4. Press and hold the SET button for at least 1.5 seconds to exit the Setup mode. Note that the meter automatically switches out of the Setup mode if no key is pressed within 7 seconds.
5. The available Setup parameters are listed below. Additional detailed information is provided below this list:

**dAtE** Set the clock (Year/Month/Date; Hours/Minutes/Seconds)

**SP-t** Set the datalogger sampling rate (0 to 3600 Seconds)

**PoFF** Automatic power-off management (Enable or disable the auto-power off function)

**bEEP** Set the beeper sound ON/OFF

**dEC** Set the numerical format; USA (decimal: 20.00) or European (comma: 20,00)

**SdF** Format the SD memory card

**t-CF** Select the temperature unit of measure (degrees C or F)

**tYPE** Select the thermocouple type (J or K)

## Setting the Clock Time

1. Access the **dAtE** parameter.
2. Use the arrow keys to change a value
3. Use the ENTER button to step through the selections
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode (or simply wait 7 seconds for the meter to automatically switch to the normal operating mode).
5. The clock will keep accurate time even when the meter is switched off. However, if the battery expires the clock will have to be reset after fresh batteries are installed.

### Setting the Datalogger Sampling Time (Rate)

1. Access the **SP-t** parameter.
2. Use the arrow buttons to select the desired sampling rate. The available settings are: 0, 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800, and 3600 seconds.
3. Press the ENTER button to confirm the entry.
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode.

### Enabling/Disabling the Auto Power OFF Feature

1. Access the **PoFF** parameter.
2. Use the arrow buttons to select ON or OFF. With the Auto Power OFF feature enabled, the meter will automatically switch OFF after 10 minutes of inactivity.
3. Press ENTER to confirm setting.
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode.

### Set the Beeper Sound ON or OFF

1. Access the **bEEP** parameter.
2. Use the arrow buttons to select ON or OFF.
3. Press ENTER to confirm setting.
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode.

### Numerical Format (comma or decimal)

European and USA numerical formats differ. The meter defaults to USA mode where a decimal point is used to separate units from tenths, i.e. **20.00**; The European format uses a comma, i.e. **20,00** to separate units from tenths. To change this setting:

1. Access the **dEC** parameter.
2. Use the arrow buttons to select USA or EUro.
3. Press ENTER to confirm setting.
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode.

### SD Card FORMATTING

1. Access the **Sd-F** parameter.
2. Use the arrow buttons to select YES to format the card (select NO to abort). Note that all data on the card will be lost if formatting is attempted.
3. Press ENTER to confirm selection.
4. Press ENTER again to re-confirm.
5. The meter will automatically return to the normal operating mode when formatting is complete. If not, press and hold SET button for at least 1.5 seconds to exit to the normal operation mode.

### Set the Temperature Units of Measure (°C or °F)

1. Access the **t-CF** parameter.
2. Use the arrow buttons to select °C or °F. Press ENTER to confirm setting.
3. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode.

## Set the Thermocouple Type

1. Access the **tYPE** parameter.
2. Use the arrow buttons to select the desired sensor type (**J** or **K**)
3. Press ENTER to confirm setting.
4. Press and hold the SET button for at least 1.5 seconds to exit to the normal operation mode (or simply wait 7 seconds for the meter to automatically switch to the normal operating mode).

## Datalogging

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### Types of Data Recording

- **Manual Datalogging:** Manually log up to 99 readings onto an SD card via push-button press.
- **Automatic Datalogging:** Automatically log data onto an SD memory card where the number of data points is limited only by the card size. Readings are logged at a rate specified by the user.

### SD Card Information

- Insert an SD card (from 1G size up to 16G) into the SD card slot at the bottom of the meter. The card must be inserted with the front of the card (label side) facing toward the rear of the meter.
- If the SD card is being used for the first time it is recommended that the card be formatted and the logger's clock set to allow for accurate date/time stamping during datalogging sessions. Refer to the Setup Mode section for SD card formatting and time/date setting instructions.
- European and USA numerical formats differ. The data on the SD card can be formatted for either format. The meter defaults to USA mode where a decimal point is used to separate units from tenths, i.e. **20.00**. The European format uses a comma, i.e. **20,00**. To change this setting, refer to the Setup Mode section.

### Manual Datalogging

In the manual mode the user presses the LOG button to manually log a reading onto the SD card.

1. Set the sampling rate to '0' seconds as described in the Setup Mode section.
2. Press and hold the LOG button for at least 1.5 seconds and the secondary display area will show  $p-n$  ( $n$  = memory position number 1-99).
3. Momentarily press the LOG button to store a reading. The REC icon will flash each time a data point is stored.
4. Use the ▲ and ▼ buttons to select one of the 99 data memory positions in which to record.
5. To exit the manual datalogging mode, press and hold the LOG button for at least 1.5 seconds.

## Automatic Datalogging

In automatic datalogging mode the meter takes and stores a reading at a user-specified sampling rate onto an SD memory card. The meter defaults to a sampling rate of two seconds. To change the sampling rate, refer to the Setup Mode section (the sampling rate cannot be '0' for automatic datalogging):

1. Select the sampling rate in the Setup Mode to a value other than zero.
2. Press and hold the LOG button for at least 1.5 seconds. The meter will flash the REC icon at the selected sampling rate indicating that readings are now being automatically recorded to the SD card. The LOG display icon will appear on the secondary (lower) LCD display digits.
3. If a card is not inserted, the meter will display "Sd","-E-" If a card is defective, the meter will display " ScAn "," Sd ".
4. Pause the datalogger by pressing the LOG button momentarily. The REC icon will stop flashing and the sample rate will display for a short time. To resume logging simply press the LOG button again momentarily.
5. To terminate the datalogging session press and hold the LOG button for at least 1.5 seconds.
6. When an SD card is used for the first time a folder is created on the card and named **HTB01**. Up to 99 spreadsheet documents (each with 30,000 readings) can be stored in this folder.
7. When datalogging begins a new spreadsheet document named **HTB01001.xls** is created on the SD card in the HTB01 folder. The data recorded will be placed in the HTB01001.xls document until 30,000 readings are reached.
8. If the measurement session exceeds 30,000 readings, a new document will be created (HTB01002.xls) where another 30,000 readings can be stored. This method continues for up to 99 documents, after which another folder is created (HTB02) where another 99 spreadsheet documents can be stored. This process continues in this same fashion with folders HTB03 through HTB10 (last allowable folder).

## SD Data Card to PC Data Transfer

1. Complete a datalogging session as detailed in above in the previous sections. Hint: For the first few tests, simply record a small amount of test data. This is to ensure that the datalogging process is well understood before committing to critical, large scale datalogging.
2. With the meter switched OFF, remove the SD Card.
3. Plug the SD Card directly into a PC SD card reader. If the PC does not have an SD card slot, use an SD card adaptor (available at most outlets where computer accessories are sold).
4. Power the PC and run a spreadsheet software program. Open the saved documents in the spreadsheet software program (see example spreadsheet data screen below).

### Spreadsheet data example

	A	B	C	D	E	F	G
1	Position	Date	Time	Value	Unit	Value	Unit
2	1	8/2/2011	18:48:00	55.5	%	30.1	Degrees C
3	2	8/2/2011	18:48:01	55.5	%	30.1	Degrees C
4	3	8/2/2011	18:48:02	55.5	%	30.1	Degrees C
5	4	8/2/2011	18:48:03	55.5	%	30.1	Degrees C
6	5	8/2/2011	18:48:04	55.5	%	30.1	Degrees C
7	6	8/2/2011	18:48:05	55.5	%	30.1	Degrees C
8	7	8/2/2011	18:48:06	55.5	%	30.1	Degrees C
9	8	8/2/2011	18:48:07	55.5	%	30.1	Degrees C
10	9	8/2/2011	18:48:08	55.5	%	30.1	Degrees C
11	10	8/2/2011	18:48:09	55.5	%	30.1	Degrees C
12	11	8/2/2011	18:48:10	55.5	%	30.1	Degrees C
13	12	8/2/2011	18:48:11	55.5	%	30.1	Degrees C
14	13	8/2/2011	18:48:12	55.5	%	30.1	Degrees C

## RS-232/USB PC Interface

The optional 407001A software kit (software and cable) allows streaming of data to a PC via the RS232 Output jack.

## AC Power Adaptor

This meter is normally powered by six (6) 1.5V 'AA' batteries. An optional 9V power adaptor is available. When the adaptor is used, the meter is permanently powered and the power button will be disabled.

## System Reset

If the meter's keys become inoperable or if the display freezes the Reset button can be used to reset the instrument.

1. Use a paper clip or similar item to momentarily press the reset button located on the lower right side of the instrument under the snap-off compartment cover.
2. After pressing the Reset button, switch the instrument ON by pressing and holding the POWER key for at least 1.5 seconds. If using the power adaptor unplug the adaptor and then plug it back in again to power the meter.

## ***Battery Replacement and Disposal***

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When the low battery icon  appears on the LCD, the batteries must be replaced. Several hours of accurate readings are still possible in this condition; however batteries should be replaced as soon as possible:

1. Remove the two (2) Phillips screws from the rear of the meter (directly above the top of the tilt stand).
2. Remove and safely place the battery compartment and screws where they will not be damaged or lost.
3. Replace the six (6) 1.5V 'AA' batteries observing polarity.
4. Replace the battery compartment cover with the two (2) Phillips screws.



All EU users are legally bound by the battery ordinance to return all used batteries to collection points in your community or wherever batteries / accumulators are sold! Disposal in the household garbage is prohibited!

# Specifications

## General Specifications

Display	Backlit LCD; LCD size: 52 x 38mm (2 x 1.5")
Status indicators	Over-range audible beep and low battery display icon 
Sensor types	Accepts supplied Moisture Content/Temperature probe and optional thermocouple temperature probe
Measurement Units	% Relative Humidity and °F/C for temperature
Temperature Compensation	Automatic temperature compensation for all measurements
Datalogger Sampling Rate	AUTO LOGGING: From 1 second to 3600 seconds MANUAL LOGGING: Set the sampling rate to '0'
Memory Card	SD memory card; 1G to 16GB size
Data Hold	Freeze the displayed reading
Memory Recall	Record and Recall the Maximum and Minimum readings
Display update rate	Approx. 1 second.
Data Output	RS-232 / USB PC computer interface
Operating Temperature	0 to 50°C (32 to 122°F)
Operating Humidity	85% R.H. max.
Auto Power OFF	After 10 minutes of inactivity (can be disabled)
Power Supply	Six (6) 1.5 VDC batteries (optional 9V AC adaptor)
Power Consumption	Normal operation (backlight & datalogger OFF): approx. 3.5mAdc With backlight OFF and datalogging ON: approx. 28mAdc With backlight ON add approx. 12mAdc
Weight	Meter: 345g (0.76 lbs.); Probe 362g (0.79 lbs.)
Dimensions	Main instrument: 182 x 73 x 47.5mm (7.1 x 2.9 x 1.9") Probe length: 600mm (23.6"); Probe head diameter: 10mm (0.39") Probe cable length: 1.5 meters (4.92')

## Electrical Specifications (ambient temperature 23°C ± 5°C)

### Moisture Probe - Humidity and Temperature

<b>Humidity</b>	Range	5% to 95% RH
	Resolution	0.1 % RH
	Accuracy	≥70% RH: ±(3% rdg + 1% RH) <70%RH: ±3% RH
<b>Temperature</b>	Range	0 to 50°C (32 to 122°F)
	Resolution	0.1°C/°F
	Accuracy	±0.8°C (1.5°F)

## Dew Point Temperature

°C	Range	-25.3 to 48.9°C
	Resolution	0.1°C
°F	Range	-13.5 to 120.1°F
	Resolution	0.1°F

**Note:** The Dew Point display value is calculated from the humidity and temperature measurements made by the moisture probe

## Wet Bulb Temperature

°C	Range	-21.6 to 50.0°C
	Resolution	0.1°C
°F	Range	-6.9 to 122.0°F
	Resolution	0.1°F

**Note:** The Wet Bulb display value is calculated from the humidity and temperature measurements made by the moisture probe; The Wet Bulb accuracy is the sum of the humidity and temperature measurement accuracies

## Thermocouple Temperature

Sensor Type	Resolution	Range	Accuracy
Type K	0.1°C	-50.0 to 1300.0°C	$\pm(0.4 \% + 0.5^{\circ}\text{C})$
		-100.0 to -50.1°C	$\pm(0.4 \% + 1.0^{\circ}\text{C})$
	0.1°F	-58.0 to 2372.0°F	$\pm(0.4 \% + 1.0^{\circ}\text{F})$
		-148.0 to -58.1°F	$\pm(0.4 \% + 1.8^{\circ}\text{F})$
Type J	0.1°C	-50.0 to 1200.0°C	$\pm(0.4 \% + 0.5^{\circ}\text{C})$
		-100.0 to -50.1°C	$\pm(0.4 \% + 1.0^{\circ}\text{C})$
	0.1°F	-58.0 to 2192.0°F	$\pm(0.4 \% + 1.0^{\circ}\text{F})$
		-148.0 to -58.1°F	$\pm(0.4 \% + 1.8^{\circ}\text{F})$

- The temperature range of the meter extends up to 1300°C (2372°F), however thermocouple sensor ranges vary greatly; be sure to select a thermocouple rated for the expected temperature measurement ranges.
- Accuracy specified for meter only. Thermocouple probes add additional measurement error.
- The above specifications are tested under an environmental RF Field Strength lower than 3 V/M and a frequency lower than 30 MHz

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