User Guide

EXTECH INSTRUMENTS

A FLIR COMPANY

Wireless Pin and Pinless Moisture Meter

Model MO270/EX3000

-PRELIMINARY-

CE

FCC warning statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF warning statement:

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

Introduction

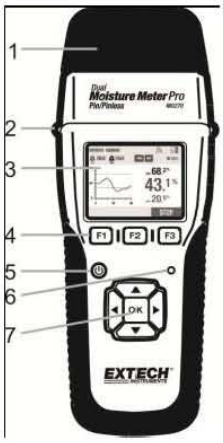
Congratulations on your purchase of the Extech MO270 Moisture Meter with full graphical display. This meter includes MeterLink™ Bluetooth capabilities for use with FLIR infrared cameras (such as FLIR T/B200, T/B300, T/B360, T/B400 or i/b60 cameras). The MO270 detects moisture in wood and other materials such as particle board, carpeting, and ceiling/bathroom tiles using a non-invasive method (pinless); the MO270 also measures moisture in sheet rock and other building materials using the pin method. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Features

- Detachable sensors transmit data viewable on meter display from up to 65ft (20m)
- Readings from up to eight (8) remote sensors can be viewed on meter
- Meter can record data from up to forty (40) remote sensors simultaneously onto SD card
- Wireless sensor affixes to 4 ft (1.2m) telescoping handle; Optional longer handles available
- Wirelessly transmit moisture data to FLIR IR cameras via MeterLink™ and Bluetooth
- Wood Moisture equivalent (%WME) pin readings
- Visual and audible High and Low Alarm modes
- 2-point calibration check built into protective cap
- Includes 3.7V rechargeable Li-Polymer battery, wireless moisture sensor, external pin probe, replacement pins, telescoping handle, AC adaptor, protective cap, 2G SD card, and hard case

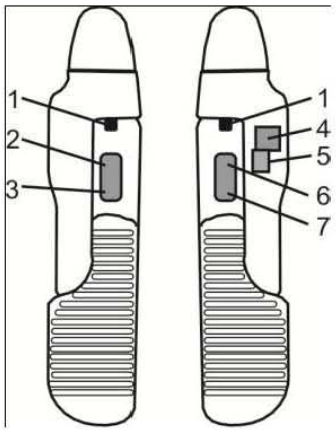
Description

Meter Front View



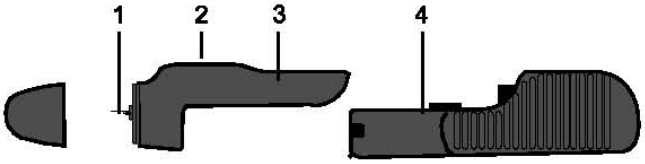
1. Electrode pins protective cap
2. Sensor release buttons
3. Display
4. Function buttons
5. Power button
6. Bluetooth status light (blue)
7. Navigation and OK buttons

Meter Side Views



1. Sensor release buttons
2. Video output
3. Audio output
4. RJ-45 remote probe port
5. Meter (receiver) USB port
6. Mini-SD card
7. Sensor (ransmitter) USB port

Meter Components



1. Contact pins
2. Non-Contact capacitive sensor
3. Sensor (transmitter)
4. Meter (Receiver)

Display Icons

ICON	Name	Function
 (black)	Low alarm set	Low alarm is set and active with sound
 (black)	High alarm set	High alarm is set and active with sound
 (black)	Low alarm set	Low alarm is set and active without sound
 (black)	High alarm set	High alarm is set and active without sound
 (red)	Low alarm triggered	Low alarm has been triggered
 (red)	High alarm triggered	High alarm has been triggered
	(B.T.) MeterLink mode	Bluetooth is on, MeterLink™ protocol is active
 (gray)	(B.T.) Transmitter ON	Bluetooth is ON; PC protocol is active
 (blue)	(B.T.) Active pairing	Bluetooth is ON; PC protocol is active
 (gray)	(RF) Wireless ON	Wireless transmitter is ON; no communication activity with sensor
 (orange)	(RF) wireless comm.	Wireless transmitter is ON; communication with sensors is active
 (blue)	REL mode	Reading moisture using non intrusive sensors
	WME mode	Reading moisture using 'pin' sensors
	External probe	Reading measurement from external probe
 (blue)	Internal probe	Reading measurements from internal probe
	Recording	Unit is actively recording content (on-screen)
 (green)	Sensor (transmitter) battery	Sensor battery (fully charged)
 (orange)	Meter (Receiver) battery	Meter battery (low)

Setup

Getting Started

1. Charge the sensor and the meter batteries (refer to following section for full details on battery charging).
2. To switch the meter ON, press and hold the ⏻ button for 3 seconds; the navigation buttons will illuminate and the display will switch ON. To power OFF, press and hold the power button for 3 seconds.
3. The F1, F2 and F3 buttons are 'soft keys' meaning that their functions change with the particular mode or screen that is active.
4. The ▲, ►, ▼ and ◄ buttons are used to navigate the menu selections.
5. The "**OK**" button is used to select the highlighted menu function.

Charging the Batteries

1. Charging will begin once the USB cable is connected between the mini-USB port on the Sensor or the Meter and a PC USB port or an AC outlet. Connecting only the Meter USB port charges both the Meter and the Sensor simultaneously (while they are physically connected to each other).
2. Note that if you connect the meter to the PC via the USB port before switching the meter ON, the meter screen will show these 3 selections when it is powered up:
   - PC CAM (reserved for future use)
   - Disk Drive (select this setting to view the meter's stored readings on the PC using optional WindowsTM software)
   - Charger (select this setting if the connection to the PC is to be used for charging purposes)
3. To check the battery status:
   a) Press and hold the ⏻ button for 3 seconds to switch the meter ON.
   b) The USB menu will appear. Navigate down to "Charger" and press OK.
   c) The digital display measurement screen will appear showing the two battery icons at the upper right side of the display.
   d) The (Meter) and (Sensor) icons will be completely filled when the batteries are fully charged.

Operation

Basic Operation for Pin Measurments WME

CAUTION: The electrode measurement pins are extremely sharp. Use care when handling this instrument. Cover the pins with the protective cap when the instrument is not in use.

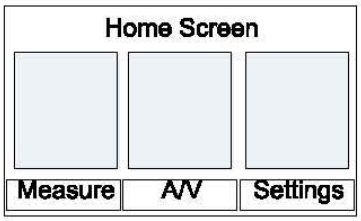
1. Remove the protective cap to expose the electrode pins.
2. Press and hold the ⏻ key for 3 seconds to switch the meter ON.
3. If the REL icon is displayed, proceed as follows to switch to the WME icon.
   a) Press the MENU (F1) button and navigate to the WME/REL box.
   b) Press OK, select WME, press OK and press EXIT.
4. Carefully push the electrode pins a minimum of 0.07" (2mm) into the material under test. Note that the pins should be inserted into wood perpendicular to the wood's fiber structure. For high moisture readings, it may take several minutes for the meter reading to stabilize.
5. Take several readings in several locations on the material for the best representation of the amount of moisture present.
6. Read the measurement values on the display
7. Replace the protective cap when finished.

Basic Operation for Pinless Measurments REL

1. Press and hold the ⏻ key for 3 seconds to switch the meter ON.
2. If the WME icon is displayed, proceed as follows to switch to the REL icon.
   a) Press the MENU (F1) button and navigate to the WME/REL box.
   b) Press OK, select REL, press OK and press EXIT.
3. Press and hold the ⏻ key for two seconds to switch the meter OFF
4. Keep hands and any surface away from the rear sensor and then press the ⏻ key to switch the meter ON. The meter will auto-zero during power-on.
5. The pinless moisture detector is located at the rear of the instrument, just behind the display.
6. Place the meter so that the rear sensor lays flat against the surface of the material under test.
7. Take several readings in several locations on the material for the best representation of the amount of moisture present.
8. Read the measurement values on the display.

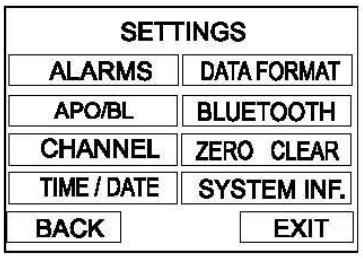
The SETTINGS Configuration Mode Basics

1. Turn the meter ON.



2. Press and Hold the OK button until the Main Menu appears

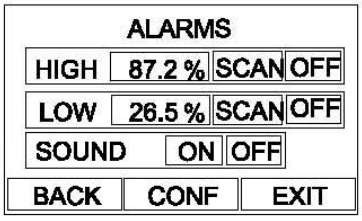
3. Press the F3 (settings) button to bring up the SETTINGS menu



4. Navigate the menu and select sub-menus as desired. Details for each setting are provided in the 'SETTINGS Mode IN DETAIL' section of this guide below.

The SETTINGS Mode Menu Items in Detail

ALARM Settings



a) From the SETTINGS sub-menu, navigate to the ALARM box and press OK.

b) Alarm limits can be set directly by a value entry or from a measured (scanned) value.

c) Navigate to the value entry box or the scan box.

d) For value entry, scroll to the value entry box and press OK. The digit-select red arrow will appear. Use the left/right arrows to move the red arrow. Use the up/down arrow buttons to set the numerical value of the digit above the red arrow. Note that the High Alarm cannot be set lower than 10.00% and the Low Alarm cannot be set higher than 10.00%.

e) When complete, press OK to capture the value and then press F3 button to store the value.

f) Re-enter the ALARMS screen for further adjustments.

g) For scanned entry, navigate to the SCAN box.

h) Take a measurement and then press the OK button to begin the scan. The measured values will appear in the % box.

i) With the desired value in the box, press the OK button to capture the value and then press the F3 EXIT button to store the value.

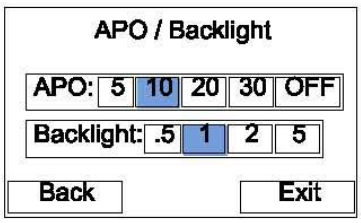
j) To turn the alarm ON or OFF: navigate back to the Alarm screen and use the arrow buttons to move the cursor to the Alarm High and/or Alarm Low OFF box.

k) Press the OK button to toggle between ON (OFF) or OFF (OFF).

l) When complete, press the OK button to capture the settings and then press the F3 EXIT button to store the setting.

m) To set the alarm beeper ON or OFF: Return to the Alarm screen and navigate to the SOUND ON or OFF box. Select the desired condition, press OK and then press F3-EXIT.

AUTO POWER OFF (APO) AND BACKLIGHT Settings



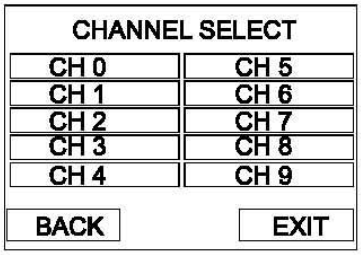
a) The APO or backlight timeout can be set in minutes.

b) Navigate to the APO/BL sub-menu in the SETTINGS mode.

c) Scroll to the desired setting.

d) Press OK and then press EXIT or BACK when done.

CHANNEL Setting



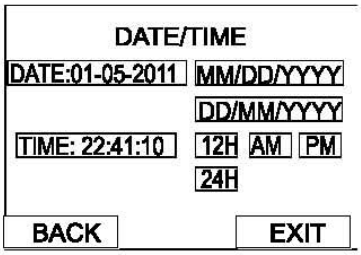
a) Up to 40 remote sensors can be identified on this screen. Up to 8 sensors can be selected at any one time for viewing remotely on the meter.

b) To set the channel, first navigate to the CHANNEL sub-menu in the SETTINGS mode.

c) Navigate to the desired channel and then Press OK

d) Continue selecting channels (up to 8) and press EXIT or BACK when done.

DATE/TIME and FORMAT Settings



a) To set the time and date, select DATE/TIME from the SETTINGS menu and then scroll to the desired setting field and press OK.

b) Use the left/right arrow keys to move the red triangular pointer to digit that is to be changed

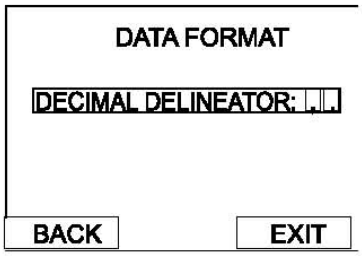
c) Use the up/down arrows to change a digit value.

d) Press OK to store the new value and to hide the red triangular arrow.

e) To select a time format, scroll to the desired settings field and press OK.

f) Press EXIT or BACK when done.

DATA FORMAT Setting

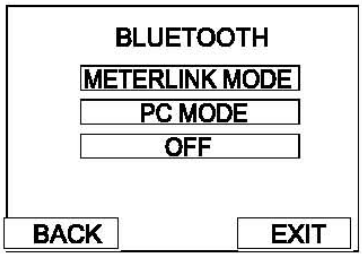


a) To set the numerical delineator to a decimal point (.) or to a comma (,) select DATA FORMAT from the SETTINGS menu.

b) Scroll to the desired selection.

c) Press OK to select and then press EXIT or BACK when done.

BLUETOOTH / PC Selection Setting



a) To activate the Bluetooth/MeterLinkTM function so as to communicate with a FLIR camera, select BLUETOOTH from the SETTINGS menu.

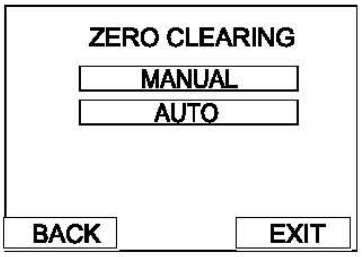
b) Scroll to METERLINK MODE and press OK

c) Select PC mode if the meter is to be connected directly to a PC for two-way communication using optional software.

d) Select OFF if no communications will be used.

e) Press BACK or EXIT when done.

ZERO CLEAR

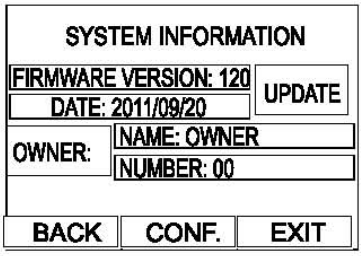


a) To set the ZERO CLEAR function to MANUAL or AUTO, select ZERO CLEAR from the SETTINGS menu.

b) Use the arrow keys to select MANUAL or AUTO.

c) Press OK to select and then press BACK or EXIT when done.

SYSTEM INFORMATION (INF)



a) To view the System Information, select SYSTEM INF from the SETTINGS menu

b) The only parameters that can be changed on this screen are OWNER NAME and NUMBER.

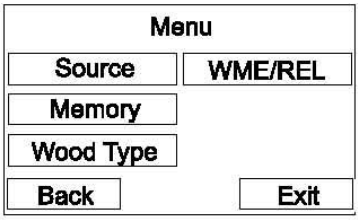
c) Scroll to the OWNER NAME or NUMBER field and then press OK.

d) An alpha-numerical screen will appear allowing the user to select text using the arrow and OK buttons.

e) Press BACK or EXIT when done.

Measure Screen Menus

F1 - MENU



Press the F1 MENU button from the main meter display to open four sub-menus;

SOURCE:
The SOURCE menu allows for selection of remote moisture transmitters. No selection is necessary for normal meter operation. The SOURCE sub-menu also permits the renaming of sensor identifiers, sensor scanning, and a 'clear all' utility.

MEMORY:
The MEMORY menu allows for viewing data and naming/clearing data for up to 10 memory groups. Refer to the dedicated 'Memory Logging Mode' section later in this guide.

WOOD TYPES:
The WOOD TYPES menu allows for selecting various species of wood which are arranged in three wood groups according to hardness. Note that there is also one building material group.

WME/REL
The WME/REL menu allows for selecting either pin measurements displayed in wood moisture equivalent as a % (WME) or pinless relative measurements (REL) using the non- contact sensor.

F2 - MODE

Press the F2 MODE button to see the three display modes: Digital display, Graphical Trend Analysis display, and Analog display. The digital display includes a bargraph at the bottom of the graphical display. Note that the bargraph is color-coded where the alarm region is shown in red and the acceptable region in green. For more on the Trend Analysis display refer to the Trend Analysis section later in this guide.

F3 - HOLD
The HOLD menu freezes the displayed reading. Sub-menus allow for saving the data to memory or exiting the mode.

MeterLink™ Bluetooth Communication

This meter includes a Bluetooth module designed to communicate with the FLIR T/B200, T/B300, T/B360, T/B400 or i/b60 cameras.

Setup

1. Enable the MO270 bluetooth in SETTINGS mode. To enter the SETTINGS mode, press and hold the OK button for 3 seconds to enter the MAIN MENU. Then press the F3 button to enter SETTINGS. Navigate to the BLUETOOTH box with the arrow keys and press OK to open the BLUE TOOTH mode. Scroll to the METER LINK box and press the OK button to activate. Press F3 to exit when done.
2. Pair the camera to the meter by following the "Pairing Bluetooth Devices" section in the thermal camera manual.
3. Once paired, the data from the MO270 will be continuously displayed and updated on the camera display.
4. Readings stored into memory can be recalled and applied to live thermal images.

Image Editing

A single or series of readings can be applied to a single image by saving and entering the image edit mode. Data stored in the MO270 memory can also be added to the image.

T/B200, T/B300, T/B360, T/B400 Image Edit

1. Entering the camera Preview mode (single press of the image store button).
2. In Preview mode real time data or recalled memory data is no longer streamed to the image but it is displayed in a preview box.
3. The data in the box can be applied to the image by pressing the ADD button in the camera's preview box.
4. Data applied to the image in this way will be enumerated.

i/B60 Image Edit

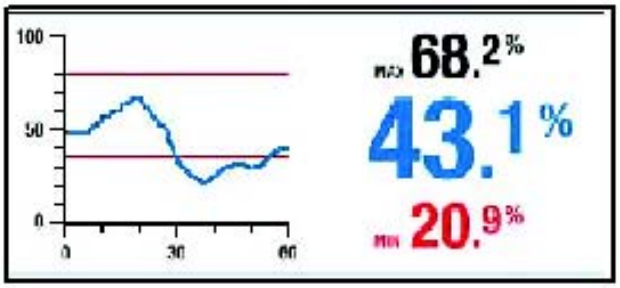
1. Press the trigger to store the image
2. Recall the image using the recall archive button (arrow in a box)
3. The real time data or recalled memory data is no longer streamed to the image but it is displayed in a preview box.
4. The data in the box can be applied to the image by pressing the camera's trigger
5. Data applied to the image in this way will be enumerated.

Alarm Operation

- The HIGH and LOW Alarm limits are user programmable as described in the SETTINGS section. Note that the HIGH alarm limit cannot be set to a value lower than 10.00% and the LOW alarm limit cannot be set higher than 10.00%.
- When an alarm is set to ON in the SETTINGS mode, the meter will indicate the alarm symbol (high or low) in black with the associated alarm value on the display (see the Display Icons section).
- Once the high and low alarm limits are set, the meter will audibly and visually alarm (in flashing red) when a measurement limit is exceeded. Note that if the SOUND setting is turned OFF in the SETTINGS mode, only the visual alarm will trigger.
- To silence an alarm, go to the ALARM sub-menu in the SETTINGS menu and select OFF for the alarm SOUND setting.

Trend Analysis Display Feature

- Press the F2-MODE soft-key once from the main meter display to access the Trend Analysis display mode. The Trend Analysis screen is shown below.
- The digits on the right side of the Trend Analysis screen show the actual measurement (center), the highest reading (top), and the lowest reading (bottom) for a given measurement session.
- The x-y graph on the left represents the measurements (vertical scale) over time (horizontal scale)
- To begin a Trend session, press the F3-START soft-key from the Trend Analysis screen (the red REC icon will be visible on the upper right hand corner of the display while the meter is trending).
- Press the F3-STOP soft-key to stop a trending session (the REC icon will switch off).



Memory Logging Mode

Store a reading

- To store a reading into one of the ten memory locations (Groups) press the F2-MODE soft-key from the main display screen. Note that stored readings are date/time stamped.
- Now use the F2-MODE soft-key again to select the Analog pointer or the Digital display mode.
- Take a measurement and when the desired reading is displayed, press the F3-HOLD soft-key.
- Press the F1-SAVE soft-key to begin the storing process. The memory locations screen will appear.
- Select a memory Group using the arrow buttons. Press the OK button when the desired memory location is highlighted. The reading will now be stored in the selected memory group.

View stored readings

- To view data from a memory group, press the F1-MENU soft-key from the main display screen and navigate to the MEMORY sub-menu and press OK.
- Highlight VIEW from the sub-menu and press OK. The groups list will appear.
- Navigate to the desired group and press OK.
- Use the up/down arrow buttons to scroll through the readings in the group. Use the CLEAR button to delete a displayed reading.
- Press F1-BACK to return to the Groups list or press EXIT to return to the normal operating mode.

Rename a Memory Group

- To rename a memory group, press the F1-MENU soft-key from the main display screen and navigate to the MEMORY sub-menu and press OK.
- Highlight NAME from the sub-menu and press OK. The groups list will appear.
- Navigate to the desired group and press OK.
- An alpha-numerical screen will appear with the current group name shown at the top.
- Use the arrow keys to select the desired digit to change and then press OK.
- Now scroll to the new digit using the arrow keys. When the desired new digit is highlighted, press OK and the old digit will be replaced by the new digit.
- When editing is complete, press CONF to save entries and to return to the Groups list.

Deleting Memory

- To delete stored data, press the F1-MENU soft-key from the main display screen and navigate to the MEMORY sub-menu and press OK.
- Highlight CLEAR from the sub-menu and press OK.
- Three sub-menus will appear: INDIVIDUAL, GROUP, and ALL. Select INDIVIDUAL to delete one reading from within one group; Select GROUP to delete an entire group; and select ALL to delete all readings in all groups. Click OK to clear the item.

Calibration Verification

Calibration Zero Check for Pinless Mode

1. Switch the meter to the Pinless mode of operation (REL mode) from the **F1-MENU**.
2. Ensure that the meter is not near any objects or surfaces. Hold the meter near the bottom to avoid contact with the pinless sensor.
3. The display should read zero.
4. If an error is displayed or if the meter reads other than zero, please return the unit for service.

Calibration Check for Pin Mode

1. Switch the meter to the Pin mode (%WME) from the **F1-MENU**.
2. The three calibration check points are located in the holes at the top of the protective cap.
3. The first measurement is made between the left test point and the center test point. The second measurement is made between the right test point and the center test point.
4. The display should read 75 for the first measurement and 25 for the second measurement.
5. If the readings are not correct, return the meter for service.

Battery Replacement

If the instrument does not switch ON or displays low battery symbols, recharge the batteries as detailed earlier in this guide. If the batteries require replacement, the unit must be returned to Extech for service.

Maintenance

- Always keep the instrument dry
- To clean, wipe the meter with a damp cloth. Use a mild detergent if necessary but never use abrasives or solvents.
- Prevent dirt from accumulating at the electrode pins

Specifications

Display	Full color graphical display
Resolution	0.1%
Accuracy	Pin mode: ± (5% rdg + 5 digits)
	Pinless mode is a relative reading only
Measurement principle	Electrical resistance (pins)
	Electromagnetic sensor (pinless)
Range	0.0 to 99.9 % Relative (pinless)
	6.0 to 99.9 % WME (pins)
Electrode pin length	0.75" (22mm)
Electrode pin type	Integrated, replaceable
Transmission frequency	Meter/sensor communication frequency: 2.4GHz
Power supply	Rechargeable Li-Polymer batteries (not user replaceable)
Low Battery Indication	Battery symbols (for meter and sensor) displayed on LCD
Meter housing	Impact-proof plastic
Operating Temperature	0 to 50°C (32 to 122°F)
Operating Humidity	80% Relative Humidity maximum
Dimensions	203 x 58 x 43mm (8 x 2.3 x 1.7"); not including remote probe
Weight	204g. (7.2 oz); not including remote probe