

MODEL: G2

SpotOn®

Consistometer

Innoquest Item # 23920

Portable
Texture
Meter



- Patent Pending
- 1 Year Warranty
- Made In USA

Product Manual

innoquestTM
Inc.

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1.0 Safety Information

Caution should be exercised while using this meter to assure the safety of the user. This meter is a low voltage battery powered device which should not cause electrical hazard to the user even when connected to a computer via a USB cable. However, please use caution not to service this meter or connect it to a computer in a wet environment.

It is recommended that this meter be used with an alkaline 9 volt battery. Such batteries can leak or explode if an attempt is made to charge them. **Do not recharge disposable alkaline batteries.**

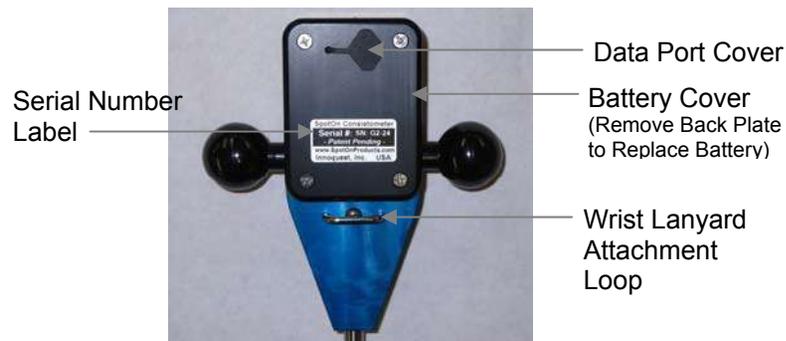
It is typical for this meter to be used to measure fats and oils which can be very slippery when on a users hands or if dropped on the floor. Please use caution when working around these materials due to a possible slipping hazard.

2.0 Introduction

2.1 Meter Diagram (Front)



2.2 Meter Diagram (Back)



2.3 Features:

- Patent Pending Design
- Quick quantitative measurements of product or ingredient consistency
- Penetrating consistometer measures entire sample, not just the surface
- Works on a variety of products and ingredients (shortening, frosting, dough, butter, cheese...)
- Measurements from 5cm up to 70cm depth (over 28 cm depth require optional shaft extension)
- Shows readings in either Grams or Pounds
- Integrated Temperature Sensor
- On-board microprocessor calculates and displays:
 - the average force of a measurement
 - the mean of a group of measurements
 - the Standard Deviation of a group of measurements
 - the equilibrated temperature of the measured sample
- Precision load cell and non-contact depth sensor simultaneously measure penetration force and penetration depth, while sample temperature is also measured
- Displays instantaneous penetration speed to guide operator for repeatable results
- Included PC software allows configuration for many products by setting the desired penetration rate, depth of measurement, type of probe tip and min/max limits; all of which can be preloaded onto the instrument
- Data can be downloaded as an Excel® file (.CSV) for analysis and plotting
- Interchangeable probe tips can be used to adapt the instrument to different products (please contact Innoquest for information on additional probe tips)

3.0 Specifications

Force: 0-22 lbs (0-9,999grams) working range, 0.01 lbs (4 g) resolution, +/- 2% accuracy, Overload protection to 62 lbs (28 kg)

Depth: 0-28 in (0-70 cm) working range, 0.1 inch (0.1cm) resolution, +/- 0.25" (0.6 cm) accuracy (Accuracy is much higher at closer ranges and falls off with distance)

Temperature: 32.0-99.9°F (0.0-37.7°C) range, 0.1°F (0.1°C) resolution, +/-0.5°F (0.3°C) accuracy, time constant approx 20 sec

Data Measurement: Records and displays force reading for every 1 cm (0.4in) of depth up to 70cm (27.6in). (Depending on shaft length used)

Memory Capacity: Up to 99 probings

Multi Reading Average: Up to 6 probings can be averaged on the meters display (also calculates standard deviation)

Computer Interface: USB port with special data interface cable (included)

Battery: Standard 9 volt alkaline battery, 25 hrs continuous use expected battery life (the meter will automatically shutoff after 2.5 minutes of non-use to save battery life)

Environmental: 35-120°F (2-49°C) / 0-95% RH / Indoor operational conditions (meter is dust tight but not waterproof)

4.0 General Operation

Note: See Demo Video on www.YouTube.com (Search SpotOn Consistometer)

4.1 Battery Installation

The meter requires a standard 9 volt alkaline battery. Use of rechargeable batteries is not recommended since the meter won't read their remaining life correctly due to voltage differences. The battery compartment is under the meter's back cover. Remove the back cover by first removing the (4) four Philips screws located in its corners. Changing the battery does NOT erase any of the meter's memory; data or settings.



4.2 Meter Modes

Once power is turned on to the meter the user has the option to scroll through and select 4-5 operating modes. (Review Mode does not show if Data Logging is turned off) Use the MODE button to cycle through the meter's modes. The meter will automatically shut off after 2.5 minutes if no buttons are pressed.

Probe Mode – Use this mode to make readings. The meter defaults to this mode when turned on.

Calibrate Mode – Use this mode to calibrate the meter. Calibration is required when changing tips or shaft configurations and recommended at the start of each day for best accuracy.

Setup Mode – Use this mode to change meter settings for units of measure or to turn data logging on or off.

Raw Mode – Use this mode to see raw sensor data. This mode is primarily used for trouble shooting and not needed for normal operation.

Review Mode – Use this mode to review a previous probing. This mode only shows and works when data logging is turned ON.

4.2.1 PROBE MODE

Probe mode is for taking readings with the meter and is detailed below in section 4.3. The meter can operate with or without saving readings to a data file. This logging function is set as described in Setup Mode section 4.2.3. If the logging is turned OFF then the meter can still take readings and calculate multi-probe averages but none of the data is stored for later download or for review in Review Mode. When logging is turned ON the meter tracks probings in its data file with an "N" number. This number is consecutively assigned to each probing while the logging function is on and is reported on the meters LCD and later in the data file so the user can track where the probing came from with his/her notes. When the logging function is off, the "N" number will only show as "-". It is possible to turn the logging function on and off as many times as desired during a days work but only readings taken while logging is on will be in the data file. Turning off the logging function does not delete previously recorded data.

4.2.2 CALIBRATE MODE

This mode is used to calibrate the meter's internal load cell for drift which can occur due to temperature changes or impact to the meter's shaft. It is required that calibration be done when ever a probe tip is changed or shaft extensions are added or removed since the weight of the shaft assembly is determined during calibration. It is recommended that calibration be done at the start of each day for best meter accuracy.

Select the CALIBRATE Mode and then press the START button to begin calibration.

The meter goes through a 2 step process to calibrate the load cell and measure the weight of the shaft and tip currently installed. First the meter asks for the user to "Hang Shaft" this means to hold the meter up by the handles and allow the shaft to hang freely down without touching anything (see Step 1 photo). Press the START button and wait for the meter to finish. The meter then asks for "Shaft Up Now" this means that the meter must be place up-side-down on a flat stable surface so that the shaft is pointing straight up in the air (see Step 2 photo). This will allow the meter to measure only the weight of the shaft and tip as configured. With the meter sitting on it's "head" press and release the start button and wait for the meter to finish calibration. Note that the meter will automatically ask for a calibration if it detects a change in the shaft length being used.



4.2.3 SETUP MODE

Once in Setup Mode press the START button to select which parameter to change.

- a. UNITS screen allows the user to change the measurement units of the meter between Metric and Imperial. Press the MODE button to enter the units screen and then change the units with the START button. Note there are two units screens; one for force/depth and one for temperature. When done press the MODE button to exit Setup Mode. The measurement units can also be changed with the PC software. Either method has the same effect.
- b. DATA LOGGING screen allows the user to select if the meter is configured to save probing data to its memory for later download to a computer or review. Press the MODE button to enter the data logging screen and then change the setting with the START button. When done press the MODE button to exit setup mode. Unless no PC is available or desired for operation it is best to set data logging ON.

4.2.4 RAW MODE

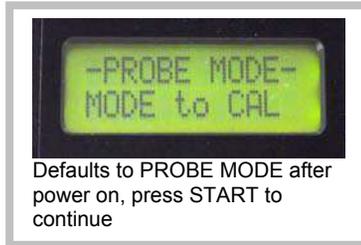
This mode allows the user to see the raw readings from the different sensors on the meter. While in this mode the user can press the START button to scroll through several other screens used for diagnostic or troubleshooting work. All of these screens are read only so no parameters can be accidentally changed. Exit raw mode at anytime by pressing the MODE button.

4.2.5 REVIEW MODE

This mode allows the user to see data from previous probings (only available if data logging is turned on). Pressing the START button again will allow the user to scroll down through the previous probings. Once the probing of interest is reached then press the MODE button to select it. At this point the START button will allow the user to see the data from this probing including each 1 cm of recorded data by continuing to press the START button. When done press the MODE button to return to the review mode.

4.3 How to Make a Probing

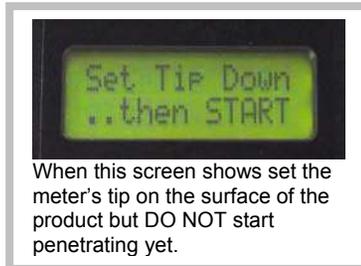
4.3.1 Turn the meter on and select PROBE MODE if not already on the screen as shown. (At power on wait for the splash screens for battery % and memory full to finish displaying.)



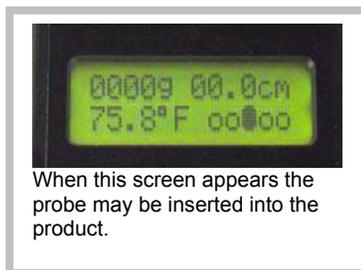
4.3.2 Press START to begin a reading once in PROBE MODE, if the meter was just turned on then the Product Type last used will be displayed. If the product type needs to be changed then press MODE.



4.3.3 Once the START button is pressed again the meter will configure itself for a probing. Turning the meter OFF and then back ON will allow selection of a new Product Type and will reset all averages and standard deviation calculations.



4.3.4 Place the meter's tip on the surface of the sample and press START again. The meter will measure the distance to the surface for use in calculating depth during the probing and for checking probe length for reporting in the data file. If the probe length measured does not match the currently calibrated configuration the meter may suggest a new calibration is required. Once this screen appears the user can then proceed by pushing the probe into the sample.



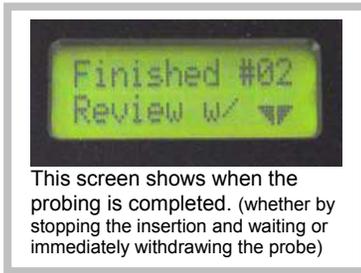
- i. While pushing the probe into the sample watch the speed indicator in the lower right of the screen. For the selected insertion speed the indicator must be centered (ooOoo). If the speed is too fast then the indicator moves to the right (oooOo). If the speed is too slow then the indicator moves to the left (oOooo). For reference: (Ooooo)= 60% of target speed, (oOooo)=80%, (ooOoo)=100%, (oooOo)=120%, (ooooO)=140%.
- ii. During the probing the force measured and the depth will be continuously updated on the screen. The meter will record a force reading at each 1 cm of depth and save them to calculate a probing average and also for later review or download to a computer if the logging function is enabled. Probe averages discard the first 3 cm and the last 1 cm of probing depth. Therefore the minimum probing depth is 5 cm for a valid reading.

4.3.5 For the meter to allow a probing to be considered complete the penetration depth must be at least 5 cm. Once the probing has gone to 5 cm or deeper then the probing reading can be completed in two ways.

- i. The downward penetration can be stopped and the probe pulled out of the sample, once it has been withdrawn 4 cm the meter will complete the probing and then take the temperature that is currently sensed by the temp sensor and then show FINISHED on the LCD as shown on the next page.
- ii. OR the downward penetration can be stopped at any depth beyond 5 cm and the meter is left to sit without further penetration or significant withdrawal for 4 seconds. After this 4 second wait the meter will recognize that the user intends to stop the probing and will automatically enter a temperature stabilization mode (looks for less than 0.1°F change every 3 seconds). Once in this mode it will monitor the temp sensor and only complete the reading once the temperature measurement has stabilized. Once stabilized the meter will complete the probing and show FINISHED on the LCD.



4.3.6 Once the meter has just finished a probing (before starting a new probing) the user can see 3-4 types of data. Pressing the START button will show the data in the following order. If data logging is enabled then this data can also be viewed later through the use of Review Mode.



SCREEN 1 - The probing force average and temperature for the current reading called "NEW". The first 3cm and last 1cm of data are not used in computing this average. If more than 50% of the recorded force readings for the probing profile were at speeds greater or less than the middle three speedometer display segments (greater than +/- 20% of target speed) then the entire probing is rejected and the user is instructed to take a new one. This keeps operator error from producing bad data sets. If a Max Depth was set through the PC software for this product type then the average as described above will only be calculated on data points up to the set Max Depth.



SCREEN 2 - The multi-probe mean of both force and temperature for all probings since the meter was turned ON. The standard deviation is also displayed for all readings included in the mean (shown as the Greek symbol sigma). The meter will only calculate the mean and std dev for up to 6 probings. If more than 6 probings are taken without turning the meter off/on then the mean will show as 0. To reset this multi-probe averaging function turn the meter OFF then back ON.



SCREEN 3 - The min and max values are displayed as set through the PC software for the currently selected product type. If the min and max are set to 0 and 9999 respectively then this min/max screen will not show.



SCREEN 3/4 & Up - Pressing the START button additional times will allow the user to cycle through the readings held in temporary memory for each 1 cm of probing depth. These readings are only recorded for computer download if the logging function is ON. Once the max probing depth has been displayed the display will cycle back to the SCREEN 1 in a continuous loop. In this way you can always get back to a reading if you accidentally pressed the start button too many times.



Pressing the MODE button at anytime will exit the review mode and ready the meter for another probing. Once this is done the data described above is no longer available to view unless data logging was ON.

5.0 PC Software

The SpotOn Consistometer PC software is used for the following:

- Before the meter can communicate with the PC a correct com port must be selected. (see 5.2.1)
- Transfer of data from the meter to a file on the PC (see 5.2.2)
- Clearing the data memory on the meter (see 5.2.3)
- Configuring settings on the meter (see 5.2.4)

5.1 Software Install

Software Installation:

Insert the SpotOn Consistometer Software CD in the computer's CD drive. This should automatically start a software install wizard on the PC. Follow the steps on the install wizard to install the software. Once the software is installed the CD will run a program that installs the driver for the USB cable. This will be seen as a small "command prompt" window that will flash on the screen for a few seconds. When this is finished the install process is complete and the software and USB cable should be ready to use.

Note: If there is a problem installing the software then locate the **SpotOn Setup.exe** on the CD and right click on it, then select windows compatibility mode and run as XP compatible.

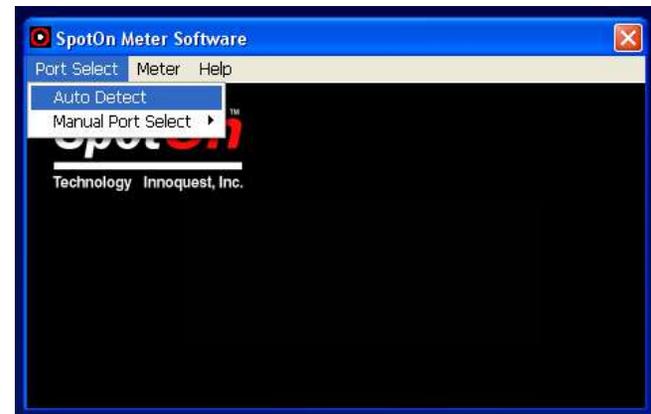
USB Cable Installation:

The meter has a data port for connection to a computer via a special USB cable that was provided with the meter. This cable requires a driver be installed on the computer for proper operation. The software CD that comes with the meter will automatically install this driver when installing the meter's software as described above. PLEASE NOTE: Don't plug this USB cable into the computer until after the software has been installed. If it is plugged in before the install please remove it and CANCEL all requests by the "New Hardware Wizard".

5.2 Software Use

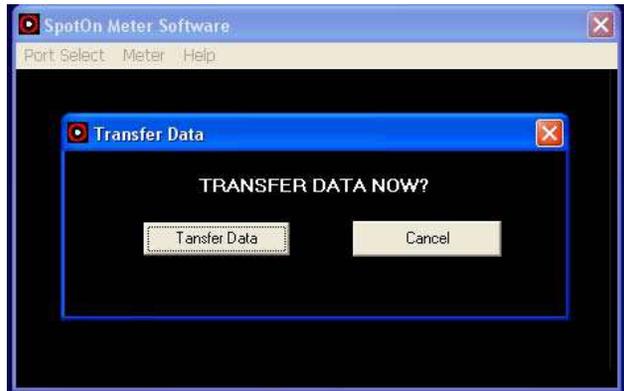
5.2.1 Port Selection

1. Make sure the meter has a battery installed. The meter should be turned off. Attach the Special USB cable to a USB port on the computer and to the data port on the meter.
2. After opening the SpotOn Meter Software enter the Port Select menu and click on **AUTO DETECT**. This will cause the software to search the computer to find the port the data cable is plugged into. The com port will be automatically located and saved for future use. (Note: only works when the meter is connected to the computer with the USB cable) The com port can also be manually selected.

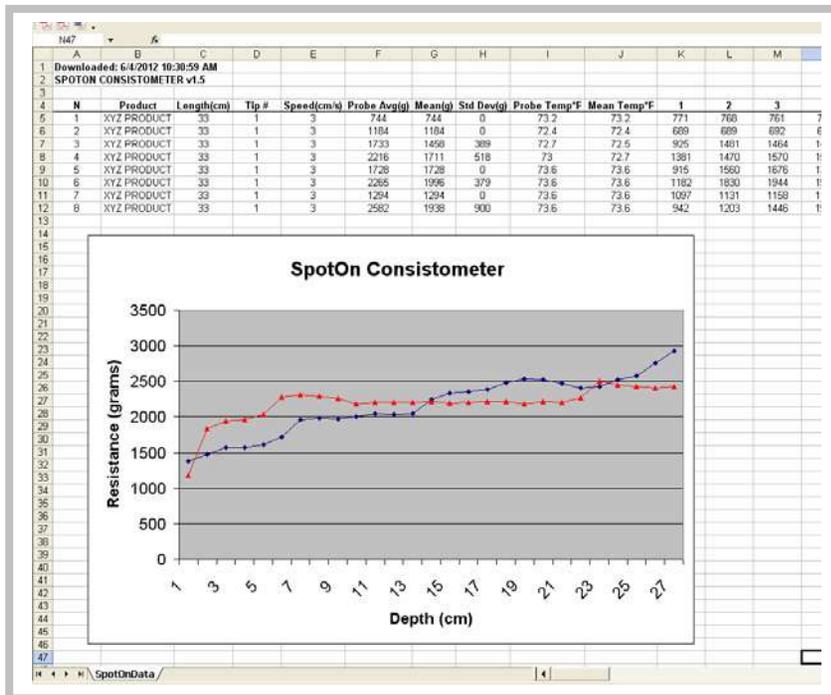


5.2.2 Transferring Meter Data

Enter the Meter menu and select **GET DATA FROM METER** to download all data on the meter. This will create a .CSV (comma separated variable) file which can be read by any spread sheet program. Note: All data stays on the meter even after a download or after changing the meters battery. The **ONLY** way to clear the data from memory is described in section 5.2.3.

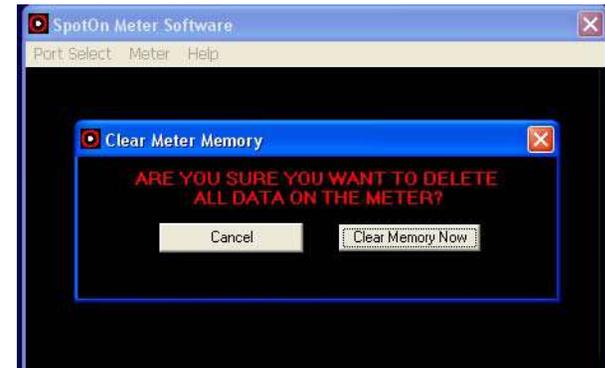


Data File Example Opened in a Spread Sheet Program:



5.2.3 Clearing Meter Memory

Clear the meters memory when desired by entering the Meter menu and selecting **CLEAR METER MEMORY**. This will clear all data from the meter's memory. Note that this does not affect settings or stored Product Type names.



5.2.4 Configuring the Meter

A list of Product Types can be generated by entering the Meter menu and selecting **CONFIGURE PRODUCT LIST**. The Product Types entered will automatically be saved and redisplayed when the software is re-opened. Only the Product Types which have been selected with a check mark will be sent to the meter. The user can then scroll through the transferred Product Types while using the meter in the field to select the one desired before a reading is taken.

Product Types -

Send Check Box – If this box is checked then its associated product type will be sent to the meter. By checking or un-checking this box the number of product types to scroll through on the meter is limited while still allowing all data to be store in the PC file. All the data is stored in the file: SpotOn Settings.cfg. This file can be copied to other computers to eliminate the need to re-enter all the settings for each computer if desired.

Product Name – Enter up to 12 characters or numbers to create a unique name that will display on the LCD of the meter once uploaded.

Min – The value entered here will show on the meter’s LCD to remind the user what the minimum acceptable value is. Set min to 0 and max to 9999 if no min/max is desired to show on the meter. Valid ranges are 25 to 9998 grams or 0 to 22.00 lbs.

Max – The value entered here will show on the meter’s LCD to remind the user what the maximum acceptable value is. Set min to 0 and max to 9999 if no min/max is desired to show on the meter. Valid ranges are 25 to 9998 grams or 0 to 22.00 lbs.

Configuration – This is a pull down menu that allows the user to select one of the custom named “configurations” as defined in the Set Up Configuration section. A configuration **MUST** be selected for each product type.

Set Up Configuration -

Configuration Name – This is a custom name the user can enter up to 15 characters to describe the configuration (i.e. “shortening”, “dough”, “icing”...). This name will show in the pull down menu in the product types section above.

Penetration Speed – Select the penetration speed the meter will use. The default is 3 cm per second.

Tip Type – This is a pull down menu that allows the user to select from tip numbers 1 to 99. The tip number does not affect the meter’s operation but is passed on to the data file for ease in tracking the use of different tips. The default tip is Tip #1.

Max Depth – This sets the maximum depth that will be used to calculate a probing average on the meter. This setting allows all data to be calculated to a given depth regardless of the users actual penetration (provided penetration at least to the Max Depth).

Select Units -

Units - Select what measurement unit the meter and software will function in. This setting is not changed on the meter until the UPDATE METER button is pressed.

Update Meter Button -

Pressing the UPDATE METER button will send all the current selected product types and units selections to the meter. All of the settings showing on the screen will be saved to a PC data file named “SpotOn Settings.cfg” when the software is closed. Therefore any changes will show the next time the software is opened.

6.0 Trouble Shooting

Why do I get an ERROR after making a probing?

If 50% of the speed readings for a given probing (measured at each 1 cm depth increment) were not within one dot of the center point of the speedometer then the meter rejects the reading as invalid and show ERROR on the LCD which requires the user to make the probing again. With experience the user will get better at producing consistent penetration speeds that do NOT generate errors. (see 4.3.4)

Why do I get a 0 for mean while the probe average is not 0?

The mean is calculated for up to 6 readings after power on. If the user takes more than 6 readings the mean and standard deviation will show as 0's. Turning the meter OFF then back ON will reset the counter for up to 6 new readings for which it will calculate mean and standard deviation. The probe average will always be correct regardless of the number of readings since power on.

Why don't I get accurate temperature measurements?

First make sure you are keeping the probe inserted in the product for 4 seconds rather than withdrawing it immediately to end the probing. If the temperature readings are still not accurate the try withdrawing the probe 1-2 cm after your full depth is reached. This will help to insure the temp sensor is in good contact with the product and should cause it to read better. Note: the probe requires 4 cm of withdrawal to make it end the probing without waiting for temp stabilization, therefore it is ok to withdraw 1-2 cm since this won't break the entry to temp stabilization mode.

Why does the Speedometer seem "stuck" at the start of the probing?

The speedometer will automatically show a centered position until the probe tip reaches a depth of 2 cm. This allows time for the user to enter the surface of the product and then develop some consistency to their speed before the speedometer starts showing real values.

Why am I having trouble taking readings near the edge of a product container?

The meter uses a non-contact infrared sensor which shines an invisible beam of light out the bottom of the meter front. Make sure its clear window is clean and that the probe tip is at least 1.5 (3.8 cm) inches back from the edge of the container so the light beam does not miss the surface of the product.

7.0 Maintenance

- Remove the battery from the meter if it will be stored without use for a long period of time (like 3 months or more)
- Clean the meter with a soft cloth using soapy water or mild cleaning agent like Windex®. The meter is sealed against moisture, dust, and oils but it is not considered water tight and must NOT be submerged.
- Check the clear window on the bottom edge of the front of the meter. This is the window over the Infrared depth sensor and must be kept clean for best performance. Use only soft cloths for cleaning this window so it does not get scratched.
- Note the purpose of the small o-ring around the threaded end of the shaft is to provide a self-locking feature to the probe tip so that it does not come loose during use. The o-ring is compressed when the probe tip is tightened by hand and should be sufficient to keep the tip from coming loose. The o-ring is not designed to form a seal nor is it required for operation.
- If during normal use an alkaline battery leaks in the meter please clean the meter immediately and wash hands to remove any caustic battery electrolyte. The battery electrolyte is water soluble so please use a wet towel to clean the battery compartment.

8.0 Warranty & Service

One Year Warranty

Innoquest, Inc. warrants this product to be free from defects in materials and workmanship under normal use and service for a period one (1) year from date of purchase. This warranty extends only to the original purchaser and shall not apply to any product which, in Innoquest's sole opinion, has been subject to misuse, alteration, abuse, or abnormal conditions of operation or handling. Innoquest's obligation under this warranty is limited to repair or replacement of the product which is returned to Innoquest. Innoquest accepts no liability for whatever damages may be caused by a malfunctioning product.

Repair & Service Policy

Product returned to Innoquest for repair or service must follow the guidelines set forth as follows: Return of the product for warranty or service repair will be the responsibility of the purchaser (Innoquest does not pay inbound shipping charges). All returns must receive an RMA number by **calling** Innoquest prior to return of the product. The RMA number must be clearly marked on the outside of the shipping carton. If the customer is returning product for non-warranty related repair or service, a minimum charge will apply for accessing the product's repair needs and further work will not be completed without the customer's approval.



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