User Manual

*Grain moisture meter – model **G939***

Version: 1.00.000
Date: 08/2013

Summary

Introduction

The G939 moisture meter includes all the characteristics to provide the most accurate grain moisture reading.

With a simple operation and without operator intervention, model G939 will provide moisture readings in a few seconds, for a wide variety of products.

With a simple 5-key keypad, the instrument can be easily operated and set up, without intensive user training.

By applying the “FLOW THRU” technology, G939 provides a fully automatic moisture analysis. There is no need of previous sample weighing; temperature, density and weight corrections are performed automatically, without the use of any other resource or additional tables.

Calibration curves for each cereal have been obtained at Gehaka laboratories, using samples collected from several areas of the plantation. Using the standard oven method as a reference, measurement scales for each product were developed. These curves were transferred to the G939 memory and they are easily identified by product name and their version.

If the development of new calibration curves is necessary, there is a function at www.moisturetester.com.br which allows creating, editing and installing them in your G939 grain moisture meter.

G939 includes three instruments into one, managed by a state-of-the-art internal microprocessor. These three instruments are: One electronic scale, which measures the sample weight; one built-in digital thermometer, which measures the sample temperature inside the chamber and the G939 temperature and finally one capacity meter, which indicates the moisture percent, to be later corrected by other parameters.

Its program performs all the required calculations, thus providing extremely reliable and repeatable readings. It also performs: automatic setting and checking the proper operation of all electronic circuits.

The meter's FLOW THRU design allows the performance of quick measurements, namely, in less than 15 seconds and without the operator intervention, in a fully automatic way. Just select the product, pour the sample in the G939 hopper, until a "BEEP" is given, the G939 will load the sample, perform the measurement and automatically unload the sample. After a few seconds, you will have the moisture and temperature measurement, all this shown on an easy to read 16-character / 2-line alphanumeric LCD display, in Portuguese.

G939 has also a bidirectional RS232C serial communication port. With this, we can connect the G939 to a printer so the measurement is printed in a label, thus making the counterchecking easier, or else, we can connect the meter to a PC and transfer the information to a managing system.

The G939 is operated by a FULL RANGE automatic power source, which means the meter operation is ensured for 90 – 240 VAC mains, thus protecting the meter from network voltage variations.

Indication conventions for G939 LCD display:

>	Right-hand arrow
<	Left-hand arrow
YES	Option acknowledgment
ESCAPE	Exit

Description

1. SAMPLE LOADING HOPPER
Place where the cereal sample, to have the moisture measured, will be weighed.

2. LCD DISPLAY
Displays results and settings with alphanumeric characters.

3. THERMAL PRINTER (OPTIONAL)
Device for printing measurement results. Silent, low consumption operation.

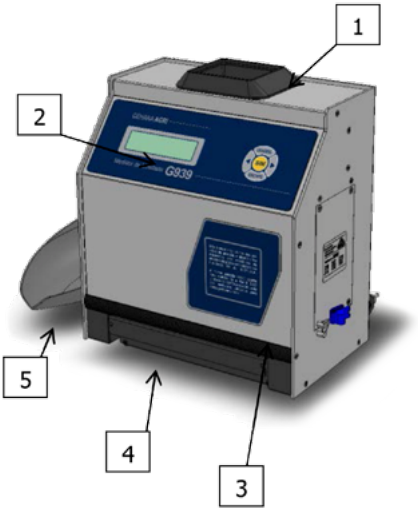
4. DRAWER
Receives the cereal sample from the chamber, after the measurement was performed. The meter unloads automatically.

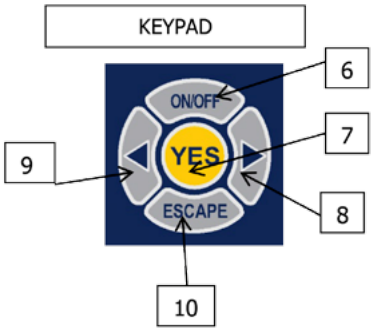
5. PLASTIC SCOOP
Used for pouring the sample into the funnel.

6. ON/OFF
Switches ON/OFF the G939 meter. Operating with numerical setting multiplies by 10 the indicated value.

7. YES
Confirms function or setting selection.

8. RIGHT-HAND ARROW
It displays the next function or increases the value of one scale interval.





9. LEFT-HAND ARROW
Displays the previous function or decreases the value of one scale interval.

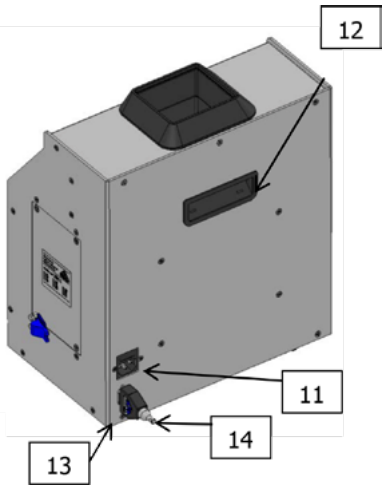
10. ESCAPE (EXIT)
Exits a function or setting that is being operated at that time. Operating with numerical setting divides by 10 the indicated value.

11. POWER CORD CONNECTOR
Place where the power cord will be connected. G939 operates between 90 and 240 VAC.

12. CARRYING HANDLE
Used for carrying the G939. Caution: before lifting the G939 remove the drawer, because due to the tilt it may fall down.

13. RS232 SERIAL PORT CONNECTOR
Data output for printer or PC.

14. HARD LOCK
When connected to RS232 serial output, it releases access to "Configuration" function, where G939 configurations will be made.



Adjusting a value

In addition to the direct functions of the keypad, it can assume other functions, and one of them is making easier to type a value.

When the setting of a value is selected, the display will show the current value, and to change it proceed as follows:

KEY	FUNCTION
ON/OFF	Multiplies the current value by 10;
RIGHT-HAND ARROW	Increases the indicated value by one scale interval;
LEFT-HAND ARROW	Decreases the indicated value by one scale interval;
ESCAPE (EXIT)	Divides by 10 the current value;
YES	Confirms the current value and completes the setting.

G939 installation

Carefully check the packing, if there were marks and damages in the cardboard case, this means that there were problems during shipment.

Open the packaging, checking the conditions of G939. Remove the equipment and check whether all its accessories are included.

Place the G939 on a stable table, in order to ensure it will not move during the operation. Remove the adhesive tapes fastening the drawer and check whether it slides easily.

If the acquired model features a Thermal Printer, install the paper roll as stated in procedure “3.2 Thermal Printer”.

Connect the AC cord to the connector on the rear panel and fit it steadily, taking care that the plug is fully inserted in the connector. It is not necessary to verify the mains voltage; the power supply is FULL RANGE, not requiring mains selection. We also do not recommend the use of voltage stabilizers.

When the cord is plugged in the outlet, G939 will start its operation, performing a self-diagnosis in order to check whether its components are working properly. If by any chance the meter verifies that some of its components is improperly operating, it will indicate an error message on the display regarding the fault.

Leave the G939 meter preheating for 10 minutes. The G939 meter shall operate continuously plugged in the outlet; use only the ON/OFF key. This way, the equipment enters the “sleeping” mode and the power consumption is lower than 1 W, however it is ready to operate.

The G939 meter shall be operated in a place free of excessive dust and with room temperature between 0º and 40 ºC.

1. Measuring – Moisture measuring

1. Select “Measuring” from the main menu, depress YES to confirm;

2. Select the type of cereal you want to measure the moisture. Use Right hand/ Left hand ARROW keys until finding the desired product. Indications below the product names are the moisture minimum and maximum limits the G939 meter is able to make the reading. Depress “YES” to confirm your choice.

3. Take a sample of at least 200 g of the product you want to measure the moisture and, using the plastic scoop, slowly pour the cereal sample into the loading hopper, until the 100% is shown on the display, a beep will be heard indicating the sample weight is correct. If by any chance the weight is exceeded, the display will show a value higher than 100%, and the sample excess shall be removed from the hopper.

4. Within a few seconds, the G939 meter will display the value of product moisture. If the Right hand/Left hand keys are depressed, the G939 meter will display all the measurements made, namely:

When selecting Right hand/Left hand Arrow we have:

Sequence number of the measured sample.

5. After having performed a successful measurement, the G939 meter will send all measurement data through the serial output to the printer or PC. An example of report follows:

```
================================
GEHAKA G939
Firmware Version 0.60.006
Hardware Version 1.00
Serial No. 12345678901234
================================
Current Product..= Wheat
Equation Version.= 20111101
Sample .........= 29
Sample Temp.............= 24.9 °C
Meter Temp.......= 25.5 °C
Sample Weight.....= 142.5 g
--------------------------------
Moisture ........= 13.05 %
--------------------------------
--------------------------------
Signature 11:02
Responsible person 21/01/13
```

NOTE: **If there is a great temperature difference between the product and the G939 Hopper where the temperature sensor is located, the meter will wait until there is a thermal balance between both of them. This could introduce a delay for the temperature measurement to be made. This way, we improve the meter precision, by measuring the actual sample temperature.**

6. When the G939 meter is showing the measurement results on the display and a new sample is poured into the hopper, the G939 meter will perform a new measurement, using the same configuration of the previous measurement. If the ESCAPE key is depressed, the MEASUREMENT option will be exited, returning to the MAIN menu.

7. After the measuring cycle, the instrument will unload the sample into the drawer.

NOTE: **If the moisture content is higher than 22%, the G939 meter will request measuring again the same sample, repeating the measurement three times in order to ensure a higher reading precision.**

1.1 Diagram of the functions

A diagram follows indicating all G939 meter functions and it will help to understand the operation.

```
                                    MENU G939
ON --+ 1. [Measure...] Measurement
     |    Performs the moisture measurement. The cereal will be selected, the weighing is made, and we will have the moisture
     |    content.
     |    To measure again, just pour the new sample in the hopper.
     |
     | 2. [Setup...] Configuration
     +---+
         | 2.1  Date and Time Adjustment
         |      Performs the Adjustment of Date and Time used in the reports. Use ARROWS and YES to perform the adjustment.
         |
         | 2.2  Adjusting the number of elements to be averaged
         |      Performs the Adjustment of the number of measurements to be used for making the average.
         |      We can select between 1 and 5 measurements.
         |
         | 2.3  Adjusting the Number of Decimal Digits
         |      This function makes the adjustment of the number of decimal digits shown on the display and in the moisture
         |      reports.
         |
         | 2.4  Adjusting the Print Mode
         |      Sends the print to Printer or PC. The PC report only sends data.
         |
         | 2.5  Adjusting the Number of Report Copies
         |      This function sets the number of copies of printing report.
         |
         | 2.6  Adjusting the Contrast
         |      Adjust the Contrast between 65% and 100%, and 100% is the maximum contrast.
         |
         | 2.7  Unlocking Chamber Door
         |      Left-Hand Arrow key opens the Chamber Door to perform the cleaning. Right-Hand ARROW key Locks.
         |
         | 2.8  Uploading Internet Equation
         |      Allows G939 to be remotely controlled by a PC. To exit, the power supply shall be disconnected.
         |
         | 2.9  Uploading Standard Equation
         |      Uploads equations built into the G939. All the equations will be programmed, and they may not be the most
         |      updated.
         |
         | 2.10 Self-Report
         |      Makes a self-diagnosis of G939, and issues a report with all data.
         |
         | 2.11 Language Selection
         |      Selects the language used by G939: Portuguese, Spanish, English, French, German and Italian.
         |      After select the language run the function 2.9 Uploading Standard Equations, to get the product names on the
         |      selected language.
         +-----------------------------------------------------------------------------------------------------------------
```

2. Configuration

The “Configuration” mode offers the possibility to make settings or configurations in the G939 meter. Now, we will describe each one of these functions.

Note that the number shown before each function corresponds to the same shown in the G939 Menu, this way it is easier to identify in the manual where the explanation of each function is.

If the Hard Lock key is not connected to the G939 Serial Port and the access to this function is attempted, the display will show an error message “Access locked, Use the Hard Lock” stating the need of the key presence.

If you wish, remove the key after entering the “Configuration”, there is not a new checking. When you exit the function, it will be locked again.

G939 settings and Equations can only be changed with the presence of the Hard Lock key, this ensures improved security.

2.1 Date and time adjustment

This function makes the Date and Time adjustment of the real time clock (RTC). This value of date and time will be sent in the reports through RS232 Serial Port after the measurement.

G939 is already delivered with the clock adjusted at the factory, but it may eventually be readjusted for the Daylight Saving Time.

There is an internal battery that keeps the clock working even when the G939 meter is disconnected from the outlet. This battery lasts for over 5 years; to have it tested, just disconnect the G939 meter and see if the clock indicates 00:00:80, if this happens, contact Gehaka service to replace the battery.

To perform the Date and Time adjustment:

1. Go to "Configuration" and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function "2.1 Date and Time Adjustment" and depress YES;

3. Now use the Right hand/Left hand ARROWS to Increase or Decrease the value of the TIME. When the value is right, depress YES and the G939 will go to the next field to be adjusted;

4. Repeat this procedure for adjusting MINUTES, DAY, MONTH, and YEAR.

NOTE: **The value being adjusted will be shown underlined, after depressing YES it will go to the next item to be adjusted.**

2.2 Adjusting the number of elements to be averaged

This function adjusts the number of elements to be used for making the average of readings used to calculate the final value of moisture percent. We can select between 1 and 5 elements.

To adjust the number of Elements to be Averaged:

1. Go to "Configuration" and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function "2.2 Adjusting the Number of Elements to be Averaged", and depress YES;

3. Now use the Right hand/Left hand ARROWS to Increase or Decrease the Number of Elements to be Averaged. This adjustment is limited between 1 and 5 elements;

4. Depress YES to complete the adjustment.

NOTE: **It should be noted that, irrespective of the adjustment made in this function, when the moisture co content exceeds 22% there will be always made a reading averaging of three elements.**

2.3 Adjusting the number of decimal digits

This function makes the adjustment of the decimal digits shown on the display and in the moisture reports. If one decimal digit is used, the rounding of the second decimal digit will be automatically made. The factory default setting is one decimal digit.

To adjust the number of decimal digits:

1. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function “2.3 Adjusting the Number of Decimal Digits”, and depress YES;

3. Now use the Right hand/Left hand ARROWS to increase or decrease the number Decimal Digits. This adjustment is limited between 1 and 2 decimal digits;

4. Depress YES to complete the adjustment.

2.4 Adjusting the print mode

This function sends the measurement data to a Printer or PC.

A. Printer:

In this mode, measurement data in a report format will be sent, as stated below, through the serial port RS232.

If the G939 meter has a built-in thermal printer, this report will be printed and simultaneously sent through the serial port RS232.

```
================================
GEHAKA G939
Firmware Version 1.00.000
Hardware Version 1.00
Serial No. 12345678901234
================================
Current Product..= Wheat
Equation Version = 20111101
Sample .........= 4
Sample Temp.............= 27.7 °C
Meter Temp.......= 27.5 °C
Sample Weight.....= 141.5 g
--------------------------------
Moisture ........= 12.42 %
--------------------------------
--------------------------------
Signature 13:00
Responsible person 18/01/13
================================
```

B. Computer:

The Computer Mode just sends the data, without considering formats. The data is separated by ";" in order to make the separation easier. This report may be easily captured and interpreted by a computerized system connected to the RS232 serial port. For this function, if the G939 meter has a built-in printer, it will be switched off by the G939 and will not print this data.

See below an example of the string that is sent. The ending is with CR and LF.

```
        15; 12.35; 141.7; 77.0; 26.9; 27.4; 66.4; Wheat;
20111101;G810; 1.00.000;1.00; "1234567891234"; 16:51; 18/01/13;
```

Descrição dos campos dos dados enviados:

```
Sample number;
Moisture;
Weight;
Density;
Sample Temperature;
Instrument Temperature;
Scale _ A (Capacitance);
Product Name;
Equation Version;
Instrument Model;
Firmware Version;
Hardware Version;
Serial number;
Time;
Date;
CR + LFCR + LF
```

To perform the print mode selection:

1. Go to "Configuration" and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function "2.4 Adjusting Print Mode", depress YES;

3. Use Right hand/Left hand ARROW keys to select between the two printing modes, Printer or Computer;

4. Depress YES to complete the adjustment.

2.5 Adjusting number of report copies

This function allows adjusting the number of copies that will be printed after each moisture measurement.

2.6 Adjusting the contrast

This function allows adjusting the contrast of the LCD display.

This value can be adjusted between 55% and 100%, and 100% is the maximum contrast. This value will be stored in the G939 memory.

To adjust the Contrast:

1. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;

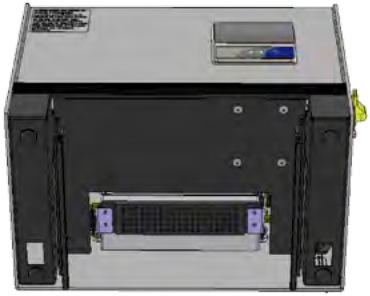
2. Go to function “2.5 Contrast Adjustment” and depress YES;

3. Use the Right hand/Left hand ARROWS to increase or decrease the Contrast value. This adjustment is made in 5% steps;

4. Depress YES to complete the adjustment.

2.7 Unlocking chamber door

When measuring products such as rough rice, soybean bran, etc., the Chamber may accumulate residues, especially when such cereals are very dry with a low relative humidity.



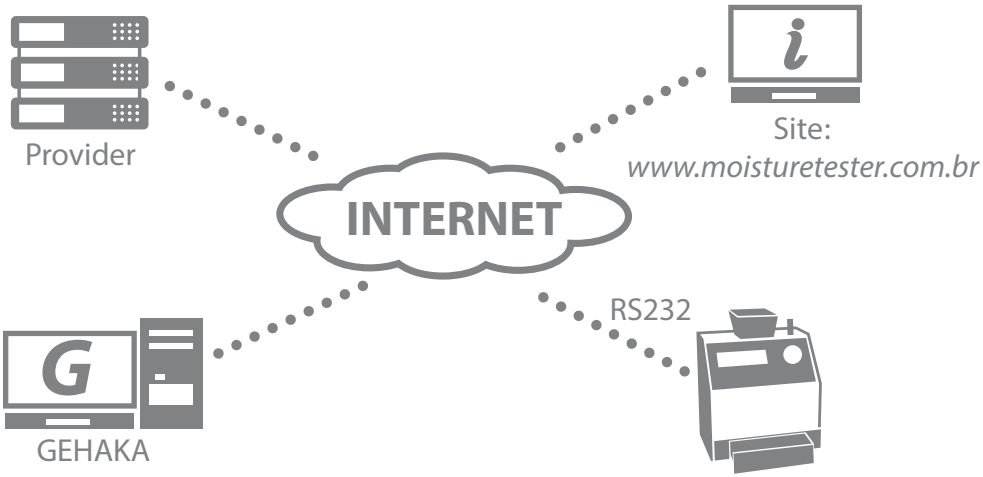
Before performing the cleaning, the Chamber Door shall be unlocked, if it is attempted to open the door without using this function, the G939 chamber could be damaged.

To open the door and performing the cleaning:

1. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;
2. Go to function “2.6 Unlocking Chamber Door”, and depress YES;
3. Use the LEFT HAND ARROW to open the door; the G939 will emit the typical noise of the Chamber Door opening;
4. Disconnect the AC Cord from the G939 rear panel;
5. Put down horizontally the G939 as shown in the photo;
6. Carefully perform the Chamber cleaning;
7. Connect the G939 again for operation.

2.8 Uploading internet equation

One great innovation of G939 is by the use of the Internet, performing a customization of the products the G939 will measure. All this information and the guidance to execute them may be accessed at ***www.moisturetester.com.br.***



Basically we can:

- Register the G939. This register entitles to an extension of six months of the Warranty; do not lose this opportunity. It also allows us to know which scales are more important to you, and allows us to keep you informed about new updates, including improvements in G939 firmware.

- Selecting which products will be sampled by G939. With this, the time for changing scale is reduced, thus making the operation easier. Also a backup of the G939 Equations in the cloud will be made, thus ensuring their return to the instrument, even if it were totally damaged.

- Updating the equations as soon as they are reviewed. Gehaka works around the year reviewing scales of the G939 meters, or developing new ones, however, before the equipment had to be carried to the Service to receive these updates. Now with the use of the Internet you will receive an e-mail telling that there was a review of a Product that is in your equipment and, in a few minutes, connected to a PC, it can be updated.

- Creating new Equations. It is possible, starting from a “Universal Scale”, to create a new equation for a product the G939 does not have. Just set up a table with the readings of the Standard and those obtained in the G939 and in a few minutes you will create a new Equation and you will be able to install in the G939. Through our website you will get all the support and guidance for the creation.

Connecting the G939 to a PC is quite simple: Just follow the steps below:

1. The computer must be connected to the Internet, otherwise it will not be possible to download the necessary files for the installation;

2. Find an unused USB port in the PC;

3. Connect the Serial Cable supplied with the G939 to the USB port, do not still connect to the G939;

4. Wait for the driver installation, this could take up to 5 minutes, depending on the Internet bandwidth. This step will only be executed the first time the Cable is connected to the PC, after this the PC will automatically recognize the Serial Cable;

5. Connect the G939;

6. Place the Hard Lock in the Serial Port of G939;

7. Select the “Configuration” function and depress YES;

8. elect the “2.8 Uploading Internet Equation” function;

9. Remove the Hard Lock and connect the Cable in the Serial Port of G939;

10. Access the website ***www.moisturetester.com.br*** and click on the “Moisture Meter”.

11. From now on, follow the instructions shown in the PC, which assumes the control of G939. All the operations stated in the site may be performed.

12. Register your G939, this will bring many advantages.

How to exit “2.8 Uploading Internet Equation” function

This function passes the control of the G939 processor to the computer to which it is connected. Once having entered in this function, we have only two alternatives to exit:

A. Exit with the site commands;

B. Disconnecting, waiting for 5 seconds, and connecting again the power supply to G939.

2.9 Uploading standard equation

This function shall be only used in case of occurring some fault in the download of Internet curves of G939. In this function, the Standard Equations built into the G939 will be uploaded, and they may not be the most updated. Moreover, there is no way to select them, so all the equations will be uploaded.

The equations undergo updates with time, and we strongly recommend that a connection Internet be made in order to download the most updated curves.

To upload Standard Equations:

1. Connect the G939;

2. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;

3. Go to “2.9 Uploading Standard Equation”, and depress YES;

4. Use the Right hand/Left hand ARROWS to select the required language;

5. Depress YES to complete.

2.10 Self-report

Makes a self-diagnosis of G939, and issues a report with all data. The Report will be sent to serial output RS232 or to the Thermal Printer built into G939.

To get the report:

1. Connect the G939;

2. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;

3. Go to “2.10 Auto Self Report” function and depress YES;

4. Wait for the Report to be printed.

This report provides the Service with data for assessing whether the G939 is operating properly, after having passed through the self-diagnosis when it is connected.

Note that there are two groups of information, the first indicates the operation of the G939, the second the products that are available in G939 with their operating range.

Below there is an example of reports and the expected values for each item with its respective tolerance.

```
================================
GEHAKA      G939
Firmware Version         1.00.000
Hardware Version         1.00
Serial No.          12345678901234
================================
Current Sample    =    271          →    Indicates the number of current sample.
Current Product   = Wheat           →    Selected product.
Equation Version = 20111101         →    Numerical version of Product equation.
TEMP. Chamber     =    27.8 °C      →    Sample Temperature.
Instrum. Temp.    =    27.9 °C      →    G939 Temperature.
Frequency Cham    = 249.59 KHz      →    Measuring Chamber Frequency.
A/D Reading..     = 4648.0 Sc Int   →    Electronic scale A/D reading.
--------------------------------
| Moisture Range per Product    |
|-------------------------------|
| Product          |%Min | %Max |
|------------------|-----|------|
|Natural Almond    |   3 |   30 |
|Peanut            |   1 |   30 |
|Whole Proc. Rice  |   5 |   30 |
|Nat. Proc. Rice   |   5 |   30 |
|Parb. Proc. Rice  |   5 |   30 |
|Nat. Rough Rice   |   7 |   30 |
|Parb. Rough Rice  |   7 |   30 |
.
.
.
|Soybean           |   8 |   35 |
|Sorghum           |   7 |   40 |
|Wheat             |   5 |   40 |
|White Wheat       |   5 |   40 |
|Durum Wheat       |   5 |   40 |
|Red Wheat         |   5 |   40 |
|Triticale         |   5 |   33 |
|Urucum Seed       |   7 |   30 |
|Universal Scale   |   1 |   60 |
================================

--------------------------------
Signature                  12:33
Responsible person       18/01/13
================================
```

2.11 Language selection

Selects the language used by G939.

Available languages in this version: Portuguese, Spanish, English, French, German and Italian.

To select language proceed as follows:

1. Connect the G939;
2. Go to “Configuration” and depress YES; you have to put the Hard Lock in the serial output;
3. Go to “2.11 Language Selection”, and depress YES;
4. Use the Right hand/Left hand ARROWS to select the required language;
5. Depress YES to complete.

NOTE: **After selected the language run the function 2.9 Uploading standard equations, to get the product names on the selected language.**

3.1 RS232 Serial Port

Set up the printer or the PC with which the G939 is connected with the following configurations:

Serial RS232C Protocol:

Baud Rate	4800 bps
Bits	8 Bits
Parity	None
Stop Bit	1 bit

This information shall be used to program the peripheral, PC or printer that is connected to G939.

In case G939 is not transmitting data and the PC is not receiving the information, observe the following items in your PC:

1. Verify whether the system is selected to the COM port that is connected to G939.

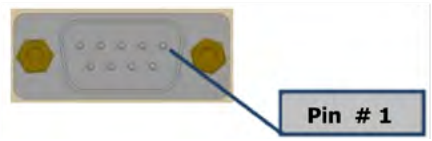
2. Verify whether the configuration of the PC Serial PORT is in accordance with the above indicatedProtocol;

3. Verify the cable pin configuration:

DB9 Female	DB9 Female	Function
1	N/C	-
2	2	RxD
3	3	TxD
4	4	DTR
5	5	GND
6	N/C	-
7	7	RTS
8	N/C	-
9	N/C	-

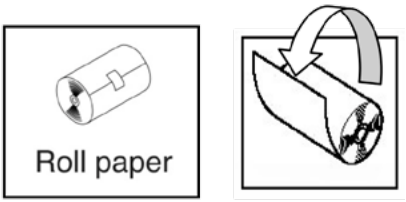
4. Contact the Gehaka Service Department.

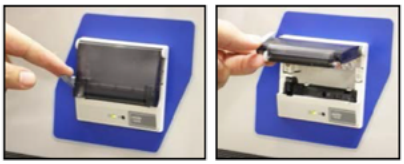
5. Illustration of DB9 Female Connector pins:



3.2 Thermal printer

The Thermal Printer is an optional feature of G939. There are two options for installing the printer, one is built into the body of G939, which spares space and wiring, in addition to leave the RS232 Serial Port available for PC interconnection. The other option is the IG200 Thermal Printer, which will be installed in the Serial Port.





See below the procedure for installation and changing paper in the Printer. Use always Gehaka paper, since it has 10-year printing warranty.

1. The G939 model when it comes with a built-in thermal printer is supplied with thermal paper rolls.
2. Remove the beginning of the roll of paper that is stuck (glued), rip and pull out to get rid of this initial paper segment.
3. To open the printer compartment, pulling up the blue arm and then lift the cover.
4. Place the roll as shown in the picture, leaving a segment of printer paper out of the mechanism.
5. Close the printer cover slightly pressing it until hearing a closing click
6. Turn the instrument on and depress the “Feed” key in order to check whether the printer is pulling the paper.
7. Tear off the excess paper.
8. The printer is ready to be operated.

NOTES: **a- When some red strips are shown in the paper that means it is time to install a new roll.**

b- When the printer red light flashes, that means the paper has finished and you should install a new roll.

c- The green light indicates that the printer is on and ready to operate.

3.3 Cleaning

Routine maintenance will basically consist on cleaning the moisture meter, keeping it free from dirt and dust, specially the chamber. When measuring products such as rough rice, soybean bran, etc., the Chamber may accumulate residues, especially when such cereals are very dry with a low relative humidity.

Never use compressed air for cleaning the chamber and the loading hopper. Use a dry soft brush or paintbrush.

To clean the Chamber proceeds as follows:

The Chamber cleaning may be performed using a soft bristle brush or paintbrush. Do not use liquids.

Before performing the cleaning the Chamber Door shall be unlocked, if it is attempted to open the door without using this function, the Chamber could be damaged.

To open the door and performing the cleaning:

1. Select “Configuration “ function;

2. Go to function “2.6 Unlocking Chamber Door”;

3. Depress YES;

4. Use the LEFT HAND ARROW to open de door;

5. Disconnect the AC Cord from the G939 rear panel;

6. Put down horizontally the G939 as shown in thephoto;

7. Carefully perform the Chamber cleaning;

8. Connect the G939 again for operation.

For the G939 external cleaning use a cloth dampened with water.

Electronic components
Electronic failures are minimized in the moisture meter through the use of solid-state electronic components. The electronic circuitry is contained in a printed circuit board located on the side of the instrument. Its operation is not affected by dust and the micro-controller is able to detect any failure, showing an error message on the display. In case of any failure, we recommend to return the G939 to Gehaka for the required meter repair and recalibration work.

Do not forget that any time the G939 is connected the micro-controller performs a Self Diagnosis that ensures its proper operation.

3.4 Error messages

Error 1 –Obstructed Chamber

A certain amount of sample or impurities could have been retained in the chamber and with this exceeding the self-adjustment limits of the Chamber. Remove the drawer, use “2.6 Unlocking Chamber Door” function; disconnect G939 from the mains, turn the device upside down and open the chamber door; using a brush or paintbrush clean the chamber. See the proper procedure in “Cleaning”.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 2 – Scale Failure

The electronic scale is not operating properly. This message indicates that there was a fault in the G939 electronic scale. Observe whether there is some grain retained into the loading hopper edge, and whether the Hopper is totally free from the Hopper Protection.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 3 – Low Sample Temp.!
Error 4 – High Sample Temp.!

Indicates that the SAMPLE temperature is either below 0ºC or above 50ºC.

Wait until the sample temperature is balanced with the room temperature before performing the measurement.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 5 – Low Instrum. Temp.!
Error 6 – High Instrum. Temp.!

Indicates that the INSTRUMENT temperature is either below 0ºC or above 50ºC.

This is a protection for the good performance of G939 electronics. Operate the instrument in a room temperature between the allowed ranges.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 7 - Delta Temp. > 15ºC

This error indicates that the temperature difference between the instrument and the sample is greater than 15 ºC. Wait for some minutes with the sample in the G939 drawer so this difference stays below 15 ºC. It is recommended that the sample temperature and instrument temperature shall be as close as possible, whenever possible.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 8 – Low Sample Weight!
Error 9 – High Sample Weight!

After having the sample weight within the limits, a final verification is made after loading; if the amount of sample used is outside the limited that G939 is able to correct, this sample will be unloaded. Increase or reduce the amount of sample to correct the error.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 10 – Low Sample Moisture!
Error 11 – High Sample Moisture!

The G939 was calibrated using the standard oven method, and its precision is ensured in the range where the tests and the adjustment were performed. When the measurement is out of this range, the G939 will display this message. If the measurement is actually out of the scale range, we recommend creating a new Equation using the resources in the website ***www.moisturetester.com.br***. See item "2.8 Uploading Internet Equation" for more details of the procedure.

Error 12 - Access Locked!

This message is displayed when we attempt to enter the "Configuration" function without the Hard Lock key that releases the access to that function. This key shall be installed in the G939 serial output. It is the security resource to prevent G939 parameters from being inadvertently changed.

Error 50 - MEM C Call Service
Error 51 - MEM D Call Service
Error 52 - RTC Call Service
Error 53 - TRIM Call Service
Error 54 - A/D Call Service
Error ?? - Call Service

When G939 is connected, it performs a self-diagnosis, ensuring the equipment will make reliable measurements.

In addition to this test, a verification will be also made at each measurement, and, if errors were found, the above stated messages will be issued.

These messages indicate a G939 hardware fault, and makes its operation impossible, send the instrument to Gehaka Service Department.

3.5 Extreme conditions

Ice or Snow
Samples containing ice or snow will not be satisfactorily measured. Frozen samples may be analyzed provided they are left to heat up in a hermetically closed container to get closer to room temperature. Use the average value of 3 or more readings. Below the temperature range of 5ºC, perform 3 readings and use the average value.

Surface Moisture
Grains from a warmed warehouse when getting in touch with humid air develop surface moisture. The same occurs with some cereals uncovered during a rainfall, which will keep surface moisture for some days unless an artificial heat is applied for drying them. Surface moisture presents very low impedance to the high-frequency current flow, thus incorrect readings will be obtained.

Moisture Measurement Processes
There are two methods for measuring moisture in cereals. The primary one and the secondary one. The primary method consists on a procedure using the vented oven. This procedure is time-consuming and would not obviously be convenient for use on grain reception. For this reason, the secondary method was developed, so that using the cereal electrical properties, quick measurements can be made.

Although many research works have been carried out in the field of electronics and also on the properties of cereals, it is not possible to analyze a cereal without some variations. Some of the involved facts are discussed below:

We recommend that the product to be measured by the G939 shall be clean and free from impurities that could interfere in the moisture measurement. We should considered that, in the instrument calibration process with the oven, it was always used the product clean.

Unfortunately, a cereal cannot be measured until the harvest is completed and the calibration cannot be modified until the measurement of a sufficient number of samples, in order to be able to determine the change in the cereal electrical properties.

The size of the seed does also affect the test quality. Corn is an example of a difficult cereal to be measured, due to the irregular size and shape of the seed. In fact, there are nearly 400 different varieties, maturing in 90 to 125 days. It is evident that, the issue of precision in moisture measurement is the on-going increase in the variation of the electrical properties.

Cereal moisture measurement is significantly affected in its accuracy by moisture and temperature range, cereal density, low temperature, mold or swelling. Moisture meters are calibrated with quality grain seeds, and certain attempts of measuring electrical properties on crushed or broken grains, or on grains with a high content of foreign matter, will certainly impair the results.

We do not only have different cereals, such as wheat, barley, corn, soybean, rice and others, but we also have a number of variations of each type of cereal. Each cereal creates its own problem for moisture measurement. With new efforts, new hybrid cereals are developed and the electrical properties of these cereals may slightly change, as for example, the grain density measurement.

Different regions of the country, different methods of cultivation under development, and the soils have to be taken into consideration when trying to obtain average values for calibrating a moisture meter to be used throughout the country.

In the operation of every moisture meter, the duly specified mechanical operations shall be performed. A representative sample of the batch shall be collected, and the moisture and temperature range shall be observed. The moisture meter shall be checked at least annually to ensure the reliability of results.

We encourage your involvement in the development of calibrations, and we ask you to contribute to our work by supplying samples or goods with the calibration under development. Gehaka offers a specific laboratory for moisture measurement and, with these results it is possible to improve the performance of moisture meters.

3.6 Technical specifications

Number of Scales	68 factory set, it can receive up to 250 scales.
Moisture	
Range	Depending on the product, see Table.
Moisture Scale Interval	0.1 % or 0.01 % selectable.
Precision	±0.3 % related to oven in the scale range.
Moisture Limits	Depending on the product, see each one.
Scale	
Range	from 0 to 1.000 g
Scale	Interval 0.1 g
Precision	±0.2 g
Sample Weight	Depending of each product.

Sample Thermometer

Operating Range	from 0º to 100°C
Scale Interval	0.1 ºC
Precision	±0.3 ºC
Function	Sample temperature automatic correction, within 2 - 15 seconds depending on the temperature difference between sample and G939. Correction range from 0°° to 50°C.

Instrument Thermometer

Operating Range	from 0º to 100°C
Scale Interval	0.1 ºC
Precision	±0.3 ºC
Function	Monitors G939 operation temperature and the difference between sample and instrument.

Data Output	Serial RS232C Bidirectional.

Printer (*OPTIONAL)

Printing Method	Thermal
Density	203dpi x 406dpi
Paper	White Thermal Paper - 56 ± 1 mm Width (Max. Roll Diameter 40 mm)
Printing Life	10 years (Gehaka Paper).
Speed	5.3 lines/sec
Paper feed rate	45 mm/sec.
Expected life	30 million lines.
Weight	5.7 kg
Dimensions	345 x 311 x 192 mm
Power supply	Full Range 90 V - 240 VAC power supply.
Operating temp.	Room temperature between 0° and 45°C.

Accessories	Instruction manual; Plastic Scoop; Serial cable for PC connection; Brush for chamber cleaning; 06 x Paper rolls.
Optional	Compact thermal printer, model IG200 Box with 12 thermal rolls (Width 56 ± 1 mm & Max. Diameter 40 mm) Adapter for RS232C/DB9 for standard USB and cable.

Available scales in this version and operating ranges for each Product:

Moisture Range per Product		
Product	%Min	%Max
Natural Almond	3	30
Peanut	1	30
Whole Proc. Rice	5	30
Nat. Proc. Rice	5	30
Parb. Proc. Rice	5	30
Nat. Rough Rice	7	30
Parb. Rough Rice	7	30
Oat	6	22
Oat Husk	7	35
Cocoa 100 g	4	18
Coffee	9	25
Coffee ISO6673	7	22
Gold Coffee	7	35
Pergamine Coffee	6	44
Canola	5	20
Rye	6	40
Barley	9	30
Coriander 75 g	5	20
Rapeseed	7	17
Clove	10	25
Pea	6	20
Citrus Bran	8	16
Soybean Bran	6	24
Anão Mula Bean	10	25
Butter Bean	6	35
Navy Bean	7	35
Carioca Bean	5	35
Coruja Bean	5	30
Black-Eyed Bean	6	35
Jalo Bean	5	25
Macaçar Bean	10	25
Pearl Bean	9	40
Pingo Oro Bean	5	30
Black Bean	8	35
Pinto Bean	6	35
Rosinha Bean	6	30
Kidney Bean	6	30
Sesame Seed	2	16
Sunflower seed	5	25
Grits	4	25
Guarana Husk	7	25
Lentil	7	30
Flax Seed	6	17
Macadamia nut	1	40
Malt	2	20
Castor Bean	4	18
Pearl Millet Seed	7	40
Corn	7	40
Grated Corn	5	50
Popcorn Corn Seed	5	35
Mustard	7	30
Black Pepper	6	30
Physic Nut	6	35
White Quinoa	7	21
Cottonseed Husk	6	22
Birdseed	2	50
Forage Turnip S.	5	15
Niger Seed	2	50
Italian Millet S.	2	50
Henfoot Seed	2	50
Soybean	8	35
Sorghum	7	40
Wheat	5	40
White Wheat	5	40
Durum Wheat	5	40
Red Wheat	5	40
Triticale	5	33
Urucum Seed	7	30
Universal Scale	1	60

3.7 Warranty

The information in this manual is regarded correct until the date of its publication, as stated in the sales invoice of the product.

Gehaka will not assume any liability resulting from the improper use or mal uses of this product, and also assumes no liability for non-observance of the information stated in this manual, and it reserves the right to modify it without previous notice.

Gehaka refuses any direct or indirect liability for accidents, damages, loss and profits, good or bad results on analyses, processing, purchase or sale of goods based on this instrument.

The equipment sold is guaranteed against failures of material or craftsmanship, for a period of one year from the date of manufacture or sale.

The responsibility of Gehaka under this warranty is limited to the repair or replacement, or optional credit granted, of any products returned by the user/buyer during the warranty period.

This warranty does extend to the coverage of damages or malfunction caused by fire, accident, modification, carelessness, improper use, repair or maintenance without authorization of the manufacturer, or even by negligence, malpractice and imprudence in the use.

Gehaka does not expressly or implicitly assumes any liability, except hereby notified.

Gehaka does not guarantee the continuity of merchantability of this product, or its suitability for a given purpose.

The responsibility of Gehaka is limited to the unit sales price, as stated in the sales invoice or price schedule, of any defective good, and it will not include the repair of losses and other material and/or moral damages, profit loss or any other consequential damages arising from the use of the equipment, other than those previously provided.

The Validity of this Warranty is one year, starting from the date of the invoice. However, the guarantee period for the painting is thirty days, starting from the date of the invoice.

The product requiring service during the warranty period shall have the freight to Gehaka and return to customer paid by the Customer.

Gehaka's salespersons or sales representatives are not authorized to offer any additional warranty other to that described in this Manual.

Notes

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Agricultural Equipment Line

Portable Grain Moisture Tester G600*i*
Portable Grain Moisture and Impurity Analyzer G650*i*
Bench Grain Moisture Meter G810
Bench Grain Moisture Meter G939
CA50 Moisture Tester
IV2500 Infrared Moisture Analyzer
IV3100 Infrared Moisture Analyzer
BK Semi Analytical Balance

Ind. e Com. Eletro Eletrônica Gehaka Ltda.
Av. Duquesa de Goiás, 235 - 05686-900
São Paulo - SP - Brazil
Phone: +55 11 2165 1100
sales@gehaka.com.br
www.**gehaka**.com.br