User manual
*Moisture meter **G610i***

Table of Contents

Introduction

The Moisture Meter G610i gathers all the characteristics to provide the most accurate reading on grains moisture.

With a single operation and without depending of the operator, the model G610i provides a moisture reading withing few seconds, for a wide range of products.

With a simple keyboard of only 5 keys, it is possible to operate the instrument and quickly setup it without requiring a long user training.

G610i enables the moisture analysis using the FLOW THRU technology. It is not necessary to provide the sample external weighting, the temperature corrections, ad weights are automatically performed, without using another resources, or additional tables.

The calibration curves for each cereal were obtained at the Gehaka laboratories, using samples collected from several planting areas.

Using the standard stove method as reference, the measurement scales for each product were created. These curves were transferred to the G610i memory and are easily identified by the product name and its version.

If it is necessary to develop new calibration curves, there is a function in the web site **www.moisturetester.com.br** that allows the creation, edition and installation in your moisture meter G610i.

The G610i has three instruments into one, managed by a state-of-the-art internal microprocessor. They are these three instruments: an electronic scale, which measures the sample weight; a built-in digital thermometer, which measures the sample temperature inside the chamber and the G610i temperature, and finally a Capacitance meter, which indicated the percentage of moisture to suffer the correction from the other parameters further up.

Its program runs all the required calculations, resulting in extremely reliable and repetitive readings. It still performs: automatic setting and checking of all the electronic circuits for the good operation.

The FLOW THRU instrument drawing allows that quick readings are accomplished, that is, in less than 40 seconds.

Simply select the product, spill the sample from the G610i Weighting Vessel, until it BEEPS, load the sample,, the measurements will be taken and the moisture content will be automatically provided. This all is displayed in an alphanumeric digital LCD display (Liquid Cristal Display), of easy reading with 16 characters and 2 lines, in Portuguese language.

The G610i also has a bidirectional communication port type serial RS232C. Therefor, it is possible to connect the G610i to a printer so that the media can be printed in a label, making the counter proof identification easier, or it can even connect the meter to a PC and transfer the information to a management system.

The G610i is run with an external power source type FULL RANGE, that is, the instrument operation is assured to mains that vary from 90 to 240VAC, protecting the instrument against the mains oscillation.

It is agreed that the indication in the G610i display means:

ON	Switches on the G610i
->	Right arrow
<-	Left arrow
YES	Operation confirmation
OFF	Quit, Switch off

Description

1. **SAMPLE LOAD HOPPER**
   The location where the sample of the cereal will be spilled in order to determine the moisture.

2. **DISCHARGE BUTTON**
   Through this Button, we discharge the sample from the Measurement Chamber. It will be used at the end of the Moisture measurements.

3. **LCD DISPLAY**
   Displays the results and settings with alphanumeric characters.

4. **ON**
   Switches on the G610i.

5. **YES**
   Confirms the Selection of a function or setting.

6. **RIGHT ARROW**
   Displays the next function or increments a value of a division.

7. **LEFT ARROW**
   Displays the previous function or decrements a value of a division.

8. **OFF (ESCAPE)**
   Switches off the G610i, quick a function or setting.

9. **DRAWER**
   Receives the cereals sample from the chamber, after the measurement was carried out.
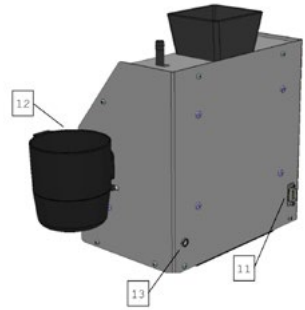
10.   AC ADAPTER
Converter, switched source, it operates from 90 to 240VAC, if removed, is starts operating with internal 9V battery.

11.   SERIAL PORT CONNECTOR RS232
Data output to the printer or microcomputer.

12.   WEIGHTING VESSEL
Sample receiver for weighting and used to spill the sample from the Weighting Vessel.

Installation of G610i

Check the package carefully, if there are marks and damages in the cardboard box, it indicates that there were problems during the transportation.

Open the package, check the state of the G610i. Remove the equipment and check if all the accessories are included.

Place the G610i on a stable table, so that it does not move during the operation. Remove the adhesive tapes that hold the Drawer and check if it slides smoothly.

Connect the AC Adapter in the connector in the real panel and fit it securely, taking care to see if the plug is totally inserted in the connector. It is not necessary to check the power supply voltage, the source is "Full Range", and the mains selection is not necessary. It is also recommended to use a voltage stabilizer.

When pressing the ON key, the G610i will start the operation, running a self-diagnosis to check if its components are working properly. In the case the instrument verifies that any of is components is working incorrectly, it will display an error message in the display regarding the failure.

The G610i can work connected in the outlet, or using an internal 9V battery. This switching is automatically selected. It is important to not that, when working with the 9V battery, the Display Backlight will be switched off in order to save the battery charge.

When the G610i is started, a percentage indicating the Battery status is displayed during the self-diagnosis, note:

30% a 100%	Normal operation
0% a 30%	Request the battery change or charge
0%	Indication of low battery, the G610i no longer works

The function "2. Battery Test" indicates the Battery voltage beyond the statue in the percentage format.

The G610i shall be operated inside a location free from excessive dust and with a temperature within 0° to 45 °C.

Functions diagram

Below, there is a diagram that indicates all the G610i functions and will help understanding the operation.

```
-------------------------------------------------MENU G610I-------------------------------
ON -+ 1. Measure Unit
     |      Performs the unit measurement. The cereal will be selected, the weighting performed, and we
     |      will have the moisture content. To measure again, just pour the new sample in the hopper.
     |
     | 2. Battery Test
     |      Indicates the battery status. The percentage indication displays the remaining capacity
     |      of the battery. The Left and Right Arrow sends the Report and Escape quit the function.
     |
     | 3. Set-up system
     +--+
        | 3.1   Set Date and Time
        |          Sets the Date and Time used in the reports. Use the ARROWS and
        |          YES perform the setting.
        |
        | 3.2   Set Number of Media Elements
        |          Sets the number of measurements that will compose the average. We can select
        |          between 1 to 5 measurements.
        |
        | 3.3   Set Number of Decimals
        |          Sets the number of decimal places shown in the display and in the reports
        |          for the moisture.
        |
        | 3.4   Set Printing Mode
        |          Directs the printing to the Printer or Computer.
        |          The report via computer only sends the data.
        |
        | 3.5   Set Number of Printed Copies
        |          Adjusts the number of copies that will be sent to the printer.
        |          Selectable from 1 to 5 copies.
        |
        | 3.6   Set Contrast
        |          Sets the Contrast between 55% and 100%, being 100% the maximum contrast.
        |
        | 3.7   Load Internet Equation
        |          Enables the G610i to be remotely controlled by a PC and download the Curves.
        |
        | 3.8   Load Standard Equation
        |          Download the built-in equations in the G610i. All the equations will be
        |          programmed and may not be the latest.
        |
        | 3.9   Select Curves
        |          Performs the selection of which curves will be displayed in the menu
        |          "1. Measure Unit". Sans the Curves internal data and press YES to select,
        |          conclude with the key DESLIGA (OFF).
        |
        | 3.10  Self-Diagnosis Report
        |          Performs a self-diagnosis in the G610i and issues a report with all the data.
        |
        | 3.11  Select Language
        |          Selects the language used by G610i, options are Portuguese, Spanish,
        |          English, French, German and Italian.
        |
        | 3.12  Auto Shutoff
        |          Activates or not the auto shutoff function in 5 minutes without using
        |          the keyboard, to save the battery.
        |
        | 3.13  Set Offset
        |          Performs the offset setting of one of the Curves selected.
        |          Enter the value with the signal opposite to the error.
        |
        +-------------------------------------------------------------------------------------
```

1. Measure - measuring moisture

1. Select "Measure" in the main menu, press YES to confirm;

2. Choice the type of cereal to measure the moisture. Use the Right/Left ARROWS keys until you find the desired product. The indications below the products names are the minimum and maximum moisture limits that G610i is able to read. Press YES to confirm your choice.

```
WHEAT
Moisture:   13.09%
```

```
Wait...
```
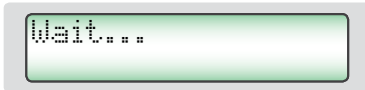
3. Get a product sample of at least 200g to which you want to know the moisture and, using a plastic cup, slowly pour the cereal sample in the Weighting Vessel, until the indication of 100% is displayed in the display, a beep will sound indicating that the sample weight is correct. In the case that weight is exceeded, the display will indicate a value higher than 100%, and the sample excess shall be removed from the Weighting Vessel.

```
100.0%      |
████████████
```

```
Wait...
```

```
Spill
The Sample...
```

4.   Pour the weighted sample in the G610i Load Hopper, using the Weighting Vessel edge as reference. Observe the drawing at the side, the Weighting Vessel shall pour the sample from backward to forward the G610i, the sample shall be poured quickly, do not pour it slowly because it decreases the instrument repeatability.

```
Thermometer
Measuring...
```

```
Capacitance meter
Measuring...
```

5.   After few seconds, the G610i will indicate the value for the product moisture in the display. If the Right/Left keys are pressed, the G610i will display all the measures it has performed, that is:

```
Wheat
Moisture: 13.09% >
```

When you select the Right/Left Keys, we will have:

```
Temp.:  24.8ºC
Date :11/16/16  >
```

```
Curve: 001765
Simple:      9 >
```

6. After successfully concluding the measurement, the G610i will send all the measurement data to the printer or computer through the serial output. An example of the report is shown below.

NOTE: If there is a large difference in temperature between the product and the G610i Chamber, where the Temperature Sensor is locate, it will wait until there is a thermal balance between both. It can cause the temperature measurement to take a longer time to be carried out. Thus, we have improved the instrument accuracy, measuring the sample real temperature.

7. After carrying out the reading discharge the Chamber using the Discharge Button.

8. When the G610i is indicating the measurement results on the display and a new sample is poured in the Weighting Vessel, the G610i will carry on a new measurement using the same settings as the previous measurement. If the OFF key is pressed, the function MEASURE will be quit, returning to the main menu.

NOTE: If the moisture content is higher than 22%, the G610i will request the sample to be measured again, repeating it three times to assure a higher accuracy in the reading.

```
=================================
      GEHAKA     G610i
---------------------------------
Firmware Version          1.00.016
Hardware Version          1.10
Serial Number     15061501001001
=================================
Product : Coffee ISO6673
Version Equation =      1760
Sample Number ...=       44
Sample Temp. ....=     24.2 'C
Instrument Temp. =     23.5 'C
Sample Weight ...=    142.0 g
---------------------------------
Moisture ........=     9.31 %
---------------------------------


---------------------------------
Signature                13:07:48
Responsible              15/05/17
=================================
```

2. Battery test

The Battery function is used to perform the measurement and indicate the battery status at the moment. Its main function is to prevent it from running out of power during an external measurement. Execute the procedures:

1. Press YES to enter in the "Battery" function. A screen will be displayed indicating the Battery voltage and the charge percentage still remaining until it is totally discharged. It is possible that a new battery indicates a percentage higher than 100% and it will be considered as discharged when it displays 0%. It is important to note that the systems only switched to the Battery when the power Adapter it is removed from the mains.

```
9.1 Volts
     100 %
```

2. There are two errors that the Battery measurement system displays, they are respectively:
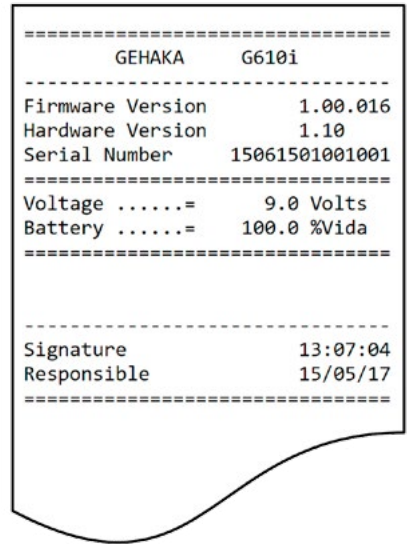
```
Error 16:
Source > 13 Volts
```

This error indicates that an improper Adapter is being used to power-up the G610i, there is a high risk of damages to the equipment electronics; please, immediately remove the source that is being used and acquire a new power Adapter at Gehaka.

```
Error 17:
Discharge Battery
```

This error shows that the battery is completely discharged; please provide the battery change as shown later in this manual.

3. If the RIGHT ARROW is pressed, a report with the result will be printed, as shown at the side:

4.	Gehaka still offers an optional, which is the Rechargeable Battery for the G610i. This Battery has the same mechanical aspect as the disposable Battery; however it is rechargeable Nickel Cadmium. Only in this case the power Adapter will e another with voltage of 12V, enough to recharge the Battery in 12 hours of loading. To verify if the battery was totally charged, observe the loading percentage in this function, it must achieve approximately 120%, and at this moment the Adapter can be unplugged from the mains. The expected autonomy for this Battery is of 10 hours of continuous operation. There can have variations depending on the model of battery used.

```
=================================
       GEHAKA     G610i
---------------------------------
Firmware Version          1.00.016
Hardware Version          1.10
Serial Number       15061501001001
=================================
Voltage ......=          9.0 Volts
Battery ......=       100.0 %Vida
=================================


---------------------------------
Signature                 13:07:04
Responsible               15/05/17
=================================
```

To optimize the battery duration, let in ON in the function "3.12 Auto Shutoff".

5.	To conclude this function press OFF (ESCAPE), there is a summary of the actions of keys in this function below:

YES KEY:	No effect in this function;
LEFT ARROW:	Sends report by Serial;
RIGHT ARROW:	Sends report by Serial;
PRESS OFF:	Quit the function;

3. Set-up system

The mode "3. Setup" allows performing settings or configurations in the G610i. We will describe each of these functions below.

They are:

      3.1.   Set Date and Time
      3.2.   Set Number of Media Elements
      3.3.   Set Number of Decimals
      3.4.   Set Printing Mode
      3.5.   Set Number of Printed Copies
      3.6.   Set Contrast
      3.7.   Load Internet Equation
      3.8.   Load Standard Equation
      3.9.   Select Curves
      3.10.   Self-Diagnosis Report
      3.11.   Select Language
      3.12.   Auto Shutoff
      3.13.   Set Offset
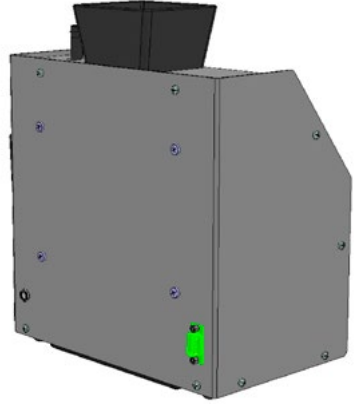
Observe that the number displayed at the beginning of each function corresponds to the same number displayed in the G610i Menu; therefore, it is simpler to identify where the explanation of each function is in the manual.

We will describe each of them below.

3.1. Set date and time

This function performs Date and Time setting for the teal time clock (RTC). This value of date and time will be sent to the reports by the Serial Port RS232 after the measurement.

The G610i is already supplied with the clock set at the factory, but it can eventually be readjusted for the daylight saving time.

Internally, there is a battery that keeps the clock working even when the G610i is switched off from the outlet. This battery is to last more than 5 years, and to test it, just switch off the G610i and observe if the clock starts indicating the time as 00:00:80, if it occurs,

contact the Gehaka Technical Assistance to change the battery.

To perform the Date and Time setting:

1. Search the function "Set-up" and press YES;

2. Search the function "3.1 Set Date and Time", press YES;

3. Now, use the Right/Left ARROWS to Increase/Decrease respectively the value for TIME. When the value is correct, press YES, G610i will skip to the next field to be adjusted;

```
3:00:00 PM
11/27/2013
```

4. Repeat this procedure to perform the adjustment of MINUTES, DAY, MONTH and YEAR.

NOTE: An underline will be displayed below the value that is being adjusted, after pressing YES it will advance to the next item to be set.

3.2 Set number of media elements

This function performs the setting of the number of elements that will compose the reading media used to calculate the moisture percentage final value. We can select between 1 to 5 elements.

To perform the setting for the number of Media Elements:

1. Search the function "Set-up" and press YES;

2. Search the function "3.2 Set Number of Media Elements", press YES;

3. Use the Right/Left ARROWS to Increase/Decrease the value for the Number of Media Elements. This setting is limited between 1 to 5 elements;

```
Measurements = 1
—   <   YES   >   +
```
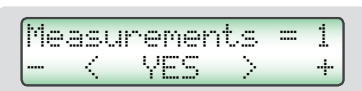
4.   Press YES to conclude the setting.

NOTE: It is important to note that independently from the setting performed in this function when the moisture content exceeds 22%, the reading will be ALWAYS performed with the average of three elements.

3.3   Ajusta número de decimais

This function sets the number of decimal places shown in the display and in the reports for the moisture. If one decimal place is used, the rounding of the second place will be automatically performed. The standard from the factory is one decimal place.

To perform the setting for the number of decimal places proceed:

1. Search the function "Set-up" and press YES;

2.   Search the function "3.3 Set Number of Decimals", press YES;

3.   Use the Right/Left ARROWS to increase/decrease the value for Decimals. This setting is limited between 1 to 2 decimals;

```
Places =   1
- < YES > +
```

4.   Press YES to conclude the setting.

3.4. Set printing mode

This function directs all the data resulting from the measurement to the Printer or Computer.

A.   Printer:

In this mode, all the measurement data will be sent in the Report format as indicated below by the Serial Port RS232.

If the G610i has a built-in Thermal Printer, this report will be simultaneously printed and sent by the Serial Port RS232.

B.   Computer:

The Computer Mode only sends data, disregarding the formating. The data is separated by ";" to make the separation easier. This report can be easily captured and interpreted by a computerized system that is connected to the Serial Port RS232.

An example of String sent is provided below. The conclusion is with CR and LF.

```
15;  12.35;  141.7;  0.0;  26.9;  27.4;  66.4;  Wheat;  20111101;  G610i;
1.00.000;1.00;16:51;18/01/13;<CR><LF>
```

Description of the data fields submitted:

```
Sample;
Moisture;
Weight;
Density;
Sample Temperature;
Instrument Temperature;
Scale _ A (Capacitance);
Product Name;
Equation Version;
Instrument Model;
Firmware Version;
Hardware Version, Time;
Date;
<CR><LF>
```

```
================================
         GEHAKA    G610i
--------------------------------
Firmware Version          1.00.016
Hardware Version          1.10
Serial Number     15061501001001
================================
Product : Coffee ISO6673
Version Equation =     1760
Sample Number ...=       44
Sample Temp. ....=    24.2 'C
Instrument Temp. =    23.5 'C
Sample Weight ...=    142.0 g
--------------------------------
Moisture ........=     9.31 %
--------------------------------


--------------------------------
Signature                 13:07:48
Responsible               15/05/17
================================
```

To perform the selection of the printing mode, proceed:

1. Search the function "Set-up" and press YES;

2. Search the function "3.4 Set Printing Mode", press YES;

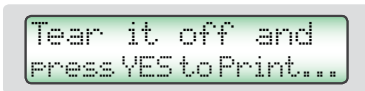3. Use the Right/Left ARROWS to select between two printing modes, Printer or Computer;

```
>        Printer
         Computer
```

4. Press YES to conclude the setting.

3.5. Set number of printed copies

This function allows the selection of the quantity of copies that will be generated in the printed report.

It is possible to select from 0 to 5 copies, where zero copies means do not print the report. For each sent copy, a screen will be displayed to tear off the paper and press YES so that the next copy can be printed.

```
Tear it off and
press YES to Print...
```

To perform the selection of the number of copies, proceed:

1. Search the function "Set-up" and press YES;

2. Search the function "3.5 Set No. of Printed Copies", press YES;

3. Use the Right/Left ARROWS to select the number of copies desired;

```
Copies=   1
- < YES > +
```

4. Press YES to conclude the setting.

3.6. Set contrast

This function allows setting the LCD Display contrast.

This value can be adjusted between 55% and 100%, being 100% the maximum contrast. The setting will be stored in the G610i memory.

To perform the setting for the Contrast, proceed:

1. Search the function "Set-up" and press YES;

2. Search the function "3.5 Set Contrast", press YES;

3. Use the Right/Left ARROWS to increase/decrease the value for Contrast. These setting advances in increments of 5%;

```
Contrast=   90%
— < Setting > +
```

4. Press YES to conclude the setting.

3.7. Load Internet equation

One of the great innovations in the G610i is the possibility of using the Internet to perform customization of products that G610i will measure. All this information, news and instructions to perform them can be accesses on the web site **www.moisturetester.com.br**
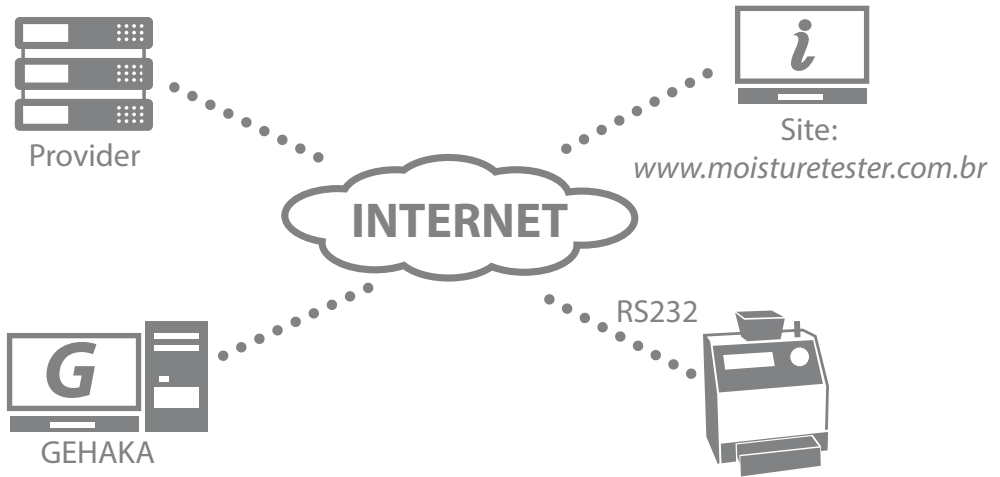
We can basically:

- Record your G610i. It also allows us to know which scales are important to you, and allows us to keep updated on new updates, including improvements in the firmware of G610i.

- Select which products will be displayed by the G610i. With that, the time for change in scales has decreased, making the operation easier. The curves backup will also be performed for your G610i in the cloud, thus assuring its return to the instrument if it is totally damaged.

- Update the Curves as they are reviewed. Gehaka works all year reviewing the scales of G610i, or creating new ones, however, before that, the equipment had to be taken to a Service Center to get the new updates. Now with the use of Internet, you can receive an e-mail warning that there was a review of a Product that is in your equipment in few minutes, connected to a computer, it can be updated.

- Create new Curves. From the "Reference Scale" it is possible to create a new Curve for the product that the G610i does not have. It is simply to prepare a chart with the readings fro the Standard and those obtained in the G610i, and you will create a new Curve in few minutes and can install it in your G610i. All the support to creation will be guided by out web site.

Connecting the G610i to a computer is quite simple. Follow the steps below:

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

2. Connect the Serial Cable supplies with the G610i in the SERIAL port RS232 on the PC and the G610i. If your computer does not have a serial port RS232C, contact the sales@gehaka.com.br and request an adapter USB/RS232 ,model UR100. All the information required for its installation are contained in its manual;

3. Switch on the G610i;

4. Select the function "3. Setup" and press YES;

5. Select the function "3.7 Load Internet Curve";

6. Access the web site **www.moisturetester.com.br** and click on "Update your equipment" in orange color.

7. From this point on, follow the instructions displayed in the computer, which assumes the G610i control. All the indicated operations can be performed at the site.

8. Perform the Registration of your G610i, it will provide you countless advantages.

How to exit the function "3.8 Load Internet Curve". This function delivers the control of the G610i processor to the computer to which it is connected. Once you enter this function, there are have only two alternatives exit it:

A. Exit by the web site commands, never quit otherwise, it can block the G610i;

B. Switch off, wait 5 seconds, and switch on the G610i power again.
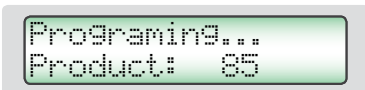
3.8.   Load standard equation

This function shall be used only when any failure occurs in the curves download on the Internet for the G610i.

In this functions, new Standard Curves will be downloaded, which are embedded in the G610i, and they can not be updated anymore. In addition, there is no selection option, and all the Curves will be downloaded. The Curves suffer updated with the time, and we strongly recommend that the Internet connection is made in order to download the most updated curves.
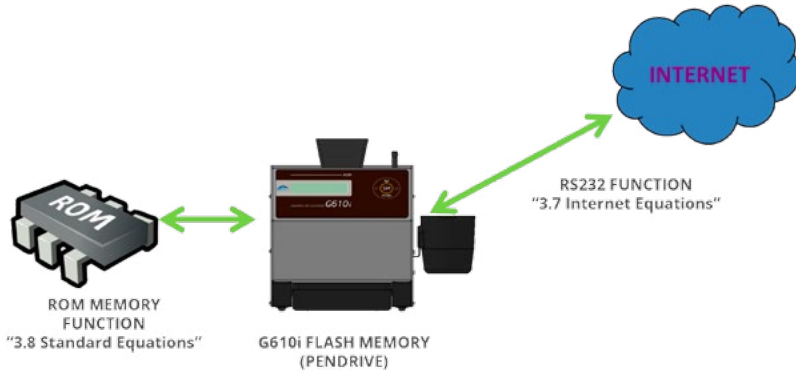
After this function, we can use the function "3.9 Select Curves" to select only the useful Curves.

To download the Standard Curves:

1. Switch on the G610i;

2. Search for the function "3. Setup" and press YES;

3. Search for the function "3.8 Load Standard Equation", and press YES, a message will be displayed indicating the product loading in the memory:

```
Programing...
Product:   85
```

4.   The system concludes this function automatically.

ROM MEMORY
FUNCTION
"3.8 Standard Equations"   G610i FLASH MEMORY
(PENDRIVE)

RS232 FUNCTION
"3.7 Internet Equations"

3.9.   Select curves

In the Database, there are more than 80 Curves, Grains or Cereals. It is tedious to have to scan the whole chart, for example, when we want to go from Arroz (Rice) to (Soja) Soybean, which is at the end of the chart. To make this work easier, a function was created to allow selecting only the grains that you want to used; therefore a change from a grain to another is quicker.

When the Curve update is made on the Internet, it will be made only for these selected grains, making the process much faster. At any moment, we can make a new grains selection, including changing the selection order.

To select our list of grains, proceed as follows:

1.   Switch on the G610i;

2.   Search for the function "3. Setup" and press YES;

3.   Search the function "3.9 Select Curves", and press YES, a screen will be displayed reminding that the key OFF shall be pressed to confirm the grains selection. If the YES key is not pressed any times, the OFF key simply quit the function keeping the previous grains selection. See the screen:

```
The OFF key Confirms
the Selection
```

4. From this point on, the Curves Database (grains) available in this G610i memory will be displayed. Use the RIGHT / LEFT ARROWS to advance or return in the products selection. When you find the desired product, press YES to confirm; this product will be learned and the system will advance to the next one.

```
Amaranth
001851  9%  >  25%
```

5. To conclude, use the OFF key.

3.10   Auto report

It performs the self-diagnosis in the G610i and issues a report with all the data. The Report will be sent by the serial output RS232 or to the Thermal Printer connected to the G610i serial port.

To obtain the report:

1. Switch on the G610i;

2. Search the function "Set-up" and press YES;

3. Search the function "3.10 Auto Report", press YES;

4. Many information related to the G610i self-diagnosis will be displayed on the screen, at the end, we will have the message below indicating that the report is being printed:

```
Wait issuing
Report...
```

5. Wait for the Report printing;

This report provides to the Technical Assistance the data to assess if the G610i is working properly, since it has already been passed through the self-diagnosis when switched on.

Note that there are two groups of information, the first one indicates the G610i operation, the second one indicates the Products that area available in the G610i with the Version of the Calibration Curve and the minimum and maximum values for moisture.

There is an example of report at the side:

```
=================================
      GEHAKA    G610i
---------------------------------
Firmware Version          1.00.016
Hardware Version          1.10
Serial Number      15061501001001
=================================
Product : Amaranto
Version Equation =       1851
Sample Number ...=         43
Sample Temp. ....=      24.3 'C
Instrument Temp. =      23.6 'C
Chamber Frequency=    2217.8 KHz
---------------------------------
|   Humidity Range by Product   |
|-------------------------------|
| Product        | Ver.|Min|Max|
|----------------|-----|---|---|
|Rice Rough Long | 1789|  7| 30|
|Cocoa Beans 100g|  863|  4| 22|
|Coffee Brazil   | 1759|  9| 25|
|Coffee ISO6673  | 1760|  7| 25|
|Coffee Oro      |  127|  7| 35|
|Coffee Parchment|  128|  6| 44|
|Coffee Roasted  | 1811|  2| 15|
|Canola          | 1402|  5| 30|
|Coffee Bark     | 3284|  3| 30|
|Cashew Nuts     |  930|  1| 15|
|Rye             |  131|  6| 40|
|Barley          |  133|  9| 30|
|Beans Nano      |  308| 10| 25|
|Beans Azuki     | 1853|  8| 25|
|Beans Turtle    |   79|  6| 35|
|Beans White     |   80|  7| 35|
|Beans Pinto     | 1761|  5| 35|
|Red Eye Beans   |   23|  5| 30|
|Beans Blackeyed |   82|  6| 35|
|Beans Peruvian  |   83|  5| 25|
|Beans Cowpea    |   84| 10| 25|
|Beans Pearl     | 1372|  9| 40|
|Beans Gold      |   28|  5| 30|
|Beans Black     | 1790|  8| 35|
|Beans Colored   |  477|  6| 35|
|Beans Pink      |   87|  6| 30|
|Beans Red       |   88|  6| 30|
|Sunflower       |  311|  5| 25|
|Macadame        |  145|  1| 40|
|Corn            | 3428|  7| 40|
|Popcorn         |  148|  5| 35|
|Blackpepper     | 1291|  6| 30|
|Cotton Seed     |  317|  6| 22|
|Soybeans        | 3427|  8| 40|
|Sorghum         |  701|  7| 40|
|Wheat           | 1765|  5| 40|
=================================


---------------------------------
Signature              13:06:53
Responsible            15/05/17
=================================
```

3.11. Select language

Selects the language used by the G610. The languages available in this version are: Portuguese, Spanish, English, French, German and Italian.

To select the language, perform the following procedure:

1.   Switch on the G610i;

2.   Search the function "Set-up" and press YES;

3.   Search the function "3.11 Select Language", press YES;

4.   Use the Right/Left ARROWS to select the desired language

```
English
      < Select >
```

5.   Press YES to conclude;

3.12. Auto shutoff

Switches on, switches off the Battery economy mode. When activated, it switches off the G610i after 5 minutes without operating any key, in order to save the Battery. The standard from the factory is with the function ON.

To select the language, perform the following procedure:

1.   Switch on the G610i;

2.   Search the function "Set-up" and press YES;

3.   Search the function "3.12 Auto Shutoff", press YES;

4.   Use the Right/Left ARROWS to select the desired mode;

```
   Off
> On 5 min.
```

5.   Press YES to conclude;

3.13.   Auto offset

Through this function, it is possible to make a curve displacement, both in the positive or negative direction, that is, add or subtract a constant value from the curve of a certain product.
This adjustment will be active even if the equipment is switched off, and the setting adjustment already made is not lost. To readjust it, the routine shall be repeated again.

It is not possible to change the angular coefficient (slope) of the curve; in this case, it is necessary to have a survey of a new scale using the "Ref Scale. 142g" and after access the web site **www.moisturetester.com.br** to create a new Curve and download it to the G610i.

Para efetuar o ajuste de Offset:

1.   Switch on the G610i;

2.   Search for the function "3. Setup" and press YES;

3.   Search the function "3.13 Set Offset", press YES;

4.   Select the Product you want do perform the setting using the RIGHT / LEFT ARROWS, press YES to confirm your choice;

```
Wheat
001765  5%  >  40%
```

5.   Use the Right/Left ARROWS again to perform the setting of the error value, in our example it is -0.5%. The signal for the adjustment value shall be the opposite to the value of the error found.

For example, if the measurement performed by the G610i was of 14,0% and comparing it with the standard the reading should be of 13.5%, we calculate:

Offset = G610i - Standard Offset = 13.5% - 14,0% Offset = - 0.5%

```
Offset=   -0.5%
-   <   YES   >
```

6.   Press YES to conclude;

7.   Perform a new reading with the G610i and check if the error was changed to zero, if there is the need of a new correction, be sure to consider the value that has already been adjusted; or we recommend to return the Offset adjustment to 0,00% and start the process again.

Serial Port RS232

Set the printer or the computer in which the G610i is connected with the following set-ups:

Serial RS232C Protocol:

Baud Rate   4800 bps
Bits   8 bits
Parity   No
Stop Bit   1 bit

This information shall be used to program the peripheral device, microcomputer or printer that is connected to the G610i.

In the case the G610i is not transmitting the data and the microcomputer does not receive the information, observe the following items in your microcomputer:

1.   Verify if the system is selecting the port COM to which the G610i is connected.

2.   Verify if the computer's Serial PORT setting is according to the Protocol indicated above;

3.   Verify the cable ping:

DB9 Female	DB9 Female	Function
1	N/C	CHASSIS
2	2	RxD
3	3	TxD
5	5	GND

4.   Contact the Gehaka Technical Assistance.

5.   Image of the pins of Connector DB9, the arrow indicates the pin 1:

Pin 1
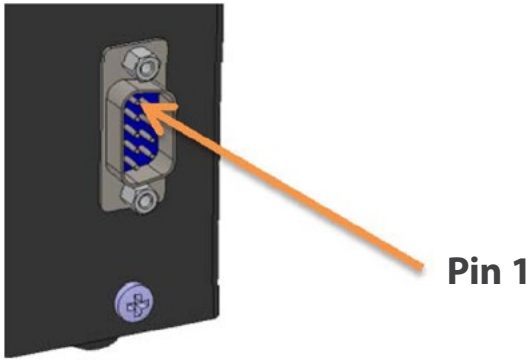
Change the battery

Always use the Alkaline-type battery, because this type of battery does not leak chemical elements along the years. Discard the battery correctly, because it is harmful to the environment.

The battery is installed in the meter lower side (right foot) and to replace it follow the procedures below:

1.   Switch off the G610i from the mains

2.   Remove the power cable from the meter

3.   Remove the discharge drawer from the meter

4.   Lay the equipment backward to access the lower side

5.   Remove the two bolts on the right side

6.   Remove the battery by releasing it from the clip

7.   Install the new battery

8.   Reinsert the bolts

When the mains adapter connector is switched off, the G610i will operate continuously with the battery for a period of approximately 20 hours. To save the battery, enable the function"AUTO SHUTOFF" to shut off the G610i automatically after it is not operated for 5 minutes.

If the battery voltage decrease to a level below the safety limit that assures the equipment correct operation, the display will show a message "change the battery" and will not perform any measurement, thus indicating the need of changing the battery.

It is important to note that the display backlight only operates when the G610i is connected to the Mains Adapter, in order to save the Battery power.
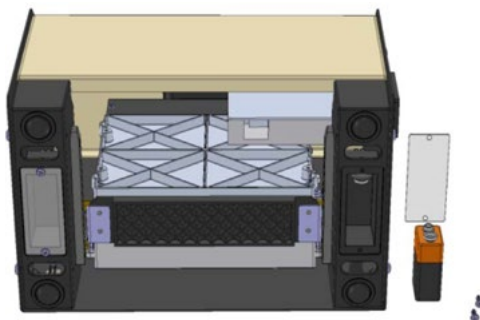
Cleaning

The maintenance routine consists first in the moisture meter cleaning, keeping it free from dirty and dust, specially the Chamber. When products as rice in husk and brans are measured, the chamber tends to accumulate residues, especially when these cereals are very dry and the moisture is low.

For the G610i external cleaning, use a cloth dampened with water.

Never use compressed air to clean the chamber. Use the brush supplied with the G610i. To clean the Chamber, proceed with the following procedure:

To open the door and perform the cleaning, proceed as follows:

1.   Switch off the Adapter from the rear panel and turn it off;

2.   Place the G610i as indicated in the picture;

3.   Open the Chamber door, using the chamber Knob;

4.   Carefully clean the Chamber;

5.   Switch on the G610i again for operation.

For the G610i external cleaning, use a cloth dampened with water.

Electronics
The reasons for failure are minimal, however, the moisture meter uses electronics components in solid state. The electronic circuit is contained in a printed circuit board located inside the dashboard. Its operation is not sensitive to dust, and the micro-controller is able to detect any failure, returning an error message in the display. In the case of any failure, we recommend return the G610i to Gehaka for the required repairs and the instrument adjustment.

Do not forget that every time the G610i is switched on, the micro-controller performs a Self-Diagnosis, which assures its proper operation.
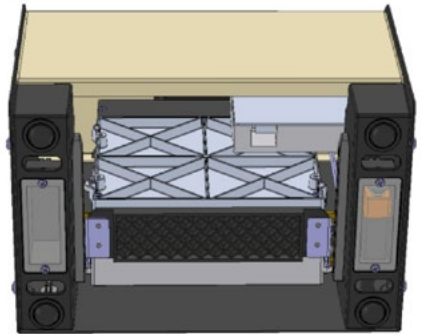
Error messages

Error 1 - Chamber Clogged

A quantity of sample or impurities may have been clogged in the chamber, and it exceeds the Chamber self-adjustment limits. Remove the drawer. Switch off the G610i from the mains, turn the equipment faced backward and open the chamber door, and use the brush to lean the chamber. See the topic Cleaning for the correct procedure.

If the error persists, there was a failure in the instrument, send it to the Gehaka Technical Assistance.

Error 2 – Failure in the Scale

The electronic scale is not working correctly. This message indicates that there was a failure in the G610i electronic scale.

If the error persists, there was a failure in the instrument, send it to the Gehaka Technical Assistance.

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

It indicates that the SAMPLE temperature is below 0 ºC or above 45 ºC. Wait for the sample temperature to balance with the room temperature before perform measuring.

If the error persists, there was a failure in the instrument, send it to the Gehaka Technical Assistance.

Error 5 - Temp. Instru. Low!
Error 6 - Temp. Instru. High!

It indicates that the INSTRUMENT temperature is below 0 ºC or above 50 ºC. That is a protection for the good performance of the G610i electronics.

Operate the instrument in an environment within the temperature range.
If the error persists, there was a failure in the instrument, send it to the Gehaka Technical Assistance.

Error 7 - Delta Temp. > 15 ºC

This error indicates that the difference in temperature between the instrument and the sample is higher than 15 °C.

Wait some minutes with the sample inside the G610i drawer so that this difference is below 15 °C.

It is recommended that the sample and instrument temperature is as close as possible, whenever possible. If the error persists, there was a failure in the instrument, send it to the Gehaka Technical Assistance.

Error 10 - Moist. Sample Low!
Error 11 - Moist. Sample High!

The G610i was calibrated using the standard stove method, and its accuracy is assured in the range in which the tests and adjustment were performed. When the measurement exceeds this range, the G610i will return the message. If the measurement is really outside the scale range, we recommend to create a new Curve using the features in the web site **www.moisturetester.com.br**. See the item "3.8".

Load Internet Equation" for further details for this procedure.

Error 50 - MEM C Call TechAssis
Error 51 - MEM D Call TechAssis
Error 52 - RTC Call TechAssis
Error 53 - TRIM Call TechAssis
Error 54 - A/D Call TechAssis
Error 55 - Call TechAssis

When the G610i is switched on, it performs the self-diagnosis, which assures that the equipment will reliably perform the measurements. In addition to this test, a checking will be performed at each measurement, and if errors are found, the messages indicated above will be displayed.

These messages indicate a failure in the G610i hardware and prevents its operation, send the instrument to Gehaka Technical Assistance.

Extreme conditions

Ice or Snow

Samples that contain ice or snow will not have a satisfactory measurement. Frozen samples can be analyzes, if left to warm in an airtight container to achieve the room temperature. Use an average of 3 or more readings. Below the temperature range of 5 °C, have 3 readings and use the average.

Surface Moisture

Grains obtained from a warehouse with warm interior, in contact with humid air, develop surface moisture. Likewise, it happens to some cereals uncovered during the rain, which will keep the surface moisture for several days, except if an artificial heat is applied to dry them. The surface moisture presents a very low impedance to the high-frequency current flow and consequently an incorrect reading will be obtained.

Moisture Measurement Processes

There are two usual methods to measure the cereals moisture: the primary and secondary. The primary method consists of a procedure using a ventilated stove. This procedure is time-consuming and obviously would not be convenient for the use at the receipt of grains. For that reason, the secondary method was developed so that quick measurements can be performed using the cereals electrical properties.

Even though researches and technological developments have been made in the electronics and also in the understanding of the cereals properties, it is impossible to analyze the cereal without any changes. Some of the facts involved are discussed below.

We recommend that the product to be measured in the G610i is clean and free from any impurities that might interfere in the moisture measurement. We shall consider that, during the instrument calibration method in relation to the stove, the clean product has always been used.

Unfortunately, the cereal can not be measured until it is harvested, and the calibration can not be changed until enough samples are measured, so that the cereal electrical properties can be determined.

The seed size also affects the test quality. Corn is an example of a material difficult to be measures, because the seed size and irregular shape. The fact is that there are approximately 400 different varieties, maturing from 90 to 125 days. Then, it can be observed that the accuracy problem in measuring the moisture is the continuous increase of changes in the electrical properties.

The cereal moisture measurement is significantly affected in its accuracy by the moisture and temperature range to the cereal density, low temperature, mold or swelling. The moisture meters are calibrated with seeds of good quality grains and some attempts to measure the cereals electrical properties when they are crushed, broken or with a large quantity of foreign materials, will certainly affect the results.

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

Different regions of the country, different planting methods under development, and the soils shall be considered when it is attempting to achieve the moisture meter calibration average, which can be used in the entire country.

The established measurements shall be performed at the operation of each moisture meter. A sample that represents the batch shall be collected and the moisture and temperature range shall be observed. The moisture meter must be checked at least annually to assure the reliability of its results.

We encourage your participation in the development of calibrations, and we ask you to help in our work by providing samples or goods that are with the calibration under development. Gehaka offers a specific laboratory to measure the moisture and with these results, it is possible to improve the moisture meters performance.

Technical specifications

Number of Scales	68 at factory, can receive up to 250 scales.
Moisture	
Range	Depends on the Product, see Chart.
Division in Moisture	0.1% or 0.01% selectable.
Accuracy	±0.25% in relation to the Stove in the scale range.
Moisture Limits	Depends on the Product, see each product.
Scale	
Range	0 to 500 g
Division	0.1 g
Accuracy	±0.2 g
Sample Weight	Depends on each product.
Thermometer Sample	
Range Operation	00 to 100 ºC
Division	0.1°C
Accuracy	0.3 °C
Function	Sample temperature automatic correction, within 2 to 15 seconds, depending on the difference of temperature between the sample and the G610i. Correction range from ooc to 5ooc.
Thermometer Instrument	
Range Operation	00 to 100 ºC
Division	0.1°C
Accuracy	0.3 °C
Function	Monitors the do G610i operational temperature and the difference between the sample and the instrument.
Data Output	Bidirectional Serial RS232C.
Printer (*OPTIONAL)	
Method Printing	Thermal
Density	203Dpi x 406dpi
Paper	White, Thermal L=56mm x Dia= 40mm.
Dura.	10 years (Paper Gehaka).
Printing Speed	5.3 lines/sec.
Paper advance	45 mm/sec
Estimated life	30 million lines.
Weight	5.7 Kg
Dimensions	345 x 311 x 192mm
Supply	Adapter Full Range of 90V to 240VAC.
Operational temp.	Room temperature between 0° to 45°C.
Accessories	Instructions Manual; 9V Battery (installed) Power Source 9VDC- 95 to 240VAC
Optionals	Brush to clean the Chamber; Serial cable R5232;

Standard product in this version and operation range of each product:

Amaranto	1851	9	25
Almond Nat 100g	303	3	30
Runner Peanuts	266	1	30
Rice Polished	69	5	30
Rice Polished Na	67	5	30
Rice Parboiled	1403	5	30
Rice Rough Long	1789	7	30
Rice Rough	1785	7	30
Parboiled Rice	66	7	30
Rice Cateto Poli	1852	9	25
Rice Inte Parbo	1206	10	25
Oats	2	6	22
Oats Rough 85g	1370	7	35
Oats Rough Black	1371	7	35
Azevem	5000	5	35
Cocoa Beans 100g	863	4	22
Cocoa Beans 142g	170	8	25
Coffee Brazil	1759	9	25
Coffee ISO6673	1760	7	25
Coffee Oro	127	7	35
Coffee Parchment	128	6	44
Coffee Roasted	1811	2	15
Canola	1402	5	30
Coffee Bark	3284	3	30
Cashew Nuts	930	1	15
Para Chestnut	305	2	15
Rye	131	6	40
Barley	133	9	30
Chia	134	5	15
Coriander 75g	306	5	20
Rapeseed	136	7	17
Crambe	402	4	20
Clove	271	10	25
Crotalaria	1397	7	20
Pea	15	6	20
Canola Meal	1046	8	18
Citrus Meal	307	8	16
Soybeans Meal	1459	6	24
Sunflower Meal	1045	7	19
Beans Nano	308	10	25
Beans Azuki	1853	8	25
Beans Turtle	79	6	35
Beans White	80	7	35
Beans Pinto	1761	5	35
Red Eye Beans	23	5	30

Beans Blackeyed	82	6	35
Beans Peruvian	83	5	25
Beans Cowpea	84	10	25
Beans Pearl	1372	9	40
Beans Gold	28	5	30
Beans Black	1790	8	35
Beans Colored	477	6	35
Beans Pink	87	6	30
Beans Red	88	6	30
Sesame White	1854	2	16
Sesame Despel.	1855	2	15
Sesame Preto	1833	2	15
Sunflower	311	5	25
Sunflower Peeled	1836	3	15
Gritz	267	4	25
Guarana Shelled	142	7	25
Lentil	143	7	30
Flaxseed Brown	144	6	18
Flax	38	6	17
Macadame	145	1	40
Malt	312	2	20
Castor Beans	147	4	18
Millet	313	7	40
Corn	3428	7	40
Corn White	314	5	50
Popcorn	148	5	35
Yellow Mustard	71	7	30
Soybean Hull Pel	272	6	24
Blackpepper	1291	6	30
Barbados Nut	152	6	35
White Quinoa	316	7	21
Cotton Seed	317	6	22
Birdseed	318	2	50
Forage Turnip	157	5	15
Niger Seed	319	2	50
Millet Seed	320	2	50
Goosegrass	321	2	50
Millet White	154	9	20
Soybeans	3427	8	40
Sorghum	701	7	40
Wheat	1765	5	40
Buckwheat	1229	10	35
Triticale	56	5	33
Annatto	161	7	30

Warranty

The information contained herein in this manual as considered to be correct as of the date of its publication and are included in the product's sales invoice. Gehaka does not assume any liabilities resulting from the product incorrect use or misuse, nor is it liable for any failure to observe the information contained in this manual, reserving the right to change it without prior notice.

Gehaka is not liable, directly or indirectly, for accidents, damages, losses or gains, good or bad analysis results, processing, purchase or sale of goods based on this instrument.

The equipment sold are warranted against defects caused by defective materials or workmanship, by a period of one (01) year from the manufacturing or sale.

The Gehaka liabilities, within the limits of this warranty, are limited to repair, replacement or posting additional credit, of any of its products that were returned by the user/purchaser, during the warranty period.

This warranty does not cover damage or malfunction caused by fire, accident, changes, negligence, misuse, repair or maintenance without the manufacturer' s authorization, or negligence, malpractice and recklessness in the use.

Gehaka is not liable, express or implied, except for what has been established herein. Gehaka does not warranty the continuity of the product commercialization or suitability for any particular use.

The Gehaka liability will be limited to the unit sale price, declared in the invoice or pricing list, for any defective merchandise, and will not include the repair of material and / or moral damages, loss of profits, or any other damage resulting from the use of the equipment other than those previously provided.

The warranty for this product is valid for one (01) year, based on the date of issue of the invoice. However, the warranty for the product painting is for thirty (30) days counted from date of issue of the invoice.

The product that requires technical assistance during the warranty period will have the freight to send the product to Gehaka and its return paid by the Customer.

Gehaka vendors or representatives are not authorized to offer any additional warranty to the one explicitly provided for in this Manual.

Moisture content

Based on the legislation of plant classification in force in Brazil, we list the following moisture content technically recommended by MAPA - Ministry of Agriculture, Livestock and Food Supply for the classification of grains and derivatives:

Cotton in cottonseed	12,0%	Barley	14,0%
Cotton in plume	10.0%	Brewery barley	13,5%
Birdseed	12.0%	Clove	16,0%
Cocoa almond type 3 and outside the type	9.0%	Pea	15,0%
Cocoa almond types 1 and 2	8.0%	Soybean meal	12,5%
Cashew nut almond	5.0%	Cassava flour	13,0%
Peeled peanut crushed stone	12.0%	Wheat flour	15,0%
Peeled peanut de-pellicle	8.0%	Beans	14,0%
Peeled peanut industrial	9.0%	Fragment of rice benefited	14,0%
Peeled peanut selected	8.0%	Sunflower	13,0%
Peanut in shell	10.0%	Guarana beans	12,0%
Treated rice	14.0%	Lentil	14,0%
Rice with premix	14.0%	Castor	10,0%
Rice in natural husk	13.0%	Corn	14,0%
Paraboiled rice	14.0%	Corn popcorn	13,5%
Oat	14.0%	White pepper	15,0%
Treated rice raw grain (green)	12.5%	Black pepper	14,0%
Dent corn	13.0%	Soybean	14,0%
Cashew nut	8.0%	Sorghum	13,0%
Brazilian nut	15.0%	Wheat	13,0%
Rye	14.0%	Triticale-grain	13,0%

Updated on 2/04/2015

Notes

Agricultural Equipment Line

Portable Grain Moisture Mester G610i
Portable Grain Moisture and Impurity Analyzer G650i
Bench Grain Moisture Meter G810
Bench Grain Moisture Meter G939
CA 50 Moisture Tester
IV2500 Infrared Moisture Analyzer
IV3100 Infrared Moisture Analyzer
BK Semi Analytical Balance