DRAMIŃSKI
TECHNOLOGY

HAY MOISTURE METER

Manual **EN**

ISO 9001 | CE

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INTRODUCTION

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Thank you for purchasing our DRAMINSKI HMM. This excellent measuring device will be irreplaceable in your activity.

It is absolutely essential for obtaining high quality hay, for safer storage and prevention of damage to collected crops, as too high moisture content causes fungal attacks or rot.

Knowing moisture content is a valuable help while buying and selling forage, as moisture is the major factor affecting quality of crops and in consequence its value and price.

DRAMIŃSKI S.A. company has developed an instrument invaluable in estimating moisture content in hay and straw.

The Moisture Meter for hay and straw measures changes occurring in the electrical conductivity of hay or straw and then converts it into a reading of moisture in percentage which is shown on the LCD display. It provides both moisture and temperature readouts.

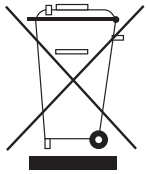
The Moisture Meter is designed to be easy to use and maintain and to provide rapid tests.

Manufacturer – DRAMIŃSKI S.A. company will share with its knowledge and experience to all users and simultaneously reserves the rights to make changes or technical/software improvements to its products.

DRAMIŃSKI S.A. company reserves the rights to make changes in the instruction manual.

Read this instruction manual carefully before starting to use the ultrasound scanner. It will guarantee safe usage and long lasting, reliable functioning of the device.

Declaration of the device's conformity is available at the DRAMIŃSKI S.A. company's office at Wiktora Steffena 21, 11-036 Sząbruk, Poland.



Please note that electronic equipment and batteries must not be disposed of in household waste containers. Used equipment and appliances should be delivered to special disposal facilities, according to the valid regulations. Proper waste disposal helps to save the natural environment.

EQUIPMENT

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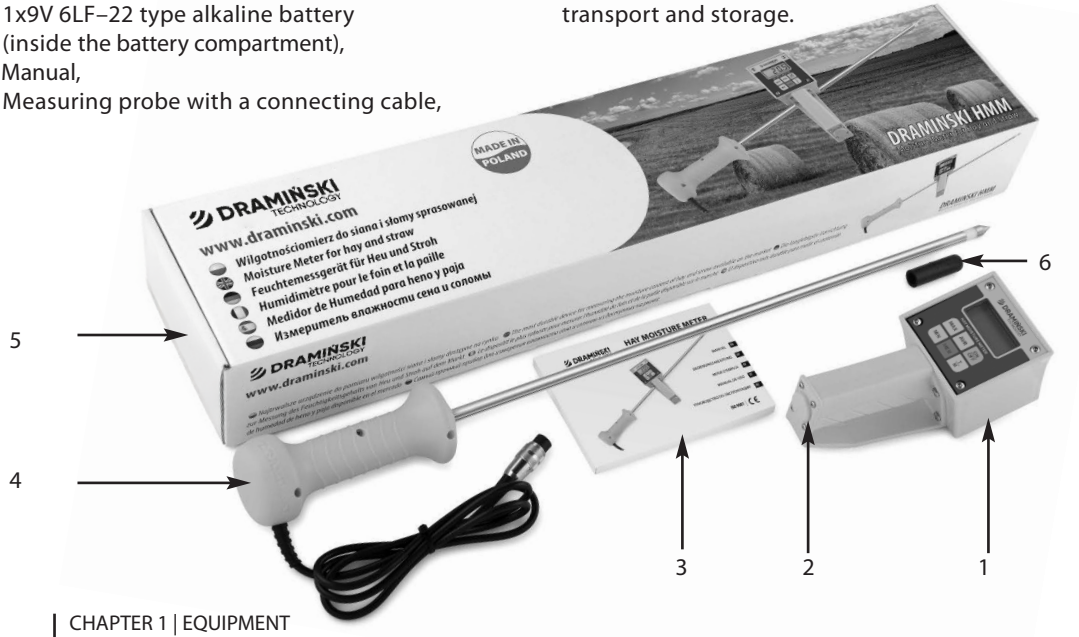
CHAPTER 1

EQUIPMENT (HMM with detachable probe on cable):

1. DRAMIŃSKI HMM moisture meter,
2. 1x9V 6LF–22 type alkaline battery (inside the battery compartment),
3. Manual,
4. Measuring probe with a connecting cable,
5. A colour transport packaging made of laminated cardboard,
6. Special cover to protect the probe during transport and storage.



EQUIPMENT (HMM with fixed probe):

1. DRAMIŃSKI HMM FIX with a fixed measuring probe,
2. A colour transport packaging made of laminated cardboard,
3. Special cover to protect the probe during transport and storage,
4. Manual,
5. 1x9V 6LF–22 type alkaline battery (inside the battery compartment).

DESIGN

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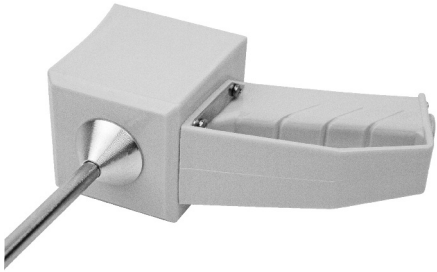
CHAPTER 2

The DRAMIŃSKI Moisture Meter is available in two versions:

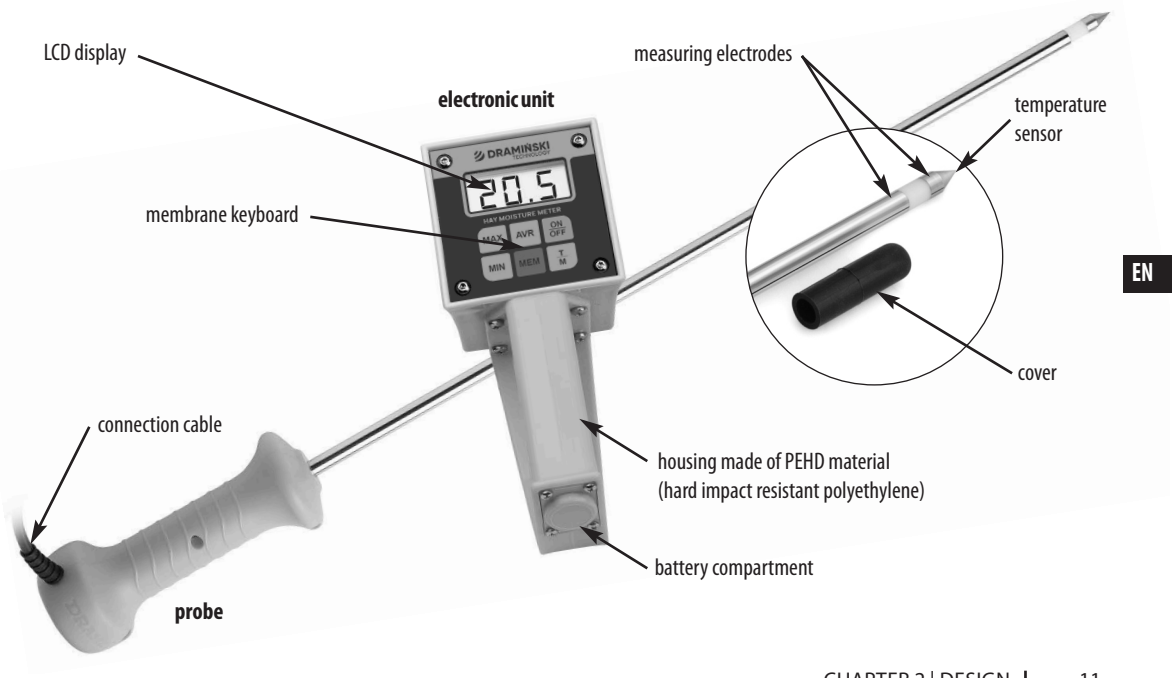
1. HMM Fix with fixed probe



2. HMM with detachable probe on cable

The methods of taking measurements and instrument maintenance are identical in both versions.

CONSTRUCTION:



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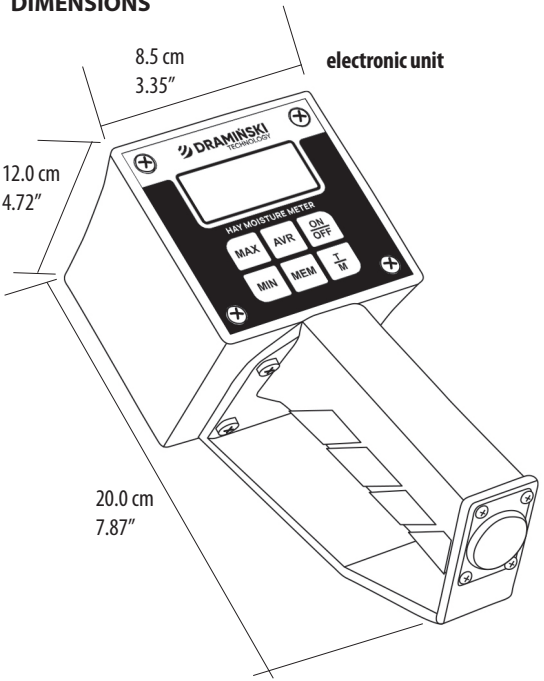
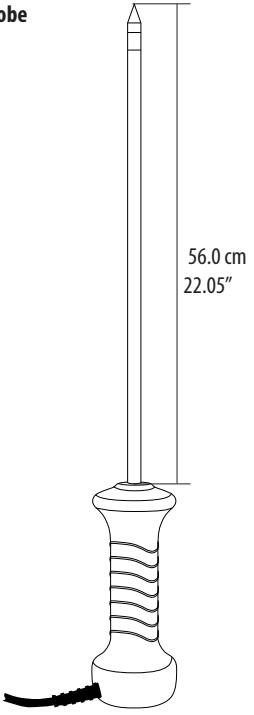
DIMENSIONS



Probe



KEYBOARD FUNCTIONS

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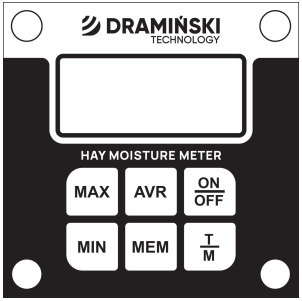
CHAPTER 3



ON / OFF	• ON / OFF – turning the device ON and OFF (Attention! The device will turn off automatically in 6 min if no button is used) • turning the moisture meter off will delete all the previously saved results.
MEM	• Saving measurement results in the memory (Attention! The results are saved when the device is on).
AVR	• Average of the results saved in the memory
MIN	• Minimum value of the results saved in the memory • Setting a number while entering the code • Using the menu
MAX	• Maximum value of the results saved in the memory • Setting a number while entering the code • Using the menu
T / M	• Changing type of measurement from temperature to moisture and back • Confirming chosen option • Choice of pressing force

OPERATION

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CHAPTER 4

1. Press **"ON/OFF"** button.

If the probe is not inserted into hay or straw, letters "LO" will be displayed.

2. Push the probe into hay or straw and then within few seconds moisture content in percentage will appear and will be displayed continuously.

The moisture measurement range is 10 – 80%. If moisture content is below 10 % letters **"LO"** will be displayed. If moisture content is higher than 80% letters **"HI"** will appear.

3. Press **"MEM"** button to store the result in instrument's memory. Remove the probe from the bale – **"LO"** will be displayed.

4. Repeat the procedure at least 5 times with the same bale for better accuracy.

The number of measurements that should be taken depends on the spread of first measurements' results. The bigger the difference between results, the more measurements should be taken.

You can store up to 50 readings in instrument's memory by pressing **"MEM"** button.

After the required number of measurements have been taken, you can find out the average result by simply pressing **"AVR"** button, or minimum and maximum results by pressing respectively **"MIN"** or **"MAX"** buttons.

CAUTION! Turning the moisture meter off will delete all the previously saved results.

5. To take temperature measurement, switch the instrument to the temperature mode by using **"T/M"** button.

6. Press **"ON/OFF"** button to switch the instrument off.

If no buttons are pressed and moisture content on the display doesn't change for minimum six minutes the instrument automaticly turns itself off.

CHANGE OF MOISTURE CURVE / PRESSING FORCE

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CHAPTER 5

Change of moisture curve:

- switch on the device (must be in moisture measurement or temperature measurement mode)
- hold **T/M** button for about 5 seconds
- the number of the curve on which the device is set up should appear, e.g. "–1–"
- use **MAX** (up arrow) and **MIN** (down arrow) to select the curve number you would like to use for moisture measurements
- confirm with **T/M** button

Identification of moisture curves regarding pressing force:

–1– suggested for high pressing force

–2– suggested for middle pressing force

–3– suggested for low pressing force

Note!

Each time you switch on the device you see the symbol of the curve at which the software is set up, e.g. "–1–" means moisture measurements are performed accordingly to curve no 1.

In case of questions contact us at:
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MODIFYING THE MOISTURE INDICATIONS READINGS

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CHAPTER 6

Modifying the moisture indications readings
This option is used for the modification (adjustment) of moisture readings by increasing or decreasing the displayed value (of the device) by the same value in the entire measuring range. However, by modifying the displayed values we are changing the measuring range limits, i.e., when we make an adjustment by „+2%" the measuring range will change from 10%–80% to 12%–82%.

The modification is made, if the user finds that for a given force of the pressed bale the tool has a tendency to over– or understate the results by the similar value in the entire moisture range. This modification is useful when the bales of hay/straw are poorly or very hard pressed, because the HMM curve is based on an average compression strength.

Procedure:
1. Press and hold four buttons at the same time: **"MAX"**, **"MIN"**, **"T/M"** and "**ON/OFF"**.
2. Hold 4 buttons pressed for about 1 second. Then release the buttons – letters "**CAL"** will be displayed.
3. Using **"MAX"** and **"MIN"** buttons set the number 399 and press **"T/M"**.
4. When the display shows „0" the device is ready for calibration.
5. Enter the requested adjustment, keeping the range from –5% to +5% (e.g. „+2" or „–5")
6. Confirm the entered value with **„T/M"** button, then turn off the device.

An example of the correctly entered modification
1. When you have entered „–5", then each time the device is turned on, the display will show the following message **„CAL"**–5. This means that the device is changing the measuring range from 10%–80% to 5%–75%.

Back to the factory settings/cancelling the modification

Procedure:

1. Press and hold four buttons at the same time: **"MAX"**, **"MIN"**, **"T/M"** and "**ON/OFF"**.
2. Hold 4 buttons pressed for about 1 second. Then release the buttons – letters "**CAL"** will be displayed.
3. Using **"MAX"** and **"MIN"** buttons set the number 399 and press **"T/M"**.
4. The display will show the previously entered value of the modification, e.g. "+2". Enter "0" and confirm the entered value with **„T/M"** button, then turn the instrument off. The device returns to factory settings, i.e. the measuring range will be 10%–80%.

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ADDITIONAL OPTIONS / NUMERICAL CODES

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CHAPTER 7

Setting up numerical codes.

- the device must be switched off.
- to enter the mode of writing numerical codes press four buttons at a time **MAX** + **MIN** + **T/M** + **ON/OFF**.
- when you see **"CAL"** release the buttons.
- on display you will see the flashing colon (:) on the left and value "00".
- with the help of **MAX** (up arrow) and **MIN** (down arrow) set up a given numerical code you want to activate
- confirm the code with **T/M** buttons.
- then switch off the device holding ON/OFF button till "OFF" appears on the display (about 2 seconds).

1. Switching on temperature compensation (enabled by default).

– set code "101" and confirm it with T/M button.
– you will see the message "ko;'".
– then switch off the device.

2. Switching off temperature compensation.

– set code "100" and confirm it with **T/M** button.
– you will see the message **"kOF"**.
– then switch off the device.

3. Changing temperature into **°C** scale (enabled by default).

– set code "01" and confirm it with **T/M** button.
– you will see the message **"°C"**.
– then switch off the device.

4. Changing temperature into **°F** scale.

– set code "02" and confirm it with **T/M** button.
– you will see the message **"°F"**.
– then switch off the device.

CALIBRATION OF TEMPERATURE SENSOR

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CHAPTER 8

CAUTION! The temperature sensor in new devices and in devices sent back from service IS PROPERLY CALIBRATED and ready for operation. This is the option for customers which didn't buy the device in a kit (HMM and probe)

Procedure:

1. Before starting calibration process it is necessary to prepare:
   – a bucket/bowl etc. filled with water and ice. Ice flowing in the water guarantees that the water will have 0 °C (or 32 °F*).
   – a bucket/bowl etc. filled with warm water
   – a thermometer
2. Attach the new probe to the main unit. Put the probe into the bucket with warm water and leave it inside for about 5 minutes until the probe will reach temperature similar to the temperature of water. Put the thermometer into the bucket and measure the temperature of water.
3. Press and hold 4 buttons: **„MAX"**, **„MIN"**, **„T/M"** and **„ON/OFF"**. Keep holding the buttons for about 1 second. Release all buttons, letters **„CAL"** will be displayed.
4. Using **„MAX"** and **„MIN"** buttons set the number 233 and press **„T/M"**.
5. Using **„MAX"** and **„MIN"** buttons choose **„HI"** and press **„T/M"**.
6. If the temperature displayed on the screen is different from readings of the thermometer, correct it and set proper temperature with **„MAX"**, **„MIN"** buttons and confrm it with **„T/M"**.
7. Put the probe into the bucket filled with water and ice and leave it inside for about 5 minutes until the probe will reach temperature similar to the temperature of water.
8. Using **„MAX"** and **„MIN"** buttons choose **„LO"** and press **„T/M"**.
9. If displayed temperature is different from „0" °C (or „32" °F*), modify it with **MAX** and **MIN** buttons, until you reach „0" (or „32"*). Confirm with **T/M**.
10. Turn the device off. The temperature sensor in the new probe is now properly calibrated.

* Only in version for North America and Australia

BATTERY REPLACEMENT

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CHAPTER 9

Low battery level is indicated by the words **"LO BAT"** flashing on the LCD display. A new battery is required when this indicator appears.

To exchange the battery:

- unscrew four screws which fix the battery compartment cover and take out exhausted battery,
- insert new battery according to +/– polarization,
- replace the cover and tighten the screws screwdriver, pay your attention to place a rubber seal under battery cover in correct position.

Manufacturer recommends to use good quality batteries. Poor quality batteries after exhaustion can leak which can cause damage of the device.

REMARKS

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CHAPTER 10

- The best accuracy is maintained by keeping the Moisture Meter clean and free from damage or extreme temperatures.

- It is essential to take readings at several different points of the bale. Remember to test not only the middle but also the sides and the ends of the bale.

- The accuracy of the measurements is affected by the density of the bale being tested, as density applies different pressure on the probe and thus on the moisture and temperature sensors.

- Results are more reliable when the bale is densely packed as a tightly compressed bale around the probe enables direct contact between the probe and the forage.

- Windrow, loose hay or straw should not be tested.

- After testing bale with a particularly high moisture content remember to wipe off the end of the probe to avoid affecting the next reading by the moisture remaining on the probe.

- When not in use, store the Moisture Meter in a dry place at normal room temperature. Remember to protect it against water, especially the probe and the cable connector.

- Please remove the battery if the device is not in use for a long time to reduce possibility of damage of the device by a battery leak.

- **The moisture meter needs to be protected against water; especially its probe and the end of the cable connected to the electronic unit.**

CAUTION! Turning the moisture meter off will delete all the previously saved results.

TECHNICAL DATA

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CHAPTER 11

Weight in version with a cable (with battery)	800 g (1.72 lbs*)
Weight in version without a cable (with battery)	665 g (1.41 lbs*)
Lenght of the probe	56 cm (22.05"*) or 200 cm (78.74"*)
Connection cable length	140 cm (55.12"*)
Dimensions of reader	20.0 x 8.5 x 12.0 cm (7.87" x 3.35" x 4.72"*)
Moisture measurement method	resistivity
Power supply	1 x 9 V battery, type 6F–22
Battery low indication	Automatic
Power input	about 4 mA
Measurement control	Single chip microcomputer
Estimated working time on one battery pack	about 100h
Display	LCD, 3.5 digits
Keyboard	membrane
Measurement resolution	humidity – 0.1%, temperature – 1 °C (1.8 °F*)
Data modification	using keyboard – Data modification option
Moisture measuring range	10 – 80%
Range of temperature measurement	1 – 100 °C (33.8 – 212.0 °F*)
Accuracy of temperature measurement	±1 °C (1.8 °F*)
Recommended storage temperature	5 – 45 °C (50.0 – 104.0 °F*)

* Only in version for North America and Australia

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