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INTRODUCTION

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Thank you for purchasing **TwistGrain**, our new grain moisture meter. You will find it indispensable for your work. It is compact and light, portable and easy to use.

It is also very fast and accurate.

You'll achieve great crops with efficient monitoring by using the **TwistGrain** meter.

Please read this User's Manual carefully before using the meter for your safety and long term measurement reliability.

NOTE:

The meter must not be used for trade settlements. It is intended on field measurement of grain humidity.

DRAMIAŃSKI S.A. provides technical expertise and excellent customer service. We reserve the right to improve the hardware and software of the meter.

The declaration of conformity of the device is available in the manufacturer's office at Owocowa 17, 10-840 Olsztyn, Poland.

EQUIPMENT

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CHAPTER **1**

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THE SET INCLUDES:

1. DRAMIŃSKI Twist Grain moisture meter with a clamping nut,
2. Transport case,
3. Carrying strap for the case, which allows hanging,
4. 4 x 1.5 V AA type alkaline battery,
5. 1 x 3 V CR2032 type battery (mounted on the nut),
6. A colour transport packaging made of laminated cardboard,
7. Manual.



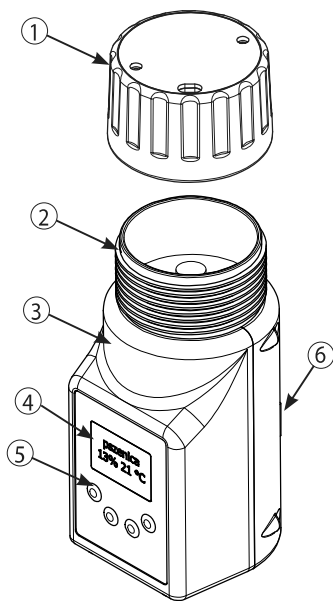
DESIGN

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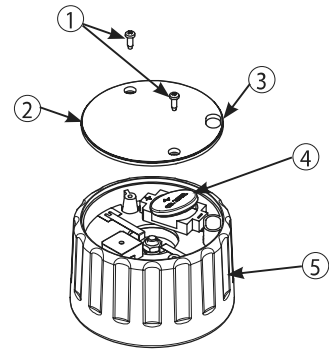
CHAPTER 2

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DESIGN

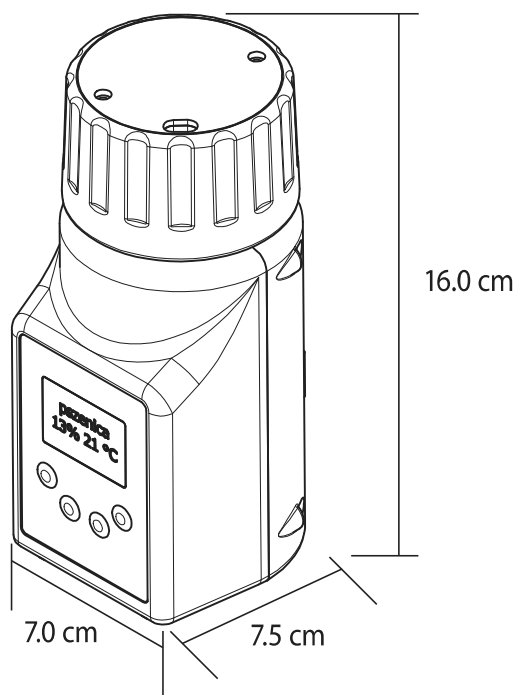


1. Push screw cap
2. Measuring chamber with temperature sensor
3. Housing is made of high quality ABS resins
4. Backlit LCD
5. Membrane keypad
6. Battery compartment (4 x AA)



1. Screws
2. Screw cap cover
3. Opening for grain residue removal
4. Buzzer battery (CR2032) mounted in the screw cap
5. Screw cap housing is made of polyamide with glass fibre

DIMENSIONS:



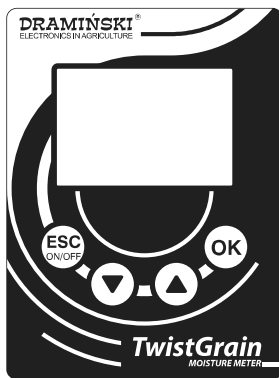
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KEY'S FUNCTIONS

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CHAPTER 3

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	<ul style="list-style-type: none"> - Press to turn the meter ON or press and hold for approx. 3 seconds to turn it OFF. <i>(Note: The meter will go off automatically if it is idle for 3 minutes).</i> - Return to the previous menu level / cancel.
	<ul style="list-style-type: none"> - Start the measurement. - Accept your selection in the menu. - Accept your entered calibration name.
	<ul style="list-style-type: none"> - Navigate the menu. - Select a setoff value for data adjustment or during calibration. - Type characters for new calibration name.

FIRST STEPS

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CHAPTER 4

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Before starting your measurement check that the measuring compartment is empty and dry. It is important that you empty the meter after each measurement.

The meter will be ready to operate after correct insertion of the batteries.

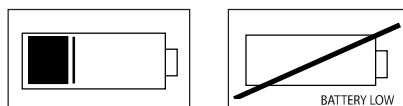
Press the **“On/Off”** button to turn the meter on.

a) First you will see the startup screen with the device name and serial number, such as the following:



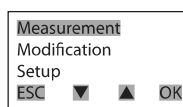
Dramiński
TwistGRAIN
MOISTURE METER
Nr. 1001

b) And then the battery status indication:



c) Finally, the meter will display the Main Menu with symbols of enabled buttons.

Press **“▼”** or **“▲”** to select one of the menu items and confirm your selection by pressing **“OK”**.



Measurement
Modification
Setup
ESC ▼ ▲ OK

d) After few seconds unit turns into sleep mode (this time can be set in the Menu). Any key wakes up.

e) After 3 minutes unit turns off.

f) To turn the device OFF please press and hold ON/OFF button for 3 seconds

MEASUREMENT

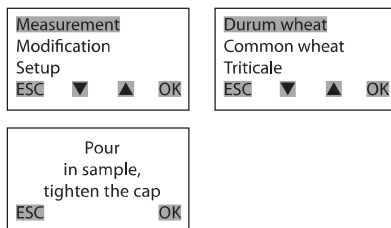
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CHAPTER 5

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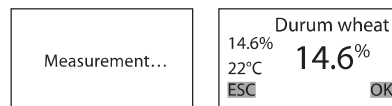
After selecting the "Measurement" menu you will see the list of grain species. The last selected grain species will be highlighted by default.

1. Press "▼" or "▲" to select a name in the list and press "OK" to accept your selection.



2. Fill the compartment evenly up to the rim and clean the thread from grain residue, if necessary.
3. **Tighten the screw cap until you hear the beep signaling sufficient grain compression.**

4. **Loosen the cap slightly to turn off the beep.**
5. Press "OK" to start your measurement. You will see the measurement in progress message and after the meter will display the result in capital digits:



The meter saves the reading in memory and displays the mean of the last 3 measurements above the temperature result. You can accept the mean as the final moisture content.

6. After reading the result please empty the measuring chamber
7. To measure next sample of the same grain press OK. or get back to the list of grains by pressing ESC

If the lower or upper measurement range limit is exceeded for a sample, the meter will display a message, such as “< 9.0%” (below the lower limit) or “> 30.0%” (above the upper limit). This means that the sample is out of the range calibrated for the specific grain species.

The out-of-range results are not included in the computation of the mean.

IMPORTANT:

Unscrew the cap, empty and clean the sample compartment after each measurement (carefully remove the moist residue, for example, with your finger).

The cleaning should be particularly thorough on the change of the grain species and between samples of significantly different or higher humidity. Because moisture (such as dew) deposited on grain surfaces can affect the measurement, “aerate” the sample before the measurement.

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In order to ensure high accuracy of the measurements please make sure that grain sample and Twist Grain have similar temperatures. Do not perform measurement of hot grain sample in cold Twist Grain and cold grain sample in hot Twist Grain (i.e. exposed to direct sunlight).

GRAIN SPECIES AND MEASURING RANGES

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CHAPTER 6

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1. Canola	4.5% – 25%	22. Green Coffee Robusta	8.0% – 30%
2. Rye	9.0% – 30%	23. Millet	4.0% – 18%
3. Durum wheat	9.0% – 30%	24. Peanuts	3.0% – 20%
4. Common wheat	9.0% – 30%	25. Soya	7.0% – 25%
5. Spring barley	9.0% – 30%	26. Horse bean	8.0% – 30%
6. Triticale	9.0% – 30%	27. Blue lupine	7.0% – 30%
7. Oat	9.0% – 30%		
8. Corn	9.0% – 25%		
9. Corn	25% – 40%		
10. Pea	10% – 17%		
11. Buckwheat	10% – 17%		
12. Red beans	8.0% – 22%		
13. Mung beans	8.5% – 20%		
14. Chickpeas	8.0% – 20%		
15. Black pepper	6.0% – 13%		
16. Sunflower seeds seedswar	5.0% – 27%		
17. White rice	8.0% – 25%		
18. Rice brown	8.5% – 25%		
19. Rice paddy	8.5% – 33%		
20. Cocoa	6.0% – 20%		
21. Green Coffee Arabica	8.0% – 30%		

We can add new calibrations upon customer's request:

• Camelina	4.5% – 15%
• Milk thistle	4.5% – 22%
• Wheat bran	6.0% – 17%

In addition to the foregoing species you can define your own grain calibrations. See the **“Setup”** section, **“Calibration”** subsection. Moisture Meter has an option of extending list of grains in cooperation with DRAMINSKI S.A. Company

MOISTURE READINGS MODIFICATION

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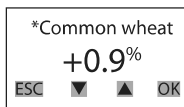
CHAPTER **7**

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The **TwistGrain** meter is factory-calibrated for certain grain species based on many comparisons with laboratory results. This calibration ensures accurate readings.

If necessary, you can modify or reset the existing calibration settings as follows:

1. Select "Modification" in the Main Menu.
2. Select a grain species in the list, press "OK", and select the setoff value using the "▼" or "▲" button. For instance:



3. Press "OK" to accept the change.

4. The name of the species will be highlighted with the asterisk (*) character displayed in front of the name.
5. You can return to the default by selecting and accepting 0.0 as the setoff value for the species (the asterisk will disappear).
6. After finishing modifications please turn the device off or exit "Modifications" menu by using "ESC" button.

Use the setoff feature carefully, only if you have noticed a long-term deviation trend for a grain species.

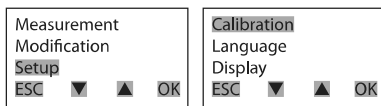
SETUP

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CHAPTER 8

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The "Setup" menu enables you to select custom settings for 3 submenus: Calibration, Language and Display.



1. CALIBRATION

This submenu enables you to define new grain species using the keypad.

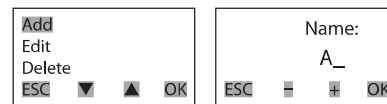
Add

To add calibration data for a new species:

1. Prepare some (from 2 to 14) grain samples of known (laboratory-determined) moisture contents. The levels of humidity have to be different so that the new calibration covers the required measuring range (e.g., from 8 % to 20 %). The temperature of the samples and the instrument should be steady, preferably within the 20-25 °C range.

2. Select "Setup" → "Calibration" → "Add" and press "OK" to accept your selection.

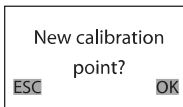
The meter is ready for entering the new grain species name:



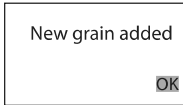
Press "▼" or "▲" to select a character and "OK" to accept it. The maximum name length is 8 characters. Finish entering the name by pressing "OK" slightly longer after selecting the last character.

3. Once you release the "OK" button, the meter will display the message: "Pour in sample, tighten the cap".
4. Measure each of the laboratory-measured samples using the standard procedure.
5. After each measurement the meter will display the mid-range value, 15.0 %, that you should change to the laboratory-determined value using the "▼" or "▲" button. Press "OK" to accept the new value.

6. The meter will display the message: "Added". Press "OK" and you will see the following message:



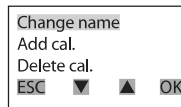
7. By pressing "OK" you can define the next calibration point. If you press "ESC", the calibration process will end and the meter will display the message: "New grain added".



8. Press "OK" to return to the "Calibration" menu.

Edit

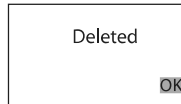
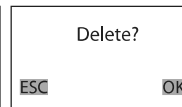
This option enables editing your custom grain species (other than the default ones). You can change the name or add or remove a calibration point for the selected species.



Delete

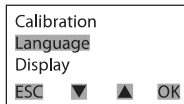
This option is used to delete a selected custom species. Once it is selected, the meter will display the list of your custom species. After selecting a species and pressing "OK" the meter will display the "Delete?" message. If you press "OK", the species with its calibrated values will be deleted.

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2. LANGUAGE

This menu enables you to select your preferred interface language.



Select "Setup" → "Language" and press "OK".

You will see a list of available languages. Highlight one of the languages in the list and press "OK". The meter will automatically switch to, and save, the new setting.

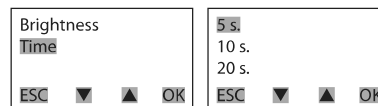
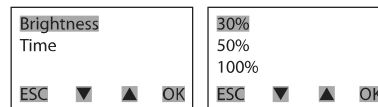
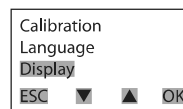


3. DISPLAY

You can use this menu to change the display brightness and backlight time (the lower the settings, the longer the batteries will last).

Select "Setup" → "Display" and press "OK".

You will see 2 options: "Brightness" and "Backlight time". Select one of them, press "OK", select your setting and press "OK" to accept it.



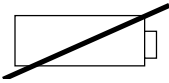
REPLACING BATTERIES

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CHAPTER 9

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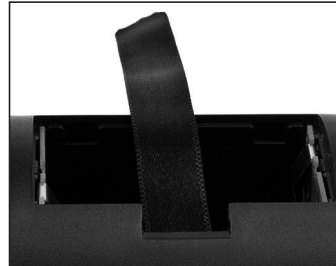
Meter batteries



The meter is supplied from 4 standard AA-type 1.5 V alkaline batteries. The instrument signals the low status of the batteries after turning the meter on or during operation by displaying the “Battery low” icon. Once the batteries are drained, the meter will shut down automatically.

To exchange the battery:

- open battery cover on the back of the device (pull the black ribbon) and take out the batteries,
- place the ribbon inside the battery compartment and leave its end stick out,
- put new batteries inside, pay attention on +/- polarity (the black ribbon should stay under the batteries),
- close battery compartment with the cover.

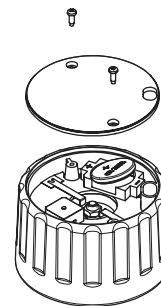


Buzzer battery

The buzzer is supplied from one lithium CR2032-type battery located under the screw cap's push cover.

To replace the battery:

- remove the 2 screws from the cover,
- lift the cover and remove the battery,
- place new battery according to its +/- polarity,
- replace the cover and tighten the screws.



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REMARKS

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CHAPTER 10

Protect the meter against water, moisture, rapid temperature changes and condensation on its metal parts, as such conditions can strongly affect the results of measurements.

Grain residues contaminate the screw cap's thread during measurements. Cleaning the thread often with soft material will facilitate tightening the cap (DO NOT use sharp instruments to clean the thread).

When the harvest season ends clean and dry measuring chamber and screw cup carefully. Leaving the device dried carefully gives certainty of long-lasting operating.

Store the meter in a warm and dry place.

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.

TECHNICAL DATA

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CHAPTER 11

Dimensions	16.5 × 7.0 × 7.5 cm
Unit weight	500 g (with a set of batteries)
Sample loading	Manual
Sample volume	90 ml
Moisture measurement method	Impedance
Power supply	4 batteries type AA 1.5 V, 1 battery type CR2032, 3 V
Estimated life of battery set	about 29 h
Battery low indication	Automatic ("Battery low" icon)
Power input	from 80 to 120 mA depending on user's settings
Measurement control	Single chip microcomputer
Display	LED backlit graphic LCD
Keyboard	membrane
Measurement resolution	temperature – 1 °C, humidity – 0.1 %
Data modification	using keyboard – Data modification option
Accuracy of moisture content measurement	±0.5 % for normalized grain, ±1 % in the range up to 10 % of humidity, ±1.5 % in the range above 10 % of humidity and can increase with increasing of sample's moisture content
Accuracy of temperature measurement	± 1 °C
Temperature compensation	Automatic
Recommended working temperature	from 10 °C to 35 °C
Recommended storage temperature	from 5 °C to 45 °C