

**Grainmaster i2**  
*Protimeter Grain Moisture Meter*

Instruction Manual

**Amphenol**  
Advanced Sensors





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*Protimeter Grain Moisture Meter*



Instruction Manual

INS3100.Rev.B  
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967 Windfall Road  
St. Marys, PA 15857- 3333, USA  
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## Introduction

The Protimeter Grainmaster i2 is a very versatile moisture meter for measuring moisture and temperature levels in crops. It is used with a grinder compressor unit to measure small samples of grains during harvesting and drying. Also it can be used with optional probes for monitoring the temperature and moisture levels of stored grain and the moisture levels of baled hay and straw.

### 1 Product features


The grainmaster is a hand-held instrument powered by one 9V battery located in a compartment on its underside. It incorporates a grain cell with retaining lugs for the grinder-compressor unit, a graphical LCD and 4 button interface for selecting the operational modes and taking measurements. There are two sockets on the left hand side of the instrument. One of them is for the optional probes to be attached and the other one is the USB device port through which the internal program can be updated with a software tool provided.


The instrument is supplied with the following auxiliary items



- Grinder-Compressor unit
- Grain Cup
- Sample spoon (10ml)
- Cleaning Brush
- Quick Check
- Pouch
- Instructions



#### 1.1 Display and Buttons

The power button  is pressed to switch the instrument ON and to take the measurements. Only when the button is pressed the measurement will be updated on the screen.

The instrument has two primary modes of operation, selected by  button which are called internal and external modes.

In internal mode, the instrument is used in combination with the Grinder-compressor unit to measure a small sample of grain in the grain cell. The  and  buttons are then used to select the required crop calibration and to switch from moisture to temperature displays. The instrument is used in external measurement mode when using optional moisture/ temperature probes.

## 1.2 Crop calibrations and functions



Sixteen calibrations are pre-programmed into the Grainmaster which are listed below.

Table 1: Pre-Programmed Calibrations of grains

Wheat	Canola	Coffee	Rice
Oats	Linseed	Soya(Soybean)	Sorghum
OSR(oilseed rape)	Sunflower	Beans	Paddy
Barley	Corn(Maize)	Peas	0-100 relative


Note: Not all calibrations are for Ground samples. Also some of the pre-programmed calibrations are not available with the optional external moisture and temperature probe.

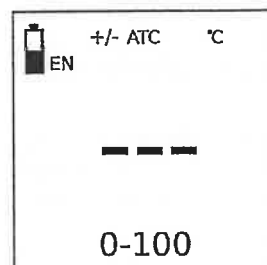
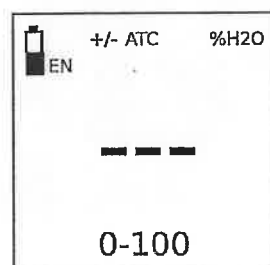
Before measuring moisture and temperature of ground and compressed samples, do the following.

1. Enter the set-up mode from the switch off state. To enter in to the set-up, press and hold  button and then turn on the unit by pressing  button.
2. Switch temperature display from °C to °F since the default is °C.
3. Switch automatic temperature correction(ATC) ON or OFF. However Protimeter recommends that ATC is always activated when measure moisture levels in crops. When ATC is off the displayed text ATC flashes on the display as a warning.

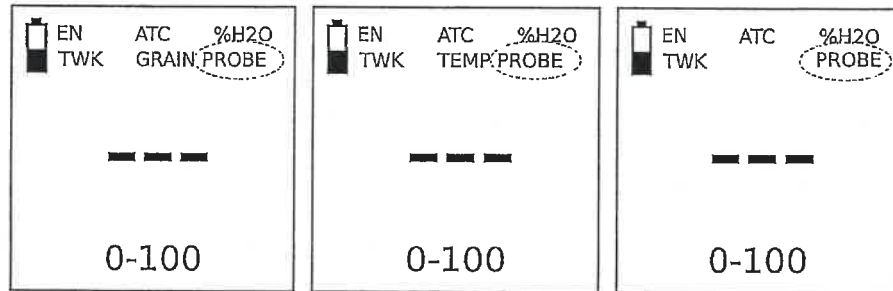
## 2 Measuring moisture and Temperature of Ground and compressed Samples.



To take moisture and temperature measurements of 10ml samples of crops, complete the following steps.

1. Ensure that no external probe is connected. Switch ON in internal measurement mode by pressing and releasing  button. if it is in the correct mode the display will be as below.






If the display is as below that means the instrument is in external measurement mode. To revert back to the internal measurement mode switch off the unit and then remove the external probe attached.



2. Scroll to the required crop calibration or 0-100 relative scale by pressing  or  button.
3. Ensure that the grain cell of the instrument is clean. If it is dirty, clean it with the brush .
4. Place the grain cup (the matte aluminium ring) over the grain cell.
5. Ensure that the grinder-compressor unit is clean and is operating smoothly. If not, disassemble and clean as detailed in section 5.1
6. Prior to placing the grinder-compressor unit on the instrument ensure that the plunger is fully retracted within its housing. The plunger is retracted fully by sliding the switch on the underside of the rotating handle forward into the compress position (picture) and rotating handle anti-clockwise until the clutch clicks a few times. The sliding switch can only be pushed or pulled in to position when the black pips on the top of the rotating handle are aligned with the yellow X.
7. Pull the switch on the underside of the rotating handle to the grind position and place the grinder-compressor unit over the grain cup. Lock the unit in place by twisting it clockwise against the three lugs.
8. Always use the correct sample size of 10ml. Using the 10ml spoon provided, pour a sample into the hopper on the side of the grinder-compressor unit.








9. Hold the Grainmaster i2 against a flat and horizontal surface and rotate the handle clockwise to grind the sample and push it through in to the grain cup, if necessary check to see the entire sample has passed through the grinder blade by turning the handle anti-clockwise a quarter turn and looking into the hopper.
10. Align the pips and the yellow X of the rotating handle and push the sliding switch forward in to the compress position. Turn the handle clockwise to screw the plunger on to the ground sample that is now in the grain cup. Correct compression is reached when the clutch clicks a few times.
11. Press and hold  button to display the moisture content of the sample. When the reading has stabilized, release button to freeze the %H2O value for approximately 7 seconds. Note and record this value as required.
12. If necessary, display the temperature of the sample by pressing  or  button only after releasing. Note and record this value as required.
13. Having noted the moisture (and/or temperature) reading, turn the handle anti- clockwise until the clutch clicks (to fully retract the plunger!). Remove the grain cup and the tested sample and clean the grain cell with the brush prior to commencing another test.



## 2.1 Adjusting the pre-programmed calibrations

If required, each of the 15 pre-programmed crop calibrations (i.e. all except the 0-100 scale) can be adjusted individually by  $\pm 1.5\%$  to allow for subtle changes that can be caused by crop variety, growing conditions or geographical region. Pragmatic users may choose to adjust their meter to match the results obtained from a local instrument used commercially.

*Note: Whenever a user adjustment is active , the "+/-" symbol flashes on the screen.*

To adjust calibrations, complete the following steps:

1. Select the required crop and measure the moisture content of a sample as outlined in section 2.
2. While holding the  button to display the %H2O value, press  to increase the calibration or press  to decrease the calibration in increments of 0.1.  
A +/- symbol appears on the display as shown earlier, indicating that the calibration has been adjusted by the user.

3. Remove a calibration adjustment by pressing  while pressing . The +/- will not appear on the display once the adjustment is removed.

*Note: The adjustments are separate for each crop and are stored in the instruments non-volatile memory until cleared in step 3 above or in section 4 (set-up mode). No adjustment is provided for temperature readings.*

### 3 Optional external Moisture and Temperature probes

A range of external moisture and temperature probes are available for use with the Grainmaster i2. The external probes connect to the instrument via the edge connector socket on the left hand side of the instrument. These ports are protected by a blanking grommet when not in use.



#### 3.1 Using the Optional Moisture and Temperature probe GRN3005

Nine calibrations for the external moisture and temperature probe are pre-programmed in to the Grainmaster i2 as shown in the below table.










##### Optional Moisture and temperature probe calibration

Wheat	Canola	Oats
OSR (oilseed rape)	Beans	Barley
Linseed	Peas	0-100 relative

*Note: The optional probe can be used with the Grainmaster i2 for checking the moisture and temperature levels of stored grain. This probe is used to monitor the condition of stored grain quickly; it is not a substitute for moisture measurements taken from ground samples as in section 2. Ground sample measurements are more reliable than external probe measurements*

*Note: Be sure that the instrument's internal grain cell is empty while using the external moisture probe. Avoid contact with the centre pad of the cell while using the grain probe.*

Use the optional external moisture and temperature probe as follows:

1. Push the probe into the grain and initially allow a few minutes for the temperature to stabilize. Connect the probe to the instrument.
2. Press and release  to switch ON, confirm that the instrument senses external moisture probe flagged by display showing "TEMP PROBE" - if not press  once to do so.
3. As with the internal grain cell, if the crop shown is not the required one, then press  or  to select it; note that some crops are not available with the external moisture probe.
4. Press and hold  to display either the temperature or moisture level. Release  and press  or  to switch from moisture to temperature displays as required.  will toggle back to the internal grain cell.

*Note: The user adjustments may be made in the same manner as for the internal grain cell, these are stored separately from the later.*







The spiral wound electrodes (that make the moisture measurement) should be wiped clean with a cloth at regular intervals to prevent the accumulation of dust that may attract moisture and give an erroneous reading. A temperature sensor is mounted behind the collar above the electrodes. User need to take care not to damage or expose this area to extreme temperature.

### **3.2 Using the Optional temperature probe (GRN6046)**

*Note: An optional temperature probe GRN6046 can be used with the Grainmaster i2 for checking the temperature of stored grain.*

Use the optional temperature probe as follows:

1. Push the probe in to the grain and initially allow a few minutes for the temperature to stabilize. Connect the probe to the instrument.

2. Press and release  to switch ON, confirm that the instrument senses external moisture probe flagged by display showing "TEMP PROBE" - if not press  once to do so.
3. Press and hold  to display the temperature of the grain. Note that  and  have no effect in this mode;  will toggle back to the internal grain cell.



### 3.3 Using the Optional Bale probes (GRN6138)

*Note: An optional Bale probe can be used with the Grainmaster i2 for checking the moisture level of the bales of hay and straw.*

Use the optional Bale Probe as follows:



1. Push the Bale probe in to the bale. Connect the probe to the instrument.

*Note: Be sure that the instruments internal grain cell is empty while using the Bale probe. Avoid contact with the centre pad of the cell.*




2. Press and release  to switch ON, then confirm that instrument senses the bale probe as flagged by the display showing "BALE PROBE" - if not press  once to do so.

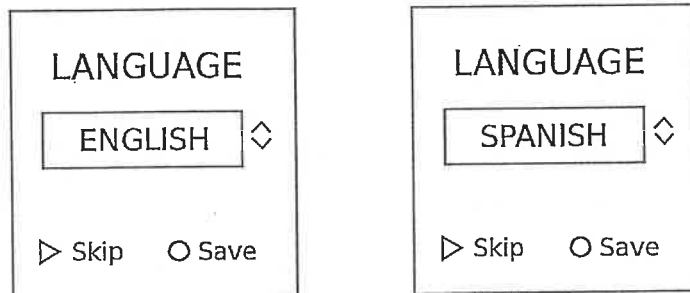
*Note: No Crop selection is possible in Bale probe mode.*

## 4 Set up mode

The set up mode is entered from the switched OFF state, by pressing  while switching ON using . This action displays the firmware version of the instrument followed by the product part number and the firmware date in yy-mm-dd format and then enters in to the configuration mode.





## 4.1 Language

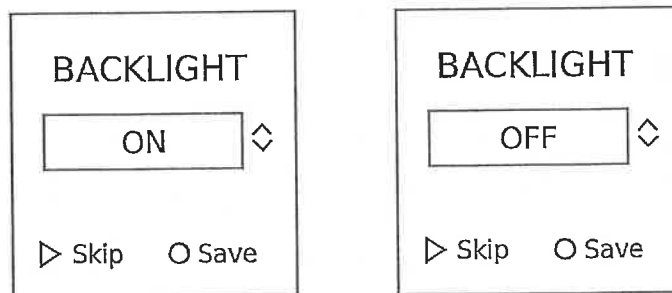
First set-up mode to come up is the Language Mode. Selected language is displayed on the screen in the box. Language can be changed with  or  button. Once the Language intended is displayed in the box, press  to save the language which will set the instrument language to the selected one.







If the Language is already set and need to go to the next setting, don't press the save button, but press the  button to skip it.

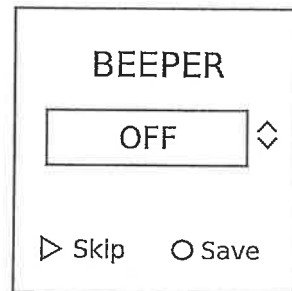
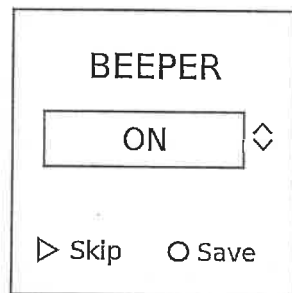
## 4.2 Back-light

Once the Language screen is moved 2nd setting mode appears which is Back-light. When on this screen press  or  to turn the back light on and off. To set the intended status press  when the intended option is on the screen. Press  to skip this setting and go to the next setting mode.



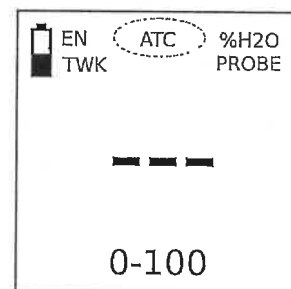
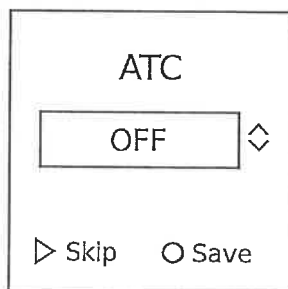
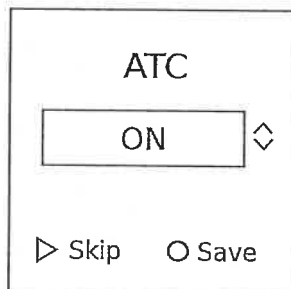
## 4.2 Beeper

Third setting mode is Buzzer / Beeper. Beeper can be turned OFF and ON by pressing  or , and pressing  to save. If the setting need not be altered and need to go to the other screen press  to skip this setting.







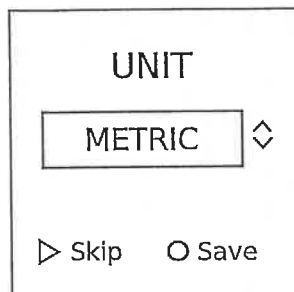
## 4.3 ATC

After Beeper either saving or skipping will take the settings to ATC, which is automatic temperature compensation. This means the probe temperature will be considered and compensated on the moisture reading. It is advised use the device always on ATC mode. If the device is not set to ATC then the text ATC on the display will flash alerting the user.






## 4.4 UNIT

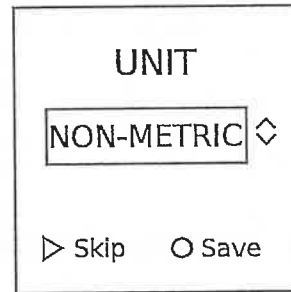
Once the previous setting (ATC) is saved or skipped, the unit moves on to the UNIT setting screen. The measurement unit can be set to METRIC or NON-METRIC based on the need. Changes can be done with  or  keys while setting can be saved with  key. If the setting need not be altered it can be skipped by pressing the  key and move on to the next set-up screen.




UNIT



METRIC 

 Skip    Save



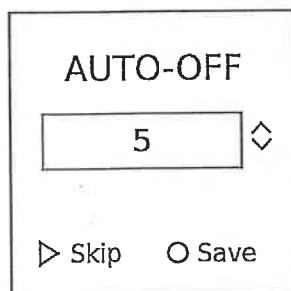
UNIT

NON-METRIC 


 Skip    Save



## 4.5 AUTO OFF

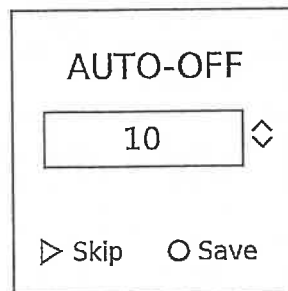
Auto Off timing can be set in GMi2 to 5sec, 10sec, 15sec & 20sec. Auto off time will decide the time for turning the unit off automatically after the set time from the last key press. If any of the key is pressed for measurement or changing the crop etc. the unit will remain turned on for the set time.




AUTO-OFF



5 

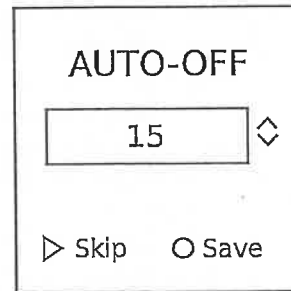
 Skip    Save




AUTO-OFF



10 

 Skip    Save



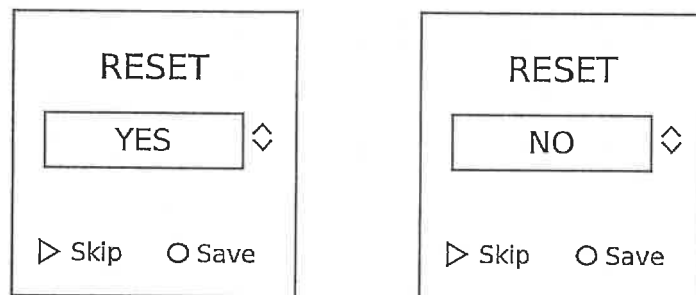
AUTO-OFF

15 

 Skip    Save

## 4.6 RESET

After auto off, the unit gets in to RESET screen where the user can reset the unit to factory default settings. If not needed, can be skipped and go to the measurement mode.



## 5 CARE AND MAINTENANCE

When not in use, store the Grainmaster i2 in a stable, dust free environment and out of direct sunlight. Remove the battery from the instrument if it is to be stored for periods of more than four weeks, or when the low battery power symbol starts blinking on the display indicating that the battery is about to die. Check the condition of accessories used with the instrument on a regular basis and replace them if they become worn or damaged.

### 5.1 GRINDER-COMPRESSOR

The Grinder-Compressor unit should be cleaned and lubricated at regular intervals, especially when testing wet or oily crops that tend to clog the thread of the plunger spindle. Follow the maintenance procedure as detailed in below steps:

- 1) Disengage the two halves of the Grinder-Compressor unit by twisting the yellow locking ring counter clockwise and pulling apart.
- 2) Open the blade retaining wings and lift out the plunger and blade assembly.
- 3) Separate the blade from the plunger assembly and remove the yellow feeder ring from inside the top half of the Grinder-Compressor unit.
- 4) Clean the blade, feeder ring and both halves of the Grinder-Compressor unit with the brush provided.



5) Clean the thread of the plunger unit and ensure it spins freely. Lubricate with a light oil.

6) Replace the feeder ring in the top half of the Grinder-compressor unit.

7) Put the blade on the plunger assembly and reposition this unit in the bottom half of the Grinder-Compressor unit. Clamp in place by closing the retaining wings.

8) Slide the two halves of the Grinder-Compressor unit together, ensuring the location lugs and plunger spindle are correctly aligned.

9) Replace the yellow locking ring.

## 6 CALIBRATION CHECK

The Grainmaster i2 is supplied with a "Quickcheck" device for verifying the instrument calibrations are correct with respect to factory settings. The procedure is detailed in the following steps:

1) Ensure that no External Probe is connected and that internal grain cell is clean and dry.

2) Deactivate ATC as detailed in section 4.3.

3) Select the 0-100 relative scale as detailed in section 2.0.

4) Place the Quickcheck over the grain cell and hold in position to ensure contact with the concentric electrodes.

5) Press and hold  $\square$ . The instrument should display  $36.5 \pm 1.0$ . If the reading is not within these limits, the instrument should be returned to Protimeter for servicing.

6) Reactivate ATC as detailed in section 4.3 before continuing to use the instrument.

## 7 INFORMATION CODES

The instrument displays a range of codes that represent various conditions as detailed in Table below.

### Codes Interpretation

Indication	Interpretation
---	Stand by mode. When showing, use ▲ or ▼ to select required crop or leave few seconds to switch off automatically based on the set time. (the auto off timing can be set to 5, 10, 15 or 20 seconds in the settings)
U-R	Under measurement range. The crop sample is too dry to register a value or temperature is too low / faulty
O-R	Over measurement range. The crop sample is too wet to register a value.

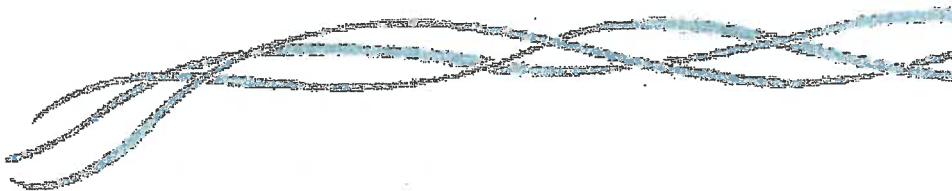


ATC	if the text ATC is flashing on the screen, the automatic temperature compensation is not activated. To activate the same go to settings and set it to ON. When the automatic temperature compensation is active, the text ATC will be stable on the screen.
+/-	Crop calibration has been adjusted
TEMP PROBE	displayed when a Temperature probe is connected. (Flashing) when the probe is disconnected while in measurement.
BALE PROBE	displayed when a Bale probe is connected. (Flashing) when the probe is disconnected while in measurement.
GRAIN PROBE	displayed when a grain probe is connected. (Flashing) when the probe is disconnected while in measurement.
	(Flashing) when the battery is very low and supposed to be replaced

## 8 SPECIFICATIONS

Weight of instrument c/w Grinder-Compressor unit:	~1KG
Dimensions of instrument c/w Grinder-Compressor unit:	195Mm length X 185mm height X 100mm width
Power :	6F22R 9V battery
Display:	Sunlight visible, Monochrome, Graphical
USB:	Mini for software upgrade
Bluetooth:	4.2





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Aug 2018





Notes:

1. Crop calibration characteristics vary over time. For optimum moisture meter results, always be sure to use a current calibration chart.  
[NOTE: THE DATA PRESENTED HERE SUPERCEDES ALL PREVIOUS ISSUES OF THIS DOCUMENT.]
2. The most common cause of measurement error is poorly maintained instruments. Always have your moisture instrument serviced by Protimeter, or an agent authorised by Amphenol Advanced Sensors to service Protimeter grain moisture meters, on a regular basis to ensure optimum accuracy and reliability.
3. Protimeter moisture instruments automatically adjust the moisture measurement with respect to temperature when *Automatic Temperature Correction (ATC)* is activated. We recommend that ATC be activated whenever measuring grain samples. For optimum accuracy, be sure that the sample under test is at the same temperature as the instrument test cell.
4. Protimeter crop calibrations are mean values of laboratory test results. As such, they should not be considered as absolute; local environmental conditions, soil characteristics, crop varieties and other variables may lead to wide differences in some cases. Growers may choose to match their Protimeter instrument calibrations to an agreed reference (e.g., a merchant's moisture instrument) with the calibration adjust feature.

## Customer Support Centers

### U.S.A.

#### Sales and Services.

#### (Repair/Calibration):

Amphenol Thermometrics, Inc.

St Marys Center

967 Windfall Road

St Marys, Pennsylvania 15857, U.S.A.

T: 814-834-9140

F: 814-781-7969

### U.S.A.

#### Technical Support:

Amphenol Thermometrics, Inc.

St Marys Center

967 Windfall Road

St Marys, Pennsylvania 15857, U.S.A.

T: 814-834-9140

F: 814-781-7969

### U.K.

Amphenol Thermometrics (U.K.) Limited

Crown Industrial Estate Priorswood Road

Taunton, TA2 8QY, UK

### Brazil

#### Sales and Service

Amphenol TFC DO Brazil LTDA

Rodovia Governador Adhemar

Pereira de Barros KM 121,5 S/N

13098-396 Campinas, Sao Paulo, Brazil

### Europe, Asia and Middle East

#### Sales and Service:

Amphenol Advanced Sensors GmbH

Sinsheimer Strasse 6

D-75179 Pforzheim, Germany

T: +49(0)7231-14335 0

F: +49(0)7212 391 035

### China:

Amphenol (Changzhou)

Connector Systems

305 Room, 5D

Jintong Industrial Park

Wujin, Changzhou, Jiangsu, China

T: +86 519 8831 8080 ext. 50087

F: +86 519 8831 2601

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**Advanced Sensors**

[www.amphenol-sensors.com](http://www.amphenol-sensors.com) | [www.protimeter.com](http://www.protimeter.com)

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Protimeter Calibration Data

How to use this chart: This chart can be used to measure the moisture level of the listed crops in conjunction with Protimeter Compressor/Grinder grain moisture instruments having a 0-100 Reference Scale or the Protimeter Ground Wheat Calibration (ISO 712 equivalent). Convert the sample reference reading to a moisture level by looking up or down the column until intersection is made with the row of the crop under test.

Example: Assume that the crop under test is linseed with a 0-100 scale reading of 42 (or a wheat scale reading of 17.3). Then, the actual moisture level obtained from the chart is 11.1%, ± the working tolerance.

CROP		% MOISTURE LEVEL																		
SCALE	0-100	5	10	14	17	20	23	27	30	33	37	39	42	47	52	60	67	73	78	84
Barley/Oats	Ground	10.9	11.8	12.3	12.8	13.3	13.8	14.3	14.8	15.4	16.0	16.7	17.2	18.2	19.2	20.8	22.6	24.5	26.7	29.3
Barley/Oats	Whole	12.9	13.5	13.9	14.4	14.8	15.3	15.8	16.5	17.1	17.8	18.4	19.0	20.2	21.4	23.5	26.0	28.5	31.0	
Beans/Tic/Winter	Ground	12.4	13.4	13.7	13.9	14.1	14.5	15.0	15.4	16.0	16.5	16.9	17.3	17.9	18.6	19.7	20.9	22.1	23.4	25.0
Brassicas	Ground/Whole	7.3	7.9	8.2	8.5	8.8	9.1	9.3	9.5	9.8	10.0	10.3	10.5	11.0	11.4	12.3				
Brussels Sprouts	Ground/Whole	7.3	7.9	8.2	8.5	8.8	9.1	9.3	9.5	9.8	10.0	10.3	10.5	11.0	11.4	12.3				
Buckwheat	Ground	12.1	12.8	13.4	13.8	14.2	14.6	15.1	15.6	16.2	16.8	17.3	17.8	18.9	19.9	21.6	23.5	25.6	27.5	29.6
Cabbage Seed	Ground/Whole	7.3	7.9	8.2	8.5	8.8	9.1	9.3	9.5	9.8	10.0	10.3	10.5	11.0	11.4	12.3				
Clover/Red Lucerne Seed	Whole	9.1	9.9	10.3	10.7	11.1	11.6	12.0	12.3	12.8	13.2	13.6	14.0	14.9	15.6	16.9	18.4	20.0		
Clover/White Seed	Whole	9.0	9.9	10.3	10.8	11.3	11.8	12.3	12.8	13.3	13.8	14.3	14.8	15.7	16.6	18.1	20.0	21.9	23.4	
Cocoa Beans	Whole	3.9	4.5	4.8	5.1	5.5	5.8	6.1	6.4	6.7	7.1	7.4	7.7	8.1	8.5	9.2	9.8	10.3		
Coffee	Ground		10.2	10.5	10.9	11.2	11.6	12.1	12.6	13.1	13.5	13.9	14.3	15.0	15.7	17.1	19.5			
Coffee	Whole	9.8	10.7	11.3	11.9	12.8	13.5	14.3	15.2	16.0	16.8	17.6	18.2	19.4	20.4	22.3	23.9			
Coffee Green	Ground		10.2	10.9	11.6	12.3	12.8	13.3	13.8	14.3	14.7	15.1	15.5	16.2	16.9	18.3	20.7			
Flax	Whole	6.9	7.4	7.7	8.0	8.5	8.8	9.1	9.4	9.9	10.3	10.7	11.1	12.0	13.0	14.6				
Flour/Soft	Wheat	12.9	13.7	14.1	14.5	15.0	15.4	15.9	16.3	16.8	17.2	17.7	18.2	19.1	19.9	21.3	23.0			
Grass Seed/Cocksfoot	Whole	8.3	9.2	9.6	10.0	10.5	10.9	11.3	11.8	12.3	12.8	13.2	13.6	14.5	15.2	16.6	18.4	20.3		
Grass Seed/Rye Grass	Whole	10.4	11.3	11.7	12.2	12.7	13.2	13.7	14.2	14.7	15.3	15.8	16.3	17.4	18.5	20.2	22.4			
Ground Nuts Hulled	Whole	5.5	6.1	6.4	6.6	6.9	7.1	7.3	7.6	7.9	8.1	8.4	8.6	9.0	9.5	10.4				
Lentils	Ground/Whole	11.8	12.3	12.5	12.7	13.0	13.4	13.7	14.0	14.4	14.8	15.0	15.3	16.0	16.6	17.9				
Linseed	Whole	7.0	7.4	7.7	8.0	8.3	8.7	9.0	9.4	9.9	10.3	10.7	11.1	12.0	12.9	14.6	16.5			
Maize/Corn	Ground	10.4	11.4	11.9	12.4	13.0	13.5	14.0	14.6	15.2	15.8	16.4	16.9	17.8	18.2	20.0	21.6	23.1	24.6	26.2
Maize/Corn	Whole	11.4	12.0	12.5	13.1	13.5	13.9	14.3	14.8	15.4	15.9	16.5	16.9	17.9	18.7	20.2	21.9	23.6	25.2	27.2
Mustard Seed	Whole	7.7	8.2	8.6	9.0	9.4	9.8	10.1	10.6	11.2	11.7	12.1	12.5	13.6	14.5	16.1				
Oilseed Rape	Ground				7.0	7.3	7.7	8.3	8.9	9.4	9.8	10.2	11.0	12.0	13.9	16.5	19.0	22.0	26.0	
Paddy	Ground	10.4	11.4	11.9	12.4	13.0	13.5	14.0	14.6	15.2	15.8	16.4	16.9	17.8	18.2	20.0	21.6	23.1	24.6	26.2
Paddy	Whole	10.1	11.0	11.5	11.9	12.3	12.8	13.3	13.8	14.4	15.0	15.6	16.2	17.3	18.3	20.3	22.6	24.8	27.0	29.4
Peas	Ground	12.0	12.9	13.5	14.0	14.5	15.0	15.7	16.2	16.8	17.5	18.0	18.5	19.5	20.1	22.5	24.3	26.2	28.2	30.9
Peas (Progreta)	Ground	9.4	10.3	10.8	11.3	11.9	12.5	13.0	13.6	14.3	14.9	15.5	16.1	17.3	18.3	19.8	21.7	23.5	25.2	27.1
Rice (Milled)	Whole		13.2	13.7	14.2	14.8	15.2	15.7	16.3	16.9	17.5	18.2	18.8	20.0	21.2	23.3	26.5			
Semolina		12.3	13.0	13.2	13.6	14.0	14.5	15.1	15.5	16.2	16.8	17.2	17.8	18.7	19.4	21.0	22.4			
Sorghum/Milo	Ground	10.2	11.7	12.2	12.7	13.1	13.6	14.1	14.6	15.1	15.6	16.1	16.6	17.4	18.2	19.6	21.4	23.0	24.7	26.9
Sorghum/Milo	Whole	11.2	12.2	12.7	13.2	13.7	14.2	14.7	15.2	15.8	16.3	16.9	17.3	18.2	19.1	20.6	22.5	24.2	25.9	28.0
Soya Beans	Ground	7.4	8.2	8.7	9.1	9.7	10.1	10.6	11.1	11.6	12.0	12.5	12.9	13.8	14.7	16.0	17.5	18.9	20.4	22.2
Soya Beans	Whole	9.3	10.4	10.7	11.1	11.5	11.9	12.4	13.0	13.6	14.3	14.9	15.4	16.5	17.6	19.6	21.8	23.7	25.9	28.6
Sugarbeet Seed	Whole	7.6	8.4	8.7	9.1	9.6	10.0	10.3	10.8	11.2	11.6	12.0	12.4	13.2	13.8	14.8	16.1	17.3	18.6	20.2
Sunflower Seed	Whole	6.2	6.9	7.3	7.7	8.2	8.5	8.9	9.4	9.9	10.5	11.1	11.6	12.5	13.5	15.3	17.7	20.3	23.0	
Wheat/Rye	Ground	11.3	12.3	12.8	13.3	13.8	14.3	14.8	15.3	15.8	16.3	16.8	17.3	18.3	19.3	21.3	23.3	25.3	27.3	29.3
Wheat/Rye	Whole	12.8	13.4	13.8	14.3	14.9	15.5	16.2	16.8	17.5	18.2	18.8	19.4	20.4	21.3	23.0	25.0	27.2	29.5	