

PROTIMETER



DIGITAL GRAINMASTER

OPERATING INSTRUCTIONS

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1. INTRODUCTION

Protimeter plc manufacture an extensive range of instruments for the measurement of moisture in solid materials and gases. Of particular interest to the agricultural industry is the Protimeter range of grain moisture meters. These instruments determine the % moisture content of the crop under test.

Most grain moisture tests are taken during harvest or during drying when grain is not in moisture equilibrium, necessitating grinding the sample. This gives a more accurate result as it tests moisture throughout the grain not just the skin. Additionally, with all moisture meters an uneven packing density of the sample in the measuring cell will lead to uneven results; hence the necessity to compress the sample to a constant pressure, achieved by Protimeter's innovative all-in-one compressor/grinder.

Protimeter products are built to a high standard of durability and provided the instrument is regularly serviced and stored properly it will give years of reliable service.



2. CONTENTS

The Protimeter Grainmaster consists of

- instrument
- all-in-one Grinder/Compressor
- two crop Program Keys (a number of optional Program Keys are available for additional crops)
- grain cup (aluminium tube)
- sample spoon
- Quick check (black) test cap
- Hi check (red) test cap
- cleaning brush
- calibration chart
- carrying pouch/case
- instruction booklet
- care of grain booklet



3. TAKING A MOISTURE MEASUREMENT

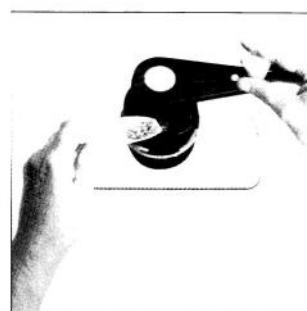
1. Place the correct crop Program Key in the side of the instrument.
 2. Make sure that the Automatic Temperature Correction (ATC) switch is in the 'in' position. Switch located on the underneath of the instrument as explained item (4).
 3. Check first that the grinder/compressor piston is at the top of its travel and the clutch clicks. If not, move the slider to the 'compress'  position. Rotate the handle anticlockwise until the clutch clicks. (see photo 1)
 4. Move the slider to the 'grind'  position. (see photo 2)
 5. Place the aluminium grain cup onto the electrode.
 6. Locate the grinder/compressor onto the 3 lugs at the base of the instrument electrode and lock by rotating it clockwise.
 7. Using the 10ml spoon supplied pour a level spoonful of sample into the hopper. Rotate the handle clockwise so grinding the sample. (see photo 3 & 4)
- CAUTION: Always use the correct amount of sample (10ml) for good measurements.





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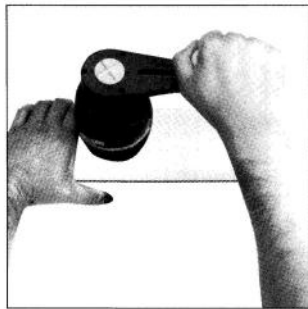
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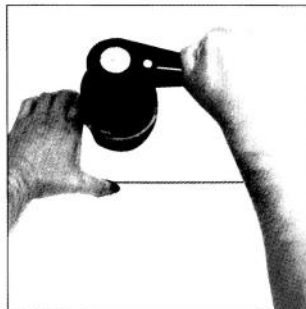
3.

8. When the sample is fully ground align the yellow cross with the black pips and move the slider to the 'compress'  position. (see photo 5)
9. Rotate the handle clockwise compressing the sample until the clutch clicks a few times.
10. Press and hold the 'on' button, the moisture reading is shown.
11. After taking a reading rotate the handle of the grinder/compressor anticlockwise. This releases pressure on the sample and allows removal of the grinder/compressor.
12. Continue to rotate the handle anti-clockwise until the clutch starts clicking again and move the slider to the 'grind'  position ready for the next sample.
13. Remove the ground sample by lifting the grain cup off the cell then clean the instrument and grinder/compressor with the brush provided. Do not use an oily cloth on the electrode.
14. If possible take more than one sample and average the results.

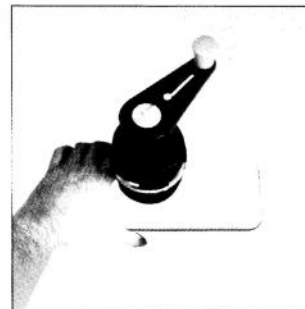
NOTE: If very wet grain has been used in the grinder you may want to clean the grinder by grinding a dry grain sample. **WARNING: DO NOT INSERT FINGERS INTO THE GRINDER.**



4.



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4. AUTOMATIC TEMPERATURE CORRECTION

Temperature affects moisture meter readings, because moisture meters are calibrated at a certain temperature: In Europe it is 20°C. If the temperature of the grain is above that temperature the readings would be high - if below that temperature they would be low.

Automatic Temperature Correction (ATC) is a facility which adjusts the instrument calibration automatically to compensate for the differences in grain temperatures above or below 20°C.

1. If the ATC is switched 'off' the instrument will give a correct reading only at 20°C and readings must be adjusted for any difference between 20°C and the true temperature of the grain. (For every 1°C above 20°C DEDUCT 1% **of the reading shown**. For every 1°C below 20°C ADD 1% **of the reading shown** (not 1% of moisture content!).
2. With ATC 'on' the instrument automatically adjusts the measured reading to compensate for sample temperatures between 10° and 40°C.
3. In almost all circumstances ATC should remain 'on'. However there is one circumstance to look out for: If the temperature of the instrument and the temperature of the sample vary greatly. If, for instance, the meter has been left in a very hot car it could be at a temperature very much in excess of that of the grain. If this happens the meter should be allowed to cool to the temperature of the grain. To check this process the grain should be ground into the cup in the usual manner; the 'on' button pressed **occasionally**. As the grain cools the reading will stabilise.

Alternatively the ATC can be turned 'off' and, using an independent thermometer, the reading can be corrected manually using the formula set out under 1. above.

5. ADJUSTING THE CALIBRATION

Protimeter moisture calibrations are carefully determined and frequently checked using the appropriate oven-drying methods.

Crop Program Keys are available for many crops based on these calibrations.

The Program Key should normally be used with the arrow pointing to 'ISO'.

However the Program Keys incorporate a user-adjustable calibration feature to allow "fine tuning" to meet local standards. The adjustable screw marked + and - increase or decrease the calibration.

6. MAINTENANCE

THE GRINDER/COMPRESSOR

It will be necessary to occasionally clean out the grinder/compressor or change the blade. To do this:-

1. Ensure the compressor piston is at the top of its travel.
2. Turn the yellow locking ring clockwise and pull the unit apart as shown in figures 1 to 4.
3. Open the two blade retaining wings so that they just clear the blade and lift out the blade. See fig 5 & 6.
4. Clean the area around the blade and grinding veins thoroughly. See fig 7.
5. Insert the new blade, matching up the locating pip and groove. See fig 9.
6. Close the blade retaining wings and replace the top half of the grinder/compressor making sure that you line up the thread square with the insert first then rotate the body until the locating lugs line up and press together. See fig 10 & 11.

IMPORTANT: Lubricate the compressor thread using gear oil every 60 samples.



1.



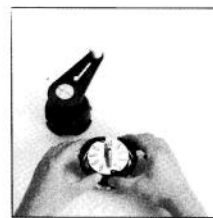
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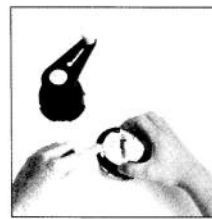
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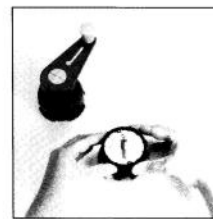
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10.

THE INSTRUMENT

7. Keep the instrument clean at all times. It is important that all sample residue is removed and the electrode thoroughly cleaned especially after oilseed rape samples.
8. Battery replacement: When the battery symbol  shows, replace 9V (type 6F22) battery located in compartment on the underneath of the meter. When it is not in use for a long time remove the batteries and store the instrument in a warm, dry environment.



CHECKING THE INSTRUMENT

Supplied with the Grainmaster are two check devices or caps (Black: Quick check, Red: Hi-check). These check the electronic workings of the instrument at two levels as follows:

9. Insert the Ground Wheat (ISO 712) program key into the instrument, ensuring that the arrow is pointing to the ISO mark.
10. Turn the Automatic Temperature Correction switch located on the underneath of the instrument to 'out'.
11. Place the black Quick check on to the electrode and turn to ensure a good contact.
12. Whilst holding the Quick check firmly in place press and hold the 'on' switch and record the reading.
13. If the instrument is working correctly electronically the reading should be $16.3\% \pm 0.5$. Repeat this exercise with the Hi-Check the reading should be $21.3\% \pm 1$.
14. If the readings are not correct please return to your supplier or a Protimeter Service Centre.

*N.B If you have no Wheat program key cross-reference using the calibration chart; e.g. ground coffee 13.5% = **16.3% wheat**.*

ROUTINELY RETURN THE ATC SWITCH TO THE 'IN' POSITION BEFORE TESTING GRAIN (see 4).

7. SERVICE

We recommend that the instrument is serviced annually at the Protimeter Service Centre to ensure long life and accuracy. Please return the instrument together with all accessories to the address overleaf where we will prepare and send you an estimate before servicing your instrument. All repairs carry a one year's warranty.

8. ACCESSORIES

Crop Program Keys

Many crop Program Keys are available from your local dealer. It is possible using the calibration chart supplied to cross-reference other crops using the Ground Wheat (ISO 712) Program Key.

Temperature Probes

There are two types of temperature probe available which connect directly into the Protimeter Digital Grainmaster. These are the 1 metre fast response probe and the 1 metre to 4 metres extendible probe.

Grinder Blade

Replacement grinder blades and plastic feeders are available from your local dealer.

Please note

The instrument is designed to be at its most accurate at the moisture levels at which grain is normally sold. When grain is excessively wet or dry it may be difficult to obtain a reading.

Disclaimer:

These instructions are scanned from a printed copy of a Protimeter instruction manual for the Digital Grainmaster published in March 1997. Please accept our apologies for the poor quality of some of the photographs and text. Martin Lishman Ltd cannot accept responsibility for any errors or omissions or subsequent corrections or updates that may be missing from this version.