



# AGRICOMPUTER

UK version: GB 4.31

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## **IMPORTANT: PLEASE READ BEFORE USING THE AGRICOMPUTER**

The *Agricomputer* has been tested and the calibration has been verified against the RDS test procedure before despatch.

However, Grain Merchants' scales do vary and the unit should be checked and adjusted to agree with your Merchant's scale before use.

# 1 - Preparing for use

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## 1.1 Inserting batteries

Low battery condition is signalled by the words 'BAT LO' appearing on the display.

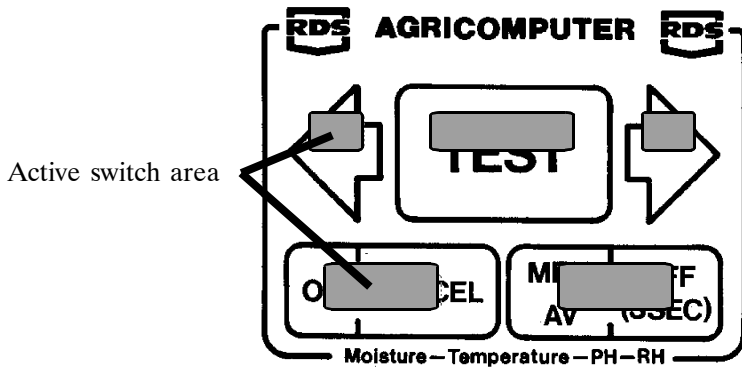
The instrument uses 2 x PP3 batteries.

Remove the cover-plate on the underside of the instrument by placing a screwdriver blade into the small slot. Depress towards the centre of the plate. Fit the batteries.

When changing batteries **DO NOT REMOVE BOTH BATTERIES AT ONCE** or valuable data may be lost.

**DO NOT** press the ON/CANCEL button while fitting or changing batteries.

## 1.2 Switching on/off



Press the ON/CANCEL button to switch on.

Press and hold the OFF button for 3 seconds to switch off.

The number which appears on the display immediately prior to power down is the software edition installed in the instrument.

If the instrument is left switched on after use, it will automatically switch itself off after two minutes.

### 2.1 Notes on Grain Moisture Testing

Care must be taken to ensure consistent conditions for moisture testing if the best results are to be obtained.

Moisture meters operate on the principle of measuring electrical parameters which vary in proportion to the presence of moisture. These measurements are calibrated to oven testing data and held in the instrument memory. Oven testing, as a method of measuring moisture content gives varying results depending on oven temperature and time. This gives rise to a number of different standards. The RDS *Agricomputer* is calibrated to ISO 712, which is the normally accepted standard in Europe.

Having eliminated one variable, the standard for oven testing, there are several more which affect the electrical measurements. The main ones are as follows:

#### **Purity of samples.**

*The sample must be free of chaff, dirt, greenstuff or any other impurities.*

The instrument will measure the dielectric constant of whatever material is in the cell!

#### **Temperature.**

The RDS *Agricomputer* automatically compensates the moisture determination for changes in temperature between -2°C and +40°C but the instrument must be the same temperature as the sample.

*Do not leave the instrument in bright sunlight or in the cab of the combine.*

If there is a temperature difference between the sample and the instrument the figures on the display will keep changing and the reading must not be taken until the display is steady.

#### **Packing Factor.**

Most of the variation in dielectric measurement due to variation in sample density, is avoided by the unique sampling cell on the RDS *Agricomputer*. The sample is automatically weighed while it is being poured into the cell.

*Always fill until the display shows 100.*

*Always fill evenly by pouring gently and from the same height onto the middle cylinder of the cell.*

*Always use the instrument on a level surface.*

## 2 - Measuring grain moisture

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### Surface Moisture

The moisture to be measured should always be the moisture *in* the grain, not the moisture *on* the grain.

*Surface moisture due to rain, dew or sweating should be removed by rubbing the sample gently with absorbant paper or towelling.*

The sample should then be stabilised by storing in a sealed plastic bag for several hours.

### Variability of sample.

The sample being tested is not always representative of the total. However the RDS *Agricomputer* enables up to 99 samples to be taken and automatically averaged.

*A minimum of three samples should always be tested.*

## 2.2 Selecting the correct scale (grain type)

The *Agricomputer* is programmed to test fifteen different types of grain. These are:

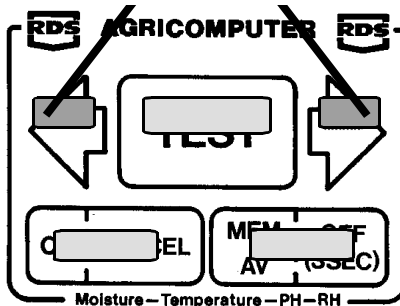
Spring barley, Winter barley, Soft wheat, Hard wheat, Oats, Rye, Rape, Peas, Mustard, Ryegrass, Timothy, Triticale, Sunflower, Linseed, Field beans and Maize.

The *Agricomputer* will also measure Grain Density, in either kg/hl (using the Feld Beans scale ) or lbs./ bushel on the “BUSHEL” scale. Scales for other crops are available.

### Selecting the required crop

Press either of the two arrows and repeat until the required crop name shows on the display. This mode is referred to as the GRAIN TYPE POSITION.

Press here to change crop scales.



### 2.3 Taking the moisture reading.

- a) Make sure that the cell is free to move, and that grains or dirt are not lodged between the white collar of the cell and the case. The white collar may be lifted to clean but *do not try to turn the collar*.
- b) Press the TEST button. Never touch the cell while pressing the TEST button. After 1-2 seconds the display will change to show 00 and a vertical arrow. This indicates that the cell is ready for filling. Release the TEST button.
- c) Fill the cell evenly by pouring gently from a cup (not your hand!) onto the centre cylinder of the cell until the display shows 99, 100, or 101. The horizontal arrow also indicates that the correct weight has been reached. Do not cover the white top of the centre cylinder. If there is too much grain the arrow turns vertical, empty the cell, press CANCEL and start the procedure again from the Grain Type display.
- d) Press the TEST button again. The display will now show the moisture content of the sample in the cell.. The TEST key will only operate in this mode when the horizontal arrow is displayed indicating that the test cell is correctly filled.

If the moisture content figure is preceded by an \*, this indicates that the calibration for this crop has been altered away from the standard calibration. (See section 6. )

### Transferring the result to memory for averaging

Press the MEM/AV key. The display will show the number of samples taken so far e.g. STO:08

### Testing a further sample

Empty the cell and press the CANCEL button. The display will now revert to show the GRAIN TYPE being tested and the procedure can be repeated. Up to 99 samples can be averaged.

### Displaying the average moisture content of the samples taken

Press the CANCEL button to display the grain type then press the MEM/AV button. The display will now show the letter A (average) and the average reading e.g. A = 17,6.

Note. The process of taking a moisture reading must always start from the Grain Type display. This avoids the Grain Type being inadvertently changed without the operator's knowledge.

## 2 - Measuring grain moisture

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### 2.4 Automatic temperature compensation

The calibration of the *Agricomputer* must be altered as the ambient temperature and grain temperature changes. A temperature sensor in the bottom of the grain test cell automatically makes this temperature compensation.

This temperature compensation is made very rapidly and normally need not be of concern. If, however the instrument and the grain to be tested are at very different temperatures, time must be allowed for the temperatures to equalize.

#### Observing the effect of temperature compensation

- (a) Test the grain moisture in the normal way.
- (b) When the grain moisture is shown on the display, press the left hand arrow.

The display will now show the cell temperature as measured by the cell sensor. e.g. C 25,4 = 25.4 °C. Before noting the grain moisture content ensure that the temperature in the cell is no longer changing.

- (c) Press the right hand arrow and the display will show the un- compensated moisture content e.g. U15,0%

After a few seconds the display will revert to show the temperature compensated moisture content.

### 2.5 Adjusting the moisture calibration

Grain and seeds are living organisms. Consequently the characteristics of the grain type which affect the measurement of dielectric constant may change slightly from year to year or from place to place. Normally these variations will have little effect on the moisture content readings. However if grain is to be sold it is better to check the RDS *Agricomputer* against the grain merchant's instrument. There may be differences in calibration and you may wish to adjust your meter to agree with theirs - irrespective of which meter may be 'right' and which meter may be 'wrong'.

#### Adjusting to a particular grain scale calibration:

- (a) Take a number of samples from a consistent mass and establish the amount of the required adjustment.
- (b) Now place a sample in the RDS *Agricomputer* and take the moisture content in the normal way using the correct crop scale.
- (c) With the moisture content still displayed press the TEST button for 3-4 seconds.

An arrow will appear in front of the moisture reading.

A horizontal arrow indicates that the standard calibration is in use.

- (d) Now the reading can be adjusted upwards by pressing the right-hand arrow repeatedly or downwards by pressing the left-hand arrow.

The arrow in front of the display indicates that the standard calibration has been altered. The maximum adjustment is +/- 2%.

#### Reverting to the standard calibration

Proceed as in (b), (c) and (d).

**If the display shows a downward pointing arrow**, press the right hand arrow switch a number of times until the arrow on the display turns horizontal.

Each time the switch is pressed the displayed moisture content will change by 0.1 %.

**If the display shows an upwardly pointing arrow**, press the left hand arrow switch to revert to the standard calibration.

If the batteries are removed, all calibration will revert to the standard.

## 2 - Measuring grain moisture

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### 2.6 Measuring grain density kg/hl or lbs/bushel

The *Agricomputer* is supplied with a 100 millilitre measuring beaker.

- (a) Scoop up a measure full of the grain to be tested. Tap the base once on a flat surface and level off the contents.

*Do not pack grain into the measure.*

#### **Measuring the density in kilogrammes per hectolitre ( kg/hl)...**

- (b) Switch the **Agricomputer** on and select the f BEANS scale. Press TEST and carefully pour the 100 ml grain sample into the test cell.

When all 100 ml is in the cell, the display will show the density in kg/hl.

#### **...or in pounds per bushel ( U.K. Bushel )**

Select the BUSHEL scale, press TEST and carefully pour the 100 ml grain sample into the test cell.

When all 100 ml is in the cell, the display will show the density in lbs./bushel.

## 3 - Measuring temperature

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The RDS *Agricomputer* can be used to measure the temperature of stored materials, e.g. grain, hay, potatoes, by using the temperature probe supplied with the instrument. Ideally the probe should be buried in the store during filling or a steel pipe incorporated into which the sensor can be inserted.

In the former method extra probes may be purchased for burying in different parts of the store. In using the steel pipe method the sensor should be left in position for approximately 10 minutes before the reading is taken.

### **Using the temperature probe**

Plug the probe into the side of the RDS *Agricomputer* and press the ON/CANCEL B button.

### **Changing from °F to °C**

Press the TEST button.

## 4 - Error messages (moisture & temperature)

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Incorrect operation or malfunction is indicated on the display as follows:

- |                      |  |
|----------------------|--|
| <b>ERROR 1</b>       | The measuring chamber was not emptied before pressing the TEST button (see para 5b) or the circuit is defective. |
| <b>ERROR 2</b>       | The user is trying to commit to memory moisture content readings of grain of more than one Grain Type.           |
| <b>MEMFUL</b>        | The maximum number of readings (99) is already in the memory store.  |
| <b>HI/LO</b>         | The moisture content of the sample is outside the range of the instrument.                                       |
| <b>TEMPHI/TEMPLO</b> | The temperature is outside the range of the temperature probe.   |
| <b>BAT LO</b>        | Batteries need changing.   |

The following accessories are available.

THE HAY/STRAW PROBE, measures the moisture content of hay or straw bales.

The RH-TESTER, measures Relative Humidity (R.H.)

The PH-TESTER, measures PH values of soils.

### Connecting an accessory

When any one is used the function of the *Agricomputer* must be changed.

- (a) Release the small module on the left-hand side of the instrument by inserting a small screwdriver into the slot on the underside and levering gently. Carefully ease the module from its slot but *do not remove it from the instrument*.
- (b) On the left hand side of the front edge of the module is located a small slide switch . Move the switch to the right.
- (c) Replace the module by pushing it firmly home.  
**DO NOT FORGET TO MOVE THE SWITCH BACK TO THE LEFT-HAND POSITION BEFORE USING THE INSTRUMENT AS A GRAIN MOISTURE METER.**
- (d) Switch on by pressing the ON/CANCEL button. The display will then show 'PLEASE CONNECT ACCESSORIES' on the side of the instrument. You are now ready to proceed.  
N.B. Should the programme module be completely removed from the instrument, *do not touch the contact strip* on the edge of the circuit board. This could cause permanent damage to the module.

## 5 - Accessories

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### 5.1 Using the hay/straw probe

#### 5.1.1 Preparation

Prepare the RDS *Agricomputer* as on page 12. When the Hay/Straw probe is connected the display will show 'HAY'.

Now press the TEST button. The display will show 'LO' and the instrument is now ready for use.

#### 5.1.2 Measuring moisture

Hold the handle firmly and push the probe into the bale.

The meter shows the moisture percentage over a range from 12-35%. If the moisture content is below 12%, the display shows 'LO'. If it is higher than 35%, the display shows 'HI'.

#### 5.1.3 Displaying memory average

- (a) Press MEM/AV to store each measurement.

The display will show STO:06 indicating the number of readings now held in memory for averaging. Up to 99 measurements can be stored in this way.

- (b) When all measurements have been entered into the memory, press ON/CANCEL so that the display shows HAY.

- (c) Press MEM/AV and the average moisture content is shown (A=25.5). The A indicates that an average value is being displayed.

#### 5.1.4 Clearing the memory

To delete the memory, switch the instrument off and back on again. Check that the memory is clear by pressing MEM/AV. The display should show six horizontal bars.

#### 5.1.5 Maintenance

Keep the instrument in a dry place and avoid exposing it to blows, shocks, or direct humidity. After each test, particularly in bales with a high moisture content, wipe off the tip of the spear carefully with a dry cloth after taking it out of the bale.

### 5.2 Using the RH-tester

#### 5.2.1 Preparation

Prepare the RDS *Agricomputer* as on page 12. When the RH-TESTER probe is connected the display will show `RH'. The instrument is now ready for use.

#### 5.2.2 Measuring relative humidity

Press the TEST button. The RH is immediately shown on the display.

#### 5.2.3 Displaying memory average

- (a) Press MEM/AV to store each measurement.

The display will show STO:06 indicating the number of readings now held in memory for averaging.

- (b) When all measurements have been entered into the memory, press ON/CANCEL and the average of all the readings will be displayed (A=54.4). The A indicates that an average value is being displayed.

#### 5.2.4. Clearing the memory

To delete the memory, switch the instrument off and back on again. Check that the memory is clear by pressing MEM/AV . The display should show six horizontal bars.

#### 5.2.5 Measuring dew point and temperature

- (a) Press the ON/CANCEL button.
- (b) Press the right-hand arrow to display TEMP' or the left-hand arrows to display DEW PT'.
- (c) Press the TEST button. The display will show the temperature on the TEMP channel or the dew point on the DEW PT channel. The dew point is the temperature at which the dew will fall, the calculation being based on the temperature and RH at the time of reading.

#### 5.2.6 Maintenance

Protect the tip of the RH-TESTER from blows and from direct exposure to moisture.

## 5 - Accessories

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### 5.3 Using the pH-tester

#### 5.3.1 Unpacking

The pH-TESTER consists of the following units:

- 1 pH Probe
- 1 pH Adapter
- 1 Bottle of Buffer Solution pH 7.0 (Green)
- 1 Bottle of Buffer Solution pH 4.0 (Red)
- 1 Bottle of 3 m KCl (White)

Check that all units are enclosed and undamaged.

#### 5.3.2 Preparation

Prepare the RDS *Agricomputer* as on page 12.

- (a) Connect the pH probe to the pH adaptor and plug into the socket on the side of the instrument. The display will show 'JUST 7'.
- (b) Dip the probe into the Buffer Solution pH.7. At least 2 cm of the probe must be covered by the solution.
- (c) Press TEST . When the probe has stabilised the display will show 'JUST OK' then 'JUST 4'.
- (c) Flush the probe in clean water then lower it into the Buffer Solution pH4.
- (d) Press TEST . When the probe has stabilised the display will show 'JUST OK' then 'pH'. The instrument is now calibrated and will remember the calibration even when it is switched off.

#### 5.3.3 Displaying pH value

When the display shows 'pH' the pH-TESTER is ready for use.  
Press TEST to display the pH value of soils or liquids.

#### 5.3.4 Displaying memory average

- (a) Press MEM/AV to store each measurement. The display will show STO:15 indicating the number of readings now held in memory for averaging. Up to 99 measurements can be stored in this way.
- (b) When all measurements have been entered into the memory, press ON/CANCEL to get back to the initial position of the instrument
- (c) Press MEM/AV . The display will show A= 7,2 .The A indicates that an average value is being displayed.

### 5.3.5 Compensating for temperature

In order to obtain a more accurate pH measurement under different temperature conditions it will be necessary to introduce compensations.

- (a) Press ON/CANCEL to get to the initial position of the instrument.
- (b) Press the right or left arrow key to choose 'TEMP' and then press TEST , The display shows at which temperature the pH value will be calculated (original adjustment 20°C /68°F ).
- (c) Press TEST again to choose between °C and °F.
- (d) Press the right or left arrow key to adjust the actual temperature for the soil sample. Normally, this adjustment can be disregarded, as a pH value of 4 will only change approx. 0,1 pH for each change of 10°C / 18°F

### 5.3.6 Adjustment

Check and adjust the pH probe at regular intervals with the buffer solutions. It may be necessary to adjust pH 7 frequently.

### 5.3.7 Error code

If the display shows `ERROR 1', please check if the correct buffer solution has been used for adjustment of pH 7 and pH 4.

### 5.3.8 Maintenance

After use, place the protection cap filled with distilled water on the tip of the probe. Please also follow the special instructions for pH electrodes on pages 16 to 18.

Do not expose the adapter, the adapter plug and the pH probe to dirt, dust or moisture ,as this could cause permanent error in indication.

## 5 - Accessories

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### 5.4 Special instructions for pH electrodes

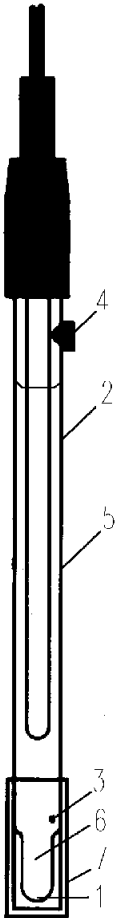
#### 5.4.1. General notes:

Make sure that the electrical plugs are always absolutely clean and dry, as current leakage might otherwise occur.

The probe and the pH-sensitive membrane glass must be treated carefully and be protected against damage.

#### 5.4.2 Initial treatment:

All electrodes are equipped with a protecting cap (7) covering the pH sensitive membrane glass (1) and the diaphragm (3). The cap contains 3m KCl solution to keep the electrodes ready for use.



- Take off the protecting cap (7), then flush the electrode with distilled water and wipe with a tissue. Do not rub as an increase in response time might be the result.
- Remove the rubber cap covering the electrolyte filling aperture (4) to ensure pressure equalization with the atmosphere.
- Check level of electrolyte (5) which should be approximately 10mm below refilling aperture. Refill, if necessary, with 3m KCl solution.
- Eliminate air bubbles inside the membrane space (6) by smoothly swinging the unit in the vertical plane.

### 5.4.3 Maintenance

The electrode should always contain sufficient liquid. The liquid column inside the electrode must reach several centimetres above the surface of the measuring solution. Refill as described previously when necessary.

If the electrode is used for pH measurement in non-water mediums, it must be regenerated from time to time. To regenerate a dried-out glass membrane, soak for several hours in the storage solution.

If the electrode is not used during a long period, place the protective cap with KCl solution on the electrode. *During storage or reconditioning only 3m KCl solution should be used.*

After a very long and dry storage period, the glass membrane can be reactivated with hydrofluoric acid as follows: The membrane is dipped for 1 minute in the solution followed by rinsing with distilled water and soaking for 12 hours in the storage solution.

Before the pH probe is put to use in soil, the soil must be prepared so that it is loose and without lumps and stones. If the soil is dried out, it must be wetted with demineralized water.

The probe must be inserted gently into loosened soil so that the fragile tip is not damaged. Press the soil gently around the probe to make good contact. Let the probe stay in the soil until the display is stable.

After each test the probe must be flushed in demineralized water.

### 5.4.4 Cleaning

Impurities deposited on the surface of the membrane glass must be removed. If careful and gentle rubbing with a soft and wet paper tissue does not remove the impurities, different chemical cleaning methods can be used according to the nature of the impurities (mild glass cleansers, laboratory detergents, acetone, alcohol, non acid solutions).

To remove albuminous deposits, which can appear after measuring milk products such as milk, cheese, yoghurt etc, special cleaning solutions (e.g. pepsin in diluted hydrochloric acid) can be purchased.

If the electrode is kept dry, the KCl crystallizes on the outside of the diaphragm. The electrodes should be rinsed with water before use or kept for a while in 3m KCl solution if the diaphragm is blocked.

In persistent cases it is recommended to warm up the electrode.

## 5 - Accessories

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To clean diaphragms for impurities the above methods can be applied. Diaphragms blocked by deposits of silver chloride (long contact with ion-poor water) or silver sulphide (measuring in mediums containing sulphide), which show a brownish or blackish tanning can be reconstituted by treatment with a 28% ammonia solution or a special diaphragm cleansing solution.

In case of very persistent and strong impurities, the surface of the diaphragm can be polished or sanded with care.

### 5.4.5 Cautions

Do not expose the electrodes to temperatures lower or higher than 0-40 F Celcius (32-104 Fahrenheit), as this could lead to changes in physical properties.

Electrodes subject to complaints must be returned to us in the original box together with a description of the errors/causes of error, and the invoice number or date of purchase.

In case of doubt do not try to make the instrument work without proper advice. Such attempts could make void the guarantee. Please contact us immediately if in difficulty.

Your distributor is: