Martin Lishman

# Grainmaster i-S

GRN3000-S

# Instruction Manual

***Professional Crop Moisture Measurement***

*Distributed by*
**Martin Lishman Ltd**
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**www.martinlishman.com**

PROTIMETER

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# Protimeter Grainmaster i-S
## *Grain Moisture Meter*

# Instruction Manual

**Contents**

# REMEMBER!

***Always grind the sample***

- most calibrations are based on a ground sample (Page 8).

***Keep it clean***

- for highest accuracy clean the grinder-compressor regularly (Page 12).

***Hard Wheat or Soft Wheat?***

- the wheat calibration is for Soft Wheat. To convert to a Hard Wheat reading see Page 8.

***Bias Adjustments***

- crop calibrations can be adjusted manually (Page 9).

Display (flashing): ≥!≤ = Bias Set

***Always use Automatic Temperature Correction (ATC)***

- ATC adjusts readings if a sample is not at 20°C. The default setting is ATC switched ON (Page 10).

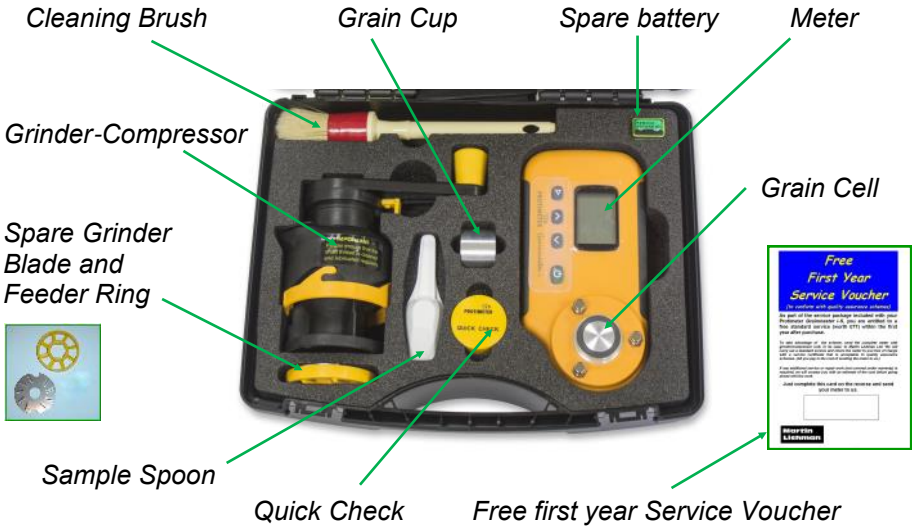
Display (flashing): ≥°C≤ or ≥°F≤ = ATC is OFF

***Avoid extremes***

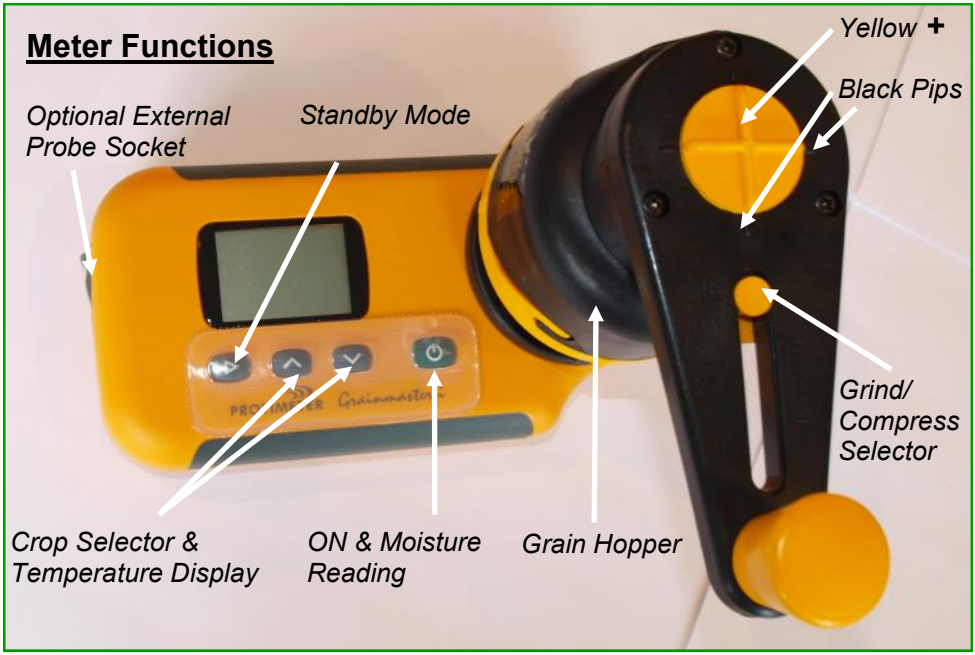
- keep the grain sample and the meter at a similar temperature.

# Product Features

## Items supplied




## Meter Functions



# Taking a Moisture Reading

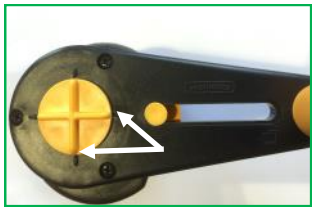
## Step 1 - Prepare the Meter

Disconnect any external probe; leave the meter to switch OFF.

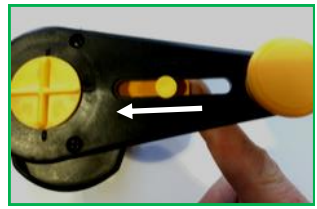
*Ensure the Grain Cell is clean*

*Place the Grain Cup on the Grain Cell*

Check the Grinder-Compressor is clean (see Page 12 for cleaning instructions). Ensure the compressor plunger is fully retracted, as follows:



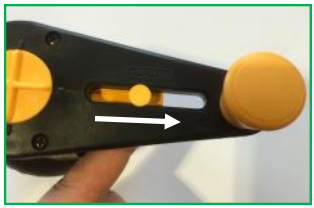
*Align the Black Pips on the handle with the Yellow ✚*



*Slide the selector inwards to the Compress position*


*Rotate handle anti-clockwise until it clicks a few times*

## Step 2 - Prepare the Sample



*Slide the selector outwards to the Grind position*

*Place the Grinder-Compressor over the Grain Cup*

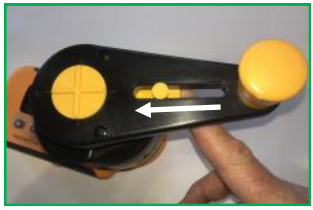

*Lock in place by twisting clockwise against the lugs*

*Using the Spoon, pour a 10 ml sample into the Grain Hopper*

*Rotate handle clockwise until there is no grinding noise*

*Ensure the yellow ✚ remains stationary during grinding*

*Align the Black Pips on the handle with the Yellow* **+**



*Slide the selector inwards to the Compress position*


*Rotate handle clockwise until it clicks a few times*

## Step 3 - Take the Reading

Press and release ⏻


***To change the crop type:***

*Press ▷ to put instrument in standby mode* **– – –**


*Use Λ or V to scroll to the crop required*


*Press and release* ⏻

## Display Codes

| | |
|---|---|
| **– – –** | Standby mode |
| **u - r** | Under measurement range<br>*The sample is too dry or too cold. Can also display if the sample is less than 10ml or not compressed.* |
| **o - r** | Over measurement range<br>*The sample is too wet.* |
| **°C** or **°F** (flashing) | Automatic Temperature Correction (ATC) deactivated |
| **!** (flashing) | Crop calibration has been adjusted with a –ve or +ve bias |
| **[!]** | Low battery power |

**Quick Check Value**
at 20° C (see page 13)

| CROP | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SCALE** | **0-100** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **36.5** | **40** | **45** | **50** | **55** | **60** | **65** | **70** | **75** | **80** | **85** | **90** |
| Barley I.S.O. 712 | Ground | 10.9 | 11.8 | 12.5 | 13.3 | 14.1 | 14.8 | 15.7 | 16.0 | 16.9 | 17.8 | 18.8 | 19.8 | 20.8 | 22.1 | 23.6 | 25.4 | 27.6 | 32.0 | 35.1 |
| Beans/Tic/Winter | Ground | 12.4 | 13.4 | 13.8 | 14.1 | 14.8 | 15.4 | 16.3 | 16.5 | 17.0 | 17.7 | 18.3 | 19.0 | 19.7 | 20.6 | 21.5 | 22.6 | 23.9 | | |
| Canola I.S.O. 665 | Ground | | | | 7.0 | 7.5 | 8.3 | 9.2 | 9.4 | 9.9 | 10.7 | 11.6 | 12.7 | 13.9 | 15.8 | 17.8 | 20.2 | 23.3 | | |
| Coffee | Ground | | 10.2 | 10.6 | 11.2 | 11.9 | 12.6 | 13.3 | 13.5 | 14.0 | 14.7 | 15.4 | 16.2 | 17.1 | 18.8 | 20.6 | | | | |
| Linseed | Whole | 7.0 | 7.4 | 7.8 | 8.3 | 8.9 | 9.4 | 10.1 | 10.3 | 10.8 | 11.6 | 12.5 | 13.5 | 14.6 | 16.0 | 16.5 | | | | |
| Maize/Corn | Ground | 10.4 | 11.4 | 12.1 | 13.0 | 13.8 | 14.6 | 15.5 | 15.8 | 16.6 | 17.4 | 18.0 | 18.9 | 20.0 | 21.1 | 22.4 | 23.7 | 25.1 | | |
| Oats I.S.O. 712 | Ground | 10.9 | 11.8 | 12.5 | 13.3 | 14.1 | 14.8 | 15.7 | 16.0 | 16.9 | 17.8 | 18.8 | 19.8 | 20.8 | 22.1 | 23.6 | 25.4 | 27.6 | 32.0 | 35.1 |
| Oilseed Rape I.S.O. 665 | Ground | | | | 7.0 | 7.5 | 8.3 | 9.2 | 9.4 | 9.9 | 10.7 | 11.6 | 12.7 | 13.9 | 15.8 | 17.8 | 20.2 | 23.3 | | |
| Paddy | Ground | 10.4 | 11.4 | 12.1 | 13.0 | 13.8 | 14.6 | 15.5 | 15.8 | 16.6 | 17.4 | 18.0 | 18.9 | 20.0 | 21.1 | 22.4 | 23.7 | 25.1 | | |
| Peas (Field protein type) | Ground | 12.0 | 12.9 | 13.8 | 14.5 | 15.4 | 16.2 | 17.2 | 17.5 | 18.3 | 18.9 | 20.0 | 21.8 | 22.5 | 23.0 | 24.3 | 25.3 | 27.4 | 30.0 | |
| Sorghum/Milo | Ground | 10.2 | 11.7 | 12.4 | 13.1 | 13.9 | 14.6 | 15.4 | 15.6 | 16.3 | 17.1 | 17.9 | 18.7 | 19.6 | 20.9 | 22.2 | 23.7 | 25.4 | | |
| Soya Beans | Ground | 7.4 | 8.2 | 8.8 | 9.7 | 10.4 | 11.1 | 11.8 | 12.0 | 12.6 | 13.4 | 14.3 | 15.2 | 16.0 | 17.1 | 18.2 | 19.5 | 21.0 | | |
| Sunflower Seed | Whole | 6.2 | 6.9 | 7.4 | 8.2 | 8.7 | 9.4 | 10.2 | 10.5 | 11.3 | 12.1 | 13.1 | 14.2 | 15.3 | 17.0 | 19.0 | 21.4 | | | |
| Rice(milled) | Whole | | 13.2 | 13.9 | 14.8 | 15.5 | 16.3 | 17.2 | 17.5 | 18.4 | 19.5 | 20.7 | 22.0 | 23.3 | 25.6 | 27.2 | | | | |
| Wheat/Rye - Hard ISO 712 | Ground | 12.0 | 13.0 | 13.7 | 14.5 | 15.3 | 16.0 | 16.8 | 17.0 | 17.7 | 18.6 | 19.6 | 20.8 | 22.0 | 23.4 | 25.0 | 26.8 | 28.7 | | |
| Wheat/Rye - Soft ISO 712 | Ground | **11.3** | **12.3** | **13.0** | **13.8** | **14.6** | **15.3** | **16.1** | **16.3** | **17.0** | **17.9** | **18.9** | **20.1** | **21.3** | **22.7** | **23.3** | **26.1** | **28.0** | | |

## Calibration Notes

- Fifteen calibrations are pre-programmed into the *Grainmaster i-S,* highlighted in red above. A further 29 calibrations can be viewed on the Martin Lishman website www.martinlishman.com.
- The difference in calibration values for hard and soft wheat may not be the same for all hard wheat varieties. If in doubt, obtain oven tests of a hard wheat sample so that the calibration can be verified.
- All crop calibrations are mean values of laboratory test results, so should not be considered as absolute. Local environmental conditions, soil characteristics, crop varieties and other variables may lead to differences.
- Other calibrations can be created by using the 0-100 scale and oven-tested reference samples.

# Meter Calibration Adjustment

**Making Bias Adjustments to the Meter**

The meter reading can be adjusted to match another meter's reading. The pre-programmed crop calibrations can be adjusted individually by +/-1.5%, as follows:

Measure the moisture content of a sample in the normal way (press ⓘ)



***To increase the bias:***

Keep pressing ⓘ to display the **%$H_2O$** value and press **Λ** to increase the calibration bias in increments of 0.1

**!** flashes in the bottom right corner of the display to indicate that a calibration has been adjusted



***To decrease the bias:***

Press ⓘ to display the **%$H_2O$** value and press **V** to decrease the bias in increments of 0.1.
Negative bias is indicated by **–** on the display.

Remove a bias by pressing ⓘ while pressing ▷. The **!** will disappear.

**Note:** *Bias adjustments are separate for each crop and stored in the instrument's memory until removed as above. Bias adjustment can also be made when using the Moisture & Temperature or Bale Moisture Probes (see Page 14). Temperature readings cannot be adjusted.*

# Temperature Correction

## The Importance of Temperature

***Hot meter, cold sample, low readings***
Keep meters out of direct sunlight, particularly in vehicles.
If not, readings will be too low

***Cold meter, hot sample, high readings***
Grain taken from a high temperature drier must be cooled before testing.
If not, readings will be too high

## Temperature Correction

The meter calibrations are based on oven tests at 20°C. If the sample differs from this temperature, Automatic Temperature Correction (ATC) corrects the moisture reading automatically.

Even with ATC on, the grain sample and the meter Grain Cell need enough time to reach close temperature equilibrium. If there are extremes of temperature between the sample and the instrument, check the Grain Cell temperature reading a few times until it is constant, as follows:

*Press and release* ⏻.
*Press* ***Λ*** *or* ***V*** *to display the Grain Cell temperature.*

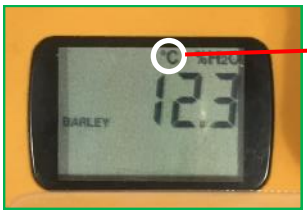
## ATC should always be on

To check if ATC is ON or OFF:

After taking a moisture reading in the normal way, the display is as follows:

If ATC is ON


If ATC is OFF




°C (flashing)

# Meter Settings

## Default Settings

The *Grainmaster i-S* is supplied ready-to-use with ATC on, no bias adjustments and temperature in °C.

**To alter default settings**

Bias is adjusted as described on Page 9. Temperature units can be changed to suit personal preference and ATC can be switched off in Setup Mode, as below:

***To enter Setup Mode:***

With the meter switched off, press and hold ▷ and then press ⏻ and then release both buttons at the same time. The meter version information will scroll across the display and then the first set up code, **0=0**.

***To change from °C to °F:***

| | |
|---|---|
| Enter setup mode: | Press ▷. Display shows **1=0** (temperature in **°C**) |
| To change to **°F**: | Press **Λ**. Display shows **1=1** (temperature in **°F** ) |
| To save this change: | Press ▷ and press ⏻ to exit Setup Mode |

***To turn off ATC:***

| | |
|---|---|
| Enter setup mode: | Press ▷ twice. Display shows **2=0** (ATC is on) |
| To turn ATC off: | Press **Λ.** Display shows **2=1** (ATC is off) |
| To save this change: | Press ▷ and press ⏻ to exit Setup Mode |

**Note:** *ATC should always be on during normal meter use.*

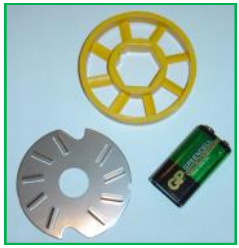
***Summary of Setup Mode displays:***

**0=0** Initial display
**0=1** Resets to default settings
**1=0** Temperature in **°C**
**1=1** Temperature in **°F**
**2=0** Turn on ATC
**2=1** Turn off ATC

# Care and Maintenance

Regular care and maintenance of the *Grainmaster i-S* meter ensures accurate readings.

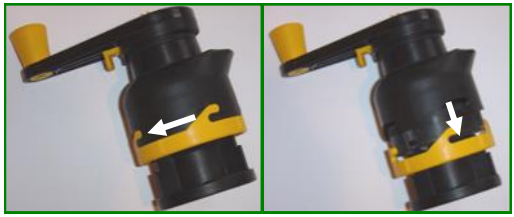
### *Check the Grinder Blade and Feeder Ring*



*A worn Grinder Blade and Feeder Ring causes inaccurate readings. Check regularly and replace (see below) if worn or damaged. A spare set is included with the meter.*

### *Grinder-Compressor Maintenance*

The Grinder-Compressor unit should be cleaned and lubricated regularly, especially when testing wet or oily crops. Visit *www.martinlishman.com* to view an animated guide to grinder/compressor maintenance or use the following steps:



*Separate the two halves of the unit by twisting the yellow locking ring anticlockwise and pulling apart.*

*Open the blade retaining wings. Lift out the plunger and blade assembly.*

*Separate the blade and yellow feeder ring from the plunger. Clean all components with the brush.*

*Clean the plunger thread and ensure it spins freely. Lubricate with a light oil.*

### *Battery*

Remove the battery if not used for long periods. When battery power is low **[!]** displays. A spare battery is included with the meter.

# Care and Maintenance

***Calibration Check***

It is rare for the meter calibration to change or the electronics to malfunction without an obvious indication. If any E codes display, return the instrument to the Martin Lishman service centre.

**To verify the instrument calibration:**

Use the Quickcheck device with ATC on and no external probe connected. Ensure the Grain Cell is clean and dry. Set the instrument to Wheat. Place the Quickcheck on the Grain Cell and hold in position.


*Press ⏻. Take a reading.*

The reading is 16.3% at 20°C, which is correct.


*Press Λ or V to display Grain Cell temperature*

***If the Grain Cell is not at 20°C:***

*For every whole degree above 20°C, ATC will subtract 0.1 %.*

**Example:** Quickcheck reading is 15.8% at a cell temperature of 25°C. ATC subtracts 0.5% from 16.3% to give 15.8%. Instrument is therefore calibrated and working correctly.

*For every whole degree below 20°C, ATC will add 0.1%.*

**Example:** Quickcheck reading is 16.6% at a cell temperature of 17°C. ATC adds 0.3% to 16.3% to give 16.6%. Instrument is therefore calibrated and working correctly.

**Notes:**

- *If a calibration has a bias adjustment, Quickcheck readings will reflect this.*

  **Example:** *Quickcheck reading is 17.1%, cell temperature is 17°C, wheat calibration is biased +0.5%. The reading is derived from 16.3% (Quickcheck value at 20°C) + 0.5% (bias) + 0.3% (ATC) = 17.1%, so the meter is working correctly.*
- *The column coloured yellow in the Calibration Chart on Page 8 gives the values for other crops with the Quickcheck at 20°C.*

***Regular Servicing and Checks***

According to most crop quality assurance schemes, your moisture meter should be checked annually against oven tested crop samples. It is also important to ensure that vital parts such as the grinder-compressor are working correctly. The Martin Lishman service centre is fully equipped to service your moisture meter throughout its working life. We also conduct testing clinics at various locations around the country where you can check your meter and obtain a test certificate to satisfy your crop assurance scheme. See our website for the latest clinic details and to download a service return form.

# Moisture Probes

## Optional Grain and Bale Moisture and Temperature Probes

External probes connect to the meter via the probe socket which is protected by a blanking grommet when not in use.

**Moisture and Temperature Probe 1.5m** **(Part No. GRN3005)**

Used with the *Grainmaster i-S* to check the moisture and temperature of grain while in the store.
Nine moisture probe calibrations are pre-programmed into the *Grainmaster i-S*: Wheat, Canola, Oilseed rape, Barley, Oats, Linseed, Beans, Peas, 0-100 scale.

**Note:** *Ground sample readings are more accurate than moisture probe measurements.*

**Bale Moisture Probe 600mm** **(Part No. GRN6138)**

Used with the *Grainmaster i-S* to check the moisture of straw and hay bales. Calibrated for wheat straw. Suitable for other baled products.

## Taking a moisture probe reading

Ensure the Grain Cell is clean. Do not touch the cell while using the probe. Push the probe into the grain or bale and allow a few minutes to stabilise. Connect the probe to the meter.


*Press ⏻. The display will show* ***PROBE or BALEPROBE*** *and the moisture reading.*
***Grain moisture probe only:*** *Press Λ or V to switch between crop moisture and crop temperature. When display shows ▬ ▬ ▬ , use Λ or V to scroll to the crop required.*

***Note:*** Bias adjustments are made as shown on Page 9.

***Care and Maintenance:***
**Moisture and Temperature Probe -** should be kept clean of dust that may give an inaccurate reading. Do not expose to extreme temperatures.
**Bale Moisture Probe and Temperature Probes -** beware sharp pointed end. Keep covered when not in use. When removing the probe from the bale, avoid twisting the handle.

# Temperature Probes

**Grain Temperature Probe 1.5m** **(Part No. GRN6046)**

Stainless steel fast response probe used with the *Grainmaster i-S* to check the temperature of stored grain.

**Bale Temperature Probe 600mm** **(Part No. GRN6155)**

T-Bar stainless steel fast response bale temperature probe used with the Grainmaster i-S to check the temperature of bales of hay and straw. Suitable for other baled products.

## Taking a temperature probe reading

Ensure the Grain Cell is clean. Do not touch the cell while using the probe. Push the probe into the grain or bale and allow the temperature to stabilise. Connect the probe to the meter.


*Press ⏻. The display will show **PROBE** and the temperature reading.*

***Note:*** Bias adjustment cannot be made to the temperature reading.

**Protimeter Balemaster** **(Part No.GRN6165)**

The 600mm bale moisture probe is also available as a stand-alone unit with hand-held monitor. Please ask for further details.

# Specifications

**% Moisture Measurement Ranges**

| | | | |
|---|---|---|---|
| **Wheat:** 11.3 to 29.3 | **Canola:** 7.0 to 26.0 | **Coffee:** 9.8 to 23.9 | **Rice:**13.2 to 26.5 |
| **Oats:** 10.9 to 29.3 | **Linseed:** 7.0 to 16.5 | **Soya:** 7.4 to 22.2 | **Sorghum:** 10.2 to 26.9 |
| **OSR:** 7.0 to 26.0 | **Sunflower:** 6.2 to 23.0 | **Beans:** 12.4 to 25.0 | **Paddy:** 10.4 to 26.2 |
| **Barley:** 10.9 to 29.3 | **Corn:** 10.4 to 26.2 | **Peas:** 12.0 to 30.9 | 0-100 relative |

**With Bale Moisture Probe in wheat straw:** 8.5 to 36.8%

*Weight with grinder-compressor:* 950g
*Dimensions with grinder-compressor unit:* 195 x 100 x 185 mm high
*Power:* 9V battery
*Resolution:* 0.1
*Operating temperature range:*
*Meter:* 0 °C to 40 °C
*Grain or bale temperature probe:* 0 °C to c.80 °C
*Crop moisture measurement ranges* - See table above or www.martinlishman.com
*Accuracy:* +/-0.5% (depends on maintenance and cleanliness of the grinder-compressor unit and consistency of grain sample)

## Warranty

*The* Grainmaster i-S *(the unit) is guaranteed for 12 months from the date of purchase against any defect or malfunction caused by faulty parts or workmanship. To claim under warranty, the complete unit or part should be returned, at the claimant's expense, to Martin Lishman Ltd with a written explanation of the problem. Should there prove to be a defect or malfunction caused by faulty parts or workmanship, it will be repaired or replaced and returned to the claimant without charge. If a warranty claim is rejected, the cost of replacement or repair will be notified to the claimant before any work is carried out.*

*Any warranty claim will automatically be invalidated if the unit has been modified or internally tampered with in any way. The manufacturers will not cover under warranty damage or faults occurring to the unit which have been caused by inappropriate use or by use not in accordance with the operating instructions for the unit.*

*Under no circumstances will Martin Lishman Ltd re-imburse any costs associated with a warranty claim if these costs have been incurred without agreement in advance.*

*Under the terms of warranty for the unit under no circumstances will liability exceed the cost of replacement or repair. The manufacturers and Martin Lishman Ltd will not be liable for any consequential or indirect loss suffered by purchasers or users of the unit, whether this loss arises from correct or incorrect use, defect or malfunction caused by faulty parts or workmanship or in any other way. Non-exhaustive illustrations of consequential or indirect loss are loss of profits, loss of contracts and damage to property.*

*The information contained in this manual is given in good faith. As the method of use of the instrument (and its accessories) and the interpretation of the readings are beyond the control of the manufacturers and selling agents, they cannot accept responsibility for any loss, consequential or otherwise, resulting from its use.*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