# Martin Lishman

## Potato Quality

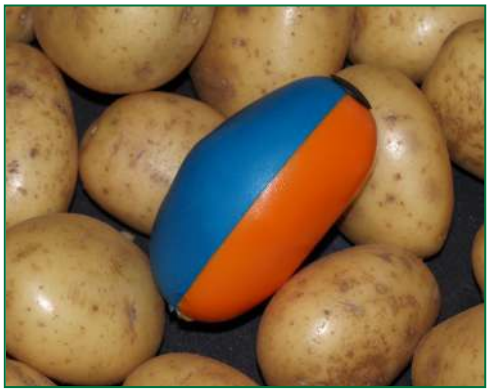
*Potato Quality Measurement and Monitoring*

# Electronic Potato

## *TuberLog*

*Bluetooth connection*

*Instant results*



*TuberLog mimics the size, shape and density of a typical ware potato*

## IMMEDIATELY Identifies Sources of Damage and BRUISING

The TuberLog Electronic Potato identifies damage and bruise causes in all types of potato handling machinery.

The operator watches the TuberLog passing through a machine. Its Bluetooth technology immediately indicates sources of impact.

TuberLog enables immediate improvements to quality problems in potato production.

TuberLog assists with the prevention of economic losses caused by bruising.

### Key Features

- **Immediate results -** Impact readings heard instantly and data viewed in real-time via Bluetooth interface on Android tablet or smartphone, using the App supplied
- **Impacts** and temperatures are all recorded
- **Data download** - the data can be stored in the logger and Android device or downloaded to a PC or laptop, using software supplied
- **Time-stamp and repeat measurement** functions allow easy identification and examination of the damage source

### Suited to testing all potato handling situations

*In the ground*

*Harvester*

*Grader*

*Washer*

*Conveyor*

*Packing line*

***See TuberLog in action - log on to: www.martinlishman.com/tuberlog-electronic-potato***

### INTERPRETATION of Results

Bruising level is related to impact, but variety, temperature and growing conditions all affect how much bruising occurs at a given impact.

TuberLog readings can be compared to Potato Hot Box bruise test results taken from the same machine section. This provides the experience to interpret TuberLog results very quickly.

In conjunction with Hot Box bruise testing, TuberLog can provide peace of mind that quality standards are being maintained.

### *TuberLog* PC software allows detailed analysis of impact records

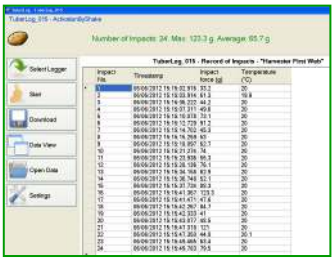
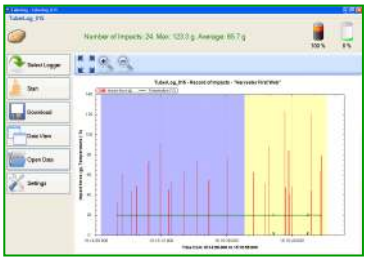


*Table of individual impacts*



*Real-time graph of impacts*

*Distribution of impact levels*

# *Potato Hot Box*

*250 Tuber 10 Tray Potato Hot Box*

*See the Potato Hot Box in action - log on to: www.martinlishman.com/potato-hot-box*

*25 tubers per tray to suit sampling protocols*

*Easy-to-use controls for temperature, humidity and time*

*A standard peel test indicates bruise levels after 12 hours*

## 12 HOUR Assessment of Potato BRUISING

## Incubate DISEASE and ROTS before STORAGE

## RESEARCH best conditions for longer SHELF LIFE

The Martin Lishman Potato Hot Box range is used for on-farm, processing and supermarket quality control.

Monitoring for bruising and disease avoids costly rejections and ensures high quality product.

### Key Features

- **Automatic control** - of temperature and humidity levels
- **Automatic fan, air heater and thermostat** - allows testing between 10 and 40°C
- **Ultrasonic atomizing humidifier** - keeps humidity levels at an accuracy of 1-3%
- **Automatic timer** - to allow precise testing for up to 99 hours

*The Potato Hot Box is available in 3 standard versions:*
*5 tray (125 tubers); 10 tray (250 tubers); 30 tray (750 tubers).*
*The 750 has a wheeled trolley base. All sizes are also available in 120v versions*

### A VERSATILE Quality Control Tool

Potato bruising can take several days to show. The Potato Hot Box reduces this time to 12 hours by creating the optimum warm, damp conditions for bruise development. The specific temperature and humidity at which rots and diseases occur can also be re-created.

The Potato Hot Box can help to avoid bruising during harvesting and handling, especially when used in conjunction with the TuberLog electronic potato, by highlighting the crops most at risk from harvesting and grading damage.

Earlier detection of bruising, damage and disease means reducing storage losses and costly processing rejections. The value of the crop can be maintained, extra transport costs avoided and consumer confidence sustained.

### SUPERMARKET Shelf Life

Supermarkets wishing to achieve longer shelf life for produce can use the Hot Box to re-create the conditions in the fresh produce areas of the shop. Discovering the delay between arrival and deterioration can determine the optimum shelf life or the best conditions to extend shelf life for produce including, not only potatoes, but avocadoes, tomatoes, peaches and other fruit and vegetables.

*The Hot Box can be used to test other produce*

# Potato Dry Matter Measurement

## Three Methods to Measure DRY MATTER and Specific Gravity

Dry matter content affects the yield of processed potatoes, oil absorption rate in fried products and the texture of cooked potatoes. It can also be used as an indicator of bruising risk, with high levels associated with more damage. The three dry matter measurement methods from Martin Lishman have been compared by potato industry bodies: no significant differences were found in their estimation of dry matter content; but each has its own benefits to suit where and how it is being used.

## *Dry Matter Field Kit*

### Test INDIVIDUAL Tubers

Demonstrates dry matter variability within samples and in the same field. Compare results with a bulk average method by averaging multiple readings.

### Key Features

- **Highly portable -** does not need water
- **Measures individual tubers -** to create a genuine average
- **Low cost method** - needs care in use to ensure accuracy
- **Standard ware corer** - individually calibrated; optional salad variety size

### Dry matter testing in 5 easy steps

***The kit works by taking a core from a pre-cut tuber, weighing it very accurately and converting the weight to percentage dry matter using a calibration chart.***

## *Zeal Manual Hydrometer*

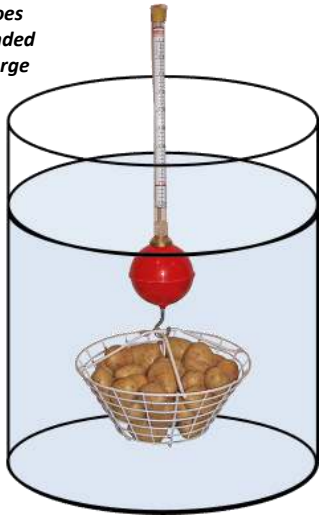
### BULK-AVERAGE Testing

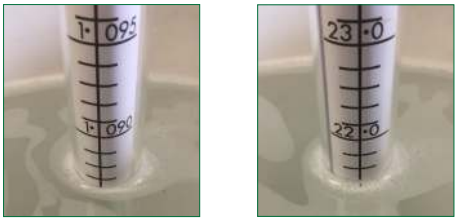
A traditional industry tool for fast intake sampling and measurement of dry matter and specific gravity (density).

### Key Features

- **Simple and quick to use -** static unit, uses a large water container (c.175 litre/45 gallon)
- **Accurate** - easy calibration (weight supplied); uses precisely-weighed potato sample
- **3 models** - to suit dry matters from 14 to 27% (1.055 to 1.114 g/ml specific gravity)

***Precisely 3.63Kg/8lbs of washed potatoes are placed in the basket, which is suspended from the hydrometer and floated in a large container of clean water.***





***The point at which the water surface crosses the vertical scale is the dry matter (right) and specific gravity (left) reading.***

## *Weltech Digital Dry Matter Weigher (PW4)*

### BULK-AVERAGE Testing with DATA STORAGE and Download

Automatically calculates the dry matter content, starch percentage and specific gravity of potatoes using the weight in water method.

NEW FOR 2022!

### Key Features

- **Suitable for standard or French Fry production** - testing up to 6Kg samples
- **Instant results** - does not require a precisely-weighed potato sample
- **Precise and easy to use -** needs only a small water container (40cm deep)
- **Data storage** - memory for up to 5000 time and date stamped weights
- **USB export as standard** - export batch data in to a USB drive for further analysis
- **Large colour display** - with multi-lingual user interface for easy operation
- **Redesigned button panel** - makes setup and measuring processes quick and easy
- **All day battery-life** - pre-installed high-capacity rechargeable lithium battery
- **Basket and chain included** - plus battery charger with choice of plugs

# Potato Quality Control/Potato Harvester Mister

## *Potato Sugar Testing*

### Potato GLUCOSE Self-Testing

***Glucolis Blue*** evaluates glucose levels in potatoes used in French fry or crisping production. It allows better planning of harvest, storage and handling to ensure the highest quality and precise colour control.

***Glucolis Blue tests the glucose content of juice extracted from a potato sample using the same technology used by diabetics, but calibrated for potato sugar.***

### Key Features

- **Digital test -** using the same strips and monitor technique as blood-sugar testing
- **Heavy duty press -** to extract juice from the sample
- **Enough consumables** - for a typical season of testing; replacements readily available
- **Easy to use** - results simple to interpret

***The ideal tool for the potato professional!***

## *Potato Sizing Squares*

A traditional industry tool for assessing and classifying samples according to square mesh size.

### Key Features

- **Stainless steel -** long-lasting, durable, easy to clean
- **Accurate** - precise measurement in clearly marked 5mm intervals
- **16 sizes** - from 20 to 90mm plus a special 42mm salad variety size

## *Fry Quality Testing*

Ensures contract quality has been achieved and avoids unnecessary rejections

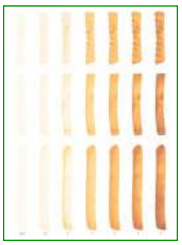
### *Chip Fryer*

Single tank chip fryer, with thermostatic control for consistent testing results. Easy to clean, stainless steel unit with removable tank, element and control panel and heavy duty basket.

### *Chip Cutter Set*

A set of 6 cutters to make consistent size French fry samples for use in fry testing. The cutters are 4 to 10.5mm in diameter. Includes a spike to push the sample out. Sizes in mm: 4,5,6.5,7.8,9,10.5

### *French Fry Colour Chart*



Colour reference chart for frozen French fried potatoes, produced to USDA (United States Department of Agriculture) guidelines

### Key Features

- **Depicts changes** - due to the frying process
- **Classifies the results** - for quality control purposes
- **Shows frying quality** - determining the finish point and colour

## *Potato Harvester Mister*

A versatile misting kit to reduce bruising on harvester roller sections. Suited to most potato and root crop harvesters.

### Key Features

- **Spray boom -** with misting nozzles. Up to five 3 nozzle booms can be fitted
- **250 litre tank** - with mounting frame to suit most harvesters
- **20 hours use** - between refills (depending on nozzle size)

# Potato Temperature Monitoring

## *Potato Temperature Spikes*

**Temperature of INDIVIDUAL tubers**

Two accuracy ranges available: +/- 0.3°C and +/- 1°C

### Key Features

- **Waterproof** - IP65 with membrane keypad
- **High contrast display** - with function indicators
- **Data hold** - to retain displayed value

## *Single Sensor Monitoring*

**Temperatures in BULK-STORED potatoes**

The simplest way to measure crop temperature and conform to quality assurance schemes. Requires a Minitemp digital monitor with flexible cable sensor of any length.

### Key Features

- **Easy to use** - place in the bulk or box when filling and connect to the monitor
- **Latching connector** - prevents accidental disconnection during use

### Key Features

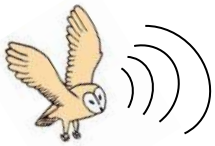
- **Quick monitoring** - and ensures readings always from the same place
- **Convenient** - junction box can be at ground level

## *Multi-Sensor Monitoring*

**MULTIPLE temperatures in boxed or bulk-stored potatoes**

A simple junction box with sensor selector switch, with capacity for up to 12 flexible cable sensors of any length. Can be connected to a Minitemp digital monitor or Temperature Differential Controller.

See our website for details of our potato store temperature monitoring packages.



## Barn Owl *Wireless* *Multi-Sensor Monitoring*

**WIRELESS Monitoring and AUTOMATIC Fan Control with DATA Storage**

Wireless radio transmitters are attached to flexible crop sensors in boxed or bulk stored potatoes. Temperature data is transmitted by SIM card to the internet and can be accessed from any location.

The system means no more manual crop temperature measurement or going to remote stores to switch fans on or off.

Automatic fan controllers give independent control of each ventilating fan using a range of programmes, providing significant energy cost savings.

***Contact us to request a quotation for Barn Owl Wireless***

***Barn Owl Wireless sends live temperature updates from the store and identifies which areas need cooling or ventilating***

***Barn Owl Wireless provides historical temperature and fan usage data in graph or table format***

# Potato Quality Details and Specifications

## TuberLog

**PTR 400** *(Product Code: POT/PTR400)*
*Data logger embedded in a synthetic shape designed to mimic the size, shape and density of a 'ware' potato, with replaceable sealing caps*
*USB flash drive loaded with:*
*- TuberLog App suited to Android tablet or smartphone (not iOS)*
*- PC software for unlimited data download function*
*- Instruction manual in English, French, Spanish and German*
*Bluetooth USB adapter; USB connection and charging cable; USB charging kit with multi-plug power supply and in-car adapter; strong carry case; instruction manual*

**PTR 500** *(Product Code: POT/PTR500)*
*As PTR 400 above, with Android 8" Tablet, pre-loaded with TuberLog App*

### *Specifications:*

***Data logger***
***Weight:*** *165g;* ***Dimensions:*** *93mm x 67mm x 53mm*
***Operating method:*** *3-axis shock sensor with sampling rate of 3000 Hz, selectable measurement period and pre-set peak value threshold. Data readout is wireless via Bluetooth interface or USB connection to a PC (using software supplied) or Android tablet or smartphone (using App supplied or downloadable from the App store).*
***Power:*** *Rechargeable battery - charge life 10 hours to 1 month, depending on setting and level of use*
***Bluetooth operating range:*** *Approx. 20m if in line of sight*
***Case dimensions:*** *30cm x 35.5cm x 9cm;* ***Weight full:*** *1.6Kg*
***Android tablet*** *(pre-loaded with TuberLog App)*
***Type:*** *Samsung Galaxy Tab A 8" 32GB*
***Power:*** *5100mAh rechargeable battery. USB charging cable and plug supplied.*
***Tablet specifications may vary according to available model and manufacturer***

## Potato Hot box

*Strong, insulated uPVC casing, sealed door and wipe-clean surfaces; Plastic covered wire tray baskets to suit c.25 standard ware tubers spaced to allow free air flow around each one; Water tray with free-standing atomizing humidifier; Automatic air circulating fan, air heater, thermostat and timer; Controller with key pad for humidity, temperature and time settings*

**Hotbox 125** *(Product Code: POT/HB/125)*
*125 tuber capacity; 5 trays*
*Dimensions: 89cm wide x 70cm deep x 72cm high; Weight: 45Kg*
**Hotbox 250** *(Product Code: POT/HB/250)*
*250 tuber capacity; 10 trays*
*Dimensions: 89cm wide x 70cm deep x 120cm high; Weight: 76Kg*
**Hotbox 750** *(Product Code: POT/HB/750)*
*750 tuber capacity; 30 trays; removable wheeled trolley base*
*Dimensions: 153cm wide x 70cm deep x 176cm high; Weight: 160Kg*

### *Specifications:*

***Timer:*** *0 to 999 hours*
***Start delay timer:*** *0 to 99 hours*
***Operating humidity range:*** *0 - 97% RH*
***Water tray capacity:*** *9 litres*
***Operating temperature range:*** *0 - 40 °C (°F setting available)*
***Power:*** *230V (120V versions also available). Supplied with mains power plug fitted, appropriate to country of use.*
***Shipping:*** *Our Hot Boxes are packed for export sales in a wooden crate. Packed sizes and weights are as follows:*
*POT/HB/125: 102cm wide x 76cm deep x 95cm high; 75Kg*
*POT/HB/250: 105cm wide x 82cm deep x 158cm high; 95Kg*
*POT/HB/750: 152cm wide x 75cm deep x 190cm high; 290Kg*

## Potato Dry Matter

**Dry Matter Field Kit** *(Product Code: POT/DMK)*
*High accuracy scales, standard ware potato corer, penknife, filter papers, calibration chart, strong carry case*
**Salad Potato Dry Matter Field Kit** *(Product Code: POT/DMKS)*
*As above, with additional salad potato corer and calibration chart*

**Zeal Manual Hydrometer**
*Stem with dry matter % and specific gravity (density) scales, flotation ball and hook, numbered basket, stainless steel calibration weight*

**Standard unit D4500** *(Product Code: POT/HYDROMETER)*
*Range: 17.0 - 25% dry matter; 1.065 - 1.110 g/ml specific gravity (density)*
**Specialist unit D4501** *(Product Code: POT/HYDROMETER4501)*
*Range: 14.0 - 23% dry matter; 1.055 - 1.095 g/ml specific gravity (density)*
**Specialist unit D4502** *(Product Code: POT/HYDROMETER4502)*
*Range: 18.0 - 27% dry matter; 1.070 - 1.114 g/ml specific gravity (density)*

**Weltech Digital Dry Matter Weigher (PW4)** *(Product Code: POT/HYDPW4)*
*Weigher unit with integral hook, sample basket with suspension chain, battery charger with choice of plugs, strong carry case. For standard and French fry potatoes. Range: 1.5 - 6Kg potatoes (must not exceed 10Kg).*

*User interface available in the following languages: English, French, German, Spanish, Portuguese (Languages can be changed in the unit settings menu)*

### *Specifications:*

***Field Kit***
***Dry matter range:*** *14.55-25%; 1049-1113 g/ml*
***Corer diameter:*** *Ware 31.5mm; Salad 22mm*
***Scales:*** *150g max; 0.1g increment; 2 x AAA batteries included*
***Case:*** *26.5 x 9.5 x 22.5cm; 1.06Kg*

***Zeal Hydrometer***
***Water container:*** *min. 356mm dia. X 660mm deep; 175 litre/45 gallon; clean metal or plastic. Hydrometer must float freely.*
***Water:*** *Clean water; c.15°C/60°F*
***Shipping:*** *Packed in cardboard box for user self-assembly; 45 x 34 x 28cm; 2.13Kg*

***Weltech Dry Matter Weigher***
***Dimensions -*** *Weigher:170mm wide x 140mm high without handle and hook/317mm high with handle and hook x 97mm deep; Case: 45cm wide x 13cm deep x 36cm high*
***Weight of unit:*** *1.5Kg; (3.14Kg with carry case)*
***Water container required:*** *min. 356mm dia. X 400mm deep; clean metal or plastic. Basket and sample must be fully immersed;* ***Water:*** *Clean water; c.15°C/60°F*
***Accuracy:*** *+/- 0.3 %;* ***Resolution:*** *0.001 scale reading*
***Operating conditions:*** *-30 to 50°C; up to 95%RH*
*(avoid sudden changes that could cause condensation)*
***Memory:*** *5000 individual weights; data stored if power off or batteries removed*
***Data output:*** *XML files readable in Excel*
***Power -*** *Battery: Rechargeable 3.7v lithium. Battery charger: Input 100-240v, 50-60Hz, 0.3A Output 12V, 500mA. c.12 hour re-charge time; display has charge level indicator; Charge duration: up to 15 hours; Battery life: 3-4 years.*
***NB.*** *The Weltech Dry Matter Weigher is NOT waterproof*

## Potato Harvester Mister

**Potato Harvester Mister** *(Product Code: SP/HM002)*
*250 litre tank, mounting frame, 12 volt pump, pressure regulator, agitation, in -cab switchbox, 1m boom, misting nozzles, low-level filling point with 3m hose and valve .*

### *Specifications:*

***Pump:*** *11.3 l/min, 4 bar, 60 psi, 12v, 5A (240v pump available)*
***Boom:*** *1m long; 3 x white 110° misting nozzles (4 l/h @ 3 bar)*
***Weight:*** *50Kg empty, 300Kg full*
***Dimensions:*** *120cm wide, 43cm deep, 99cm high*

# Potato Quality Details and Specifications

## Glucolis Blue *(Product Code: POT/GLUCOLISBLUE)*

*Accu-Chek Performa Glucose Meter with memory for 500 readings with time and date; 2 sealed containers of 50 coded and dated test strips; 2 control test solutions; 3v lithium battery; protective case*
*Micro-pipette with 30 replaceable tips and 5 tip filters*
*Dilution solution (distilled water) in 30 individual tubes (for 30 separate tests)*
*Laminated instruction sheet and calibration table*
*Strong carry case*
*Powder-coated steel sample press with food-grade nylon receptacle suitable for sections from up to 20 tubers*

### Specifications:

***Glucose meter***
***Operating range:*** *10-600 mg/dl*
***Operating conditions:*** *14-40°C; 10-90% RH*
***Measuring time:*** *5 sec;* ***Resolution:*** *0.1% RH; 0.1°C*
***Power:*** *3V CR2032-type lithium battery (included)*
***Auto-off:*** *2 mins*

***Carry case for whole kit (except sample press)***
***Dimensions:*** *32 x 29 x 10.5cm*
***Weight:*** *1.125Kg*

***Sample Press***
***Dimensions:*** *28 x 27 x 10cm;* ***Weight:*** *3.25Kg*

## Potato Sizing Squares *(Product Code: POT/SQUARESS)*

*Stainless steel set of 16 individually marked measuring squares held together with allen bolt and nyloc nut*

### Specifications:

***Sizes:***
*5mm intervals from 20-90mm, plus 42mm for salad varieties*
*Each square has a 15mm rim*
***Total weight:*** *770g*

## Fry Quality Testing

**Chip Fryer** *(Product Code: POT/FRYER)*
*Catering quality, stainless steel, single tank fryer*
*Thermostatically controlled, with timer, batter plate and lid*

**Chip Cutter Set** *(Product Code: POT/CHIPCUT)*
*6 cutters with spike to push sample out*

**French Fry Colour Chart** *(Product Code: POT/CHIPCHART)*
*USDA Standard colour chart; 5th edition 2007*

### Specifications:

***Chip Fryer***
***Capacity:*** *7Kg chips per hour (raw to cooked)*
***Thermostat:*** *130-190°C;* ***Power supply:*** *230v, 13A*
***Power rating****: 3kW*
***Dimensions:*** *315mm high x 270mm wide x 400mm deep*
***Weight:*** *10kg gross, 7.5kg net*

***Chip Cutter Set***
***Sizes:*** *4-10mm;* ***Weight:*** *170g;* ***Set Length:*** *170mm*

***French Fry Colour Chart***
***Colour range:*** *000-4;* ***Paper:*** *US Letter size*

## Potato Temperature Monitoring

**Potato Temperature Spikes**
*Stainless steel probe; thermistor sensor; data hold; auto-off; LCD display; waterproof case; membrane keypad; protective cap*
**Standard** *(Product Code: POT/TBARTHERMO) Accuracy: +/-1°C (-20 to 120°C); Range: -50 to 150°C.*
**High Accuracy** *(Product Code: POT/TBARHIGH) Accuracy: +/-0.3°C (-20 to 90°C); Range: -50 to 220°C*

**Bulk and Box Store Temperatures**
***Minitemp*** **Temperature Monitor** *(Product Code: CQ/MTM10) Max, Min, Auto-off; Calibration certificate;* **Flexible cable Sensor** *(Product Code: FC046/(length) Standard lengths in 5m intervals up to 30m;* ***Multi-Sensor Switch*** *(Product Code: CQ/MULTISWITCH) 12 sensor input sockets; output socket; connecting cable & plugs.*
*Ask about our multi-sensor store monitoring packages.*

**Wireless Multi-sensor Monitoring**
*Barn Owl Wireless systems are specified individually for each storage situation. The following components might be included:*
**Gateway gsm-internet link** *(Product Code: BOW/GATE)*
*Handles all sensors & controllers in one geographical location*
**Wireless Bridge** *(Product Code: BOW/BRIDGE)*
*Enhances radio signal transmission between buildings*
**Wireless Crop Temperature Sensor** *(Product Code: BOW/TR/4)*
*Multi-input data transmitter, suitable for potato stores. Add flexible cable sensors to suit (see above)*
**Wireless Ambient Humidity & Temperature Sensor**
*(Product Code: BOW/ST/AH/EXT/IP) - IP rated dual data transmitter*
**Wireless Static or Portable Automatic Fan Controller**
*Many options possible for up to 12 fans - ask for further details*

### Specifications:

***Potato Temperature Spikes***
***IP rating:*** *IP65*
***Dimensions****: 125mm long, 5mm diameter*
***Resolution:*** *0.1°C;* ***Sampling speed:*** *0.7 sec*
***Battery:*** *1.5V AAA;* ***Life: Standard*** *- 5000h;* ***High Acc*** *- 10,000h*

**Minitemp** ***Temperature Monitor***
***Accuracy:*** *+/- 0.4°C over range –10°C to 70°C.*
***Operating range with sensor:*** *-40 to 125°C*
***Power:*** *3 x AAA battery (included)*

***Multi-Sensor Switch***
***Dimensions:*** *165 x 120 x 85 mm;* ***Weight:*** *450g*

***Barn Owl Wireless***
***Gateway*** *- with SIM card and aerial*
***Dimensions:*** *19.5 cm wide x 19.5 cm high x 9.5 cm* deep *plus 1m aerial extension cable*
***Power supply:*** *230v*

***Bridge*** *- with 2 aerials, 2m connecting cable, mounting bracket*
***Dimensions:*** *7.5 cm wide x 15 cm high x 5 cm* deep
***Power supply:*** *230v*

***Sensor*** *- transmitter with aerial, 4 sensor input sockets*
***Dimensions:*** *9.5 cm wide x 30.5 cm high (with aerial)/11.5cm (no aerial) x 5.5 cm* deep
***Power supply:*** *Replaceable long-life battery pack (life depends on use, but typically 2-3 years).*
***Ambient Humidity & Temperature Sensor*** *- transmitter with aerial connected by 3m cable to sensor in enclosure*
***Dimensions:*** *Transmitter - 19.5 cm high x 9.5 cm deep x 11.5 cm* deep, *Sensor enclosure - 15cm high x 8cm wide x 5.5cm deep*
***Power supply:*** *230v*

Potato Dry Matter Field Kit, Potato Hot Box, Potato Sizing Squares and Barn Owl Wireless systems are designed and manufactured by Martin Lishman Ltd. © All designs copyright Martin Lishman Ltd. TuberLog is manufactured by ESYS GmbH; the Weltech Digital Dry Matter Weigher PW-2050 is manufactured by Weltech International Ltd; the Zeal Hydrometer is manufactured by G.H.Zeal Ltd; the Glucolis Blue is manufactured by Arvalis. All are distributed exclusively worldwide by Martin Lishman Ltd. ®Barn Owl is a registered trademark of Martin Lishman Ltd. Martin Lishman Ltd reserves the right to alter product specifications at any time without notice.
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