



*Harvester Mister*



*Dry Matter Testing*



*Hot Box*



*Wireless Monitoring & Control*



*TuberLog Electronic Potato*



*Potato Sizing Squares*



*Temperature Spikes*



*Chip Testing Equipment*



*Simple Temperature Monitoring*

# TuberLog

## The Economics of Damage and Bruising Prevention

Potato bruising is a serious problem in potato production worldwide. Estimates indicate that more than 60% of some crops are damaged in some way.

The economic effects of such losses cannot be over-estimated. *TuberLog* is an economically priced incentive for growers and processors to take preventive action and reduce their losses.

*TuberLog* has been devised by a team of researchers from Potsdam University in Germany, together with electronics specialists from development company Esys and a panel of potato industry experts. It takes previous electronic potato designs several steps further by incorporating Bluetooth and the latest Android App technologies.

### A diagnostic tool

*TuberLog* should be used regularly so that bruising problems caused by poor machine maintenance or incorrect settings can be detected quickly. Machine settings are often changed, but the effects on bruising may not be realised. A quick check with *TuberLog* can make sure.

Different varieties or the same variety at different temperatures can bruise at different impact levels. In conjunction with bruise testing *TuberLog* can help to ensure bruise-free working and provide peace of mind that quality standards are being maintained.

**A powerful  
quality control  
tool**

## *TuberLog* identifies sources of damage and bruising in all types of potato handling machinery

*TuberLog* is a powerful quality control tool which assists in the drive towards high quality potato production

### Key Features of *TuberLog*:

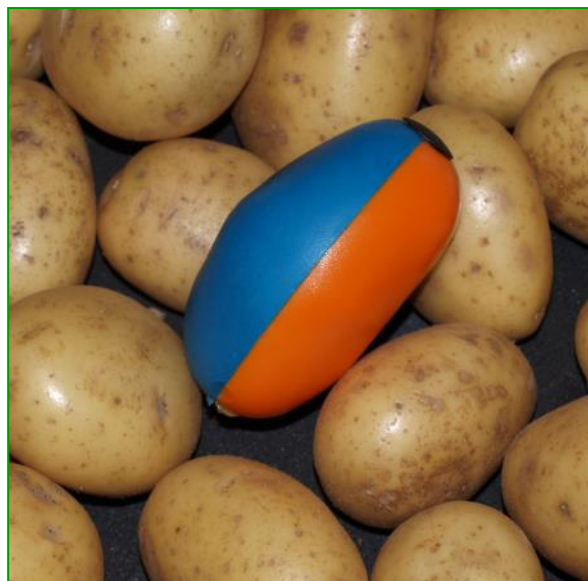
- Data logger that mimics the size, shape and density of a ware potato
- Data is stored in the logger or transferred by Bluetooth or USB interface to a computer
- Impacts can be time-stamped to allow easy identification of the source of the problem
- Repeat measurement facility allows detailed examination of damage sources
- The *TuberLog* software provides an unlimited data download capacity
- Impact data can be displayed and analysed in tabular or graphical form
- Measurements and data can be filtered to concentrate on specific impact levels

### Additional Features of *TuberLog*<sup>PLUS</sup>:

- Impact readings heard instantly in the operator's headphones
- Data viewed in real-time via Bluetooth interface on Android tablet or smartphone

### Additional Features of *TuberLog*<sup>EXTRA</sup>:

- As above, plus Android 4.2 JELLY BEAN 7" Tablet

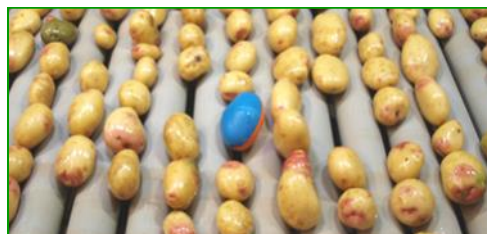


*TuberLog* mimics the size, shape and density of a typical ware potato

*TuberLog* is a powerful quality control tool which assists in the drive towards high quality bruise-free potato production. It identifies damage and bruise-causing areas in all types of potato handling machinery from the harvester to the packing line.

*TuberLog* changes the approach to damage control and bruising prevention. Packhouses, processors, co-operatives and growers can all benefit from the quality control information which *TuberLog* provides.

*TuberLog* will not indicate bruise levels in real potatoes but the user can interpret the information and make significant improvements to quality problems in potato production.



*TuberLog* can assess all types of potato handling machinery, including washers

## Who can benefit from using *TuberLog*?

### Potato growers, producers and processors

- Reducing damage and bruising in potato handling machinery
- Increasing the return on the investment in the potato crop
- Retaining key customers through consistent supply of high quality potatoes

### Manufacturers of harvesting and post-harvesting machinery

- Assisting users to set-up their machines to avoid high impact levels
- Improving machinery design by identifying high impact levels
- Demonstrating the quality levels of potatoes passing through the machines

### Agronomists and Crop Consultants

- Advising on ideal machine settings for bruise-free production
- Carrying out objective comparisons of production facilities
- Providing evidence for adherence to quality control procedures

### Research and development technicians

- Determining thresholds for the risk of damage to potatoes due to impact force
- Investigating materials and handling techniques that would reduce the risk of damage to potatoes



# Electronic Potato - PTR300, PTR400 & PTR500

An essential quality control tool - suited to testing all potato handling situations



*TuberLog can be harvested with potatoes in the ground*



*TuberLog can be used to test all parts of the harvester*



*TuberLog can travel through the grading line*



*TuberLog can pass through the picking conveyor*



*TuberLog can check falls from conveyors into hoppers*

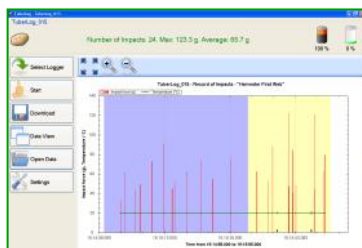


*TuberLog can be bagged to check the packing line*

Impact No.	Timestamp	Impact Force (N)	Temperature (°C)
1	08.09.2012 15:15:01.876	33.2	20.0
2	08.09.2012 15:15:02.894	41.2	19.8
3	08.09.2012 15:15:03.912	45.2	19.6
4	08.09.2012 15:15:04.930	48.2	19.4
5	08.09.2012 15:15:05.948	51.2	19.2
6	08.09.2012 15:15:06.966	54.2	19.0
7	08.09.2012 15:15:07.984	57.2	18.8
8	08.09.2012 15:15:08.002	60.2	18.6
9	08.09.2012 15:15:09.020	63.2	18.4
10	08.09.2012 15:15:10.038	66.2	18.2
11	08.09.2012 15:15:11.056	69.2	18.0
12	08.09.2012 15:15:12.074	72.2	17.8
13	08.09.2012 15:15:13.092	75.2	17.6
14	08.09.2012 15:15:14.110	78.2	17.4
15	08.09.2012 15:15:15.128	81.2	17.2
16	08.09.2012 15:15:16.146	84.2	17.0
17	08.09.2012 15:15:17.164	87.2	16.8
18	08.09.2012 15:15:18.182	90.2	16.6
19	08.09.2012 15:15:19.200	93.2	16.4
20	08.09.2012 15:15:20.218	96.2	16.2
21	08.09.2012 15:15:21.236	99.2	16.0
22	08.09.2012 15:15:22.254	102.2	15.8
23	08.09.2012 15:15:23.272	105.2	15.6
24	08.09.2012 15:15:24.290	108.2	15.4

*Data table of individual impacts can be downloaded to Excel*

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



*Data graph of impacts with timestamps, repeat runs and temperature values*



*Percentage distribution of impact level classes*

## How does TuberLog work?

TuberLog is an acceleration measurement device which records impact forces received while moving with real potatoes during harvesting and processing and locates damage and bruise-causing parts of machinery (including washers). It comprises a data logger embedded in a synthetic shape designed to mimic the size, shape and density of a ware potato.

The TuberLog data logger records impacts and temperature values during each measurement. The data can be stored in the logger itself or transferred by USB connection or Bluetooth to a PC or laptop where it can be stored and analysed using the software supplied.

TuberLog data can be displayed as a table or graph of impacts as the logger passes through the machine or as a percentage distribution of impacts of different levels.

TuberLog is powered by a rechargeable battery which is charged by connecting to the USB interface of a computer or with the USB charging kit supplied.

TuberLog<sup>PLUS</sup> registers impacts instantly they occur both audibly in the operator's headphones and displayed visually on the screen of an Android tablet (TuberLog<sup>EXTRA</sup>). The operator watches the TuberLog as it passes through the machine and can immediately see the exact source of the impact.



*TuberLog<sup>PLUS</sup> with Android device*

## TuberLog features and options

### TuberLog



#### Product code **POT/PTR300**

- TuberLog data logger with sealing caps
- TuberLog software on USB flash drive
- Strong carry case
- Bluetooth USB adapter
- USB connection and charging cable
- USB charging kit with multi-plug power supply and in-car adapter

#### Product code **POT/PTR400**

- All as above with TuberLog 'App' suited to Android tablet or smartphone

#### Product code **POT/PTR500**

- As above, plus Android 4.2 JELLY BEAN 7" Tablet

## Interpretation of TuberLog results

Impact measurements from TuberLog can be compared to bruise test results from real potatoes taken from the same machine section. Making this comparison in several situations provides the experience to interpret results very quickly.

As an example, it may be known that a variety starts bruising at the 150g impact level, but TuberLog may have recorded impacts of 50g, so the variety can safely be processed by a machine with sources of impacts that are too low to cause damage.

## The Human Dimension

TuberLog can reveal the reason for unexplainable bruising. The consequence of changing a machine setting or of incorrect sack handling methods can be demonstrated to personnel by introducing TuberLog into the line.

# Potato Dry Matter Measurement

## Manual Hydrometer

### The Importance of Dry Matter

Dry matter content directly influences the yield of processed potatoes, the oil absorption rate in fried products and also the texture of cooked potatoes. Dry matter is also used as an indicator of bruising risk, with high levels associated with more damage.

Dry matter varies between varieties but dry matter of the same variety may also vary between seasons in the same locality. This can be the result of differences in the time of planting, soil moisture and ambient temperature.

Typical dry matter ranges for various potato products\*:

French Fries  
19.7 to 24.1%

Potato chips  
21.7 to 25.1%

Dehydrated products  
20.7 to 24.1%

\* guidance only

3 ways to  
measure  
potato dry  
matter



Available in 3 different dry matter ranges:

**Model D4500** Product code: POT/HYDROMETER  
17 to 25 % Dry Matter; 1.065/1.110 g/ml specific gravity

**Model D4501** Product code: POT/HYDROMETER4501  
14 to 23 % Dry Matter; 1.055/1.095 g/ml specific gravity

**Model D4502** Product code: POT/HYDROMETER4502  
18 to 27 % Dry Matter; 1.070/1.114 g/ml specific gravity

### Zeal Bulk-Average Hydrometer

*A traditional industry standard used extensively throughout the potato world by producers of crisps, French fries, potato wedges and canned, frozen and powdered potato products.*

*A simple and accurate method of measuring specific gravity and percentage dry matter of potatoes.*

*The method of use involves placing a known weight of potatoes in the basket and suspending the hydrometer and potatoes in a large container of clean water. The buoyancy of the unit in water determines the water level against the vertical scale and hence gives the dry matter reading.*

- Suitable for static applications
- Requires a clean metal or plastic container at least 350mm dia. x 660mm deep. When filled with tap water (approx. temperature 15°C/60°F), the instrument with basket attached must float freely. A 45 gallon/175 litre drum or plastic bin is ideal
- Potato weight needs to be exact (3.63Kg/8lbs)
- Supplied with sample basket and calibration weight



Easy calibration with the calibration weight supplied

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## Potato Dry Matter Field Kit

### Potato Dry Matter Field Kit

*A pocket-sized kit to test dry matter of individual tubers quickly and simply in the field*

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.

The kit demonstrates the dry matter variability within samples and in the same field. Results can be compared with a bulk average method by taking multiple readings and averaging them.

*The kit is supplied in a sturdy carry case with high accuracy scales, corer, penknife, filter papers and calibration chart*

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Dry matter testing in 5 easy steps



Available with standard ware and optional salad variety size corers

**Model POT/DMK** - Kit for ware potatoes  
**Model POT/DMKS** - Kit for ware and salad varieties



# Potato Dry Matter Measurement

## Digital Hydrometer

### Weltech Digital Dry Matter Weigher PW-2050

*Measures the dry matter content and specific gravity of potatoes using the weight in water method.*

*A precise and easy to use method of measuring specific gravity, percentage dry matter and starch percentage of potatoes.*

*On the push of one button the PW-2050 weigher automatically calculates percentage dry matter, specific gravity and starch percentage of a potato sample. It can store up to 5000 individual weights in its memory. The time and date of each weighing is recorded and will remain in the memory until cleared. To download data we recommend the version with USB port and memory stick.*

*The PW-2050 is battery operated and will continue to work for up to 12 hours between charges.*

- Within limits, any weight of potatoes can be measured
- Records weight in water and weight in air, calculates dry matter and starch % automatically
- Requires a container with just a 40cm depth of water
- Portable, simple to use and robust. Stores data for PC download
- Supplied with strong carry case and battery charger. Basket & chain (as shown in picture) also available as an extra item



*PW-2050 Digital Dry Matter Weigher (the basket & chain is optional and should be ordered separately)*

#### Models available:

##### **PW-2050 Standard 3Kg**

Product code: POT/HYDROMETERDIG

- Weight range: 1.5 – 3Kg of potatoes (must not exceed 5Kg)

##### **PW-2050 USB 3Kg**

Product code: POT/HYDROMETERDIGUSB

- Weight range: 1.5 – 3Kg of potatoes (must not exceed 5Kg)
- USB output and memory stick

##### **PW-2050 French Fry 6Kg**

Product code: POT/HYDROMETERDIGFRENCH

- Weight range: 1.5 – 6Kg of potatoes (must not exceed 10Kg)

##### **PW-2050 French Fry USB 6Kg**

Product code: POT/HYDROMETERDIGU10

- Weight range: 1.5 – 6Kg of potatoes (must not exceed 10Kg)
- USB output and memory stick

##### **PW-2050 Basket & Chain** (as shown above)

Product code: POT/HYDROMETERBASK&CHAIN

- Must be ordered separately

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*An optional USB port and memory stick is available*



*The PW-2050 weigher is supplied in a strong carry case*

## PW-2050 Specifications

**Dimensions:** 170mm wide x 140mm high without handle and hook x 97mm deep  
170mm wide x 317mm high with handle and hook x 97mm deep

**Weight of unit:** 1.5Kg; **Operating weight range:** Depends on model (see above)

**Accuracy:** +/- 0.3 %; **Resolution:** 0.01 scale reading

**Operating conditions:** -30 to 50°C; up to 95%RH (avoid sudden changes that could cause condensation)

**Data memory:** 5000 individual weights; data stored if power off or batteries removed

**Data output capabilities:** Optional USB output and memory stick

**Power:** Plug-in battery charger with choice of plugs and in-car adapter supplied. Charger details: Input 100-240v, 50/60Hz, 0.18A; Output 0.4A, 12V max

**Battery charge duration:** c.12hours; **Battery charging time:** c.15 hours; **Battery life:** 3-4 years

## Comparing dry matter measurement methods

The three methods of measuring dry matter all have their own design benefits to suit different types of use and there are pros and cons of each one.

### Dry Matter Field Kit

- Highly portable
- Compact
- Does not need water
- Uses individual tubers to create a genuine average
- Low cost method
- Needs care in use to ensure accuracy

### Manual Hydrometer

- Simple to use
- Accurate
- Fast results
- Static use only
- Needs a large water container
- Potato samples must be weighed precisely

### Digital Hydrometer

- Precise and easy to use
- Instant results
- Needs only a small water container
- Portable or static use
- Does not require a precise weight of potatoes
- Data storage and download facility

All three methods have been compared independently and scientifically by potato industry bodies. No significant differences were found between the three methods in their estimation of dry matter content.

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## Blackspot - a major issue for the potato industry

### What is Blackspot?

Blackspot is the consequence of the susceptibility of potatoes to bruising caused by high impact levels during handling. It consists of dark coloured spots below the skin surface which become visible after peeling.

The degree of blackspot severity is assessed from how many times the potato has to be peeled before the spot disappears.

### Factors affecting susceptibility to bruising

Clearly, the degree of bruising relates to the impact force during handling, but the tendency to bruise also depends on:

- Potato variety
- Dry matter content (higher is more susceptible)
- Handling temperature (higher leads to less damage)
- Nutrient levels (low potassium increases susceptibility; higher nitrogen reduces it)
- Size and shape of potato
- Storage depth

### The economics of blackspot bruising

Blackspot caused by bruising is a significant factor affecting the entire global potato industry. Losses run to huge levels each year, with estimates that every grower loses £200/ha (which equates to €250/ha or \$125/acre).

In addition to losses due to load rejection, extra transport cost and a lower market price, bruising damages consumer confidence in ways which can have knock-on consequences in further years of trading.



Hot Box for 250 tubers - 10 trays



Hot Box for 500 tubers - 20 trays



Hot Box for 250 tubers - 10 trays



Interior of the 750 tuber Hot Box showing the fan, heater and humidifier

# Potato Hot Box

*The ideal tool for overnight assessment of potato bruising*

*Quality assessment to avoid costly rejections*

*Monitoring for storage and processing to ensure the highest quality production*

Potato bruising can normally take up to 3 days to show, which can mean that harvested crop goes into store or for processing without bruise and damage levels being monitored. The resulting rejections or downgrading can prove costly.

The Martin Lishman range of potato Hot Boxes will indicate bruise levels in less than 12 hours. This can help considerably in the fight to reduce bruising losses by highlighting the crops most at risk from harvesting and grading damage. Problems can be identified before potatoes go into store to ensure the maximum saleable yield.

In addition to bruise assessment, loads can be monitored for the presence of rots and diseases by recreating the optimum humidity and temperature conditions and incubation period for them to occur.

### Design Features of the Martin Lishman Hot Box:

- Strong, insulated uPVC casing with lockable door and wipe-clean surfaces
- Plastic covered wire tray baskets designed to accept a single layer of c.25 standard ware tubers spaced to allow air to circulate around each one
- Automatic timer to allow precise testing regimes for up to 99 hours
- Built-in heavy duty fan, air heater and thermostat to allow testing between 10 and 40°C
- Water reservoir with ultrasonic atomizing humidifier to allow humidity levels to be kept at an accuracy of 1-3%

# Potato Hot Box



*Standard Potato Hot Box - 125 tuber capacity with 5 trays*



*The complete range of Martin Lishman Potato Hot Boxes*

## Potato Hot Box Models and Specifications



### **Model: Hot Box 125**

**Capacity:** 5 trays; 125 tubers  
**Size:** 890mm wide x 630mm deep x 730mm high  
**Weight:** 20Kg  
**Electrical:** 240v, 50Hz  
(110v, 60Hz available - specify when ordering)  
**Product code:** POT/HB/125



### **Model: Hot Box 500**

**Capacity:** 20 trays; 500 tubers  
**Size:** 1430mm wide x 630mm deep x 1200mm high  
**Weight:** 80Kg  
**Electrical:** 240v, 50Hz  
(110v, 60Hz available - specify when ordering)  
**Product code:** POT/HB/500



### **Model: Hot Box 250**

**Capacity:** 10 trays; 250 tubers  
**Size:** 890mm wide x 630mm deep x 1200mm high  
**Weight:** 40Kg  
**Electrical:** 240v, 50Hz  
(110v, 60Hz available - specify when ordering)  
**Product code:** POT/HB/250



### **Model: Hot Box 750**

**Capacity:** 30 trays; 750 tubers  
**Size:** 1430mm wide x 630mm deep x 1700mm high  
**Weight:** 100Kg  
**Electrical:** 240v, 50Hz  
(110v, 60Hz available - specify when ordering)  
**Product code:** POT/HB/750

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## Benefits of using a Hot Box

### Faster bruise development

When potatoes are bruised, the physical effects are not immediately visible. A biochemical reaction takes place which gradually causes a colour change at the point of impact. In cool dry conditions this effect can take several days to appear.

The Hot Box speeds up the reaction time by creating the optimum warm, damp conditions for bruise development to occur more quickly. This allows action to be taken sooner, resulting in fewer bruised and damaged potatoes.

### Testing procedure and frequency

The Hot Box controls allow a wide range of temperature, humidity and time settings. Typically, a temperature setting of 30°C and a humidity setting of 93% for a time period of 12 hours is sufficient to bring out the bruises. Samples should be peel tested for bruises as soon as they are removed from the Hot Box.

Testing should ideally take place on a tray full of tubers taken from the end of the harvester or grader line about 5 times per day. If readings are high, samples should be taken at more locations to try to pinpoint the causes. This can be carried out in combination with the TuberLog electronic potato.

### Disease testing

The design of the Hot Box allows levels of tuber blight and soft rot to be assessed. Temperatures, humidity and testing times can be selected, suitable for accelerating the incubation of diseases.

### Shelf life potential

Optimum humidity and temperature conditions for longer shelf life can be recreated in the Hot Box to provide information to retailers.

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# Potato Harvester Mister

## Benefits of Mist Spraying

Bruising costs the potato industry dearly every year, so effective strategies to maintain potato quality are very important.

Achieving the highest quality in all types of harvesting conditions can be difficult, but mist spraying has been shown to reduce bruising during the harvesting operation, particularly in dry conditions when dolmen rollers tend to cause potatoes to bounce.

The fine mist spray from the nozzles dampens both the potatoes and the rollers in the harvester. This lubricates the passage of the potatoes over the top of the rollers and helps to prevent them being pinched and damaged.

Even when lifting conditions are relatively easy, other factors such as dry matter, handling temperature and nutrient levels can influence bruising susceptibility, so a Harvester Mister should be standard equipment fitted to all harvesters in all conditions.

## Potato Harvester Mister

**Reduce bruising during harvesting with this versatile wetting kit**

**Suitable for most potato and root crop harvesting equipment**

### Key Features:

- Delivers a fine mist spray of water onto potatoes as they are lifted from the ground and pass through the harvester
- 125 or 250 litre tank with large filling lid and strainer fitted into strong, purpose-built frame designed to fit easily to most potato and root crop harvesters
- 1 metre spray boom fitted with 110° misting nozzles, able to be positioned so that water can be directed in the most effective way onto the potatoes and rollers
- 11.3 litre/min 12 volt pump with agitation and pressure control operated by in-cab switchbox
- Low-level water filling point with 3m filling hose and valve
- The potato Harvester Mister is suited for chemical application if required

### Options:

- 240v pump
- Alternative boom configurations and lengths
- Alternative nozzle types and sizes



*The 125 litre Harvester Mister fitted to a Grimme potato harvester*



*The 125 litre Harvester Mister tank is a compact unit suitable for smaller harvesters*



# Potato Harvester Mister



*The 250 litre Harvester Mister tank has a built in baffle*

## Harvester Mister Details

### Mounting Frame

The frame of both models of Harvester Mister has been designed to be fitted to the framework of most potato harvesters.



### Spray Boom

The Harvester Mister spray boom can be positioned to suit the design of the harvester so that water can be directed in the most effective way onto the potatoes and rollers.

The standard boom length is 1 metre and is supplied with white 110° misting nozzles which provide a flow of 4 litre/hour @ 3 bar. The fine mist spray dampens both the potatoes and the rollers which helps to prevent the potatoes being pinched and damaged.

### Operating Time

The 250 litre Harvester Mister can give up to 20 hours of continuous operation between re-fills (depending on nozzle size used) and 10 hours for the 125 litre model.



*The 250 litre Harvester Mister fitted to a potato harvester*



*Harvester Mister 1 metre spray boom in position over dolmen rollers*

## 125 & 250 litre Potato Harvester Mister Specifications

Product Codes: 125 litre - SP/HM001; 250 litre - SP/HM002

### Harvester Mister Weights

125 litre: Weight - 33kg empty, 158kg full  
250 litre: Weight - 51kg empty, 301kg full

### Harvester Mister Dimensions (maximum)

125 litre: 120cm wide x 38cm deep x 63cm high  
250 litre: 120cm wide x 43cm deep x 99cm high

### Pump Details

Both models: 11.3 l/min, 4 bar, 60 psi (12 volt, 5A)  
Alternative 240 volt pump available

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# Potato Temperature Monitoring

## Simple Monitoring Methods

### Temperature Monitoring in Bulk Stores and Boxes

#### Where?

Take temperature readings using an imaginary 6m x 6m grid over the bulk surface and take a reading in the centre of each grid square at 70mm and 300mm below the surface. This means readings are always in the same place and shows actual changes rather than location differences.

In boxes, place sensors in stacks at the edge and centre and in the top and bottom box 70mm and 300mm from the surface.

#### When?

Record the crop temperature readings at least once per week until the potatoes have been cooled to the target storage temperature; and then every two weeks thereafter.

This is the minimum requirement. The more comprehensive and the more frequent that temperature monitoring takes place, the better the chances of good store management. Manual readings should ideally be taken daily; automatic readings should be 3-hourly in the crop and continuous for ambient temperature.

### Potato Temperature Spikes

- for temperature measurement in individual tubers



#### Key Features :

- Stainless steel probe with thermistor sensor
- Data hold function to retain displayed value
- High contrast LCD display with function indicators
- IP65 waterproof polycarbonate case with membrane keypad

Two models available, with different accuracies:

T-Bar Thermometer	Standard	High Accuracy
Measurement range:	-50 to 150°C	-50 to 220°C
Resolution:	0.1°C	
Accuracy:	+/- 1°C	+/- 0.3°C
Sampling speed:	0.7 seconds	
Spike length:	13cm	
Spike diameter:	5mm	
Battery power (supplied)	1.5v button, 500h	1.5v AAA, 3000h
Product Code:	TBARTHMO	TBARHIGH

### Minitemp Temperature Monitor and Flexible or Rigid Sensor

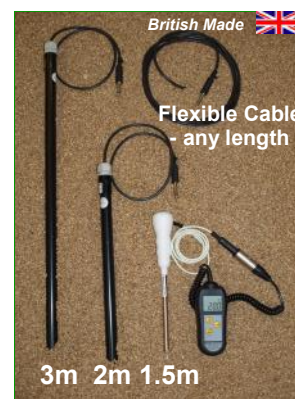


Minitemp Temperature Monitor

- The simplest way to measure crop temperature and conform to quality assurance schemes
- Easy to use - just place in the potato bulk or box when filling and connect to the monitor
- An inexpensive crop monitoring solution

A simple digital monitor for use with a range of static temperature sensors. Most suitable for potato monitoring would be the flexible cable sensor of any length or the rigid PVC 2m sensor.

Functions: Max, Min, Hold, Auto-off. Range: -40°C to 150°C. Accuracy: +/- 0.4°C over range -10°C to 70°C. Supplied with calibration certificate. Monitor Product Code: CQ/MTM10  
Operating range for monitor and sensor combinations: -40°C to 125°C; accuracy > +/-1°C over this range. Sensor Product Codes: 1.5m sensor - CQ/MTM10PS; 2m sensor - FC054; 3m - FC055; Flexible - TEMPFLEXSENSOR10/(length)



## Multi-Sensor Monitoring

Create a simple potato box multi-sensor monitoring system using a Minitemp monitor, a Multi-sensor selector and up to 12 cable sensors. The sensors connect by cable, which can be any length in multiples of 10 metres, to the selector which can be conveniently located at ground level near to the store door.

#### Multi-Sensor Selector

A simple junction box capable of having up to 12 crop sensors plugged into it. Supplied with connecting lead to the Minitemp monitor. A rotary selector connects each sensor in turn to the Minitemp and gives the sensor reading.

Product Code: CQ/MULTISWITCH

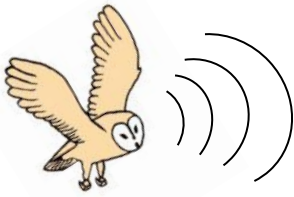


- Provides multiple temperature records quickly and ensures readings are always taken in the same place
- Saves time walking across the crop surface and makes it quicker to decide how to manage cooling fans
- A relatively inexpensive crop monitoring solution



# Temperature Monitoring

## Wireless Monitoring & Automatic Fan Control



### Barn Owl Wireless

Wireless and Remote Crop Monitoring and Automatic Fan Control with Data Storage and Management

*The most advanced crop monitoring and automatic fan control system available*



4-way Barn Owl Wireless Transmitter attached to cable sensors

#### Key Features of Barn Owl Wireless:

- Entirely web-based system - no software to install
- Wireless radio transmitters attached to crop sensors in boxed or bulk stored potatoes
- No manual crop temperature measurement or driving to remote stores to switch fans on and record temperatures
- All store locations managed from the same webpage
- Verifiable quality assurance records whenever required, with read-only online access for storage customers
- Modular system with no limit to the quantity of sensors or automatic fan controllers
- Independent control of each ventilating fan providing significant energy cost savings

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



1



2



3



4

#### Barn Owl Wireless step by step

1. Temperature data sent from the store to the website
2. Data accessed via the internet
3. Fan controls selected on the webpage
4. Fans controlled automatically by the website

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Every time you log on to Barn Owl Wireless:

Get live colour-coded temperature updates from the store and identify which areas need cooling or ventilating



Barn Owl Wireless provides historical temperature data in graph or table formats:

To provide verifiable records of cooling progress and fan usage for the user and, if required, for contract storage customers

## How Barn Owl Wireless Works

- Flexible or rigid crop temperature sensors are fitted with radio transmitters
- Temperature data is transmitted to a Gateway (hub) located in the store roof
- The Gateway sends the data by mobile phone signal to the internet
- The data is accessed on the internet cloud from any location

#### Barn Owl Wireless Components



##### Wireless Gateway

A gsm-internet link to handle all sensors and controllers in one location, the Gateway is located in the highest point of the store.

##### Crop Temperature Sensors

Battery powered radio transmitter attached to up to 4 flexible cable or rigid crop sensors. Can be placed in boxes or in bulk stored potatoes. Any quantity of transmitters can be used.



##### Ambient Sensors

Ambient sensors provide the air temperature and humidity readings used in the drying and cooling control programmes.



##### Wireless Controllers

Portable or static controllers for use with ventilating fans and other equipment. The portable unit can control up to 5 fans. Static controllers are ideal for connection to large fans, control panels or other equipment.



01778 426600



# Potato Quality Control


A range of equipment for use in quality assessment both on-farm and at intake points for processors and producers

## Potato Sizing Squares



Stainless steel measuring squares in a set of 16 at sizes from 20 to 90mm in 5mm intervals including a special salad variety size of 42mm.

Long-lasting and durable, these sizing squares are ideal for assessing and classifying samples according to square mesh size.

British Made  Product code: POT/SQUARESS

## Chip Fryer



Ideal for testing fry quality of potatoes as part of quality control procedures. Knowing the quality and grade before transportation ensures peace of mind that contract quality has been achieved and avoids unnecessary and expensive rejections.

*The single tank fryer is thermostatically controlled for consistent results. It comes complete with batter plate and lid. It is an easy to clean, stainless steel unit with removable tank, lift-out element and control panel and heavy duty stainless steel basket.*

Capacity: 7Kg chips per hour (raw to cooked)  
Power rating: 3kW  
Product code: POT/FRYER

British Made 

## Chip Cutter Set



A set of cutters for making consistent size French fries for use in testing procedures.

Each set has 6 cutters to produce sizes ranging in diameter from 3.5 to 8.5mm. A spike to push the sample out is also supplied.

Product code: POT/CHIPCUT

## Chip Colour Chart



Standard colour reference chart for frozen French fried potatoes, produced according to the USDA (United States Department of Agriculture) guidelines.

The standards depict changes that occur because of the frying process and provide a means of classifying the results for quality control purposes.

In addition to the use for evaluating frozen French fries, the chart can be used to ascertain frying qualities of fresh potatoes, determining the finish point for frying and judging the colour of similar fried products.

Product code: POT/CHIPCHART

## Glucolis Blue Potato Sugar Testing



Product code: POT/GLUCOLISBLUE

A potato glucose self-testing kit that makes it possible to carry out on-the-spot evaluation of optimal harvesting dates for potatoes destined to become crisps or French fries.

This easy-to-use kit, which requires no special training to use, enables producers to optimize their production schedules so that harvest times, storage temperatures and potato handling can all be planned to ensure the highest quality possible.

It is well known that sugar content can play an essential part in the culinary and technological quality of potato tubers. It is also recognized that sugar content depends on variety, maturity at harvesting and storage conditions.

Each test uses at least 20 potato tubers, representative of the bulk to be tested. There are enough consumables in the kit for 30 tests, which should be sufficient for an analysis scheme carried out by an average size producer in a typical season. Replacement consumables are readily available or can be purchased by larger producers at the same time as the basic kit.



The Glucolis Blue kit can assist in the production of French fries to ensure the desired fry colour



Glucolis Blue can help to determine the best time to move potatoes out of storage



Glucolis Blue can help to manage harvest times and storage temperatures to ensure precise colour control of crisping potatoes

### FURTHER INFORMATION

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