

# Catalogue Sections

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# Introduction



WAGTECH PROJECTS  is pleased to present our new Agronomy Catalogue which contains details and information on a wide range of the latest laboratory and field testing instruments for use by experts engaged in the cultivation and management of agricultural crops and plants.


working in:

- National and Regional Agricultural Research Centres
- Universities & Higher Education
- Vocational Training Centres
- Seed Testing Laboratories
- Crop Quality Control Laboratories
- National Standards Bureaus
- Private Laboratories
- Specialist Consultancies

The catalogue is divided into the following sections:

- Physical Survey
- Soil Science
- Agrometeorology
- Hydrology and Groundwater
- Crop Science
- Seed Technology
- Forestry
- Laboratory Chemical Analysis

## AFTER SALES SUPPORT, SERVICE & TRAINING

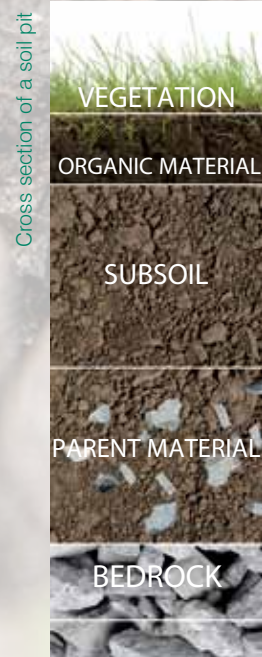
This is an important feature of WAGTECH PROJECTS  which we take very seriously. In addition to the support provided by our local companies, our team of agronomists, scientists and engineers make regular country visits and, for particular projects, dedicated site visits to install and commission equipment and to train the local experts in their use.

Please remember should you not find the particular product or specification you are seeking please contact us and our in house agronomists and engineers will be pleased to advise you on alternatives that may be available.

# Soil Science

Soil Science is concerned with the study of soil as a natural resource, and in agricultural applications, this refers to assessing its properties in order to enable plants and crops to flourish. Information on soil characterisation is a key indication of how an ecosystem works. The properties of soil horizons must be known in order for a prediction to be made on how fast water will take to move through them.

Soil properties also indicate as to whether or not the soil has the potential to store enough water to keep plants growing through a drought, to withstand a flood, and to provide the right combinations of chemicals to plants (as indicated in measurements of pH, and NPK levels) so that they will grow properly.



Although certain physical and chemical tests require the use of specialised laboratory analytical equipment, many of the key properties of soil can be measured using a range of field testing instruments and kits.

A comprehensive range of this equipment is included within this section, covering the following:

- Soil Sampling
- Soil Classification
- Soil Analysis
- Soil Water Sampling
- Irrigation Water Quality Testing
- Soil Moisture and Permeability
- Soil Compaction

# Agrometeorology

Information on weather conditions is essential for the modern farmer and agronomist. Although such information may be readily available from national meteorological offices, details of more localised conditions may not be, and such data is of vital importance to farmers to ensure their crops are protected and flourish. Local weather conditions can vary greatly from the national picture due to the aspect, altitude, and microclimate of a particular area.

This section includes a range of automatic weather stations that are used for measuring all the standard parameters such as wind speed, wind direction, air temperature, relative humidity, solar radiation, and rainfall. In addition, some more specialised stations have also been included for Agrometeorology, Hydrological and Soil Conditions monitoring.

# Hydrology & Groundwater

Water is a precious agricultural resource and thus its careful monitoring is essential in order to ensure that it is used as effectively as possible. In any water resources assessment study, long term measurements of water quality, flow, level, and depth are crucial to produce accurate data for later processing and analysis. This section contains a comprehensive range of equipment that is widely used for measuring and recording such data.

Contained within this section are items such as Flow Meters, Flumes, Dipmeters, Water Samplers, and Water Level Monitors. For a further range of equipment such as Multi-Parameter Water Quality Testers and Portable Echo Sounders, please refer to the [WAGTECH PROJECTS T<sub>2</sub> Environmental Catalogue](#), which is available upon request.

Our comprehensive range has been divided into the following sections:

- [Current Flow monitoring](#)
- [Water Level Monitoring](#)
- [Geophysical Testing](#)

# Crop Science

Crop Science is concerned with the scientific processes that serve to enhance and maintain the quality of crops. Plant related factors are as essential to effective crop productivity as the quality of soil. The purpose of crop science is to exemplify how plants use primary inputs such as water and solar energy, and to then provide methods and practices that serve to aid successful irrigation scheduling.

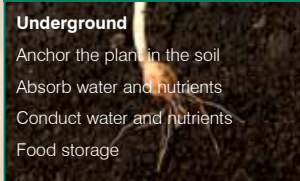
## THE SHOOT SYSTEM

**Above the ground** Includes the leaves and reproductive organs  
Elevates the plant above the soil  
Serve many functions including:  
photosynthesis reproduction and dispersal food and water conduction



## THE ROOT SYSTEM

**Underground**  
Anchor the plant in the soil  
Absorb water and nutrients  
Conduct water and nutrients  
Food storage



This section comprises a wide variety of equipment that will enable the user to effectively and efficiently monitor, test and manipulate samples. This will in turn, serve to ensure that a particular crop variety has the best possible chance to survive and flourish within a given environment and ultimately produce optimum yields.

The equipment listed covers the following fields:


- Plant Physiology
- Microbiology
- Entomology
- Nematology
- Light Measurement
- Forestry Science

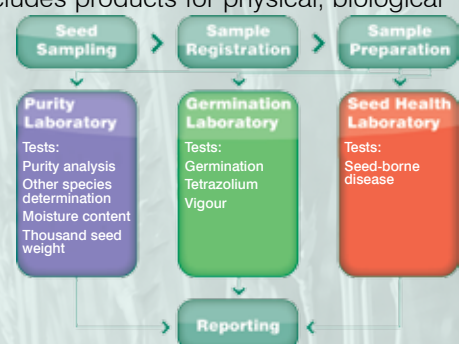
# Seed Technology

Seed Scientists and Seed Technologists have established standard procedures and tests to evaluate seeds. The various steps are highlighted in the diagram below, which make it possible to determine information on those important quality characteristics such as purity, uniformity, germination, moisture content, seed health etc.

The International Seed Testing Association (ISTA) accreditation has been prepared to meet specific needs of ISTA, its member laboratories and the International Seed Trade.

The ISTA rules for seed testing, published in Seed Science and Technology, form an integral part of the standard, as they constitute the methods which must be used for the issuance of ISTA certificates by accredited Seed Testing Laboratories.

WAGTECH PROJECTS  has taken care to manufacture and supply equipment suitable for independent seed testing laboratories around the world. This equipment includes products for physical, biological and cultivator purity, incidence of noxious weed seeds, germination percentage, moisture and content etc. After sample registration, seed samples are transferred to the Purity Laboratory. The Purity laboratory is responsible for sampling and preparation of samples before testing in any of the three disciplines, i.e. Purity Laboratory, Germination Laboratory, and Seed Health laboratory.



# Laboratory Chemical Analysis

A wide range of specialised analytical and general laboratory equipment is required to carry out a full analysis of soil and plant material.

This equipment can be summarised as follows:

- Atomic Absorption
- Spectrophotometry
- Gas Chromatography (GC)
- Spectrophotometry
- Flame Photometry
- Colorimetry
- Ion Selective Electrodes
- Microscopy
- Titration.
- Kjeldahl
- Soxhlet
- Dietary Fibre

Details of these instruments can be found in our General Laboratory Catalogue or in our Environmental Catalogue. However for research work involving soil and crops specific tests are required in particular for protein determination, extraction of fats and oils, and the analysis of dietary fibre. This section contains details of the instruments required to carry out these tests.

## **KJELDAHL:**

Long established and widely used analytical technique for the determination of nitrogen/protein involving the Digestion, Distillation, and Titration of the sample material.

## **SOXHLET APPARATUS:**

Used for the determination of oil and fat content in agricultural products.

## **DIETARY FIBRE:**

Agricultural products contain substances belonging to different categories: eg - carbohydrates, proteins, fats, mineral salts and fibres. The "fibre" consists of polymers (lignin, cellulose, hemicellulose, pectin) which are non-digestible for humans but nevertheless form part of a healthy diet. The equipment in this section is used to determine the levels of dietary fibre in agricultural products.



# General Survey



A full survey of a region is essential in determining the suitability of a particular ground for agricultural development. This section includes a basic range of instruments required to carry out essential survey work prior to any development project. The range includes both conventional field instruments and other items that are required for a full survey, including altimeters, inclinometers, binoculars, hand held GPS etc.

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# General Survey

**General Survey:** A full survey of a region is essential in determining the suitability of a particular ground for agricultural development. This section includes a range of instruments required to carry out essential survey work prior to an agricultural development project.

The range includes both conventional field instruments and other items that facilitate a detailed and accurate survey.

- Compasses
- Clinometers
- GPS Receivers
- Digital Planimeter
- Theodolites
- Automatic Level
- Line Locator
- Binoculars
- Land Measuring Wheel
- Levelling Staff



## Sighting Compass

AG11-100

These hand held sighting compasses represent the highest quality in precision, sensitivity and durability, offering the performance required by professionals. They have friction free sapphire jewel bearings with short settling time for quick and accurate readings. The compasses incorporate a 10x magnification precision ground sighting lens with a diopter sight for compass estimations to 1/4 of one degree. The Prismatic version combines the traditional features with a superbly clear and open to light prismatic sighting system. Due to its advanced construction, it is extremely easy to obtain accurate readings even when used in poor lighting conditions.



- Anodised aluminum housing with cord
- High quality glass lens for sighting
- 360° true bearing and 360° back bearing scales
- Precision scale aluminum compass card

Catalogue No	<b>AG11-100</b>
Model:	Prismatic
Sighting system:	Open light Parallax glass lens, 10x magnification
Compass card:	Transparent card with precision scale
Accuracy:	0.5° from true magnetic course with precision sighting 0.1° when used for map reading
Capsule:	Anti-static liquid filled for optimal dampening of the card
Weight, g:	110
Dimensions, mm:	75 x 53 x 16

AG11-120



## Clinometer

This type of handheld Clinometer/ heightmeter is perfect for quickly and very accurately measuring vertical angles/ heights. Typical users of this kind of instrument are: foresters, geologists, engineers, telecom, pylon erectors, overhead cable management, miners, crane operators, architects, surveyors, and others who have to measure vertical angles/heights in forests, city, quarries, mines, caves, buildings etc. Available with different angle/ heigh scale depending on user category. The instrument is very easy to use and comes complete with full instructions.

- 10x magnification parallax-free lens provides distortion-free readings
- Liquid damped for quick and accurate readings
- Inch and metric scales, instructions and lanyard included

Catalogue No	AG11-120	AG11-122
Model:	Lensatic	Prismatic
Sighting system:	Parallax free glass lens, 10x magnification	Open light Parallax glass lens, 10x magnification
Compass card:	Aluminum compass card with precision scale	Transparent compass card with precision scale
Accuracy:	Max. $\pm 0.25^\circ$ from true angle with precision sighting Max. $\pm 1.0^\circ$ from true angle with direct reading at the lubber line on top of the card	
Capsule:	Anti-static liquid filled for optimal dampening of the card	
Weight, g:	110	
Dimensions, mm:	75 x 53 x 16	

AG11-142



## Compass/Clinometer

This hand held instrument uniquely provides a combination of both the Sighting Compass and the Clinometer. The unit is especially well suited for professionals who need to measure vertical angles/heights and compass bearings. The Prismatic combines the original features with a superbly clear and open to light prismatic sighting system. Due to its construction, it is extremely easy to obtain accurate reading even when in dark conditions. The unit is equipped with a top scale for direct readings on the top of the card. Sapphire jewel bearings are used for friction free movement of the card, allowing for fast and accurate readings.

- Two instruments in one
- Easy to read due to the open to light, crystal-clear scales
- Quick setting time due to the liquid damped scales
- Extremely accurate readings

Catalogue No	AG11-142
Model:	Prismatic
Sighting system:	Open light Parallax glass lens, 10x magnification
Compass card:	Transparent compass card with precision scale
Accuracy:	Max. $\pm 0.25^\circ$ from true angle with precision sighting Max. $\pm 1.0^\circ$ from true angle with direct reading at the lubber line on top of the card
Capsule:	Anti-static liquid filled for optimal dampening of the card
Dimensions, mm:	160 x 54 x 16

## Mirror Compass with Inclinator

AG11-160

A sighting compass for really advanced users. Specially designed to simplify map work. Scale markings for measuring co-ordinates and built in magnifier. Also equipped with luminous markings in the housing, on the needle and on the baseplate, for difficult navigation in the dark.

This is a classic, detailed sighting compass with magnifying mirror and sighting hole at the lower edge of the mirror for the most accurate bearings. With Silicon rubber feet on the baseplate for best friction on map when taking bearings, magnifier and measuring scales in millimeters and inches. Also equipped with Romer scales (1:50.000 and 1:25.000) for plotting positions on maps and mm/ inch map measuring scales. Built-in magnifying lens and luminous markings for night navigation, as well as permanent compensation for magnetic declination and a clinometer for inclined angles are other important features for the most demanding users.



- Built in clinometer and a magnetic declination adjuster for measuring vertical angles
- Lid with large sighting mirror
- Exceptional performance in all conditions

Catalogue No	Description
<b>AG11-160</b>	Mirror Compass with Inclinator

## Altimeter/Barometer

AG11-180

This is a classic hand held altimeter/barometer which shows both the absolute barometric pressure as well as the altitude above sea level and height differences. Calibration is made easy by simply turning the altimeter scale ring.

The unit comes with a click on lanyard and the design and friction treatment of the body provides a perfect hand-fit both with and without gloves.



Catalogue No	<b>AG11-180</b>
Units of measure:	M/Hpa
Altitude range:	0-5000m
Pressure range:	580-1040HPa
Accuracy:	±30m

### Note:

A further range of surveying equipment is available upon request.

General Survey

Soil Science

Aggro- Meteorology

Hydrology & Groundwater

Crop Science

Seed Technology

Laboratory Chemical Analysis

AG11-200



## GPS Receiver, Garmin eTrex Vista HCx

The Garmin etrex Vista HCx is a tough and rugged piece of equipment suited to all types of terrain. It has a highly-sensitive WAAS/EGNOS-enabled receiver which holds a GPS signal in the toughest conditions. It has a bright colour screen, barometric altimeter, electronic compass, microSD and automatic routing.

- Power supply 2 x AA batteries
- 256 colour screen TFT
- USB compatible
- Rugged and weater proof case
- Water resistant to IEC-529, IPX7 standards
- 25 Hours battery life

Catalogue No	<b>AG11-200</b>
Receiver:	12 channel
GPS Antenna:	Patch
Acquisition time:	0:15 - 0:45
Accuracy:	<15m
Internal memory:	24MB
Number of waypoints:	1000
Number of tracking plots:	10000
Weight, g:	156
Dimensions, mm:	111 x 50 x 30

## Digital Planimeter

Planimeters are excellent tools to use when measuring irregular-shaped areas on plans or drawings. They eliminate the need for grids, charts, or calculations to be done by hand.

This is a very precise instrument used for quick and accurate determination of areas on blueprints, maps, photographs and drawings. Simply follow the outline of the area with the tracer. The revolution of the measuring wheel to either direction is sensed by the electro shaft-encoder which generates pulses to be processed by the built-in processor.

- Cordless operation - powered by rechargeable Ni-Cad battery
- Direct digital readout of traced area in cm<sup>2</sup>, m<sup>2</sup>, km<sup>2</sup>, inch<sup>2</sup>, ft<sup>2</sup>.  
No table references, no calculations
- Accumulative measurement of different areas
- Push button averaging of several measurements of the same area
- 'Hold' function freezes readout to prevent accidental loss of result
- Measures drawings when vertical scale differs from horizontal scale

Catalogue No	<b>AG11-300</b>
Measuring range:	3000mm x 300mm
Accuracy:	Better than $\pm 2\%$ ( $\pm 2/1000$ pulses)
Resolution:	One digit corresponds to 1mm <sup>2</sup>
Operating Hours:	30 hours
Internal memory:	LCD with zero suppression
Weight approx:	650g
Dimensions, mm::	150 x 240 x 39

AG11-300



## Electronic Theodolite

Designed for enhanced reliability in construction applications, advanced features let the contractors work faster and longer, in proving productivity and increasing profitability. Automatic vertical compensator with 2" horizontal and vertical readout. Precision dual LCD panels with large, easy to read numbers. Vertical angle measuring provides three different options plus percentage of grade. Auto power off option, laser plummet, zero resetting, removeable tribach for multiple setups.

Rugged IP54 protection - water resistant, sealed construction. Theodolite is supplied complete with, Laser Plummet, Carrying Case, Plumb Bob, Rechargeable Battery, Charger, Alkaline Battery Holder and Tools Set.

Catalogue No	<b>AG11-400</b>
<b>Telescope</b>	
Image:	Erect image
Magnification:	30x
<b>Display</b>	
Display screen:	LCD
Operating temperature:	-20°C to +45°C
Operating time:	8 hours
Power source:	Re-chargeable Ni-H battery. 8 hours running time
Weight, kg:	5.2
Dimensions, mm:	160 x 150 x 330

## Accessories

Catalogue No	<b>AG11-402</b>
Description	Budget Aluminium Tripod - Quick Lock
Height/ Weight	0.98m - 1.65m / 3.7kg

## Optical Theodolite

This is a compact, low height unit that is ideally suited to the alignment of pillars, masts, scaffolds, sheathings and elements, as well as for simple pegging tasks and levelling. The low height and compact design of this Theodolite make it an indispensable piece of equipment in all surveying applications. The unit is supplied in a fully portable and rugged case.

- Practical system of control and reading guarantees fast and safe operation
- Fast transit telescope with 20x magnification
- Erect and on-reversed telescope image
- Cross lines grid with double and single lines for exact target location and distance lines for optical distance measuring
- Optical peep sights in both telescope positions to facilitate rough pointing

Catalogue No	<b>AG11-450</b>
<b>Telescope</b>	
Image position:	Erect and true-to-side
Magnification:	20x
View field angle:	2° (3.5m/100m)
<b>Temperature</b>	
Operating range:	-20°C to +50°C
<b>Instrument</b>	
Weight, kg:	1.2
Dimensions, mm:	260 x 140 x 140

## Accessories

Catalogue No	<b>AG11-402</b>
Description	Budget Aluminium Tripod - Quick Lock
Height/ Weight	0.98m - 1.65m / 3.7kg

AG11-400



AG11-450



General Survey

Soil Science

Agrometeorology

Hydrology & Groundwater

Crop Science

Seed Technology

Laboratory Chemical Analysis

AG11-500



## Automatic Level

Many rural and agricultural applications require accurate information concerning the differences in levels between two or more points. Typical examples include pipelines, irrigation design, water supplies, drainage design and road building.

This reliable instrument is compact, portable and easy to use. The design allows for the instrument to quickly and easily be fitted upon a tripod. The Level is ideally suited for building construction, transferring elevations, excavations, setting grades/lines, and establishing foundation elevations.

- Sealed structure is totally waterproof
- Excellent shockproof function
- Exclusive closed magnetic field, magnetically dampened compensator
- Friction-braked rotation and endless horizontal drive
- Prism for viewing circular vial
- Water, dust and dirt proof

Level is supplied complete with tripod and 5m levelling staff.

AG11-502



Catalogue No	AG11-500
SD for 1km double run levelling:	2.5mm
Image:	Erect
Magnification:	20x
Objective aperture:	36mm
Field of view:	1° 20´
Minimum focus:	0.8m
Multiplication constant:	100
Compensation range:	± 15´
Compensation setting accuracy:	± 0.5"
Weight (Level, Tripod & Staff):	10kg
Dimensions, cm:	30 x 30 x 120

## Accessories

Catalogue No	Description
AG11-502	Standard Aluminium Tripod. Collapses to 1.02m, extends to 1.62m. Weight 4.2kg

## Pocket Binoculars

Pocket Binoculars are a useful accessory for any package of surveying equipment. The general terrain can be examined, prominent landscape features noted and the survey route planned, whilst they are easily stored in pockets. These small, lightweight binoculars are very practical to have with you at all times. Rubber-coated and with anti-reflection coated optics, these Binoculars offer exceptional quality for their size.

AG11-600



Catalogue No	AG11-600	AG11-602
Description	Pocket Binoculars 8 x 20	Pocket Binoculars 10 x 25

AG11-602





## Pocket Stereoscope

Designed for the interpretation of aerial photographs, this pocket stereoscope facilitates the clarification of contours, and enables measurements to be made of essential features so that detailed maps of the region can be made. The unit is equipped with an impact resistant plastic frame with metal folding legs.

Catalogue No	<b>AG11-620</b>
Interpupillary range, mm:	55 to 75
Field of view, mm:	125 x 125

AG11-620



## Land Measuring Wheel

Featuring an extra rugged construction, this measuring wheel has been specifically designed for use over agricultural land and other rough terrain. The handle can be removed and folded away for easy storage.

- Robust solid tyre fitted to spoke wheel
- Heavy duty counting head fitted directly to wheel
- Five figure counting head, 7mm high figures
- Scraper to prevent mud build up on wheel
- Adds forwards, subtracts in reverse

Catalogue No	<b>AG11-650</b>
Accuracy:	±5%
Weight:	5kg

AG11-650



## Levelling Staff

Lightweight aluminium levelling staff with 5 durable telescopic connectable sections and English 'E' style metric markings.

Catalogue No	Description
<b>AG11-670</b>	5m Aluminium Staff

AG11-670



## Survey Rods

1 and 2 metre survey rods. The rods are 27mm in diameter and are constructed of reinforced glass fibre..

Catalogue No	<b>AG11-700</b>	<b>AG11-702</b>
Description	1 metre survey rod.	2 metre survey rod. PVC plastic covering and solid steel point

## Measuring Tape

- 13mm wide blade
- 3:1 rewind ratio for return
- Metric and imperial markings

Catalogue No	<b>AG11-800</b>	<b>AG11-802</b>	<b>AG11-804</b>
Description	Measuring tape, 30 metre length	Measuring tape, 50 metre length	Measuring tape, 100 metre length

AG11-802



# Unique Solutions...

Wagtech Projects provide a range of bespoke Portable Testing Kits:

- Soil Survey Kit
- Agricultural Inspectors Kit
- Irrigation Water Test Kit
- Plant Tissue Analysis Kit
- Soil pH Kit
- Soil Fertility Kit
- Soil Nutrients Kit
- Soil Analysis Kit

# Soil Science

**Soil Science** is concerned with the study of soil as a natural resource, and in agricultural applications, this refers to assessing its properties in order to enable plants and crops to flourish. Information on soil characterisation is a key indication of how an ecosystem works. The properties of soil horizons must be known in order for an accurate prediction to be made on how fast water will take to move through them (permeability).

**Soil Sampling & Classification** is required to determine the physical and chemical characteristics of a particular area or plot required for agricultural development.

The equipment in this section will enable disturbed and undisturbed samples to be taken away for later analysis in the laboratory.

## Soil Survey Kit

AG21-050

A self contained soil survey kit comprising a comprehensive range of specialist equipment, that is designed to provide the soils specialist with all the equipment required for soil sampling, classification, basic chemical analysis, and soil compaction.

- Hand held GPS
- 50m measuring tape
- Dutch and Riverside hand auger kits, 55mm and 75mm diameter, depth to 6m
- Surface soil sampler
- Soil colour charts
- Soil texture kit
- Range of soil sieves
- Pocket soil Penetrometer
- Soil analysis kit for NPK
- Field handbook



Catalogue No	Description
<b>AG21-050</b>	Soil Survey Kit

General Survey

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Hydrology &amp; Groundwater

Crop Science

Seed Technology

Laboratory Chemical Analysis

AG21-100



## Agricultural Inspectors Kit

Supplied in a purpose built aluminium carry case this kit possesses the unique ability for the user to carry out the full range of seed and soil quality testing procedures all in one fully portable system. Ideally suited to farmers who require an on the spot determination of the quality of both seeds and soils.

### Contains the following components:

- Grain Moisture Meter, 0-100 Relative scale and digital readings for 15 pre-programmed crop calibrations
- Soil Moisture Probe with a range of 0-1bar negative pressure
- N-P-K Soil Testing Kit, sufficient for 50 tests
- Tropical Soils Colour Chart
- Set of 5 stainless steel, agricultural sieves with lid and receiver
- Hand Held GPS system for the accurate recording and measurement of bearings and positioning
- Sack Spear Sampler for grain, 12.7mm diam. x 650mm long, single slot, protective cover
- Soil Auger
- 2 x Plastic Sample Bottles
- Pack of 25 re-sealable Polyethylene Bags
- Hand Held magnifying Glass

Grain Moisture Meter



### Grain Moisture Meter

Easy to use, lightweight and portable, this meter is ideal for measuring moisture content in a wide range of crops.

Soil Moisture Probe



### Soil Moisture Probe

A robust soil tensiometers which is used to measure the moisture available within the soil for plant growth. An important tool for use in irrigation scheduling.

### NPK Soil Test Kit

A simple test kit used for measuring the key nutrients in the soil essential for plant growth:

- N** - Nitrogen: promotes the growth of leaves and vegetation
- P** - Phosphorous: promotes root growth
- K** - Potassium: promotes flower and fruit growth

Soil Colour Chart



Other items in the kit will help to take samples and classify soil and crops.

Finally, a hand held GPS survey unit is included to enable the inspector or farmer to log their survey position accurately using 21st century technology.

Catalogue No	Description
<b>AG21-100</b>	Agricultural Inspectors Kit

GPS Receiver



### Note:

You can find all these items sold as individual components throughout the rest of our catalogue.

## Hand Auger Kits

A comprehensive set for augering all types of soil down to a depth of 8-10 metres. These kits are specifically designed for use in soil research studies and are made to a high standard to ensure a long service life.

**Clip-on connection:** The advantage of the clip-on connection is that it is very fast with little weight. The clip-on connection is strong, rigid and long lasting

### Hand Auger Kit consisting of:

- 6 x 1 metre clip-on rods
- 1 x Driving Handle
- 2 x Dutch Hand Augers S/L (55mm and 75mm diameter)
- 7 x Slide Tubes for clip-on rods
- 1 x Short tube for clip-on rods
- 1 x Solid clip-on adapter for driving handle

**Screw thread connection:** This connection is based on male and female thread on the parts to be coupled. The use of tapered threads for connection allows you to simply hand tighten the connection to create a rigid construction.

### Hand Auger Kit consisting of:

- 6 x 1 metre Auger rods
- 1 x Driving Handle
- 2 x Dutch Hand Augers S/L (55mm and 75mm diameter)
- 5 x Couplings



Catalogue No	Description
<b>AG21-150</b>	Hand Auger Kit: depth 6m, 55 and 75 mm dia. Clip-on
<b>AG21-152</b>	Hand Auger Kit: depth 6m, 55 and 75 mm dia. Screw thread

## Riverside Hand Augers

A range of riverside hand augers designed for soil investigations and explorations. The design is very suitable for augering in hard, stiff soils, mixed with fine gravel both above and below the ground water level. The very sharp extremities of the auger bits point at an angle downwards, thus enabling the auger to pass through soil with minimal difficulty.

The augers are plated against corrosion to ensure a long life.

Catalogue No	Description
<b>AG21-200</b>	Hand auger with handle and T-piece, 80mm dia. x 1m long
<b>AG21-202</b>	Hand auger with handle and T-piece, 100mm dia. x 1m long
<b>AG21-204</b>	Hand auger with handle and T-piece, 150mm dia. x 1m long
<b>AG21-206</b>	Extension Rod, 1m length



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AG21-300



## Surface Soil Sampler / Core Cutter

Used to obtain field samples of compacted ground or undisturbed soils, in order for an evaluation of density compaction at the ground surface to be undertaken. The set consists of a drop hammer which slides on the drive rod and falls on the drive head where the sampling tube is held.

Catalogue No	Description
<b>AG21-300</b>	Surface soil sampler with sampling tube 73mm diam. 5kg drop hammer
<b>AG21-302</b>	Surface soil sampler with sampling tube 100mm diam. 10kg drop hammer
<b>AG21-304</b>	Sampling tube, 73mm diameter
<b>AG21-306</b>	Sampling tube, 100mm diameter

AG21-400

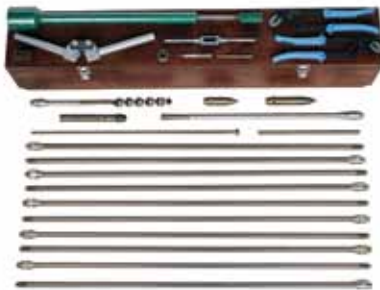


## Soil Sampler

Used to obtain undisturbed soil samples of diameter 38mm. The set consists of a T-handle with a 900mm extension rod, and a stainless steel tube, diameter of 38 x 230mm. The unit has a total weight of 7kg.

Catalogue No	Description
<b>AG21-400</b>	Soil Sampler, T-handle with extension rod, 38mm dia. 900mm long
<b>AG21-402</b>	Spare stainless steel sample tube, diameter 38 x 230mm
<b>AG21-404</b>	Hand extruder used to extract specimens from the sample tube

AG21-500



## Soil Prospecting Kit

A complete set of soil prospecting equipment contained within a tough, durable and fully portable carrying case make this the ideal kit for soil prospecting applications in field studies. Maximum depth of 15 metres, for sample sizes of 25mm diameter.

### The kit comprises the following items:

- 10 x 1 metre long Boring Rods
- 2 x Driving Points
- 12 x Couplings
- Driving Head
- Core Tube
- Clearing Rod
- 2 x Wrenches
- Clay Core Tube
- Core Tube Adaptor
- Spiral Auger Tool
- Lifting Tool
- Prospecting Hammer
- Hammer and Tommy Bar

Catalogue No	Description
<b>AG21-500</b>	Soil Prospecting Kit

AG21-600



## Soil Colour Chart

The Munsell Soil Chart is an affordable way to evaluate the type of soil that is present in a given area, the book is set up to allow users to make soil colour evaluations in the field quickly and easily. Practitioners from a wide range of professions can share reliable and consistent information about the colour of soils at a particular site with colleagues anywhere around the world.

Catalogue No	Description
<b>AG21-600</b>	Soil colour chart. Complete with supplementary tropical soil charts

## Soil Texture Kit

Soil texture refers to the proportionate distribution of the different sizes of mineral particles within a soil. Particles are grouped according to their size into what are called 'size separates' (clay, silt, and sand). Soil separates are a group of mineral particles that fit within definitive size limits expressed as diameter in millimetres.

Included in this set, are three calibrated conical tubes with a stand, in addition to dispersing reagent and flocculating reagent that work together to speed settling of finely divided particles. Instructions explain method for breaking down soil samples into sand, silt and clay fractions. "A Study of Soil Science" provides background information on weathering and its relationship to soil formation. Provides for 50 tests.

Catalogue No	Description
<b>AG21-700</b>	Soil texture kit.
<b>AG21-702</b>	Soil texture kit refill pack. Provides reagents for 50 tests

## Agricultural Soil Set

Soil sieve set providing a fast and effective means for the coarser components to be separated from a dry sample in order for preliminary analysis to be undertaken on site. The Alloy nesting sieves are 125mm in diameter and have round hole openings of sizes 0.5mm, 1mm, 2mm, 3mm and 5mm diameter. With lid and receiver, weight 4kg.

Catalogue No	Description
<b>AG21-800</b>	Agricultural soil sieve set

## Soil Sieve Set

Supplied as a complete set comprising of a broad range of sieve sizes with a lid and pan. 10 no sieves in the set with aperature sizes 2mm, 900mic, 600mic, 400mic, 250mic, 200mic, 140mic, 125mic, 100mic, 63mic. Pan diameter 100mm, pan height 45mm, body height 45mm.

Catalogue No	Description
<b>AG21-810</b>	Set of 10 soil sieves

## Soil Sampling Bags

A set of 100 plastic bags that are used for the submission of samples for analytical assessment. The bags have a wire closure designed for sampling of soils and other materials.

Catalogue No	<b>AG21-900</b>
Dimensions, mm:	75 x 125
Pack quantity:	100 bags

### Note:

For a further range of Sampling Equipment, please refer to General Lab Catalogue.

AG21-700



AG21-800



AG21-810



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# Soil Analysis

**Soil Analysis:** Measuring the key chemical characteristics of the soil is essential in order to be able to create the best conditions for good plant growth.

This section includes a wide range of field testing kits and instrumentation for measuring the pH of the soil plus major nutrients such as Nitrogen, Phosphorus & Potassium.

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AG22-100



## Soil pH Kit

A dual purpose kit measuring both soil pH and lime requirement. The pH test uses a single tablet reagent in conjunction with the pH (colour comparison) block. The lime requirement test uses a single buffer tablet and is carried out as a continuation of the pH test. The kit is supplied in a small plastic carrying case and contains sufficient tablet reagents for 50 soil pH and lime requirement tests.

Catalogue No	Description
<b>AG22-100</b>	Soil pH Kit
<b>AG22-102</b>	Refill pack for Soil pH kit, 50 tests.

AG22-300



## Soil Fertility Kit

The Soil Fertility Kit provides the analysis required for the routine assessment of agricultural soils and soil fertility. The tests include pH, nitrate, phosphate and potassium (NPK).

Rapid field tests are made possible by the extraction and reagent tablets in the kit which is suitable for use in the field, on the farm or in the laboratory. Supplied in a carrying case and containing sufficient extraction and reagent tablets for 50 each of the tests.

Catalogue No	Description
<b>AG22-300</b>	Soil Fertility Kit
<b>AG22-302</b>	Refill soil extraction and reagent pack, 50 tests

AG22-400



## Soil Nutrients Kit

This kit contains an additional range of tests to assist farmers with soil management operations.

The Soil Nutrients Kit includes all the extraction and tablet reagents required for 50 tests of the following: nitrate nitrogen, phosphate, potassium, (NPK), calcium, magnesium, pH, and conductivity - supplied in carrying case.

Catalogue No	Description
<b>AG22-400</b>	Soil Nutrients Kit
<b>AG22-402</b>	Refill soil extraction and reagent pack, 50 tests



## The Soil Analysis Kit

This comprehensive soil analysis kit is designed for use by farmers, horticulturalists, agronomists, scientists and consultants in the field or laboratory and will enable a range of tests to be carried out at a fraction of the cost of full scale laboratory analysis. Increased accuracy is ensured by the use of digital meters and a photometer which, together with extraction and reagent tablets for 50 tests, will measure the following parameters: pH, conductivity, nitrate nitrogen, phosphate phosphorus, potassium, sulphate, iron, manganese, copper, ammonia nitrogen, chloride, calcium, and magnesium - supplied in carrying case.

Catalogue No	Description
<b>AG22-410</b>	Soil Analysis Kit including accessory pack
<b>AG22-411</b>	Refill soil extraction and reagent pack for Soil Analysis Kit, 50 tests

AG22-410



## Agriculture Test Kit

Soil Test kit allows you to test and measure the key parameters in soil for healthy plant growth. Namely Nitrogen, pH, Phosphorous and Potassium. In Agricultural applications, monitoring the quality of the soil is extremely important for the healthy growth of crops. The pH level is an excellent guide as to which plants may thrive in a particular terrain, as well as indicating which conditioners and fertilizers to use. Soil test kits allow you to test not only for pH, but for Nitrogen, phosphorous and potassium as well, which are all important for the quality of soil.

Agriculture test kit is supplied with an extraction solution which facilitates the precipitation of suspended solids so that measurements can be taken immediately. The kit includes everything you need to carry out 25 tests and includes a useful guide to measurement.

**Parameter:** Nitrogen, **Range:** traces, low, medium, high, **Method:** Colormetric, **Chemical Method:** Ned. pH, 4 to 9pH (1 pH increments), Colorimetric, pH indicator. Phosphorus traces, low, medium, high, Colorimetric, Ascorbic Acid. Potassium traces, low, medium, high, Turbidimetric, Tetraphenylborate

Catalogue No	<b>AG22-413</b>
Description	Agriculture Test Kit
Dimensions/ Weight	113 x 113 x 62 mm Weight 105 g

AG22-413



## Budget Soil Test Kit

Soil test kit is ideal for testing and monitoring the quality of the soil. pH level is an excellent guide as to which plants may thrive in a particular terrain, as well as indicating which conditioners and fertilizers to use. Combination test kits allow you to test not only for pH, but for nitrogen, phosphorous and potassium as well, which are important for the quality of soil. The kit comes with all the necessary components for 25 tests.

**Parameter:** Nitrogen, **Range:** traces, low, medium, high, **Method:** Colormetric, **Chemical Method:** Ned. pH, 4 to 9pH (1 pH increments), Colorimetric, pH indicator. Phosphorus traces, low, medium, high, Colorimetric, Ascorbic Acid. Potassium traces, low, medium, high, Turbidimetric, Tetraphenylborate

Catalogue No	<b>AG22-414</b>
Description	Budget Soil Test Kit
Dimensions/ Weight	113 x 113 x 62 mm, Weight 105 g

AG22-414



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## Compact ION Meters

This compact and robust nitrate ion meter uses flat sensor technology. This technology allows very small sample sizes to be measured (minimum sample size 0.3ml). The instrument is simple to calibrate and easy to use. Combine this with its compact pocket size and you have an instrument that can be used for various applications in the lab or out in the field.

- Waterproof
- Automatic calibration function (selection of 1-point, 2-point calibration)
- Wide measuring range
- Flat sensor enables measurements of small sample volumes (0.3ml)
- Special setting modes
- Selectable analysis of nitrate or nitrate as nitrogen
- Selectable units of measure (ppm, mg/L, kg/10a)

### Specifications

Principle method:	Sodium ion electrode	Potassium ion electrode	Nitrate ion electrode
Display:	LCD, 2-digit display	LCD, 2-digit display	LCD, 4-digit display
Range, ppm:	23-2300	39-3900	30 to 600 ppm
Sample Volume:	0.3 ml to 2.0 ml	0.3 ml to 2.0 ml	0.3 ml to 2.0 ml

Catalogue No	Description
<b>AG22-500</b>	Compact Ion Meter, Sodium
<b>AG22-502</b>	Compact Ion Meter, Potassium
<b>AG22-504</b>	Compact Ion Meter, Nitrate
<b>AG22-506</b>	Compact Ion Meter, Salt

## Accessories

Catalogue No	Description
<b>AG22-508</b>	Standard solution set for Sodium meter
<b>AG22-510</b>	Standard solution set for Potassium meter
<b>AG22-512</b>	Standard solution set for Nitrate meter
<b>AG22-514</b>	Standard solution set for Salt meter

## Compact pH Meter

Incorporating flat sensors, these compact pH meters are able to take accurate pH value (acidity - alkalinity) measurements from a single drop sample. The unique flat sensor allows measurements of powder and solid object samples to be easily taken.

The unit comes complete with standard solution sets for pH4 and pH7. Replacements are available on request.

- Measurements may be taken from a single drop (0.1mL) sample solution
- Light, easy-to-clean, and waterproof Twin pH meters are suitable for a wide range of measuring applications
- Scoop function eliminates the need for pipettes and beakers in taking samples
- A sensor guard protects the delicate electrode

Catalogue No	<b>AG22-600</b>
Measurement range:	pH 2 - pH 12
Sample temp, °C:	5 to 40 (temp. of sample is compensated to give ambient temp.)
Calibration:	Two point (pH 7, pH 4)
Power:	Two 3V lithium batteries
Weight, g:	53
Dimensions, mm:	165 x 29 x 19

## Compact Conductivity Meter

AG22-650

Incorporating a flat sensor, this conductivity meter can measure the conductivity of a solution from a single drop of sample. Users can either place a sample on the meters flat sensor or immerse the meter directly in the solution being tested, giving the meter a broad range of applications e.g. measuring rainwater pollution levels or the electric conductivity (EC) of solutions used in agricultural operations. The device also includes a convenient salinity conversion indicator.

Supplied complete with standard solution set. Replacement sets and conductivity probes are also available on request.

- Highly precise measurements can be obtained from a single-drop sample
- Automatic range switching gives a wide measurement range
- Automatic calibration, automatic temperature conversion, and other intelligent functions are standard features

Catalogue No	<b>AG22-650</b>
Measurement method:	0ms/cm ~ 19.9ms/cm
Measurement range:	2% FS±1 digit. At a depth of more than 10ms/cm, the range is 3% FS±1 digit
Ambient temperature, °C:	5 to 35
Power:	3V x 2, two CR-2032 lithium batteries
Weight, g:	46
Dimensions, mm:	150 x 27 x 16



## Direct Soil pH Measurement Kit

AG22-655

The kit has been designed to measure pH directly in soil accurately and quickly. Testing both the pH of soil directly or after preparation of a diluted sample. In order to measure the pH directly, the kit includes a plastic auger to perforate the ground.

The pH electrode has been specifically designed for direct soil measurement. It has a conical, rugged tip and can be directly inserted in moist or soft soil. Use the specially made soil preparation solution for higher degrees of accuracy, or for stony ground where the electrode may be damaged. This solution is included to help you measure pH more precisely by diluting the soil sample.

This hand held product has a large, multi-level LCD which displays the primary reading, temperature and calibration guides simultaneously. Complete kit includes meter, pH electrode, soil auger, soil preparation solution, starter set of calibration solution sachets, 100ml plastic beaker, batteries, instructions and carrying case.

Specifications		
Range:	pH	-2.00 to 16.00 pH
	Temperature	-5.0 to 105.0 °C
Resolution:	pH	0.01 pH
	Temperature	0.1 °C
Accuracy: (@20 °C)	pH	±0.02 pH
	Temperature	±0.5 °C up to 60 °C; ±1 °C outside
Temperature Compensation:		Automatic
pH Calibration:		Automatic 1 or 2 point calibration with 2 sets of memorized buffers (4.01, 7.01, 10.01 or 4.01, 6.86, 9.18)
Electrode: (included)		pre amplified pH/ temperature electrode with DIN connector and 1m cable
Battery:		Type (3) 1.2V AAA, life: 1500 hrs
Environment:		0 to 50 °C RH max. 100%
Dimensions, mm:		150 x 58 x 29
Weight, g:		205

Catalogue No	Description
<b>AG22-655</b>	Direct Soil pH Measurement Kit
<b>AG22-656</b>	pH electrode for soil measurement, with internal temperature sensor, DIN connector on a 1m cable
<b>AG22-657</b>	Refill pack containing buffers and cleaning solutions



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# Trace<sub>2</sub>O

## HM4000 Metalyser Heavy Metals Soils Analyser

Portable Analyser, incorporating innovative extraction and digestion equipment, for easy detection of heavy metals in soil samples.

- Rapid in-field analysis
- Precise results to ppb levels
- Voltammetric technique
- User-friendly extraction and analysis
- Rugged, waterproof carrying case
- Consumables for 50 tests included

Catalogue No	Description
<b>HM4000</b>	Complete Kit contains:- Metalyser HM4000 Instrument, Sonde with 2m cable, 3 working electrodes, 1 reference electrode, 1 counter electrode, beakers, mains charger, car charger, USB cable, buffers, standards and conditioning solutions for analysis of 7 metals (AsII, As(total), Cd, Au, Cu, Hg, Pb) soil extraction kit, Metaware software and waterproof carry case.



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## Also available within the Metalyser range



### HM1000 Metalyser Portable

Portable Analyser for the quick and easy detection of heavy metals in water, at ppb levels.

- Rapid in-field analysis
- Precise results from as low as 3 ppb
- Voltammetric technique
- Intuitive user interface
- Rugged, waterproof design
- Consumables for 50 tests included



### HM2000 Metalyser Deluxe

Portable Field Kit, combining electrochemical & photometric techniques, for analysing a more diverse range of metals in water.

- Rapid in-field analysis
- Suitable for remediation studies
- Voltammetric and photometric techniques
- Precise results from ppb to ppm levels
- Intuitive user interface
- Rugged, waterproof kit
- Consumables for 50 test included



### HM3000 Metalyser Field Pro

Advanced Portable Analyser, with integrated tablet PC and bespoke software, for precise analysis of a wide range of heavy metals in water.

- Rapid laboratory analysis in field, using integrated tablet PC
- Precise results from as low as 1 ppb
- Voltammetric technique
- Intuitive graphical software interface
- Built-in wireless connectivity
- Rugged, waterproof kit
- Consumables for 50 tests included



Laboratory Chemical Analysis

# Soil Water Sampling

**Soil Water Sampling:** Soil water is water that is held within the pore spaces between particles of soil and is the water that is immediately available to plants.

The simple equipment in this section is used to extract a water sample from the soil for later analysis in the laboratory or in the field using water test kits.



## Soil Water Samplers

When attempting to determine the moisture retention of soil, an undisturbed sample of a uniform size is required. This is a range of 50mm diameter soil water samplers that are designed to collect soil water which can then be extracted from the device and taken to the laboratory for analysis. The sampler is installed into a hole made with a screw or bucket auger (**refer to Hand Auger Kits on page 11**). Water then enters into the sampler through the porous ceramic cup at the end of the sampler. The rate of water accumulation depends on the soil type and moisture content. This method of water sampling can further be effectively used to determine Nitrate leaching from fertilizer applications.

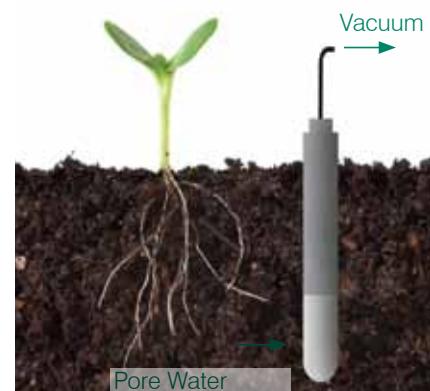
Catalogue No	Description
<b>AG23-100</b>	300mm length Soil Water Sampler complete with ceramic tip, stopper assembly, neoprene tubing and pinch clamp. 500mm diameter.
<b>AG23-102</b>	600mm length Soil Water Sampler complete with ceramic tip, stopper assembly, neoprene tubing and pinch clamp. 500mm diameter.
<b>AG23-104</b>	900mm length Soil Water Sampler. Complete with ceramic tip, stopper assembly, neoprene tubing and pinch clamp. 500mm diameter.

## Accessories

Catalogue No	Description
<b>AG23-106</b>	Extraction Kit, includes a vacuum pump, 1000ml flask, nylon and silicone tubing

### Note:

Soil Water Sampling Equipment: If you are unable to find your specific requirements, please contact our in-house experts.



# Irrigation Water Quality Testing

**Irrigation Water Quality Testing:** Good quality water for use in agricultural development is essential to ensure healthy plant growth and the field test kits shown in this section are intended to measure the key water quality parameters quickly and simply.

AG24-600



## Irrigation Water Test Kit

A comprehensive testing kit designed to measure the following parameters of water quality;

pH, Total Hardness, Chloride, Nitrates, Nitrates and Ammonia

The complete range of equipment is contained within a portable and rugged aluminium carrying case, making this the ideal solution for field work.

- pH - this is an essential test to check that the water is neither too acidic nor too alkaline. Normal range is from 6.5 to 8.4
- Total hardness - a test for measuring the total calcium and magnesium levels in water. Normal desirable range for plant growth is from 100 to 150 mg/l
- Chloride - measures the salinity of the water. Many crops and plants will not tolerate highly saline conditions. The following table is a useful guide on the affects of chloride levels of plants

Chloride (mg/l)	Effect on Crops
Below 70	Generally safe for all plants
70-140	Sensitive plants show adverse affects
141-350	Moderately tolerant plants adverse affects
Above 350	Can cause severe problems

Catalogue No	Description
<b>AG24-600</b>	Irrigation Water Test Kit
<b>AG24-602</b>	Refill Pack for Irrigation Test Kit-- Calcium Hardness-50 tests
<b>AG24-604</b>	Refill Pack for Irrigation Test Kit-- Chloride-50 tests
<b>AG24-606</b>	Refill Pack for Irrigation Test Kit-- Ammonia-250 tests
<b>AG24-608</b>	Refill Pack for Irrigation Test Kit--Nitrate-250 tests
<b>AG24-610</b>	Refill Pack for Irrigation Test Kit--Nitrite-250 tests

## Sewage Effluent Test Kit

AG24-100

Sewage Effluents are used in many countries for irrigation, and this kit provides a simple means of checking the quality of such water.

It is used extensively for control testing at small sewage works. Based on simplified methods of sewage effluent testing, the kit contains tests for the essential quality control checks required for the day-to-day operation of sewage effluent treatment plants. Each of the tests is performed simply without the use of complicated equipment and are suitable without formal training in water testing and analysis.

- **Permanganate Value** - enables the Permanganate Value (PV) to be determined and the effluent classified as to its acceptability for discharge.
- **pH test** - Chemical and biological reactions at sewage works are profoundly influenced by pH. A pH test will also check, for example, on the effect of acid or alkaline trade wastes in the effluent flow.
- **Turbidity and Suspended Solids** - Designed to give a measure of the suspended solids content of the final effluent. It is also useful in following the day-to-day variation in the quality of sewage and effluent.
- **Probable BOD, COD and TOC** - It is possible to derive an indication of the Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) from the result of the Permanganate Value test.
- **Temperature** - A check should be maintained on the temperature of effluent discharges and these should always be close to ambient temperatures.
- Kit comes complete with a -10° to +50° thermometer complete in a brass protecting case.



Catalogue No	Description
AG24-100	Sewage Effluent Test kit
AG24-102	Spare reagents for permanganate value and pH (50 tests)

## Aquaculture Water Test Kit

AG24-110

This kit provides users with the most important test parameters for aquaculture applications: alkalinity, carbon dioxide, dissolved oxygen, hardness, pH and salinity.

Each of these parameters plays a critical role in the delicate balance of the aquatic environment: alkalinity acts as a stabilizer for pH; carbon dioxide must be monitored because of its toxic effects on fish (every species can tolerate different levels of CO<sup>2</sup>); oxygen levels affect fish respiration and incorrect concentrations can slow down their growth rate; hardness is monitored because it diminishes the toxicity level of ammonia; pH also is measured to determine the toxicity level of the water; salinity is important because of its relation to dissolved oxygen.

Parameter	Range	Method	Smallest Increment	Chemical Method	Number Of Test
Alkalinity	0-100 mg/L 0-300 mg/L	Titration	1 mg/L 3 mg/L	Phenolphthalein/ Bromphenol blue	approx. 110
Carbon Dioxide	0-10.0 mg/L 0-50.0 mg/L 0-100 mg/L	Titration	0.1 mg/L 0.5 mg/L 1 mg/L	Phenolphthalein	approx. 110
Hardness	0-30.0 mg/L 0-300 mg/L	Titration	0.3 mg/L 3 mg/L	EDTA	approx. 110
Oxygen, Dissolved	0-10.0 mg/L	Titration	0.1 mg/L	Modified Winkler	approx. 110
pH	0-14.0 pH	Electronic pH Tester	0.1 pH	N/A	approx. 110

Catalogue No	Description
AG24-110	Aquaculture Test Kit, includes all reagents necessary to perform over 100 tests for each parameter, electronic pH tester, rigid carrying case, all needed accessories for tests and instruction manuals.



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# Soil Moisture and Permeability

Water management in agriculture is essential to ensure scarce irrigation water resources are used carefully and efficiently.

The instruments in this section are used to collect important data on soil moisture content, soil moisture retention, infiltration capacity, permeability, hydraulic conductivity, and soil compaction that will assist the agronomist, soil scientist and farmer in making important decisions on irrigation scheduling etc.



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## Quickdraw Soil Moisture Probe

With reaction times varying from 3-5 minutes in sandy loam to 12-15 minutes in heavy clay, this instrument is suitable for both greenhouse and field measurement. This is a durable Tensiometer on which the probe readings are unaffected by differing soil types, soil temperatures or salinity conditions.

Available in two lengths: 300mm and 460mm. The length is measured from the mid-portion of the ceramic tip upward to a point approximately 50mm below the gauge.

- Large 50mm dial gauge reads directly in centibars of soil suction, the basic measurement used by soil scientists
- Hydraulic force of soil water is measured through the porous ceramic tip
- Probe indicates moisture conditions in relationship to plant growth, thus demonstrating the basic forces involved in moisture movement



Catalogue No	Description
<b>AG25-100</b>	Quickdraw Soil Moisture Probe, 300mm
<b>AG25-102</b>	Quickdraw Soil Moisture Probe, 460mm



**Zero**  
A gauge reading of zero means the surrounding soil is completely saturated with water, regardless of the type of soil.



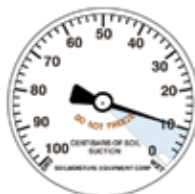
**20-40 Centibars**  
Available moisture and aeration good for plant growth. Heavy Clay Soils: No irrigation required. Medium Textured Soils: No irrigation required. Sandy Soils: Irrigation started for coarser sandy soils in the 20-30 cb range. For finer sandy soils in the 30-40 cb range.



**0-10 Centibars**  
This range indicates a surplus of water for plant growth. Water held by the soil in this range drains off within a few days.



**40-60 Centibars**  
Available moisture and aeration are good for plant growth in finer textured soils. Heavy Clay Soils: No irrigation required. Medium Textured Soils: Irrigation started in this range. The finer the texture the higher the reading before start of irrigation. Sandy Soils: Too dry. Hot windy conditions can force soil suction to high reading quickly and damage plants.



**10-20 Centibars**  
This indicates that there is ample moisture and also air in the soil for healthy plant growth in all types of soils. This range is often referred to as the "field capacity" range for soils.



**60-80 Centibars**  
Readily available moisture scarce, except in heavy clay soils. Heavy Clay Soils: Start of irrigation desirable as soil suction values reach 70-80 cb. Medium Textured Soils: Too dry. Hot, windy conditions can force soil suction to high reading quickly and damage plants. Sandy Soils: Too dry. Damage to plants will occur before irrigation can be applied.



## Dial Gauge Tensiometers

Tensiometers measure the water availability to plant roots and so can be used in irrigation and crop management. They are designed to be permanently installed in the growing medium, which they equilibrate with and measure the 'soil suction' used by the roots to remove water from the soil. This is a simple, effective and low cost Tensiometer that is particularly suitable for applications such as irrigation scheduling and crop management.

- Suitable for soil, peat and many other mediums
- Robust construction for long life
- Full instructions included

Specifications	
Operating range, °C:	0 to 70 (precautions required for operation in below zero conditions)
Shaft construction:	Porous Ceramic bulb. Clear acrylic shaft. Rubber septum stopper
Gauge dimensions, mm:	41 x 26
Gauge construction:	Brass mechanism. Plastic housing
Catalogue No	Description
<b>AG25-150</b>	Dial Gauge Tensiometer, 300mm long. Requires service kit.
<b>AG25-152</b>	Dial Gauge Tensiometer, 600mm long. Requires service kit.
<b>AG24-154</b>	Dial Gauge Tensiometer, 900mm long. Requires service kit.

## Accessories

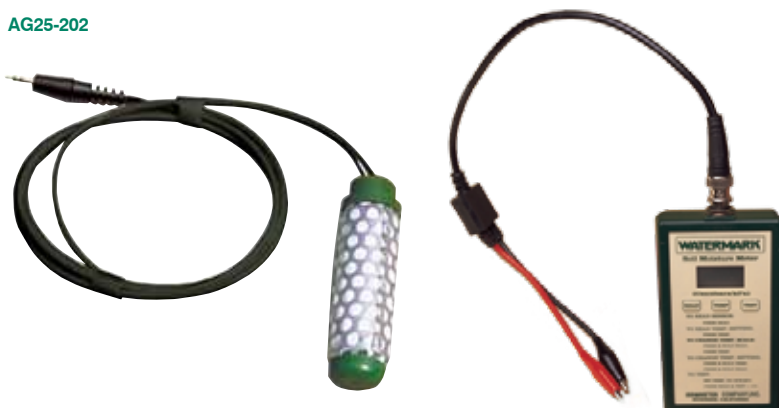
Catalogue No	Description
<b>AG25-156</b>	Auger kit for Tensiometers - Contains 19mm dia, 600mm long Auger and spatula.
<b>AG25-158</b>	Service kit for Tensiometers - Contains syringe and filling tube.

## Soil Moisture Meter

Solid state, electrical resistance type sensor provides accurate readings from 0 to 200 centibars, covering the entire soil moisture range required in irrigated agriculture. In operation, soil moisture is constantly being absorbed or released from the sensor. As soil dries out, sensor moisture is reduced and electrical resistance between electrodes is increased. Resistance is read by the hand-held digital meter which gives a digital readout in centibars of soil water suction. Digital meter features soil temperature compensation which adjusts for the effect soil temperature has on electrical resistance reading. Temperature scale can be adjusted to use either °F or °C scales. To use, bury the sensor to desired depth, connect alligator clips located on meter to the sensor, and view results on digital display. Sensor is manufactured from non-corrosive parts and measures 22mm dia. x 82mm. Accuracy: ±3%.

Catalogue No	Description
<b>AG25-200</b>	Digital soil moisture meter and sensor with 1.5m cable
<b>AG25-202</b>	Replacement sensor

AG25-202



AG25-200



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AG25-250



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AG25-300



## Soil Profile Probe

No other system enables you to monitor your soil water profiles with such ease and flexibility. Install an access tube into the soil, insert the probe and press the 'Read' button to display an instantaneous reading, or connect the unit to a data logger and leave the system to record soil moisture changes over time. The access tube requires an installation hole of 27mm in diameter, allowing easy installation and minimal soil disturbance. Correct installation is essential and we recommend the use of the specially designed augering equipment as displayed below.

- Soil moisture content - not just trends
- Low salinity and temperature sensitivity
- Portable meter option for multisite measurement
- Datalogger option for continuous monitoring
- Out of the box solution - supplied with soil calibrations for common soil types
- Uses access tubes for easy probe insertion and removal

Catalogue No	<b>AG25-250</b>
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## Accessories

Catalogue No	Description
<b>AG25-252</b>	<b>Data Logger:</b> With IP67 weather-proof case and battery power. Up to 16000 readings can be stored in the memory.
<b>AG25-254</b>	<b>Moisture Meter:</b> Holds multiple user-defined soil types. Stores up to 2000 time-stamped readings. Includes PC data collection software
<b>AG25-256</b>	<b>Augering Kit:</b> Essential equipment for the correct installation of the access tubes on the soil profile probe
<b>AG25-257</b>	Access tubing, 28mm dia x 115cm long

## Soil Moisture, Temperature and Salinity Probe

A highly accurate meter that displays soil moisture percentage, soil temperature °C, and soil salinity cS/m. A particularly versatile instrument, this probe can be used in a variety of soils and is unaffected by temperature, pH, dissolved salts, or metallic ions.

This easy-to-use instrument simply needs to be placed at least 150mm into the ground, and then results are displayed at the push of a button. Rapidly perform multiple tests at various depths and locations.

Features 700mm stainless steel probe, clay, loam and sand scales printed on meters face panel, and soft foam handles.

Catalogue No	<b>AG25-300</b>
Operating temperature, °C:	4 to 65
Power:	9V battery
Overall length, mm:	900
Probe Length, mm:	700
Weight (approx), g:	2000
<b>Soil Moisture</b>	
Range:	0 to 100%
Repeatability:	± 2%
Response time:	3 seconds
<b>Soil Temperature</b>	
Range:	4°C to 65°C
Accuracy:	± 17°C
Response time:	60 seconds
<b>Salinity</b>	
Range:	0 to 100 cS/m
Accuracy in water:	± 2 cS/m
Accuracy in soil:	± 10 cS/m
Response time:	5 seconds

## Soil Drying Oven

A laboratory oven designed to dry and aggregate large quantities of soils in accordance with most B.S and ASTM requirements. Constructed of a prefinished coated mild steel exterior and an aluminium coated steel interior chamber which is both durable and corrosion resistant. This unit meets the requirements of BS 1377 and is ideal for on-site laboratories and general soils and aggregate testing.

- Dial thermometer 0-200°C with collar fixing for door
- LED display for showing temperature on thermostatically controlled units
- Heavy duty shelves
- Units complying to BS2648
- Traceable calibration certificates

Catalogue No	AG25-350
Capacity, litres:	225
Temperature, °C:	40 - 200
Fluctuation:	0.75°C
Number of shelves:	3
Shelf positions:	4
Power:	220/ 240V AC 50 hz
Weight, kg:	80
Dimensions, cm:	60 x 100 x 50

AG25-350



## Handheld Infiltrometer

A handheld Infiltrometer that provides quick and convenient measurements of soil hydraulic conductivity. The Infiltrometer is constructed of a polycarbonate tube with a semi-permeable stainless steel sintered disk. An adjustable steel tube is installed above the sample chamber to regulate the suction rate.

The Infiltrometer is immersed in water and the rubber stopper is installed while it is still underwater. When taken out of the water, it will not infiltrate until the water tension on the disk is broken. The disk is placed on the soil surface, and the volume change is recorded at regular intervals.

This Infiltrometer is ideal for soil hydrology studies, classroom instruction, research, and many other applications. The suction rate can be adjusted to accommodate measurement of any soil type.

Catalogue No	AG25-400
Volume of water required to operate, ml:	135
Suction range:	5 to 700mm of suction
Total length, mm:	327
Diameter of tube, mm:	31
Sintered stainless steel disc, mm:	4.5
Length of suction regulation tube, mm:	102
Length of Mariotte tube, mm:	280

AG25-400



### Note:

Wagtech Projects offer a comprehensive range of ovens, please refer to our General Lab Catalogue.

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## Double Ring Infiltrometer

The double ring Infiltrometer is a simple instrument that is used to determine the rate of infiltration of water into the soil. The measure of infiltration of water into the soil is an important indication concerning the efficiency of irrigation and drainage, optimising the availability of water for plants, improving the yield of crops and minimising erosion.

The provision of 3 measuring devices permits the synchronous determination of infiltration capacity in triplicate, with the benefit of more representative and reliable data.

The unit may be used for determining the rate of infiltration and capacity for irrigation and drainage projects, studying drainage, determining the intensity of artificial precipitation and the effect of treatment of the soil.

- Ideal for infiltration measurement of top soils
- Perfect for flood / furrow irrigation advice
- Triple rings to get a representative average
- Stainless steel rings

Catalogue No	Description
<b>AG25-450</b>	Double ring Infiltrometer, complete kit comprising 3 Infiltrometers; inner ring 280mm, outer ring 530mm diameter; inner ring 300mm, outer ring 550mm diameter; inner ring 320mm, outer ring 570mm diameter; driving plate with handle for inner and outer rings. 3 adjustable measuring bridges, 3 floats with measuring rods, and a nylon headed hammer
<b>AG25-452</b>	Double ring Infiltrometer, comprising one inner ring 280mm diameter and one outer ring 530mm diameter, an adjustable measuring bridge and float
<b>AG25-454</b>	Driving plate with handle for placing rings

AG25-500



## Proctor Penetrometer

A spring-type Penetrometer that can be used in the field for the controlling of soil compaction. The stem is calibrated to 150 lbf x 2 lbf divisions, and a sliding collar indicates the applied load. A rapid estimate of the moisture content of soil can be obtained by comparing the amount of penetration of the needle for a corresponding load, with a laboratory determined moisture/density curve for a similar soil.

The set comes complete with accessories, a carrying case, and 9 interchangeable stainless steel needles with diameters of 4.52, 5.23, 6.40, 9.07, 12.83, 16.54, 20.22, 24.79, and 28.55mm.

Catalogue No	<b>AG25-500</b>
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AG25-600



## Proving Ring Penetrometer

A 30° cone Penetrometer that is used to determine the bearing strength, penetration resistance of soil, and the compaction degree of subgrades. To determine the penetration resistance, the Penetrometer is firmly pushed into the soil at a uniform rate. When the top of the penetration cone is reached, the proving ring dial is read. The corresponding penetration loads can be determined from the calibration chart supplied. The proving ring dial indicator is equipped with a maximum load pointer.

Penetrometer is lightweight and compact and is supplied with a handle and rod extension. The single proving ring has a capacity of 1 kN. The extension rod is graduated every 150mm. The cone points are easily removed. Diameter of the shaft is 19mm.

Catalogue No	<b>AG25-600</b>
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## Field Vane Tester

Used to determine the shear strength of cohesive very soft, to firm non-fissured soil on site. The maximum torque value is measured on a collar attached to the shaft. The kit, which is housed in a tough and durable carry case, comprises the following equipment:

- Measuring head comprising a T-handle spring loaded, range 0 to 200 kPa
- 1 extension rod 500mm long
- 3 vanes (dia. x height) 16x32, 20x40, and 25.4x50.8mm, with vane dummy and tools

Catalogue No

**AG25-650**

AG25-650



## Hand Vane Tester

An accurate and portable instrument for the determination of in-situ shear strength of cohesive soils, either on site or on undisturbed samples within the laboratory.

The instrument comprises a torque head with a direct reading scale which is turned by hand. A non-return pointer indicates the reading. The vanes, either 19mm or 33mm diameter, are screwed into the rear of the torque head, and pushed at least 200mm into undisturbed clay. Extra 300mm or 1000mm extension rods can be used for greater penetration and for gaining access to difficult or dangerous locations.

Catalogue No

Description

**AG25-700**

Hand vane tester, complete with 2 vanes; 19mm for 0-120 kPa shear strength, and 33mm vane for 0-28 kPa shear strength, 2 spanners, and a carry case

**AG25-702**

300mm long extension rods

**AG25-704**

1000mm long extension rods

AG25-700



## Soil Compaction Meter

Measure, log, and review data with this Soil Compaction Meter to make better soil management decisions based on data specific to your field. Identify and address specific problem areas on-site and in real time.

Soil Compaction meters are used to determine the density of soil and other material. An operator pushes a rod with attached (ASAE standard) cone into the ground. The resistance of the cone as it is pushed in the ground is measured and recorded in the memory of the compaction meter. The depth of the cone below soil surface is also measured and recorded in memory. Compaction data is recorded and displayed at one inch intervals, in PSI or kPa. Built-in datalogger eliminates the need to record data manually. Included software allows user to download data, change logger settings and configure the meter.

Catalogue No

**AG25-800**

Measurement units:

Cone Index (PSI or kPa)

Resolution:

25mm, 5 PSI 935 kPa)

Accuracy:

± 125mm depth, ± 15 PSI (103 kPa) Pressure

Diameter of tube, mm:

31

Range:

0-440mm, 0-1,000 PSI (0-7,000 kPa)

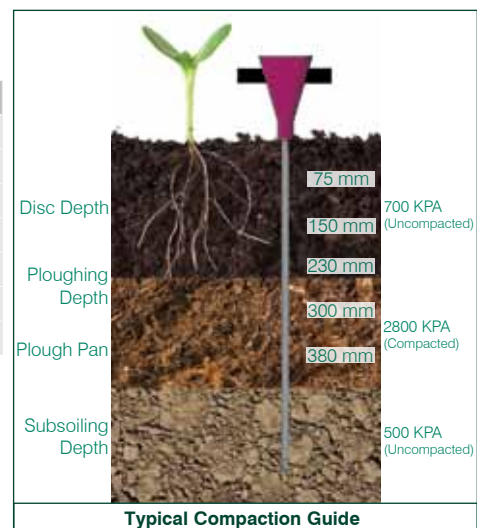
Battery life:

4 AAA alkaline batteries; approximately 12-month life

Data logger capacity:

772 profiles

AG25-800



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AG25-810



## Portable Soil Respiration System

This ultra compact and portable unit is an exceptionally easy to use, and affordable research instrument. Despite weighing only 2kg, it provides accurate soil flux measurements and 10 hours of battery life.

The highly accurate miniaturised CO<sup>2</sup> infrared gas analyser is housed directly adjacent to the soil chamber, ensuring the fastest possible response to gas exchanges in the soil. The chamber has been carefully designed to minimise boundary layer effects and alleviate pressure differences that can suppress CO<sup>2</sup> exchanges. For repeated measurements of the same area, a stainless steel collar can be installed in the soil to ensure correct positioning and measurement of total soil flux activity.

A graphical display allows easy monitoring of soil flux trends and the real time plotting of experimental curves.

- Integral CO<sup>2</sup> chamber analyser
- High quality soil chamber
- Graphical display
- Affordable research instrument
- Enhanced data capture and output capabilities
- Ideal for spatial distribution studies
- Lightweight, compact and easy to use
- 10 hour battery life
- Weighs only 2kg

Specifications	AG25-810
Gas exchange:	CO <sup>2</sup> : 0-2000ppm, Infrared gas analyser, 1ppm resolution. H <sub>2</sub> O: 0-75mbar, 0.1mbar resolution. Two fast response water sensors
Other sensors:	Chamber temperature: 0°C to 50°C. Precision thermistor Soil temperature: 5°C to 50°C. Precision thermistor PAR: 0-3000µmols m <sup>-2</sup> sec <sup>-1</sup> silicon photocell
Flow rate to chamber:	0-500ml min <sup>-1</sup>
Warm up time:	5 minutes @ 20°C
Display:	Graphic display 240 x 64 super twist LCD
Recorded data:	Removable SD cards typically store 16 million sets of data on a 1Gb card
Data output:	Direct from SD cards and via USB
Battery:	2.6Ah lead acid 12V battery. 10 hr battery life
Battery charger:	90-260V, 50/60Hz
Operating temperature range:	5°C to 45°C
Console:	Dimensions 230 x 110 x 140cm Weight: 2.4kg
Chamber: Construction:	Collar stainless steel, Upper chamber cast Acrylic
Volume:	1 litre
Dimensions:	Diameter: 130mm, Height: Collar 75mm, Upper chamber 70mm, Weight: Collar 325g, Upper chamber 320g
Catalogue No	Description
<b>AG25-810</b>	Portable Soil Respiration System

# Agrometeorology

## Agrometeorology:

Information on weather conditions is essential for the modern farmer and agronomist.

Although such information may be readily available from national meteorological offices, details of more localised conditions may not be and such data is of vital importance to farmers to ensure their crops are protected and flourish. Local weather conditions can vary greatly from the national picture due to the aspect, altitude, and microclimate of a particular area.

## Automatic Weather Stations:

This section includes a range of automatic weather stations that are used for measuring all the standard parameters such as wind speed, wind direction, air temperature, relative humidity, solar radiation, and rainfall. In addition, some more specialised stations have also been included for Agro-Meteorology, Hydrological and Soil Conditions Monitoring.

### Wagtech Automatic Weather Station

Comprises 6 sensors for measuring all the key weather parameters; wind speed, wind direction, air temperature, relative humidity, rainfall and solar radiation.

An 8 channel datalogger is used to collect and store the data which can then be retrieved using either the 2 metre RS 232 cable and a laptop pc on site, or alternatively by using one of the remote connection options listed on page 32. The unit is powered by internal alkaline batteries which, under normal use, will last from 4 to 6 months. Supplied complete with data transfer software.

Sensors	Range	Accuracy
Air Temperature	-20 to +70°C	0.2°C at 25°C
Relative Humidity	0 to 100% (-20 to 70°C)	+/- 2% max, typical 1% or better
Rain Gauge	Sensitivity 0.2mm/tip	
Pyranometer	400 to 1100nm	+/- 5% max, typical 3% or better
Anemometer	> 75m/s	+/- 2%, +0.1m/s
Wind Direction Sensor	> 75m/s	+/- 2%

Catalogue No	<b>AG31-100</b>
Description	Complete unit comprises 8-Channel Datalogger with memory capacity of 1MB RAM for approximately 27,000 readings (dependant upon number of channels). Datalogger unit includes batteries, RS232 PC connection cable and downloading software.



### Note:

#### Conventional Meteorological Equipment:

A full range of manually operated instruments can be found in our Environmental Catalogue.

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## Wagtech Agrometeorological Station

The Wagtech Agrometeorology Station has been designed to allow farmers, agronomists, and researchers to monitor most of the conditions that affect plant health. The station comprises 8 sensors for measuring wind speed, wind direction, air temperature, relative humidity, solar radiation, soil temperature, surface wetness, and rainfall. The 8 channel data logger uses standard Alkaline batteries with a life sufficient for most applications, but a solar power pack is available as an option if this is required.

The station is supplied fully configured and ready to operate together with a 2 metre mast and data transfer software. Optional deluxe software is available to enable the data to be displayed using a choice of different graphics and tables. The optional deluxe auto software is used to monitor a network of up to 25 weather stations.

Sensors	Range	Accuracy
Air Temperature	-20 to +70°C	0.2°C at 25°C
Relative Humidity	0 to 100% (-20 to 70°C)	+/- 2% max, typical 1% or better
Rain Gauge	Sensitivity 0.2mm/tip	
Pyranometer	400 to 1100nm	+/- 5% max, typical 3% or better
Anemometer	> 75m/s	+/- 2%, +0.1m/s
Wind Direction Sensor	> 75m/s	+/- 2%
Soil Temperature Probe with 3m cable	-20°C to +80°C	0.2°C at 0-60°C
Surface wetness - Active surface - Goldplate		

Catalogue No	Description
<b>AG31-200</b>	Complete unit comprises 8-Channel Datalogger with memory capacity of 1MB RAM for approximately 27,000 readings (depending upon number of channels). Datalogger unit includes batteries, RS232 PC connection cable and downloading software.

## Wagtech Hydrological Monitoring Station

The Wagtech Hydrological Station has been designed for use by farmers, hydrologists, and researchers to collect data on local hydrological conditions. As with the other Wagtech stations, this is a lightweight unit that can easily be moved from site to site if required.

The station comprises sensors for measuring wind speed, wind direction, rainfall and water level (0 to 10 meters). Supplied complete with datalogger, 2 metre frame, solar charger unit, re-chargeable battery pack, and computer software.

Catalogue No	<b>AG31-300</b>
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## Wagtech Windspeed and Direction Monitor

Wagtech Windspeed and Direction monitor comprising of a 2 channel datalogger and wind speed and wind direction sensor mounted on a 2 metre mast.

Catalogue No	<b>AG31-400</b>
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## Wagtech Soil Conditions Monitoring System

Soil Conditions Monitoring System with a 9 channel datalogger that has been specifically designed for use by farmers, soil scientists, and agronomists to measure soil temperature, soil water potential, and soil moisture, using the following sensors:

- 1 x soil temperature sensor, 3m cable
- 3 x 60cm Tensiometers, 3m cable
- 3 x gypsum block sensors, 3m cable

Catalogue No	Description
<b>AG31-500</b>	Wagtech Soil Conditions Monitoring System



## Sensors

Our standard systems use the most common sensors. However, a wide range of additional sensors are available for use with the weather station. These include light sensors such as PAR quantum, UVA, UVB, as well as tensiometers, soil moisture and water level. Please contact Wagtech Projects if you require a non-standard weather station using these sensors.



Wind Direction & Wind Speed - AG31-110		Rainfall - AG31-112	
<b>Wind Direction</b>		Range:	0.2mm per tip
Range:	0 to 360°	Accuracy:	±5% (24 to 36 mm/hr)
Accuracy:	±2° obtainable in steady winds over 5 m/s		
Maximum wind speed:	> 75 m/s		
Wind Speed		Soil Temperature - AG31-113	
Range:	0 to 75m/s	Range:	-20 to + 80°C
Accuracy:	2% ±0.1 m/s	Accuracy:	±0.2°C at 0 to 60°C
Air Temperature & Humidity - AG31-111		Solar Radiation - AG31-114	
Range:	-20 to +70°C	Range:	400 to 1100 nm
Accuracy:	±0.2°C between 0 and 60°C	Accuracy:	±5% traceable to UK Met Office
Humidity		Air Pressure - AG31-115	
Range:	0 to 100% RH	Range:	500 to 1050 mbar
Accuracy:	±2% RH	Accuracy:	Absolute error at 20°C / 1000 mbar typically 0.5 mbar (Max. 1mbar) Error over 0-50°C typically 1.5 mbar (Max. 3.6 mbar)
Surface wetness - AG31-116			

## Masts

Catalogue Number	Description
<b>AG31-117</b>	Portable 2m mast mounted on metal plate with guylines and pegs
<b>AG31-118</b>	10m retractable mast with guylines, base and pegs

## Datalogger

Specifications	
Channels:	Maximum of 16 available
Operating range:	-20°C to +70°C
Housing:	Gray ABS with seal to IP65
Communications:	RS232C
Power supply:	6 x C-cell alkaline batteries. These will last approximately 4 to 6 months
Memory capacity:	1Mb RAM, total of up to 27000 readings

Catalogue No	Description
<b>AG31-119</b>	8 channel datalogger includes batteries, data downloading software, RS232 data cable & USB/ Serial converter
<b>AG31-120</b>	16 channel datalogger includes batteries, data downloading software, RS232 data cable & USB/ Serial converter



### Note:

Software for Automatic Weather Stations see following page.

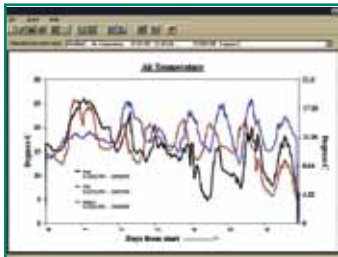
General Survey



Soil Science



Agrometeorology



AG31-900

Hydrology & Groundwater



Crop Science

Seed Technology



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## Communications and Computer Software\* for Automatic Weather Stations

The standard weather station is supplied with a 2m long RS232 communications cable and standard downloading software. A laptop computer is required to retrieve the data on site. Additional software is available to display the data, build graphs and windroses etc, and to monitor the operation of up to 25 weather stations.

### Other options include:

- Permanent cable link which is used with mains power supply, and the communications from base to AWS distance no more than 50m
- Permanent cable link also uses the mains power supply and communication for distances up to 1km
- GSM modem unit is available in order to enable communication with the station 24 hours a day using the local cell phone network

Catalogue No	Description
<b>AG31-550</b>	Laptop computer
<b>AG31-600</b>	Permanent cable link (with 25m cable)
<b>AG31-650</b>	Permanent cable link (with 75m cable)
<b>AG31-700</b>	GSM modem unit (requires solar power unit supply)
<b>AG31-750</b>	Solar power supply, for use with GSM modem
<b>AG31-800</b>	Deluxe software, for use with the standard datalogger to display the weather data, build graphs etc
<b>AG31-850</b>	Deluxe Auto software, for use with up to 25 weather stations to monitor and download data automatically

\* Please contact us for alternative communications options.

## Vue AWS- Automatic Weather Station

This wireless weather station provides accurate, reliable weather monitoring in a self-contained, easy-to-install system. Vue AWS gives you all the weather data you need for use by small farms, and in education. Sleek but tough—your outdoor sensor unit can be set up in minutes and starts sending data wirelessly to your console anywhere in your school, or business. Current weather conditions are displayed, including indoor and outdoor temperature, humidity, barometric pressure, wind speed and direction, dew point and rainfall. Also displayed are weather forecast icons, moon phase, sunrise/sunset times, graphing of weather trends, alarms and more. Vue AWS also boasts the innovative Weather Centre button that displays additional data on weather variables for today and over the last 25 days.

- Compact, self-contained and easy to install
- Combines a rain gauge, temperature/relative humidity sensor, an anemometer and wind vane into one package
- Transmits wirelessly up to 300 metres
- Includes console

Vue AWS Automatic Weather Station includes sensors for measuring wind speed, wind direction, air temperature, relative humidity, barometric pressure and rainfall, solar powered with lithium back up battery.

Catalogue No	Description
<b>AG31-900</b>	Vue AWS Automatic Weather Station



## Pro 2 AWS-Automatic Weather Station

AG31-910



Pro2 AWS automatic weather stations are available in both wireless and cabled versions. Both include innovative integrated sensor unit, which combines a rain gauge, temperature and relative humidity sensors, anemometer and wind vane all into one unit -- making setup easier than ever and improving performance and reliability.

Includes console/receiver, integrated sensor unit, and mounting hardware. Integrated sensor unit includes rain gauge, temperature and relative humidity sensors, anemometer, 12 m anemometer cable, and solar panel. Electronic components are housed in a weather-resistant shelter.

Sensor unit is solar powered. Electronic components are housed in a weather-resistant shelter. Console may be powered using the included AC-power adapter or with three C batteries (not included).

Wireless range is up to 300 m outdoors, line of sight. Typical range through walls under most conditions is 60 to 120 m.

- Forecasting, on-screen graphing and much more
- Quick view icons show the forecast at a glance while a moving ticker-tape display gives details
- Innovative, integrated sensor unit combines a rain gauge, temperature/humidity sensor and an anemometer into one package – making setup easier than ever and improving performance and reliability
- For improved accuracy, temperature and humidity sensors are housed inside a radiation shield
- Transmits wirelessly up to 300 m
- Cabled station includes 30 m cable from console to sensor unit

Specifications	Accuracy
<b>Wind:</b> Direction: 1°	±3°
<b>Speed:</b> 3 to 241 km/h	±5%
<b>Wind Chill:</b> -92° to 60°C	±2°C
<b>Humidity:</b> Inside: 0% to 100%	±5%
Outside: 0% to 100%	±3%
<b>Barometer:</b> 480 to 820 mm Hg	±1.3 mm Hg
<b>Temperature:</b> Inside: 0 to 60°C	±0.5° C
Outside: -40° to 65.5°C	±1° F, 0.5° C
<b>Rainfall:</b> Daily: 0-6553 mm	±4%
Accumulation: 0-6553 mm	±4%
<b>Time &amp; Date:</b> 12 or 24 Hour Clock, Time Alarm and Date	

Catalogue No	Description
<b>AG31-910</b>	Pro 2 AWS Automatic Weather Station (Cabled)
<b>AG31-920</b>	Pro 2 AWS Automatic Weather Station (Wireless)

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# THE LAB CAT

A comprehensive range of laboratory equipment can be found in our Wagtech Projects General Laboratory Equipment Catalogue.

This contains products made by leading manufacturers certified to ISO 9001 quality standard, supplied and shipped to your nominated destination.



# Hydrology & Groundwater

## Hydrology & Groundwater:

Water is a precious agricultural resource and thus its careful monitoring is essential in order to ensure that it is used as effectively as possible.

In any water resources assessment study, long term measurements of water quality, flow, level, and depth are crucial to produce accurate data for later processing and analysis.

This section contains a comprehensive range of equipment that is widely used for measuring and recording such data.

Contained within this section are items such as Flow Meters, Flumes, Dipmeters, Water Samplers, and Water Level Monitors.

## Current Flow Monitoring:

A comprehensive range of equipment for the measurement or estimation of water flow in both natural and man-made, irrigation and drainage channels.

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## Wagtech Flow Master

The Wagtech Flow Master is a highly accurate water velocity instrument for measuring flows in open flow channels and partially filled pipes. The instrument has been extensively used by water professionals for over 30 years. The Flow Master consists of the protected Turbo Prop positive displacement sensor coupled with the expandable probe handle to the digital readout display. The water instrument is ideal for storm water run-off studies, sewer flow measurements, measuring flows in rivers and streams, and also in monitoring velocity in ditches and canals.

- Highly accurate and low cost
- Lightweight, rugged, and reliable
- Debris shedding turbo-prop
- Rain-proof digital read-out
- Padded carrying case for easy storage
- Displays instantaneous and true average velocity

Specification	AG41-100
Range, m/sec:	0.1-6.1
Accuracy, m/sec:	0.03
Operating temperature, °C:	-20 to +70
Sensor type:	Turbo-Prop propeller with magnetic pick-up
Datalogger:	30 sets, min, max, avg
Weight, kg:	4
Power:	Internal batteries - approx 5 year life

Catalogue No	Description
AG41-100	Wagtech Flow Master, 1 to 2m
AG41-102	Wagtech Flow Master, 1.5 to 4.5m



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AG41-200



## Wagtech Flow Meters

The Wagtech Current Flow Meters are suitable for use in a wide variety of environments ranging from major rivers to small streams, fresh and salt water or effluent.

Measurements can be made for river gauging, open channel flow, pollution and hydrometric studies.

The Wagtech Digital Display Unit (DDU) offers real time and averaged display of velocity with data logging. Data can be downloaded to a PC via the RS232 interface using the cable supplied. The DDU comes with an LCD display with optional backlight sealed to IP65 and weighing less than 1 kg.

- Easy to use, robust, low maintenance design
- Reliable and accurate velocity readings
- Wide measurement range
- Calibrated in accordance with BS3680

Catalogue No:	AG41-200	AG41-204
Velocity range:	0.03 to 10m/s	0.04 to 5m/s
Accuracy:	± 1.5% reading above 0.15m/s	± 2.5% reading above 0.5m/s
	± 0.004m/s below 0.15m/s	± 0.001m/s below 0.5m/s
Impeller:	125mm dia. by 0.27m pitch	50mm dia. by 0.10m pitch
Materials		
Motor body:	Black Acetal	
Impeller:	High Impact Styrene	
Impeller shaft:	Stainless Steel on Jewelled Bearing	

Catalogue No:	Description
<b>AG41-200</b>	<b>Wagtech Large Current Flow Meter</b> Wading set, comprising model (WFM001) Flow Meter with 125mm diameter impeller, Digital Display Unit, 3 x 0.5m stainless steel wading rods, complete with base plate, direction knob, 2m cable, carrying case and operation manual.
<b>AG41-202</b>	<b>Suspension Set</b> Comprising model (WFM001) Flow Meter with 125mm diameter impeller, tail fin, suspension bar digital display unit, 35m suspension cable, carrying case and operation manual.
<b>AG41-204</b>	<b>Wagtech Small Current Flow Meter</b> Wading set, comprising model (WFM002) Flow Meter with 50mm diameter impeller, Digital Display Unit, 3 x 0.5m stainless steel wading rods, complete with base plate, direction knob, 2m cable, carrying case and operation manual.
<b>AG41-106</b>	<b>Suspension Set</b> Comprising model (WFM002) Flow Meter with 50mm diameter impeller, tail fin, suspension bar digital display unit, 35m suspension cable, carrying case and operation manual.

## Electromagnetic Flow Meters

AG41-120

This small electromagnetic flow meter has been designed specifically for use in open channels where fouling by weed or sewage can be a problem. A high precision instrument which can be relied upon to give accurate readings ( $\pm 0.5\%$  of reading plus zero stability) over a wide flow range ( $\pm 5$  m/sec) in only 5cm of water. The control display unit provides a choice of averaging modes, standard deviation of the data, and a logging facility for recording up to 999 averaged readings.

Two sensor types are available, to suit different application requirements. One for measuring speeds in water depths of 15cm or more, and one for 5cm or more.

Both offer excellent durability, reliable accurate data, and are suitable for use in clean water and dirty or difficult environments.

### Calibration

Both instruments are calibrated to NAMAS traceable standards for speeds up to 1m/s.



Specifications	Cylindrical Type	Flat Type
Range:	-5m/s to +5m/s	-5m/s to +5m/s
Accuracy:	$\pm 0.5\%$ of reading plus 5mm/s	$\pm 0.5\%$ of reading plus 5mm/s
Zero Drift:	$\pm 0.004$ m/s below 0.15m/s	<5mm/s
Sensing Volume:	Sphere of approx 12cm diameter around sensor	Cylinder of approx 20mm $\varnothing$ x 10mm high
Minimum Depth:	15cm	5cm
	Display Unit	
Size, cm/ Weight:	25 x 16 x 10/ 2kg	
Environmental:	Sealed to IP67	
Power:	8 x alkaline C cells, lasting for up to 37 hours	
Operating Temp:	-5°C to +50°C (display unit) -5°C to + 40°C (sensor)	
	Wading Set	
Dimensions and weight:	62 x 42 x 34cm, 9kg	

Catalogue No:	Description
<b>AG41-120</b>	Electromagnetic Flow Meter Wading Set, with single axis cylindrical sensor (water depths of 15cm or more), 3m cable, control display unit (with logging facility), wading rod set c/w 3 x 0.5m graduated rods, base, direction knob and operation manual. Supplied complete in large carrying case.
<b>AG41-122</b>	Electromagnetic Flow Meter Wading Set, with single axis flat sensor (water depths of 5cm or more), 3m cable, control display unit (with logging facility), wading rod set c/w 3 x 0.5m graduated rods, base, direction knob and operation manual. Supplied complete in large carrying case.

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## Parshall Flumes

The Parshall Flume is the most widely used flume and has been the standard for flume measurements since it was designed in the 1930's. A Parshall Flume has a specially shaped open channel flow section which may be installed in a ditch, furrow, canal or lateral allowing for rapid measurement of flow rate.

The flumes are manufactured in a tough yet lightweight fibreglass construction and are displayed below in two sizes, 1" and 2", although alternative sizes are available from 1" to 72". The flumes are supplied complete with measuring scale and calibration details.

Catalogue No:	AG41-302	AG41-304
Model:	1" Parshall Flume	2" Parshall Flume
Flow rate, l/s:	0.8887 to 5.506	0.1842 to 13.55
Throat width, mm:	25	50
Weight:	2kg	3kg
Dimensions, mm:	710 x 360 x 270	860 x 420 x 305



## Trapezoidal Flumes

60° V Trapezoidal flumes provide a practical means of obtaining good flow data on low and intermittent flow streams. The flumes provide more readable head under 15 L/S than any other flume or weir.

The flumes are manufactured in tough yet lightweight fibreglass construction and are displayed below in two sizes, small and large. The flumes are supplied complete with measuring scale and calibration details.

Catalogue No:	AG41-306	AG41-308
Model:	Small 60° V	Large 60° V
Flow rate, l/s:	0.8887 to 5.506	0.1842 to 13.55
Weight:	2kg	3kg
Dimensions, mm:	500 x 250 x 175	780 x 350 x 175

### Note:

Please contact us for alternative sized Flumes.

**Call:** +44 (0)1635 872 929

**Email:** sales@wagtechprojects.com



# Water Level Monitoring

Water level measurements form the basis of hydrological soil examination (porosity of the soil, determination of the current direction of the groundwater etc.)

Several widely used systems are displayed here that allow for the recording of water levels in applications such as in bore holes, casing tubes, well pipes, water wells, open water, and tanks.



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## Dipmeter

Wagtech dipmeters are robust, light and convenient in use, and are all fitted with an extremely strong tape marked in metres and centimetres. The tape is wound on a plastic coated metal carrying frame. Powered by a 9V PP3 battery, the dipmeters produce an amplified audio signal (buzzer) when the probe contacts a water surface.

- Shrouded probe, stainless steel, 15mm diameter x 175mm length
- Lightweight and durable
- Reinforced flat tape with close interval markings
- Variable sensitivity control
- Available with temperature measurement option  
\* Longer length's available on request

AG42-100



Catalogue No	Length of tape
AG42-100	20m
AG42-102	50m
AG42-104	100m
AG42-106	150m
AG42-108	200m

## Water Samplers

Catalogue No	Description
AG26-160	Water sampler, stainless steel, 250ml, 32mm o.d. 20m fibre tape
AG26-162	Water sampler, stainless steel, 1000ml, 45mm o.d
AG26-164	Rope with hook eye for use with AG26-162

### Note:

For a further range of Sampling Equipment please refer to our General Lab Catalogue.



AG42-202



General Survey

AG42-210



## Water Sampling Pump

Ideal for removing samples from shallow wells and surface water sources, including lakes, ponds, and holding pools. The water sampler is lightweight, rugged, easy to use, weather resistant, and requires minimal maintenance. Designed to take a manual sample, it also has the ability to backflush the sample hose once a sample has been taken. To provide high sample integrity, the water sample never comes in contact with any water sampler components other than the norprene and polyethylene tubing. The tubing is easy to clean and replace. To avoid cross-contamination or lengthy decontamination procedures, simply change the inexpensive tubing between samples.

Includes a 3m power cord that can be attached to a 12V (car battery) power source.

Specifications	
Flow Rate	1000 ml per minute at 1.2m head
Maximum Lift	6.7m
Pump Tube	Norprene 6mm ID
Sample Hose	4.6 m nylon reinforced polyethylene tubing with intake strainer
Enclosure	Expanded UV protected PVC
Dimensions	23cm x 19cm x 11.5cm. Weight: 2.7kg

Catalogue No	Description
<b>AG42-210</b>	Water Sampling Peristaltic Pump, includes tubing and 3m power cord
<b>AG42-212</b>	Polyethylene Tubing (Per M)

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## Water Level Logger & Sensor



## Water Level Logger Kits

These water level data loggers offer high accuracy at an affordable price, with no cumbersome vent tubes or desiccants to maintain. They are ideal for recording water levels and temperatures in shallow wells, streams, lakes and freshwater wetlands.

- Available in 4 depth ranges
- No-vent-tube design for easy and reliable deployment
- Durable ceramic pressure sensor for reliable performance
- Memory: 21,700 combined pressure and temperature measurements
- Sample rate: 1 second to 18 hours, fixed or multiple-rate up to 8 user-defined sampling intervals
- Battery life: 5 years (typical) — factory-replaceable
- Fully-sealed housing ensures many years of trouble-free operation.
- Suitable for deployment in water or air; case materials resistant to fuels, solvents and lubricants.
- Calibration certificate included

## Water Level Logger Kit (Without Case)



Includes calibration certificate of accuracy in accordance with NIST-traceable standards at three pressure points distributed throughout the range.

	Water Level Logger Specifications		
	0-4 m	0-9 m	0-30 m
Range	0-4 m	0-9 m	0-30 m
Factory Calibrated Range (0° to 40° C)	69 to 145 kPa	69 to 207 kPa	69 to 400 kPa
Water Level Accuracy (Typical Error)	±0.3 cm	±0.5 cm	±1.5 cm
Resolution	0.14 cm	0.21 cm	0.41 cm
Burst Pressure	310 kPa 18 m depth	310 kPa 18 m depth	500 kPa 40.8 m depth

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## Data Retrieval Units

### Waterproof Shuttle

- Can be used either as a data shuttle or an Optic USB Base Station
- Supports all Optic USB loggers
- Outdoor or underwater data readout
- Convenient direct USB connection to host computer
- Waterproof to 20 m
- Checks and indicates its own battery status



Specifications	
4 MB non-volatile memory:	Up to 63 loggers
Operating temperature range:	0° to 50°C
Battery life:	1-year (typical) — user-replaceable
Software:	Pro software
Dimensions, cm/ Weight, g:	15.2 x 4.8/ 150

### Base Station

- Provides fast optical infrared (IR) communications for easy launch and read out of all Pendant loggers
- Connects via USB cable to host computer while Coupler attaches the logger to Base Station
- Splash-resistant



Specifications	
Operating temperature range:	Range 0° to 50° C
Cable length:	180 cm
Offloads full 64K logger:	30 Seconds

Water Level Logger Kits						
Catalogue No	AG42-310	AG42-312	AG42-314	AG42-316	AG42-318	AG42-320
Logger Range:	One logger 0-4m	Kit includes two 0-4m loggers	One logger 0-9m	Kit includes one 0-4m and one 0-9m logger	One logger 0-30m	Kits includes one 0-4m and one 0-30m
Communications:	Base station	Waterproof shuttle	Base Station	Waterproof shuttle	Base Station	Waterproof shuttle
Carrying Case:	Not included	Included	Not included	Included	Not included	Included
Software:	Included					
Logger Housing:	Stainless steel					

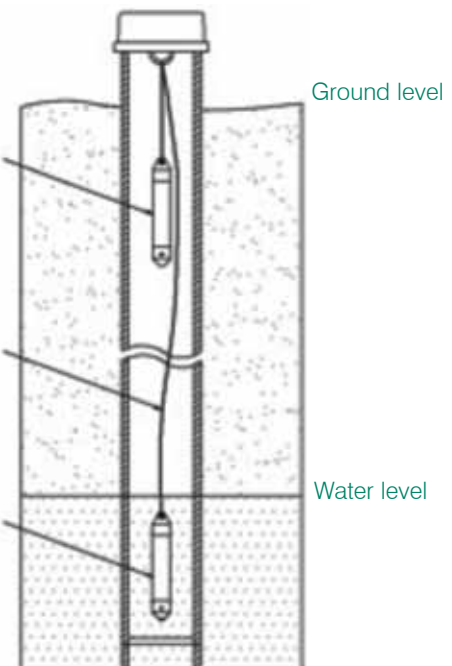
### Water Level Logger Kit (With Case)



Optional addition logger for barometer pressure compensation

Suspension cable

Water level logger



Specifications	Carrying Case
Dimensions, cm:	40 x 25 x 5
Weight, kg:	3

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AG42-300

## Wagtech Water Level Monitor

A Water Level Monitor consisting of a datalogger with a submersible pressure transducer for remote monitoring and recording of water level, flow and pressure data. Constructed with an acrylic coat to protect the electronics from condensation. This water testing instrument is easy to use and install, and can be used in various applications such as groundwater monitoring, irrigation canals, wetlands, infiltration/inflow studies and many more.

- Water level logger records over 81,000 readings
- Measures water depth down to 150m
- Accurate water level measurements ranging from 1m to 76m
- Automatic barometric pressure and temperature compensation

### Data Logger

Memory:	Non-volatile flash memory
Battery life:	Up to 1 year
Resolution:	12 bit
Humidity:	0-95% non-condensing
Storage capacity:	81,759 time and date stamped data points
Enclosure, mm:	48 x 292, weather resistant cylindrical enclosure
Weight, kg:	0.7 (inc battery and cable)
Communication:	USB

### Pressure Transducer

Accuracy:	±0.1% of full scale at constant temperature, ±0.2%
Material:	Stainless steel housing and microscreen

### Cable

Length:	Standard 7.5m (other lengths available up to 150m)
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Catalogue No:	Description
<b>AG42-300</b>	Water level Monitor: Supplied with datalogger, housed in a Weatherproof cylindrical enclosure, pressure sensor, PC software, 7.5m of cable and 9Vdc battery
<b>AG42-302</b>	Extra cable lengths per metre, up to 150 metres

### Surface water installation



### Groundwater installation



# Geophysical Testing

**Irrigation is the artificial application of water to the soil, and is used for assisting the growing of crops. It assumes a particularly high level of importance for crop production during periods of drought, and also to protect crops from frost.**

**In the search for new sources of irrigation water, geophysical techniques are widely used particularly in remote regions of the world where groundwater records may be non-existent.**

## Earth Resistivity Meter

This Earth Resistivity Meter provides excellent and reliable performance in a convenient, robust and fully portable design. Ideally suited for subsoil groundwater prospecting at shallow, medium and great depth, it can also be used for geological stratigraphy, studies of salt water contamination in fresh water layers, landslide monitoring, mineral exploration and archaeological research.

- Creation of energetic wave based upon the parameters supplied by the user
- Fast downloading of data through RS232
- Easy to operate menu for quick learning
- More than 50 hours of battery life
- Automatic calibration at every switch-on
- Light and compact structure in a sturdy weatherproof case

### Complete unit comprises of the following:

- Earth Resistivity measuring unit
- Cable reel with 300m cable (section 1mm) x2
- Cable reel with 100m cable (section 1mm) x2
- Rechargeable accumulator (200V, 500mA) x2
- Copper electrode x2
- Inox steel electrode x2
- 1.25kg Mallet x2

Catalogue No:	<b>AG43-050</b>
Energization Curve:	May be customised to suit the following parameters: Positive and negative wave length: 0.1 - 9.9 seconds (impl. at 25 seconds) Time between positive and negative wave: 0.1 - 9.9 seconds Intercycle time: 1 - 99 seconds Number of cycles: 1 - 99
Resolution:	610 nV, 126, 8nA
Number of readouts per wave:	3 readouts of voltage and 3 readouts of current, consecutively and at wave term
Voltage range for VMN:	From +/-20mV to +/-1280 V (automatically selected)
Memory:	Up to 1500 measures
Recommended energiser:	600V (1200V peak-peak), 0.5A max
Noise suppression:	Superior to 98 db at 50-60 Hz
Power supply:	2x internal rechargeable battery 6V - 4A/h
Operating temperature:	0 - 60°C
Physical dimensions, cm:	38 x 27 x 15 (shock proof case)
Weight, kg:	7

AG43-050



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**Crop science** is concerned with the scientific approaches that serve to enhance and maintain the quality of crops. Plant related factors are as essential to effective crop productivity as the quality of soil. The purpose of crop science is to exemplify how plants utilise primary inputs such as water and solar energy, and to thus provide methods and practices that serve to facilitate successful irrigation scheduling.

This section comprises of a wide variety of equipment that enable the user to effectively and efficiently monitor, test, and manipulate samples. This will in turn, serve to ensure that a particular variety has the best possible chance to survive and flourish in a given environment and to ultimately produce optimum yields.

**Plant Physiology** is physiological research which comprises a study of all kinds of processes taking place in growing plants or their environment. The following section contains a range of quality equipment for carrying out the principle physiological determinations on growing plants from the analysis and prevention of disease and insect damage, to growth, and the extent to which plants utilise and assimilate nutrients, water and gases.



## Portable Leaf Area Meter

One of the most popular leaf area meters on the market. This instrument consists of a high speed scanner and a scan board with built-in data logger, display, function keys, and batteries.

To measure a leaf, simply lift the film, place the leaf on the board, and slide the scanner over the board. The leaf area, length, width, perimeter, ratio, and shape factor are all measured at the same time. The unit comprises of a white backplate with guide rails which eliminates lateral leaf movement whilst scanning. A clear film on the back plate allows for the measurement of tender leaves, and the unit can also be used on leaves that are still attached to the plant. The device comes complete with internal batteries, battery charger, communication software, one additional transparent film and an operating manual.

- A high resolution of 0.025mm<sup>2</sup>
- Non-destructive measuring
- Built-in data logger stores 8000 data sets
- Transfers data to computers or printers

Catalogue No	AG51-020
Scanner:	118mm wide, with over 1200 scan points
Measuring Width mm:	150
Measuring Length mm:	360
Resolution, mm <sup>2</sup> :	0.025
Memory size:	8000 Measurements
Voltage:	7.2 volt rechargeable
Weight, kg:	1.8
Dimensions, mm:	381 x 254 x 25

## Plant Photosynthesis System

An instrument that is used for determining the photosynthesis rate of plants. With an affordable price, this is a robust and reliable system with a very good technical specification and yet simple to use design. All the features are fully integrated into a field portable, lightweight package that is particularly well suited to teaching and researching purposes.

Supplied complete with a custom designed carrying case and shoulder strap, making field measurements simple and easy.

- Lightweight and field portable
- Accurate CO<sub>2</sub> and H<sub>2</sub>O measurement
- Adjustable CO<sub>2</sub>, H<sub>2</sub>O and light for response curves
- Simple, user friendly operation
- Full data logging and storage capability
- RS232 output for data transfer to PC

Catalogue No	<b>AG51-030</b>
Leaf cuvette size, mm:	18 diameter
Measurement range:	CO <sub>2</sub> : 0-2,000 μmol mol <sup>-1</sup> (Optimal range) 0-9,999 μmol mol <sup>-1</sup> (Max. range) H <sub>2</sub> O: 0-75 mb
Precision:	CO <sub>2</sub> : < 1% at 300 ppm H <sub>2</sub> O: < 2% at 100% RH
Operating environment:	0-50°C, non-condensing. In dirty environments, external air filtration is required
Housing:	High impact ABS plastic case



### Note:

Please contact us for details of alternative systems offering a wider range of leaf cuvettes.

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## Hand Held Plant Photosynthesis System

This lightweight hand-held photosynthesis system features a new design concept and a compact solid-state structure. The entire system - display, keypad, computer, data memory, CO<sup>2</sup> /H<sub>2</sub>O gas analyzer, flow control system, and battery - is contained in a single hand-held case and includes everything required to measure the following:

Photosynthesis, Transpiration, Stomatal Conductance, and internal CO<sup>2</sup> concentration, as well as many other factors.

As the chamber is connected directly to the differential gas analyzer, there is virtually no time delay when measuring CO<sup>2</sup> /H<sub>2</sub>O in the chamber. Coupled with the carbonate injection CO<sup>2</sup> /H<sub>2</sub>O Supply Module (AG51-064), concentrations of CO<sup>2</sup> and H<sub>2</sub>O can be precisely controlled in the leaf chamber. Temperature and light intensity can also be controlled with the optional Temperature Control and Light Modules (AG51-066 and AG51-062).

In addition the Chlorophyll Fluorescence Chlorophyll Fluorescence Module (AG51-068) enables simultaneous measurements of photosynthesis and chlorophyll fluorescence

### Soil Respiration

Soil Respiration Module (AG51-070) enables measurements of soil surface CO<sup>2</sup> efflux data which is important in the study of carbon balance in terrestrial ecosystems. CO<sup>2</sup> flux from soil is a good indicator of overall biological activity and is used in studies of the carbon cycle.

- An entire photosynthesis system in one handheld case.
- Lightweight and truly portable.
- Open and closed system measurements.
- 9 interchangeable chambers for different types of leaves.
- Soil respiration chamber and plant canopy attachment available.
- Modular attachments include light, temperature control, CO<sup>2</sup> /H<sub>2</sub>O supply, and chlorophyll fluorescence measurement.
- Infrared non-contact leaf temperature measurement.
- Measures chlorophyll fluorescence and photosynthesis simultaneously.

### Specifications

Main System	
Data Storage:	2 MB internal FLASH RUN
Data Output:	PC link cable, RS232 or USB (with adapter)
Flow Rate to Chamber:	100 ~ 1000 cm <sup>3</sup> min <sup>-1</sup> (1 lpm)
Readings Displayed:	LCD screen
Power Supply:	7.2 mAh. Rechargeable battery providing 4 hours of continuous use, or AC power with adapter provided, or 6 ~ 12 VDC input
Dimensions:	452 L × 53 W × 48 D mm
Weight:	1.5 kg with battery
CO <sup>2</sup> Analyzer 2	
Type:	Stable analyzer for accurate CO <sup>2</sup> measurements
Sensor:	Low-power infrared detector. No sensitivity to motion
Typical Response Time:	35 sec
Resolution:	0.1 ppm
Warm-Up Time:	3 minutes
Accuracy:	Better than ± 2% anytime
H <sub>2</sub> O Analyzer	
Type:	Stable analyzer for accurate H <sub>2</sub> O measurements
Range:	0 ~ 100% RH
Sensor:	Humidity-sensitive capacitor
Accuracy:	±2% at 10% RH. ±3.5% at 90% RH
Typical Response Time:	Time: 15 sec
Typical Signal:	0.5v for 50% RH



PAR Sensor	
Type:	Filtered GaAsP photodiode
Range:	0 ~ 2500 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Accuracy:	5 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Response:	400 ~ 700 nm
AIR Temperature Sensor	
Type:	Thermocouple
Range:	-15 ~ 50°C
Accuracy:	$\pm 0.1^\circ\text{C}$
Leaf Temperature Sensor	
Type:	Infrared
Range:	-10 ~ 50°C
Accuracy:	$\pm 0.3^\circ\text{C}$

### Hand Held Photosynthesis System

Includes infrared gas analyzer, PAR sensor, air temperature sensor, choice of one leaf chamber, an infrared non-contact leaf temperature sensor, a soda lime tube, a silica gel tube, a spare parts kit, rechargeable battery, battery charger, RS232 communication cable, communication software, operating manual, and a carrying case.

Catalogue No	Description
<b>AG51-060</b>	Hand Held Photosynthesis System

### Optional Accessories

Catalogue No	Description
<b>AG51-062</b>	Light Module
<b>AG51-064</b>	CO <sub>2</sub> & H <sub>2</sub> O Supply Module
<b>AG51-066</b>	Temperature Control Module
<b>AG51-068</b>	Chlorophyll Fluorescence Module
<b>AG51-070</b>	Soil Respiration Chamber
<b>AG51-072</b>	Carrying bag for 4 modules



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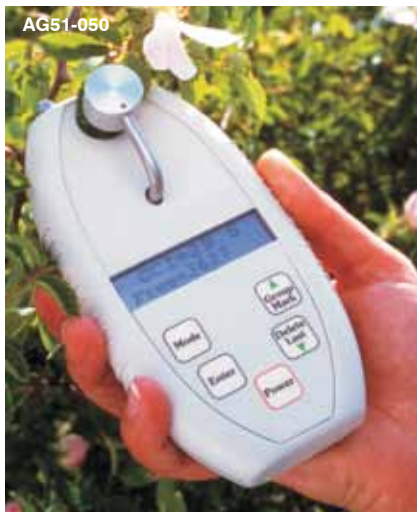
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## Chlorophyll Content Meter

Chlorophyll absorbs sunlight and uses its energy to synthesise carbohydrates from CO<sup>2</sup> and water. This process is known as photosynthesis and is the basis for sustaining the life process of all plants. Changes in chlorophyll content can occur as a result of nutrient deficiencies, exposure to environmental stress, exposure to certain herbicides and differences in light environment during growth (shading).

Designed to non-destructively measure the chlorophyll concentration of leaf tissue without the need to detach and grind a sample. The unit offers accurate, reliable and easily repeatable measurements, all in one lightweight, weatherproof design which is optimised for field work. The measurements are rapid and simple to obtain, allowing researchers and agronomists to gather and evaluate data quicker and more efficiently than ever before.

Especially useful for improving Nitrogen and Fertilizer management programs, this device is also ideal for crop stress, leaf senescence, plant breeding, herbicide activity, health determination and quality control studies; a tool that is aptly suited to both teaching and research applications.

- Fast, accurate, and easily repeatable measurements
- Large sampling area
- Internal data logging
- Stand alone operation - no P.C. required
- User friendly operation
- USB connection

Catalogue No	AG51-050
Measured parameters:	Optical absorbance in two wavebands
Measurement area:	9.5mm diameter circle
Accuracy:	+/- 1 CCI unit
Source:	2 LEDS's
Detector:	Silicon photodiode with integral amplifier for absorbance measurements and source power monitoring for temperature compensation
Memory:	160,000 measurements
Temperature range, °C:	0-50
Temperature drift:	Temperature compensated source and detector for minimum drift over full range
Power source:	9V Alkaline battery
Weight, g:	162
Dimensions (lxxwxd), mm:	152 x 82 x 25

### Note:

#### Wagtech Plant Tissue Analysis Kit:

You can also find the Chlorophyll Content Meter in the Wagtech Plant Tissue Analysis Kit on page 50.

## Plant Moisture System - Digital

This fully portable plant moisture system can be used for observations in the field, and allows for plant observations in accordance with the Scholander method.

The demand for water in the plant is a combination of many factors including the availability of water to the roots, environmental factors (for example temperature, wind, humidity, solar radiation) and the ability of the plant to move water.

Water potential is a clear indication of water deficiency in a plant and of the ability of the plant to absorb water. Fluctuations of water potential imply changes in growth, proteins and photosynthesis, and thus portray an accurate picture of developmental changes within the crop.

The leaf of a plant is placed in a pressurization chamber by sealing the leaf stem in the removable neck of the chamber, allowing for the operator to observe the stem, while the chamber is being pressurised. Pressurization takes place in the air cylinder, which can easily be refilled. The chamber pressure is measured by a semi-conductor transducer, while a large LCD screen provides a read out.

- Main chamber is machined from a single piece of solid, high grade brass, there are no metal joins and seams to fail under high pressures
- Chamber head is secured using a quick fastening, multi start thread, ensuring the chamber cannot be pressurised unless the head is secure
- Safety release pressure valve is fitted to each system, this is set to automatically evacuate the chamber lid if the maximum working pressure is exceeded at any time.

Specifications	
Operating pressure:	0 to 40 Bar
Chamber dimensions, mm:	135 x 70 diameter
Chamber volume, L:	0.54
Dimensions, cm/ Weight, kg	15 x 32 x 25/ 9 (excluding gas bottle)
Power:	9V Battery

Catalogue No	Description
<b>AG51-100</b>	Plant Moisture System, supplied complete with 3 litre air bottle, regulator and 'A' clamp for bottle, pressure head, 6mm specimen adapter, set of 10 stem seals, flexible hose to collect PMS to regulator/bottle, safety screen and safety goggles.



## Sapflow Measurement

A hand held unit designed to measure sapflow rates using the Heat Ratio Method (HRM). The HRM allows for very slow rates and even reverse sap flow rates to be measured across a wide range of applications including sapflow in roots, acid ecosystems and drought, night time water loss, radial sap velocity profiles and many more supplied with standard 5m cable.

\* An external 12v DC rechargeable battery is required but not included with this monitor.

- 'Plug and Play' operation - simple to use, autonomous operation
- Requires no thermal insulation
- User variable energy input options
- Auto-scaling heat pulse duration
- 2 milli-degree temperature resolution

Catalogue No	<b>AG51-150</b>
Raw temperature:	°C
Heat pulse velocity:	CM/ Hr
Sap velocity:	CM/ Hr
Sapflow:	Litres/ Hr
User adjustable heat pulse:	250 Joules (approx.) equivalent to a 2.5 second heat pulse duration
Weight, g:	250
Dimensions (lwxwd), mm:	125 x 50 x 25



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AG51-200



Refractometer



Pocket EC Tester



Pocket pH Meter



InfraRed Thermometer



Chlorophyll Meter



## Plant Tissue Analysis Kit

The Plant Tissue Analysis Kit is designed to equip the agronomist and farmer with simple instruments to assess the health of his crops by analysing the plant tissue.

Plant sap can be tested using the instruments in the Plant Tissue Analysis Kit as soon as the leaves of the crop are large enough to be able to obtain several drops for testing using the Mini Plant Press included with the kit

### The kit is supplied complete with the following:

- Hand Held Refractometer
- Pocket pH, and EC Testers
- Chlorophyll Meter
- Infra red thermometer
- Plant tissue colour charts
- Pocket penetrometer
- Full instruction manual covering the use of the instruments and interpretation of the results

The following tests can be performed using the instruments in the kit:

### Hand Held Refractometer

This measures total dissolved solids-TDS (or Brix) which indicates the level of balance of nutrient uptake and complexing into sugars or proteins in the photosynthesis factory - the leaf. If Brix is low, even after several hours of sunshine, some element(s) are missing in the photosynthesis factory. Ions, if present, have not been "complexed" into sugars or proteins.

### Pocket pH Tester

pH, indicates elements which may be out of balance. A pH of less than 6.4, may indicate a need for calcium, magnesium, potassium or sodium while a pH of greater than 6.4 phosphates or sulphates may be required. If the proper elements are selected and applied, the Brix reading will increase and the pH will go to the desired level of approximately 6.4.

### Pocket EC Tester

EC or conductivity, indicates the level of simple ion uptake into the plant sap. If a crop has a low Brix reading and if sap EC is also too low, elements are not being made available to the plant and appropriate measures should be taken to correct this.

### InfraRed Thermometer

This is used to measure the foliage temperature. The higher this is above ambient air temperature, the more stress the plant is exhibiting.

### Chlorophyll Meter

The measurement of chlorophyll in a crop can be useful in determining if the levels of nitrogen are low.

### Pocket Penetrometer

Measures soil penetration resistance and indicates the physical condition of the ground and suitability for plant growth.

Catalogue No	Description
<b>AG51-200</b>	Plant Tissue Analysis Kit, supplied complete with hand held refractometer, pocket pH and EC testers, chlorophyll meter, infra red thermometer, plant tissue colour charts, pocket penetrometer, mini plant press, deionised water pack, beakers, and full instruction manual, all housed in a robust carrying case

## Leaf Porometer, Hand Held

A hand held leaf porometer that measures the amount of water being evaporated from a leaf through small pores in the leaf known as stomata. The device measures stomata conductance by putting a leaf in series with two known conductance elements, and comparing the humidity measurements between them.

- Manual and Auto read mode options
- Automatic sampling mode removes user subjectivity
- No daily calibration
- No tubes, pumps, fans, moving parts or heavy equipment
- Accurate steady-state measurement
- Very simple, easy-to-use interface
- Includes software for downloading data
- Robust Design

Catalogue No	<b>AG51-220</b>
Conductive range:	0-1000 mmol m <sup>-2</sup> s <sup>-2</sup>
Operating environment:	5-40°C, 10-90% RH, non-condensing
Data storage:	4095 measurements in flash memory
Measurement time in auto mode:	30 seconds
Measurement aperture:	6.3mm diameter
Power:	4 AA alkaline cells
Battery life:	More than 1 year



AG51-240



## Plant Tissue Colour Charts

These 17 colour charts are used to determine and record the colour of plant tissues. This information is important to scientists working with growth rates, nutrient deficiencies, plant diseases and other plant processes. The set contains 320 matte colour chips which are permanently mounted on charts of 17 hues.

Catalogue No	<b>AG51-240</b>
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## Fenwick Can

The Fenwick Can is the most commonly used instrument for the extraction of cysts from soil samples using the principles of flotation. The can tapers toward the top, with a slopping collar around the outside of the rim which collects overflow and directs it towards an outlet. The can has a sloping internal base with a drain plug at its lowest point.

Soil is placed at the bottom of the can. Water is then turned on and enters through a device that creates a swirling action in the bottom of the can. As the can fills, lighter soil particles and nematodes flow over the spout and onto one or more sieves from which nematodes are 'backwashed' after approximately two to five minutes.

Catalogue No	Description
<b>AG51-250</b>	Fenwick Can, Dimensions, 375 x 200 x 625mm. Weight 3.5 kg. Supplied complete with 850 µm and 250 µm sieves.

AG51-250



## Accessories

Catalogue No	Description
<b>AG51-252</b>	Test Sieve: Stainless steel frame and mesh. 200mm diameter, 250 microns
<b>AG51-254</b>	Test Sieve: Stainless steel frame and mesh. 200mm diameter, 850 microns

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Laboratory Chemical Analysis

AG51-300



## Tullgren Funnels

In use around the world for more than 50 years, Tullgren Funnels provide the best solution for both dry and wet extraction of soil organisms from soil samples.

Tullgren funnels operate as an extraction method for soil animals.

A temperature gradient of approximately 14°C is created in a litter or soil sample, in order to create downward movement of the soil arthropods into a collecting vessel.

- Built in banks of 6 and 12 funnels
- Constructed of steel tubular section, with steel shelves - providing a clean and robust assembly for laboratory use
- Lamps are switched in pairs and the unit will accommodate 25 watt tungsten filament bulbs
- Unit available for floor or wall mounting

Specifications	AG51-300 (6 Bank)	AG51-302 (12 Bank)
Diameter of funnels, top, mm:		152
Diameter of lower end, mm:		14
Capacity of collecting bottle*, mm:		50 x 25
Overall height, mm:		826
Overall width, mm:	210	381
Overall length, mm:		1003
Weight (approx), kg:	18.1	31.8

\* 50x25mm as standard - Larger vessels can be accommodated

AG51-320



## Spore Trap, Seven-Day Volumetric Recording

A compact unit with a built in vacuum pump, which is designed to capture and quantify a broad spectrum of fungal spores (both culturable and non-culturable) that are present in the air. This instrument can also be used to sample pollen, fibreglass particles, fungus spores, hyphal fragments, hair and skin cells and many more. Particles are impacted on adhesive-coated transparent plastic tape supported on clockwork driven drum.

- Constructed from materials which are light in weight, making it readily portable for field use.
- Unit is treated to ensure a weather and corrosive proof finish
- Quick and easy change over of drums
- Vacuum pump available for use on most voltages and frequencies

Specifications	AG51-320
Sampling duration:	7 days
Drum movement:	2mm/hour
Accuracy:	+/- 1 CCI unit
Throughput at orifice:	10 litres/minute
Orifice size, mm:	2 x 14
Working area:	0.882m <sup>2</sup> through 530mm radius
Height of sampler, mm:	940
Weight, kg	16

## Pocket Spring-Steel Net Frame

A net that is suitable for the sampling of all flying insects. Unique design allows for the steel frame to twist up and fold to pocket size, making it a compact and fully portable device. Supplied with a short brass handle. Extension handles can be added using the net handle system.

Catalogue No	Description
<b>AG51-322</b>	Pocket Spring-Steel Net Frame, 300m frame when opened
<b>AG51-324</b>	Black net bag for the pocket spring-steel net frame
<b>AG51-326</b>	Push-fit net handles. Strong aluminium tubes, black powder coated finish, with push-fit connections. Simply attach to the short brass handle of the net frame. Available in 600mm (2ft) sections).



AG51-326



## Sweeping Net

A net that is designed for the purpose of collecting in grass and heather etc. It consists of a very strong and durable aluminium frame with stainless steel arms which fold up like an umbrella

Catalogue No	Description
<b>AG51-330</b>	Sweeping net with a diameter of 460mm. Supplied complete with white bag with extra strong reinforced heading.



AG51-330

## Beating Tray

A beating tray is used where insects rely on their natural camouflage for defence and remain still, e.g. in amongst trees and shrubs. A piece of light coloured cloth is stretched between two supports underneath a tree or shrub which is then beaten or vigorously shaken. Insects that have taken refuge there will fall into the tray for collection.

Catalogue No	Description
<b>AG51-350</b>	Frame complete with white bag. Folding pattern giving a tray area of approximately 1100mm x 860mm.

AG51-350



## Pooters

A pooter is a useful instrument for picking up small invertebrates and depositing them into a collecting chamber. It works like a vacuum cleaner. Suction is applied through the rubber tubing while directing the shorter plastic tube over the target to draw it into the chamber. Offered here are tough and durable Perspex pooters, and also portable glass pooters.

Catalogue No	Description
<b>AG51-370</b>	Pocket pooter, Glass. Small pooter with a 75mm x 25mm glass tube, plastic pipes, rubber bung and tubing.
<b>AG51-372</b>	Perspex pooter. Very tough durable material with cork ends and rubber tubing.



AG51-372

AG51-370

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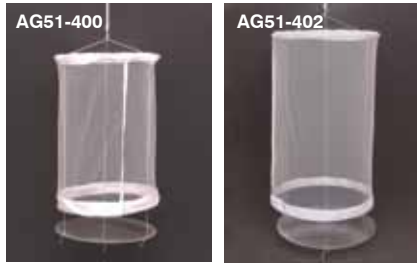
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## Blendon Butterfly Traps

Instrument for collecting butterflies alive, and is therefore ideal for survey work. Particularly suited to the collection of butterflies in the tropics that feed on rotten fruit etc. Two sizes are available, the strings are fully adjustable for different sized butterflies, and replacement nets are also available.

Catalogue No	Description
<b>AG51-400</b>	Small butterfly trap, 300mm round base, 650mm high
<b>AG51-402</b>	Large butterfly trap, 400mm round base, 900mm high

Soil Science



## Robinson Mercury Moth Trap

The best moth trap for quantities and species of moth attracted. The base and cone are made of high impact moulded ABS plastic and the trap is rust-proof, robust and light. Supplied complete as illustrated with all electrical fittings, 50m flex on a cable winder and operating instructions. Designed for 200-250 volt operation.

Catalogue No	Description
<b>AG51-420</b>	Robinson moth trap, complete unit

Agrometeorology

## Containers, Clear Plastic Rectangular Boxes

A range of clear plastic boxes suitable for collecting and examining specimens.



Catalogue No	Dimensions, mm:
<b>AG51-450</b>	150 x 117 x 75
<b>AG51-452</b>	174 x 115 x 60
<b>AG51-454</b>	228 x 121 x 86
<b>AG51-456</b>	279 x 159 x 102

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AG51-470



## Insect Suction Sampler

This is a lightweight and fully portable device, designed to extract insects from herbage or debris, which can easily be operated by one person. The insects collected are immediately visible and there is no need for nets, bags or filters. A wide range in size and shape of collecting vessels can be used and each one can rapidly be removed or replaced for ease-of-use. The collected insects are safely deposited and may be returned to their natural habitat if required.

Catalogue No	<b>AG51-470</b>
Air throughput, m <sup>3</sup> /min:	10.5
Collecting area, m <sup>2</sup> :	0.2
Weight (including engine), kg:	7.8
Overall height, mm:	930

### Note:

Please refer to our General Lab Catalogue for a further range of containers.

Laboratory Chemical Analysis



## Refractometer, Hand Held

A hand held Refractometer used for the determination of sugar content within food stuffs. This device provides high precision with an exceptional optical design that improves image resolution and illumination.

- Water Resistant and Dustproof IP67 Rated: The only Refractometer that features a sealed housing and eyepiece. Cannot be damaged or destroyed by use in dusty or wet environments. Optics inside will not “fog up”
- Shock Resistant: constructed of Xenoy polycarbonate materials and double cemented glass optics that make it an ultra rugged and impact resistant design able to withstand repeated drops from 1m
- Automatic Temperature Control (ATC) - provides accurate and reliable measurements in all environments and conditions. No conversion charts or second guessing required. Measures concentration correctly each and every time

Catalogue No	<b>AG51-660</b>
Description:	Sugar % (BRIX)
Refractive index:	1.3330 - 1.4200
Range, %:	0-50
Scale divisions:	0.25

AG51-660



### Note:

For a further range of refractometers, please refer to our General Lab Catalogue.

## Refractometer, Hand Held, Digital

This pocket sized digital refractometer is a powerful, multi-scale instrument that is easy to operate and provides quick results. It has an IP65 dustproof/water resistant rating so it can be used in virtually any environment and is suitable for numerous applications in various industries, including: Agriculture • Beverage • Beer • Food • Industrial • Wine

This refractometer features a 5-digit, full view screen that displays all pertinent measurement data in one window. This feature reduces the costs associated with reading errors and eliminates the time associated with waiting for scrolling values. It is easy to operate eliminating the need for specialised training. Measurement results display in 2 seconds, which saves time and increases productivity

- 3 measurement scales
- Brix with Automatic Temperature Correction (ATC)
- Refractive Index with Automatic Temperature Correction (ATC)
- Refractive Index at Actual Temperature
- 5-digit, full view LCD screen
- Results display in 2 seconds

Specification	Digital Pocket Refractometer
Refractive Index Reading Range	1.3330-1.4465
Refractive Index Reading Accuracy	0.0002
Brix Reading Accuracy	0.2
Brix Reading Range	0.0 to 62% Brix
Calibration	Water
Prism Material	Glass
Dimensions (WxDxL), mm	54 x 27 x 100
Power:	2 x AAA batteries

Catalogue No	Description
<b>AG51-664</b>	Digital Pocket Refractometer

AG51-664



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AG51-668



## Thermometer, Laser, Infrared

Temperature measurement is a fundamental component of many agricultural processes from the use by farmers during each stage of the crop cycle to laboratory applications where the standardisation of temperature is essential to ensure accurate and reliable testing conditions.

This compact infrared thermometer provides easy and safe non-contact temperature measurements for a wide variety of applications such as making stress-degree measurements, important in determining when plants or crops should be watered or irrigated.

- Max / min feature
- High intensity laser beam makes targeting objects easy
- Simple operation, point, shoot and read off the temperature
- Complete with carry case, battery and full instructions

Specifications	AG51-668
Range, °C:	-50 to 550
Response time:	Less than 1 second
Accuracy:	±2% of reading or ±2°C
LCD dimensions, mm:	19 x 26
Dimensions (hwxwd), mm:	160 x 82 x 41.5

Soil Science

Agrometeorology

AG51-670



## Plant Sap Press, Hydraulic

Speed up collection of large samples with this Hydraulic Plant Sap Press which provides a rapid, easy to use method for collecting larger samples. The press extracts sap into a collection vial and comes complete with plunger, grate, cylinder, expeller rod and six collection vials.

Catalogue No	AG51-670
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AG51-672



## Plant Sap Press, Hand Held

A simple to operate, hand held instrument which can be used to extract sap from plants. This device offer a fully portable alternative to the hydraulic plant sap press. Constructed of stainless steel.

Catalogue No	AG51-672
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Seed Technology

AG51-700



## Fruit Firmness Tester

The firmness of fruit pulp is very important for fruit traders. The harvest date of fruit is fixed with the help of the measurement of the fruit pulp, regarding the shipment date to different customers' countries, or duration of storage.

This is a simple to use instrument that reliably measures the firmness of fruits in a non-destructive manner.

Catalogue No	AG51-700
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Laboratory Chemical Analysis

## Digital Fruit Firmness Tester

This Fruit Hardness Tester Penetrometer measures fruit ripeness and is used to improve fruit quality, harvest, storage, and product transportation time. 4 x Penetrometer tips, (3mm, 5mm, 8mm, & 11mm) for large/hard and small/soft fruits are supplied as standard.

- Measures fruit ripeness to improve fruit quality, harvest, storage, and product transportation time
- Large LCD with back light feature • Simple operation, point, shoot and read off the temperature
- Basic accuracy of 0.5%
- Tension or Compression, Peak hold and Zero functions
- Positive/Reverse display for easy readability
- RS-232 PC interface

Specifications	AG51-710
Range, kg:	20kg
Accuracy:	±(0.5% + 2 digits)
Resolution:	0.01kg
Minimum Display:	0.02kg
Display:	5 digits, 0.63" (16mm) LCD display
Update Rate:	Fast mode 0.2 secs; Slow mode 0.6 secs
Full scale deflection:	approx 0.4mm
Transducer type:	Load cell
Peak Hold:	Freezes Max reading on display
Power Supply:	Six 1.5V AA batteries
Weight, g:	650
Size, mm:	215 x 90 x 45

Catalogue No	Description
<b>AG51-710</b>	Digital Fruit Hardness Tester, supplied complete with 4 x penetrometer tips (for large/hard and small/soft fruits), 6 x AA 1.5V batteries, instruction manual and hard carrying case.

## Optional Accessories

Catalogue No	Description
<b>AG51-712</b>	Data Acquisition Program and cable
<b>AG51-714</b>	USB adapter for use with AG51-712

## Fruit Calliper

Universal fruit calliper providing simultaneous reading of diameter (from 25 to 95mm) and circumference (from 8 to 30mm). Portable, hand held device aptly suited for work in the field.

Catalogue No	AG51-702
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## Callipers, Bananas

A hand held device designed to measure the diameter of banana fingers in order to determine the fruit grade. Quick and easy readings are obtained simply by pressing the calliper button which squeezes against the banana finger and then the diameter is provided in seconds.

Catalogue No	Description
<b>AG51-704</b>	Banana calliper, hand held

AG51-710



AG51-702



AG51-704



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AG51-708



## Magnifier, Controlled Focus, Illuminated

A high quality X30 magnification instrument with built-in illumination retractable condenser and daylight filter slide. Accurate focussing is facilitated by the provision of a rotary control. Supplied complete with lens-ended bulb and protective case.

Catalogue No	<b>AG51-708</b>
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## Fruit QC Tester

This non-destructive fruit quality control tester uses a near-infrared spectrometer (NIRS) to help establish the optimum harvest time for fruit and vegetables.

It can be used for monitoring on-tree fruit ripening, to establish accurately the optimum harvest time and to reduce the variability in fruit batches. It can also be used in cool stores to establish maturity changes and to support research into the fruit maturation.

The Fruit QC Tester measures the chlorophyll content in fruit which is a precise index of a fruit's ripening state and is unrelated to weather conditions, a factor which influences other methods of measurement such as the brix index.

The DA index, measured with the Fruit QC Tester, is useful during many stages in the production and consumption's cycle of fruit for example, by farmers to optimize the tree pruning, during harvest, in storage to determine shelf life and maturation state, and by retailers to select the best products for sale.

AG51-720



Specification	<b>AG51-720</b>
Range:	0 – 5 DA
Resolution:	0.01
Calibration:	white
Working temperature	0 – 70°C
Memory	2 giga byte
Display	Alpha-numeric/graphic
Download data	USB port
Batteries	3 pcs 1,5V AAA
Weight (instrument + batteries + case)	1.4 kg
Dimensions (case)	25 x 21 x 10.5 cm

Catalogue No	Description
<b>AG51-720</b>	Fruit QC Tester, supplied complete in a carrying case

AG51-800



## Carbon Dioxide Meter, Hand Held

This hand held CO<sup>2</sup> meter is an efficient instrument for measuring indoor air quality and is also ideal for checking ventilation in green houses, laboratories, mushroom farms, commercial kitchens, etc

- Monitoring based on maximum and mean calculation
- Long-term stable 2 channel infrared sensor
- On-site prints available with infrared printer (optional)
- Repeated calibration unnecessary

Specifications	
Probe type:	2 channel infrared sensor
Measuring range:	0 to +9,999 ppm CO <sup>2</sup>
Accuracy ± 1 digit:	±50 ppm CO <sup>2</sup> ±2% of mv - (0 to +5,000 ppm CO <sup>2</sup> ) - ±100 ppm CO <sup>2</sup> ±3% of mv - (+5,001 to +9,999 ppm CO <sup>2</sup> )
Resolution:	1 ppm CO <sup>2</sup>

Catalogue No	Description
<b>AG51-800</b>	Carbon Dioxide Meter, hand held, supplied with attached probe, batteries and calibration protocol

## Optional Accessory

<b>AG51-808</b>	Printer - wireless with one roll of thermal paper & batteries
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# Light Management

Photosynthetic processes in plants are much dependent upon solar radiation, and there are three principal characteristics of light that affect plant growth: **quantity, quality, and duration.**

Light quantity refers to the intensity or concentration of sunlight. Light quality refers to the colour or wavelength reaching the plant surface. Light duration or photoperiod refers to the amount of time that a plant is exposed to sunlight

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## Pyranometer

An extremely popular and widely used light sensor, this device offers a compact and efficient sensor for solar energy measurements. It gives much greater output than thermopile pyranometers, which, with its better temperature stability, makes it easier to use.

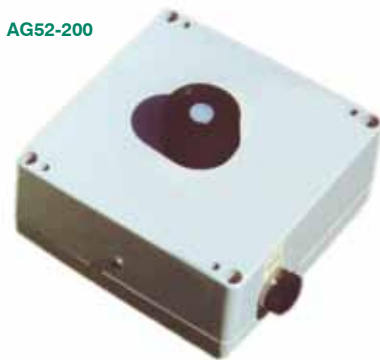
The sensors are calibrated against precision reference thermopile pyranometers in natural daylight, and this item should therefore not be used with artificial or filtered light sources. This limitation to outdoor use is due to the sensor response curve which differs from that of received solar energy. However, because it takes a constant sample of sky light it will always be accurate when used in such conditions outdoors.

In order for data retrieval and subsequent analysis to be undertaken, a datalogger is required. The datalogger shown here is a 1-channel dedicated and reliable system which is easy to use, robust, durable, and completely weatherproof with an ABS housing that is sealed to IP65. The Sensor and Digital Read-out units are also available for purchase as individual components. A levelling unit is also available, and this is recommended for maintaining the sensor at a level height.

<b>Sensor:</b>	Working range, w/m <sup>2</sup> :	0 to 5000
	Temperature range, °C:	-30 to +75
	Humidity range, RH:	0-100%
	Temperature coefficient, °C:	±0.2%
	Construction:	Material Delrin - fully sealed to IP68
	Weight, g:	130 (with 3m cable)
	Dimensions (hwxw), mm:	38 x 34
<b>Datalogger:</b>	Operating temperature, °C:	-20 to +70
	Memory:	Battery packed RAM, 1Mbit, 4000 readings approx.
	Communications:	RS232 ASCII output will communicate with any PC
	Power:	Standard 6x 'C' batteries (4 to 6 months approx.)
	Weight, g:	1100
	Dimensions, mm:	105 x 122 x 120

Catalogue No	Description
<b>AG52-200</b>	Pyranometer Sensor with Integral Datalogger
<b>AG52-202</b>	Pyranometer Sensor and digital meter with battery and carrying case
<b>AG52-206</b>	Levelling Unit for Sensor

AG52-200



AG52-202



Digital Meter



AG52-206



AG52-100



## Lux Meter, Digital

A robust and portable hand held light meter. Supplied with carry pouch, rubber boot, protective lens cap and battery.

- Silicon photo diode sensor and spectral response filter
- Measures both lux and foot-candles, user selectable
- Automatic power off after 30 minutes
- Manual range selection over 5 ranges (Lux) and 4 ranges (Fc)
- Easy to read, large 43mm backlit LCD display with 40 segment bar graph

Catalogue No	<b>AG52-100</b>
Range, Lux:	400,000
Maximum resolution, Lux / Fc:	0.01
Accuracy:	±0.5% of reading
Power:	9V PP3 battery
Weight, g:	390

AG52-300



## Quantum Meter

Quantum meters approximate the quantity of photons between 400 and 700 nanometers. Photosynthesis is largely driven by the number of photons between these wavelengths so this radiation is called the Photosynthetic Photon Flux (PPF) and is measured in  $\mu\text{mol m}^{-2} \text{s}^{-1}$  (micromoles of photons per meters squared per second).

This meter includes data recording capability and sun and electric calibration with each meter.

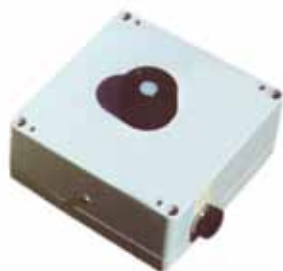
The instrument can store up to 99 manually recorded measurements. In automatic mode, measurements are made every 30 seconds and averages are stored every 30 minutes. Daily totals are also calculated and the past 99 days are recorded. The communication cable (AG52-304) must be purchased to download data to a PC.

These meters feature an innovative blue lens for improved spectral response along with a cosine-corrected head, self-cleaning characteristics, and long-term stability.

Specifications	<b>AG52-300</b>
Measurement range:	0 to 2999 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Operating environment:	0 to 50 C Less than 90% non-condensing relative humidity up to 30 C Less than 70% relative humidity from 30 to 50 C
Memory:	99 manually stored data points Automatically store 99 consecutive 30 minute averages 99 daily averages
Input Power:	Standard 3 V coin cell battery

Catalogue No	Description
<b>AG52-300</b>	Quantum Meter and sensor and 5m cable
<b>AG52-302</b>	Levelling plate for use with light sensor on AG52-300
<b>AG52-304</b>	Communication cable for use with AG52-300

AG52-350



## UVA and UVB Measurements

Sensors for measuring light levels in the Ultraviolet A and Ultraviolet B wavebands. Ideally suited to climatology and meteorology studies, measuring the UV effects on ecosystems, studies of plant responses to UV levels.

Working range, W/m <sup>2</sup> :	0 to 100 (UVA Sensor)	0 to 5 (UVB Sensor)
Operating range, °C:	-30 to +60	
Operating range, RH:	0 to 100%	
Temperature coefficient, °C:	±0.2%	
Dimensions, mm:	69 x 34	

Catalogue No	Description
<b>AG52-350</b>	UVA Sensor with integral datalogger (datalogger specification on page 59)
<b>AG52-352</b>	UVB Sensor with integral datalogger (datalogger specification on page 59)

**PAR Quantum Measurements**

A fully portable instrument designed to measure Photosynthetically Active Radiation (PAR), the light which falls between 400 and 700nm and which is used by plants for growth.

The instrument can provide an accurate prediction of the efficiency of photosynthetic activity in plant growth, and is particularly useful when used in fluctuating light environments such as plant canopies. Accurate measurements are made as a result of the filtering within the sensor, on light of any nature, sunlight, tungsten, fluorescent or xenon lamps etc.

In order for data retrieval and subsequent analysis to be undertaken, a datalogger is required. The datalogger shown here is a 1-channel dedicated and reliable system which is easy to use, robust, durable, and completely weatherproof with an ABS housing that is sealed to IP65. The Sensor and Digital Read-out units are also available for purchase as individual components.

- Measurement of the efficiency of photosynthetic activity on plant growth
- Use in outdoor or indoor applications
- Measurement procedure has become a standard in scientific papers worldwide
- Assessment of drift in radiation sources
- Comparison of Photosynthetic efficiencies of light sources differing in spectral emission

<b>Sensor:</b>	Sensitivity current:	2µA/100 µmol/m <sup>2</sup> /sec
	Sensitivity voltage:	1mV/100 µmol/m <sup>2</sup> /sec
	Working range:	0 to 5 x 10 <sup>4</sup> µmol/m <sup>2</sup> /sec
	Temperature range, °C:	-35 to +75
	Humidity range, RH:	0 to 100%
	Sensor:	Cosine corrected head
	Weight, g:	130
Dimensions, mm:	38 x 34	
<b>Datalogger:</b>	Operating temperature, °C:	-20 to +70
	Memory:	Battery packed RAM, 1Mbit, 4000 readings approx.
	Communications:	RS232 ASCII output will communicate with any PC
	Power:	Standard 6x 'C' batteries (4 to 6 months approx.)
	Weight, g:	1100
	Dimensions, mm:	105 x 122 x 120

Catalogue No	Description
<b>AG52-400</b>	PAR Quantum Sensor with Integral Datalogger
<b>AG52-402</b>	PAR Quantum Sensor and digital meter, with battery and carrying case
<b>AG52-206</b>	Levelling unit for Sensor

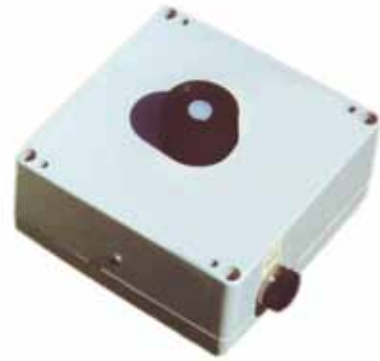
**Note:**

**Light Measurement:**

If you cannot find your exact requirements then please contact us.

We regularly supply a wide range of light measurement equipment in addition to that which is listed in this section.

AG52-400



AG52-402



Digital Meter



AG52-206



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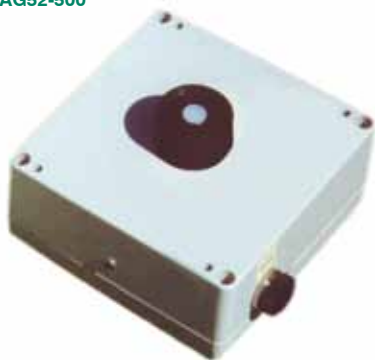
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Laboratory Chemical Analysis

AG52-500



AG52-600



## PAR Energy Measurements

A professional, accurate and cost effective PAR Energy Sensor designed to measure Photosynthetically Active Radiation or PAR range in watts per metre squared (PAR Energy).

The PAR range (between 400 and 700nm) is important for the plant's photosynthesis process which produces sugars and growth. Measuring lighting levels in this range will aid in the monitoring and regulation of plant growth and development.

The datalogger shown here is a 1-channel dedicated and reliable system which is easy to use, robust, durable, and completely weatherproof with an ABS housing that is sealed to IP65. The Sensor and Digital Read-out units are also available for purchase as individual components.

- Direct readout of light level
- Check that the light is uniform over the crops
- Increase yields with regular spot checks of the light levels the plants are receiving - shade or add supplementary lighting as required

<b>Sensor:</b>	Working range, w/m <sup>2</sup> :	0 to 5000
	Spectral response, nm:	400 to 700
	Temperature range, °C:	-35 to +70
	Humidity range, °C:	0 to 100%
	Weight, g:	150
	Sensor:	Cosine corrected head
	Dimensions, mm:	38 x 34

<b>Datalogger:</b>	Ranges, w/m <sup>2</sup> :	0 to 20, 0 to 200, 0 to 2000
	Temperature range, °C:	-10 to +60
	Accuracy:	0.1% LSD
	Power supply:	1x9 V PP3 battery, alkaline or NiCad
	Weight, g:	280
	Dimensions, mm:	145 x 80 x 35

Catalogue No	Description
<b>AG52-500</b>	PAR Energy Sensor with Integral Datalogger
<b>AG52-502</b>	PAR Energy Sensor and digital meter, with battery and carrying case
<b>AG52-206</b>	Levelling unit for sensor

## Plant Canopy Measurement

A simple to operate instrument for measuring Photosynthetically Active Radiation (PAR) and Leaf Area Index (LAI), this linear PAR ceptometer consists of an integrated probe and microcontroller. The probe consists of 80 sensors that are sensitive to the PAR waveband, and the microcontroller allows for instantaneous visual read outs of PAR.

The unit has just 4 menus: PAR/LAI sampling, unattended logging, file access, and setup and the intuitive 6-key interface allows for quick and simple navigation.

The external PAR sensor (included) will allow for simultaneous PAR measurements above and below the canopy and the recordings are saved at the push of a button.

Catalogue No	AG52-600
PAR range, $\mu\text{mol m}^{-2}\text{s}^{-1}$ :	0 to >2500
Operating environment, °C:	0 to 50
Number of sensors:	80
Data storage capacity:	1MB RAM (over 2000 measurements)
Data retrieval:	Direct via RS232
Weight, kg:	1.21
Overall length/ Probe length, mm:	990/ 840
Power:	4 x AA batteries



# Forestry

**Forestry is concerned with the establishment and management of forests for timber production, environmental conservation and amenity purposes, and in many regions is of major ecological, economic and social importance.**

**This section consists of a range of portable equipment for the monitoring and conservation of timber.**

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## Wood Moisture Meter

An advanced yet simple to use moisture meter specifically designed for the timber industry. This device is ideal for a range of quality control applications associated with the production, trading and use of wood products. This compact instrument has eight calibration scales, enabling the user to take accurate moisture measurements in 150 wood species. With a variety of package options available, this is the complete wood moisture measurement system.

- All readings are displayed on a large LCD display
- May be used with optimal hammer electrode for sub-surface measurements
- Built in wood calibration scales
- Automatic temperature correction (with temperature probe)
- Durable and rugged design
- Hand held, fully portable device

AG53-100



Catalogue No	Description
<b>AG53-100</b>	Plus package comprising of a wood moisture meter, temperature probe, heavy duty two pin moisture probe, WME calibration check, carrying case and wood calibration chart and instructions
<b>AG53-102</b>	Standard package comprising of a wood moisture meter, heavy duty moisture probe, wood calibration chart and instructions, WME calibration check and a carrying case

## Manual Band Dendrometer

Manual band Dendrometers or increment gauges are used extensively in commercial forestry and forest research. They are a very reliable and low cost method of accurately measuring and monitoring tree growth rates. In many applications trees growth rate data is sufficient on its own such as in commercial forest research mensuration. Tree growth rate data can also be very useful to combine with sapflow data to correlate water use with tree growth.

- Accurate laser printed scale
- Reusable with new tape
- No upper stem diameter limit
- All stainless steel components

AG53-130



Catalogue No	Description
<b>AG53-130</b>	Manual band Dendrometer
<b>AG53-132</b>	Dendrometer Tape, 15m spool

General Survey

AG53-150



## Electronic Dendrometer

An electronic and fully portable basal area/dendrometer that accurately and instantaneously measures tree diameters. Utilising the integrated tilt sensor, diameter data can be collected at any point up the stem and the height at which a specific diameter is reached is also displayed. The Basal Area Factor (BAF) routine will show 'In and Out' trees for a wide range of sampling factors.

- Fully portable unit offering exceptionally accurate and quick results
- Borderline trees are easily resolved by entering distance into keypad
- In-scope LED offers variable brightness levels, making it easy to ready under diverse lighting conditions

Catalogue No		AG53-150
Range:	Diameter, mm:	50 to 2500
	Basal Area Factor, M <sup>2</sup> /HECT:	0.2 to 39
	Inclination, degrees:	± 90
Accuracy:	Diameter, mm:	± 6 up to 24m
	Inclination, degrees:	± 0.1 (typical)
	Temperature, °C:	-30 to +60
	Display:	External LCD and Internal LED
	Environmental:	Water & dust resistant, NEMA 3, IP 54
	Power:	2 x AA batteries
	Weight, g:	500
	Dimensions, mm:	70 x 50 x 165

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AG53-200



## Hypsometer

An all-in one height, diameter, and log volume measurement.

This lightweight, hand held hypsometer uses Class 1 eye safe laser technology to measure tree diameters at a touch of a button. Designed for one-person operation, you simply point and shoot. The unit measures a target's distance, elevation, height, and diameter as well as slopes and gradients. The unique aiming and diameter scope allows you to easily take remote measurements, and an electronic brush filter ensures accurate distance measurements to prism targets in areas of scrub or undergrowth.

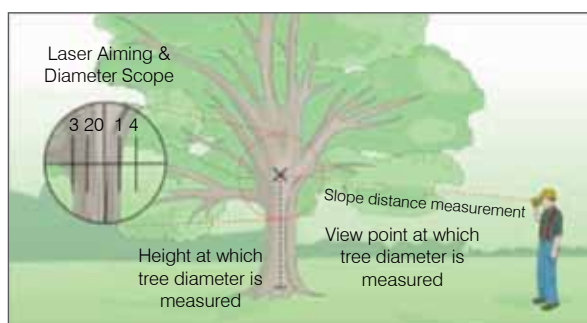
The unit features an onboard multifunction computer which stores results (up to 2,000 trees) for later viewing or downloading to your PC or PDA using the Bluetooth (or RS 232) data link. Water and dust resistant to IP 67.

Catalogue No		AG53-200
Range:	With no reflection target, m:	150
	With reflector, m:	600
	From horizontal, degrees:	±70
Accuracy:		50mm, 0.2° at level
Power:		7.2V lithium rechargeable batteries (8 hours approx)
Weight, g:		396
Dimensions, mm:		109 x 100 x 50

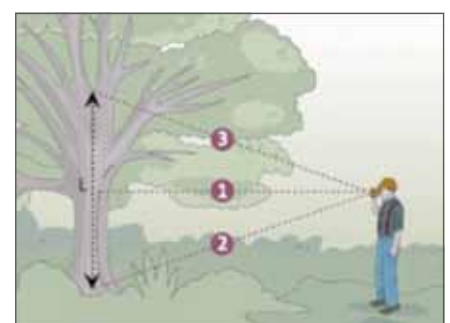
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Measure Diameters



Measure height, lean and volume

## Wooden Tree Calliper

Constructed from strong, straight grained maple, this calliper offers a simple method for the determination of tree diameters up to 609mm. Black graduations are listed on both sides.

Catalogue No	<b>AG53-300</b>
Range, mm:	609
Weight, g:	680

## Aluminium Calliper

Aluminium callipers used for the determination of tree diameters. Featuring high strength injection moulded plastic brackets. The tough and durable design eliminates loose rivets and wear that could produce inaccurate measurements. These heavy-duty aluminium callipers give accurate diameter measurements up to 1270mm. Easy-sliding, adjustable measuring jaws. The beams are graduated on both sides.

Catalogue No	Length, mm	Weight, g
<b>AG53-302</b>	400	680
<b>AG53-304</b>	500	793
<b>AG53-306</b>	650	907
<b>AG53-308</b>	800	1020
<b>AG53-310</b>	950	1133
<b>AG53-312</b>	1020	1360
<b>AG53-314</b>	1270	1600

## Increment Borers

Used to extract cores of wood from trees or freshly treated poles, piling, lumber, or timbers in order to determine growth rate, age, tree soundness, and chemical penetration. Teflon coating protects bit against rust and resin build-up and also reduces friction. Hardened rubber cap is forged with extractor so it will not work loose. Increment borer use and care booklet included. Those illustrated below are constructed with a 5.15mm core and with 3 threads. Other sizes, both core sizes and lengths are available upon request.

Catalogue No	Bit Length, mm
<b>AG53-352</b>	200
<b>AG53-354</b>	300
<b>AG53-356</b>	400
<b>AG53-358</b>	510
<b>AG53-360</b>	710

## Bark Gauge

Measures bark thickness by driving the cutting edge through bark until wood is reached. Guard is slid against tree or log and bark thickness is read directly off the scale.

Catalogue No	Description
<b>AG53-400</b>	Measures to 50mm in 1mm units

AG53-300



AG53-302



AG53-352



AG53-400



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# Single Source Solution...

Wagtech Projects can offer advice and guidance on a wide range of equipment used in agricultural research. Our in-house experts are always available to help you select the correct product either from that which is listed in the catalogue or by suggesting suitable alternatives.

# Seed Technology

**Seed Technology:** The ISTA rules for seed testing, published in Seed Science and Technology constitute the methods which must be used for the issuance of ISTA certificates by accredited Seed Testing Laboratories.

Wagtech has taken care to manufacture and supply equipment suitable for independent seed testing laboratories around the world for applications such as physical, biological and cultivator purity, incidence of noxious weed seeds, germination percentage, moisture and content etc.

**Sampling and Uniformity:** A defined procedure whereby a representative part of a seed lot is taken for submission to a seed testing laboratory. Before sampling a seed lot, it is important to first ensure that the lot is uniform.

The quality of seed tested in the laboratory is minute in comparison to the size of the seed lot that it is intended to represent. To obtain uniform and accurate results it is essential that the primary, composite and submitted samples be taken from the seed lot and prepared according to methods agreed internationally, and to ensure that the sample tested in the laboratory accurately represents the composition of the seed lot in question. Likewise, in reducing the sample in the laboratory, every effort must be made to obtain a working sample that is representative of the sample submitted for testing.

## Heavy Duty Boerner Divider

AG61-050

A required piece of equipment for obtaining a truly representative sample, is standard equipment in most seed testing laboratories and is made to meet ISTA specifications.

To operate the device, a sample of grain is placed in the hopper and then released down a cone which is directly under the centre of the opening. Around the base of the cone are 38 openings or pockets. The divider is calibrated to provide accuracy of 1% between pans on a 1000g sample.

- Constructed of brass and copper only, eliminating any possibility of rust
- Entire bottom section is removable to facilitate cleaning if necessary
- Legs and supports are brass plated steel, and the unit comes complete with two pans
- Dimensions, cm 50x 50 x 97
- Weight 16kg

Catalogue No

AG61-050

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## Spear Samplers

A comprehensive range of spears and tries are available as listed. A wide range of alternative sizes (length and aperture) are also available on request.

- Bag and bulk cargo varieties to suit most materials; corn, wheat, barley, coffee etc
- Protective cover for when not in use
- Provides years of trouble-free service

### Sack Spear Samplers (single slot)

Consisting of a rust proof, single-slotted tube, this device permits easy sampling of sack-stored seeds. A sample is obtained by spearing the sack horizontally with the slot facing downwards; at the desired position the spear is turned leaving the slot uppermost. Grain then falls into the spear and is allowed to exit from the open-end of the spear by tilting it slightly downwards.

Catalogue No	Description
<b>AG61-100</b>	Sack spear sampler, 12.7mm diameter, 650mm long
<b>AG61-101</b>	Sack spear sampler, 15mm diameter, 650mm long
<b>AG61-102</b>	Sack spear sampler, 19mm diameter, 650mm long
<b>AG61-104</b>	Sack spear sampler, 22mm diameter, 650mm long

### Sack Spear Samplers (double concentric)

Consisting of accurately fitting inner and outer tubes which may be separated for easy cleaning, these sampling spears are designed for vertical insertion into sack, bin and floor-stored grain.

The inner tube is rotated to close when inserting and withdrawing, and is further rotated to collect and recover the sample. The multi-slot spear has the advantage of extracting discrete grain samples over a range of depths, thus

Catalogue No	Description
<b>AG61-106</b>	Sampler spear, 1m long x 32mm diameter, single slot
<b>AG61-108</b>	Sampling spear, 1.5m long x 32mm diameter, three slots
<b>AG61-110</b>	Sampling spear, 2m long x 32mm diameter, three slots
<b>AG61-112</b>	Sampling spear, 2m long x 32mm diameter, five slots



## Centrifugal Seed Divider

This is a traditionally designed precision divider that has repeatedly demonstrated its ability to precisely divide large samples of seed, grain and feed into working size samples in a matter of seconds.

The dividing and mixing are accomplished by the centrifugal action of a motor driven revolving neoprene disc positioned under the hopper. A smooth inside chrome plated finish virtually eliminates any of the sample sticking to the inner surfaces. Both the hopper and cylinder top lift off to provide easy access to the interior of the dividing chamber.

The unit consists of a stainless steel hopper over 102mm diameter spinner above spiral fluted, cast bronze, two-way dividing head. The spinner is driven at 450rpm by 50W geared motor unit housed in base. Detachable hopper for access to the spinner and two-way dividing head; the divider is fitted with an off bias push button switch. The unit comes with a transformer for use with 220V AC 50Hz.

Catalogue No	<b>AG61-250</b>
Weight. Kg:	23
Dimensions (wxdxh), mm:	343 x 324 x 534

## Accessories

Catalogue No	Description
<b>AG61-252</b>	Stainless Steel Collection Pans x2

## Mechanical Seed Divider (Riffle Box)

These sample dividers provide duplicate samples which ensure representative test results. Material poured into the hopper is divided into two equal portions by two series of chutes which discharge alternately in the opposite direction into separate pans. Painted or stainless steel construction, and supplied with two collecting pans. They are available in different sizes for splitting a range of sample quantities.

Catalogue No	Description	Chute Width, mm	Chute No.	Weight, kg
<b>AG61-300</b>	Stainless steel	6.25	12	1
<b>AG61-302</b>	Stainless steel	12.5	12	1
<b>AG61-304</b>	Painted steel	19	12	11
<b>AG61-306</b>	Painted steel	25	12	11
<b>AG61-308</b>	Painted steel	37.5	8	11
<b>AG61-310</b>	Painted steel	50	8	13
<b>AG61-312</b>	Painted steel	63.5	8	18

AG61-300



## Vacuum Sampler

This enables samples to be taken from deep bulk stores or lorry trailers. A maximum depth of eight metres can be sampled and all components are housed in a carrying bag. The unit comprises of a 3000W industrial vacuum cleaner which has a removable drop bin with a capacity of 60 litres mounted on castors, and 3 self cooling motors suitable for 220-240V, 1pH, 50Hz (110V available on request).

Catalogue No	Description
<b>AG61-400</b>	Vacuum Sampler

AG61-400



## Accessories

Catalogue No	Description
<b>AG61-402</b>	Vacuum probe set, 6 x 1m plastic probes and case
<b>AG61-404</b>	Plastic probes, 1m length

## Seed Blower

Precision built laboratory instrument designed for sorting and removing inert matter from a variety of seeds.

The blower is equipped with a synchronous motor to ensure uniform RPM and therefore consistent test results. Air flow is regulated with a calibrated vernier gate and adjusted with a calibrated hand wheel for precise adjustments that can be easily repeated.

The unit is supplied with a large tube kit as standard.

Catalogue No	<b>AG61-510</b>
Power:	220V 50/60Hz
Weight, kg:	32
Dimensions, mm:	580 x 560 x 460

AG61-510



## Accessories

Catalogue No	Description
<b>AG61-512</b>	Spare Large Tube Kit

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AG61-600



## Seed Sorting Machine

This seed blower serves for quick and easy separation of light and heavy seed. The seed is filled into a drawer of the acrylic glass cylinder. A fine meshed sieve closes the upper end of the cylinder. A speed controlled blower in the cylinder generates a constant upward air column.

Depending on its size and weight, the seed will fall into one of the 3 collecting vessels being installed at the cylinder. The light seed will be deposited in the upper collecting vessel, whereas the heavy seed will be deposited in the lower collecting vessel. A further sieve at the bottom of the cylinder avoids penetration of seed into the blower.

After disconnection of the blower, the sieve contains also the deposit, consisting of the residues and eventually of small stones. The collecting vessels are equipped with a snap buckle clip allowing easy removal. For 220-240V 1ph, 50Hz (110V available on request).

Catalogue No	Description
<b>AG61-600</b>	Seed Sorting Machine
<b>AG61-602</b>	Spare Cylinder

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AG61-700



## Diaphanoscope (Seed Viewer)

Designed for testing the purity of seed samples with maximum comfort and efficiency. Light below the rectangular 200mm x 120mm glass shines up through the seed to determine if the embryo is alive. A convenient drawer is provided in the front for larger seed lots.

The unit is constructed of seasoned hard wood with a varnish coating. Supplied with a magnifying glass plus one spare light bulb.

Catalogue No	<b>AG61-700</b>
Drawer capacity, cubic cm:	930 approximately
Power:	220 to 240V (110 available on request)
Dimensions, mm:	500 x 280 x 100

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# Moisture Content

**Moisture Content:** Samples for moisture content tests should only be accepted if they are submitted in an intact moisture proof container from which as much air as possible has been excluded. Most customers submit their samples in 250 gauge polythene bags that are either tied or closed with elastic bands. Neither of these methods of sealing provides a proper seal, which could be accomplished using a Wagtech heat-sealer. Where a heat sealer is not available it is recommended that the seed testing lab obtain a supply of heavy duty polyethylene bottles with screw top seals.

## Programmable Moisture Analyser

A market-leading instrument for the measurement of moisture content within agricultural commodities. This analyser simultaneously senses capacitance, weight and temperature of the sample being tested, providing a corrected moisture (%) reading in a few seconds on the liquid crystal display.

The technology allows the use of whole grains with no need to grind the sample. Cereals, oil seeds, pulses etc, can be loaded directly into the measurement cell without any sample preparation.

The average moisture content of a series of up to 254 samples can be measured in one second. Readouts of temperature and Hectolitre (bushel) weight can be displayed and the RS232 printer output allows information to be fed to a computer for hard copy record and/or printing.

Up to 7 calibration programmes can be held in the memory and these can be individually adjusted in order to optimise the accuracy. Please specify the type of crop you wish to analyse when ordering.

- Accurate - standard deviation of 0.03
- Fast - 6 second analysis
- Easy - no need to grind the sample
- Robust and portable - strong, thick polyurethane construction weighs under 2kg

Catalogue No	AG62-100
Measurement range, %:	1-35 moisture, wet basis (depending on application)
Accuracy:	Typical standard deviation 0.03 for moisture, 1.0 Hectolitre weight
Operating environment, °C:	0 to +55
Power supply:	Four C size 1.5V alkaline batteries
Weight, kg:	1.8
Dimensions, mm:	325 x 164 x 120

## Accessories

Catalogue No	Description
AG62-102	Portable printer, for use with the Moisture Analyser

AG62-100



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AG62-200



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## Moisture probes

Time, effort and money are saved with this moisture probe, allowing for the moisture and temperature of hundreds of tons of crops to be tested within seconds.

The device represents a practical and efficient solution in the determination of both moisture content and temperature of bulk and bagged foodstuffs by insertion at a depth of up to 2m. The requirement for time costly laboratory analysis is eliminated as the probe can simply be inserted into the load of a truck, or used anywhere where commodities or foodstuffs are being stored. Results are displayed instantaneously on a large digital display without the need for any sample preparation. Multiple readings can be obtained within seconds, providing a truly accurate representative of the whole.

Catalogue No	AG62-200
Range:	Moisture: 0 to 35% Temperature: -20 to 60°C
Resolution:	Moisture: 0.1% Temperature: 0.1°C
Accuracy:	Moisture: Better than 0.5% over a given range Temperature: Better than 0.5°C
Measurement Principles:	Moisture: Temperature compensated electric field strength Temperature: BS 1904/DIN 751 Platinum Resistance Detector
Power:	4 x 1.5 V AA cells or DC supply

Agrometeorology

AG62-204



Catalogue No	Description
AG62-200	Grain Moisture & Temp Probe for bulk samples(1m shaft length)
AG62-202	Grain Moisture & Temp Probe for bulk samples (2m shaft length)
AG62-204	Grain Moisture Analyser for bagged samples 1m shaft length

Hydrology & Groundwater

AG62-210



## Large Seed Moisture Analyser

Large Seed Moisture Analyser is the ideal solution for measuring moisture and temperature in large seeds. It's unique sensor technology allows easy measurement of moisture in large particles without grinding or processing in any way. This makes it ideal for measuring: cocoa beans, palm oil kernels, animal feeds or virtually any other granulated material.

Catalogue No	AG62-210
Accuracy:	Better than +/-0.5% mc dependant upon application
Measurement range:	0% - 35% dependant upon application
Operating Environment:	20 – 60 °C
Power Supply:	4x1.5v AA Cells
Principle of Operation:	Capacitance
Temperature Compensation:	Automatic, programmable
Readout resolution:	0.1% mc ,0.1 °C
Dimensions (display unit/ sensor):	195 x 154 x 33 mm, 0.6 kg/ 100 x 380 mm, 1.5 kg
Sensor volume:	1.4 litres

Crop Science

## Special Bin Thermometer

A Thermometer that is specifically designed for recording grain temperatures within bins. A 210mm solid brass cover encases a 130mm glass spirit filled thermometer that is protected by a plastic cover. Three temperature ranges are available. The unit attaches to a standard 900mm extension and T-Handles (Accessories). Weight 453g, Dimensions 300 x 230 x 130 mm.

Catalogue No	Description
AG62-300	Special Bin Thermometer, -0-120°F, 1° divisions
AG62-304	Dual Range Bin Thermometer, -10-110°C / 0-220°F, 1° divisions

Seed Technology



## Accessories

Catalogue No	Description
AG62-306	T-Handle
AG62-308	900mm Extension

Laboratory Chemical Analysis

## Moisture Balances

### MB23

- Moisture determination from 50°C to 160°C, 5°C increments, repeatability 0.2% (10g sample), compact design, infrared heating, manual, automatic or timed duration drying time
- Display- Custom backlit LCD
- Mains power operation
- RS232 Interface communication
- Durable ABS construction, in-use cover, sample pan holder

### MB25

- Moisture determination from 50°C to 160°C, 5°C increments, repeatability 0.05% (10g sample), compact design, halogen heating, manual, automatic or timed duration drying time
- Display- Custom backlit LCD
- Mains power operation
- RS232 Interface communication
- Durable ABS construction, in-use cover, sample pan holder

Catalogue No	Model No	Capacity, g	Readability	Platform size, mm
<b>AG62-350</b>	MB23	110	0.01g/ 0.1%	90
<b>AG62-352</b>	MB25	110	0.005g/ /0.05%	90

AG62-350



## Moisture/Temperature Analyser

This is a highly versatile instrument to measure the moisture and temperature of crops. The meter is pre-programmed with 15 crop calibrations, each of which can be adjusted individually.

In addition to the 0-100 relative scale, the 15 pre-programmed calibrations include: Wheat, Barley, Oats, Oilseed Rape, Canola, Linseed, Peas, Corn, Sunflower, Coffee, Soya, Rice, Sorghum, Paddy and Beans.

It is supplied with an integrated grinder-compressor unit that enables the user to take moisture readings in ground samples very quickly and simply. There is also a range of optional probes for measuring temperature in stored grain (AG62-402) and moisture levels in baled hay and straw (AG62-406). Power 9V Battery.

Table: % Moisture Measurement Range			
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

Note: Not all calibrations are for ground samples

Catalogue No	Description
<b>AG62-400</b>	Moisture/Temperature Analyser, supplied in a pouch with grinder-compressor unit, grain cup, sample spoon, and brush.

AG62-400



AG62-402



## Accessories

Catalogue No	Description
<b>AG62-402</b>	Fast Response Temperature Probe, length 1m
<b>AG62-404</b>	Grinder blade and plastic feeder ring. Replacement parts for the Grinder Compressor
<b>AG62-406</b>	Hay and Straw Bale Moisture Probe 600mm length for use with AG62-400 Moisture Meter

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AG62-410



## Hay & Straw Bale Moisture Meter

The Digital Hay & Straw Bale Moisture Meter is a hand held instrument which displays the results on a large LCD Digital Display.

This digital moisture meter is a complete moisture measurement system for assessing RH content in the bales of straw and hay. It is a feature packed agriculture moisture meter.

Supplied with a probe which is made from strong durable stainless steel and is 600mm long to reach the centre of large bales.

Measurement range: 9% - 40%

Catalogue No	Description
<b>AG62-410</b>	Hay and Straw Bale Moisture Meter

AG62-500



## Whole Grain Analyser

A powerful near-infrared, full spectrum spectrophotometer that is specially designed for use by farmers as a tool to enhance the management of crop production and harvesting.

Capable of measuring protein, oil and moisture in cereal grains and oil seeds, this simple to operate, rugged and portable instrument allows the farmer to measure their crops in the field, on the header or in the farm.

- Broad spectral range
- Multiple constituent analysis
- Optimum calibration development PLS calibrations
- 1st and 2nd derivative spectral data
- Qualitative and quantitative data
- No moving parts - good for transportation and use in the field
- Internal computer - saves calibrations and results, and predicts constituents onto a LCD
- RS323 Serial Port - allows for convenient uploading of data to a PC or to download calibrations to the instrument
- Tough and durable case

Catalogue No	<b>AG62-500</b>
Scan range, nm:	720 to 1100
Pixels:	38
Scan speed, seconds:	2 to 4
Power:	12 to 18V DC via mains adapter 220/240V
Weight, kg:	11
Dimensions, mm:	390 x 270 x 220
4 sample cells:	8mm cell - canola, powders 15mm cell - barley, sorghum 18mm cell - wheat, oats, triticale 28mm cell - lupins, faba beans, chick and field peas, pellets

## Micro Hammer Cutter Mill

A Cutter Mill for pulverising a large variety of materials up to 6mm in size. This instrument is both easy to use and suitable for almost any small scale dry grinding or milling applications within the laboratory.

- Integrated overheating, overload and blocking protection
- Interchangeable grinding chambers and blades for either hammer or cutting mill configurations
- Safety switch and push button overload circuit-breaker
- Integrated speed control with LED display
- Interchangeable sieves with mesh sizes from 0.2 to 6mm orifice

Catalogue No	<b>AG62-600</b>
Funnel or working volume:	Approximately 500mL
Speed range:	50 to 6,000 rpm
Working conditions:	0-40°C, up to 95% relative humidity
Motor:	3-phase, 1000 watt input, 600 watt output
Noise output:	< 70 dB(A) at 6,000 rpm with no load
Power:	Single phase 230V, 50Hz or 115V, 60 Hz
Weight:	12kg
Dimensions (wxdxh), mm:	251 x 325 x 480

## Accessories

A comprehensive range of additional screens are available for use with the Micro Hammer Cutter Mill. The screens are manufactured in either Nickel or Stainless Steel.

Catalogue No	Description	Catalogue No	Description
<b>AG62-602</b>	Nickel Screen: 0.2mm	<b>AG62-612</b>	SS Screen: 2.00mm
<b>AG62-604</b>	Nickel Screen: 0.5mm	<b>AG62-614</b>	SS Screen: 3.00mm
<b>AG62-606</b>	Nickel Screen: 0.8mm	<b>AG62-616</b>	SS Screen: 4.00mm
<b>AG62-608</b>	SS Screen: 1.00mm	<b>AG62-618</b>	SS Screen: 5.00mm
<b>AG62-610</b>	SS Screen: 1.50mm	<b>AG62-620</b>	SS Screen: 6.00mm



AG62-600



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AG62-700



## Laboratory Mill

A disc type laboratory mill that is used for grinding grains, peas, corns, soybeans and other similar matter without any moisture loss. The sample is rapidly crushed/sheared between sharp steel discs and collected in a quick release plastic sample cup. The disc design and the rapid grinding minimize heat development. Loss of water is virtually eliminated. Typical sample size is 5-50g for general applications and 10-15g for grain moisture determinations.

The mill is supplied with a standard grinding disc (medium 4x3 teeth). A further range of discs are available in the Accessories box below.

- Large inlet allows grinding of pellets and large sized grain
- Grinds up to 250 gram sample
- Sample preparation for accurate moisture analysis
- Particle size distribution is easily adjusted by changing distance between discs
- Reliable operation and long mill life
- Low noise motor

Catalogue No	<b>AG62-700</b>
Operation:	Direct drive
Capacity:	50g in 10-15 seconds
Dimensions, (hxdx), mm:	480 x 410 x 175
Disc diameter, mm:	75
Noise output, DB:	100
Power:	Single phase 230V, 50Hz or 115V, 60 Hz
Net weight, kg:	16

## Accessories

Catalogue No	Description
<b>AG62-702</b>	Medium Grinding Disc: Used for determination of moisture content. Supplied as standard with AG62-700
<b>AG62-704</b>	Fine Grinding Disc: Used for Particle Size Index (PSI) or when a fine particle size is required
<b>AG62-706</b>	Coarse Grind Disc: Used for oats and other high moisture grains

AG62-800



AG62-802



## Grinding Mill, Analytical

Batch mill that can be used for impact grinding of hard, brittle or non-elastic grinding materials with the use of the high-grade stainless steel beater, or for pulverising soft fibrous materials with an accessory cutting blade.

- Stainless steel beater can be used for a Mohs hardness up to 6
- Grinding chamber is constructed of reinforced glass fibre with stainless steel inlet, useful with volumes up to 80ml
- Electronic overload protection and overheat safety switch

Catalogue No	<b>AG62-800</b>
Speed, rpm:	28000
Overload protection:	Electronic
Useful volume, ml:	80
Permissible ambient temperature, °C:	5 to 40
Permissible humidity, %:	80
Dimensions, mm/ Weight, kg:	85 x 85 x 240/ 1.5
Power:	220/ 240V AC 50Hz

## Accessories

Catalogue No	Description
<b>AG62-802</b>	Cutting Blade
<b>AG62-804</b>	Grinding Chamber 250ml

## Seed and Grain Dryer

A laboratory based seed and grain dryer that is designed to combine flexibility, efficiency and ease of testing application. It is used to dry laboratory samples of grain and seed since this is required to estimate hulling and recovery of different kinds of grain. The drying time will vary according to the variety and type of grain to be tested, as well as its initial contained humidity. The power supply is 220V 50/60Hz as standard, although 110V is also available.

Choosing the right size of the sample tray will depend on many variables. A selection of sizes is available; 50mm tall, 150mm tall or 200mm tall, with volumes of 14090mm<sup>3</sup> (86 Cu.In), 28670mm<sup>3</sup> (175 Cu.In), and 57680mm<sup>3</sup> (352 Cu.In) respectively. Sample trays are sold separately. Four samples can be dried at the same time.

- The ideal device to reduce the humidity of the sample to optimise test level
- Energy efficient two-speed centrifugal fan
- Capacitor and auto thermal protection
- Digital control box with high temperature limit protection, real time temperature and targeted temperature

Catalogue No	<b>AG62-900</b>
Materials:	Body, heater assembly and most fasteners made in stainless steel. Fan made in carbon steel, paint finished. Covers and trays constructed in stainless steel.
Power:	230V single phase, 60/50Hz (110V also available)
Weight, kg:	131
Dimensions, mm:	762 x 1016 x 1117

## Accessories

Catalogue No	Description
<b>AG62-902</b>	Brass sieve: 200mm diameter, 50mm tall
<b>AG62-904</b>	Brass sieve: 200mm diameter, 150mm tall
<b>AG62-906</b>	Brass sieve: 200mm diameter, 200mm tall
<b>AG62-908</b>	Caster Wheels: set of 4 wheels

**AG62-900**



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# Germination

**Germination:** Before carrying out the germination test it is essential to ensure suitable germination substrates are available as specified by ISTA i.e sand, paper towels, filter paper, soil/ compost etc. Adequate stock should always be ordered and a full listing is highlighted within the General Lab Catalogue.

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AG63-100



## Plant Growth Chamber

Growth chamber that allows for the accurate reproduction and control of the wide variety of temperatures, humidity and lighting patterns that are essential components of plant research. Advanced insulating and lighting technology optimises the climatic control and is all controlled by the user friendly, programmable microprocessor control system that is mounted on the front door. The chamber provides the appropriate climatic and lighting conditions for test applications such as seed germination, plant growth and the acclimation of plants, culture of plant cells and tissues, and the genetic manipulation of plants.

- 9 programmable steps for temperature and humidity
- Lighting from three sides: left, right and up
- Programmable lighting function: 0-24 hour timer for each side
- Self diagnostic system to identify possible failures
- Adjustable electronic safety thermostat
- CFC-free refrigerant and insulation

Catalogue No	AG63-100
Temperature range without humidity, °C:	-20 to +60 (lights off) 0 to 60 (lights on)
Temperature range with humidity, °C	10 to 60
Humidity range, %:	20 to 95
Temperature set and reading sensitivity:	0.1°C
Maximum light level, Lux:	20,000
Memory capacity:	10 programs
Useful volume, litres:	400
Internal dimensions, mm (WxDxH):	630 x 630 x 1010
External dimensions, mm (WxDxH):	870 x 1250 x 1745
Power consumption:	6000W
Power supply:	400V, 50Hz, 3PH



## Temperature Gradient Plate

This Gradient Plate is a highly efficient, bi-directional temperature gradient system for investigating responses to temperature of various seeds. Analysis of results is straightforward and optimum or harmful temperatures, whether constant or alternating, are easily identified.

A removable Perspex grid effectively divides the working area into 196 miniature incubators, and thus, many samples can be tested simultaneously. An eight channel data logger provides a time/temperature plot from five probes located on the underside of the plate (one in each corner and one in the centre). Applications include seed testing, seed physiology, microbiology, entomology, biotechnology etc.

Catalogue No	AG63-200	
Temperature range:	Cold edges, °C: Hot edges, °C:	0 to 30 ambient +5 to 50
Stability, °C:		± 1
Time/temperature recording:		Integral five channel chart recorder Output socket for data logger
Temperature display:		Digital
Weight, kg:		229
Dimensions (LxWxD), mm:		1020 x 1020 x 1040
Power:		2050W, 220-240V 50/60Hz

AG63-200



## Soil/Sand Steriliser

A sterilisation unit that is designed to eliminate soil-borne pests, disease and weed seeds that inhibit the growth of plants. The unit can also be used for the sterilisation of sand prior to germination testing.

This insulated steriliser represents the simplest, cleanest and most effective method of carrying out sterilisation (86.6°C). The matter is placed on the large surface areas of the special aluminium panel resistance elements. It is filled at the top and emptied through the bottom, with an electrical loading of 1.5kW. Sterilisation is completed in about 90 minutes with a consumption of 2¼ units of electricity. After treatment, the sand or soil should be cooled rapidly and stored in sterile conditions. Supplied with a dial type thermometer.

Catalogue No	AG63-300
Loading, kW:	1.5
Capacity, litres:	34
Sterilisation duration:	90 minutes (approx)
Dimensions (lxwxh), mm:	685 x 255 x 520
Weight, kg:	27
Power:	220/ 240V AC 50Hz

AG63-300



## Dehumidifier

Desiccant dehumidifier designed for humidity control across a wide range of dewpoint temperatures. This is a completely self-contained unit including desiccant rotor, fan, filters, electrical reactivation and controls.

The unit is ready for connection to standard size duct works, electrical power supply and external humidity sensor. It is enclosed within a stainless steel casing.

Catalogue No	AG63-350
Dehumidification capacity (at +20°C and 60% RH):	4.4 kg/h
Dry air flow (at 150 Pa available external pressure):	800 m³/h
Wet air flow (at 175 Pa available external pressure):	250 m³/h
Electrical power supply (3x 400V, 50Hz):	Adjustable resettable cut-out
Electrical power:	7 kW, 400V AC, 50Hz, 3Ph
Maximum noise level:	60 dB (A)
Weight, kg:	80
Dimensions, mm:	1050 x 600 x 690

AG63-350



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AG63-400



## Automatic Copenhagen Seed Testing Bath

The Automatic Copenhagen Seed Testing Bath provides the conditions specified for seed germination testing according to the regulations of the International Seed Testing Association (ISTA)

This equipment allows setting and maintenance of seed germination testing, where an eight hour period of operating at 30°C is followed by a sixteen hour period at 20°C. The thermostatically controlled water circulator is intended for use in an environment of 17 to 18°C. This will allow a natural radiation of heat through the bath bottom and a drop to 20°C will take about 2 hours without chilled water assistance. However, the temperature controller will accept cooling water into its heat exchanger if there are difficulties in maintaining the lower set point.

The stainless steel water bath is designed to hold 12 glass plates about 25 mm above the water level. Each plate will hold five test pads that are individually protected by a small plastic cover. These covers provide controlled micro environments to each germination test.

Specifications	
Temperature range, °C:	10 to 50
Heating power:	750W
Over-temperature protection:	Adjustable resettable cut-out
Electrical power, 220-240V 50Hz:	1.2kW
Dimensions (LxWxH), mm:	
	Tank: 1220 x 500 x 65
	Support frame: 1220 x 500 x 812
	Glass plates: 495 x 90 x 6

- Stainless Steel water bath with high flow capability for fast responsive control of pre-set temperatures
- Programmable temperature and time controller, allowing three user defined programmes or choice from six predefined programmes.
- Design optimised to operate at the 20°C and 30°C standard germination cycle.
- Temperature controller with 2000 watt heater and a high flow circulation pump. Standard operating voltage is 220/250 Vac.
- Facility to assist water bath cooling with chilled water if ambient is too high.
- Stainless steel support frame.
- Focused temperature probe to detect seed bed temperature.

Catalogue No	Description
<b>AG63-400</b>	Copenhagen Seed Testing Bath, system with tank, circulator, pipes, and drain tap. Supplied complete with 12 x glass plates, 60 x plastic covers, and a pack of 500 filter papers
<b>AG63-400SP</b>	Spare Parts Kits for Copenhagen Seed Bath comprising, 12 x Glass Plates, 60 x plastic covers, and pack of 500 filter papers

AG63-600



## Germination Trays

Germination trays made of black plastic with a standard propagation lid with 24 sections. Convenient design allows for stacking. Dimensions, 375 x 240 x 55mm.

Catalogue No	Pack Quantity
<b>AG63-600</b>	200

## Seed Germination Test Paper

We offer a wide variety of germination test paper including white pleated stripes and circles; available in a variety of sizes and quantities. Outlined below is one example of such items.

Catalogue No	Description
<b>AG63-650</b>	Germination test Paper: Case of 12 rolls of 190mm width by 60m length

AG63-650



## Tetrazolium Salt

Germination percentage is a good measurement of seed quality. One disadvantage of conventional germination tests is that they require a waiting period of two weeks or more. The Tetrazolium test is a biochemical test that can be conducted in a short period of time with minimal equipment, and results are produced as a percentage viability. The test uses these Tetrazolium salts in a combination of staining and sequential sampling. It can also be applied to individual seeds that remain hard and fresh but have not germinated at the end of a germination test. Supplied in 100g pack.

Catalogue No	<b>AG63-700</b>
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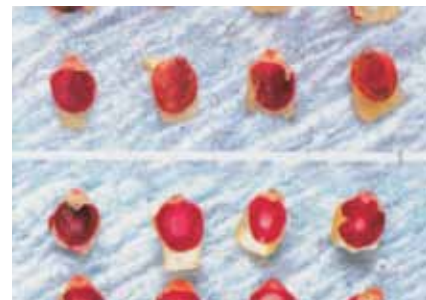


## Ultraviolet Lamp Hand Held

A hand held UV lamp offering longwave, shortwave or multiband longwave/shortwave UV modules. This lightweight device has a comfortable, ergonomically designed handle and a snap-on wavelength selector for easy switching between wavelengths. The on/off switch is located on the back of the lamp.

Catalogue No	<b>AG63-800</b>
Wave-length, nm:	365
Power:	230V/50Hz
Dimensions (lxwxh), mm:	378 x 81 x 64
Weight, kg:	0.90

AG63-700



## Dissecting Set

Consisting of the following stainless steel instruments enclosed within a PVC roll:

- 3 x scalpels, 35mm, 45mm, 50mm
- 2 x needles
- 1 x seeker
- 1 x section lifter
- 1 x forceps, blunt
- 1 x forceps, sharp
- 1 x forceps, sharp, curved
- 1 x scissors, fine
- 1 x scissors, blunt
- 1 x section razor

Catalogue No	<b>AG63-900</b>
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AG63-800



AG63-900



### Note:

For a further range of UV products and Dissecting Equipment. Please refer to our General Lab Catalogue.

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## Grain Splitter

This grain splitter has been designed to reliably and accurately split barley, wheat or maize grains with the intention of exposing the germ in readiness for viability stain testing.

Constructed from stainless steel for visual durability and ease of cleaning, the simple design was conceived for use by unskilled operatives in either laboratory or field environments. The split grains are separated and then collected in small trays that lock into the machine to ensure minimal spillage. Dimensions, cm: 30 x 16 x 16, Weight, kg: 6

Catalogue No	Description
<b>AG63-910</b>	Grain Splitter for barley or wheat
<b>AG63-912</b>	Grain Splitter for maize



## Germination Tester

Testing malting barley (and other seeds) for a viable germ has never been simpler. This cost-effective solution has been developed in conjunction with end users to meet the need for fast turnaround testing in one space efficient unit .

The thermostatically controlled test vessel maintains  $40 \pm 2^{\circ}\text{C}$  using negligible power. The thermostat is limited to  $50^{\circ}\text{C}$  so that overheating of the test salts is not possible. One button of the control unit allows temporary energisation of the vacuum pump whilst the other button allows evacuation or venting of the test vessel. Once evacuated, the efficient vacuum seals maintain negative pressure throughout the test.

The vacuum pump is small, very quiet, requires no oil and is virtually maintenance-free. It takes about 5 seconds to achieve its max 25" Hg (850 mbar). It is supplied with sufficient pipe-work and cable to allow under-bench mounting.

- Simultaneous testing of both sample halves.
- At least SIX sample tests with independent start times can be conducted together.
- Process temperature continuously monitored in the test vessel.
- All equipment powered via a single mains input
- Quiet vacuum pump can be sited away from work surface
- A control unit allows simple evacuation of the test vessel to 850 mbar
- Extremely economical and efficient 350 watt heater module, 220/240 AC 50HZ, 1ph

Dimensions, cm: 61 x 61 x 55, Weight, kg: 16

Catalogue No	Description
<b>AG63-920</b>	Germination Tester, supplied complete

## Seed Counting, Weighing & Grading

### Seed Counting, Weighing & Grading:

A complete range of equipment for use in both the laboratory and in the field, for the accurate counting, weighing, and grading of seeds. Forming an essential component of effective crop management, this process ensures that the destructive elements of a sample (i.e. weed seeds, soil/straw dust, damaged and under- or over-sized seed) are removed from the lot, ensuring quality produce is obtained.

### Electronic Grain Counter

The Wagtech Electronic Grain Counter provides reliable counts for a variety of seeds. This instrument is robustly constructed in steel with a powder coat paint providing a hard wearing finish.

Grains falling into the counter from the feeder tray interrupt a beam before passing into the collection tray. This creates pulses which register as numbers on the easily read display. When the pre-selected number has been reached, a control signal stops the feeder and 'count complete' will show on the control panel.

Specially developed firmware resident in the microcontroller uses error detection algorithms to minimise "double counting" and errors of counting undersized samples such as counting split grains as two grains.

- Suitable for use with a wide variety of seed sizes
- Grain feed rate adjustable via the keypad for optimum efficiency and for calibration.
- Once calibrated, counting is automatically controlled for pre-determined grain sizes/types.
- Flexibility of count totals and batch numbers
- Automatic cut-off
- LCD display

Catalogue No	<b>AG64-100</b>
Grain size range, mm:	0.3 to 15
Counting range (grains per batch):	Up to 1000
Counting rate (grains per minute):	500 (dependent on size)
Electrical power supply:	90-240V AC, 50-60Hz, 1ph
Weight, kg:	7
Dimensions, mm:	280 x 310 x 290

### Hectolitre Weight Measurement

This is a laboratory instrument packed in a custom carrying case and comprises an engineered stainless steel measuring tube (chondrometer), electronic digital balance (battery or mains operated), sample container falling weight, cut off slide and reference chart.

The grain is allowed to fall into the lower chamber of the chondrometer under the restriction of a falling weight, which is a standard operation at all times.

The grain is weighed on the balance and the weight in grammes is converted at a glance to Hectolitre weight via the calibration chart supplied.

Catalogue No	<b>AG64-200</b>
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AG64-100



AG64-200



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AG64-300

## Test Sieves

These test sieves are simple, easy to use instruments that have long been one of the most widely used methods for particle size analysis and size distribution of samples.

A complete set of 36 test sieves are supplied in this kit.

The sieves are suitable for a wide variety of applications from soil studies through to the standardisation and grading of harvested grain. The sieves are 200mm in diameter, range in aperture size from 38 microns to 16mm, and are compliant to ISO standards 565 and 3310,1.

Catalogue No	Description
<b>AG64-300</b>	Set of 36, 200mm test sieves ranging in aperture size from 38 microns to 16mm. Constructed of stainless steel frame & mesh, the set comes complete with a lid and receiver

## Accessories

Catalogue No	Description
<b>AG64-302</b>	Cover/receiver sets, Stainless Steel.
<b>AG64-304</b>	Sieve Brush: Double ended for use with both fine and coarse sieves

AG64-400



## Grain Counters

A simple and convenient method for counting seeds and grains in order to ensure an accurate count is made at all times. This instrument is ideal for the testing of 100 seed counts, and comes in two options; one for Barley and Wheat, and the other for Oil Seed Rape.

- Counts 100 seeds in seconds
- Easy to use, experience is not necessary
- Faster than other methods
- A must for busy laboratory

Catalogue No	Description
<b>AG64-400</b>	Grain counter for Barley or Wheat
<b>AG64-402</b>	Grain counter for Oil Seed Rape

AG64-410



## Vacuum Seed Counter

Used for counting and depositing seed on paper substrates. Comprises 3 x components; an adjustable vacuum system with connecting hose, a number of counting heads and a valve to dissipate the vacuum. 2 x counting heads are supplied as standard, 70mm dia, with 100 holes, one with 0.7mm hole dia and one with 1.0mm hole dia. Other heads are available. Power: 240V AC 50HZ Dimensions: 270 mm x 440 mm x 220 mm, Weight: 6 kg.

Catalogue No	Description
<b>AG64-410</b>	Vacuum Seed Counter, supplied complete with 2 counting heads

AG64-450



## Seed Planting Head, with Vacuum Pick-Up

This system automatically picks up 100 seeds under vacuum and is ideal for testing or planting a variety of seeds. With the planting head constructed of high quality brass or alloy, and the valve constructed of brass, the unit will pick up and release a wide variety of different seed sizes. Power 240V AC, 50Hz.

Catalogue No	Description
<b>AG64-450</b>	Seed planting head valve with vacuum unit (without planting head)
<b>AG64-451</b>	Planting Head for use with vacuum Seed Planter (AG64-450) Circular heads with holes 1.8mm dia, Head dia 125mm
<b>AG64-452</b>	Planting heads: Round in Brass. Choice of 100mm or 125mm diameter, hole sizes 0.4mm, 0.6mm, 1.0mm and 1.8mm
<b>AG64-454</b>	Planting heads: Rectangular in Alloy. 310mm x 185mm with hole sizes to order
<b>AG64-456</b>	Planting head valve
<b>AG64-458</b>	Plant seed placement tray



## Balances, Precision, PGW Range

- Large easy to read, backlit LCD display
- Applications include weighing, check weighing and percentage weighing
- 18 weighing units including 2 user programmable custom units
- Automatic temperature compensation function
- Bi-directional RS-232 interface for GLP compliant reports
- Below pan weighing facility
- Draught shield supplied as standard on all models with 1 mg readability

Catalogue No	Capacity, g	Readability	Platform size, mm (WxL)
<b>Internal Calibration</b>			
<b>AG64-500</b>	150	1mg	140 x 140
<b>AG64-502</b>	450	1mg	140 x 140
<b>AG64-504</b>	1500	0.01g	192 x 192
<b>AG64-506</b>	4500	0.01g	192 x 192
<b>External Calibration:</b>			
<b>AG64-508</b>	150	1mg	140 x 140
<b>AG64-510</b>	450	1mg	140 x 140
<b>AG64-512</b>	1500	0.01g	192 x 192
<b>AG64-514</b>	4500	0.01g	192 x 192

## Accessories

Catalogue No	Description
<b>AG64-534</b>	Standard Printer
<b>AG64-516</b>	Weigh below hook
<b>AG64-518</b>	Density determination kit
<b>AG64-520</b>	Dust cover
<b>AG64-522</b>	In-use cover

## Balances, Analytical, PW Range

- Large easy to read backlit LCD display
- Large weighing pan and chamber with 3 door windshield
- Internal calibration using motorised calibration weight
- Selectable automatic calibration against temperature variation or pre-set time
- 17 different weighing units including 2 user programmable units
- Fitted with a bi-directional RS-232 interface for GLP compliant reports
- Below pan weighing facility

Catalogue No	Capacity, g	Readability, mg	Pan diameter, mm
<b>AG64-524</b>	120	0.1	90
<b>AG64-526</b>	180	0.1	90
<b>AG64-528</b>	250	0.1	90

## Accessories

Catalogue No	Description
<b>AG64-534</b>	Standard Printer
<b>AG64-530</b>	Density Determination Kit
<b>AG64-532</b>	Dust Cover

AG64-500



### Note:

For a further range of balances, please refer to our General Lab Catalogue.

AG64-524



General Survey

Soil Science

Agrometeorology

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Laboratory Chemical Analysis

# Laboratory Chemical Analysis

General Survey

## Laboratory Chemical Analysis:

A wide range of specialised analytical and general laboratory equipment is required to carry out a full analysis of soil and plant material.

These can be summarised as follows:

Atomic Absorption Spectrophotometry (AAS), Gas Chromatography (GC), Spectrophotometry, Flame Photometry, Colorimetry, Ion Selective Electrodes, Microscopy, Titration, Kjeldahl, Soxhlet, Dietary Fibre

Details of these instruments can be found in our General Laboratory Catalogue or in our Environmental Catalogue.

However, for research work involving soil and crops, specific tests are required in particular for protein determination, extraction of fats and oils, and the analysis of dietary fibre. This section contains details of the instruments required to carry out these tests.

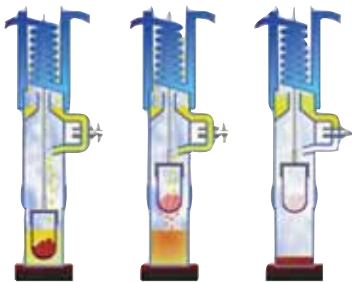
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Randall's Technique

## Solvent Extraction of Soluble Substances

### Randall's Technique

The first phase of extraction is performed by immersing a sample - containing thimble, in boiling solvent followed by a washing with cold refluxing solvent.

The fast solubilisation achieved by the hot solvent results in a sharp reduction of extraction time.

### Soxhlet Technique

The solubilisation of extractable components is performed by a cold solvent dropping from a reflux condenser. Consequently, a complete extraction lasts many hours.



Soxhlet Technique

## Kjeldahl Method for Nitrogen Determination

The Kjeldahl's method is named after the Danish chemist who developed it more than a century ago. Today, the method is widely used according to official methods to determine nitrogen and proteins in food, feed, soil, waste water etc.

The equipment in this section allows you to perform the Kjeldahl method easily and with reproducible results.

Laboratory Chemical Analysis



## Digestion Units

These are widely used instruments within laboratories performing analysis for different applications such as digestions in the Kjeldahl process for protein determination and analysis in the environmental field.

A user-friendly program menu allows for the selection of up to 20 work programs, while 4 temperature ramps are available for the simultaneous digestion of 6, or 20 samples in test tubes of different dimensions.

These instruments are provided with a wide range of options (temperature selections, programmable permanence time, continuous working mode availability etc) and with a visualisation display which allows for the desired values to be set and to monitor the digestion progress.

**Please note: The operating accessories are necessary for the correct functioning of the instruments**

- High accuracy - temperature precision is  $\pm 0.5\%$ , with a heating speed of 20 to 420°C in 30 minutes
- RS232 interface - for PC data transfer and storage according to GLP
- Safety - Electronic microprocessor checks and automatically calibrates the heating block's temperature
- Customisable - the operator can choose among 6 different languages

Catalogue No	AG71-100	AG71-102
Number of samples:	6 in 250ml tubes with 42mm Ø	20 in 250ml tubes with 42mm Ø
Temperature range, °C:	From room temperature to 450	
Construction material:	Epoxy painted stainless steel structure	
Selectable programs:	20 with 4 ramps for each programs	
Selectable durations:	from 001 to 999 minutes	
Power supply:	230V / 50-60Hz	
Power, W:	1100	2300
Weight, kg:	10	24
Dimensions (wxhxd), mm:	293 x 152 x 339	393 x 152 x 446

## Operating Accessories

Catalogue No	Description
<b>AG71-104</b>	Test tubes, Ø 42x300mm, 250ml, 3 pcs/box, for use with both units
<b>AG71-106</b>	Glassware handle with heat shields, for use with AG71-100
<b>AG71-108</b>	Suction cap, for use with AG71-100
<b>AG71-110</b>	Support system, for use with AG71-100
<b>AG71-112</b>	Glassware handle with heat shields, for use with AG71-102
<b>AG71-114</b>	Suction cap, for use with AG71-102
<b>AG71-116</b>	Support system, for use with AG71-102



AG71-100



AG71-102



AG71-106



AG71-108



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Laboratory  
Chemical  
Analysis

AG71-300



## Recirculating Water Pump for Fumes Aspiration

Recirculating water pump that lets two different timed modes for the digesters to be selected. This ensures optimum aspiration depending on the digestion phases and the number of samples in the digester connected to the pump. Lack of adequate water mains pressure or its high consumption frequently prevent common water pumps from being used. This unit consists of a tank where the water introduced is recirculated continuously, offering considerable savings on water. The type and quality of the materials used make the instrument extremely quiet and long-lasting, and guarantee a high flow rate (up to 35 l/min).

Combined with the scrubber unit, it provides the ideal complement to achieve highly effective fume neutralization that is developed during acid digestions.

The unit is supplied complete with a Viton tube, 10 x 14mm diameter

- Automatism and optimization of the sucking power
- Strongly reduced water consumption in comparison to water jet pumps connected to tap
- Possibility of avoiding emission into the atmosphere of gaseous pollutants or polluted waters into drainages
- Independent from tap water contingencies like low water availability or low pressure

Catalogue No	<b>AG71-300</b>
Air flow max, l/min:	35
Flow regulation, l/min:	from 0 to 35
Residual pressure with water temp. of 15°C:	35 mmhg
Power:	160 W
Power supply:	230 V / 50 Hz
Weight, kg:	8.4
Dimensions (wxhxd), mm:	250 x 400 x 370

AG71-350



## Scrubber

A scrubber, that when connected to the Recirculating Water Pump, is designed to neutralise corrosive and toxic fumes that develop during oxidative mineralizations or other processes. The system is supplied in the configuration consisting of two stages; condensation, and neutralisation.

The instrument can be supplied with a third (optional) stage, generally used with samples that generate high amounts of fumes during digestion (e.g. soybean). The unit has a broad range of applications, from the Kjeldahl method to neutralisation with acids and bases. Thanks to the elevated surface of contact between gas and liquid, the unit provides effective cleaning of the fumes, preventing their hazardous emission into the laboratory and the environment.

- A highly efficient neutralization, due to the optimized gas-liquid contact
- Safe and practical to use
- Simple disposal of condensates
- Simple control and replacement of neutralizing solution

Catalogue No	<b>AG71-350</b>
Construction material:	Epoxy painted stainless steel structure
Weight, kg:	3.5
Dimensions (wxhxd), mm:	300 x 500 x 190

## Accessories

Catalogue No	Description
<b>AG71-352</b>	Filter for activated carbon
<b>AG71-354</b>	Pack of 10 refill of activated carbon



## Distillation Units

Distillation units that are designed for diversified and flexible use, including applications such as determining ammoniacal nitrogen, protein nitrogen, (Kjeldahl or direct alkaline distillation), nitric nitrogen (after reduction), phenols, volatile fatty acids, cyanides, alcohol content, etc, according to official procedures.

The units come with a patented steam generator that assures distillations are carried out in absolute safety and without routine maintenance. The supply water feed is automatically stopped during pauses, thus cutting down on its consumption. The instrument is equipped with a system that recognises when the sliding protection door is not closed and when the test tube is not in position, without which the dosing pump does not start operation. Use of an innovative system allows various sizes of test tubes to be used and 500 ml Kjeldahl flasks to be housed. Both units work in accordance with official methods AOAC, EPA, DIN e ISO, with model AG71-400 representing the basic unit, and model AG71-402 the more advanced, semi-automatic unit. Supplied complete with 42mm Dia x 300mm - 250ml test tube, flask, tongs and inlet tube.

- A maintenance-free steam generator that uses deionised water
- Innovative titanium condenser that achieves outstanding heat exchange and higher resistance than glass, and that is also easy to clean

Catalogue No	AG71-400	AG71-402
Analysis time of 100ml of distillate:	5 minutes	4 minutes
Time related to start for Devada alloy analysis:	0 to 99 minutes	0 to 30 minutes
Steam generator:	Deionised / Distilled water	
Distillation residual removal:	Manual	Automatic
Reproducibility (RSD):	< 1 %	
Recovery:	> 99.5 % at nitrogen levels 1 - 200 mgN	
Detection limit:	> 0.1 mgN	
Sodium hydroxide addition:	Automatic	
Dilution water addition:	Manual	Automatic
Boric acid addition:	Manual	
Sodium hydroxide addition:	Automatic	
Dilution water volume:	-	0 to 200 ml
Boric acid volume:	-	0 to 100 ml
Steam flow regulation:	-	0 to 100 %
Tap water consumption:	0.5 l/min at 15°C - 1 l/min at 30°C	
Weight, kg:	25	26
Dimensions, mm:	385 x 780 x 416	385 x 780 x 416
Power:	240V AC 50HZ	

## Accessories

Catalogue No	Description
AG71-104	Test tubes, Ø 42 x 300mm, 250ml, 3 pcs/box
AG71-404	Test tubes, Ø 26 x 300mm, 100ml, 6 pcs/box
AG71-406	Test tube, Ø 48 x 260mm, 300ml
AG71-408	Spacer for test tube Ø 48 x 260mm
AG71-410	Test tube, Ø 80 x 300mm for alcohol determination
AG71-412	Test tube connection Ø 26mm, Ø 48mm, 500ml balloon

AG71-400



AG71-402



General Survey

Soil Science

Agrometeorology

Hydrology & Groundwater

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Seed Technology

Laboratory Chemical Analysis

AG71-500



AG71-502



## Solvent Extractors

Solvent extractor units which allow for a substance or group of substances to be quantitatively separated (e.g. fat) from a mixture of solids or semisolids. Extraction is carried out in accordance with the Randall technique, which works in two phases (plus one to recover the distilled solvent). This technique offers protection against atmospheric pollution, and cuts analysis costs and extraction time.

The instruments, designed to optimise ease of handling, are provided with a microprocessor allowing up to 29 different work programs to be set. The operational phases set will be carried out in sequence with the temperature and remaining time constantly shown on two different displays. The analyses are performed in absolute safety thanks to its IP55 protection rating.

The main fields of application include analysis of food products, animal feeds, detergents, rubber and plastic formulations, pharmaceutical products, soils, etc. for the content of soluble products such as fats, detergents, plasticizers and pesticides.

AG71-500 is supplied complete with 3 extraction cups, 25 extraction thimbles, 3 extraction thimbles holders, an inlet tube, heat shield, 3 butyl seals and 3 viton seals.

AG71-502 is supplied complete with 6 extraction cups, 25 extraction thimbles, 6 extraction thimbles holders, an inlet tube, heat shield, 6 butyl seals and 6 viton seals.

Catalogue No	AG71-500	AG71-502
Number of samples:	3	6
Number of programs:	29	
Max. volume extraction cup, ml:	150	
Working temperature, °C:	from 100 to 260	
Solvent recovery:	from 50 to 75%	
Reproducibility (RSD):	< 1%	
Power supply	230 V / 50-60Hz	
Power, W:	500	950
Weight, kg:	30	40
Dimensions (wxhxd), mm:	480 x 620 x 390	700 x 620 x 390

## Accessories

Catalogue No	Description
<b>AG71-504</b>	Extraction cup - 6 pcs/box - for use with both units
<b>AG71-506</b>	Vafon seal - for use with both units
<b>AG71-508</b>	Thimble weighing cup - for use with both units
<b>AG71-510</b>	Handling device for extraction cups - for use with AG71-502
<b>AG71-512</b>	Pincer for weighing cups - for use with AG71-502
<b>AG71-514</b>	Thimbles stand (6 places) - for use with AG71-502

## Dietary Fibre Extractor

This unit allows the final filtration and washing phase envisaged by the enzymatic method to be rationalised in dietary fibre determination. Used together with the Enzymatic Digester, this unit operates according to the official method AOAC n.o. 985.29 for the determination of the total time required compared to a manual procedure.

The glass funnels facilitate the introduction of the digested sample and the solvents in the instrument. The possibility of working with vacuum enables the filtering and the final washings to be completed in a shorter amount of time. The unit comes complete with 6 glass crucibles and these are also available as individual components, see below.

Catalogue No	<b>AG71-600</b>
Construction material:	Epoxy painted stainless steel structure
Peristaltic pump:	High suction capacity
Counter pressure:	Electronic setting
Residues collecting:	Separate
Filtration time:	Shortening
Power:	220 W
Power supply:	230 V / 50-60 Hz
Weight, kg:	28
Dimensions (wxhxd), mm:	750 x 420 x 380

## Accessories

Catalogue No	Description
<b>AG71-602</b>	Glass crucible, 6 pcs/box

## Enzymatic Digester

The analytical procedure for the determination of the dietary fibre requires the digestion of the sample with thermostable enzyme, a process that reproduces more effectively than the chemical methods that occur during the natural phenomena experienced through digestion in man and animals.

This Enzymatic Digester operates according to the official method AOAC n.o. 985.29 for the determination of the total dietary fibre. The unit optimises the delicate phase of the enzymatic digestions of the sample, working in reproducible and standardised conditions in order to obtain final reliable results.

The elevated performance is guaranteed due to a multiple magnetic stirrer that assures a continuous and constant sample mixing avoiding the sample overheating at the same time.

Catalogue No	<b>AG71-700</b>
Temperature range, °C:	from room temperature to 105
Power:	900 W
Power supply:	230 V / 50-60 Hz
Weight, kg:	6.2
Filtration time:	Shortening
Dimensions (wxhxd), mm:	413 x 295 x 410

## Accessories

Catalogue No	Description
<b>AG71-702</b>	Beaker, 400ml
<b>AG71-704</b>	Stirring Bar, 6x35mm

AG71-600



AG71-700



General Survey

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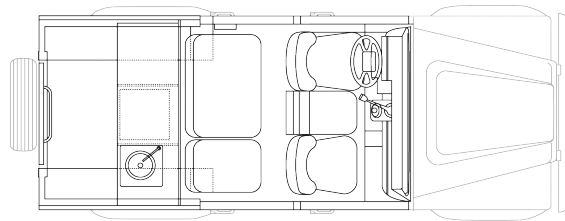
Laboratory Chemical Analysis

## Mobile Testing Laboratory

Based on a Land Rover Defender 110 Station Wagon, Hard Top, with 2200cc, 4 cylinder, diesel engine.  
6 speed manual transmission, export tropical specification.  
Rear of vehicle converted into a small laboratory/storage area for test kits and small laboratory instruments and comprising the following:

- Washable ant-slip flooring
- Sink top and waste with clean and dirty water containers to left hand side of rear saloon
- 12V Fridge/Freezer: Capacity 43litres including 4 litre freezer compartment
- Laboratory laminated work surface at rear of second row seats.
- Laboratory Area powered by 12V vehicle electrics.
- Lockable cupboard with shelf left of fridge.
- Front opening cupboard to right of refrigerator over wheelbox.
- Separate intermediate battery with split charge relay.
- Hook up for generator (generator not provided)
- Rear overhead lighting.

Product Code	Description
EN95-100	Mobile Testing Laboratory

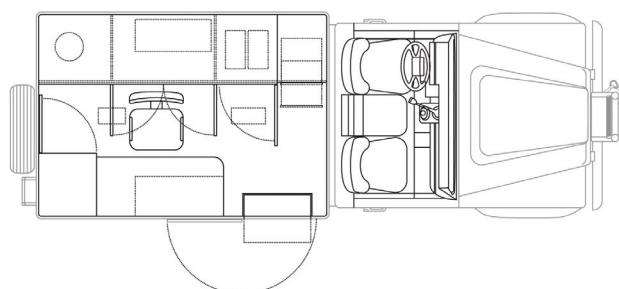


## Mobile Laboratory

An extremely mobile fully fitted laboratory allowing a wide range of laboratory analyses to be done in the field. It is used around the world by scientists and technicians working on environmental and agricultural studies in **education, research, agriculture, mining, general industrial, and petroleum sectors**. Wagtech Projects is able to recommend suitable field and laboratory instruments for a wide range of studies which can be stored and used in the vehicle.

Mobile Laboratory, based upon a Land Rover Defender 130 chassis cab, fully fitted with a mobile laboratory unit mounted on the rear with internal dimensions of 2.6m(L) x 1.7m(W) x 1.5m(H), and including sliding window, side entrance door, hand wash unit and water tank, cupboards and drawers with laminated worktops, Fridge 156L/ Freezer 16L, 2.5kVa portable generator to power internal sockets and lighting housed in rear external locker, roof rack and access ladder.

Product Code	Description
EN95-200	Mobile Laboratory
EN95-220	Cassette mounted external awning for use with Mobile Laboratory, size 3.0M x 2.5M with 3 windows, zip up doors & base frame.
EN95-224	Winch and accessories for mounting on the front of the Mobile Laboratory.



## Mobile Trailer Laboratory

The Mobile Trailer Laboratory is designed and constructed to be flexible, secure and robust, for use in a wide range of studies and environments.

Wagtech Projects's team of engineers and scientists can recommend suitable instruments and internal layouts for many applications including:

- Water Quality Testing
- General Laboratory Monitoring
- Contaminated Land Studies
- Landfill Studies
- Soil Classifications and Analysis

- Test results obtained quickly while on site.
- Analysis on site avoids sample deterioration and identifies potential health hazards rapidly.
- Design is flexible, modular and robust for use in a wide range of applications and conditions.
- Extensive range of the latest instruments available separately giving full laboratory grade accuracy.

The 6.6m long trailer is mounted on a close coupled twin axle chassis for towing by a 4 wheel drive vehicle, fully tropicalised, fitted complete with laboratory furniture, plumbing and electrical installation, water storage tank, electrical storage heater, tropical roof, spare wheel.

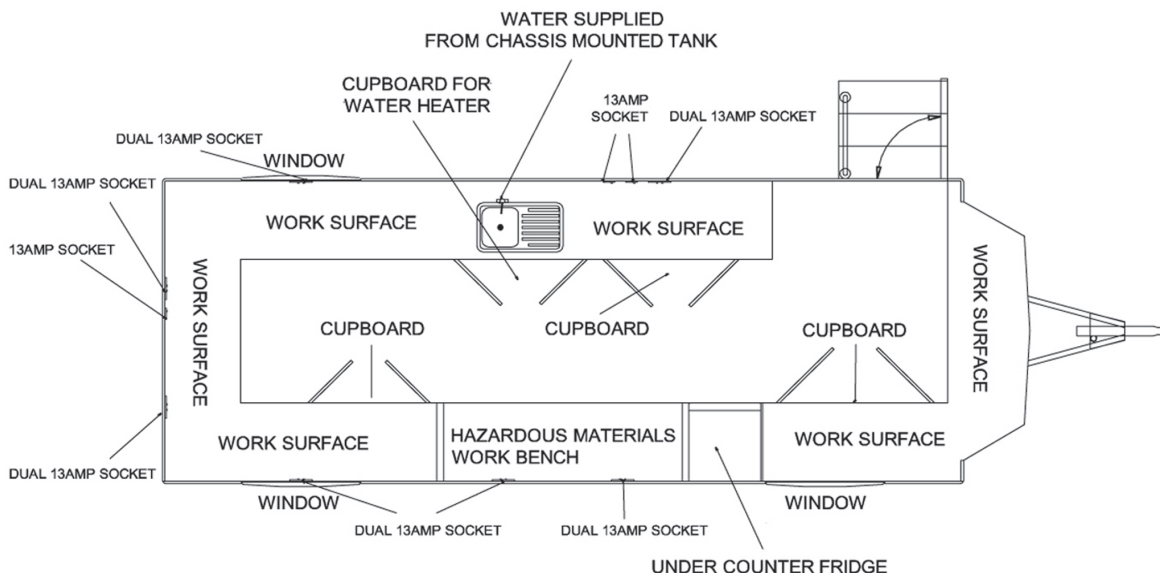


Product Code	<b>EN95-400</b>
<b>Body</b>	
External Dimensions, M	7 x 2.4 x 3
Internal Dimensions, M	5 x 2.3 x 2.2
<b>Chassis</b>	
Construction	Close coupled twin axle chassis with towing hitch 3500kg GTW heavy duty all steel chassis frame
Towing Vehicle	Land Rover or other suitable 4 wheel drive vehicle
Weight, Kg	3500



### Accessories \*available separately upon request

Air conditioning, canvas side tent, fume cupboards, chemical toilet, butane gas installation, gas water heater, mobile generator. Please contact our technical department for details of these and other specialised mobile laboratories we have supplied in the past.



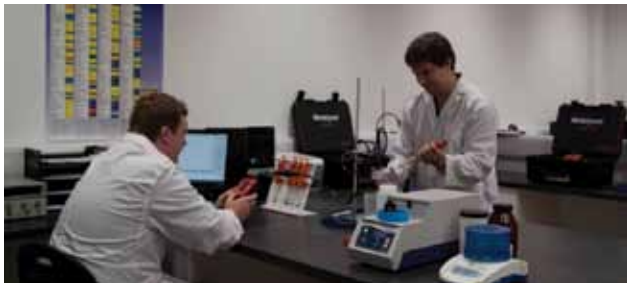
# Installation, Commissioning & Training

Wagtech Projects supplies equipment all over the world, and the importance of both training and technical support are recognised and as essential in the long term success and sustainability of any project.

Through a well established network of regional offices, agents and distributors, we can offer a range of after sales services including installation, commissioning and training on the use and maintenance of the equipment.

## Equipment Installation and Commissioning

A full Installation and Commissioning service is available worldwide from Wagtech Projects through its network of local companies, and fully supported by a team of scientists and technicians from the UK who regularly travel to countries around the world supporting our customers and training our local experts.



In addition to this, product training can be given at our dedicated Technical and Training Centre in Thatcham, UK which has a laboratory and training facilities to handle groups of trainees.

Following successful commissioning of the equipment, on-going product support is available locally and via email and phone contact with experts in the UK if required.

## Training

The provision of training has been a key service from Wagtech Projects for many years and we continue to offer and expand this facility.

The training can either take the form of detailed instruction in the use and maintenance of the equipment we supply or we can organise academic training courses in a variety of separate disciplines in the Agricultural and Environmental Sciences both in the UK and overseas.

These courses can be tailored around customer's specific requirements, and at Wagtech Projects we are flexible enough to be able to accommodate most people's wishes.

Please contact us for more information on any training issues you have in mind. We are always pleased to provide advice on equipment selection, or any technical queries that you may have.

We look forward to hearing from you.





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## Terms and Conditions of Business

### Definition and construction

"The Seller" shall mean Wagtech Projects Limited, any associated company or subsidiary thereof or any duly appointed agent. These conditions shall be deemed to be incorporated in any contract between the Purchaser and the Seller and shall be construed in accordance with the provisions of English Law prevailing at, on or after the day any order has been accepted by the Seller. Any disputes which may arise in relation to a contract shall be referred to a single arbitrator (who shall act as an expert and not as an arbitrator) in accordance with the Arbitration Act 1950 or any statutory modification on re-enactment thereof for the time being in force: the decisions of such arbitrator shall be final and binding upon the parties to the contract in dispute and his fees shall be borne by the party who appointed him.

**1 Acceptance:** All orders received shall be understood to be placed in accordance with these Terms and Conditions of Business. In accepting proprietary goods delivered by the Seller the Purchaser shall be deemed to accept the Manufacturers Terms and Conditions of Business as if the Purchaser had been dealing directly with the Manufacturer in addition to the conditions contained herein so far as applicable. Any other terms of business are excluded and no variation of these terms and conditions shall bind the seller unless made in writing and signed by a Director of the company with whom the order is placed.

**2 Goods on Approval:** Where the Seller has agreed with the Purchaser to supply goods to the Purchaser for the Purchaser's approval prior to acceptance then if the Purchaser decides he does not require the goods he must return them at his own expense to the Seller in good order and condition within 30 days of receipt failing which the Purchaser shall be deemed to have accepted the goods within the Terms and Conditions hereof and shall be bound to pay for the same accordingly.

**3 Prices:** All quoted prices are ex-warehouse unless expressly specified to the contrary and are subject to alteration without notice. The Seller reserves the right to invoice goods at prices prevailing at the date of despatch plus value added tax (if appropriate) at the appropriate rate.

**4 Quotations:** All quotations are subject to confirmation. The right is reserved to correct any errors or omission and to re-quote at prices prevailing at the date of despatch in accordance with Section 3 hereof. A quotation expressed to be for a fixed price remains open for acceptance by the Purchaser within the period stated in the quotation or, if no period is stated, within 30 days of the date of the quotation irrespective of when the quotation is received by the Purchaser.

**5 Delivery:** Whilst every effort is made to adhere to delivery dates, no liability whatsoever can be accepted for lateness of non-delivery howsoever arising. Deliveries offered ex-stock are subject to goods being unsold at the date of receipt of the Purchasers order. The seller reserves the right to charge for delivery unless otherwise agreed and stated in writing in respect of individual transactions. Liability for any loss or damage in transit howsoever caused is not under any circumstances admitted to the Seller.

**6 Delay:** Whilst every effort will be made to adhere to delivery dates, delay or failure to maintain a delivery date shall not entitle the Purchaser to rescind or cancel any order or withhold any payment that may be due.

**7 Minimum Order Value:** The minimum order value for payment in advance or account is £250.00 and for payment by letter of credit £1000.00.

**8 Cancellation:** The Seller shall be under no obligation to accept amendment, cancellation or rescission of any order or any part thereof, but may nevertheless agree in writing to such amendment, cancellation or rescission upon whatever terms and conditions it chooses to impose.

**9 Returned Goods:** Items correctly supplied against an order but subsequently returned as no longer required or cancelled too late to halt delivery, at the discretion of the Seller may be returned, at the Purchasers expense, for credit providing the goods are in an unused condition and in the original packing. A restocking charge will be levied for this service. Before returning any goods to our warehouse, approval for such action must be first obtained from an identified member of our sales/customer service staff who will take down details in event of our agreeing to the return, you will then be given a unique goods return number. This goods return number must accompany any goods returned and be included in any paperwork sent to us. If you omit to include this number the returned goods will not be accepted by the seller and will be returned to you at your expense. All returned goods must include all accessories e.g. AC/DC adaptors. Once approval for the return has been given, the goods must be received by the seller within 3 weeks.

**10 Warranty:** Goods are only guaranteed to the extent of the guarantee (if any) given to the Seller by the actual manufacturers, all other conditions, statements and warranties, express or implied, statutory or otherwise on the part of the Seller are hereby excluded.

### 11 Title:

(a) The title in goods sold to the Purchaser by the Seller shall not pass to the Purchaser until all sums due to the Seller from the Purchaser (whether in respect of those goods or otherwise) have been paid to the Seller. If the Purchaser defaults in paying any such sum the Seller shall be entitled to take such action against the Purchaser as it may be entitled in law or in equity without further reference to the Purchaser.

(b) The Purchaser shall have the right before title in the goods has passed, to resell the goods or any part thereof but shall pay to the Seller the proceeds of sale or such part thereof as may be necessary to pay all sums due to the Seller from the Purchaser and until such payment shall hold the proceeds of sale on trust for the Seller.

(c) Notwithstanding subclause (a) of this clause, the goods shall be at the Purchaser's risk from the time they are delivered to the Purchaser.

**12 Dangerous chemicals and poisons:** Chemicals should be handled and used only by trained personnel or under appropriate supervision. No responsibility or liability whatsoever is accepted for any loss arising out of the storage, use or handling of chemicals howsoever caused. The sale of poisons is regulated by the Pharmacy and Poisons Act 1933, the Poisons List and the Poison Rules and amending legislation from time to time laid or made by any competent authority.

**13 Orders:** No order can be accepted unless all necessary arrangements have been made to the satisfaction of the Seller regarding import and export licenses and for the provision of payment.

### 14 Terms of payment:

(a) Prices are strictly net and unless other terms have been arranged and agreed in writing by the Seller no deductions can be allowed. The right is reserved (i) to request a remittance with an order, (ii) where new accounts are involved, either to request two trade and Banker's references or to issue Pro-Forma invoices and (iii) to charge interest on any balance from time to time outstanding and due to the seller at 5% per annum over and above the Base Rate from time to time charged by Fortis Bank S.A./NV. For purchasers enjoying a trading account with the Seller, payment must be received by the Seller within 30 days of the invoice date. If payment has not been received by this time the Seller reserves, in addition to the rights above, the right to suspend further supplies of goods until the overdue amount is cleared.

(b) Orders from Purchasers outside the United Kingdom must be covered by an Irrevocable Letter of Credit to cover the purchase price, shipping and other additional costs or charges confirmed by a London Clearing Bank (or a London Merchant Bank subject to the prior written approval of such bank by the Seller) unless other arrangements have been made and agreed in writing. Letters of Credit should allow for part payments and shipments and in the case of orders including chemicals should permit deck or special stowage.

**15 Delivery and delay:** All orders for overseas shipment are accepted in accordance with the conditions herein before contained, it being understood and agreed that delivery time is the Seller's estimate of the time by which it can have the necessary goods packed and ready for dispatch. The Seller cannot accept any responsibility for delays in despatch caused through non-availability of shipping space and/or other causes beyond its control.

### 16 Damage and/or Loss in transit and Insurance:

(a) the Seller accepts no responsibility for goods shipped uninsured and shall not be obliged to claim in respect of damage or loss where, at the Purchaser's request, insurance arrangements have been made other than the Seller's own open cover with it's insurers for the time being.

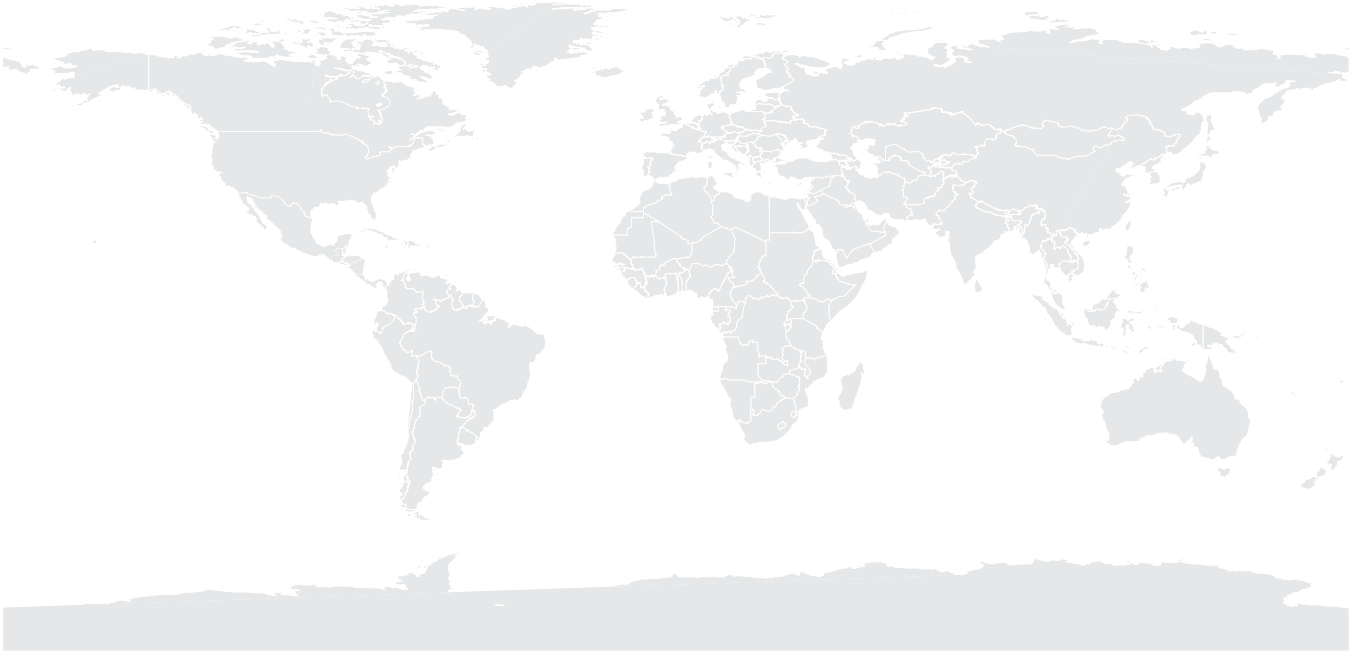
(b) Unless the Seller is specifically instructed otherwise, goods will be insured only against loss or damage in transit for the C.I.F value plus 10%.

(c) All claims under the Seller's insurance must be notified in writing to the Seller within 45 days from point of discharge.

**17 Import Licenses:** Where applicable, the Purchaser's order must specify the number, date of expiry and value of the Import License. It shall be the Purchaser's responsibility to obtain all necessary Import Licenses.

**18 Bank Charges, Special Documentation, Fees and Duties:** All consular and bank charges, import and customs duties and any taxes arising from or by virtue of the contract and its settlement are the liability of the Purchaser unless specifically agreed in writing by the Seller.

# International Network



## **Office, Agents and Distributors**

Wagtech Projects has its own offices, authorised dealers or distributors in many countries throughout the world.

All of them have the necessary skills and relevant experience to provide you with a wide range of services from providing equipment, spares, consumables and reagents to full after sales service and technical support.

Contact us for details of your nearest appointed agent or distributor.

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