

Capability Statement



General Company Information

Ultra-Dynamics is a well-established Australian company that specialises in the development and technical support of innovative process monitoring equipment, electronic monitoring equipment, and control technologies for power generation, mining and manufacturing industries.

Ultra-Dynamics adapts existing technologies and develops new technologies that improve process efficiency and hence minimize production costs. We strongly adhere to the maxim that “if you can’t measure it, you can’t control it”.

At the forefront – our Pioneering magnetic susceptibility and microwave technologies – MAGNASAT® and hydroSCAN® – allow minerals mining companies across the globe to improve efficiency and benefit from reduced operating costs.

With over 60 years’ experience collectively - our qualified senior management team continue to be actively engaged in the design and development of these precision process instruments. Design, Manufacture, Project Management etc. is completed in Australia



Products

Our prime focus is on providing high quality process control equipment for the Mining, Quarrying and Bulk handling industry.

We manufacture our own on-conveyor moisture meters – hydroSCAN®, our own belt scales – ultraWEIGH®, and have developed our unique magnetic susceptibility technology, MAGNASAT® that can measure iron ore in real time on-conveyor, in pipe or on-bench for laboratory use, we have also developed MAGNASAT® applications for measuring RC drill chip in the field, or even scan drill cores. We are also agents for Promecon's excellent MconAir air flow meters, and Procon's highly regarded, Boiler tube leak detection system.

Experience Project List

Ultra-Dynamics Pty Ltd has been in operation for almost 20 years and our customer base is impressive. Our full user list is available on request.

Additionally, Ultra-Dynamics exclusively markets and distributes a complementary product range from recognised local and overseas manufacturers.

Financial Capability

Ultra-Dynamics Pty Ltd's financial affairs are private and confidential, however, we should point out that there is no debt in the company and all the equipment, stock and premises used for the operation of the company are owned outright. In addition to this there is sufficient liquidity in the company so that projects in excess of AUD500,000 can be executed without the need for external financing.

Relative Business Licence

Ultra-Dynamics Pty Ltd is a privately owned company which is wholly owned by Trevor Maurice Powell who is the sole director.

Ultra-Dynamics Pty Ltd is registered with the Australian Securities Investment Commission and holds both an Australian Business Number (18 086 828 266) as well as an Australian Company Number (086 828 266).

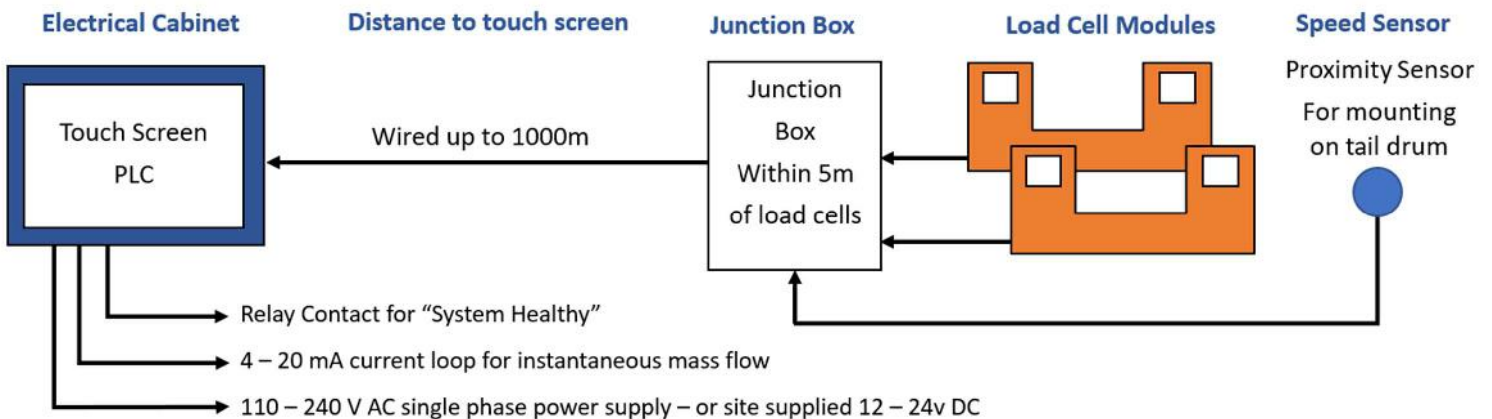
QA/QC Management

All goods supplied will be manufactured and tested in accordance with our ISO 9001:2015 certified Quality system. We have a proud record of on-time and on-specification delivery. Our clients can expect and will receive high level support and service from our experienced technical team.

Proven Technology

ultraWEIGH® provides mass flow measurement at an affordable cost. ultraWEIGH uses proven load cell technology and is ideally suited for installation into a wide range of industries including:

- Minerals Processing Plants and Mines
- Coal processing
- Quarries / Sand Plants
- Fertiliser producers
- Grain facilities
- Sugar refineries
- Bagasse / Biomass
- Food producers
- Timber industry
- Recycling plants
- Etc.



Installation

Load Cell Modules

Two load cell modules are supplied which are installed on either side of the conveyor belt using standard “U” channel which is fixed to the stringers. During installation, one of the existing idler sets is removed, the load cell modules installed and then the idler set replaced. Shims are used to align the adjacent lead in and lead out idler sets. The accuracy of alignment affects the overall system performance.

Electrical Cabinet

The Electrical Cabinet houses the touch screen PLC, load cell signal electronics, power supply and terminations. This can be installed up to 1000m from the load cells. The system is supplied with a single-phase 240V to 24V power supply, however, if a 24V supply is available locally, this can also be used directly.

Secure remote access is available via 3G/4G phone network.

Speed Sensor

The speed sensor is a proximity switch which is usually installed on the tail drum of the conveyor. The software uses the pulse rate and drum diameter to calculate conveyor speed.

Calibration

The system is calibrated after installation and this is typically carried out using the supplied calibration weights. An optional “roll over” calibration frame is available.

ultraWEIGH® Low-Cost Belt Scale

Features and Benefits

Standardised Load Cell Modules supplied	Fits a wide range of conveyor widths “one size fits all”
Proximity Sensor supplied as standard	Accurate belt speed measurement input
Non-Contact with Process Material	No wear concerns
State-Of-Art Electronics	Ultimate precision
Touch Screen PLC – “Wizard” set up guide	Easy set up and calibration
Ruggedized Construction	Suitable for arduous field installations

Technical Specifications

Operation	
Type of operation	Automatic, on-line direct on conveyor installation
Conveyor size	Up to 2,000 mm as standard
Conveyor speed range	No limit
Mass Flow Range	Up to 1,000 tph (depending on belt loading)
Performance	
Accuracy	Typically 1 to 2 % depending on installation
Electrical	
Power supply	Single phase, 2 Amp (optionally 24 V DC)
Inputs	
Clean contacts	Accumulated tonnes reset
Outputs	
Analogue	4 – 20 mA providing instantaneous mass flow
Analogue	4 to 20mA Optional accumulated tonnes
Digital	Contact for system healthy
Serial	Modbus available as an optional communication protocol (other protocols available on request)
System Physical Specifications	
Mass	Electrical Cabinet 25 kg Load Cell Modules 60 kg
Dimensions	Electrical Cabinet 400mm wide x 600mm high x 200mm deep Field Coil Assembly dependent on conveyor dimensions
Shipping	
Mass	80 Kg (approximately)
Dimensions	800mm x 600mm x 400mm

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Moisture measurement has always been an important process parameter, conventionally carried out using conventional laboratory analysis of a manual sample.

Now the hydroSCAN® On-Conveyor Moisture Measurement System allows the accurate measurement of moisture

hydroSCAN® is suitable for all nonconducting materials such as:

- Aggregates
- Mineral Ores
- Coal
- Bagasse
- Wool
- Bauxite
- Grains
- Silica
- Wood Chip
- Bulk Foods
- Sand
- Chemicals
- Sugar
- Cotton



The Electrical Cabinet houses the touch screen PLC, meter signal electronics, power supply and terminations. This can be installed up to 1000m from the meter. The system is supplied with a single-phase 110 – 240 VAC power supply or site supplied 12V – 24V DC. Remote access is available via 4G. This allows assisted calibration and maintenance to be done anywhere in the world.

Potential Limitation	hydroSCAN®	Near Infra-Red
Vertical segregation	Unaffected – beam penetrates full bed of material	Reflectance technique from surface molecules only
Sample presentation	Unaffected by the position of material	Distance of material surface to receiver important
Colour	Unaffected	Significant effect
Ambient lighting	Unaffected	Requires shielding
Wear	No moving parts	Mechanical filter system
Presence of steam	Unaffected	Can cause interference
Dirty atmosphere	IP65 enclosures	The window is required to be kept clean

hydroSCAN® Microwave Moisture Monitor

hydroSCAN® On-Conveyor Moisture Monitor – subsystems

Electronics Control Cabinet – usually mounted on the Measurement Support Frame. This cabinet contains electrical, electronic, and microwave hardware which consists of:

- Microwave Components
- Touch Screen display and control Terminal
- 4G Remote Access Module
- Processor / PDC
- Power Supplies
- Electrical Terminations

Mass Flow Measurement

HydroSCAN can interface with a belt scale or weigh feeder to calculate weight percent moisture. When an application has no measurement device hydroSCAN® can be supplied complete with an integrated belt- scale.

Technical Specifications

Operational

Conveyor width (Distance between stringers)	Up to 1,750mm as standard (1,800 mm and wider may require extension arms)
Conveyor speed	No limit
Material top size	Typically, up to 300mm (material dependent)
Bed depth range	Typically, 20mm to 300mm (material dependent)
Moisture range	0 to 80%
Measurement update time	Typically, 1-minute user configurable
Instrument precision	Typically, 0.5% at 1 standard deviation

Electrical Requirements

At the Electronics Control Cabinet	110 - 240 V AC, single phase, 3.2 amp or 12V – 24V DC Site Supply
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Environmental Requirements

Operating temperature range	0 to 45°C with protection from direct sun and rain
Humidity	0 to 95% relative (non-condensing)

Outputs

Instantaneous moisture	0 to 10 volts or 4 to 20 mA current loop
Tonnage weighted moisture	0 to 10 volts or 4 to 20 mA current loop — requires a belt-scale signal
Serial	Modbus, Ethernet, Profibus etc
High moisture	Relay closure
Low moisture	Relay closure
Shipping mass	120 kg
Shipping dimensions	1200mm x 600mm x 600mm — dependant on conveyor size

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On-Line Magnetite Measurement Directly on Tonnage Rated Conveyor Belts

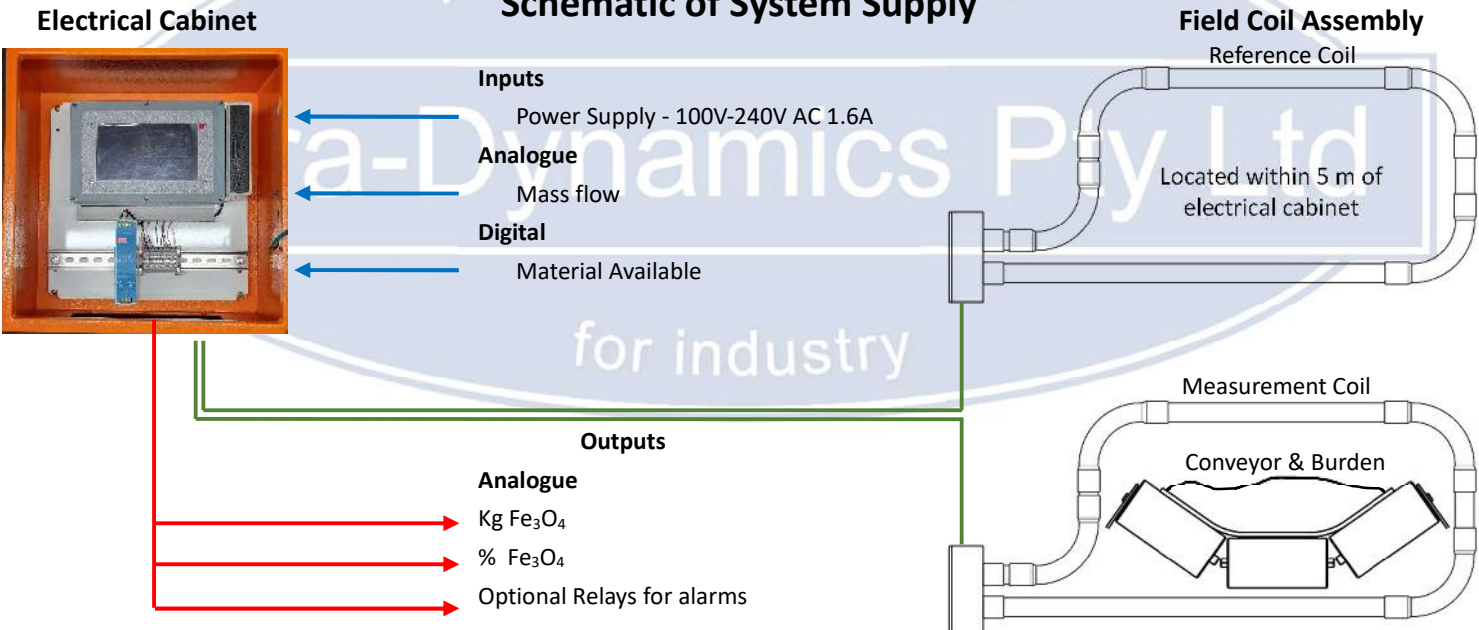
ironSCAN® provides the real time measurement of magnetic ore concentrations such as magnetite and hematite.

ironSCAN® is a proven technology and is ideally suited for installation into a wide range of industries including:

- Plant Feed Grade Control
- HPGR Feed Grade Control
- Metallurgical Accounting
- Grade Control
- Product Quality Control
- Tailings Losses Monitoring



Schematic of System Supply



System Description

Field Coil Assembly

A Measurement Coil is installed around the conveyor belt close to a Reference Coil. The Measurement Coil measures changes in magnetic field caused by the passage of the magnetite on the conveyor belt.

Electrical Cabinet

The Electrical Cabinet houses all electronic components, power supply and terminations. These electronics manipulate the raw data and output the Magnetite result.

Calibration

The system is calibrated after installation – usually by using an automatic sampling system if this is available. If automatic sampling is not available then stop belt sampling can be used.

ironSCAN[®] On-Conveyor Magnetic Susceptibility Meter

Features and Benefits

Encircling Coil Configuration	Interrogates the entire conveyor burden
“Split-Coil” Design	No need to cut the belt for installation
Non-Contact with Process Material	No wear concerns
State-Of-Art Electronics & Inbuilt Temperature Compensation	Ultimate precision
Mass Flow Measurement Input Capability	Adjusts to varying tonnage rates and bulk densities
Ruggedized Construction	Suitable for field installation

Technical Specification

Operation	
Type of operation	Automatic, online direct on conveyor installation
Conveyor size	Up to 1,200mm as standard. Larger conveyors require non-standard coils
Conveyor speed range	No limit
Magnetite range	0 to 100 wt %
System update time	User-configurable
Performance	
Accuracy	Typically, 0.5 wt % Fe ₃ O ₄
Repeatability	Better than 0.2 wt % Fe ₃ O ₄
Electrical	
Power supply	Single-phase, 100 – 240VAC 1.6A Amp (optionally 24 V DC)
Inputs	
Mass flow	Analogue 4 – 20 mA (from belts-scale etc)
Clean contacts	Material Available
Outputs	
Analogue	4 – 20 mA providing kg Fe ₃ O ₄ (optional wt % Fe ₃ O ₄ available)
Digital	Optional clean contacts for high Fe ₃ O ₄ , low Fe ₃ O ₄ , system healthy
System Physical Specifications	
Mass	Electrical Cabinet 25 kg / Field Coil Assembly 40 kg (typical)
Dimensions	Electrical Cabinet 400mm wide x 600mm high x 200mm deep Field Coil Assembly dependent on conveyor dimensions
Shipping	
Mass	120 Kg (approximately)
Dimensions	Dependent on conveyor dimensions

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Accurate and quick determination of magnetic susceptibility for magnetite and hematite

MAGNASAT® Benchtop Mark V Analyser measures the magnetic susceptibility of a sample by measuring the changes to an alternating current magnetic field caused by a sample placed in the analysis chamber.



The magnitude of these changes is dependent on; magnetic and electrical properties, Sample geometry and quantity of the material presented for measurement.

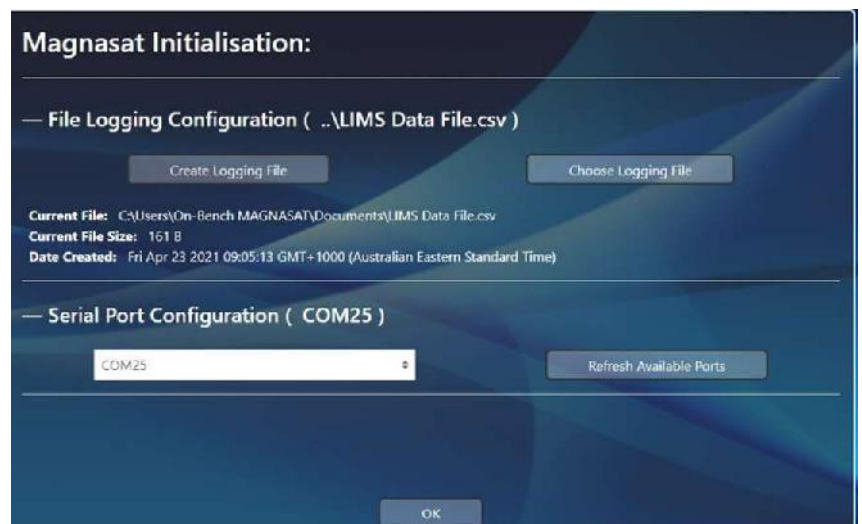
MAGNASAT® provides a measurement of the magnetic susceptibility in absolute terms, i.e., $m^3/kg \times 10^{-7}$. It can be used to replace time-consuming Davis-tube measurements and does not rely on high accuracy mass balances like other competitor systems. As a result of this, MAGNASAT® is not sensitive to vibration and can be located in any convenient part of the lab.

The system connects to a windows PC via USB and uses the application software to interface with the measurement unit. Results are provided in a matter of seconds. A number of process parameters of interest can also be derived such as: Davis Tube results, weight % magnetite, % magnetics etc.

Applications include:

- Iron Ore Processing
- Diamond Processing
- Mineral Sands Processing
- Dense media (Magnetite / Ferro Silicon)
- Jigging plants for improved metals recovery
- Geological field mapping
- Stone Soil and vegetation analysis
- Archaeological investigation
- Hydrology and sedimentation
- Pollution studies
- Building material analysis
- University research

The system operates under PLC control and carries out the analysis automatically. The sample to be analysed is weighed, placed in a sample container and is then inserted into the analysis chamber. On screen prompts confirm the system status as well as guiding the operator through the analysis procedure. The results are stored in Excel compatible format on a PC or laptop as well as a remote PC. This means that the results are available for graphical display or tabular configuration remotely.



MAGNASAT[®] Benchtop Analyser Mark V

MAGNASAT[®] System Standard Scope of supply

- Measurement coil, Reference coil and electronics
- Mains power supply and lead
- 20 Sample bottles
- One calibration standard
- MAGNASAT[®] PC applications software
- Operation and maintenance manual
- USB cable
- One PC running Windows 10

Features and Benefits

Easy to use, PC controller operation	No need for highly qualified labour
State-of-the-art electronics	Ultimate precision of better than 1×10^{-7}
Measurement of absolute magnetic susceptibility	Reported as $m^3/kg \times 10^{-7}$
Up to 10 calibration equations are available	Can be used for multi-source material
"LIMS" capability	Optimised data availability
Data stored in Excel-compatible format	Easy data manipulation and display
Up to 4 times competitor sample size	Unparalleled sampling representation

Technical Specifications

Sample Presentation

Sample holder size	Approximately 20mm diameter and 50mm long.
Sample size required	Typically, 10g – 20g
Sample preparation	Typically pulverised to minus 0.1mm
Measurement Resolution	Better than $1 \times 10^{-7} m^3 / kg$

Electrical

Power supply	240V AC Single phase, 2 Amp
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Computer Software requirements

Windows 10

LIMS Capability	Dependent of user LIMS specifications
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System Physical Specifications

Mass	2 Kg
Dimensions	Approximately 290mm x 240mm x 110mm (L,W,H)

Shipping

Mass	Approximately 5 Kg
Dimensions	Approximately 300mm x 300mm x 150mm (L,W,H)

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On-Pipe Non-Nuclear Density Gauge

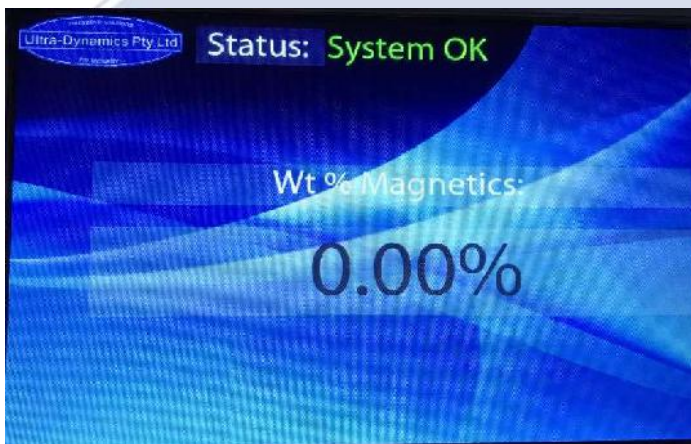
Your OH&S friendly alternative to conventional gamma ray density gauges, proven in the field for reliability and accuracy

densiMAG™ determines the density of heavy medium slurries primarily magnetite & ferrosilicon. The system is a direct replacement for the conventional and hazardous gamma ray-based technologies with none of the regulatory costs associated with use of a gamma ray sources.

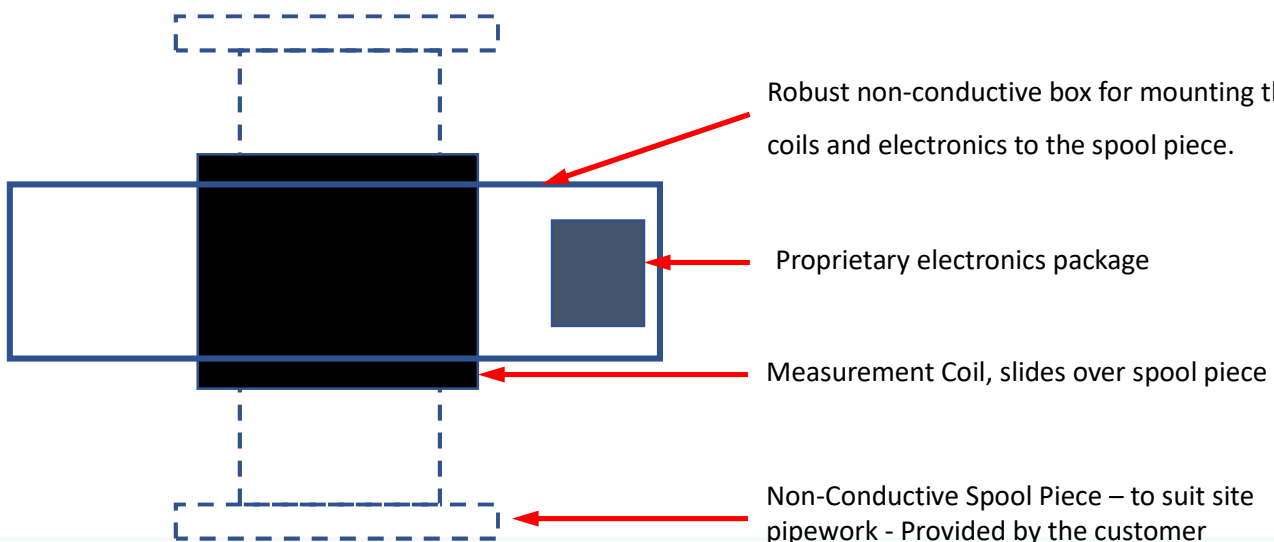
Applications for the technology are varied and include wherever magnetite or ferrosilicon is utilised

For example:

- Coal washeries
- Iron Ore Processing Plants
- Magnetite Processing Plants
- Diamond Mines
- Ferro silicon plants etc



- Simple and easy to use “Wizard” calibration menu.
- Touch Screen Operator Interface
- Two Point Calibration
- Remote access feature allows access to data and touch screen functions via the 3G/4G phone network.



densiMAG[®] On-Pipe Non-Nuclear Density Gauge

Features and Benefits

No gamma ray source	No Occupational Health and Safety concerns Reduced “whole of life” system cost e.g.: <ul style="list-style-type: none">▪ No annual test fees▪ No source disposal costs▪ No requirement for Site Radiation Officer
Fast response	Short response accuracy unaffected by pipe diameter
Factory calibrated	Two-point calibration
Wear resistant HDPE	No wear concerns
Balanced Field Coils	Continuous standardisation for ultimate accuracy
State of the art electronics	Components selected for ultimate electronic stability

Technical Specifications

Application	
Minimum pipe size	No minimum
Maximum pipe size	No maximum – Probe option available for pipes larger than 300mm
Precision	
Operational	Application dependent; for magnetite and ferrosilicon better than 0.01%
Resolution	Application dependent; for magnetite and ferrosilicon better than 0.001%
Operation	
System update time	1 second upwards, user configurable
Electrical	
Power supply	Single phase, 2 Amp
System Physical Specifications	
Mass	Depends on pipe size
Dimensions	Electrical cabinet; 400mm x 400mm x 200mm
Shipping	
Mass	Typically, 60 – 80 kg – Depends on pipe size
Dimensions	1,200mm x 600mm x 600mm (approximately)

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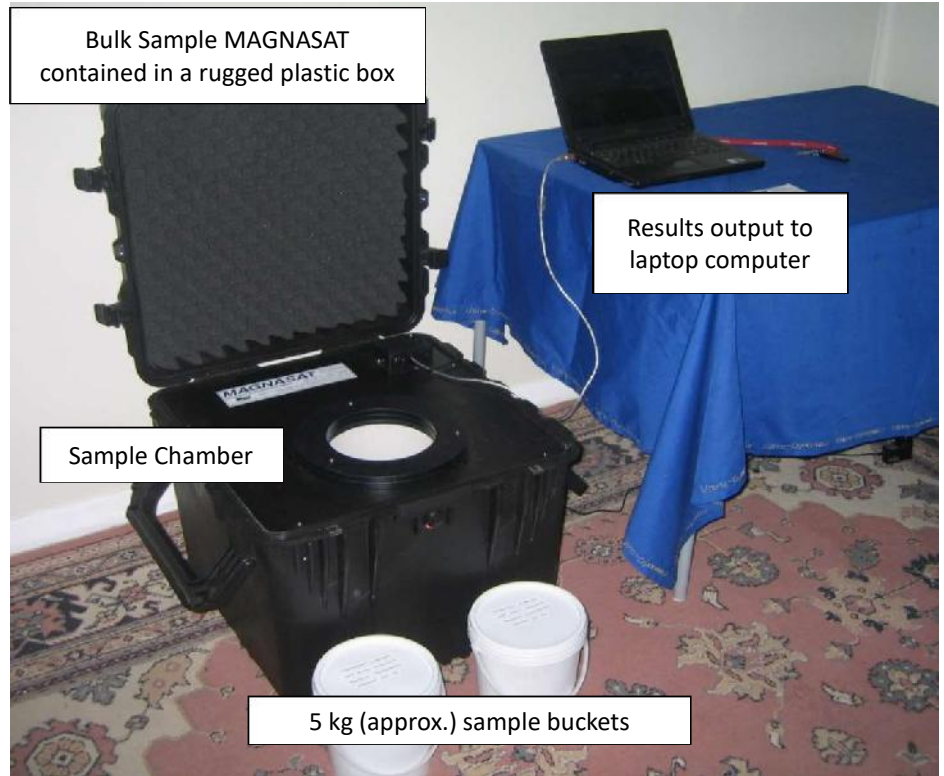
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System Description

MAGNASAT is an easy to use, compact, fully integrated system designed for use out in the field. The sample to be analysed is weighed, placed in a sample bucket and then inserted into the analysis chamber. The system operates under computer control and carries out the analysis automatically. Indicator lights confirm the system status. The results are stored in Excel compatible format, available to be output for display in graphical or tabular configuration remotely.

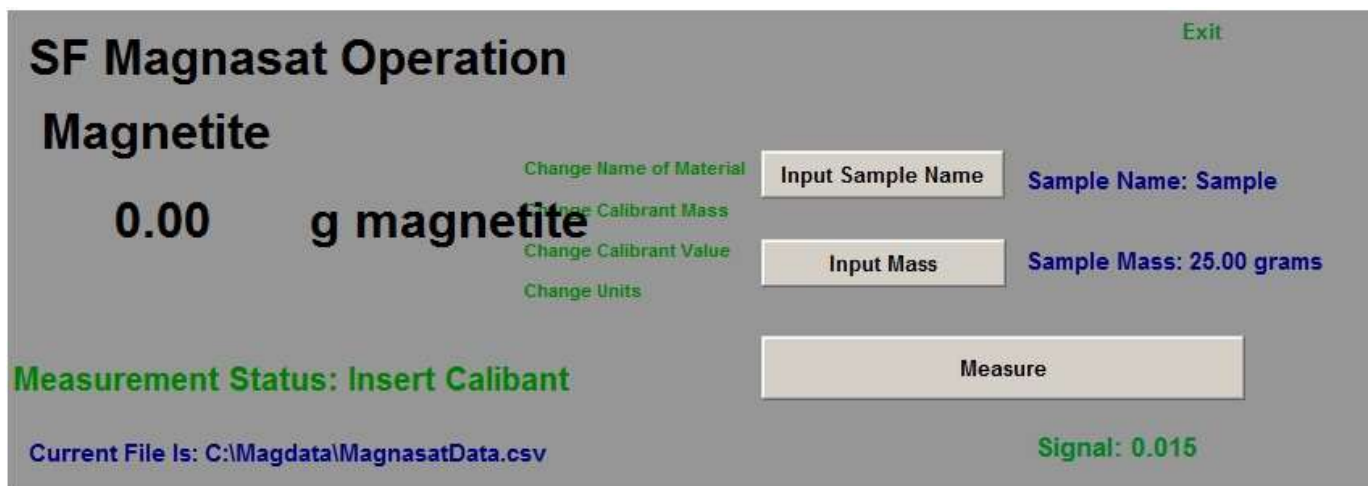


Components of MAGNASAT® RC Chip analyser

Principle of Operation

MAGNASAT determines the magnetic susceptibility of materials by measuring the changes that these materials cause to an alternating current magnetic field. Changes in the magnetic field are caused by a complex mix of eddy currents and the action of magnetic domains. The magnitude of these changes is dependent on the material's magnetic and electrical properties, sample geometry and quantity of material presented for measurement.

The physical principle on which **MAGNASAT** is based relies on tried and tested technology; if a magnet is moved through a coil an electrical current is generated, conversely, if an electrical current is passed through a coil a magnetic field is produced. In this way, an absolute measurement of magnetic susceptibility is provided.



Showing the typical screen elements during operation

MAGNASAT[®] RC Chip Bulk sample Analyser

Features and Benefits

Easy to use, compact PC controlled operation	- No need for highly qualified labour
Fast operation	- Large daily sample throughput
Measurement of absolute magnetic susceptibility	- Results reported as m ³ /kg (and % magnetite plus other useful parameters)
Large sample size up to ~ 5kg	- Good sample representation
Data stored in Excel compatible format	- Ease of data manipulation
Battery-powered, rugged construction	- Portable operation, suitable for use in the field
Built-in reference coil	- Continuous self-adjustment for external influences
Calibration routine before each use	- Ready reference across all sample results

Technical Specification

Sample Presentation	
Sample size	Up to approximately 5 kg
Sample preparation	Weighing an RC Chip sample into the sample container
Electrical	
Power supply	Battery-powered requires a 240V AC single-phase supply for charging
Computer	
PC Specification	Windows operating system with one available USB port and a network connection.
System Physical Specifications	
Mass	15Kg
Dimensions	500mm wide, 450mm high, 500mm deep
Shipping	
Mass	20Kg (approximately)
Dimensions	600mm x 550mm x 600mm (approximately)

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Remote Access Feature

Ultra-Dynamics equipment can be supplied with our 4G remote access module. This allows users to access the system data remotely through internet-connected computers. The remote access feature communicates via the 4G phone network and does not access the site network, thus preserving network security.

The system offers many advantages to the user including:

- The system allows Ultra-Dynamics secured access to the touch screen configuration options. This allows remote assistance to assist with calibration and fault finding, without the need to travel to the site hence removing travel costs and onsite costs, reducing the overall cost of ownership unit downtime as well as removing the need for supervision for site visits. Installation and calibration of systems can cost tens of thousands of dollars depending on the travel distance involved and the complexity of the installation.
- The 4G system can also allow Head Office access to daily, weekly, monthly or a user-selectable date range.
- If supplied, the 4G option requires a data-only sim card. This is relatively cheap and the benefits far outweigh the cost.

A typical 4G dashboard is shown below - Subject to change without notice

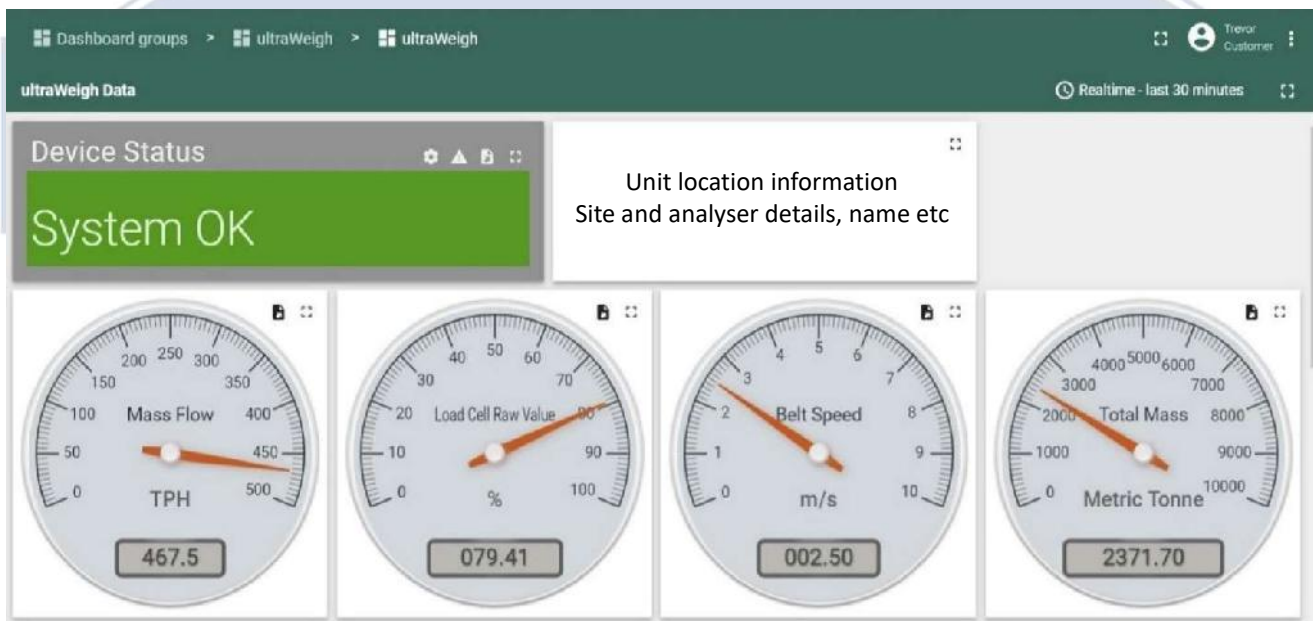


Figure 1 Typical Dashboard (note, the display will vary depending on the product supplied)

The top left contains the “System OK” box, this changes to Red in the event of a fault. The dials show import unit information such as Moisture (%), as in both analogue dial and digital readout formats. Below these dials are several graphs that show the last 30 minutes of moisture data (user-configurable).

The dashboard allows the user to download historical data over weeks, months or a defined date range.

4G Remote Access Feature



Features and Benefits

Remote Site Visit	Significant Savings over physical visits
	No need to allocate time and personnel to supervise site visits
	Allows access to site data from any authorised device

Technical Specifications

Electrical

Power supply	9-24v DC, Supplied with 240v plug transformer
Working Current	400mA
Antenna	External antenna with magnetic base supplied – suitable for indoor use.
Support Modes	TD-LTE, FDD-LTE, WCDMA, TD-SCDMA, GSM, EVDO, CDMA2000, 4G, 3G, 2G.
Input	RS485, RS232, RJ45 Ethernet

System Physical Specifications

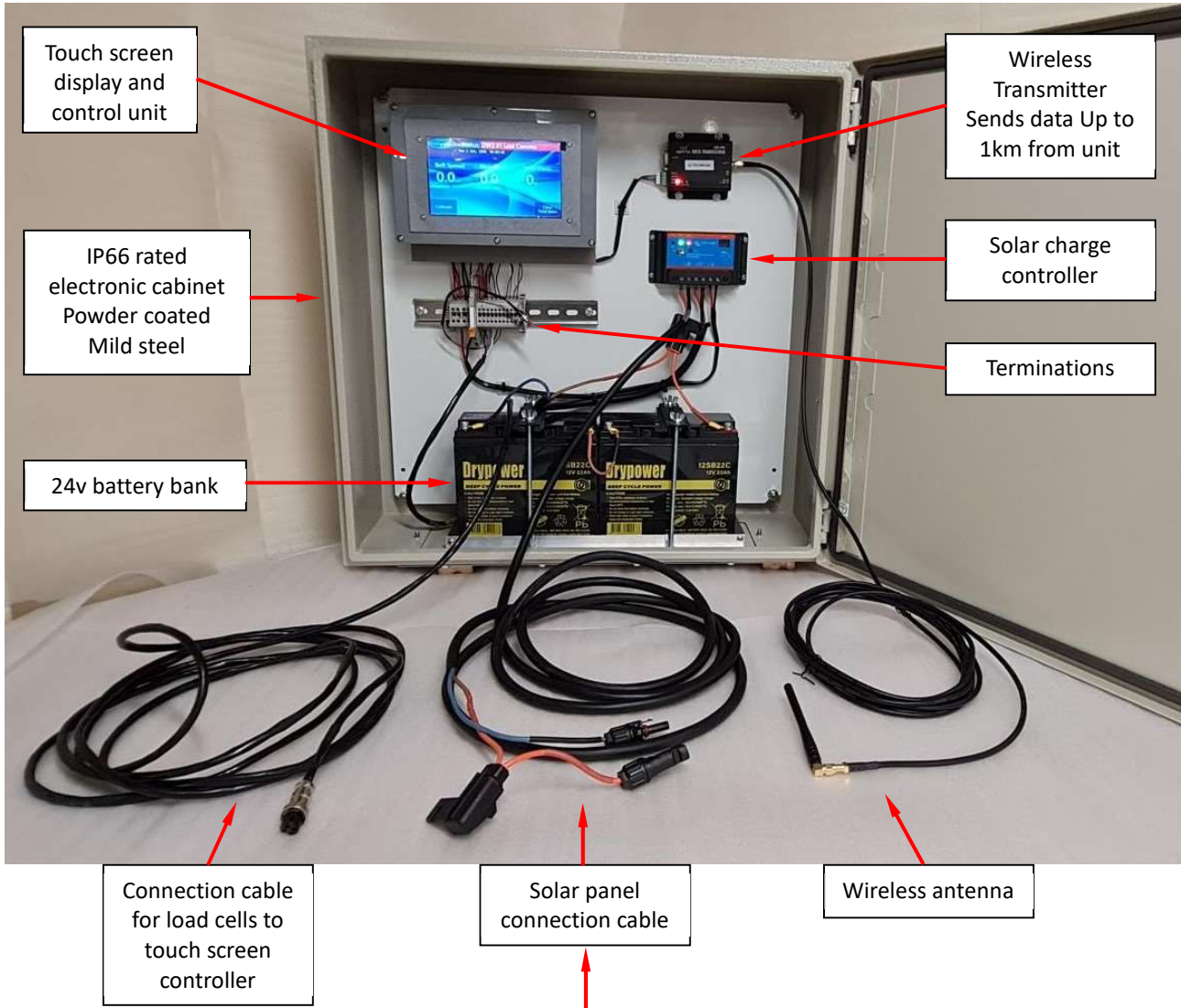
Mass	< 500g
Dimensions	100 mm x 70 mm x 30 mm

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ultraWEIGH[®] Solar and Wireless Option



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