GEOSENSE

HOSKIN SCIENTIFIC

Geotechnical & Structural Instruments

Made in the UK, Trusted Worldwide

Company

OUR PROMISE

Our philosophy is simple: to provide our customers with quality products at competitive prices with the best possible service, technical support and after care. We promise to ensure you find the best possible solution for each specific project requirement - and to get it delivered when you need it.

- VW specialists
- MEMS sensors
- Wireless systems
- Global supplier

OVERVIEW

Quality UK manufacturing & technical support

Established in 1992, Geosense Ltd is now one of Europe's leading manufacturers and suppliers of instruments to the geotechnical, civil engineering, mining and environmental industries.

With a comprehensive in-house design and manufacturing capability we can provide products not only to tight deadlines but also to suit custom-engineered solutions for specific project requirements.

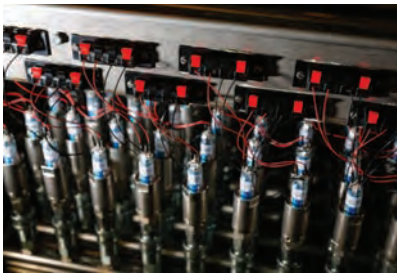
Geosense specialises in the manufacture of vibrating wire and MEMS sensors, which are used to produce a wide range of instruments. In addition we manufacture automated data acquisition systems to complement our sensors, including wireless systems.

All components are manufactured in the UK using CAD-CAM and CNC techniques and this, together with rigorous inspection under our ISO 9001 quality management system, ensures products are of the highest quality.

SERVICES

- Proven quality sensors
- Design & Engineering
- Worldwide Distribution
- Technical Support
- Bespoke solutions
- Training
- Service & repairs


GEOSENSE




GE SENSE

Contents


GEOSENSE

Portable Inclinometers

NEW

Vertical

For the measurement of lateral displacement of soil, rock and structures.

***Applications**: Natural and cut slopes, dams & embankments, bridge piers and abutments, tunnels, shafts, underground workings, piled foundations.*

- High accuracy
- IncloPRO App
- Guided sensor set-up
- MEMS technology
- Wireless communication to readout
- Lightweight rugged construction
- On board calibration in probe
- Probes and reels interchangeable
- Kevlar® reinforced cable with swaged marks

Probe Diameter	25.4mm
Probe Length	719mm
Wheelbase	0.5mm
Resolution	0.005mm per 500mm
Range	±30° from vertical
Temperature Range	-40°C to +70°C
Repeatability	±0.002°

NEW

Horizontal

For monitoring settlement or heave under structures and observation of ground movement caused by construction excavation.

***Applications**: Embankments, dams, roadways, storage tanks, landfills.*

- High accuracy
- IncloPRO App
- Guided sensor set-up
- MEMS technology
- Wireless communication to readout
- Lightweight rugged construction
- On board calibration in probe
- Probes and reels interchangeable
- Kevlar® reinforced cable with swaged marks

Probe Diameter	25.4mm
Probe Length	719mm
Wheelbase	0.5mm
Resolution	0.005mm per 500mm
Range	±30° from horizontal
Temperature Range	-40°C to +70°C
Repeatability	±0.002°

Portable Inclinometers

NEW

Inclined

Used for monitoring lateral deformations within an inclined borehole or surface.

Applications: Down-stream face of concrete faced rock filled dams.

- High accuracy
- IncloPRO App
- Guided sensor set-up
- MEMS technology
- Wireless communication to readout
- Lightweight rugged construction
- On board calibration in probe
- Probes and reels interchangeable
- Kevlar® reinforced cable with swaged marks

Probe Diameter	25.4mm
Probe Length	719mm
Wheelbase	0.5mm
Resolution	0.005mm per 500mm
Range	±15° from 45°
Temperature Range	-40°C to +70°C
Repeatability	±0.002°

Portable Inclinometers

The new Geosense MEMS Portable Inclinometer System utilises the very latest technology to provide direct from site connection, meaning data can be sent live via FTP, email or API. Full 360° EMC protection ensures stable readings even on 'noisy' sites.
The system comprises a slimline probe (detachable), lightweight cable reel and readout via a rugged smartphone using android-based operating software.

In-Place Inclinometers (IPIs)

Vertical

MEMS

- Uni-axial and bi-axial options
- MEMS sensors
- Single cable digital BUS system
- Stainless steel construction
- IP68 (20 bar) rated
- Removable
- Variable gauge length
- High accuracy and precision
- Rigid rod or wire rope versions available

Measure lateral movement of soil and rock or deflection of man-made structures when remote and continuous monitoring is required. Can be BUSSED so only one cable per borehole reducing cost of installation.

Applications: Retaining/diaphragm walls, dams, slope stability,tunnelling.

Range	±15° from vertical
Resolution	±2 arc sec (±0.01mm/m)
Axis	Uniaxial and biaxial
Accuracy	±0.004° (±13.5 arc sec,±0.065 mm/m) ±0.0125% FS
Output	RS-485 Digital bus
Operating Temp	-40°C to +85°C
Casing sizes	70-85 mm

Inclined

MEMS

- Uni-axial and bi-axial options
- MEMS sensors
- Single cable digital BUS system
- Stainless steel construction
- IP68 (20 bar) rated Removable
- Variable gauge length
- High accuracy and precision
- Rigid rod or wire rope versions available

Used primarily for monitoring the downstream concrete face of rock-filled dams or other inclined applications.

Applications: Dams, slope stability, tunnelling.

Range	±15° from 45°
Resolution	±2 arc sec (±0.01mm/m)
Axis	Uniaxial and biaxial
Accuracy	±0.004° (±13.5 arc sec,±0.065 mm/m) ±0.0125% FS
Output	RS-485 Digital bus
Operating Temp	-40°C to +85°C
Casing sizes	70-85 mm

In-Place Inclinometers (IPIs)

Horizontal

MEMS

Designed to remotely monitor, and continuously measure, underground vertical movement as a result of construction and excavation and any settlement that may occur.

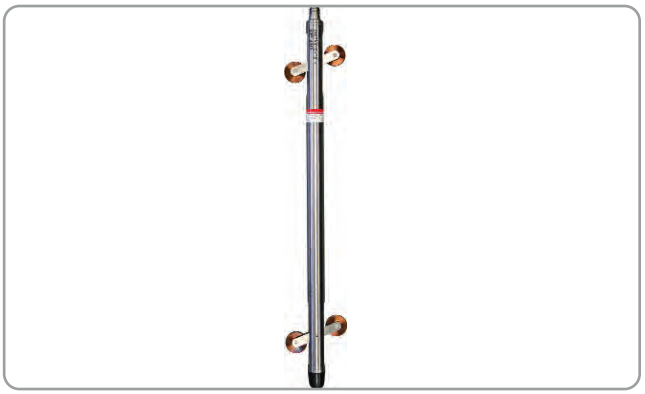
Applications: Embankments, storage tanks, landfills & tunnels.

- Uni-axial and bi-axial options
- MEMS sensors
- Single cable digital BUS system
- Stainless steel construction
- IP68 (20 bar) rated
- Removable
- Variable gauge length
- High accuracy and precision
- Rigid rod or wire rope versions available

Range	±15° from horizontal
Resolution	±2 arc sec (±0.01mm/m)
Axis	Uniaxial and biaxial
Accuracy	±0.004° (±13.5 arc sec, ±0.065 mm/m) ±0.0125% FS
Output	RS-485 Digital bus
Operating Temp	-40°C to +85°C
Casing sizes	70-85 mm

Spiral Sensor

MEMS



Used to determine down-hole helical deformation of installed inclinometer casing.
It can be used with a vertical inclinometer system by using the same cable, reel, and hand-held readout.

Application: Determining spiral deformation of inclinometer casing.

- 'Hot swap' capability with Digital Inclinometer
- System – simply connect probe to reel's connector and prepare for spiral readings on the spot
- No additional software required
- Inclinalysis™ Software used for Digital Inclinometer Systems doubles as the method of processing spiral data
- Compact and lightweight design ensures spiral surveys in all casing orientations

Range	360°
Weight	1kg
Overall length	570mm
Gauge length	400mm
Accuracy	± 0.25% FS
Resolution	0.01°

Inclinometer Casing & Accessories

Quick Joint (QJ) Casing

Quick-connecting casing, precision extruded from ABS, with four precise keyways formed at 90 degrees. Faster and easier to install than traditional glue & socket casing.

Applications: Slopes & landslides, embankments, diaphragm walls, sheet pile walls, piles, pre-loads, deep excavations.

- Flush coupled with Quick Connect joints and O-ring seal
- Rapid and easy installation
- No need for glue, rivets and tape
- Telescopic sections available
- Fully compatible with all probe types
- 70 and 83mm diameters
- Available in 3 & 1.5 metre lengths
- Colour: Orange

Material	ABS 100% virgin
Groove spiral	<0.3 °/3m
Collapse resistance	~ 2000kPa
Joint strength	186Kgf
Maximum temperature	+80°C

External Coupler (XC) Casing

Precision extruded from ABS with four precise keyways formed at 90 degrees which allow accurate installation of portable and in-place inclinometers. Standard joints are made by using external couplers.

Applications: Slopes & landslides, embankments, diaphragm walls, deep foundation, tunnelling, piles, pre-loads, deep excavations.

- Low spiral
- Fast installation
- Can be cut & repaired on site
- Available in 3 & 1.5 metre lengths
- Fully compatible with all probe types
- 70 and 85mm diameters
- Telescopic sections available
- Colour: Natural

Material	ABS 100% virgin
Groove spiral	<0.3 °/3m
Collapse resistance	~ 2000kPa
Joint strength	710Kgf
Maximum temperature	+80°C

Inclinometer Casing & Accessories

Casing Anchors

Fixed to the bottom of casing prior to installation to prevent uplift, usually due to buoyancy forces of water or grout. As soon as the anchor exits the bottom of the drill rod/ borehole, the spring-loaded arms are automatically extended to grip the borehole wall.

Anchors available for 70 and 85mm casing in both snap seal and glue and socket coupling styles.

Slip Indicator System

The Slip Indicator comprises a flexible pipe with base plate which is inserted into the base of a borehole and surrounded with sand.

When a lateral differential movement of the soil occurs, the flexible tube will become deformed in the zone of movement. Indicator probes, attached to a length of support rope, are used to determine the zone of movement.


GE SENSE
MEMS TILT METER
MEMS

Tilt Sensors

MEMS In-place Tilt Meter

- MEMS technology
- Ultimate accuracy and repeatability
- Uniaxial or biaxial sensors option
- LSHF cable option
- Horizontal or vertical mounting
- Easy to install
- Outputs: 4-20mA, RS-485 (BUS)
- IP66 enclosure
- Data logger compatible

Range	±15° (other ranges on request)
Axis	Uniaxial and biaxial
Accuracy (analogue)	±0.005°
Accuracy (digital)	±0.004°
Resolution (analogue)	0.0019°
Resolution (digital)	0.0005°
Repeatability (analogue)	±0.002°
Repeatability (digital)	±0.002°

Measure uniaxial or biaxial tilt, measured from the plane(s) perpendicular to the base unit. They are designed to be installed permanently in either the vertical or horizontal position by either bonding or bolting directly to a structure or mounting plate.

Applications: Retaining, diaphragm & party walls, concrete dams, structures, bridge piers, tunnels, compensation grouting, slopes, piles.

MEMS Submersible Tilt Meter

- MEMS technology
- Robust construction
- Suitable for long-term, high-pressure underwater situations
- Can be mounted on inclined, vertical or horizontal surface
- Outputs: 4-20mA, RS-485 (BUS)
- High accuracy and repeatability
- IP68 (16 bar) enclosure

Range	±15° (other ranges on request)
Axis	Uniaxial and biaxial
Accuracy (analogue)	±0.005°
Accuracy (digital)	±0.004°
Resolution (analogue)	0.0019°
Resolution (digital)	0.0005°
Repeatability (analogue)	±0.002°
Repeatability (digital)	±0.002°

Precision real-time remote monitoring of tilt in submerged structures. A tilt sensor and electronics are mounted inside a rugged waterproof enclosure. It can be mounted directly on horizontal, vertical or inclined surfaces. In all three situations, no precision levelling is required as the sensor (+/-15°) allows for latitude in installation.

Applications: Monitoring of tilt in submerged structures.

Tilt Sensors

MEMS Portable Tilt Meter

MEMS

- MEMS technology
- Uniaxial or biaxial sensors available
- Horizontal or vertical applications
- Readout units & portable sensor lightweight
- Easy to use
- Data logger compatible
- High accuracy & repeatability
- Outputs: 4-20mA, RS-485

Range	±15° (other ranges on request)
Axis	Uniaxial and biaxial
Accuracy (analogue)	±0.005°
Accuracy (digital)	±0.004°
Resolution (analogue)	0.0019°
Resolution (digital)	0.0005°
Repeatability (analogue)	±0.002°
Repeatability (digital)	±0.002°

Measure tilt in either one or two axial planes perpendicular to the surface of the base plate. Used in conjunction with a permanent reference plate which is bolted or bonded to the surface being monitored.

Applications: Typically where a large number of measuring points are to be observed.

EL In-place Tilt Meter

MEMS

- Electrolytic technology
- Ultimate accuracy and repeatability
- Uniaxial or biaxial sensors option
- LSHF cable option
- Horizontal or vertical mounting
- Easy to install
- Outputs: RS-485 (BUS)
- IP66 enclosure
- Data logger compatible

Range	±15° (other ranges on request)
Axis	Uniaxial and biaxial
Accuracy	±0.01°
Resolution	0.0003°
Repeatability	±0.005°
Operating temperature	-40 to +85°C

Measures uniaxial or biaxial tilt, measured from the plane(s) perpendicular to the base. Can be installed in either vertical or horizontal position. Well-established Electrolytic technology particularly resistant to the effects of vibration.

Applications: Retaining, diaphragm & party walls, concrete dams, structures, bridge piers, tunnels, compensation grouting, slopes, piles.

Tilt Sensors

MEMS Tilt Beam

Attached to structures, on either a vertical or horizontal surface, for the measurement of tilt or differential settlement. Can be joined in long strings for profile measurements.

Applications: Retaining walls, diaphragm walls, concrete dams, party walls, structures, bridge piers, tunnels, compensation grouting.

- Robust construction
- Convenient to install and easy to use
- Beams can be linked together to provide profile data over long distances
- Outputs: RS-485 (BUS)
- Easily adaptable to datelining
- Integral temperature sensor
- Length 1, 2 , 3m

Range	25.4mm
Axis	719mm
Accuracy (digital)	0.5mm
Resolution (digital)	0.005mm per 500mm
Repeatability (digital)	±30°from vertical

NEW

Tunnel Segment Monitoring System

A series of tilt meters, fixed to the tunnel wall on recast concrete segments erected in place as tunnel lining by a Tunnel Boring Machine (TBM).
It can be deployed in the tight space available around the TBM.

Applications: Monitor convergence of precast concrete segments in TBM-driven tunnels during construction & monitoring existing tunnels.

- Very low profile design
- Suitable for installation in the tight space available around TBMs
- No tunnel traffic interference
- High system accuracy
- Tilt meters can easily be redeployed periodically to follow tunnel face progression
- Built-in connectors for manual tape extensometer connection
- Immune to the air density related problems inherent in optical systems

Range	±15°
Resolution	±2 arc sec
Non-linearity	±0.0125% FS
Repeatability	±0.0125% FS

Pendulum System

HPS-3500 (Hanging) and IPS-3000 (Inverted) Pendulums are used to measure the tilt or rotation by measuring the relative internal horizontal displacement of points along a true vertical line.
Displacements relative to the wire are measured using an optical manual readout or, for remote reading, the TP-2000 automatic readout is used.

Applications: Concrete dams, bridges & high-rise buildings.

- High accuracy and repeatability
- Manual or automatic readouts available
- Direct and inverted options available
- Simple to use
- Long-term reliability
- Movements can be observed at frequent intervals
- Proven technology
- Can read X, Y and Z movement

AVAILABLE ITEMS
Direct pendulum c/w tensioning weight & tank
Inverted pendulum
Stainless steel wire for pendulums
Portable optical readout
Automatic readout
Repeatability

Piezometers

VW Piezometer VWP-3000/3310 (standard)

- Reliable long-term performance
- Rugged
- Suitable for demanding environments
- High accuracy
- Insensitive to long cable lengths
- LAE & HAE filter options

Pressure Range	345, 518, 690 kPa 1, 2, 3.5 MPa
Over-range	1.5 x rated pressure
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Temp range	-20°C to +80°C

VWP-3000: Standard construction with high & low air entry filters to measure groundwater elevations and pore pressures.
VWP-3310: Standard construction but vented to compensate for barometric pressure changes. Available with high & low air entry filters.

Applications: Pore pressure measurement in soils and rocks, fluid pressures in hydro-fracture and pump tests.

VW Piezometer VWP-3100 (heavy duty)

- Reliable long-term performance
- Rugged
- Suitable for direct burial & deep installations
- High accuracy
- Insensitive to long cable lengths
- LAE & HAE filter options

Pressure Range	345, 518, 690 kPa 1, 2, 3.5, 5, 7, 10, 20 MPa
Over-range	1.5 x rated pressure
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Temp range	-20°C to +80°C

Heavy duty body for direct burial in-fills and dam embankments. Available with high & low air entry filters, standard and heavy duty cable.

Applications: Pore pressure measurement in soils and rocks, fluid pressures in hydro-fracture and pump tests.

Piezometers

VW Piezometer VWP-3200/3300 (low pressure)

- Reliable long-term performance
- Rugged
- Suitable for environments with low pressure
- High accuracy
- Insensitive to long cable lengths
- LAE & HAE filter options

VWP-3200: Low pressure version to measure groundwater elevations and pore pressures.
VWP-3300: Low pressure vented version to compensate for barometric pressure changes.
Available with high & low air entry filters.

Applications: Pore pressure measurement in soils and rocks, fluid pressures in hydro-fracture and pump tests.

Pressure Range	70, 173 kPa
Over-range	1.5 x rated pressure
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Temp range	-20°C to +80°C

VW Piezometer VWP-3400/3401 (drive-in)

- Reliable long-term performance
- Rugged
- Suitable for soft soils
- High accuracy
- Insensitive to long cable lengths
- Range of adaptors to suit installtion method
- Tapered body to aid self sealing of borehole

VWP-3400: Drive-in version available for use with CPT rods.

VWP-3401: Drive-in version available for use with 1" BSPM rods.

A range of drive-in adaptors, including R32, are available.

Applications: Pore pressure measurement in soils and rocks, fluid pressures in hydro-fracture and pump tests.

Pressure Range	345, 518, 690 kPa 1, 2, 3.5 MPa
Over-range	1.5 x rated pressure
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Temp range	-20°C to +80°C

Piezometers

Multi-point VW Piezometer

- No inter-zone leakage
- Simple installation
- Field proven reliability & accuracy
- Will tolerate wet wiring common in geotechnical applications
- Immune from external electrical noise
- Signal transmission of several kilometres
- Cable lengths can be changed without affecting the calibration

Pressure Range	345kPa to 3.5 MPa
Over-range	1.5 x rated pressure
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Temp range	-20°C to +80°C

Allows multiple VW piezometers to be simply and reliably installed in a single borehole, connected to a single cable. Used primarily where multi-zone monitoring is needed at single locations. No conductors are shared ensuring the independent reliability of each sensor reading.

Applications: Assessing stability of earth fill dams & embankments & slope stability, monitoring of pressures behind retaining and diaphragm walls & pore pressures during fill or excavation.

Strain Gauge Piezometer SGP-3400

- Fast response
- Suitable for dynamic measurements
- High accuracy
- Easy to read
- Can be easily automated
- Wide pressure range
- Temperature compensation

Pressure Range	0 to 3.5 MPa
Over Range	1.5 x rated pressure
Accuracy	<0.5% FS
Thermal Effect	<0.04% FS/°C
Temp range	-20°C to +80°C
Output	4 - 20 mA, 0 - 10 VDC

Monitors soil pore pressure or changes in water level. Accurate, highly reliable and suitable for use in harsh environments including water wells, boreholes, dams, reservoirs, rivers, tanks or any other body of water.

Applications: Well monitoring, groundwater & surface water monitoring, dewatering, percolation testing, slug testing, pore water pressure.

Piezometers

Standpipe Piezometer

- Economic
- Simple to install
- Simple to use
- Variable filters
- Variable Material
- Can be used for artesian pressure

Porous Plastic Element	Material	HDPE
	Mean Pore Size	60 microns
	Permeability	3x 10-4m/s
	Porosity	35%
Ceramic Element	Material	Alumo Silicate
	Mean Pore Size	60 microns
	Permeability	3x 10-4m/s
	Porosity	45%

Simple & economic measurement of groundwater pressures in soil and rock. Low air entry porous plastic or ceramic elements are connected to standpipe tubing and lowered into a pre-drilled borehole. Alternative types may be driven or pushed into soft soil.

Applications: Monitoring of dams, reservoirs & embankments, slope stability, groundwater levels & sampling, permeability testing, contaminated soil monitoring.

Water Level Meter

- Slimline 14 mm probe
- High accuracy
- Simple to use
- Easy to clean
- Robust construction
- Compact design

Probe Diameter	14mm
Probe Length	150mm
Tape Type	Steel mm markings
Tape Lengths	30, 50, 100, 150, 200, 250, 300 metres*
Audible Indicator	88 dB (A) buzzer
* Special lengths available on request	

Used to determine the water level within a borehole, piezometer pipe or sump.
It consists of a stainless steel shrouded probe with a specially-designed conductive probe to minimise displacement errors, providing unparalleled accuracy particularly in small bore piezometers.


GE
SENSE
PRODUCT
TYPE
RANGE
SERIAL NO

Extensometers

Magnetic Extensometer GEO-XM

- Quick & easy to install even in up-hole applications
- Easy access & adjustment to sensors
- Mechanical & electrical options
- Low profile
- Accurate & reliable

Applications: Foundations, excavations, dams, embankments, sheet piles, retaining walls, slurry walls, tunnels & shafts & reclamation.

Used typically to monitor settlement or heave in foundations, excavations and embankments. Total settlement is identified as well as the depth/position where it has occurred.

OPERATION

The system comprises a Reed Switch Probe, a mm graduated tape on a reel and an access tube, along which magnetic targets are positioned. The magnets are coupled to the surrounding soil and move up or down as heave or settlement occurs.

Readings are obtained by drawing the probe through the access pipe to find the depth of the magnets. When the probe enters a magnetic field, a reed switch closes, activating a light and buzzer. The operator then refers to graduations on the cable and notes the depth of the magnet.

When the access tube is anchored in stable ground, the depth of each magnet is referenced to a datum magnet fixed to the bottom section of the access tube. Any settlement or heave of the ground being measured will cause the magnets to move along the axis of the pipe.

If the bottom of the access tube is not in stable ground, the depths of the magnets must be referenced to the top of the pipe, which is optically surveyed before readings are taken.

MODELS

GXM-100	Central access tubing and spider magnets for use in boreholes
GXM-100P	Central access tubing and settlement plates for use in fill
GXM-100T	Central access tubing with telescopic joints to accommodate larger levels of movement
GXM-200	Combined settlement/heave and inclination using inclinometer casing as the access tubing with spider magnets
GXM-200P	Combined settlement/heave and inclination using inclinometer casing as the access tubing with settlement plates
GXM-200T	Combined settlement/heave and inclination using inclinometer casing with telescopic joints for larger levels of movement
GXM-300	Central access tubing de-bonded by an outer corrugated pipe with magnetic targets
GXM-300i	Combined settlement/heave and inclination using inclinometer casing as the access tubing de-bonded by an outer corrugated pipe with magnetic targets

Extensometers

Borehole rod extensometer GEO-XB2

VW

Used to measure and locate settlement, displacement and deformation in soil and rock. It consists of a reference head and one or more in-hole anchors, each of which is placed at a known depth and connected to the reference head. As the soil or rock deforms the anchors' positions change and the relative movement can be measured in the reference head.

Applications: Measurement of deformation of dam abutments & foundations, ground movement around tunnels & mines and behind retaining walls & sheet piles, fracturing in roofs of underground caverns, deformation of concrete piles and settlement & heave in soft soil excavations.

- Quick & easy to install, even in uphole applications
- Easy access & adjustment to sensors
- Mechanical & electrical combination possible
- Integral grout holes in head make grouting easy
- Accurate & reliable

SPECIFICATIONS	
Standard Range	0 to 500 mm
Resolution	0.025% FS
Non-linearity	<0.5%
Typical Borehole Diameters	45 mm to 101 mm

MEASUREMENT	
Description	Ranges
Manual/Mechanical	0-200mm
Vibrating Wire	5, 12.5, 25, 50, 75,100, 150, 200, 300, 500mm
Linear Potentiometer	25, 50, 75, 100, 125, 150,. 175, 200mm

VW SENSORS	
Resolution	0.025% FS
Accuracy	±0.1% FS
Non-linearity	<0.5% FS
Waterproof Rating	IP68 (16 bar)


1

REFERENCE HEAD TYPES (PIC 1)
Mechanical
Electrical

MEASUREMENT OPTIONS
Mechanical - Reading is carried out using a dial indicator or depth micrometer
Electrical - Reading is carried out using an electrical sensor


2

SENSORS (DISPLACEMENT GAUGES)
Vibrating wire (PIC 2)
Linear Potentiometer (PIC 3)

RODS
Rigid type - 6mm stainless steel M6 threaded flush coupled joints available in 1, 2, 3m lengths
Flexible type - 5mm GRP in lengths up to 400m


3

SLEEVES
Available in rigid PVC with flush threaded joints or flexible nylon with external couplers

ANCHORS
Groutable (PIC 4)
Hydraulic (PIC 5)
Snap Ring (PIC 6)
Packer (PIC 7)


4


5


6


7

Extensometers

Reed Switch Probe

- Slimline probe
- High accuracy
- Simple to use
- Easy to clean
- Robust construction
- Compact design

Probe Diameter	14mm
Probe Length	150mm
Probe Material	Austenitic Stainless Steel
Tape Type	Steel mm markings
Tape Width	11.5mm
Tape Coating	Polyethylene
Tape Lengths	30, 50, 100, 150, 200m*

* Special lengths available on request

The reed switch probe is used to determine the location of magnetic sensors in magnetic settlement systems. When the reed switch passes through a magnetic field it closes, completing a circuit, and a buzzer is activated. The elevation of the magnet target is read directly from the tape.

Applications: To measure location of magnetic targets, For use with magnetic extensometer systems.

VW Soil Extensometer

VW

- Easy installation and maintenance
- Suitable for remote reading and data logging
- Robust and accurate
- Wide measuring range
- VW displacement sensor assures long-term stability

Gauge Length	1m, with 0.5, 1, 2 & 3m extension kits
Sensor Range	100, 150, 200, 300, 500mm
Accuracy	±0.1% FS
Resolution	0.025% FS
Non-linearity	0.5% FS

Monitors lateral and longitudinal deformation of soil and different types of embankments and embankment dams.

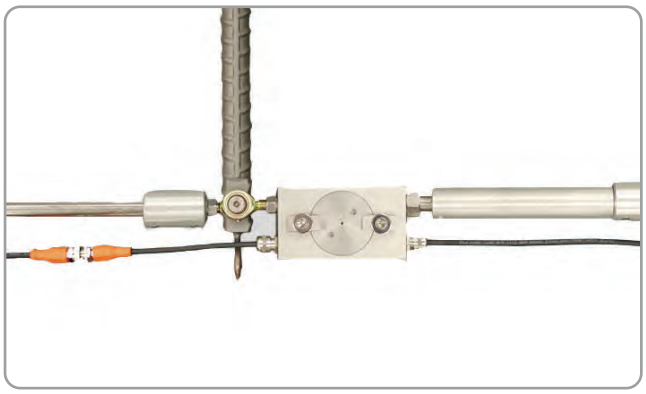
It consists of a vibrating wire displacement sensor encased in a sealed body. The body contains a telescopic outer PVC pipe fitted with two flanges and an inner stainless steel rod. As deformation occurs, the telescopic pipe moves with the soil causing the rod to operate the displacement sensor.

Applications: Measurement movements in embankment fill material, displacements of retaining walls and abutments & foundation spreading.

Extensometers

Tunnel Profile Monitor

MEMS



- Low profile design with multiple arms to fit close to tunnel wall
- Does not interfere with tunnel traffic
- High system accuracy of up to 0.02mm of deformation
- Custom engineered to suit each individual application
- Immune to air density problems inherent in optical systems
- Direct measurement of displacement rather than calculation from tilt measurement

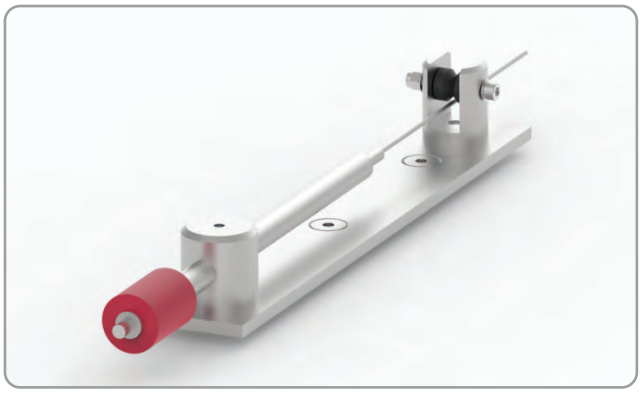
The system involves a series of linked rods, fixed to a tunnel wall to monitor deformation. A data logging system and related software is available to provide near real time displacement and generate a graphical representation of tunnel performance.

Applications: Monitor underground openings during construction for control and safety, tunnel deformation due to nearby construction, long-term deformation and performance of existing tunnels.

DISPLACEMENT SENSOR	
Total Mechanical	25mm
Resolution	Infinite
Accuracy	0.06mm
TILT SENSOR	
Range	±15°
Resolution	±2 arc sec. (±0.0006°)
Non-linearity	±0.0125% FS (±0.002°)

Wire Deformeter GEO-DW300

VW



- Displacement range up to 50mm
- Wire extendable up to 10 metres
- Simple to install
- VW output
- 4-20mA output
- Rugged construction
- Compatible with WI-SOS 480 wireless system

The GEO-DW300 Wire Deformeter is designed to monitor the changes in distance between two anchor points and is available with either vibrating wire or potentiometer transducers. A stainless steel wire connects the transducer to the opposing anchor.

Applications: For monitoring displacements and convergence in structural joints, landslides, rock movements & walls.

Range	25mm, 50mm.
Technology	VW transducer with thermistor/ Linear potentiometer
Total Accuracy	< ±0.50% FS,< ±0.30% FS, < ±0.20% FS
Signal output	Frequency (VW), ohm (T), 4-20 mA current loop
Operating temp	- 20°C to +80°C, - 20°C to +60°C

Extensometers

Wire Deformeter GEO-XW100

- Displacement range up to 2000mm
- Wire extendable up to 30 metres
- External sleeve available for environmental and physical protection
- Stainless steel support posts available
- Simple to install
- 4-20mA output
- Rugged enclosure rated to IP65

Sensor type	Potentiometric linear transducer
Displacement	50 to 1000mm
Accuracy	± 1mm (dependent on temp)
Resolution	Infinite
Nonlinearity	<0.255 FS
Repeatability	± 0.03mm

Designed to monitor the changes in distance between two anchor points up to a maximum of 30 metres apart.
It comprises a rotary potentiometric displacement gauge, an opposing anchor and a stainless steel wire that runs between the displacement gauge and the opposing anchor. With a wire extension kit, the length of the wire can be extended up to a maximum distance of 30 metres.

Applications: For monitoring large displacements in landslides, rockfalls & surface faults.

Measuring Anchor

VW

- Simple & robust construction
- Replaces system anchor
- No extra borehole required
- Automatic data acquisition possible

Lengths	2, 3, 4, 6, 9 metres
Anchor points	4
Capacity	250 kN
Range - manual	±10mm
Range - VW	±10mm
Resolution - manual	0.01mm
Resolution - VW	0.01mm
Accuracy (VW)	<0.5% FS

Measuring Anchors are a combination of a rock bolt and an extensometer and are used to determine the load exerted on rock bolts.
They consist of a hollow anchor body, the sectional area and material of which corresponds to that of the rock anchor being monitored. Changes of length due to extension or compression between each anchor point can be measured using a mechanical dial gauge, VW or potentiometric transducer.

Applications: Tunnels, mines, dams, bridges, retaining walls, rock formations, foundations.


GE SENSE

Joint & Crack Meters

VW Crack Meter VWCM-4000

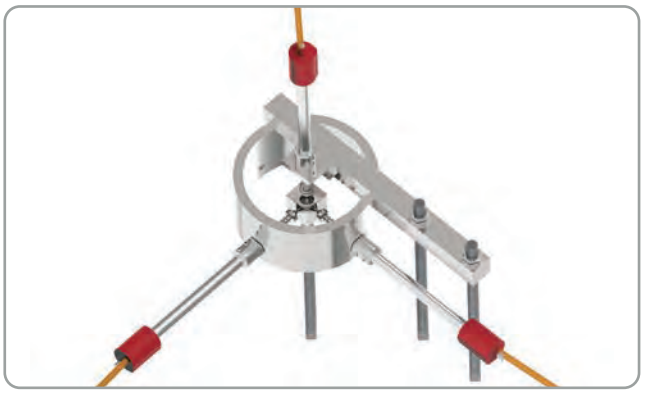
- Simple to install and read
- High resolution & accuracy
- Internal thermistor
- Insensitive to long cable runs
- Data logger compatible
- Ranges from 5 to 500mm
- Waterproof up to 16 bar
- 3D version available

Ranges	5, 12.5, 25, 50, 100, 150, 200, 300 mm
Resolution	<0.025% FS
Accuracy	±0.1 FS
Non-linearity	<0.5% FS
Frequency	1650 - 2700 Hz
Waterproof rating	16 bar

Measures movement across surface cracks and joints in concrete, rock, soil and structures. Consist of a sensor outer body tube and an inner free-sliding rod which is connected at the internal end to a vibrating wire sensor by a spring. At the sensor end of the outer body and the external end of the rod anchors are attached.

Applications: Concrete structures, stone & brick buildings, dams, tunnels, construction joints, pipelines, rock formations can be fixed either side of a crack to be monitored.

VW 3D Crack Meter VWTCM-4600



- Monitors X,Y, Z axes
- Accurate and robust
- Range up to 50mm
- Internal thermistor
- Waterproof to IP68 (18 bar)
- Data logger compatible

Range	12.5, 25mm
Resolution	<0.025% FS
Accuracy	± 0.1% FS
Non-linearity	<0.5% FS
Frequency Range	1650 - 2700 Hz
Nominal zero value	1850 Hz
Body material	Stainless Steel

Monitor three-way displacement across cracks and joints in concrete, rock, soil and structures.
The central reference block allows the vibrating wire transducers to show independent movement in all directions, irrespective of each other.
A 3D mounting frame comprises two arms and two groutable anchors. Three vibrating wire displacement transducers, which also monitor temperature, are installed in the mounting frame.

Applications: Concrete structures, stone & brick buildings, dams, tunnels & rock formations.

Joint & Crack Meters

Manual 3D Crack Meter

- Three way independent movement monitoring
- Reads in X, Y and Z axes
- Easy to install
- Simple manual reading
- Accurate and precise
- Low maintenance
- Long-term stability and reliability
- VW option available

Range	±12, ±35, ±75mm
Block Material	Anodised Mild Steel
Anchor type	Groutable
Anchor Material	BZP Mild Steel
Anchor Size	100 x 160mm

Monitors joints of mass concrete structures, it comprises a socket and a main body.
The body is set or drilling into a concrete surface across a joint or crack. Once set, a manual depth gauge is used to accurately measure displacement.

Applications: Monitoring of joints of concrete arch, gravity and buttress dams, concrete-faced, rock fill dams, concrete retaining walls piled foundations.

Linear Potentiometer Crack Meter LPCM-4500

- High accuracy
- Fast stability of readings
- MEMS technology
- Wireless communication to readout
- Lightweight
- Rugged construction
- On board calibration in probe
- Probes and reels interchangeable
- Only probe returned for calibration
- Kevlar® reinforced cable with swaged marks

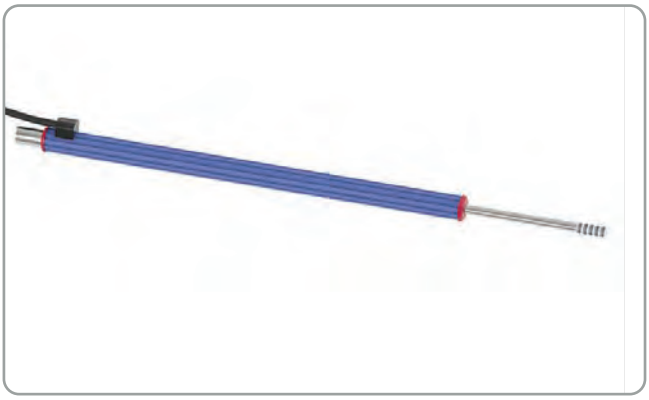
Range	25, 50, 75, 100, 125, 150, 175, 200mm
Resolution	<0.01% FS
Accuracy	±0.20% FS
Non-linearity	<±0.5% FS
Signal output	4-20mA, mV/V
Temp range	-30 °C to +125°C

Used to measure movement across surface cracks and joints in concrete, rock, soil and structures.
A potentiometric displacement transducer is housed in an aluminium body with a stainless steel shaft and two anchor points. They are installed by grouting, bolting, bonding or fixing expandable anchors to the structure to be monitored.

Applications: Concrete structures, stone & brick buildings, dams, tunnels, construction joints, pipelines, rock formations.

Joint & Crack Meters

Linear Potentiometer Displacement Gauge LPDT-5500



- Reliable long-term performance
- Rugged, suitable for demanding environments
- High accuracy
- Low noise output signal
- Ultra-slim 13mm

Ranges	25-200mm
Accuracy	< ±0.20% FS
Resolution	0.01% FS with MP12 readout
Length (compressed)	127 - 302mm
Length (expanded)	154 - 504mm
Diameter	13mm

Cover displacement ranges up to 300 mm.
They can be incorporated into many displacement products such as rod extensometers, crack and joint meters, convergence meters, soil extensometers and displacement meters.

Applications: Rod extensometers, crack meters Joint meters, wire convergence meters Piled foundations.

VW Displacement Gauge VWDT-5000

- Reliable long-term performance
- Rugged, suitable for demanding environments
- High accuracy
- Insensitive to long cable lengths
- Waterproof to 16 bar

Ranges	5-500mm
Accuracy	±0.1% FS
Resolution	<0.025% FS
Length (compressed)	200 - 1451mm
Length (expanded)	204 - 1901mm
Diameter	13mm
Repeatability	±0.002°

Cover displacement ranges up to 300mm and are fully waterproof to a minimum of IP68 (16 bar external pressure). They can be incorporated into many displacement products such as crack and joint meters, convergence meters, soil extensometers and displacement meters.

Applications: Rod extensometers, crack meters Joint meters, wire convergence meters.

Joint & Crack Meters

NEW

VW Displacement Gauge VWDT-6000

- Reliable long-term performance
- Spring-loaded
- Rugged, suitable for demanding environments
- High accuracy
- Insensitive to long cable lengths
- Waterproof to 16 bar

Ranges	12.5-75mm
Accuracy	±0.1% FSO
Resolution	0.025% FS
Over-range	Range + 20%
Excitation	Pluck or swept frequency
Diameter	13mm

Cover displacement ranges up to 75mm and are fully waterproof to a minimum of IP68 (16 bar external pressure). They can be incorporated into many displacement products such as crack joint meters, convergence meters, soil extensometers and displacement meters..

Applications: Rod extensometers, crack meters, joint meters, wire convergence meters.

VW Joint Meter

- Long-term stability in difficult environments
- Integral lighting protection
- Suitable for data logging and remote monitoring
- High accuracy and resolution
- Accommodates shear movement
- Not affected by cable length

Ranges	12.5, 25, 50mm
Over range	1.25 X range
Resolution	0.025% range FS
Accuracy	0.2% FS
Temp range	-20°C to +80°C
Diameter	51mm
Length x diam	340mm, 430mm

Monitors joints of mass concrete structures. The socket is secured to the form and embedded into the block to be constructed. After removal of the form, and prior to concreting of adjacent block, the gauge is screwed into the socket, set at the desired range and then embedded into concrete.

Applications: Monitoring of joints of concrete arch, gravity and buttress dams, concrete-faced, rock fill dams, concrete retaining walls.

Settlement Monitors

Rod Settlement System GEO-XR

- Simple to install & use
- Low cost

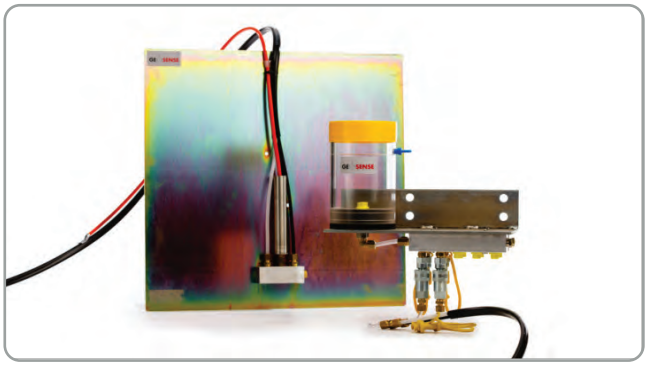
Steel rod OD	25, 33mm
Steel rod ID	19, 25mm
Steel rod Connection	3/4", 1" BSPF/M
Steel rod length	1 metre
PVC sleeve OD	60, 165mm
PVC sleeve ID	52, 150mm
PVC sleeve connection	Flush thread
PVC sleeve length	1 metre

Used to monitor sub-surface settlement or heave of ground. The system comprises a series of inner steel rods and plastic outer sleeves together with plates when positioned on ground before fill or Borros type anchors when used in boreholes.

Applications: Measure subsurface settlements or heave in embankments, pre-loads, deep excavations.

Liquid Settlement System VWLSS-200

VW



- Vented and sealed options available
- In-situ checks available
- Air can be easily removed
- Manual or automated readout
- Reservoir can be sited away from construction area

Standard Range	7, 17 metres
Sensor Accuracy	0.1% full scale
System Accuracy	7, 17 metres
Resolution	0.1% full scale
Temperature Range	-20°C to +80°C

Monitors settlement or heave in soils and structures such as embankments, earth and rock fill dams.
The main components are a reservoir (single or multiple), liquid-filled tubing and a vibrating wire pressure transducer cell mounted on a plate or, for borehole application, attached to an anchor. The vibrating wire sensor is attached to a settlement plate at the point of settlement.

Applications: Measure subsurface point settlements/heave beneath embankments, surcharges, fills, dams, landfills.

VW Settlement Profiler

VW

- Not affected by barometric pressure
- Simple & easy to use
- Accurate settlement profile

Standard Range	7m
Resolution	0.025% FS
Sensor Accuracy	0.1% FS
Temp Range	-20°C to +80°C

For measurement of subsurface settlement. A vibrating wire sensor is located within a probe that can be pulled through a buried pipe or borehole. The sensor, connected via a liquid-filled tube mounted on a reel, measures the hydraulic head of liquid between the sensor and reservoir locations.

Applications: Subsurface settlement/heave profiles beneath embankments, surcharges, fills, roadways, storage tanks, structures and landfills.

Load Cells

VW Anchor Load Cell VWLC-5000

This consists of a cylinder of high strength steel with 3 to 5 vibrating wire strain sensors mounted parallel to the longitudinal axis and arranged equidistant around the circumference to measure compression of the cylinder under load. They are manufactured with a centre hole to accommodate anchors, rock bolts and tendons.

Applications: Measurement of load acting on ground anchors, rock bolts, tie-backs, struts, arch supports, props.

- High strength steel construction
- Load distribution plates available
- Proven long term accuracy
- Accommodates eccentric loading
- Multiple gauge system
- Available with plug connector or cable

Range	300 to 5000kN
Internal Diameters	25, 50, 77, 112, 144, 165, 190, 223, 230mm
Resolution	<0.05% FS
Accuracy*	0.5 % FS
Temperature range	-20°C to +80°C
Output	1200 - 2800 Hz

* System accuracy depends on loading conditions

Hydraulic Anchor Load Cell HLC-6000

These cells consist of a sensitive pressure pad formed by joining two stiff steel discs at their periphery.
The void inside the cell is filled with de-aired fluid. When load is applied the pressure of the inside liquid changes corresponding directly to the load applied. They are manufactured with a centre hole to accommodate anchors, rock bolts and tendons.

Applications: Measurement of load acting on ground anchors, rock bolts, tie-backs, struts, arch supports, props.

- Robust stainless steel construction
- Load distribution plates available
- Manual or VW transducer readout
- Proven long-term accuracy
- Accommodates eccentric loading
- Data logger compatible
- Available with plug connector or cable

Range	250 to 2000kN
Internal Diameters	50, 71, 92, 110, 165, 225mm
Over range capacity	20% FS
Resolution[1]	<0.2% FS
Accuracy[1]	± 1.0 % FSI
Temperature range	-30°C to +85°C
Output signal	Manual or Frequency

[1] For VW sensor

Strain Gauge Anchor Load Cell SGLC-7000

A cylinder of high strength steel with a series of electrical resistance strain gauges connected around the periphery as a Wheatstone Bridge that compensates for unevenly distributed loads and provides a single mV/V signal output. They are manufactured with a centre hole to accommodate anchors, rock bolts and tendons.

Applications: Measurement of load acting on ground anchors, rock bolts, tie-backs, struts, arch supports, props.

- Robust stainless steel construction
- Load distribution plates available
- Dynamic testing possible
- Accommodates eccentric loading
- Multiple gauge system
- Data logger compatible
- Available with plug connector or cable

Range	25.4mm
Internal Diameters	40, 50, 71, 110, 120, 165, 190, 225mm
Over range capacity	up to 130%
Bridge Resistance	1400Ω
Sensitivity	± 2.0 mV/V
Accuracy	± 0.3 % FS
Temperature range	-20°C to +70°C

VW Solid Load Cell VWLC-5050

VW

A solid cylinder of high strength steel with three vibrating wire strain sensors mounted parallel to the longitudinal axis, arranged equidistant around the circumference to measure the compression of the cylinder under load.
With the multi- sensor configuration, it is possible to obtain accurate readings under mildly eccentric loading conditions as the sensors are read individually.

Applications: Measurement of load acting on piles, struts, arch supports & props.

- High strength steel construction
- Load distribution plates available
- Proven long term accuracy
- Accommodates eccentric loading
- Multiple gauge system
- Data logger compatible
- Available with plug connector or cable

Range	250 to 5000kN
Outer Diameters	45, 63, 76, 88, 98, 108, 116, 124, 138, 151, 174, 195mm
Resolution	<0.05% FS
Accuracy*	0.5 % FS
Temperature range	-20°C to +80°C
Output	1200 - 2800 Hz

* System accuracy depends on loading conditions

Load Cells

Hydraulic Solid Load Cell HLC-6050

VW

- Robust stainless steel construction
- Load distribution plates available
- Proven long-term accuracy
- Accommodates eccentric loading
- Multiple gauge system
- Data logger compatible
- Available with plug connector or cable

Range	1000 - 10,000kN
Outer Diameters	107, 145, 174, 198, 219, 239, 273, 331, 380, 423mm
Over range capacity	150%
Nonlinearity	± 1% FS
Output	VW (Hz), manometer
Temperature range	-20°C to +70°C

A sensitive pressure pad is formed by joining two stiff steel discs at their periphery. The void inside the cell is filled with de-aired fluid. When load is applied the pressure of the liquid changes, corresponding directly to the load applied. Pressure is measured either by a manometer, vibrating wire or resistance transducer.

Applications: Measurement of load acting on piles, struts, arch supports & props.

Strain Gauge Solid Load Cell SGLC-7050

- Robust stainless steel construction
- Load distribution plates available
- Proven long-term accuracy
- Accommodates eccentric loading
- Multiple gauge system
- Data logger compatible
- Available with plug connector or cable

Range	1000 - 10,000kN
Outer Diameters	100, 125, 138, 165, 276mm
Over range capacity	150%
Nonlinearity	± 1% FS
Output	1.5mV/V
Temperature range	-20°C to +70°C

A solid cylinder of high strength stainless steel with a series of electrical resistance strain gauges connected around the periphery as a Wheatstone Bridge. It compensates for unevenly distributed loads and provides a single mV/V signal output.

Applications: Measurement of load acting on piles, struts, arch supports & props.

Load Cell For Tunnel Linings & Struts

A sensitive pressure pad is formed by joining two stiff steel discs at their periphery. The void is filled with de-aired fluid. When load is applied the pressure of the inside liquid changes. The changes in pressure correspond directly to the load applied and is measured by a resistance transducer.

Applications: Measurement of load acting on steel lining in tunnel construction, struts in big open excavation, pile testing.

- Specially designed for steel linings and struts
- High strength steel construction
- Load distribution plates available
- Proven long term accuracy
- Accommodates eccentric loading
- Multiple gauge system
- Data logger compatible
- Available with plug connector or cable

Measuring range	1,900 & 3,000 kN
Cell plate diameters	220, 270mm
Linearity	+/-0.25%FS
Accuracy*	<1% FS
Temperature range	-10°C to +60°C
Signal output	4-20 mA (current loop)

* System accuracy depends on loading conditions

Pressure Cells

VW Total Earth Pressure Cell TPC-4000

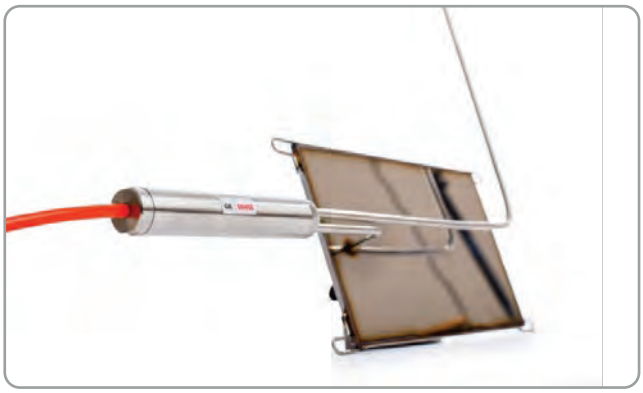
- High accuracy
- Long-term stability
- Stainless steel construction
- High height to diameter ratio
- Dynamic measurement possible
- VW or strain gauge output
- Suitable for remote reading and data logging

Range	344, 518, 690, 1034 kPa 1, 2, 3, 5, 7, 20 MPa
Over range	150% FS
Resolution	± 0.025% FS, Infinite
Accuracy	± 0.1% FS
Non-Linearity	<0.5% FS
Outer Diameter	165, 245, 320mm
Thickness	7.5, 11mm
Operating temperature	-20°C to +80°C

Measures total pressure in soils and at the interface between structures and the wall of excavation. Models 4000 and 4020 are designed to measure soil pressure within soils. Models 4010 and 4030 are designed to measure soil pressures on structures and are fitted with fixing lugs.

Applications: Concrete dams, diaphragm walls, retaining wall surfaces, slurry walls, sheet piles, tunnel lining, fills & embankments, mine backfilling.

VW NATM Pressure Cell NPC-3000



- High rigidity
- High accuracy
- Long-term stability
- Stainless steel construction
- Environmentally friendly internal fluid
- VWT-3000 pressure transducer
- Strain gauge transducer
- Radial & tangential cells
- Data logger compatible

Range	2, 3, 5, 7, 20, 35 MPa
Over range	150% FS
Resolution	± 0.025% FS, Infinite
Accuracy	± 0.1% FS
Non-linearity	<0.5% FS
Cell dimensions	100 x 200mm, 150 x 250mm
Cell Thickness	5mm
Operating temperature	-20°C to +80°C

Monitor radial and tangential stresses of shotcrete in the construction of tunnels, particularly those using the New Austrian Tunnel Method and other underground works. Two stainless steel plates welded around their periphery with the narrow gap between filled with hydraulic fluid.

Applications: Measurement of radial stress and tangential stress in shotcrete tunnel lining and radial and tangential stress in concrete tunnel lining.

NEW

VW Push-In Pressure Cell

A Push-in Pressure Cell, also called a Spade Cell, is designed to be pushed into the ground where it can measure total earth pressure and pore water pressure within the soil. Typical installations are in fine grained cohesive soils, including very soft to stiff clays.

Applications: Site investigation tool to determine in-situ stress state, both vertical and horizontal. Change in active and passive pressure around retaining structures (diaphragm walls etc) & tunnelling and other earthworks.

- Integrated pore pressure measurement
- Long-term stability
- High accuracy and sensitivity
- Constant monitoring capability
- Ease of data logging
- Either vibrating wire or strain gauge transducers

Capacity	350, 700 kPa , 1, 2, 3, 5 MPa
Over range	150% FS
Resolution	± 0.025% FS
Accuracy	± 0.1% FS
Temperature range	-20°C to +80°C

Flat Jack

Flat jacks are used for in-situ testing of masonry structures and rock.
The jack is inserted into a slot cut into the structure to be monitored and gradually brought up to pressure with a special hydraulic pump.

Applications: Measurement of in-situ stress, evaluation of mechanical properties of concrete and rock masses, monitoring of variations in the stress state, restoration of monuments and historic buildings, sheet piles, tunnel lining, fills & embankments, mine backfilling, rail tracks.

- Robust and reliable
- Available in various sizes
- Possibility of automatic monitoring

Material	Steel
Thickness	4mm
Max operating pressure	60 bar
Exterior finish	Painted

Strain Gauges

VW Embedment Strain Gauge VWS-2100

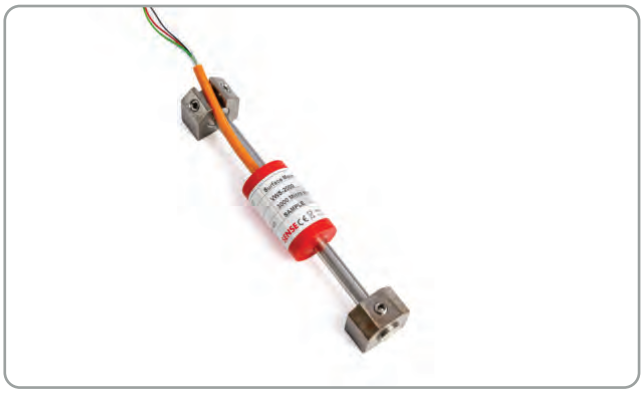
- Reliable long term performance
- Rugged, suitable for demanding environments
- High accuracy
- Insensitive to long cable lengths
- Totally waterproof
- Direct embedment in concrete

Gauge length	150, 50 & 250mm
Overall length	54, 156 & 260mm
Resolution	1 ε, 0.4ε
Strain range	3000 ε
Accuracy	±0.1% to ±0.5% FS
Non- linearity	<0.5% FS
Temperature range	-20°C to +80°C
Frequency range	850-1550 Hz, 1350-3150Hz

Designed for direct embedment in concrete.
As concrete undergoes strain, the end flanges move and tension in the wire changes. A vibrating wire readout generates voltage pulses in the magnet/coil at the centre of the gauge and measures the resonant frequency of vibration.

Applications: Driven and bored piles, tunnels and deep excavations, concrete dams, retaining walls, building foundations.

VW Surface Mount Strain Gauge VWS-2000



- Reliable long-term performance
- Suitable for demanding environments
- Range of mounting blocks
- Insensitive to long cable lengths.
- High accuracy
- Integral Thermistor
- Suitable for demanding environments

Gauge length	150, 89mm
Overall length	156, 95mm
Resolution	1 ε
Strain range	3000 ε
Accuracy	±0.1% to ±0.5% FS
Non linearity	<0.5% FS
Temperature range	-20°C to +80°C
Frequency range	850-1550, 900-2200 Hz

Designed for long-term monitoring of steel or concrete structures. Gauges may be attached to steel structures by arc welding or, using alternative end blocks, bonded or grouted into concrete.
It operates on the principle that a tensioned wire, when plucked, vibrates at its resonant frequency. The square of this frequency is proportional to the strain in the wire.

Applications: Steel struts, excavation support systems, driven and bored piles, tunnel linings, bridges & arches, on-board truck weighing.

VW Spot Weld Strain Gauge VWS-2020

Designed primarily to measure strains on the surface of steel structures but may also be used on other material. Available in two versions: Gauge with integral coil housing and Gauge only with separate coil housing

Applications: Stress and/or strain determination in or on bridges & dams, buildings, struts and support systems, pipelines, tunnel linings, piles & mass concrete, reinforcement bars.

- Small size - can be used in confined spaces
- Easily tensioned on site
- Reliable long-term performance
- Insensitive to long cable lengths
- Integral Thermistor

Strain Range	3000 με
Resolution	0.4 με
Accuracy	±0.1% to ±0.5% FS
Non Linearity	<0.5% FS
Temp range	-20°C to +80°C
Gauge Length	49mm
Overall Length	65mm

Rebar Strain Meter & Sister Bars VWS-4000

Embedded in concrete to measure strains due to imposed loads in mass concrete.
The VWS-4000 Sister Bar is installed by tying it alongside an existing length of rebar within the cage.
The VWS-4001 Rebar Strain Meter is installed by welding it into the existing rebar cage at a location within the structure where loads can be accurately passed from the concrete into the gauge.

Applications: Concrete piles, tunnel linings, mass concrete structures, diaphragm walls & barrettes.

- Reliable long-term performance
- Suitable for demanding environments
- High accuracy
- Insensitive to long cable lengths
- Direct concrete embedment

Thermistor	3k 0hms at 25°C
Over-range	+20%
Resolution	0.6με
Accuracy	±0.25% FS
Non-linearity	<0.75% FS
Overall Length	1.39m
Standard Diameters	12, 14, 16, 20, 25, 28, 32mm


Smart
Mux
Interface
GEOSENSE
ESC
ENT
UP
DOWN
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
0
120Ω
off
SD
off
12V
BATTERY
CHARGER

NEW

NexusGEO

A Bluetooth Interface can be used to connect sensors with analogue or RS-485 digital outputs to an android smart device. Data can be accessed on site by any android device such as a smartphone or tablet.

Applications: For use with Piezometers, in-place inclinometers, tilt meters & beams, strain gauges, rod extensometers, settlement systems, joint meters & crack meters, pressure cells, NATM cells & load cells.

- android compatible
- Bluetooth technology
- Multiple sensor inputs
- Auto calibration factors upload
- Purpose-designed APP
- Small & lightweight
- Easy to use
- Re-chargeable battery
- Displays battery status
- Fully CE compliant

Signal inputs	VW (Hz), mA, V, mV/V, Pt100, NTC, RS-485
Power supply	12Vdc Ni-Mh battery, rechargeable
Temp range	-20 to +70 °C
Enclosure	IP65
Dimensions L x B x H	150 x 105 x 35mm
Weight	600g

Vibrating wire readout VWR-1

VW

A compact manual readout unit which can be used with all types of vibrating wire sensors.
Colour coded connections make the VWR-1 easy to use with any type of sensor cable. The simple display means no complicated multiple screen menus. It can be operated with just two simple buttons.

Applications: Manual readout for piezometers, load cells, strain gauges, rod extensometers, settlement systems, joint & crack meters, pressure cells & NATM cells.

- Small - can be used in confined spaces
- Easily tensioned on site
- Reliable long-term performance
- Insensitive to long cable lengths
- Integral Thermistor

Signal inputs	VW, NTC
Power supply	9.6V internal battery
Temp range	-20 to +70 °C
Enclosure	IP40
Dimensions L x B x H	120 x 85 x 35mm
Weight	360g

Readouts

Multi-purpose Readout MP12

The MP12 is a multi-purpose manual readout unit which can be used with all types of electrical outputs including vibrating wire. Colour coded connections for the different sensor types makes the MP12 easy to use with any type of sensor cable.

Applications: Manual readout for: Piezometers, load cells, tilt meters & tilt beams, strain gauges, rod extensometers, settlement systems, joint meters & crack meters, pressure cells & NATM cells, thermistors & thermocouples.

- Displays frequency & temperature
- Small & lightweight
- Easy to use
- Simple keyboard buttons
- Audible sound option
- Easy to see
- Re-chargeable battery
- Displays battery status
- Fully CE compliant

Signal inputs	4-20mA 2C, 4-20mA 3C, V, mV, mV/V 3C, mV/V 4C, °C, Hz, PT100, NTC 12V internal battery
Power supply	12V internal battery
Temp range	-20 to +70 °C
Enclosure	IP65
Dimensions L x B x H	130 x 100 x 35mm
Weight	600g

Vibrating Wire Analyser

VW

Field-ready to measure quickly any vibrating wire sensor, save the data, and communicate results.
Measurements are geo-located with the integrated GPS, allowing the analyser to verify locations and direct you to your sensors. It can measure all vibrating wire sensors including strain gauges, piezometers, pressure transducers, tilt meters, crack meters, and load cells.

Applications: Reads, displays, and logs both vibrating wire sensors and thermistors.

- Precise measurement
- PDF report output
- Field ready Integrated GPS
- Easy to use
- Graphical display
- Measures all vibrating-wire sensors
- Low-power operation

Memory	1,700 site/sensor measurements
GPS	±5m typical (±1 ms time sync)
Channel count	1 channel (VW & thermistor reading)
Enclosure	IP62
Battery Type/Life	5 AA (1.5 V) 20 hours continuous use
Operating Temperature	-20° to +70°C

NEW

S41 Smart Phone

- Rugged design for use in extreme environments
- 5,000mAh battery and battery share
- 44 days stand-by-time
- 32GB flash storage
- Data speed: Downlink 300Mbps; Uplink 50Mbps
- Corning® Gorilla® Glass screens
- MIL SPEC 810G and IP68 certified
- Dust-proof and drop-proof

Battery	Non removable Lithium Ion
Capacity	5000mAh, Pump Express 2.0
Stand-By Time	Up to 44 days
Maximum Downlink Data Rate	300Mbps
Maximum Uplink Data Rate	50Mbps
Memory ROM Flash	2GB
Memory RAM	3GB
Network	4G compatible, user SIM dependent

The CAT® S41 smartphone is used as a handheld readout to configure and collect data using a purpose-designed app. Designed for use in challenging environments, the S41 has a long-lasting battery and provides a high-level user interface and industry-leading memory plus wireless communication options for ease of use and reliability.

Applications: For use with the Geosense Portable Inclinometer & NexusGEO.

Linx Windows Tablet

- Suitable for use with all Geosense software
- Dual-band Wi-Fi for better connectivity
- Complete connectivity with 2 full-size USB ports
- 10.1inch screen - IPS TFT LCD
- Windows 10

Screen Size	25.65cm
Resolution	1280 x 800
Processor	Intel Atom 1440MHz
RAM Size	2GB
Hard Drive Size	32GB
Batteries	1 Lithium ion
Average Battery Life	7 hours

A 10" 32GB tablet featuring a 64-Bit Quad-Core Intel processor, dual-band Wi-Fi for better connectivity and all the features of Windows 10.
It is ideal for using on site with Geosense software for data-handling and visualisation.

Applications: For running Geosense software to provide on-site access for the visualisation and presentation of data.

Readouts

Smart Mux Interface

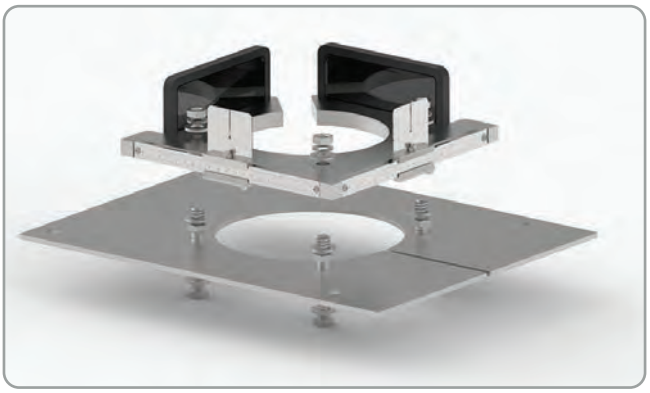
- Reads all types of sensors
- Rugged design
- Large LED display
- Stores readings
- Easy-view scrolling menu

Power Consumption	100mA
Power Output	12Vdc 650mA
Direct Inputs	1 x RS-485
Via Smart Mux	VW, V, mV/V, 4-20mA, Pt100, NTC & RS-845 up to 256 sensors
Memory Type	VW, V, mV/V, 4-20mA, Pt100, NTC and RS-485 up to 256 sensors
Sampling Intervals	1 minute - 10 Days
Data Storage	>2,000,000 (max config)

The Smart Mux Interface replaces time-consuming rotary switches and readout. It reads directly digital sensors and when connected to the Smart Mux modular multiplexer, can read any sensor with VW, V, mV/V, 4-20mA, Pt100, NTC and RS-485 outputs.

Applications: Reading sensors including inclinometers, tilt sensors, piezometers, extensometers, joint & crack meters, settlement monitors, load & pressure cellS & strain gauges.

Manual Pendulum Readout MPR-2000



- Can be used with direct & inverted pendulums
- Robust stainless steel construction
- Simple to use
- Maintenance-free
- Range 120mm
- Can be retro-fitted to any existing pendulum

Range	120mm
Accuracy	±0.1mm
Dimensions	250 x 250 x 15mm
Weight	4.25kg

Designed to measure manually relative movements of normal and inverted pendulums. The readout is placed onto a mounting bracket and measurements are taken by aligning the sight, the wire and the wire reflection and noting the position on the Vernier scale. Changes are then related to movement of the pendulum.

Applications: Manual measurement of direct & inverted pendulums in large structures including dams, bridges, high-rise buildings & tall structures.

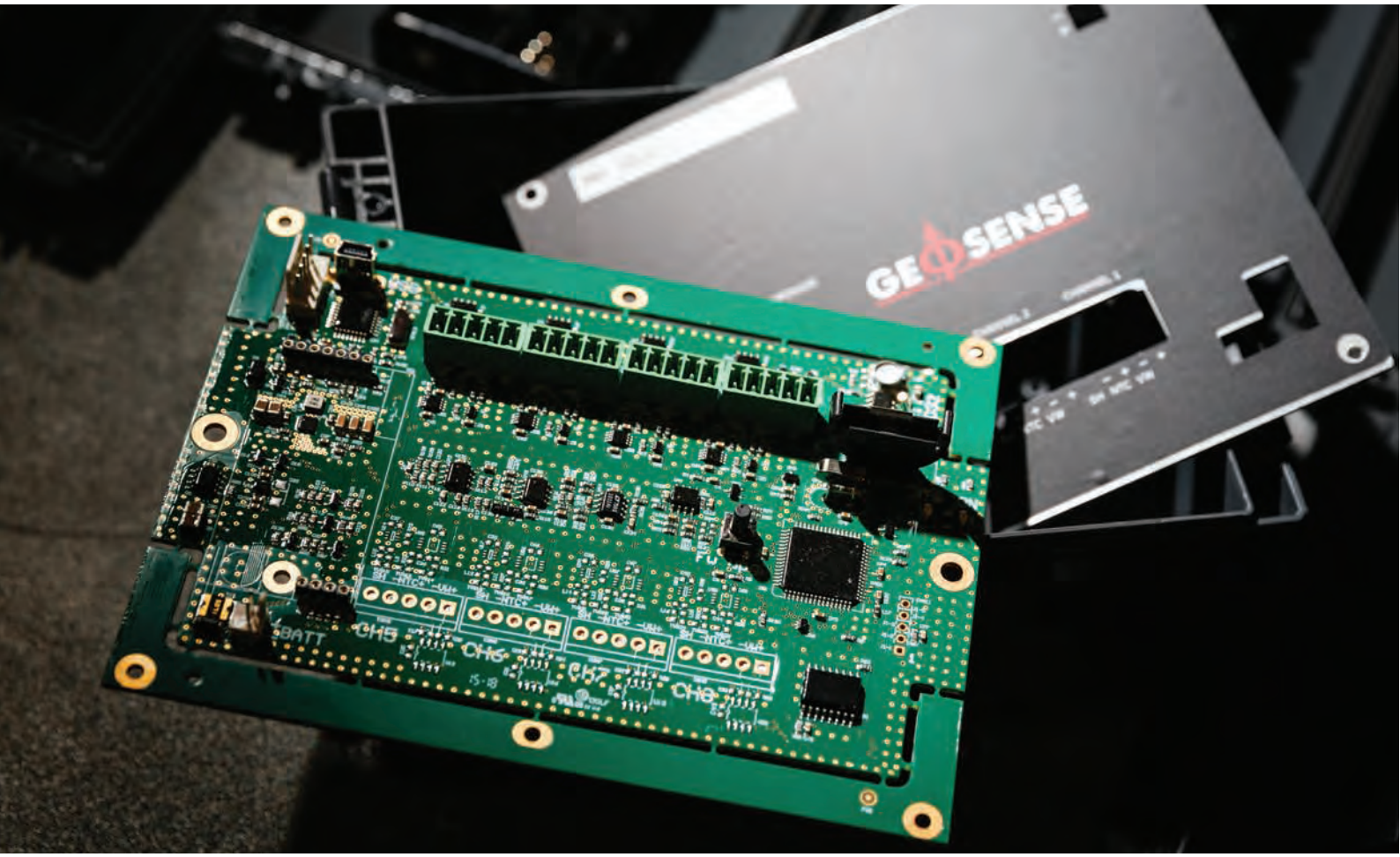
Automatic Pendulum Readout TP-2000

- Can be used with direct & inverted pendulums
- Can be retrofitted to manual pendulums
- Local data storage
- Can be integrated into automatic data acquisition systems
- Analogue or digital output
- 2D & 3D models available
- Weatherproof housing

Designed to automatically measure and record relative movements of normal and inverted pendulums. Can be installed as part of a complete new system or retro-fitted as part of an upgrade to an existing manual system. Models: TP-2D-2001-Range 50 x 50mm; TP-2D-2002-Range 50 x 100mm; TP-3D-2003-Range 50 x 100 x 50mm.

Applications: Automatic measurement of direct & inverted pendulums in large structures including dams, bridges, high-rise buildings & tall structures.

Resolution	0.01mm
Accuracy	± 0.05mm
Repeatability	± 0.1mm
Display	4-digit LED
Communication Method	4-20mA, RS-485
Power Supply	85-265 VAC, 50-60 Hz
Protection	IP65


GEOSENSE
BATT
CH5
CH6
CH7
CH8

NEW

Linx Connect

VW

- Cellular connectivity (SIM card)
- Data transferable via FTP
- Internal antenna
- Compatible with all VW & NTC sensors
- Auto-fill of calibration data
- Battery life > 6 months
- 8MB internal memory
- Local download via USB

Frequency Range	260 to 4800 Hz
Resolution	0.10 Hz
Accuracy	0.01% FS
Channels	1, 4 & 8 VW + 1, 4 & 8 NTC
Readings	~ 279,000
Battery Life*	> 6 months
Battery	2 x lithium C
Enclosure	IP67

* Depending on temperature, sampling interval & FTP transmissions

All the benefits of the popular Linx data logger with the advantage of cost-efficient cellular data transmission via an internal SIM card. Excellent energy efficiency, reliable and stable transmission of readings means almost maintenance-free and cost-efficient data measurement.

Applications: Stand-alone monitoring of VW sensors and/ or thermistors such as: Piezometers, crack & joint meters, strain gauges, pressure cells, load cells, rod extensometers & weir monitors.

Single Channel Linx Data Logger

VW

- 8MB memory
- Auto fill of calibration data
- Weather resistant IP66 enclosure
- Battery powered for remote sites
- Download via USB
- User friendly LINX host software
- Lithium battery option available
- Compatible with all VW sensors

Frequency Range	260 to 4800 Hz
Resolution	0.10 Hz
Accuracy	0.01% FS
Channels	1 VW + 1 NTC
Readings	~ 279,000
Battery	4 x Alkaline AA
Battery Life*	>8 years /8 memory fills
Temperature Range	-20°C to +80°C
Enclosure	IP66

* Depending on temperature & sampling interval

Low cost, battery powered data logger, designed for reliable, unattended monitoring of a single vibrating wire sensor and thermistor. It can be automatically configured using a text file via the USB connection.
It is a purpose-built logger ideal for remote locations or instruments that require frequent reliable data recording.

Applications: Ideal for applications that require reliable, unattended monitoring of a single vibrating wire sensor.

Data Loggers

4 Channel Linx Data Logger

VW

- 8MB memory
- Auto fill of calibration data
- Weather resistant IP66 enclosure
- Battery powered for remote sites Lithium battery option
- Download via USB
- User friendly LINX host software
- Compatible with all VW sensors

Low cost, battery-powered multi-channel data logger designed for reliable unattended monitoring of up to four vibrating wire sensors and their associated thermistors. Automatically configured using a text file via USB connection. This logger is ideal for remote locations or instruments that require frequent reliable data recording.

Applications: Can be used with any vibrating wire sensor including piezometers, crack gauges, strain gauges and pressure cells.

Frequency Range	260 to 4800 Hz
Resolution	0.10 Hz
Accuracy	0.01% FS
Channels	4 VW + 4 NTC
Readings	~ 135,000
Battery	4 x Alkaline C
Battery Life*	>5 years /4 memory fills
Temperature Range	-20°C to +80°C
Enclosure	IP66

* Depending on temperature & sampling interval

8 Channel Linx Data Logger

VW

- 8MB memory
- Auto fill of calibration data
- Weather resistant IP66 enclosure
- Battery powered for remote sites
- Download via USB
- User friendly LINX host software
- Lithium battery option available
- Compatible with all VW sensors

Low cost, battery-powered multi-channel data logger designed for reliable unattended monitoring of up to eight vibrating wire sensors and their associated thermistors. They can be automatically configured using a text file via the USB connection. A purpose-built logger ideal for remote locations or instruments that require frequent reliable data recording.

Applications: Can be used with any vibrating wire sensor including piezometers, crack gauges, strain gauges and pressure cells.

Frequency Range	260 to 4800 Hz
Resolution	0.10 Hz
Accuracy	0.01% FS
Channels	8 VW + 8 NTC
Readings	~ 83,000
Battery	4 x Alkaline C
Battery Life*	> 5 years /3 memory fills
Temperature Range	-20°C to +80°C
Enclosure	IP66

* Depending on temperature & sampling interval

Data Loggers

Geologger G8-Plus

VW

- No software programming
- Easily re-configured
- Tailored to your individual requirements
- Large LCD display
- Ultra-low power consumption

Supply	110/220Vac, 12Vdc, solar panel
Communication ports	1 x Ethernet, 2 x RS-485, 2 x RS-232, 1 x Dust Network
Data acquisition	SD card, USB, GPRS/UMTS, Ethernet (FTP)
Memory	8GB SD card, USB memory-stick
Protection	IP66

Built around the easy-to-use G8 control module which is purpose-designed for geotechnical applications. It offers reliable remote monitoring under demanding conditions. The power management system features different power modes, including ultra-low power which enables it to be powered by battery for periods in excess of 12 months.

Applications: For use with any instrument outputting RS-485, SDI-12 such as in-place inclinometers, tilt meters & tilt beams.

Geologger G8 Module

VW

- Ability to read most geotechnical sensors
- Low power for remote sites
- Long life (~1 year) internal battery
- Can be used with mains power
- Internal FTP or FTP client
- Easy to use key pad
- Data can be viewed on site
- Can be used with "Smart" phones or tablets
- Large internal memory

Supply	110/220Vac, 12Vdc, solar panel
Communication ports	1 Ethernet, 2 x RS-485 isolated 2 x RS-232
Data acquisition	Locally via SD card, USB memory stick(FTP)
Memory	8GB SD card, USB memory-stick
Download intervals	1/59min - 1/23h - 1/10 days

A versatile low powered multi-channel data logger which is capable of being used with a wide range of sensors with outputs which include VW, V, mV/V, 4-20mA, Pt100, NTC. It can be used with multiplexers to capable of managing up to 16320 channels. Its low power requirement enables it to be used in remote locations for up to one year without mains power thus minimising any EMC effects.

Applications: Remote data logging of various types of geotechnical instruments used in dams, tunnels, bridges, deep foundations and slope stability.

Data Loggers

Smart Mux Multiplexer - analogue

VW

- Manual readings available
- Can be integrated into automatic systems
- Intelligent on-board A2D processing
- Vibrating wire inputs
- Analogue inputs
- Can be connected together

Channel numbers	4+4, 8+8, 16+16, 12+12
Total multiplexers that can be linked	Up to 508
Total channels	32 for MUX, max 16320 channels
Inputs	VW, V, mV/V, 4-20mA, Pt100, NTC
Resolution	24 Bit V, mV/V, 4-20mA, Pt100, NTC 0.1Hz

A modular multiplexer that allows the management of multiple analogue sensors as part of a remote or automatic data acquisition system. It is an easy-to-use digital alternative to a traditional rotary switch terminal box. Sensor connection is simple thanks to plug-in connectors.

Applications: Allows multiple sensor types to be connected in a central location and is used typically for dams, tunnels, roads, deep foundations.

Smart Mux Multiplexer - digital

VW

- Manual readings available
- Can be integrated into automatic systems
- Intelligent on-board A2D processing
- Digital inputs & outputs
- Can be connected together

Channel numbers	4+4, 8+8, 12+12, 16+16
Total multiplexers that can be linked	Up to 254
Total channels	32 for MUX, max 16320 channels
Inputs	RS-485
Resolution	24 Bit

A modular multiplexer that allows the management of multiple digital sensors as part of a remote or automatic data acquisition system. It is an easy-to-use digital alternative to a traditional rotary switch terminal box. Sensor connection is simple thanks to plug-in connectors.

Applications: Allows multiple sensor types to be connected in a central location and is used typically for dams, tunnels, roads, deep foundations.

Data Loggers

GeoLogger GL Series

- Tailored to your individual requirements
- Precision measurement capability
- Rugged construction
- Wide operating temperature range
- Low power consumption

Data logger module	CR800, CR1000, CR6
Sensor inputs	VW, Volt, 4-20mA, RS-485
Input expansion	Multiplexers
Communication	Radio, GSM, GPRS
Dimensions	Variable
Power supply	Mains, battery, solar panel
Enclosure	IP66

Built around the Campbell Scientific CR800 and CR1000 control modules, it offers reliable remote monitoring under demanding geotechnical conditions.
Functions include sensor measurement, time-keeping, data reduction, data storage, control and alarm notification.

Applications: Remote data logging of geotechnical & structural instrumentation in: dams, tunnels, deep excavations, buildings, bridges.

GeoLogger 485-SDI

- Long battery life
- IP67 enclosure
- Waterproof USB plug & play port
- Configuration via 'Smart' android phone or tablet

Sensor Inputs	RS-485
Battery	4 x Lithium C
Communication	USB
Temperature Range	-20°C to +70°C
Memory	15,000 for 30 sensors, 90,000 readings for 5 sensors
Enclosure	IP67

A small, portable, battery-powered data logger system for use with instruments with digital outputs. Ideal for sensors which use digital BUS and can accommodate up to 30 connected sensors.

Applications: For use with any instrument outputting RS-485 such as in-place inclinometers, tilt meters & tilt beams.

Wireless

Wi-SOS 480 System

- Sub 1GHz frequency range
- Spread spectrum modulation
- Long range up to 15km
- No repeaters needed
- Long battery life
- Signal coverage tests available
- Data storage in Node & Gateway
- Simple configuration via android device
- Can be configured 'over air'
- Raw data can be viewed via the Internet or pushed to any FTP address

Input Type	VW, analogue, digital
Inputs	1, 4, 5
Sampling Rate	5, 10, 15, 30 minutes, 1, 4, 24 hours
Range Open Field (LOS)	15km
Battery Life	~ 10 years*
Radio Frequency	Sub 1GHz
Enclosure	IP67/8

Wireless Sensor Observation System collects, data logs, transmits and receives data from any sensor with a vibrating wire, voltage, 4-20mA, RS-485, resistance or SDI12 output. Using Star topology spread spectrum modulation and sub 1Gz frequencies, it has an extremely long range, up to 15 km in open field conditions and typically 3.5km in dense urban areas.

Applications: Wireless sensor network for a range of sensors.

VW Node

- 1 to 5 sensor inputs
- Sub 1 GHz radio frequency
- Long battery life
- 4MB memory
- Configuration via android device
- Small rugged IP68 enclosure
- USB communication port

Sensor input	VW + NTC
Battery	4 x Lithium C
Battery life	Up to 10 years
Communication	USB
Memory	4MB
Temperature range	-20°C to + 70°C

Low powered battery-operated, it can be used with any sensor with a vibrating wire signal output and its associated thermistors and is available with one or five channels. Fitted with a 4MB internal memory, data is stored locally and can be accessed via USB. Individual configuration and signal coverage tests can be carried out using the G-LOG App on any android device.

Applications: For use with any sensor with a vibrating wire output such as piezometer, strain gauge, crack meter, pressure cell, load cell.

Digital Node

- Up to 30 RS-485 BUSSED sensor inputs
- Sub 1GHz radio frequency
- Long battery life
- 4MB memory
- Configuration via android device
- Small rugged IP68 enclosure
- USB communication port

Used with several types of digital sensor and fitted with one RS-485 channel (up to 30 sensors in a BUSSED string) plus two channels for SDI-12. Fitted with a 4MB internal memory, data is stored locally and can be accessed via USB. Individual configuration and signal coverage tests can be carried out using the G-LOG App on any android device.

Applications: For use with any sensor with a digital output such as In-Place inclinometer, tilt meter, tilt beam.

Sensor input	RS-485, SDI-12
Battery	4 x Lithium C
Battery life	Up to 2.5 years
Communication	USB
Memory	4MB
Temperature range	-20°C to + 70°C

Analogue Node

- 1 to 4 sensor inputs
- Sub 1GHz radio frequency
- Long battery life
- 4MB memory
- Configuration via android device
- Small rugged IP68 enclosure
- USB communication port

Can be used with any sensor with a Voltage, mV/V, 4-20mA, resistance signal output and is available with one or four channels.
Low-powered and battery operated, it is fitted with a 4MB internal memory, data is stored locally and can be accessed via USB. Individual configuration and signal coverage tests can be carried out using the G-LOG App on any android device.

Applications: For use with any sensor with an analogue output such as tilt meter, tilt beam, piezometer, strain gauge, crack meter, pressure cell, load cell.

Sensor input	Volt, 4-20mA, mV/V, PT100, NTC
Battery	4 x Lithium C
Battery life	Up to .5 years
Communication	USB
Memory	4MB
Temperature range	-20°C to +70°C

Wireless

Wireless Tilt Meter

- Highly accurate and reliable biaxial tilt sensor
- Individual calibration UKAS traceable
- Long-range 868/915MHz radio
- Long-range communications (up to 15km)
- Low-power LoRa® spread spectrum technology
- Up to 8 years battery life
- Robust, small and weather-proof box
- Easy configuration

Low-powered battery operated stand-alone Tilt Meter which can be integrated with any other type of Node into the Wi-SOS 480 system. Fitted with a 4MB internal memory, data is stored locally and can be accessed via USB. Individual configuration and signal coverage tests can be carried out using the G-LOG App on any android device.

Applications: Monitoring of tilt for structures, rail tracks, tunnels, slopes.

Range	±15°
Axis	Uniaxial and biaxial
Resolution	±2 arc sec.
Battery	1 x Lithium C
Battery Life	Up to 5 years
Communication	USB
Memory	4MB
Temperature range	-20°C to + 70°C

Laser Disto Node

- Wireless sensor
- Long-range communications (up to 15 km)
- Long battery life (>6 years @1h sampling rate)
- Visible Laser Class II laser with 655 nm
- High repeatability
- User-friendly android configuration app included
- Pointing mode for an easy installation
- Web browser software
- Standard CSV download, FTP push, Modbus TCP and API access
- Robust, small and weather-proof box
- Easy configuration

Measures the relative distance between pairs of reference points. One of the two points can be a natural surface or target foils while the node can be placed at the other end point.

Applications: Tunnel and mining convergence monitoring, deformations in underground excavations, remote monitoring of slope movements, fracture and faults surveillance, bearing and expansion joint movements, monitoring displacement in structures & buildings.

Measuring range at favourable conditions	0.05 to 150 m
Typical accuracy	±1 mm
Resolution	0.1 mm
Repeatability (1 sigma)	0.15 mm
Laser type (light source)	Visible Laser Class II laser with 655 nm

Gateway

- On-board software
- >500 Node inputs
- Sub 1GHz radio frequency
- Low power – 1.5W
- Mains, solar or PoE
- 8GB memory
- Internal barometer
- Small rugged IP67 enclosure

Powered by mains, solar panel or PoE the Gateway collects data from any series of Nodes, stores it internally and then pushes the data to the Wi-SOS WebCentre or any FTP address where it can be viewed and/or downloaded.

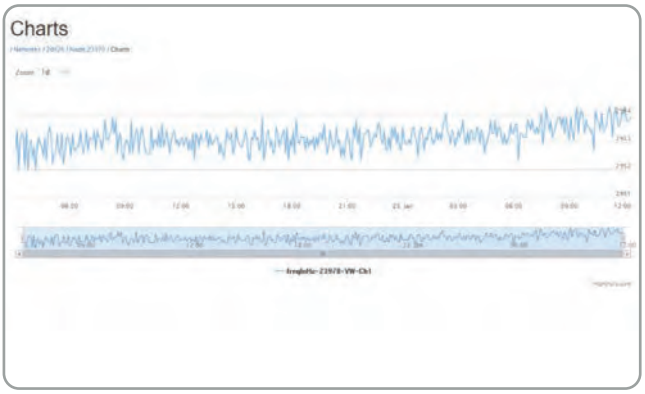
Applications: Part of a wireless sensor network to collect data from Nodes, pushing it to web centre of FTP address where it can be viewed.

Sensor input	VW, analogue, digital
Communication	GPRS, Ethernet
Memory	8GB
Temperature range	-20°C to + 70°C

Software

The free G-LOG software can be used on any android Smart device & allows configuration, diagnostics and download of all Node types.
Signal coverage tests can also be carried out to confirm connectivity of the Nodes to the Gateway. The on-board software within the Gateway allows data to be converted into Engineering units. All data can be pushed to the Wi-SOS WebCentre or to any FTP address for visualisation

WebCentre



The Wi-SOS WebCentre provides real-time data visualisation and allows the data to be downloaded in CSV format. Alarm thresholds can be set and alerts sent via email or SMS. The system health can be viewed and re-configured.

- Free access
- System health diagnostics
- Real-time monitoring

Software

NEW

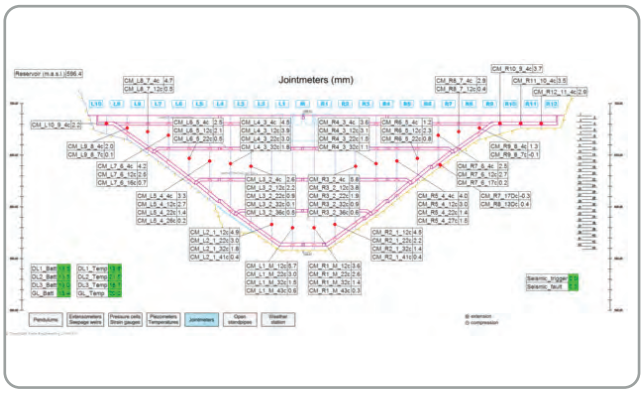
SiteMaster

SiteMaster is a powerful inclinometer processing and presentation software program. It can process and present all inclinometers within a project, as well as include plan view displacement graphs related to excavation construction history. Displacement graphs are organized in an efficient and easy way. Reports can be customized and exported in PDF or MS Word format

Applications: Analysis and compilation of inclinometer data into a range of visual formats.

- Modern interface
- Site plan
- Key Plan
- Correction options
- Check-sum logic scanner
- Smart Data system
- Imperial or metric units
- Summary table
- Customisable graphs
- Warning limits
- Construction history
- Export reports

GeoAxiom Vista



GeoAxiom Vista is a specialist Geotechnical software which provides data handling, storage, visualisation, alarms, reporting and web based access from any size of automatic data acquisition system.
It comprises three main components: DataStore, DataViewer and Internet Publisher.

Applications: For the visualisation and presentation of data from: Vibrating wire sensors, 4-20 mA sensors, mV sensors, Inclinometers, Robotic Total Stations, Manual readings, GPS stations, Webcam.

- Data shown as photographs, plans or cross-sections
- Displacement graphs
- Can import Google maps
- Trend lines can be generated
- Wide range of reports
- Highly configurable
- Easy to configure
- Near real time data
- Can be accessed via Internet
- Can be networked
- No limit to sensor number
- Multi-language options

Temperature

VW Temperature Sensor

- Accurate
- High resolution
- Long-term stability
- Insensitive to long cable lengths.
- Integral Thermistor
- Integral lightening protection
- Suitable for remote reading and data logging

Temperature range	100°C
Operating Temperature Range	-20°C to +80°C
Operating frequency	2000 to 3500 Hz
Cable	4 x 22 AWG (shielded)
Weight	210g
Dimensions	20mm Ø x 140mm long

Used primarily for the measurement of internal temperature in concrete structures, soil, rock or water and ideally suited for use where other types of vibrating wire sensors are used. As the thermal response of the VWTS 6000 is relatively slow it is not suitable for measuring rapid change in temperature.

Applications: Monitoring temperatures in or on: Dams, concrete structures, geothermal wells, soil & rock temperatures, water temperature.

Thermistor Strings

- Fast Response
- High accuracy
- Excellent long term stability
- Operating range -50°C to +150°C

Temperature Range	-50°C to +150°C
Accuracy	± 0.2°C
Resolution	0.1°C

Thermistors provide accurate and reliable long-term temperature measurements and are used widely within Geotechnical monitoring.
They are available in two types: Probe – A single point sensor mounted within a PVC or stainless steel housing which is attached to a cable length.
String – A series of sensors mounted along a multi-core cable which provide a temperature profile.

Applications: For monitoring temperature in: Concrete (particularly RCC dams), soil, rock, ice caps, glaciers & landfill.

Flow Sensors

VW Weir Monitor

- High sensitivity & stability
- Low maintenance
- Force transducer immune to zero drift & has low response to temperature changes
- Not affected by long signal cables
- Measured by portable readout or data logger

This water level monitor utilises a vented vibrating wire force transducer in combination with a cylindrical weight suspended from it to monitor water levels.
The transducer is vented to atmosphere so that any atmospheric changes are automatically compensated.

Applications: Precise water level measurement of: Weirs, streams, reservoirs, tanks.

Standard Ranges	150,300,500, 1500mm
Accuracy	±0.1% FS
Resolution	0.025% FS (min)
Linearity	<0.5% FS
Stability	±0.05% FS per year
Temp Range	-20°C to +80°C
Repeatability	±0.002°

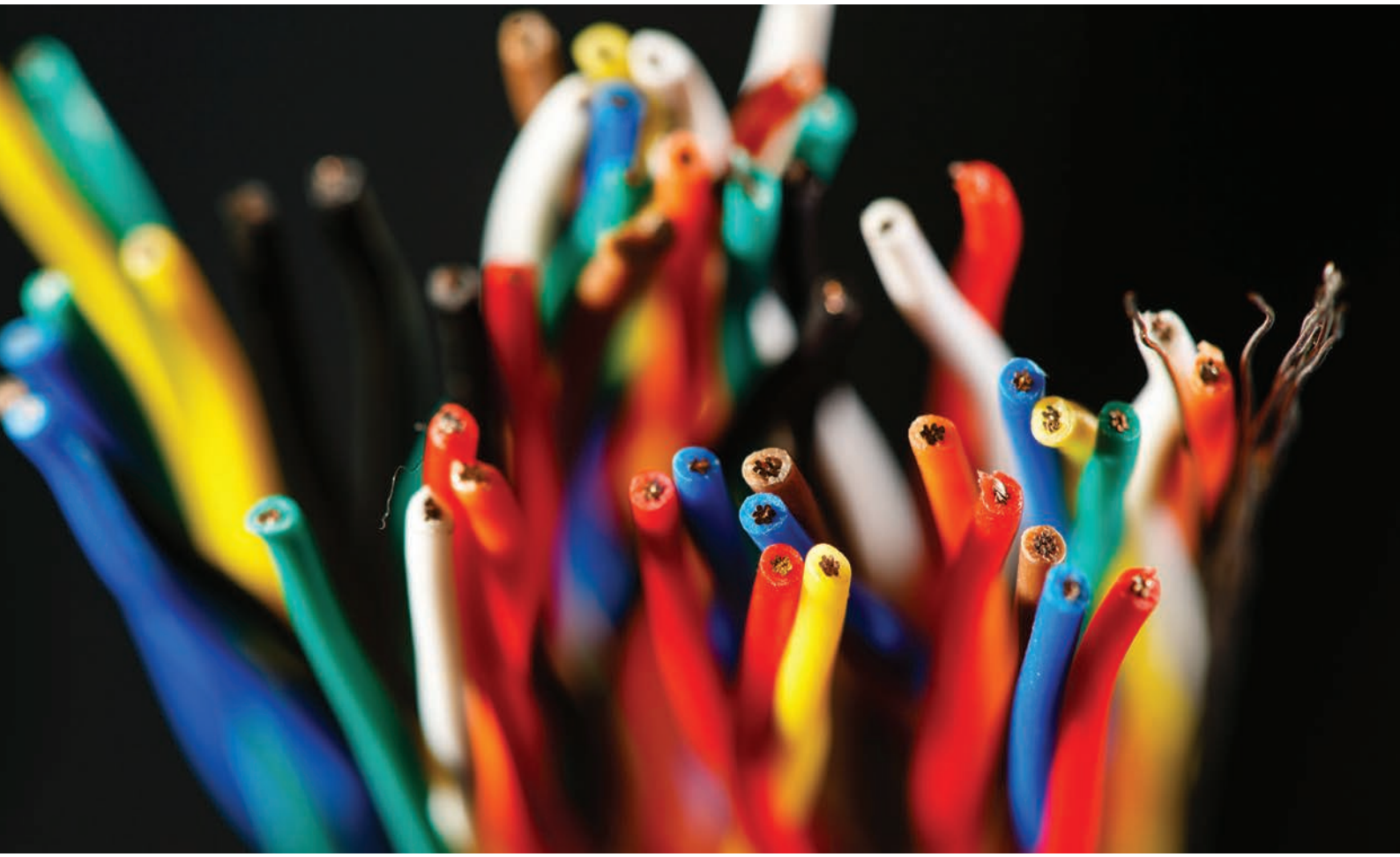
V-Notch Weirs & Tanks

- In accordance with BS 3684 Pt 4
- Available in 90, 45, 22.5 degrees
- Flows from 10 to 60 litres/second
- Simple principle
- Very low maintenance
- Made from corrosion resistant materials
- Can be easily automated
- Portable or fixed

Used to measure seepage water flows in open streams, channels or tanks and used mainly as part of dam safety monitoring programs.
A V-notch weir system comprises a stainless steel plate with a chosen notch profile to suit expected flow rates and a means of measuring the head on the weir plate.

Applications: Measuring water flows in dams, rivers & streams & open channels

Design standard	BS 3684 Pt 4
Material	Stainless steel
Geometry	90, 45, 22.5°
Flow	10 to 60 litres/second*



Cables & Accessories

Cables

Geosense supplies a wide range of high quality stranded copper cables manufactured to British, European and American standards which comply with the European Directive RoHS-II.

All cables have excellent strength and flexibility making them suitable for installation within applications such as dams, tunnels bridges etc .

They are suitable for direct burial within selected graded material such as clay cores, filter sand and concrete.

CONSTRUCTION
Twisted pair or Multi-core

OUTER SHEATH MATERIAL
PUR , PVC, PE, PP, Teflon, Flame retardant, LSHF

CONDUCTORS
Multi-stranded copper for flexibility and easy handling during installation. Typical conductor size is 0.2-0.75mm² (24 –18AWG) with PE or PP insulation. The number of conductors is dependent on the type and quantity of sensors.

COLOUR CODING
DIN 47100, VDE 0293-308, IEC 60757, BS 6360,
US Chart 2 & 3

SHIELDING
Shielding is required for protection against the effects of EMI (electromagnetic interference) from sources such as electrical equipment, power lines, generators, transformers etc. Protection is available by using twisted pair construction, foil drain wires, partial or fully braided cable.

ARMOUR
Armoured cables typically use a series of solid steel helically wound around the cable conductors and is used where large forces are exerted on cables by settlement or earth moving vehicles.

VENTED CABLE
Used for products such as piezometers and liquid level sensors to allow a path for the changes in barometric pressure to act upon both sides of the sensing element and thus negate the need for barometric compensation.

STANDARDS & APPROVALS
Cables are made to a wide range of standards and approvals including:
IEC 60228, IEC 60332, IEC 61034, IEC 60754, BS 6360, BS EN 60228, BS EN 60332, BS 5308, PAS5308, VDE 0812, VDE 0814 , VDE 0295, UL 2464, LU 1-085-A2.

Terminal Switch Box & Accessories

VW

- Can be used all types of VW sensors
- Increases efficiency of taking manual readings
- Eliminates need to visit multiple locations to take readings
- Enables manual readings during installation and commissioning
- Allows manual troubleshooting
- Enables cable lengths to be reduced
- Reduces costs
- Auto readings version available

Available to connect up to 12, 24 or 36 instruments. Equipped with up to three 12-position rotary switch boards with connectors for readout output. Housed in an IP66 wall mounting, plastic or steel lockable enclosure. Different models of waterproof junction boxes are available for single or multiple cable entry, together with a full range of cable ducting, cable end protection, slicing kits, flying and jumper cables.

Application: Provides central monitoring location for multiple sensor installations.

Remote Smart-Mux

VW

- Manual readings available
- Can be integrated into automatic systems
- Intelligent on-board A2D processing
- Vibrating wire inputs
- Analogue inputs
- Digital inputs & outputs
- Can be connected together

A Smart-Mux housed in a waterproof cabinet which can be placed in any position on site and have multiple sensors attached. Cable lengths up to 1000 metres can be realised, even for 4-20mA signals. Also available as Remote Smart-Mux-Plus: By connecting a Smart Mux Interface (SMI) local data acquisition can be obtained and stored onto the interface module.

Applications: Allows multiple sensor types to be connected in a central location and is used typically for dams, tunnels, roads & deep foundations.

Channel numbers	4+4, 8+8, 16+16
Total multiplexers that can be linked	Up to 256
Total channels	32 for MUX, max 16320 channels
Inputs	VW, V, mV/V, 4-20mA, Pt100, NTC, RS-485
Resolution	24 Bit V, mV/V, 4-20mA, Pt100, NTC 0.1Hz

Cables & Accessories

Remote-Mux

Allows multiple sensor cables to be connected into one central location with subsequent connection to a data logger via one multi-core cable. The cost of cabling and installation is therefore significantly reduced. Comprises a series of multiplexers, each with five sets of five input channels which allows five vibrating wire instruments with their thermistors and ground conductors to be connected.

Applications: Dams, tunnels, roads & deep foundations.

- Unlimited connections to data logger using cascading method
- Detachable screw terminals
- Simple wiring process
- Built-in transient protection
- Robust steel box
- Waterproof to IP67 rated
- Up to 100 sensors can be connected

Multiplexers	1-10
Channel Inputs	5-50
Cable Entries	7-52
Enclosure	IP67
Power	12 VDC

Surge Protective Device

Protects all types of sensors from transient overvoltage. Transient overvoltage is typically due to lightning strikes which can lead to destructive voltages at sensors. Transient protection devices attempt to re-direct the energy in these transients.

Applications: Protecting sensors and cables from overvoltages.

- Lightweight impact-resistant ABS box
- Corrosion free
- Waterproof to IP67 rated
- Robust 5 pole terminal strips
- Easy & quick to wire
- Up to 10 sensors can be connected
- Conductor sizes from 28-12 AWG
- Spring Pressure Connection Technology
- Vibration-Proof connections
- Maintenance-free connections
- Colour coded glands for IN & OUT

Lines Protected	4+1 shield
Maximum Surge Current	15,000 Amps
Minimum Breakdown Voltage	17.1 Volts
Maximum Clamping Voltage	32.5 Volts
Output Clamp Voltage	< 5 Volts
Max AC Current	40 Amps

Junction Box

Allow multiple sensor cables to be connected into one multi-core cable, reducing cost of cabling & installation. Fitted with a five pole spring pressure connectors, they are quick and easy to wire and provide vibration-proof, maintenance-free connections, unlike traditional screw terminals.

Applications: Joining multiple sensors to a single multicore cable, providing central location for manual readings, protecting sensors and cables from overvoltage protection.

- Lightweight impact resistant ABS box
- Corrosion free
- Waterproof to IP67 rated
- Robust five pole terminal strips
- Easy & quick to wire
- Conductor sizes from 28-12 AWG
- Spring Pressure Connection Technology
- Vibration-Proof connections
- Maintenance-free connections
- Colour coded glands for IN & OUT
- Simple hinged quick-release catch lid
- Up to 10 sensors can be connected

Survey Accessories

Monitoring Prism

- High precision
- Robust construction
- Range of reflective targets available
- WILD/LEICA compatible
- Range of fixings

A 3-dimensional triple mini prism target primarily used for measuring the deflection of buildings. It is mounted in an aluminium metal holder and supplied with an L-bar for fixed installations with a weight of 0.25kg.
The prism offset is dependant on the mounting position.

Applications: Tunnel convergence monitoring, deflection of buildings.

IR range	2000m (7000ft)
Prism Material	BK7, Grade A glass
Prism diameter	25.4mm
Prism Chamfer Edges	0.10-0.25 Max
Prism Total Angular Deviation	5 Arc Seconds
Prism Surface Quality	60/40
Prism Surface Flatness	1/4 Wave

Reflective Targets

- High precision
- Range of retro reflective targets available
- Robust construction
- Range of reflective targets available
- Range of prism diameters
- WILD/LEICA compatible

Model GSRT2 is a 2-dimensional reflective Bireflex target used primarily for tunnel convergence monitoring. It has reflectors on both sides.
Models GSRT3/4 are 3-dimensional triple mini prism targets primarily used for measuring the deflection of buildings. Both are mounted on universal joints so they can be orientated in any direction.
They are made from high impact and resistant plastic with a bottom fitting which allows them to be mounted on a wide range of fixings such as convergence and reference bolts and prism poles.

Description	GSRT2	GSRT3	GSRT4
Prism Diam	60mm	25mm	38mm
Cut Accuracy	NA	<0.5"	<0.5"
Off Set (prism constant)	2mm	-17.5mm	-34mm
Range	10-150m	~1000m	~1000m
Materials	Polyamide	Polyamide	Polyamide
Weight	0.2kg	0.2kg	0.2kg

Staff Gauge

Used to measure water levels in dam reservoirs or in combination with V-notch weirs to monitor seepage or entry flows as part of dam safety monitoring programmes. Red datum numerals for easy surveying and numerals which can either be on separate boards or printed directly onto the board itself. Special ranges or sizes can be produced to meet specific project requirements.

Applications: Measuring water levels in or on dams, rivers & streams, lagoons & harbours.

- Made from GRP
- Corrosion resistant
- Low moisture absorption
- High impact resistance
- Chemically resistant
- Long life
- Lightweight
- Clear markings
- In accordance with BS 3680 Part 7
- Red datum numerals

Standard	BS 3680 Part 7
Material	Glass reinforced plastic (GRP)
Width	145mm
Length	1 metre
Thickness	4mm
Fixing	8 x M10 SS screws

Conversion Tables

DENSITY							
Tonne/m³ Mg/mg/cm	kg/m³	lb/in³	UK ton/yd³	US ton/yd³	lb/ft³		
1	1000	0.03613	0.75247	0.8428	62.423		
10^{-3}	1	3.613×10^{-5}	7.525×10^{-4}	8.428×10^{-4}	6.243×10^{-2}		
27.680	27680	1	20.828	23.238	1.728×10^{3}		
1.3289	1.328×10^{3}	4.801×10^{-2}	1	1.12	82.955		
1.1865	1.186×10^{3}	4.287×10^{-2}	0.8929	1	74.074		
1.602×10^{-2}	16.019	5.787×10^{-4}	1.205×10^{-2}	1.35×10^{-2}	1		
FORCE & WEIGHT							
MN	kN	N	kgf	tonf	lbf		
1	1000	10^{6}	1.0196×10^{5}	100.4	2.248×10^{5}		
10^{-3}	1	10^{3}	101.96	0.1004	224.82		
10^{-6}	10^{-3}	1	0.10196	1.004×10^{-4}	0.2248		
9.807×10^{-6}	9.807×10^{-3}	9.807	1	9.842×10^{-4}	2.2048		
9.964×10^{-3}	9.964	9964	1016	1	2240		
4.448×10^{-6}	4.448×10^{-3}	4.448	0.45355	4.464×10^{-4}	1		
PERMEABILITY							
m/s	cm/s	m/year	Darcy	ft/yr	ft/day		
1	100	3.156×10^{7}	1.04×10^{5}	1.035×10^{8}	2.835×10^{5}		
0.01	1	3.156×10^{5}	1.04×10^{3}	1.035×10^{6}	2.834×10^{3}		
3.169×10^{-8}	3.169×10^{-6}	1	3.28×10^{3}	3.281	8.982×10^{-3}		
9.66×10^{-6}	9.66×10^{-4}	304	1	1000	2.74		
9.658×10^{-9}	9.659×10^{-7}	0.3048	10^{-3}	1	2.378×1010^{-3}		
3.527×10^{-6}	3.527×10^{-4}	111.33	0.365	365.25	1		
PRESSURE, STRESS & MODULUS OF ELASTICITY							
MN/m² MPa	kN/m² kPa	kp kgf/cm²	bar	atm	m H_2O	psi lbf/in²	lbf/ft²
1	1000	10.2	10	9.869	102	145.04	20885
0.001	1	1.02×10^{-2}	0.01	9.87×10^{-3}	0.1020	0.14504	20.885
9.807×10^{-2}	98.07	1	0.9807	0.9678	10	14.223	2048.2
0.1	100	1.0197	1	0.9869	10.197	14.504	2088.5
0.1013	101.33	1.033	1.0133	1	10.332	14.696	2116.2
9.806×10^{-3}	9.806	9.983×10^{-2}	9.806×10^{-2}	9.678×10^{-2}	1	1.4198	204.82
6.895×10^{-3}	6.895	7.031×10^{-2}	6.895×10^{-2}	6.805×10^{-2}	0.7031	1	144
4.788×10^{-5}	4.788×10^{-2}	4.882×10^{-4}	4.788×10^{-4}	4.725×10^{-4}	4.882×10^{-3}	6.944×10^{-3}	1

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