

**2015
Catalog**

SLOPE INDICATOR

Geotechnical and Structural Instrumentation

INCLINOMETERS



DIGITILT DATAMATE II READOUT

The Digitilt DataMate inclinometer readout is compatible with classic inclinometer probes, spiral sensors, and portable tiltmeters. It shows the required depth for each reading and signals when the reading is stable. It also provides easy-to-use routines for validating and correcting readings. A convenient hand-switch permits efficient one-man surveys.

DigiPro 2 BASIC software is included with the DataMate. This program transfers readings from the DataMate to a PC and generates simple graphs and reports.

The DataMate II is functionally compatible with the original DataMate, but provides significantly faster operation, memory for up to 320 surveys, and a USB port.

SPECIFICATIONS

Function: Displays and records readings from Digitilt inclinometer probes, spiral sensors, and portable tiltmeters. Works with metric and English-unit sensors.

Survey Type: 2-pass survey for inclinometer probes; 4-pass survey for spiral sensors or uniaxial probes; manual reading for tiltmeters.

Minimum Reading Interval: 0.5 m or 1 foot.

Maximum Intervals per Survey: 1000.

Memory Capacity: 320 surveys with 100 lines of data each, 160 installation headers.

Operating Time: 16 hours.

Temperature Range: -20 to 50°C (-4 to 122°F).

PART NUMBER

Digitilt DataMate II Readout..... 50310900

DIGITILT CLASSIC INCLINOMETER PROBE

The Digitilt inclinometer probe measures tilt in vertical inclinometer casing. Its twin, force-balanced servo-accelerometers, designed and manufactured by Slope Indicator, are known for their durability, high precision, and rapid response. Readings are obtained with the Digitilt DataMate readout.

The complete specifications for inclinometer system accuracy and technical notes on other inclinometer issues are available at the Slope Indicator web site.

PART NUMBERS

Digitilt Probe, Metric 50302510
Digitilt Probe, English 50302500
Pulley for 48 and 70 mm casing 51104604
Pulley for 70 and 85 mm casing 51104606

HORIZONTAL DIGITILT PROBE

The horizontal inclinometer probe (below) is used in horizontal inclinometer casing to provide settlement profiles. Specifications and gauge lengths are similar to those of the vertical Digitilt probe. An adaptor, supplied with the probe, allows wheels to be set for operation in either 70 mm or 85 mm casing.

PART NUMBERS

Horizontal Probe, Metric..... 50303510
Horizontal Probe, English 50303500

DIGITILT CLASSIC CONTROL CABLE

Digitilt control cable is used to control the depth of the inclinometer probe. Durable and easy to handle, the cable provides excellent dimensional stability, stays flexible in cold weather, and resists chemicals and abrasion.

SPECIFICATIONS

Metric Graduations: Yellow marks at 0.5 m intervals, red marks at 1 m intervals, and numerics at 5 m intervals.

English Graduations: Yellow marks at 2-foot intervals, red marks and numerics at 10 foot intervals.

Construction: Steel strain wire core, six conductors, multiple binder layers, embedded torsion braid, and Polyurethane cable jacket and depth marks. Cable diameter is 10 mm (0.4 inch).

PART NUMBERS

Control Cable, 30 m 50601030
Control Cable, 50 m 50601050
Control Cable, 100 m 50601100
Control Cable, 100' 50601002
Control Cable, 150' 50601003
Control Cable, 300' 50601004
Cables are also available in custom lengths.

SPIRAL SENSOR

The spiral sensor (not shown) measures the twist of installed casing and is recommended for deep installations. Readings are taken with the Digitilt DataMate. The spiral sensor operates in both 70 mm • 2.75" casing and 85 mm • 3.34" casing.

PART NUMBERS

Spiral Sensor, Metric 50900115
Spiral Sensor, English 50900100

INCLINOMETERS



DIGITILT AT SYSTEM

The Digitilt AT System is a portable, all-inclusive and self-contained inclinometer system. It is based on our MEMS technology, and features lightweight cable, a reel equipped with blue tooth technology, a reader app for Android tablets (available for free download from the Google Play Store), and the ability to send the data from the app into cloud storage (such as Dropbox or Google Drive) or save directly to a USB flash storage device. Once the data is on your PC, our DigiPro2 software allows you to explore and plot data gathered by the Android app. An optional, custom-designed backpack offers superior mobility for hard to reach places or long treks to distant monitoring points.

Part Numbers

Digitilt AT Probe - Metric..... 50332510
(Cable available in 30, 50, 75, and 100 meters)

Digitilt AT Probe - English..... 50332500
(Cable available in 100, 150, 200, and 300 feet)

Digitilt AT Backpack..... 50330900



CABLE REELS

The slip-ring cable reel allows the readout to remain connected while the reel is operated. The storage reel keeps cable neat when not in use. Both types of reel have large diameter hubs to prevent cable damage.

PART NUMBERS

Slip-Ring Reel for 200 m (650') cable..... 50503100
Slip-Ring Reel for 300 m (1000') cable 50503300
Storage Reel for 30 m (100') cable..... 50502030
Storage Reel for 70 m (230') cable..... 50502050
Storage Reel for 110 m (360') cable 5050211

QC INCLINOMETER CASING

QC casing is Slope Indicator's most popular style of casing. It offers precision grooves, self-sealing flush joints, and snap-together convenience.

Assembly: Casing sections have built-in couplings that snap together. O-rings ensure that the joint is grout proof and there is no need for solvent cement or tape.

PART NUMBERS 85mm • 3.34" CASING

10' (3.05 m) Section 51150310
5' (1.52 m) Section..... 51150311
Top Cap 51100500
Bottom Cap..... 51150330
Heavy-Duty Bottom Cap..... 51100520
Grout Valve 51100830
Telescoping Section 51150320

PART NUMBERS 70mm • 2.75" CASING

10' (3.05 m) Section 51150210
5' (1.52 m) Section..... 51150211
Top Cap 51101500
Bottom Cap..... 51150230
Heavy-Duty Bottom Cap..... 51101520
Grout Valve 51100820
Telescoping Section 51150220

STANDARD CASING

Slope Indicator's standard casing is widely considered to be the strongest, most reliable casing available. Offered in three diameters, standard casing features precision grooves, flush joints, and strong, injection-molded couplings that provide superior resistance to twisting and bending.

Assembly: Casing sections and couplings are glued together, riveted, and then sealed with mastic and tape.

PART NUMBERS 85mm • 3.34" CASING

10' (3.05 m) Section 51100100
5' (1.52 m) Section..... 51100105
Coupling 51100200
Cap..... 51100500
Heavy-Duty Bottom Cap..... 51100520
Grout Valve 51100830
Telescoping Section 51106400
Pop Rivet AD44H 51103301

PART NUMBERS 70mm • 2.75" CASING

10' (3.05 m) Section 51101100
5' (1.52 m) Section..... 51101105
Coupling 51101200
Cap..... 51101500
Heavy-Duty Bottom Cap..... 51101520
Grout Valve 51100820
Telescoping Section 51107400
Pop Rivet AD42H 51003303

PART NUMBERS 48mm • 1.9" CASING

5' (1.52 m) Section, Self-Coupling..... 51102305
Cap..... 51102500
Grout Valve..... 51104000

85mm • 3.34" casing accommodates the most movement and provides the longest installation life. It is useful for landslides and long-term monitoring projects. 70 mm • 2.75" casing is suitable for medium to short-term construction projects. 48 mm • 1.9" casing is used in rock or concrete where deformations will be small.



INCLINOMETERS



CPI CASING

CPI casing features precision grooves, self-sealing couplings, and rapid assembly. Its oversize, injection-molded couplings can withstand twisting and bending. CPI casing can be used in weather that is too cold for snap or glue couplings. It is also suitable for temporary installations that require repeated assembly and disassembly.

Assembly: The coupling is pressed onto the casing section and a nylon shear wire is inserted to lock the joint. An O-ring inside the coupling makes the joint grout proof.

PART NUMBERS 85mm • 3.34" CASING

10' (3.05 m) Section 57500100
 5' (1.52 m) Section..... 57500105
 Coupling..... 57500200
 Heavy-Duty Bottom Cap..... 51100520
 Grout Valve 51100830
 Telescoping Section 57506400

PART NUMBERS 70mm • 2.75" CASING

10' (3.05 m) Section 57501100
 5' (1.52 m) Section..... 57501105
 Coupling..... 57501200
 Heavy-Duty Bottom Cap..... 51101520
 Grout Valve 51100820
 Telescoping Section 57507400

SHEAR WIRE CASING

Shear Wire casing is a cold-weather alternative to QC casing. It provides precision grooves, self-sealing flush joints, and rapid assembly. Shear Wire casing can be disassembled, but is not designed for repeated disassembly.

Assembly: Casing sections have integral couplings. Sections are pressed together and a nylon shear wire is inserted to lock the joint. An O-ring makes the joint grout proof.

PART NUMBERS 85mm • 3.34" CASING

10' (3.05 m) Section 51160310
 5' (1.52 m) Section..... 51160311
 Top Cap 51100500
 Bottom Cap..... 51160330
 Heavy-Duty Bottom Cap..... 51100520
 Grout Valve 51100830
 Telescoping Section 51160320

PART NUMBERS 70mm • 2.75" CASING

10' (3.05 m) Section 51160210
 5' (1.52 m) Section..... 51160211
 Top Cap 51101500
 Bottom Cap..... 51160230
 Heavy-Duty Bottom Cap..... 51101520
 Grout Valve 51100820
 Telescoping Section 51160220

EPIC CASING

EPIC casing can be cut and coupled anywhere along its length, making it easy to extend and easy to repair. Its strong, oversize couplings withstand twisting and bending.

Assembly: Casing sections and couplings are glued together, riveted, and sealed with mastic and tape.

PART NUMBERS 70mm • 2.75" CASING

10' (3.05 m) Section 51111100
 Coupling 51111200
 Cap..... 51111500
 Heavy-Duty Bottom Cap..... 51101520
 Grout Valve 51100820
 Telescoping Coupling 51111400
 Pop Rivet AD46H 51003310

CASING ANCHORS

The casing anchor is installed in place of the bottom cap. Activated before the borehole is grouted, the anchor prevents the casing from floating upwards. The casing anchor can also be supplied with a grout valve.

PART NUMBERS

Anchor for 85 mm • 3.34" Casing..... 51104385
 Anchor for 70 mm • 2.75" Casing..... 51104370
 Anchor + Grout Valve, 85 mm Casing..... 51104485
 Anchor + Grout Valve, 70 mm Casing..... 51104470

GROUT MIXES FOR INCLINOMETERS

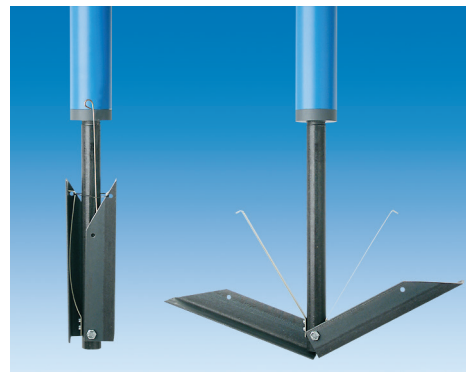
HARD & MEDIUM SOILS

Portland Cement	94 lb • 40 kg (1 bag)	1
Water	30 gal • 100 ℓ	2.5
Bentonite	25 lb • 12 kg	0.3

SOFT SOILS

Portland Cement	94 lb • 40 kg (1 bag)	1
Water	75 gal • 264 ℓ	6.6
Bentonite	39 lb • 16 kg	0.4

Use these mixtures as a starting point. Mix water and cement first, so you can control the strength of the grout. Then add bentonite as needed until the mixture has the consistency of heavy cream. The amount of bentonite needed varies with water type, temperature, and agitation. The 28-day strength of the hard/medium mix is about 100 psi, and the strength of the soft mix is about 4 psi.



TILTMETERS



PORTABLE TILTMETER

The portable tiltmeter is used with tilt plates to monitor changes in the inclination of a structure. The economical tilt plates can be mounted horizontally or vertically on the structure. The tiltmeter is carried from plate to plate to obtain measurements. The tiltmeter employs Slope Indicator's reliable Digitilt accelerometer. Readings are obtained with the Digitilt DataMate readout.

SPECIFICATIONS, METRIC TILTMETER

Sensor type: Digitilt accelerometer.

Range: $\pm 53^\circ$.

Resolution: 8 arc seconds.

System Repeatability: ± 50 arc seconds.

Temperature Range: -20 to $+50^\circ\text{C}$.

SPECIFICATIONS, ENGLISH TILTMETER

Sensor type: Digitilt accelerometer.

Range: $\pm 35^\circ$.

Resolution: 10 arc seconds.

System Repeatability: ± 50 arc seconds.

Temperature Range: -4 to $+122^\circ\text{F}$.

SPECIFICATIONS, TILT PLATE

Size: 140 mm (5.5") diameter.

Material: Bronze.

Mounting: Epoxy glue or screws.

PART NUMBERS

Metric Tiltmeter.....	50304410
English Tiltmeter.....	50304400
Tilt Plate.....	50307300
Tilt Plate Cover.....	50307350
Epoxy Compound.....	50305500

EL TILT SENSOR

The EL tilt sensor is used to monitor changes in the inclination of a structure. It features a high-resolution, narrow-angle sensor and a single-anchor mounting bracket that rotates 360 degrees to permit installation on a ceiling, floor, or wall. Readings are obtained with an M-Logger, other data logger or the EL Data Recorder.

SPECIFICATIONS

Sensor type: Uniaxial electrolytic tilt sensor works directly with Campbell Scientific data loggers. The signal conditioned SC version provides compatibility with other data loggers and with the EL Data Recorder.

Range: ± 40 arc minutes.

Resolution: 1 arc second.

Repeatability: ± 3 arc seconds.

Temperature Range: -20 to 50°C .

Size: 125 x 80 x 59 mm (5 x 3.2 x 2.3").

PART NUMBERS

EL Tiltmeter.....	56802100
EL Tiltmeter SC.....	56802120
Rotating L-Bracket.....	56801350K
Expansion Anchor.....	5780312
Groutable Anchor.....	57803130K
Signal Cable.....	50612804
Signal Cable for SC Version.....	50613527

EL NULLING DEVICE

When a narrow-angle EL tiltmeter or EL beam sensor is installed, it should be adjusted so that its output is null or near zero. The EL nulling device makes this task easy.

Red, yellow, and green LEDs guide the user in adjusting the sensor. When the output of the sensor is null, the green LED is illuminated.

The EL nulling device is compatible with both standard and signal-conditioned sensors.

PART NUMBER

EL Nulling Device.....	56803300
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MEMS MONOPOD TILTMETER

The MEMS tiltmeter measures tilt over a range of $\pm 10^\circ$ from vertical and is available in uniaxial and biaxial versions. Signal Conditioning makes the tiltmeter compatible with most data loggers.

The tiltmeter is fixed to the structure via an angle bracket that can be welded to steel or bolted to an anchor set into concrete or rock. Readings are obtained with a data logger or the EL Data Recorder.

SPECIFICATIONS

Sensor Type: MEMS (Micro Electro-Mechanical Systems) sensor for tilt readings and a 3K Ohm thermistor for temperature readings.

Range: $\pm 10^\circ$.

Resolution: 9 arc seconds.

Repeatability: ± 22 arc seconds.

Size: 32 x 190 mm (1.25 x 7.5").

PART NUMBERS

MEMS Tiltmeter, Uniaxial.....	57803101
MEMS Tiltmeter, Biaxial.....	57803102
Signal Cable.....	50613527





EL BEAM SENSOR

The EL tilt sensor may be configured as a beam sensor with the addition of an optional bracket and beam. The resulting EL beam sensor is used to monitor changes in the inclination of a structure. When linked end to end, beam sensors can be used to monitor differential movements. The resulting data provides both profiles of deformation and absolute displacement data. The horizontal beam sensor configuration monitors settlement and heave. Readings are obtained with a data logger and then retrieved and forwarded to the web-based Atlas Monitoring system for automated processing.

The M-Logger can monitor one multiplexer with 16 EL-SC sensors, or one EL-SC sensor connected directly.

SPECIFICATIONS

Sensor type: Uniaxial electrolytic tilt sensor compatible with Campbell Scientific data loggers. The signal conditioned SC version provides compatibility with other data loggers and with the EL Data Recorder.

Range: ± 40 arc minutes.

Resolution: 1 arc sec (0.005 mm/m).

Repeatability: ± 3 arc sec (± 0.015 mm/m).

Temperature Range: -20 to 50° C.

PART NUMBERS

EL Tilt Sensor	56802100
EL Tilt Sensor SC	56802120
Omni Bracket	56801355K
1 meter Beam	56801612
2 meter Beam	56801614
3 meter Beam	56801616
Spare End-Bracket	56801815
Signal Cable	50612804
Signal Cable for SC Version.....	50613527

TRACK MONITORING

Track monitoring systems help maintain railroad safety by monitoring settlement and twist. The systems are installed on railroad tracks that cross landslides or washout areas. They are also installed on tracks affected by nearby construction activities. Readings are obtained with a Campbell Scientific data logger and then processed and displayed on a PC.

SPECIFICATIONS, SETTLEMENT SENSOR

Sensor type: MEMS sensor.

Range: $\pm 10^\circ$.

Resolution: 9 arc sec (0.04 mm/m).

Repeatability: ± 22 arc sec (± 0.1 mm/m).

Temperature Range: -20 to 70° C.

SPECIFICATIONS, TWIST SENSOR

Sensor type: MEMS sensor.

Range: $\pm 10^\circ$.

Resolution: 9 arc sec (0.04 mm/m).

Repeatability: ± 22 arc sec (± 0.1 mm/m).

Temperature Range: -20 to 70° C.

PART NUMBERS

Track Settlement Sensor	97806550
Track Twist Sensor	97806570
Gauge Tubing, 3 m (10')	97806558
End-Anchor.....	96806351
Signal Cable.....	50613527



Special beam sensor configuration with integral EL sensor. Upon request only.



PIEZOMETERS



WATER LEVEL INDICATOR WITH LASER-MARKED CABLE

The water level indicator is used to obtain depth-to-water measurements in standpipes and wells. Its small-diameter probe and cable fit even small diameter standpipes, and its sensitivity adjustment provides reliable readings in nearly any type of water. The cable is graduated by a laser marking machine, which produces precise and indelible marks.

SPECIFICATIONS

Probe Diameter: 9.5 mm (3/8").

Cable: Twin steel conductors inside 3.2 mm (1/8") diameter polyurethane jacket with laser marked graduations.

Reel: Durable aluminum plate. 180 mm (7") reels have handle or stand. Larger reels have stand.

Metric Graduations: 2 mm.

English Graduations: 0.01 foot.

PART NUMBERS, METRIC UNIT WLI

WLI, 30 m cable on 180 mm reel.....	51690303
WLI, 30 m cable on 230 mm reel.....	51690300
WLI, 50 m cable on 180 mm reel.....	51690304
WLI, 50 m cable on 230 mm reel.....	51690305
WLI, 100 m cable on 230 mm reel.....	51690310
WLI, 150 m cable on 280 mm reel.....	51690315
WLI, 200 m cable on 230 mm reel.....	51690320
WLI, 300 m cable on 280 mm reel.....	51690330

PART NUMBERS, ENGLISH UNIT WLI

WLI, 100' cable on 7" reel.....	51690010
WLI, 100' cable on 9" reel.....	51690012
WLI, 150' cable on 7" reel.....	51690014
WLI, 150' cable on 9" reel.....	51690015
WLI, 300' cable on 9" reel.....	51690030
WLI, 500' cable on 11" reel.....	51690050
WLI, 1000' cable on 11" reel.....	51690100

PADDED NYLON CASE

For WLI with 230 mm • 9" reel.....	51671009
For WLI with 280 mm • 11" reels.....	51671000

VW PIEZOMETER

The VW piezometer is used to monitor pore-water pressure. Its high sensitivity allows it to be directly grouted in, eliminating the need for a sand filter zone and a bentonite seal. This greatly simplifies same-hole installation of multiple piezometers or piezometers with inclinometer casing. Readings are obtained with a VW readout or data logger.

Information about the grout-in method of installation is available at the Slope Indicator web site: www.slopeindicator.com.

SPECIFICATIONS

Sensor Type: Vibrating wire.

Resolution: 0.025% FS.

Accuracy: ±0.1% FS for 3.5 and 7 bar sensors, ±0.3% FS for 17 and 35 bar sensors.

Temperature Range: -20 to 80° C.

Size: 19 x 197 mm (0.75 x 7.75").

Cable: 4-wire, shielded, polyurethane jacket.

PART NUMBERS

0.7 bar (10psi) piezometer.....	52611610
1.8 bar (25psi) piezometer.....	52611625
3.5 bar • 50 psi piezometer.....	52611020
7 bar • 100 psi piezometer.....	52611030
17 bar • 250 psi piezometer.....	52611040
35 bar • 500 psi piezometer.....	52611050
Signal Cable.....	50613524

PIEZOMETERS WITH CABLE

3.5 bar • 50 psi piezometers

Piezometer with 15 m • 50' cable.....	52611028
Piezometer with 30 m • 100' cable.....	52611024
Piezometer with 45 m • 150' cable.....	52611027
Piezometer with 60 m • 200' cable.....	52611026

7 bar • 100 psi piezometers

Piezometer with 30 m • 100' cable.....	52611033
Piezometer with 45 m • 150' cable.....	52611034
Piezometer with 60 m • 200' cable.....	52611035
Piezometer with 90 m • 300' cable.....	52611036

HEAVY-DUTY VW PIEZOMETERS

This piezometer features a strong double wall housing and is normally supplied with armored signal cable.

PART NUMBERS

3.5 bar (50 psi) Piezometer.....	52610520
7 bar (100 psi) Piezometer.....	52610530
17 bar (250 psi) Piezometer.....	52610540
35 bar (500 psi) Piezometer.....	52610550
Signal Cable, Armored.....	50613586

MULTI-LEVEL VW PIEZOMETER

Multi-level piezometers (below) are used to monitor pore-water pressure at multiple zones in a borehole. Each piezometer is isolated from the borehole zones above and below, but remains highly responsive to changes in pore-water pressure at its own elevation.

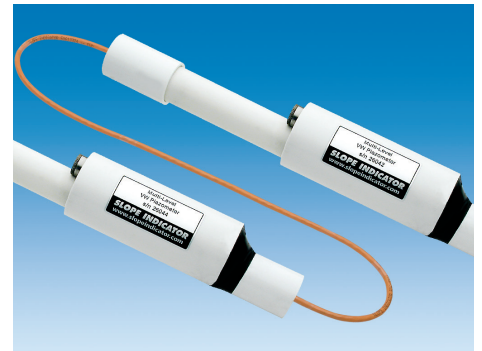
SPECIFICATIONS

Housing Diameter: 71 mm (2.8").

Pipe Requirement: 1.25 inch, schedule 40 PVC.

PART NUMBERS

3.5 bar • 50 psi VW piezometer.....	52611020
7 bar • 100 psi VW piezometer.....	52611030
Multi-Level Housing.....	52611100
Signal Cable.....	50613324



PIEZOMETERS



PUSH-IN VW PIEZOMETER

The push-in VW piezometer is pushed into soft clays to monitor pore-water pressure. The top of the piezometer is threaded to accept a drill-rod adaptor. Readings are obtained with a VW readout or data logger.

PART NUMBERS

3.5 bar • 50 psi piezometer..... 52621020
7 bar • 100 psi piezometer..... 52621030
17 bar • 250 psi piezometer 52621040
35 bar • 500 psi piezometer 52621050
Signal Cable..... 50613524

PNEUMATIC PIEZOMETER

The pneumatic piezometer is used to monitor pore-water pressure. It is an economical, non-electric alternative to the VW piezometer and is read with a pneumatic indicator.

SPECIFICATIONS

Sensor Type: Pneumatic.
Range: 12 bar • 180 psi.
Resolution: 0.001 bar, 0.01 psi when digital gauge is used.
Accuracy: Depends on pressure gauge.
Repeatability: $\pm 0.25\%$ FS.
Size: 25.4 x 76 mm (1 x 3").

PART NUMBERS

Pneumatic Piezometer 51417800
Twin Tubing..... 51416900
Quick Connector..... 51407302
Piezometer with 15m • 50' tubing..... 51417801
Piezometer with 30m • 100' tubing... 51417802
Piezometer with 45m • 150' tubing... 51417803
Piezometer with 60m • 200' tubing... 51417804

VENTED VW PIEZOMETER

The vented VW piezometer is used to monitor changes in water levels. It features a large diameter vent tube for quick response to changes in atmospheric pressure and a large-capacity, low-maintenance desiccant chamber that keeps the vent tube dry for three to six months.

SPECIFICATIONS

Sensor Type: Vibrating wire.
Resolution: 0.025% FS.
Calibration Accuracy: $\pm 0.1\%$ FS.
Temperature Range: -20 to 80° C.
Size: 29 x 191 mm (1.25 x 7.5").
Cable: 4-wire, shielded, with 10 mm (0.25") vent tube, bundled in polyurethane jacket.

PART NUMBERS

1.5 bar • 20 psi piezometer..... 52612402
Desiccant Chamber 52612495
Vented Signal Cable 50614410

CORROSION-RESISTANT VW PIEZO

The body of the corrosion-resistant VW piezometer is manufactured of titanium while the filter and diaphragm are protected by a heat bonded PTFE coating.

PART NUMBERS

7 bar (100 psi) piezometer 52621230
17 bar (250 psi) piezometer 52621240
PVC Signal Cable..... 50613824

HIGH CAPACITY PIEZOMETER

Our high capacity piezometers are designed to withstand conditions with extremely high pressures.

PART NUMBERS

17 bar (250 psi) piezometer 52611040
35 bar (500 psi) piezometer 52621150

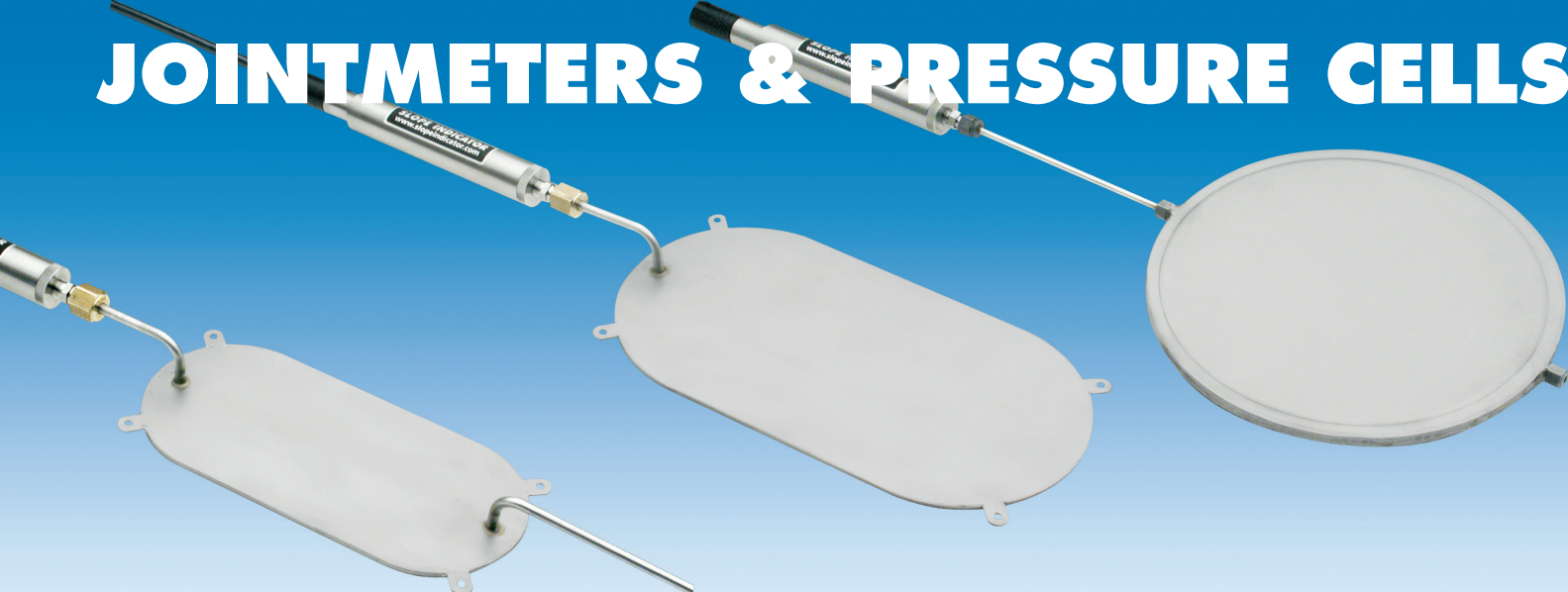
CONVERSION FACTORS FOR UNITS OF PRESSURE

bar	kPa	psi	m H ₂ O	ft H ₂ O	atm	millibar	inHg
1	100	14.504	10.197	33.456	0.98692	1000	29.529
0.01	1	0.14504	0.10197	0.33455	0.0098692	10	0.2953
0.068947	6.8947	1	0.70377	2.3089	0.068046	68.948	2.036
0.098068	9.8068	1.4223	1	3.2808	0.096788	97.068	2.8959
0.029891	2.9891	0.43353	0.3048	1	0.0295	29.891	0.88267
1.0133	101.33	14.696	10.332	33.899	1	1013.3	29.921
0.001	0.1	0.014504	0.010197	0.033455	0.00098692	1	0.029529
0.033864	3.3864	0.49115	0.34566	1.1329	0.033421	33.864	1

Example: To convert millibars to psi, find the 1 in the millibar column. The 1 marks the row that contains multipliers to convert millibars to other units. Follow the row to the psi column. The multiplier is 0.014504. Thus you would multiply the millibar value by 0.014504 to convert it to psi. Factors for head of water are derived from water at 4 °C (39.2 °F).



JOINTMETERS & PRESSURE CELLS



VW EMBEDMENT JOINTMETER

The VW embedment jointmeter is used to monitor movement at joints in mass-concrete structures. It has a range of 50 mm and is waterproof to 15 bar.

SPECIFICATIONS

Range: 50 mm (2")*.

Resolution: 0.025% FS.

Calibration Accuracy: $\pm 0.1\%$ FS.

Repeatability: $\pm 0.5\%$ FS.

Waterproof: 17 bar (250 psi)*.

Materials: 300-series stainless steel.

Socket Size: 51 mm diameter, 90 mm long (2 x 3.5"), stainless steel.

Transducer Housing: 51 mm diameter, 420 mm long (2 x 16.5"), PVC.

PART NUMBERS

Jointmeter..... 52632244

Signal Cable..... 50613524

VW 3-D JOINTMETER SYSTEM

The VW 3-D jointmeter is used to monitor movement at joints and cracks. Designed to withstand extended submersion, the jointmeter is suitable for applications such as monitoring movement at sub-merged construction joints in concrete-face dams, or monitoring joints/cracks in tunnels and tanks.

PART NUMBERS

Sensor Mount and Target 52632205

Anchor Kit 52632210

Drilling Template 52632206

Signal Cable..... 50613524

VW EARTH PRESSURE CELL

The VW total pressure cell can be embedded in soil or placed at the interface between a structure and the surrounding earth. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS

Sensor Type: Vibrating wire.

Sensor Resolution: 0.025% FS.

Sensor Accuracy: $\pm 0.5\%$ FS.

Temperature Range: -20 to +80° C.

Size: 230 x 11 mm (9 x 0.43").

PART NUMBERS

3.5 bar (50 psi) 52608220

7 bar (100 psi) 52608230

17 bar (250 psi) 52608240

35 bar (500 psi) 52608250

Signal Cable..... 50613524

GOODMAN JACK

The Goodman Jack (left) is used for in-situ investigations of the deformability of rock masses. Two versions are available, one for hard rock, and the other for soft rock. Both versions operate in 3" (76 mm) boreholes. Readings are obtained with the Goodman Jack displacement indicator.

SPECIFICATIONS, HARD ROCK JACK

Max Bearing Pressure: 64,000 kPa (9,300 psi).

Maximum Force: 703 kN (158,100 lbf).

Linearity: $\pm 0.5\%$ to $\pm 1\%$.

Temperature Range: -32 to 60° C.

SPECIFICATIONS, SOFT ROCK JACK

Max Bearing Pressure: 38,200 kPa (5,540 psi).

Maximum Force: 416 kN (94,200 lbf).

Linearity: $\pm 0.5\%$ to $\pm 1\%$.

Temperature Range: -32 to 60° C.

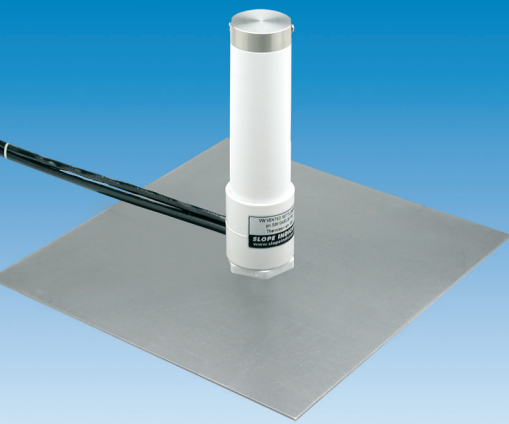
PART NUMBERS

Goodman Jack, Hard Rock 52100100

Goodman Jack, Soft Rock..... 52100200



SETTLEMENT SYSTEMS



SETTLEMENT CELL

The settlement cell is used to monitor a single point for settlement. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS, VENTED VW CELL

Sensor Type: Vibrating wire.
Range: 14 m (47').
Resolution: 0.025% FS.
Repeatability: ± 0.25 % FS to ± 1 % FS.
Temperature Range: -20 to 80° C.

SPECIFICATIONS, SEALED VW CELL

Sensor Type: Vibrating wire.
Range: 33 m (108').
Resolution: 0.025% FS.
Repeatability: ± 0.25 % FS to ± 1 % FS.
Temperature Range: -20 to 80° C.

SPECIFICATIONS, PNEUMATIC CELL

Sensor Type: Pneumatic.
Range: 64 m (210').
Repeatability: ± 0.25 % FS to ± 1 % FS.

PART NUMBERS

VW Vented Settlement Cell..... 52612420
 Settlement Plate 51410100
 Vented Signal Cable 50614410
 Desiccant Chamber 52612495
 Tubing 51416950
 Reservoir 51419500

50 psi VW Sealed Settlement Cell..... 52612020
 100 psi VW Sealed Settlement Cell ... 52612030
 Settlement Plate for Sealed Cell..... 52630512
 Signal Cable..... 50613524
 Tubing 51416950
 Reservoir 51419500
 Field Barometer 52612070

SONDEX

The Sondex system provides multi-point measurements of settlement or heave along the axis of inclinometer casing. Readings are obtained with the Sondex readout and its laser-graduated cable or a steel tape. The resulting data indicate the settlement at each sensing ring as well as the total settlement.

SPECIFICATIONS

Metric Cable Graduations: 2 mm.
English Cable Graduations: 0.01 foot.
 Cable has durable, laser-marked graduations. For highest precision, a steel tape is also used.
Probe Diameter: 43 mm (1.7").
Corrugated Pipe OD: 92 mm (3.6"). This pipe accommodates 70 mm (2.75") inclinometer casing. Corrugated pipe to fit 85 mm casing is also available.

PART NUMBERS

Sondex Readout with 50 m cable..... 50810305
 Sondex Readout with 100 m cable 50810310
 Sondex Readout with 150 m cable 50810315
 Sondex Readout with 150' cable 50810015
 Sondex Readout with 300' cable 50810030
 Sondex Readout with 500' cable 50810050

Corrugated Pipe for 70 mm Casing 50801600
 Coupling for Corrugated Pipe..... 50801602
 Cap for Corrugated Pipe 50801601

Sensing Ring, Factory Installed 50801800
 Sensing Ring, for Installation by User..... 02842004

SETTLEMENT POINT

The settlement point (not shown) employs a Borros-type anchor and riser pipe to provide single point measurements of settlement. The mechanically expanded anchor is suitable for soft soil. Requires 1" outer and 1/4" inner pipe.

PART NUMBER

Borros-Type Anchor..... 51808000

MAGNET EXTENSOMETER

The magnet extensometer provides multi-point measurements of settlement or heave along the axis of inclinometer casing or access pipe. Readings are obtained with the Magnet Extensometer readout and its laser-graduated cable. The resulting data indicate settlement at each magnet as well as the total settlement.

SPECIFICATIONS

Metric Cable Graduations: 2 mm.
English Cable Graduations: 0.01 foot.
 Cable has durable, laser-marked graduations.
Probe Diameter: 16 mm (5/8").

PART NUMBERS

Readout with 30 m cable..... 51817203
 Readout with 50 m cable..... 51817205
 Readout with 100 m cable 51817210
 Readout with 150m cable 51817215
 Readout with 100' cable 51817310
 Readout with 150' cable 51817315
 Readout with 300' cable 51817330
 Readout with 500' cable 51817350

Datum magnet for 1" pipe 51817303
 Spider magnet for 1" pipe, 51817503
 Plate magnet for 1" pipe..... 51817703
 Pipe magnet for 1" pipe 91281450
 Access Pipe, 1" x 10' 50711408
 Telescoping Section, 1" x 10' 50711458
 End Cap, 1" pipe..... 50711428

Datum magnet for 70 mm casing 51817346
 Spider magnet for 70 mm casing 51817546
 Plate magnet for 70 mm casing 51817746
 Telescoping Section, 70 mm QC 51150220

Datum magnet for 85 mm casing 51817366
 Spider magnet for 85 mm casing 51817566
 Plate magnet for 85 mm casing 51817766
 Telescoping Section, 85 mm QC 51150320



EXTENSOMETERS



DIGITAL TAPE EXTENSOMETER

The tape extensometer is a portable device used to monitor changes in the distance between reference points that are mounted on the tunnel lining or on the walls of underground openings. The reference points can be bolted, welded, grouted, or mechanically anchored to the structure. The digital display makes the instrument easy to read.

SPECIFICATIONS, METRIC INSTRUMENT

Display Resolution: 0.01 mm.

Repeatability: ± 0.10 mm.

Tape: Steel, 13 mm x 20 m.

Size: 70 x 610 mm.

SPECIFICATIONS, ENGLISH INSTRUMENT

Display Resolution: 0.0005 inch.

Repeatability: ± 0.005 inch.

Tape: Steel, 0.5 inch x 66 feet.

Size: 2.75 x 24 inches.

PART NUMBERS

Metric

Tape Extensometer, 20 m 51811510

Tape Extensometer, 30 m 51811530

English

Tape Extensometer, 66 ft 51811500

Tape Extensometer, 100 ft Special Order

Reference Point 51812000

Groutable Anchor 51804304

Expansion Anchor 51812050

VW CRACKMETER

The VW crackmeter is used to monitor movement at joints and cracks in concrete structures or rock. Groutable anchors and swivel mounts are included. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS, 60 MM CRACKMETER

Sensor type: Vibrating wire.

Range: 60 mm (2.4") nominal.

Resolution: 0.025% FS.

Repeatability: $\pm 0.5\%$ FS.

Temperature Range: -20 to 80° C.

Nominal Length: 400 mm (15.7").

SPECIFICATIONS, 100 MM CRACKMETER

Sensor type: Vibrating wire.

Range: 100 mm (4") nominal.

Resolution: 0.025% FS.

Repeatability: $\pm 0.5\%$ FS.

Temperature Range: -20 to 80° C.

Nominal Length: 530 mm (21").

PART NUMBERS

Crackmeter, 60 mm Splashproof 52636081

Crackmeter, 60 mm Waterproof 52636088

Crackmeter, 100mm Splashproof 52636082

Crackmeter, 100 mm Waterproof 52636089

Signal Cable 50613524

MECHANICAL 3D CRACKMETER

The Mechanical 3D Crackmeter allows you to obtain readings and measure the changes on X,Y, and z axes. A digital micrometer allows for easy manual reading.

PART NUMBERS

Aluminum 3D Crackmeter 51708800

Stainless 3D Crackmeter 91708800

Digital Indicator with Collar 51708868K

Alignment Collar Only 51708867

Weldable Anchor Kit 51708855

ROD EXTENSOMETER

Rod extensometers are installed in boreholes to monitor settlement in foundation soil, subsidence above tunnels, deformations of underground openings, and displacement of retaining structures.

COMPONENTS

Anchors are available in groutable, hydraulic, or packer versions.

Rods are made of fiberglass or stainless steel. Fiberglass rod extensometers are shipped to the site ready to install. Steel rods are assembled on site, but are suitable for deeper anchor depths.

Single and Multi-Point Reference Heads are available in mechanical or electric versions. Mechanical heads are less expensive but require direct access for reading. Electrical heads use displacement sensors and can be read remotely.

Displacement Sensors are available with 50, 60, or 100 mm range.

PART NUMBERS

Single-Point Mechanical Head 51836110

Multi-Point Mechanical Head 51836120

Single-Point Electric Head 51836130

Multi-Point Electric Head 51836140

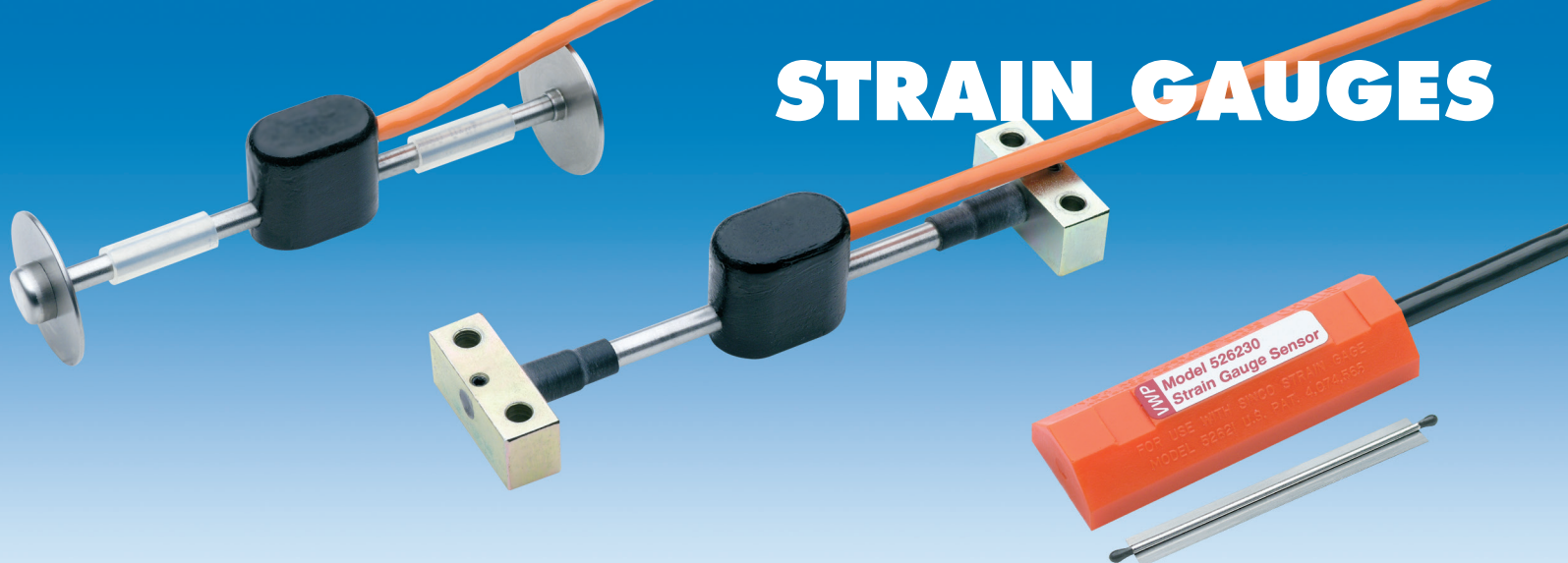
SOIL STRAINMETER

Soil strainmeters, also known as embankment strainmeters, are installed in series to monitor soil strain in large earth structures. The strainmeter typically employs potentiometer displacement sensors and is available in plastic or stainless steel housings.

Single-Sensor Strainmeter 91707610

Double-Sensor Strainmeter 91707620

STRAIN GAUGES



EMBEDMENT STRAIN GAUGE

The VW embedment strain gauge is used to monitor strain in reinforced concrete and mass concrete structures. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS

Sensor Type: Vibrating wire.
Range: 3000 microstrain.
Resolution: 1 microstrain.
Accuracy: $\pm 0.1\%$ FS.
Temperature Range: -20 to $+80^{\circ}\text{C}$.

PART NUMBERS

Embedment Strain Gauge..... 52640226
 Signal Cable..... 50613324

LOAD CELL

The center-hole load cell (below) is used to monitor loads in tiebacks, rock bolts, and cables. Typical applications include proof testing and performance testing of anchor systems. Readings are obtained with a load cell indicator or data logger. Cells are available in a variety of ranges and diameters.

SPECIFICATIONS

Sensor Type: Vibrating Wire or resistive.

PART NUMBERS

Load Cell, 250 kN 91300250
 Load Cell, 500 kN 91300500
 Load Cell, 1000 kN..... 91301000
 Signal Cable..... 50613527



ARC-WELDABLE STRAIN GAUGE

The VW Arc-Weldable strain gauge is used to measure strain in steel or other materials. The gauge is supplied with two weldable mounting blocks. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS

Sensor Type: Vibrating wire.
Range: 3000 microstrain.
Resolution: 1 microstrain.
Accuracy: $\pm 0.1\%$ FS.
Temperature Range: -20 to $+80^{\circ}\text{C}$.

PART NUMBERS

Arc-Weldable Strain Gauge..... 52640306
 Signal Cable 50613324

SPOT-WELDABLE STRAIN GAUGE

The VW spot-weldable strain gauge is used to monitor strain in steel. The gauge, which is pre-tensioned for easy installation, features a patented, low-profile design that reduces error caused by bending. A VW strain gauge sensor is fixed atop the gauge. Readings are obtained with a VW readout or data logger.

SPECIFICATIONS

Sensor Type: Vibrating wire.
Range: 2500 microstrain.
Resolution: 1 microstrain.
Accuracy: $\pm 0.1\%$ FS.
Temperature Range: -20 to $+80^{\circ}\text{C}$.
Length: 76 mm (3").
Welder: Spot welder.

PART NUMBERS

Gauge, set Mid-Range 52602100
 Gauge, set for Compressive Strain 52602101
 Gauge, set for Tensile Strain..... 52602102
 VW Strain Gauge Sensor 52623000
 ScotchKote..... 06700019
 3M Mastic Pad 06700180
 Protective Cover, Stainless 52623120
 Signal Cable..... 50613524



READOUTS



VW DATA RECORDER

This vibrating wire readout is designed for utility and economy. No preliminary setup is needed, and its simple two-key operation can be learned in minutes. Quick-connect terminals on the front panel allow direct connection of sensor signal cables and eliminate the trouble of lost or forgotten jumper cables. Easy to use Windows software retrieves readings and saves them in a comma-delimited ASCII file, ready for spreadsheets.

SPECIFICATIONS

Function: Displays and records readings from vibrating wire sensors, thermistors, and RTDs. Transfers readings to PC.

Displayed Units: Hz, Hz², °C, and microstrain units (for the VW spot-weldable strain gauge).

Resolution: 0.01% FS.

Accuracy: ±0.02% of Hz reading.

Batteries: 2 D-cells, 60 hours continuous use.

Temperature Range: -20 to 50°C.

Size: 235 x 190 x 108 mm (9.25 x 7.5 x 4.25").

Weight: 1.5 kg (3.3 lb).

PART NUMBER

VW Data Recorder 52613500

TERMINAL BOXES

Terminal boxes for vibrating wire sensors are available with 6, 12, or 24 positions. The 12-position box can also be used with other types of sensors. A jumper cable is used to connect a readout to the box, and a rotary switch provides access to each position. Jumper cables for vibrating wire sensors are available with VW readouts. Jumpers for other types of sensors can be special-ordered.

PART NUMBERS

Terminal box for 6 VW sensors 57711606

Terminal box for 12 sensors 57711600

Terminal box for 24 VW sensors 97711624

EL / MEMS DATA RECORDER

The EL Data recorder is used to read EL SC and MEMS sensors. No preliminary setup is needed, and its simple two-key operation can be learned in minutes. The front panel has quick-connect wiring terminals for direct connection of sensor signal cables. Easy to use Windows software retrieves readings and saves them in a comma-delimited ASCII file, ready for spreadsheets.

SPECIFICATIONS

Function: Displays and records readings from EL SC and MEMS sensors. Transfers readings to PC.

Displayed Units: Volts, °C.

Resolution: 0.004% FS.

Accuracy: ±0.1% FS.

Batteries: D-cells, 30 hours continuous use.

Temperature Range: -20 to 50°C.

Size: 235 x 190 x 108 mm (9.25 x 7.5 x 4.25").

Weight: 1.5 kg (3.3 lb).

PART NUMBER

EL / MEMS Data Recorder 56813500

PNEUMATIC INDICATOR

The 256 pneumatic indicator is used to read pneumatic piezometers and settlement cells. It features a precision flowmeter, a return-flow indicator, convenient controls, a large internal tank, and an analog or digital pressure gauge.

SPECIFICATIONS

Function: Reads twin-tube pneumatic transducers.

Accuracy, Digital Gauge: ±0.25% FS.

Accuracy, Analog Gauge: ±0.25% FS.

Pressure Range: 0 to 150 psi (10.3 bar).

Internal Tank: 1.38 liter.

Size: 508 x 457 x 178 mm (20 x 18 x 7").

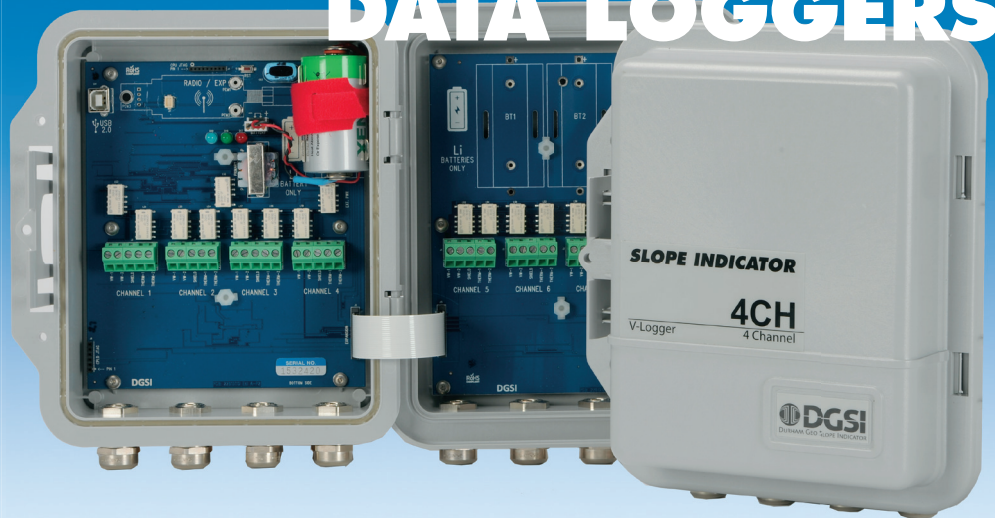
Weight: 11 kg (24 lb).

PART NUMBERS

256 Indicator with Digital Gauge 51425602

256 Indicator with Analog Gauge 51425601





FULL-SIZE DATA LOGGERS

Campbell Scientific data loggers are known for their reliability and work with nearly all sensors used in geotechnical applications.

Most systems are powered by battery, which can be charged by AC mains power or a solar panel. A wide array of data retrieval options is available, including telephone, cellular, and radio modems.

Data from the loggers is directly compatible with the Atlas web-based monitoring system.

Slope Indicator can configure data logger systems and write monitoring programs to customer specifications. Such services significantly reduce the time and expense required to deploy a data acquisition system. Please contact Slope Indicator for more information.

PART NUMBERS

CR800 Data Logger	56700800
CR1000 Data Logger	56701000
PS100 Power Supply	56703120
AC Adaptor, 90 to 260 V ac	56703124
RS-232 Interface Cable	50306869
USB Interface Cable	56704018
ENC 16/18 Enclosure	56705020
AVW200 VW Interface	56701550
AM16/32 Multiplexer	56702110
System Integration	96700000
Loggernet Software	56708020
Custom Programming	96701000

V-LOGGER

The V-Logger (top center and right) is a vibrating wire data logger that can collect data on up to four (or eight, depending on the model) sensors at set intervals and store the readings for later retrieval via a radio or USB connection.

SPECIFICATIONS

Data Storage: Stores 65,520 records for each sensor in secure, non-volatile memory. Each record includes a VW reading, a temperature reading, and the time and date. When memory is full, recording either stops or continues by overwriting the earliest readings, according to user preference.

Power: 1 or 4 D-cell lithium batteries provide power for 9+ (6+ for 8-channel) years in moderate temperatures, assuming readings are taken every hour. A rechargeable battery pack option is also available.

Weatherproofing: V-Logger is housed in an IP 68 enclosure. Lugs are provided for unused ports.

PART NUMBERS

4-Channel V-Logger	52615140
8-Channel V-Logger	52615180

M-LOGGER

M-Loggers are used to monitor Slope Indicator MEMS sensors. They are also compatible with EL-SC sensors. Simple to use and economical to deploy, M-Loggers can be placed close to sensors, enhancing reliability and keeping cable costs down. Each M-Logger can monitor up to 16 sensors. See page 5.

VW MINILOGGER

The VW MiniLogger (not shown) is a reliable, low cost data logger designed to monitor a single vibrating wire sensor.

MiniLoggers are ideal for small-scale projects. They are also useful for monitoring sensors that are too remote for economical connection to centralized data acquisition systems.

Windows software supplied with the logger is used to set up logging schedules and retrieve data. Readings are saved to a comma-delimited ASCII file, ready for a spreadsheet.

A wireless option makes it easy to retrieve data when access to loggers is difficult or when frequent retrieval of data is required.

SPECIFICATIONS

Function: Records readings from a vibrating wire sensor and a thermistor or RTD.

Memory: 8,000 readings.

Power: In temperate climates, the two D-cell batteries provide about six months of operation, or two to four months of operation with the wireless option installed.

Temperature Range: -20 to +50° C.

Size: 100 x 100 x 90 mm (4 x 4 x 3.5").

PART NUMBERS

VW MiniLogger	52613310
900 MHz Wireless Option	52613356
900 MHz Wireless Base Station	52613450
2.4 GHz Wireless Option	52613360
2.4 GHz Wireless Base Station	52613455



ATLAS WEB-BASED MONITORING

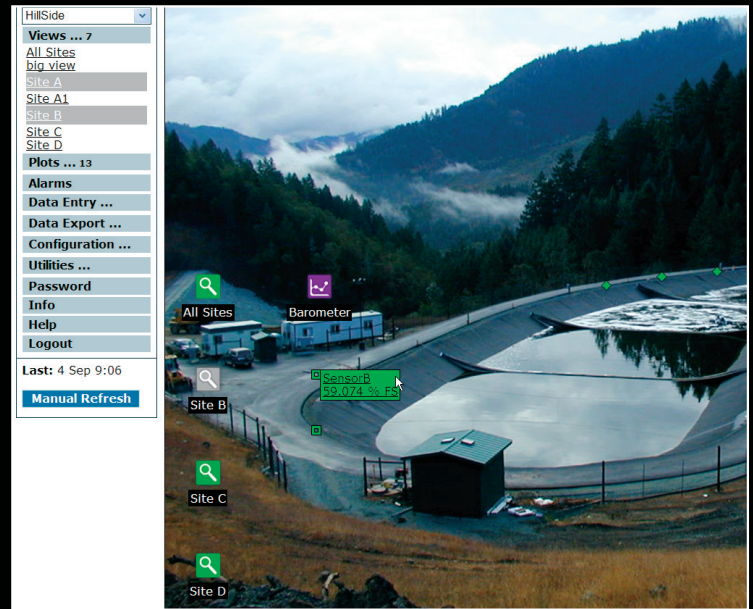
Atlas web-based monitoring software solves the two main problems of data acquisition: the timely processing of data and the timely distribution of results.

Atlas is a fast, reliable, and cost-effective way to process sensor readings and distribute the resulting data. Atlas automatically processes sensor readings, checks for alarm conditions, generates graphs and reports, and makes all of these results available on the web. Users can view and download graphs and data with their web browsers, whether they are at work, at home, at a client's office, or half-way around the world.

Atlas provides a secure, central location for sensor readings, calibration information, and processing routines, thus ensuring the continuity of the monitoring program, regardless of common events at the work place, such as computer crashes or changes in personnel.

Atlas is available as a web service. The web service offers monthly plans based on the number of sensors to be monitored. Atlas is the easiest and most cost-effective way to deploy web-based monitoring.

Atlas Activation Fee58851000
Atlas Monthly Web Service58851050
Atlas Prepaid Web Service.....58851090



ABOUT DGSi

Durham Geo Slope Indicator designs and manufactures materials testing equipment, geotechnical instruments, and remediation pumps. DGSi has two factories in the US and more than thirty-seven distributors world wide.

DGSi SUPPORT & SERVICES

REPAIR & CALIBRATION

Repair and calibration services are available at the Slope Indicator factory. Call for authorization before sending your instrument.

RENTALS

Rental equipment is available to customers in North America. The inventory is limited, so call in advance to reserve the necessary equipment.

TRAINING

DGSi offers an advanced course for inclinometer users and can also provide training courses for other types of instrumentation.

DATA ACQUISITION

DGSi can provide system integration of sensors, data loggers, communications, and web-based monitoring.

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