



Index

Slope Indicator	2
ABS Inclinometer Casing	4
Digital Tiltmeter	7
Static Data Logger	9
V.W Readout Unit	11
V.W Readout Unit with SD Card	12
Electric Readout Unit	13
VW Type Piezometer	14
Standpipe (Casagrande) Water Level Meter	16
Water Level Meter Tip	17
VW Type Load Cell	18
VW & Arc-Weldable Type Strain Gauge	20
VW & Spot-Weldable Type Strain Gauge	22
VW & Embedment Type Strain Gauge	23
VW Type Displacement Meter (Crack Meter)	25
VW Type 3D Crack Meter	26
Digital Gauge Type 3D Joint Meter	27
Potentiometer Type Crack meter	28
MEMS Type EL Beam Sensor	29
MEMS Type EL Inclinometer	31
MEMS Type Precision Inclinometer	32
MEMS & Bar Type EL Tilt meter	33
MEMS & Roller Type In-Place Inclinometer	34
MEMS Type In-Place Inclinometer	35
VW Type Shotcrete Stressmeter	36
VW Type Rock Bolt Stressmeter	37
VW Type Rod Extensometer	39
VW Type Rod Settlement Meter	41
Magnetic Probe Extensometer	43
VW Type Earth Pressure Cell	45
VW Type Reaction Force Meter	46
VW Type Rebar Strainmeter	47
VW Type Weir Monitoring System	49
VW Type Wave Pressure Cell	50
VW Type Tide Level Gauge	51
Laser Target & Pin	52
Folder Type Laser Target & Pin	53
Surface Settlement Pin	54
Rotary Type Terminal Box	55

The inclinometer SJ-5000 we developed is easy to see the working power and display on the large LCD and Back-Light screen adopting the directory menu function which is easy to handle and use. The size is compact less than other ordinary meters so it is easy to carry and when it is not used for more than 10 minutes the power is automatically off. Moreover, the Indicator-Read Cable and Indicator-Enter Key communication is wireless to get easy for carrying and testing unlike other products using the cable communication method connected each part.



Components

- * Probe
- * Indicator
- * Reel Cable & Drum
- * Remote Control
- * Others: PC Connect Cable, charger, hand carrying box and case

Feature

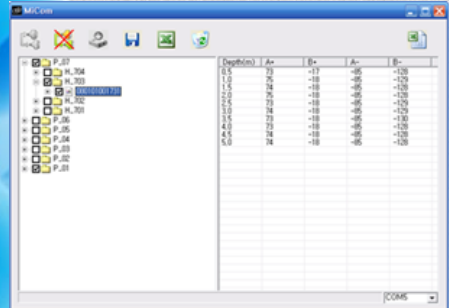
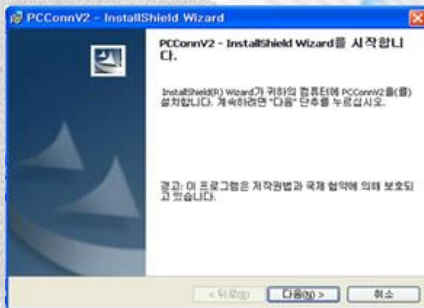
- * The accelerating sensor with high precision is superior to other servo accelerating types in terms of the shock survivability, so that it can minimize the tolerances of the shock caused by vibration and moving in the surrounding field.
- * Quick testing speed and outstanding stability of the data
- * Easy to carry and test due to the wireless communication method adopted.
- * Product's localization and quick A/S based on in-house production system
- * Compact size and light weight for each components

Specification

Model		SJ-5000	SJ-5010
Probe	Cable Length	50meter	100 meter
	Sensor Type	MEMS Accelerating Type	
	Measurement range	±15° (2 axle direction displacement measurement)	
	Total System Accuracy	±3.94mm / 30M	
	Formula to obtain Sinθ	$\sin \theta = \arcsin (\text{readout value} / 16000)$	
	Formula to obtain distance (m/m)	Distance = $\sin \theta$ * Measurement distance (ex: 500 for 5cm distance)	
	Product's size	Length: 680mm, Weight: 1.4kg	
	Material	Stainless steel	
	Working temp.	-20 ° C ~ 50 ° C	
Indicator	LCD screen	Large LCD	
	Illumination	Back-Light LCD	
	Power	Rechargeable Li-Ion Battery	
	Internal Flash Memory	40 MB	
	Operating Time	32 Hours	
	Serial PC Port (USB)	115,600 bps	
	Total Project Name	7 pcs	
	No. of Holes per Project	50 pcs	
	No. of Data file per Hole	5 pcs	
	Power interruption & save	Auto power off when not operated for more than 10 min. (For Power Off, Time Back-Up as Sleep Mode)	
	Product size	Length: 25*100*165mm, Weight: 0.5kg	
	Working temp	-20 ° C ~ 80 ° C	
Reel cable	Cable length	50m	
	Measurement distance ID	0.5m	
	Product's size	Length: 50m*100mm, Weight: 0.0kg	
	Material	Urethane	
	Signal cable	485 COM Digital	

Software

The software operating system for this product is available for Windows, LINUX and Macintosh and it is easy to install and operate. Also it is easy to use because of the Excel File converting function.



Our ABS inclinometer casing is designed to operate or install portable servo accelerometer type inclinometer or in-place inclinometer that monitor under ground horizontal displacement. And inside 4 guide groove can control direction of inclinometer probe to measure the stability of embankments, slopes, rock cuts, foundation, excavation wall, piles and dams, etc.

Application

- * Pillings
- * Landfills stability
- * Prock cuts
- * Under large storage tanks
- * Embankment stability
- * Bridge pier, abutments deflection
- * Landfills
- * Slopes stability
- * Dam stability

Characteristic

Our inclinometer casing is composed of casing and coupling and end cap basically and telescopic casing is option.

If heavy torision force casing, inclinomter cannot be inset to casing.

Our material of casing is ABS(Acrylonitrile Butadiene Styrene) resin that is very strong and lightweight abd corroison resistnace and environmental resistnace.

And we manufacture inclinometer casing and casing by extrusion and cutting and keep tolerance of groove within 0.2° by precise processing.

Therefore our inclinometer casing protect inclinometer against heavy spiral force and deformation and guide inclinometer probe to measure slop stably.

Telescopic section

If settlement or uplift of the ground is expected to exceed 1-2%, telescope section must be installed to protect inclinometer casing against vertical strain. To install telescopic section with inclinometer casing, additional same quantity coupling is need with installationtelescopic section quantity.

Maximum length : 750mm

Minimum length : 600mm



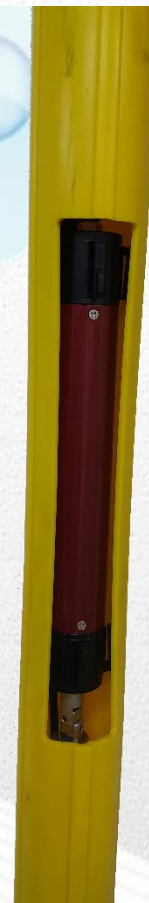
SJ-5000 Slope indicator



SJ-6900 In-place inclinometer

Installation

Inclinometer casing shall be installed by special monitoring company. If settlement or uplift of the ground is expected, telescope section shall be installed. Inclinometer casing shall be not pushed by drilling equipment to remove buoyancy. Optimum grouting shall be selected according to soil environment. Before installation, borehole depth shall be checked. Groove shall be installed to meet direction that is expected displacement. Grooves of our inclinometer casing is on casing to meet direction easily. After installation, if direction casing is changed, it is caused by spiral force that is caution of measurement error, therefore groove direction is met carefully at the installation. Inclinometer casing shall be jointed by coupling and fixed by rivet. The joint parts shall be sealed and waterproofed by sealing materials like silicon, and tape.



Specification

Model	60 CASING	60 COUPLING	70 CASING	70 COUPLING
Load test	600kg or more			
Collapsing Pressure	225psi or more			
Processing method	Pultrusion and cutting.			
KIWI processing accuracy	within 0.2°			
Heating penetration test	80 ° C and more			
Temp. range	-20 ° C ~ 100 ° C			
Humidity range	0 ~ 100%			
Material type	ABS(Acrylonitrile Butadiene Styrene) RESIN			
O.D (mm)	60±0.2	70±0.5	70±0.2	80±0.5
I.D (mm)	50±0.2	60.5±0.2	60±0.2	70.5±0.2
Length(mm)	3000±5	200±5	3000±5	200±5
Weight	2.0	0.3	3.1	0.6

※ The product spec is subject to change without prior notice in order to enhance the product's quality.



We developed portable type digital tiltmeter SJ-705 is applied by our developed control technology of digital sensor and tuning technology for accurate and stable output. SJ-705 is single body type that include built-in battery and compensation function for easy operation in site, office, laboratory and everywhere.



Components

- * Digital tiltmeter body
 - built-in battery
 - Accurate mold housing
 - No deformation metal housing for stable application to structure or tilt plate
- * Portable bag : Hard case including optimum buffer



Tilt Plate



Feature

- * Dual axis
- * Portable design for Excellent durability and mobility
- * Output mode : A mode, B mode, AB mode
(Display of sensor output and calculated angle)
- * Built-in "Hold " function
- * Built-in Battery(charging type)
- * Separable tilt sensor with housing

Specification

Model		SJ-705
Sensor	Sensor Type	MEMS Accelerating Type
	Measurement range	$\pm 15^\circ$ (dual axial tilt measurement)
	Temp. compensation	Built-in self Temp. compensation function
Body	LCD screen	Large LCD
	Illumination	Back-Light LCD
	Power	Rechargeable Li-Ion Battery
	Operating Time	32 Hours
	Serial PC Port	Built-in port
	Material	Stainless steel case and ultra light alloy metal
	Resolution	0.001785714 (Degrees/mV)
	Diension	147(L) X 105(W) X 165mm(H), Weight: 1.2kg
	Operation Temp.	-20 ° C ~ 45 ° C

Product Photo

The side of housing



Screen and control parts



Port for recharge and calibration



Loading in potable hard case



Automatic measurement system SJ-1000 can connect digital sensor and frequency output VW sensors and analog sensors (mV, mA), and acquire, save and control data.



Application

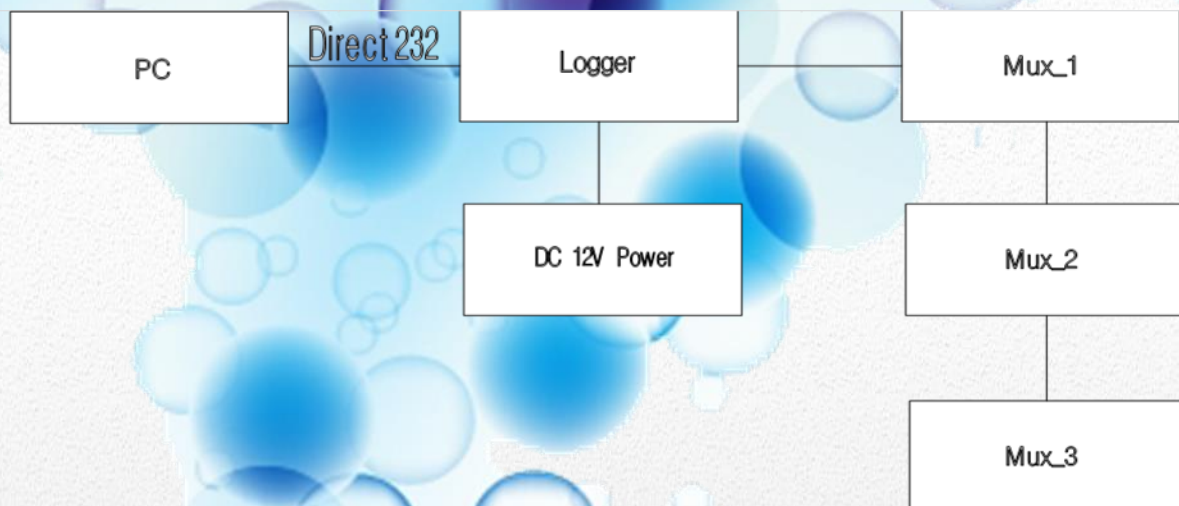
- * Automatic measurement of hard to access site as like harbor, bridge and subway
- * Much electrical noise site in city as like subway
- * Other soft ground, tunnel, sheathing site

Characteristic

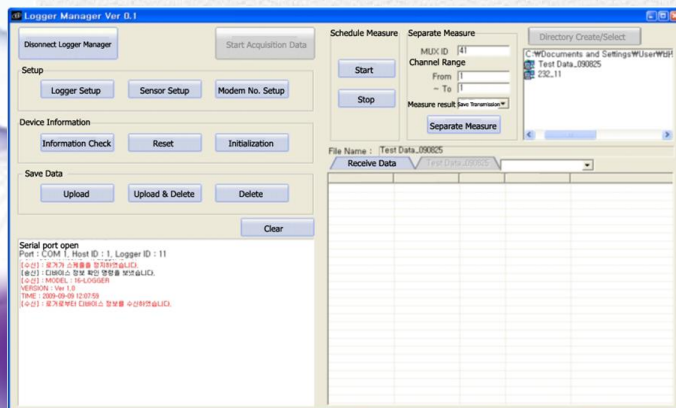
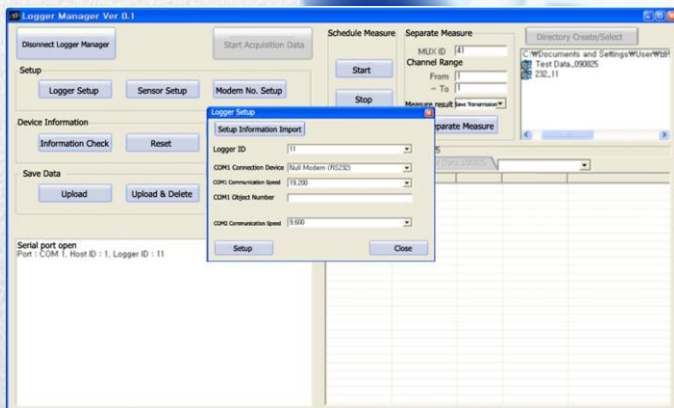
Automatic static data logger SJ-100 is structured by measuring terminal, communication module and wiring panel. Measuring terminal is 16channels and can be expanded to 68channels by connection of 3 muxs. RS485 module can measure 86 sensors by communication only. Power is DV 12V and Min. 9.8V can operate data logger. Built in memory is 32MB and various digital or analog sensor can be measured.

Feature

- * 16 Channels data logger : 16 Sensors can be connected to data logger.
- * Avail to connection with 3 Muxs : Each Mux has 16 channels and Max. 3 Mux can be connected by series.
- * Small quiescent current : 20mA
- * Small sleep current : 40uA (Clock can be operated for 9 months by Ni-Cd battery without main power.
- * Big memory (32MB)
- * 4 kinds output sensors can be connected.: Vibration wire type, voltage, current, digital(485)
- * Accurate measurement
- * Strong design
- * Not only logger manager also data acquisition function
- * Test data can be changed easily to excel file.
- * Test data can be analyzed because test data are divided into logger (Modem) and arrange data in order of sensors.
- * Auto time setup
- * Auto start : If operator not start schedule, when data logger start data acquisition, data logger start schedule.
- * Data logger can test by sensors and save data separately without PC.



Software



Specification

Model	SJ - 1000
Number of channel	16 channels / 90 channels by 5 muxs (16 channels)
Input power	DC 12V
Built-in save memory	32MByte
Operation Temp.	-20 °C ~ 50 °C
Dimension	205mm(W) X 100mm (L) X 50mm (H)
Communication standard	Frequency : 2.4GHz / Communication speed 100mm / Communication model : CDMA
Digital sensor accuracy	±0.05% FSR
Analog sensor accuracy	±0.001 V

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Model SJ-1200 VW Readout Unit, is composed of body (battery contained), sensor connecting cable and charger.

The body is equipped with two buttons and large LCD and it is designed in such a way that anyone can handle conveniently to read the data easily. The mode selection suitable to VW sensor and the engineering unit by the mode are displayed at the same time. The external case uses durable cabinet materials with waterproof connector and rubbers.



Components

- * SJ-1200 main body
- * Sensor testing Cable
- * Charger

Features

- * Resolving power: 0.01uS
- * Charging display function
- * Continuous use hour : 20 hours
- * Battery indicator
- * LCD Back-Light

Specification

Model	SJ – 1200
Sensor	All VW sensors
Measurement scope	450Hz ~ 6000Hz, 5V square wave
Resolution	0.01uS
Accuracy	+/-50ppm
Working Temp.	-20 ° C ~ 80 ° C
Storage Temp.	-20 ° C ~ 80 ° C
Temp. measurement resolution	0.1 ° C
Temp. measurement range	-50 ° C ~ 80 ° C
Display	128 x 64 Dot STN Graphic LCD
Battery	3.8V Li-Ion
Charger	4.2V / 1A, Charging lamp
Weight	450g
External dimension	93 x 154 x 27mm

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Model SJ-1300, VW Readout Unit, is composed of body (battery contained), sensor connecting cable and charger.

The body is equipped with two buttons and large LCD and it is designed in such a way that anyone can handle conveniently to read the data easily. The mode selection suitable to VW sensor and the engineering unit by the mode are displayed at the same time. The external case uses durable cabinet materials with waterproof connector and rubbers.



Components

- * SJ-1300 main body
- * Sensor testing Cable
- * Charger

Features

- * Resolving power: 0.01uS
- * Charging display function
- * Continuous use hour : 20 hours
- * Battery indicator
- * LCD Back-Light
- * SD card port

Specification

Model	SJ – 1300
Sensor	All VW sensors
Measurement scope	450Hz ~ 6000Hz, 5V square wave
Resolution	0.01uS
Accuracy	+/-50ppm
Storage device	SC card
Working Temp.	-20 ° C ~ 80 ° C
Storage Temp.	-20 ° C ~ 80 ° C
Temp. measurement resolution	0.1 ° C
Temp. measurement range	-50 ° C ~ 80 ° C
Display	128 x 64 Dot STN Graphic LCD
Battery	3.8V Li-Ion
Charger	4.2V / 1A, Charging lamp
Weight	450g
External dimension	93 x 154 x 27mm

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Model SJ-1400 is the exclusive sensor tester for inclinometer, accelerometer, CRACK Gauge, Strain Gauge and Analog DC Voltage and the body is equipped with two buttons and large LCD so that anyone can handle it conveniently to read the tested data. The mode selection suitable to sensor property and the engineering unit by the mode are displayed at the same time. The external case uses good durable cabinet materials with waterproof connector and rubbers.



Components

- * SJ - 1400
- * Sensor testing Cable
- * Charger

Features

- * Resolving power :1 mV
- * Charging display function
- * Continuous use hour : 20 hours
- * Battery indicator
- * LCD Back-Light

Specification

Model	SJ - 1400
Sensor	Inclinometer, Accelerating meter, Crack gauge, Strain gauge, Analog DC Vol Sensor
Measurement scope	+/-0 ~ 2,500mV
Resolution	1mV
Accuracy	+/-50ppm
Working temp	-20 ° C ~ 50 ° C
Temp measure. resolv. Power	0.1 ° C
Temp measure. Scope	-50 ° C ~ 80 ° C
Display	128 x 64 Dot STN Graphic LCD
Battery	3.8V Li-Ion
Charger	4.2V / 1A
Weight	400g
External dimension	93 x 154 x 27mm

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

VW Piezometer type pore pressure meter is designed to test the pore water pressure and liquid pressure of pressure

vessel, pipe line, soft ground or embankment foundation, embankment and inside the boring hole.

Application

- * Measurement of pore water pressure at soft ground field
- * Water level measurement at river, reservoir and standpipe
- * Research of stability of slope and ground
- * Measurement of leakage and underground water flow of dam, embankment and lake.



Feature

- * High stability that can be worked under extreme conditions.
- * Excellent reproducibility and responsibility which is free from the cable length and change of resistance
- * Optimization by use and supersensitive design
- * High accurate temp sensor and lightning protection device mounted.

Characteristic

VW Piezometer and pressure gauge is to convert the water pressure transmitted to the diaphragm into the frequency signal due to the interaction between the vibration wire and magnetic coil using the vibration wire sensor.

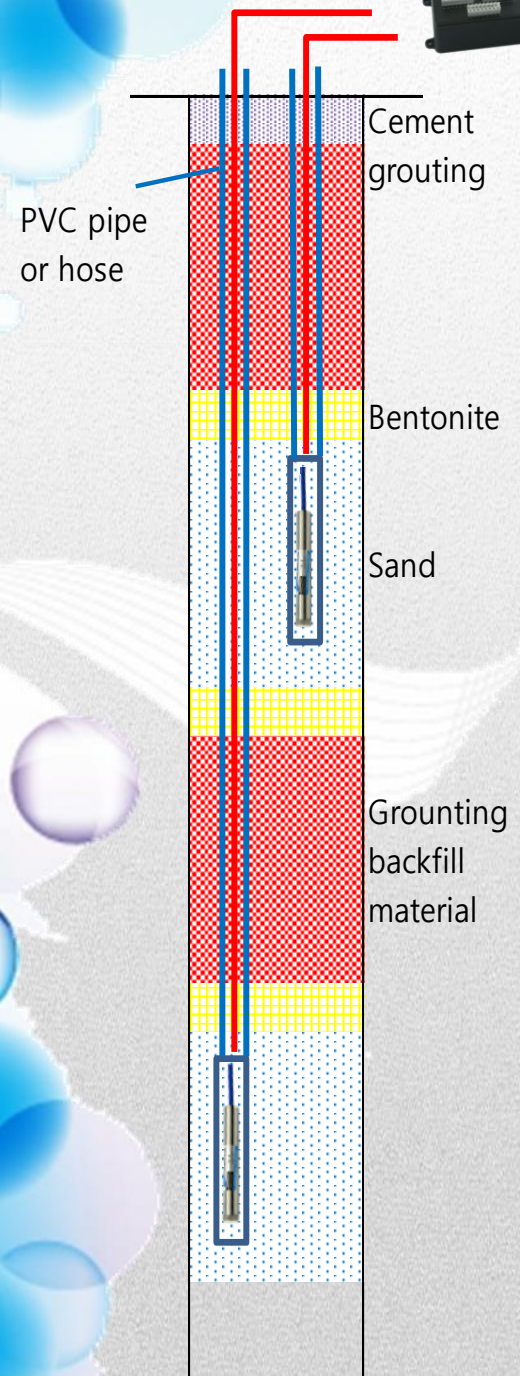
VW Piezometer used the principle of vibration wire tensile force by water pressure or pneumatic pressure transmitted to the diaphragm. When the frequency signal generated is transmitted to the output device then the output device will display the necessary engineering unit by applying the conversion factor. Special metal material was used to minimize the thermal expansion coefficient due to the temperature change and also the high precise diaphragm which is the sensing element was adopted. High accurate resistance temp sensor and arrestor were mounted in order for zero calibration due to the temp change and also high density epoxy resin and stainless steel special materials were adopted to allow semi-permanent measurement.

Specification

Model	SJ - 4000	SJ - 4050
Type	General	Heavy duty
Capacity	2-70kg/cm ²	
Max. Pressure	150 % FSR	
Resolution	0.025% FSR	
Accuracy	+/-0.1% Full scale	
Operatrion Temp.	-40 °C ~ 80 °C	
Temp sensor	NTC Thermistor (3KD-ATF)	
Temp sensor operation range	Thermistor: -40 °C ~ 80 °C	
Temp sensor accuracy	Thermistor : ±1°C	
Filter	Stainless sintered filter 70µm	
Lightening Protection	Tube Gas Arrestor (Frequency output line)	
Main material	Stainless special steel, High density epoxy potting	
Dimension	133mm X Ø19.1mm	133mm X Ø25.4mm
Signal cable	Ø6 4core shield	

Installation

- * If Air is in piezometer, reading value can be lower than real value.
So piezometer shall be inputted to water from before 24 hours of installation
- * If many cable can cause loss of pore pressure. So installer install less than 3 piezometers in one bore hole.
- * If settlement is occurred and signal cable has not extra length, cable can be cut. So When piezometer is installed, 10-20% extra length cable is installed.
- * if isolation between piezometer is poor, reading value can be not accurate.
- * Installer shall not use bentonite power, use bentonite pellet.
- * If top of signal cable is contacted with ground, water can be insert to cable. Therefore top of cable shall be cover by cable cap or others.
- * The initial days of installation, pore pressure can be increaded by expansion of bentonite. But over pressure is disappeared after few days.
- * Signal cable shall be protected by PVC pipe or hose



This Casarande water level meter measure under ground water level to check load increase by increase under ground water pressure. And also check change of water by excavation to grasp effect of around structure and study environment damage by exhaustion of under ground water, and stability by settlement.

Operation

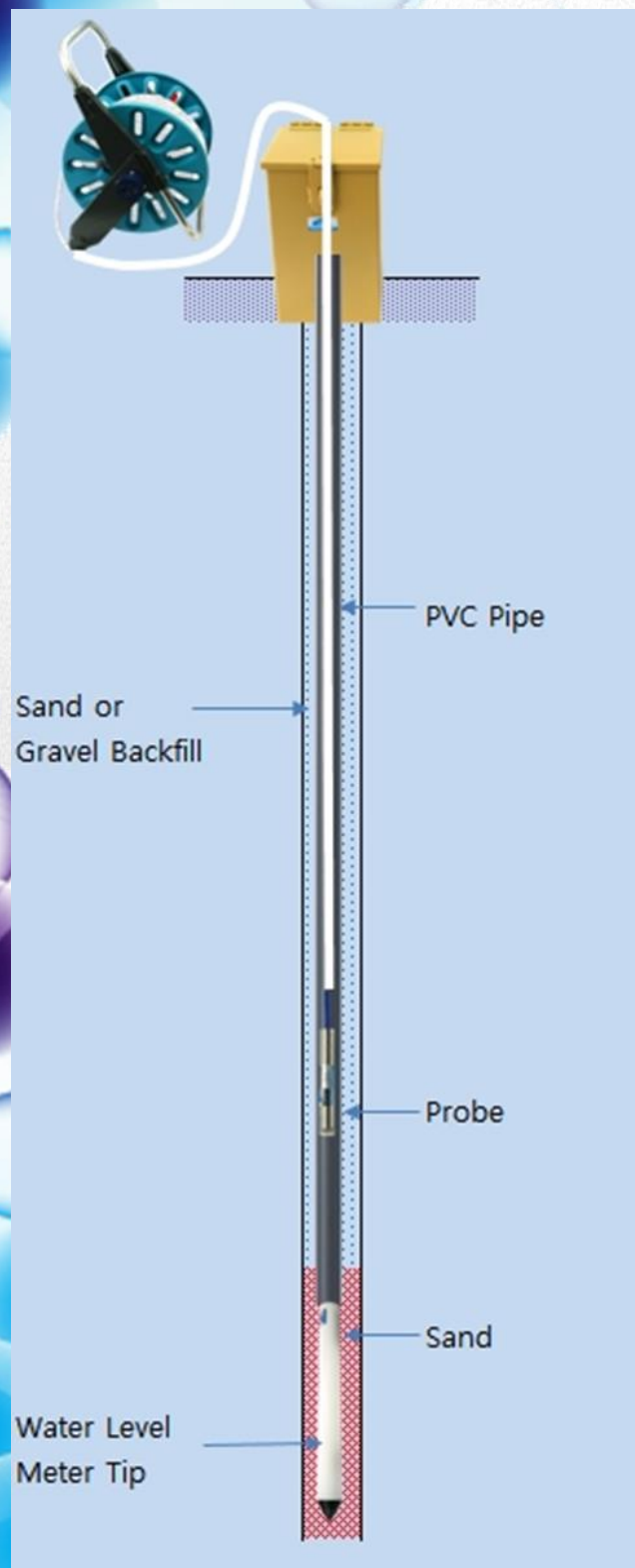
When water level probe is reached to under water through PVC pipe that is installed with water level filter, sensor is connected to electrode and buzzer is rung on and lamp is on. At the moment, operator read tape measure that is connected to probe.



Specification

Probe and reel	SJ-4100	SJ-4110
Measurement range	50 meter	100 meter
Probe dimension	Ø19 X 180mm	
Tape Accuracy	1mm	
Resolution	±1mm	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.



Standpipe (Casagrande) Water Level Meter Tip

Water level meter tip is connected with the PVC Stand Pipe to install the water level meter and it is to filter foreign substances when the underground water flows into the PVC pipe inside from the lowest bottom in earth drill.

It is desirable to use the sand bag as subsidiary material to avoid filter blocking by fine particles for construction of soft ground or long-term construction.



Characteristic

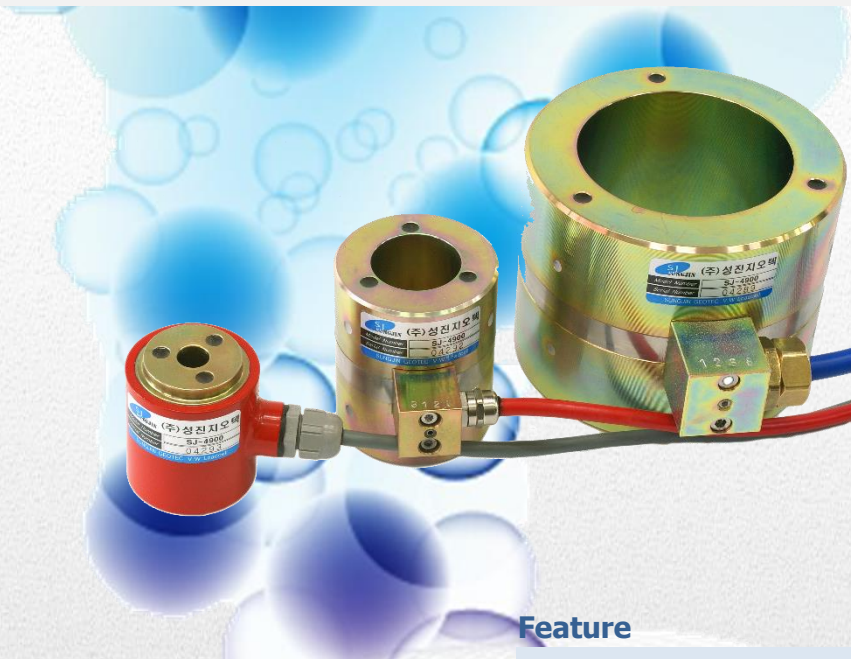
Basic components are ABS casing, coupling and end cap. The filter tip material uses PVC resin.

Specification

Type	Description
Size	1 Type: 300mm*30mm, 2 Type: 500mm*50mm
Material type	Filter tip (PVC Synthetic resin)
Density	40um

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

VW Load Cell is to measure the reaction force available at Earth Anchor to analyze in connection with the change of the retaining wall and judgment of the stability of the support after construction of anchor. Also, it is to measure the axial force affecting the strut.



Application

- * To measure the reaction force available at Earth Anchor
- * To measure axial force affecting the strut
- * To ensure the stability of the support system such as retaining wall and tie back, etc.

Feature

- * Excellent reproducibility and responsiveness which is free from cable length or resistance change
- * Perfect waterproof structure
- * High stability and high sensibility
- * High accuracy even for the eccentric load
- * High accurate resistance temp sensor mounted.
- * Two types separated considering the load pattern

Characteristic

For VW Load Cell, the VW stainless gauge was mounted by trisection (quadrisection) equally in the cylindrical cell hole precisely processed for the heat treated alloy materials. The principle is that when the cell is affected by the load the tensile force of the VW gauge mounted will be changed. When the VW Load Cell is magnetized by the magnetic coil mounted due to the load the vibration wire will generate the resonant frequency and this frequency will be transmitted to the output device to display the necessary engineering unit. It can be calculated as the load unit accurately and easily by the conversion coefficient provided. The reliability of the VW Load Cell is guaranteed since it is calibrated for each product through the verification of the effectiveness of the certified load tester. To get the best result, the load cell should be installed between upper and lower bearing plate and the Earth Anchor should be located in the center of the cell. The bearing plate will prevent it from bending or absorbing compression power to help affect the distribution load on the entire load cell. The housing and signal cables are completely waterproof and humid-resistant to get the data on a stable basis for long time, so that it can be used under the extreme conditions at civil work while protecting from external shock, etc.

Specification

Model	SJ-50	SJ-100	SJ-130	SJ-150
Capacity	50 tonf	100 tonf	130 tonf	150 tonf
Max. applied load	150 % FSR (Field Service Regulations)			
Resolution	0.01 % FSR			
Accuracy	0.1 % FSR			
Cell section (External)	80.11mm ²		80.49mm ²	
Cell material	SCM family alloy steel			
No. of gauge mounted	3 VW Strain gauge (4 Strain gauge)			
Thermal expansion coefficient	10.8 x 10-6/C			
Operation Temp.	-29 ~ 105 ° C			
Temp. sensor	NTC Thermistor (3KD-ATF)			
Temp. sensor operation range	-40 °C ~ 80 ° C			
Storage Temp.	-40 °C ~ 80 ° C			
Temp sensor accuracy	Thermistor : ±1°C			
Waterproof capacity	Fluoro family O-Ring, High density vacuum grease coating			
Airtight material	Stainless steel, High density epoxy potting			
Signal cable	Ø10 4core shield			

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Reference

Linear Value (KHz2)

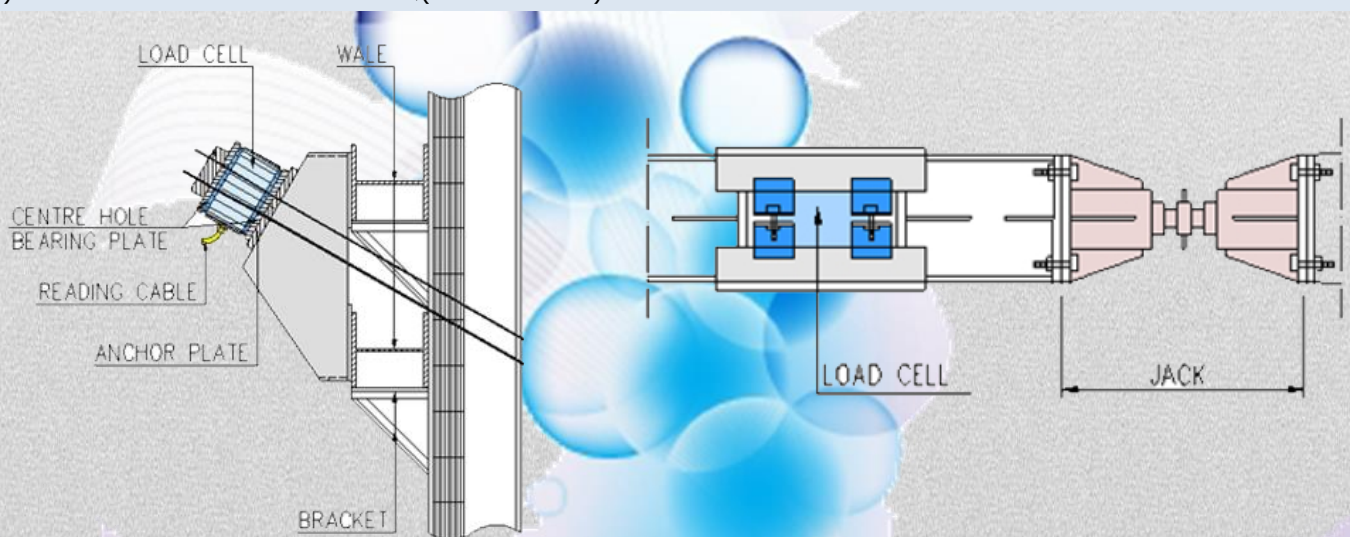
- Application: It can be used for load cell and VW pressure meter. It is also mainly used when the frequency value is decreased according to the increase in the engineering unit which is the reference standard for calibration.

- Unit: 103Hz2

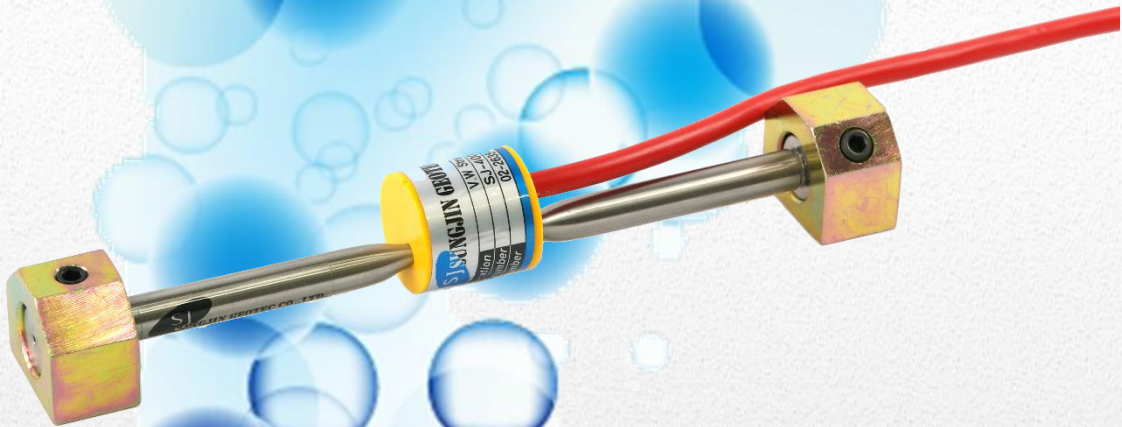
- Unit Conversion

a) Hz is converted into 103Hz2 : $103\text{Hz}2 = \text{Hz} \times \text{Hz} / 1000$

b) 103Hz2 is converted into Hz : $\text{Hz} = \sqrt{(103\text{Hz}2 \times 1000)}$



VW Arc-Weldable Strain Gauge is mounted on the steel or steel structure to test the stress changing condition of the structure caused by the excavation or surrounding work while predicting the stability of retaining wall and provisional facilities or testing the changing condition of the concrete structure by reclamation in the concrete.



Application

- *To measure axial force of the strut for shielding or timbering.
- *To measure strain for shielding steel materials of bridge and building which is under construction or finished construction
- *To measure the strain for supports and tunnel lining
- *To measure the stress concentration of pipe line
- *To measure the concrete strain using anchor for concrete surface mounting.

Feature

- * Excellent reproducibility and responsiveness which is free from cable length or resistance change
- * Perfect waterproof structure
- * High stability and high sensibility
- * High accurate resistance temp sensor mounted.

Characteristic

The body of VW Arc-Weldable Strain Gauge is composed of the sensor processed by airtight epoxy, stainless steel tube and the mounting block welding on both edge. Magnetic coil is mounted in the sensor inside. Vibration wire with proper tensile force on both edges is mounted in the body of the stainless steel tube. The displacement of two mounting blocks for welding both edges causes different tensile force in vibration wire to change the magnetic field, so this will generate the resonant frequency to the electron beam. This resonant frequency is transmitted to the output device to display the engineering unit and it can be calculated as the stress and strain easily and accurately by the conversion coefficient provided. The vibration sensor has the excellent responsiveness and reproducibility and it is almost not affected by the secular change, so it is most suitable for permanent measurement. The vibration sensor measurement outputs vibration counts instead of voltage and one of the greatest advantages is that it is almost not affected by the resistance change of electronic cable, electric leakage, noisy and contact resistance with the ground. High accurate resistance temp sensor is mounted to compensate the thermal expansion factor of the gauge due to the change of temp.

Specification

Model	SJ-2000
Sensor	VW sensor type
Measurement range	3,600 micro strain
Resolution	0.3 micro strain
Accuracy	0.1 % FSR
Thermal expansion coefficient	10.8ppm/ ° C
Operation Temp.	-20° C ~ 105° C
Temp sensor	NTC Thermistor (3KD-ATF)
Temp sensor operation range	Thermistor: -40° C ~ 80° C
Temp. sensor accuracy	Thermistor: +/-1° C
Main material	Stainless steel 300, Fluoro O-ring, High density epoxy potting
Waterproof capacity	100m H2O
Weight	0.2 Kg
cable	6.4 mm, 0.235mm ² x 4C Shield PVC SYS cable

* The product spec is subject to change without prior notice in order to enhance the product's quality.

Reference

* Strain ($\mu\epsilon$) calculation:

$$\text{Microstrain } (\mu\epsilon) = \text{Gage Factor} \times 10^{-3} \times F_2 = \text{Gage Factor} \times 109 / N_2$$

Whereas, F=Hz measurement value, N=microsec measurement value, Gage Factor=4.062

* Stress (σ) calculation:

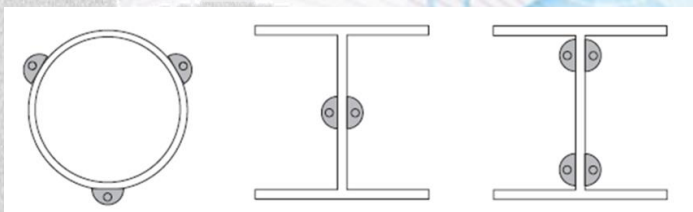
$$\text{stress } (\sigma : \text{kg. cm}^2) = -1.0 \times \text{Strain } (\epsilon) \times \text{Material elastic modulus } \epsilon$$

* Axial force (P) calculation:

$$\text{Axial Force } (P : \text{ton}) = \text{Stress } (\sigma) \times \text{Material cross section } (A) \div 1000$$

* Standard installation : Steel pipe and Strut

Anchor type Mounting Block for concrete surface installation (Option)



Application

- * To measure strain for building, bridge and steel structures
- * To measure strain for tunnel lining, support system
- * To measure eccentric load affecting pipe line
- * To measure distributed load for pile test

Feature

- * High accurate resistance temp sensor mounted.
- * High stability and high sensibility



Characteristic

SG-2100 is equipped with coil housing with gauge and magnetic coil connected with stainless steel tube and flange in waterproof and anti-corrosion. SG4150 contains stainless steel tube and gauge and magnetic coil in waterproof and anti-corrosion. The vibration sensor has the excellent responsiveness and reproducibility and it is almost not affected by the secular change, so it is most suitable for permanent measurement.

Specification

Model	SJ - 2100	SJ - 2150
Measurement range	2,500 micro strain	
Resolution	0.1 micro strain	
Accuracy	0.1% FSR	
Thermal expansion coefficient	11X10 ⁻⁶ / °C	
Operation Temp.	-20°C ~50°C	
Temp sensor	NTC Thermistor(3KD-ATF)	
Coil resistance	180Ω	50Ω
Temp sensor operation range	Thermistor: -40° C ~ 50° C	
Temp sensor accuracy	Thermistor: +/-1° C	
Gauge length	50.8 mm	
Main material	Stainless steel 300, Fluoro O-ring, High density epoxy potting	
Waterproof capacity	100m H2O	
Weight	0.1 Kg	
Signal cable	6.4 mm, 0.235mm2 x 4C Shield PVC SYS cable	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

VW embedment strain gauge is embedded in the concrete structure to measure the effective strain affecting the concrete inside.

Application

- * To measure maintenance of dam, bridge, subway structure, etc.
- * To measure construction of slab, tunnel lining, etc.

Feature

- * High density epoxy molding with shock-resistance of connecting part
- * 200m H2O waterproof
- * Permanent anti-corrosion material adopted
- * 100% absorption of material strain



Characteristic

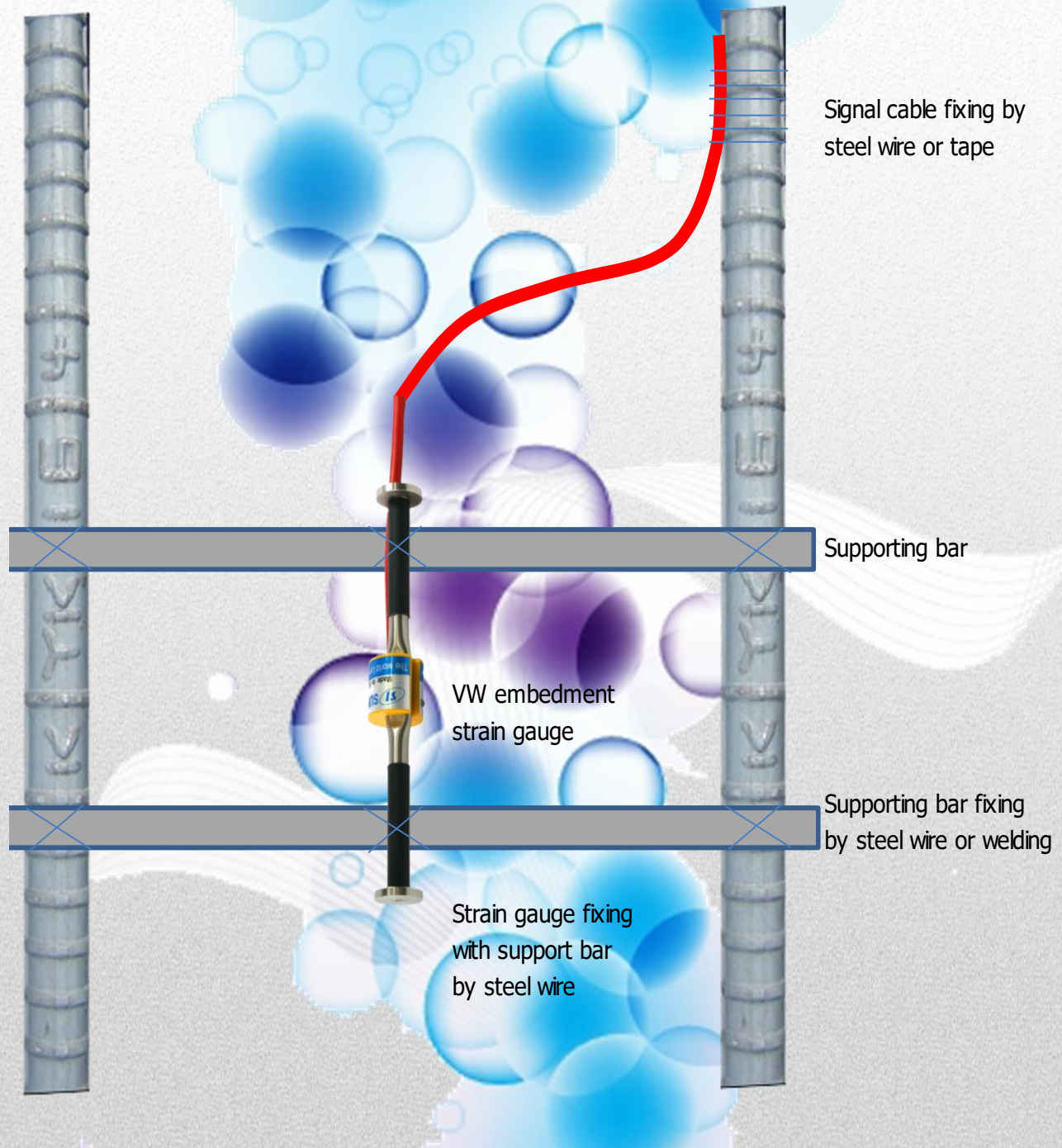
This product can measure stress, distribution direction and trend of strain, etc. with the strain gauge in 2-4 directions using the Rosette Block. Also, non-stress strain gauge case can be used to compare and verify the non-stress condition and load applying condition in dam, bridge, subway structure, etc. which are required for long-term measurement. In addition, it can be installed easily to get accurate measurement using the bracket for radial direction or tangential direction of the stress for shortcrete accelerating cement which is used for tunnel lining material.

Specification

Model	SJ - 2200
Measurement range	3,600 micro strain
Resolution	0.3 micro strain
Accuracy	0.1% FSR
Thermal expansion coefficient	10.8ppm/ °C
Operation Temp.	-20°C ~50°C
Temp sensor	NTC Thermistor(3KD-ATF)
Temp sensor operation range	Thermistor: -40° C ~ 80° C
Temp sensor accuracy	Thermistor: +/-1° C
Main material	Stainless steel 300, Fluoro O-ring, High density epoxy potting
Waterproof capacity	200m H2O
Weight	0.18 Kg
Signal cable	Ø6.4 mm, 0.235mm ² X 4C Shield PVC SYS cable

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Installation



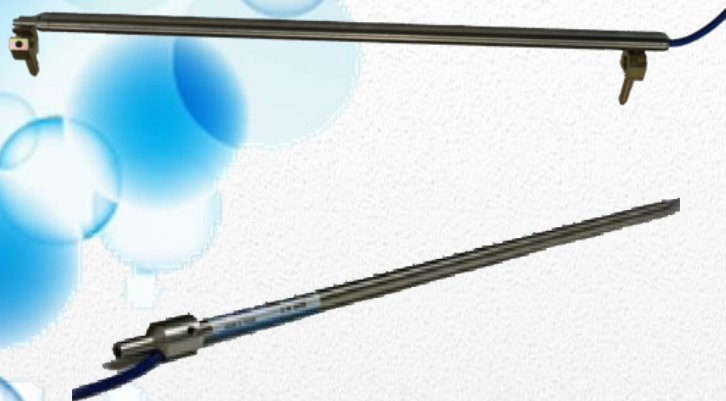
VW Crack Meter is to measure the development of the crack size on the structure surface and connecting area.

Application

- * To measure the development of the crack size in the adjacent building or connecting area of the structure caused by the construction work
- * To check the crack condition of the structure caused by the earthquake

Feature

- * 10m H2O waterproof structure
- * High accurate resistance temp sensor mounted
- * Two types of the gauge for 50 and 100mm of measurement area



Characteristic

VW Crack Meter is composed of sensor part and anchor fixing part. Both edges of the crack crossing the crack space are fixed with the anchor bolt. The development of the crack condition is transmitted to the sensor part through anchor and body and when the vibration wire is magnetized by the magnetic coil due to the tensile force changed the vibration wire will generate the resonant frequency and then this frequency will be transmitted to the output device to display the engineering unit. Two types of the gauge are available for different measurements, so it is optional depending on the crack size. It can be measured semi-permanently using anti-corrosive and rust-resistant materials.

Specification

Model	SJ-3000	SJ-3010	SJ-3015	SJ-3020
Measurement range	0 ~ 50 mm	0 ~ 100 mm	0 ~ 150 mm	0 ~ 200 mm
Resolution	0.025% FSR (0.01mm)			
Accuracy	±0.5 % FSR			
Thermal expansion coefficient	11X10 ⁻⁶ /°C			
Operation Temp.	-20°C ~50°C			
Temp sensor	NTC Thermistor(3KD-ATF)			
Temp sensor operation range	Thermistor: -40° C ~ 80° C			
Temp sensor accuracy	Thermistor: +/-1° C			
Waterproof capacity	10m H2O			
Main material	Special steel, High density epoxy			
Weight	0.51 Kg			
Signal cable	Ø6.4 mm, 0.235mm ² X4C Shield PVC SYS cable			

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

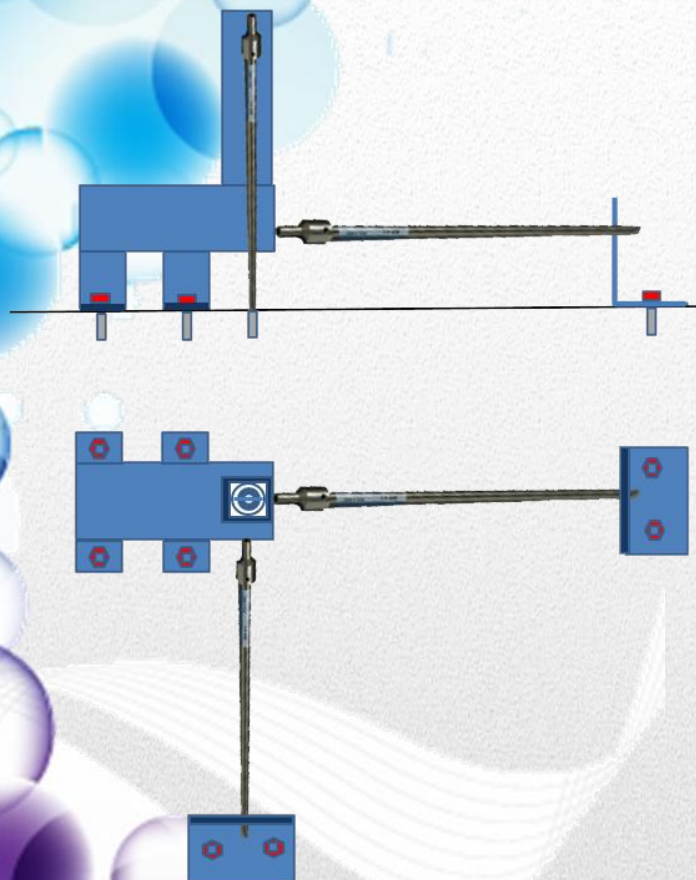
Description

This is a mounting jig that measure displacement as triple axial by waterproof type displacement meter.

This mounting jig with displacement is installed to measure movement at the expansion joint and crack in dam or tunnel or tank.

The design of mounting jig can be changed to meet purpose at the site.

The Max. range of displacement meter is 50mm, 100mm and 150mm.



Specification

Model	SJ-3100	SJ-3110	SJ-3115
Measurement range	0 ~ 50 mm	0 ~ 100 mm	0 ~ 150 mm
Resolution	0.025% FSR (0.01mm)		
Accuracy	±0.5 % FSR		
Thermal expansion coefficient	11X10 ⁻⁶ /°C		
Operation Temp.	-20°C ~50°C		
Temp sensor	NTC Thermistor(3KD-ATF)		
Temp sensor operation range	Thermistor: -40° C ~ 80° C		
Temp sensor accuracy	Thermistor: +/-1° C		
Waterproof capacity	10m H2O		
Main material	Special steel, High density epoxy		
Mounting jig material	Stainless steel		
Signal cable	Ø6.4 mm, 0.235mm ² X4C Shield PVC SYS cable		

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

This is a mounting jig that measure displacement as triple axial by 3sets dial gauge.

This mounting jig with dial gagues is installed to measure movement at the expansion joint and crack in dam or tunnel or tank.

The design of mounting jig can be changed to meet purpose at the site.

The Max. range of displacement meter is 12.5mm, 25mm and 50mm.



Specification

Model	3200	3225	3250
Measurement range	±12.5 mm	±25 mm	±50 mm
Resolution	0.01mm		
Mounting jig material	Stainless steel		
Weight	2.6 kg	3.2 kg	5.5 kg
Anchor	Deformed rebar		

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

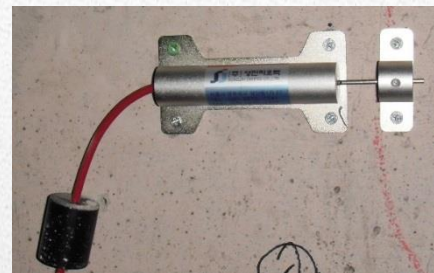
The electric crack meter is to measure the development of the crack size on the concrete structure surface or connecting area.

Application

- * To measure the development of the crack size in the adjacent building or connecting area of the structure caused by the construction work
- * To check the crack condition of the structure caused by the earthquake

Feature

- * High stability and reliability
- * Excellent reproducibility and responsiveness due to the high precise linear potentiometer mounted
- * Various measurement size (10mm~300mm)



Characteristic

The electric crack meter is equipped with high precise linear Potentiometer inside the stainless housing, so when the strain is caused the rod will push or pull the sensor and it is transmitted to the Potentiometer to convert the length variation to the electric signal transmitting to the output device. This output signal can revert to the length displacement easily by applying the conversion coefficient. The displacement is the difference between the initial measurement value and the current measurement value. It can measure the development speed of the crack, percentage and ongoing progress. The gauge is optional depending on the size of the crack and application.

Specification

Model	SJ-3300
Sensor	Potentiometer type
Measurement range	For 10mm ~ 300mm
Resolution	Below 0.1 mm
Accuracy	Below 0.1%
Resist. thermal expan. Coefficient	+/-400ppm°C
Rated power	0.6W ~ 4W
Linearity	Below +/-1%
Total resistance deviation	+/-20%
Weight	500g
Signal cable	Ø6.4 mm, 0.235mm ² X 4C Shield PVC SYS cable

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

The gage of MEMS type Beam Sensor is usually manufactured in 1 – 2m and it is to check the displacement (slope, declining, elevation or uplift and horizontal displacement) of the target structure in meter unit.

Application

- * To check the stability of the adjacent structure caused by the excavation and tunnel work
- * To check declining, stress concentration and slope changing for retaining wall, bridge, dam and subway, etc.
- * Vertical EL Beam Sensor is to check the lateral displacement or convergence while horizontal EL Beam Sensor is to measure the elevation or declining.



Characteristic

SJ-6000 is equipped with electric sensor inside the aluminum pipe treated by waterproof and anti-corrosion, so it is semi-permanent and almost not affected by the temp change. Also, the temp is automatically calibrated at normal temperature 10~25℃ displaying accurate measurement value. It also contains specially designed module not to be affected by the vibration due to the work.

Specification

Model	SJ-6000S	SJ-6000D
Axis	Single	Dual
Sensor	MEMS Sensor	
Measurement range	±5°	
Accuracy	0.1%	
Resolution	1 arc seconds	
Operation Temp.	-20℃ ~ 50℃	
Product dimension	40*40*500mm, 40*40*1,000mm, 40*40*2,000mm	
Material	Stainless steel pipe	
Signal cable	Ø6.4 mm, 0.235mm ² X4C Shield PVC SYS cable	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.



Installation Picture of EL Beam Inclinator



Installation Picture of EL Beam Inclinator



Installation Picture of EL Beam Inclinator with Crack Meter

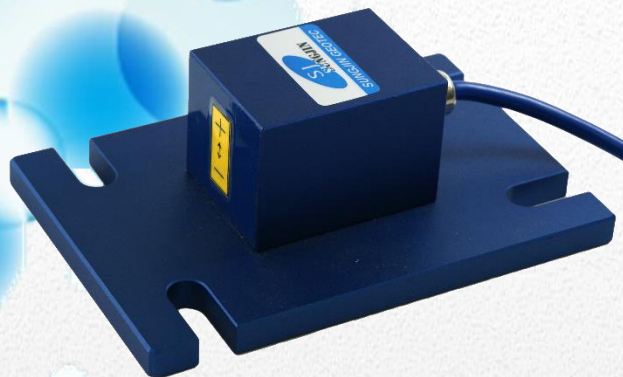


Installation Picture of EL Beam Inclinator with Cover

MEMS type Tiltmeter is to measure the slop and deviation angle for the target structure to determine the stability by the slop displacement.

Application

- * To check the stability of the adjacent structure caused by the excavation and tunnel work
- * To check declining, stress concentration and slope changing for retaining wall, bridge, dam and subway, etc.



Characteristic

This product is used for similar purpose to EL Beam and the electric sensor is mounted inside the stainless steel pipe treated by waterproof and anti-corrosion, so it is semi-permanent and almost not affected by the temp change. Also, the temp is automatically calibrated at normal temperature 10~25°C displaying accurate measurement value. It also contains specially designed module not to be affected by the vibration due to the work.

Specification

Model	SJ-6100S	SJ-6100D
Axis	Single	Dual
Sensor	MEMS Sensor	
Measurement range	±3, 5, 10, 15°	
Operation Temp.	-20℃ ~ 50℃	
Accuracy	0.03%	
Resolution	1 arc seconds	
Product dimension	W: 100 * H: 150 * H: 50	
Material	Stainless steel pipe	
Signal cable	Ø6.4 mm, 0.235mm ² X 4C Shield PVC SYS cable	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

MEMS type Tiltmeter is to measure the slop and deviation angle for the target structure to determine the stability by the slop displacement.

Application

- * To check the stability of the adjacent structure caused by the excavation and tunnel work
- * To check declining, stress concentration and slope changing for retaining wall, bridge, dam and subway, etc.



Characteristic

This product is used for similar purpose to EL Beam and the electric sensor is mounted inside the stainless steel pipe treated by waterproof and anti-corrosion, so it is semi-permanent and almost not affected by the temp change. Also, the temp is corrected automatically at operation temperature -20~50°C. It also contains specially designed module not to be affected by the vibration at the work.

Specification

Model	SJ-6300S	SJ-6300D
Axis	Single	Dual
Sensor	MEMS Sensor	
Measurement range	±3, 5, 10°	
Operation Temp.	-20°C ~ 50°C	
Sensitivity	0.03%	
Resolution	0.0012°(±3°) / 0.002°(±5°) / 0.004°(±10°)	
Product dimension	Sensing parts (φ=85mm, H=54mm), Plate(φ=125mm, H=5mm)	
Material	Aluminum	
Signal cable	Ø6.4 mm, 0.235mm ² X 4C Shield PVC SYS cable	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

MEMS type Tiltmeter is to measure the slop and deviation angle for the target structure to determine the stability by the slop displacement.

Application

- * To check the stability of the adjacent structure caused by the excavation and tunnel work
- * To check declining, stress concentration and slope changing for retaining wall, bridge, dam and subway, etc.



Characteristic

This product is used for similar purpose to EL Beam and the electric sensor is mounted inside the stainless steel pipe treated by waterproof and anti-corrosion, so it is semi-permanent and almost not affected by the temp change. Also, the temp is automatically calibrated at normal temperature 10~25°C displaying accurate measurement value. It also contains specially designed module not to be affected by the vibration due to the work.

Specification

Model	SJ-6200S	SJ-6200D
Axis	Single	Dual
Sensor	MEMS Sensor	
Measurement range	±5°	
Operation Temp.	-20°C ~ 50°C	
Accuracy	0.03%	
Resolution	0.001785714(degree/volte)	
Product dimension	φ = 32mm, L = 160mm	
Material	Stainless steel pipe	
Signal cable	Ø6.4 mm, 0.235mm ² X 4C Shield PVC SYS cable	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Model SJ-6900 is used to measure underground horizontal displacement by different depths at the excavation work. High accuracy accelerometer is applied to measure accuracy displacement.



Application

- * Measurement of displacement at the sheating and excavation work
- * measurement of critical surface of slop

Characteristic

Single and dual axial accelerometer is applied to Model SJ-6900. The optimum housing is applied to measure reliable value to meet site characteristic. ABS inclinometer casing is applied to maximum repeatability at the measurement of displacement. Sensor wheel is taken down along grooves of inclinometer casing.

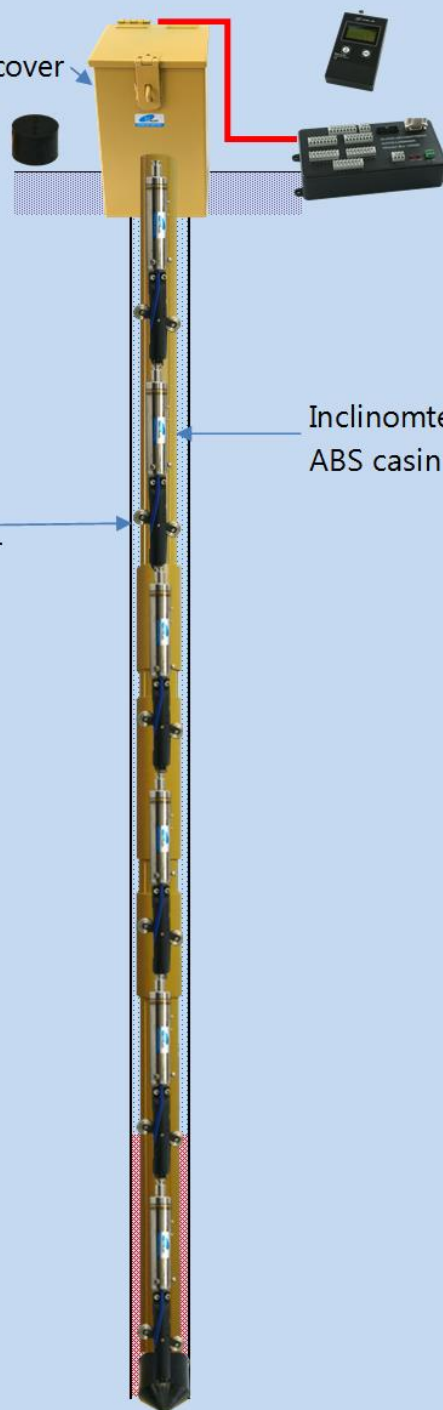
Specification

Model	SJ-6900
Sensor Type	MEMS Type
Axial	Dual Axial
Measurement Range	$\pm 15^\circ$
Operation Temp.	-20°C - 50°C
Sensitivity	0.002%
Resolution	0.001785714 (Degree/Volt)
Temp sensor mounted	300mm(L)*36mm(Ø)
Material	Stainless steel pipe
Signal cable	O6.4mm, 0.235mm \times 4C Shield PVC SYS cable 3m

Protective cover

in-place
Inclinometer

Inclinometer
ABS casing



※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Model SJ-6600 is used to measure underground horizontal displacement by different depths at the excavation work. High accuracy accelerometer is applied to measure accuracy displacement.



Application

- * Measurement of displacement at the sheating and excavation work
- * measurement of critical surface of slop

Characteristic

Single and dual axial accelerometer is applied to Model SJ-6900. The optimum housing is applied to measure reliable value to meet site characteristic. ABS inclinometer casing is applied to maximum repeatability at the measurement of displacement. Sensor wheel is taken down along grooves of inclinometer casing.

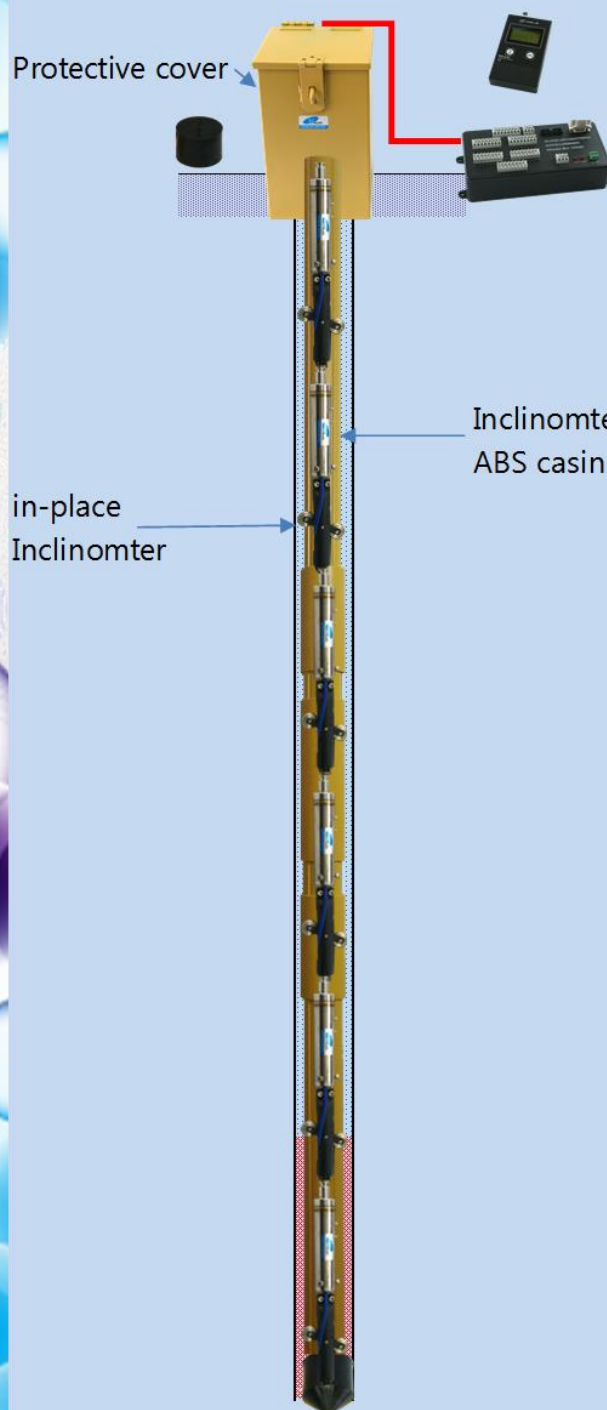
Specification

Model	SJ-6600
Sensor Type	MEMS Type
Axial	Dual Axial
Measurement Range	$\pm 15^\circ$
Operation Temp.	-20°C - 50°C
Sensitivity	0.002%
Resolution	0.001785714 (Degree/Volt)
Temp sensor mounted	300mm(L)*36mm(Ø)
Material	Stainless steel pipe
Signal cable	O6.4mm, 0.235mm ² x 4C Shield PVC SYS cable 3m

Protective cover

in-place Inclinator

Inclinometer ABS casing



※ The product spec is subject to change without prior notice in order to enhance the product's quality.

VW shotcrete stress meter is installed before laying S/C with a sensor to measure the stress generated in the shotcrete for tunnel work and also it measures the compression and tensile capability of the tangential direction in the radius and tunnel radius direction.

Features

- * High accurate resistance temp sensor mounted
- * High stability and high sensibility
- * Anchor can be mounted required for installation



Characteristic

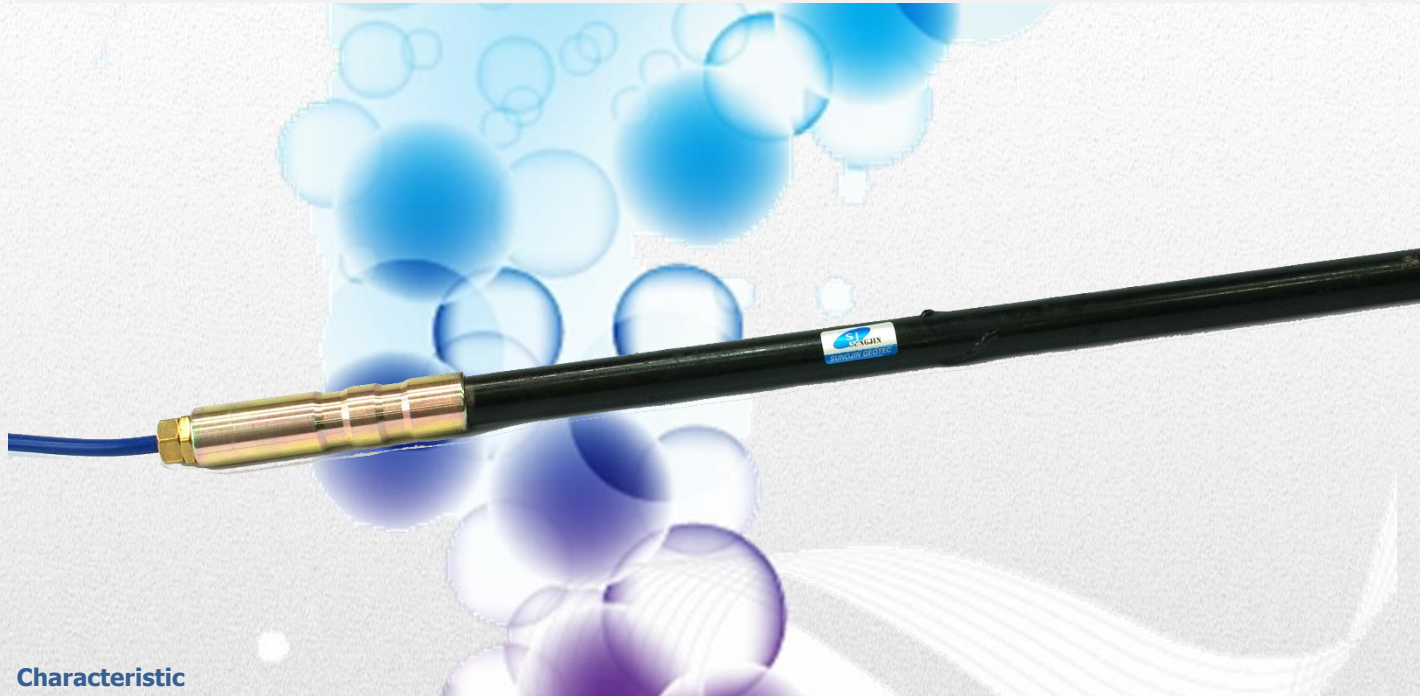
Shotcrete Stress meter is equipped with stainless steel tube gauge SG-5500 and magnetic coil which are treated by waterproof and anti-corrosion. The vibration sensor has outstanding responsiveness and reproducibility that is almost not affected by the secular change, so it is suitable for permanent measurement.

Specification

Model	SJ-5500
Measurement range	2,500 micro strain
Resolution	0.1 micro strain
Accuracy	0.1% FSR
Thermal expansion coefficient	11X10 ⁻⁶ / °C
Operation Temp.	-20°C ~ 50°C
Temp sensor mounted	NTC Thermistor (3KD-ATF)
Coil resistance	50Ω
Temp sensor working range	Thermistor : -40°C ~ 80°C
Temp sensor accuracy	Thermistor : ±1°C
Gauge length	50.8 mm
Main materials	Stainless steel 300, Fluoro O-Ring, High density epoxy potting
Waterproof capacity	100 m H2O
Weight	0.1 kg
Signal cable	O6.4mm, 0.235mm ² x 4C Shield PVC SYS cable 3m

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

VW Rock Bolt Stressmeter is to measure the axial force transmitted to the rock bolt to verify the effectiveness of the rock bolt (effective length, quantity and stress of rock bolt). It is designed to measure accurate axial force applying to the rock bolt to be reinforced and installed for strengthening the rock at the construction field such as tunnel, mining, hanger, cable tunnel, etc.



Characteristic

Model 5600 VW rock bolt stress meter is equipped with each high precise VW strain sensor at 4 areas divided by four in total length of the anchor inside the rock bolt anchor to fix the grouting in the tunnel rock and it was treated by waterproof anti-humidity and anti-corrosion. When the rock is subject to load due to its development, relaxation and joint, fine strain is made in the anchor due to the axial force. The built-in VW strain sensor will absorb all of these displacements. The gauge body inside is equipped with the adjusted VW at approx. 1,800Hz. When horizontal displacement occurs, it is detected by strain gauge to make it magnetized and the VW resonant frequency will generate the frequency to transmit to the output device. The output device will display the frequency as a required engineering unit. Our VW rock bolt stress meter can calculate the stress distribution area and the size easily and accurately using 4 measuring points method for which the material mechanics concept was introduced. Also, it is equipped with the precise resistance temp sensor to calibrate the gauge's thermal expansion coefficient due to the temp change. The rock bolt anchor is manufactured in 2-6m length for optional use depending on the construction field conditions. The rock bolt anchor is made of high carbon piping steel material with the inside diameter $\varnothing 16.2 \times$ outside diameter $\varnothing 27.2\text{mm}$, so that it can be easily installed in the ordinary hole size with the inside diameter $\varnothing 38\text{mm}$ at tunnel. The VW rock bolt stressmeter has cleared the inaccuracy occurring at the electric sensor and it is easy to measure the error or tolerance caused in the manual machine type. Precise and semi-permanent measurement is possible due to the waterproof and anti-corrosion treated.

Specification

Model	SJ-5600				
Sensor type	VW Type Sensor				
Measurement range	Total 3,300 microstrain (Tensile 1700, Compression 1600 microstrain or equivalent)				
Accuracy	0.1% FSR				
Resolution	0.5 microstrain				
Thermal expansion coefficient	11X10 ⁻⁶ / °C				
Operation Temp.	-20°C ~ 50°C				
Temp sensor working range	RTD : -45 ~ 100°C Thermistor : -30 ~ 80°C				
Temp sensor accuracy	RTD : ±0.7°C Thermistor : ±1°C				
Measurement point number	4 Points				
Minimum hole diameter	Ø38mm or above				
Product's length	2m	3m	4m	5m	6m
Gauge length with sensor	500mm	750mm	1,000mm	1,250mm	1,500mm
Weight	6.0kg	9.0kg	12.0kg	15.0kg	18.0kg
Anchor nominal size	Inside dia. Ø16.2 x External dia. Ø27.2mm				
Anchor cross section area	374.95 mm ²				
VW gauge effective load	Approx. 15 ton.f				
Anchor elastic coefficient/Yield point	2.1 x 10 ⁴ / dir 17 ton.f (Assume that elastic strain is 4,500 kg/cm ²)				
Anchor material	High carbon piping steel (film coated)				
Signal cable	Ø10mm, 0.235mm ² x 8C Shield PVC SYS cable 3m				

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Reference

This is VW type sensor to output the frequency signal to be connected with the VW sensor output units (Readout, Datalogger, and Multiplex Module for measurement of automation). It is compatible with any other company products.
(except temp sensor)

VW Rod Extensometer is useful to measure the horizontal and vertical displacement of rock or soil in the tunnel or strain of slope or displacement of surrounding ground caused by the stress concentration for excavation work at the tunnel or mining and cable tunnel, etc.



Specification

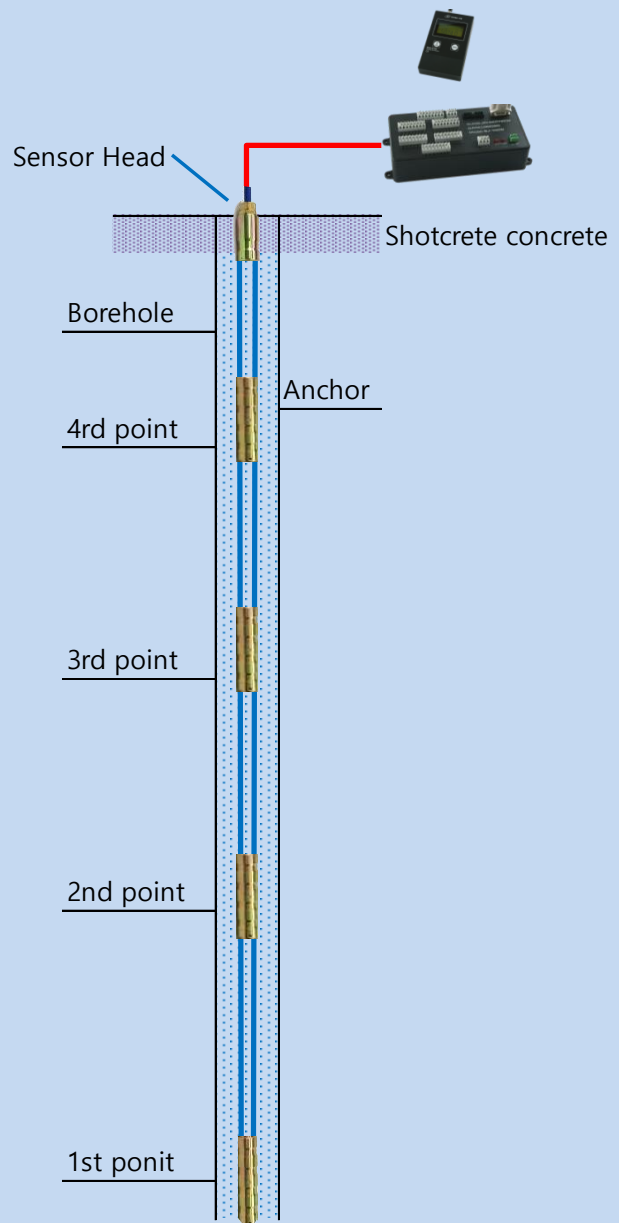
Model	SJ-5700				
Sensor type	VW Type Sensor				
Measurement range	0 ~ 50mm				
Resolution	0.025% FSR				
Sensor accuracy	±0.25% FSR				
System accuracy	±0.5% FSR				
Working temp	-20℃ ~ 50℃				
Temp sensor working range	RTD : -45 ~ 100℃ Thermistor : -30 ~ 80℃				
Temp sensor accuracy	RTD : ±0.7℃ Thermistor : ±1℃				
Thermal expansion coefficient	11 × 10 ⁻⁶ ℃				
No. of anchor for measurement	4 Points				
Minimum hole diameter	Ø38mm or above				
Product's length	2m	3m	4m	5m	6m
Gauge length	500mm	750mm	1,000mm	1,250mm	1,500mm
Weight	3.4kg	3.7kg	4.0kg	4.3kg	4.6kg
Sensor part	Stainless special steel, alloy steel (coated)				
Anchor rod	Stainless steel (Φ 4 x Φ 6mm)				
Anchor rod protection cover	Nylon Tube (Φ 8 x Φ 10mm)				
Signal cable	Ø10mm, 0.235mm ² x 8C Shield PVC SYS cable 3m				

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Characteristic

Model 5700 VW Rod Extensometer is made up with sensor part having 4 sensors of small VW displacement treated by waterproof and anti-humidity and anchor rod having stainless steel tube to transmit the anchor and displacement for treatment of grouting at tunnel rock to the sensor. When the displacement occurs due to the development or relaxation and joint of rock, it is transferred to VW displacement sensor by anchor rod transforming the tensile force of vibration wire. If the vibration wire is magnetized by the magnetic coil then the resonant frequency is generated and then this frequency is transmitted to the output device to display the necessary engineering unit, so you can check the displacement velocity, percentage, size and displacement distance easily. Our VW rod extensometer is designed for slim type so that the measurement anchor can be installed easily in $\varnothing 38\text{mm}$ which the minimum hold size for installation of rock bolt as 4 measurement points method. VW displacement sensor is designed for total 50mm measurement scope. When the slab on the reference point sensor head is adjusted setting at normally 25mm distant point after the grouting of anchor part has been solidified, the tensile force and compression volume can be measured up to each 25 mm exactly and the frequency property for the displacement before delivering the sensor can be easily calculated using the exclusive calibrator for each item to apply the accurate calibration coefficient by recording the result. The anchor length of VW rod extensometer is 2-6m which is based on longest anchor and it is optional to use depending on the civil engineering designated length or construction site conditions. Also, the precise resistance temp sensor was mounted to compensate the thermal expansion coefficient of the gauge caused by the temp change. The VW rod extensometer has got over any inaccuracy caused in the electric sensor and it is not difficult at all to measure any error or measurement error caused in manual machine type. It is also possible to do precise and semi-permanent measurement because it was treated by waterproof and anti-humidity.

Installation



Reference

This is VW type sensor to output the frequency signal to be connected with the VW sensor output units (Readout, Datalogger, and Multiplex Module for measurement of automation). It is compatible with any other company products. (except temp sensor)

Rod extensometer measure each layer settlement of foundation ground to predict consolidated settlement and decide stability.

Application

- * Measurement of settlement and heave of foundation ground.
- * Check of stability of tunnel, slop and fill
- * Check of stability of adjacent ground for long structure building work

Feature

- * High stability of available operation in inferior environment
- * High repeatability and responsibility by no effect from cable length and change of resistance
- * Optimum high sensitivity design by application

Characteristic

VW type rod extensometer include anchor, rod, protection tube and sensing parts. Displacement can be measured accurately by VW type sensor that sense different frequency output by displacement of ground as like settlement heave. Sensed frequency output is transmitted to output device and display need engineering unit to check displacement speed, rate and section. Our SJ-3500 include high accuracy NTC Thermistor and lightning protection so that compensate zero point by change of temperature, and can operate continuously by high density epoxy potting and stainless steel.

Specification

Model	SJ-3500
Sensor Type	VW Type
Max. Displacement meter No.	4 sets displacement meter/head
Max. over load	150 % FSR
Accuracy	±0.1% full scale
Operation Temp.	-20°C ~ 50°C
Temp sensor mounted	NTC Thermistor (3KD-ATF)
Temp sensor accuracy	Thermistor : ±1°C
dimension	φ = 158mm, L = 106mm
Material	Stainless steel 300, High density epoxy potting

※ The product spec is subject to change without prior notice in order to enhance the product's quality.



Components

**Displacement meter
(SJ-3000/
3010/
3015)**



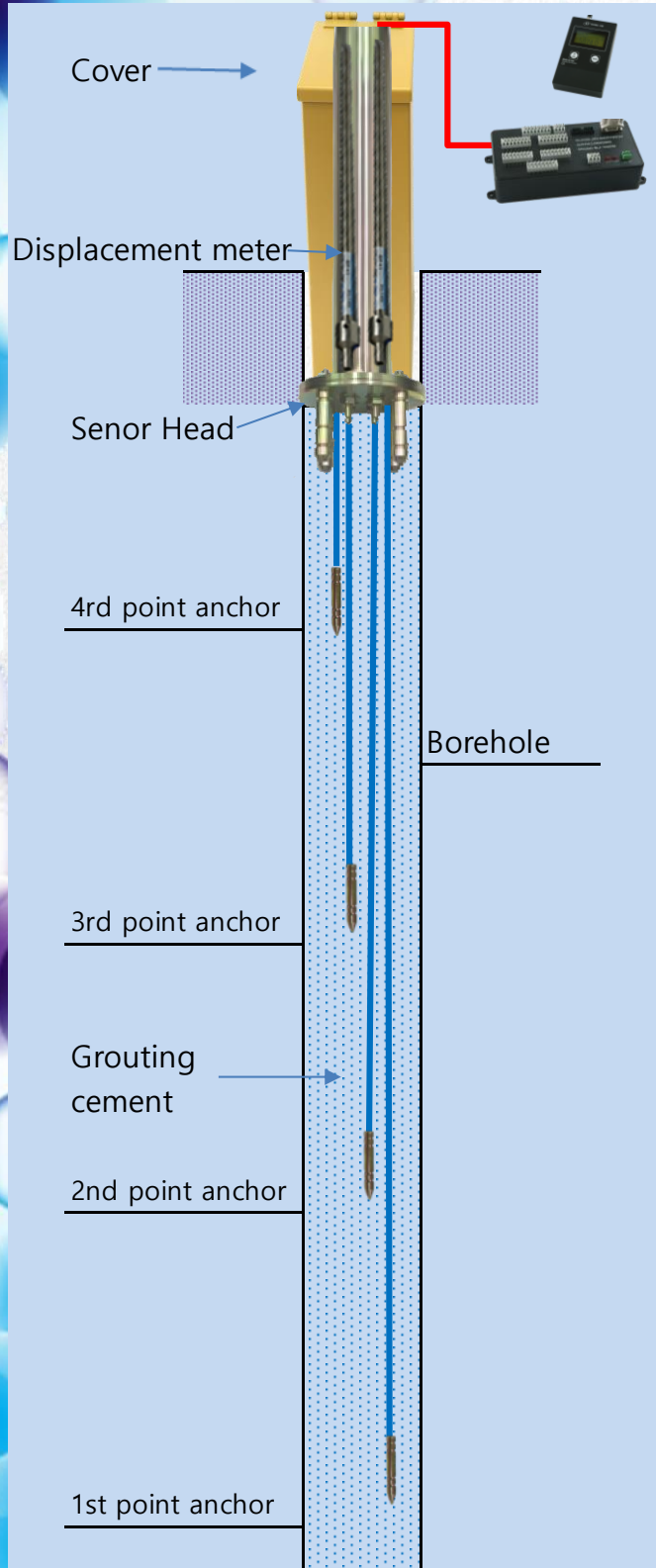
**Head
(SJ-3500)**



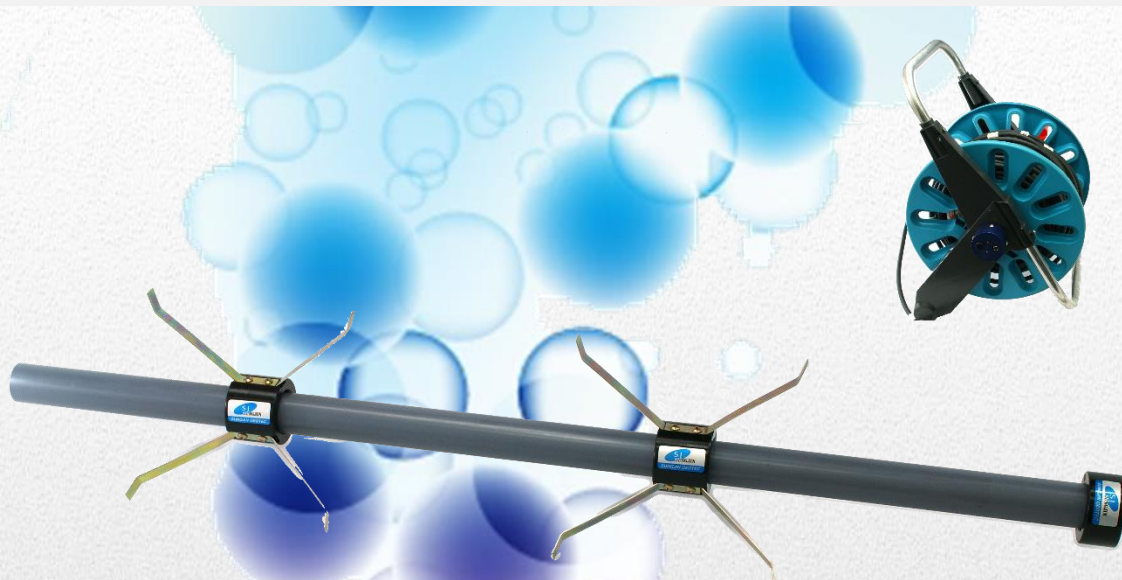
**Rod
(SJ-3510)**



**Anchor
(SJ-3520)**



Model SJ-7000 magnetic probe extensometer is designed to measure settlement or heave through movement of probe in PVC access pipe. Ring magnet and Spider magnets and magnet plate are installed at PVC access pipe and borehole. Probe sense magnetic position. If probe reach spider magnet, LED lamp is "ON" and buzzer rings. When signal is "On", operator measure millimeter graduation in tape.



Characteristic

Ring magnet at the bottom of access pipe and immovable layer and insert spider magnets at planning depths. Reed switch is installed in probe and, if probe sense magnet filed during probe is lifted down, reed switch close and buzzer and LED lamp is operated automatically.

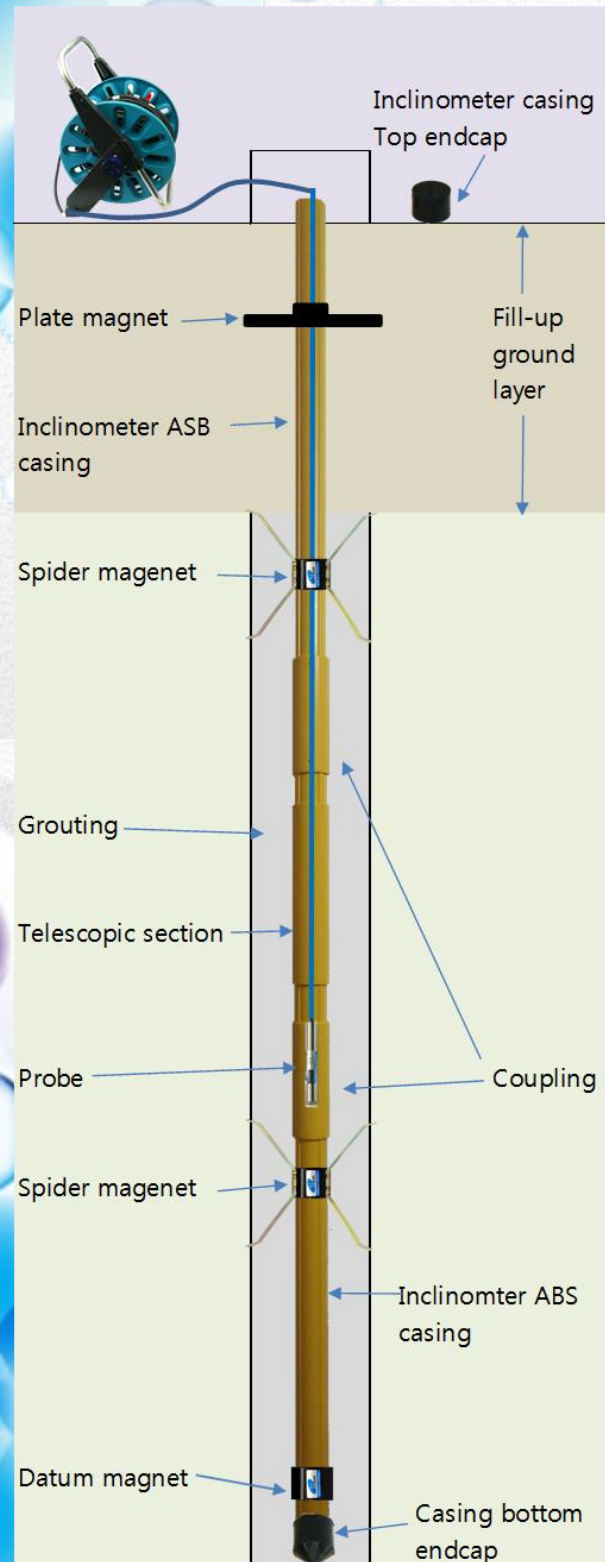
Specification

Magnetic probe and reel	SJ-7000			SJ-7010
Measurement range	50 meter			100 meter
Probe dimension	Ø19 X 180mm			
Tape Accuracy	1mm			
Resolution	±1mm			
Spider magnet	SJ-7130	SJ-7140	SJ-7160	SJ-7170
Diameter	Ø30 (for PVC pipe)	Ø40 (for PVC pipe)	Ø60 (for inclinomter casing)	Ø70 (for inclinomter casing)
Ring magnet (Datum magnet)	SJ-7230	SJ-7240	SJ-7260	SJ-7270
Diameter	Ø30 (for PVC pipe)	Ø40 (for PVC pipe)	Ø60 (for inclinomter casing)	Ø70 (for inclinomter casing)
Magnet plate	SJ-7330	SJ-7340	SJ-7360	SJ-7370
Diameter	Ø30 (for PVC pipe)	Ø40 (for PVC pipe)	Ø60 (for inclinomter casing)	Ø70 (for inclinomter casing)

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Installation

- * Operator shall fix datum magnet (ring magnet) by screw nail or clamp the above 50cm from the bottom of PVC access pipe (or inclinometer casing).
- * Operator fix datum magnet at the steady layer as like rock and install spider magnet by installation rod or leg at the plaining depth step by step.
- * Size of magnetic sensors depend on diameter of borehole, and datum magnet is smaller than borehole and spider magnetic including spider leg is bigger than diameter of borehole to protect slip.
- * Operator insert tremie pipe or grout pipe grout in borehole and grout borehole from bottom by pump.
- * Operator shall install magnetic spider to has enough space from coupling for protection that magnetic sensors are caught by coupling during settling.



Jack out type

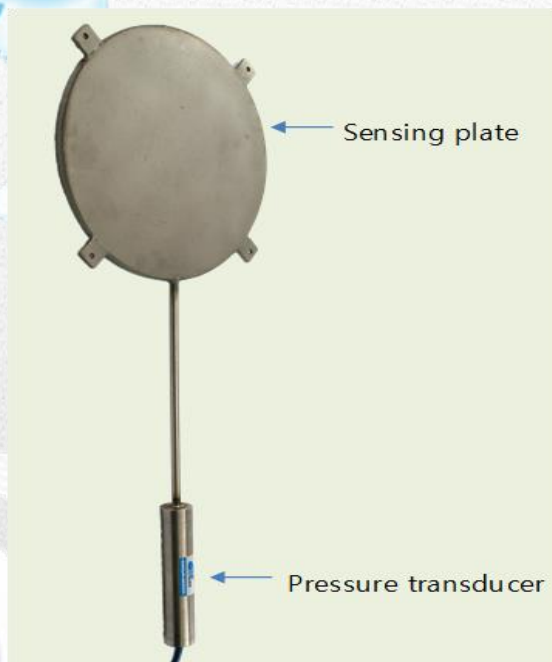


Standard type



Characteristic

VW type Model SJ-8000 consists of sealed by stainless 2 plates and 2 plates is welded and space of 2 welded plated is filled in by hydraulic fluid. If pressure is transmitted to sensing plate, the hydraulic fluid is flowed to diaphragm in pressure transducer. VW type Model SJ-8000 is used to measure ground soil pressure. Model SJ- 8000 is standard type and measure whole pressure that affect at the embankment work, and is wall type to measure soil pressure at the retaining wall. Our earth pressure cell measure stress of mass and direction in embankment dams and measure the back soil pressure at the retaining wall and measure the change of soil pressure by the load of fill in ground. At the tunnel, stress of tunnel linings is measured by earth pressure cell.



Specification

Model	SJ-8000	SJ-8100
Sensor type	VW & Standard type	VW & Jack out type
Resolution	0.025%FS	
Accuracy	±1.0%FS	
Measurement range	2 ~ 70 kg/cm ² (30 psi ~ 1,000 psi)	
Operatrion Temp.	-40 °C ~ 80 ° C	
Storage Temp.	-40 °C ~ 80 ° C	
Signal cable	O6.4mm, 0.235mm2 x 4C Shield PVC SYS cable 3m	
Dimension	Ø 230mm	Ø 150mm

Reaction force meter measure the base reaction force to study stability of foundation ground and effect to structure. And this meter is used to verify contact pressure by expecting soil or wave pressure at the design.

Application

- * Measurement of reaction force of foundation ground at the bottom of cassion structure
- * Measurement of reaction force of foundation ground of suction pile or concrete structure

Feature

- * High stability of available operation in inferior enviroment
- * High repeatability and responsibility by no effect from cable length and change of resistance
- * Optimum high sensitivity design by application
- * Built-in high accuracy thermistor and lightening protection



Characteristic

For VW type reaction force meterl, the VW stainless gauge was mounted at the cylindrical cell that is processed precisely by the heat treated alloy material. It is use prinple when the cell is affected by the load, the tensile force of the mounted VW gauge is changed. Reaction force meter guarantee reliability by calibration by recognized load testing machine. For long and stable operation, housing and cable of this meter is designed as waterproof and dustproof structure by that can be operate in inferior environment and protected from the out side shock.

Specification

Model	SJ-8500	SJ-8510	SJ-8515	SJ-8520	SJ-8525	SJ-8530
Measurement range	5kgf/cm ²	10kgf/cm ²	15kgf/cm ²	20kgf/cm ²	25kgf/cm ²	30kgf/cm ²
Sensor type	VW type					
Operation Temp.	-20°C ~ 60°C					
Resolution	±0.02 % FSR					
Accuracy	±0.025 % FSR					
Waterproof	Fluoro O-ring, High density grease coating					
Sealing material	Stainless steel, High density epoxy potting					
dimension	φ = 158mm, L = 105mm					
Material	SCM line alloy steel material					
Signal cable	O6.4mm, 0.235mm ² x 4C Shield PVC SYS cable 3m					

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Application

- * Measurement of rebar strain inside of concrete to check structural health and stability
- * Measurement of reaction force of foundation ground of suction pile or concrete structure



Feature

- * High stability and high sensitivity design
- * Built-in high accuracy thermistor and lightning protection

Characteristic

Model SJ-7513 and 7519 is strain gauge direct installation type to rebar, and strain gauge is structured by waterproof and rust-proofing stainless steel tube and connected gauge by flange and coil housing by built-in magnet coil. This VW sensor is simple installation than old type(sensor installation after processing rebar separately), and high responsibility and repeatability and suitable to permanence measurement due to no effect almost by secular change.

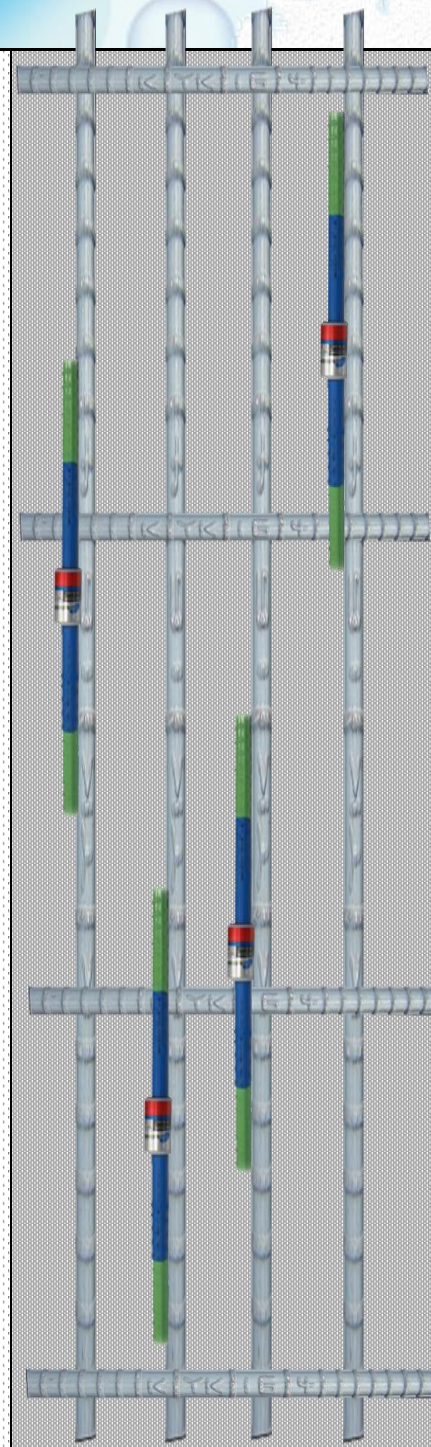
Specification

Model	SJ-7513	SJ-7516	SJ-7519	SJ-7525
Rebar Diameter(approx)	Ø12.7mm	Ø15.9mm	Ø19.1mm	Ø25.4mm
Sensor type	VW type			
Measurement range	2,500 microstrain			
Resolution	0.1 microstrain			
Accuracy	0.5% F.S			
Thermal expansion coefficient	$11 \times 10^{-6} \text{ }^{\circ}\text{C}$			
Operation Temp.	$-20^{\circ}\text{C} \sim 80^{\circ}\text{C}$			
Temp sensor mounted	NTC Thermistor (3KD-ATF)			
Temp sensor working range	Thermistor : $-40^{\circ}\text{C} \sim 50^{\circ}\text{C}$			
Temp sensor accuracy	Thermistor : $\pm 1^{\circ}\text{C}$			
Material	Stainless steel 300, Fluoro O-ring, High density epoxy potting			
Waterproof	100 m H ₂ O			
Signal cable	Ø0.64mm, 0.235mm ² x 4C Shield SYS cable 2m			

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

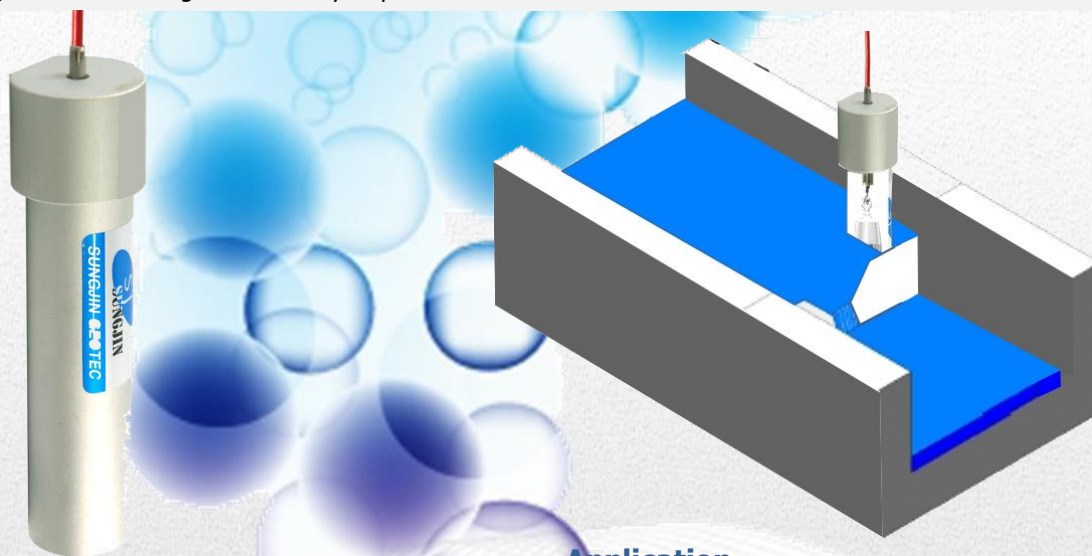
Rebar Diameter

Model	Diameter	Length
D10	Ø 9.53	1,000 mm
D13	Ø 12.7	
D16	Ø 15.9	
D19	Ø 19.1	
D22	Ø 22.2	
D25	Ø 25.4	
D26	Ø 26	
D29	Ø 28.6	
D32	Ø 31.8	
D35	Ø 34.9	
D28	Ø 38.1	
D41	Ø 41.3	
D51	Ø 50.38	



※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Our weir monitor SJ-4300 series are water level monitoring sensing system for V notch system that is used to measure water leakage variation. This monitor is installed near surface impermeable wall. The sensitive floating cylinder is hanged in housing, and connect vibration wire type displacement meter. Water level that is passed to distributing plate, is changed by leakage volume. The water level in same with the our side water level and if this water level is changed, the buoyance of floating cylinder is changed and this change is sensed by displacement meter.



Feature

- * High sensitivity
- * High stability
- * Long time measurement
- * Automatic measurement

Application

- * V notch weirs
- * Water tanks
- * Stream levels
- * Reservoir levels

Specification

Type	SJ-4303	SJ-4306	SJ-4315
Capacity	300mm	600mm	1500mm
Resolution	0.25% F.S		
Accuracy	±0.1% F.S		
Linearity	±0.5% F.S		
Stability	±0.05% F.S /year		
Operation temperature	-20 °C ~ 80 °C		
Temp. Sensor	Thermistor		
Material	Stainless steel and PVC		
Signal cable	Ø0.64mm, 0.235mm ² x 4C Shield SYS cable 2m		

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

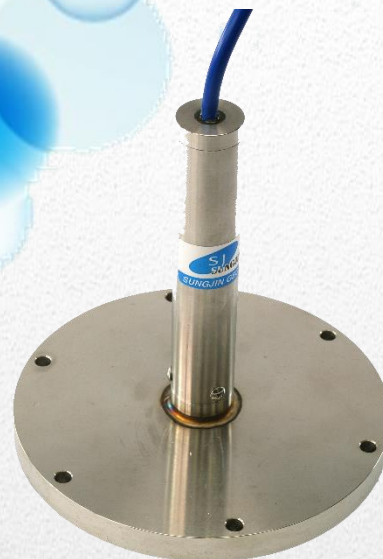
Wave pressure cell measure wave pressure that influence cassion structure at dock contruction work, and understand the ocean character of work section through connection analysis with output of tide level gauge

Application

- * Measurement of wave pressure to influence cassion structure at dock construction work

Feature

- * High stability of available operation in inferior enviroment
- * High repeatability and responsibility by no effect from cable length and change of resistance
- * Optimum high sensitivity design by application
- * Built-in high accuracy thermistor and lightening protection



Characteristic

Wave pressure cell use electrical sensor that change water pressure that is transmitted to diaphragm, to electrical signal. the built-in strain gauge resistance is changed by the transmitted water or pneumatic pressure to diaphragm. The changed signal is transmitted to output device and display need engineering unit to check pressure. Our water pressure cell include high accuracy NTC Thermistor and lightening protection so that compensate zero point by change of temperature, and can operate continuously by high density epoxy potting and stainless steel.

Specification

Model	SJ-4700	SJ-4710
Sensor Type	Pressure cell	
Capacity	50 psi	100 psi
Max. over load	150 % FSR	
Accuracy	±0.1% full scale	
Operation Temp.	-20°C ~ 50°C	
Temp sensor mounted	NTC Thermistor (3KD-ATF)	
Temp sensor accuracy	Thermistor : ±1°C	
dimension	φ = 150mm, L = 100mm	
Material	Stainless steel 300, High density epoxy potting	

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Tide level gauge measure tide level at the dock construction work, and understand the ocean character of work section through connection analysis with output of tide gauge.

Application

- * Measurement of water level at river, reservoir and stainless pipe
- * measurement of tide level at the dock construction work

Feature

- * High stability of available operation in inferior enviroment
- * High repeatability and responibility by no effect from cable length and change of resistance
- * Optimum high sensitivity design by application
- * Built-in high accuracy thermistor and lightening protection



Characteristic

Tide level gauge use foil strain gauge that change water pressure that is trransmitted to diaphragm, to electrical signal. the built-in strain gauge resistance is changed by the transmitted water or pneumatic pressure to diaphragm. The changed signal is transmitted to output device and display need engineering unit to check pressure. Our water pressure cell include high accuracy NTC Thermistor and lightening protection so that compensate zero point by change of temperature, and can operate continuously by high density epoxy potting and stainless steel.

Specification

Model	SJ-4500
Measurement range	70psi
Max. over load	150 % FSR
Accuracy	±0.1% full scale
Operation Temp.	-20°C ~ 50°C
Temp sensor mounted	NTC Thermistor (3KD-ATF)
Temp sensor accuracy	Thermistor : ±1°C
Filter	Stainless sintered filter 70μm
lightening protection	Tube Gas Arrester (Frequency output wire)
dimension	φ = 27mm, L = 150mm
Material	Stainless steel 302, High density epoxy potting

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

It is to check the development of the surrounding ground as well as graded and displacement convergence condition in tunnel section by obtaining the absolute settlement figure of each section and crown settlement for tunnel work, estimating the loosing area of the adjacent ground. It is also used for fundamental data to determine timing for tunnel face closing and the stability due to the tunnel construction while checking the support effect and reviewing the succeeding process.



Features

- * To measure crown settlement and displacement in tunnel section
- * To measure displacement and development of the retaining wall, bridge and dam structure

Characteristic

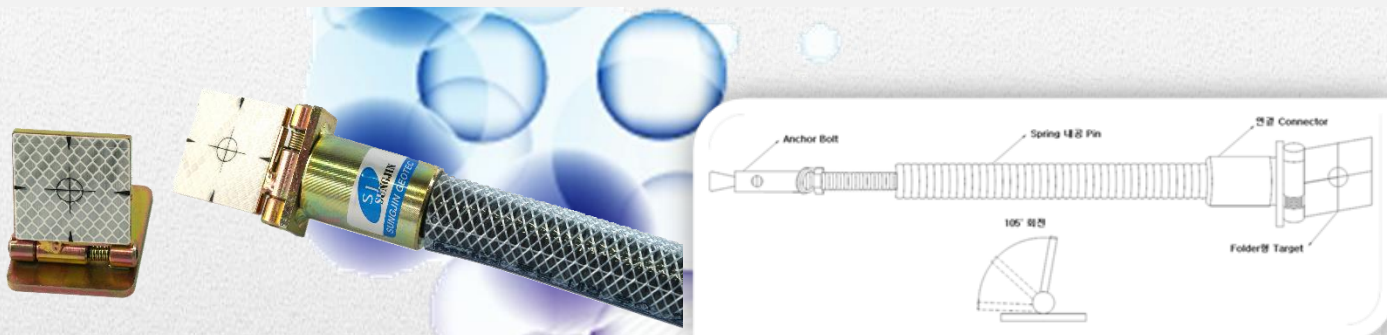
Using for electronic wave surveying target is mainly divided into triple prism and refraction type target (to measure the displacement using a reflecting sheet). For refraction type target, the reflecting sheet with ultra high brightness is attached. The measurement accuracy of the displacement is not better than that of triple prism method but the 2-D measurement is possible because of the short distance. It is much used for measuring the crown settlement and displacement for tunnel work.

Specification

Model	SJ-8800
Accuracy	Angle : $\pm 0.5\text{Mgon}$, Distance Measurement : 1.2mm
Reflection sheet size	60mm
Reflection sheet material	High Brightness Sheet
Inner displacement target material	ABB Synthetic Resins
Inner displacement pin size	25 X 300mm, 25 X 500mm
Inner displacement pin material	Steel

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

The most important item in "A" measurement of the tunnel is the crown settlement and displacement measurement. The purpose of measurement for crown settlement and displacement is to check the stability of the surrounding ground of the tunnel as well as the development caused by the tunnel excavation so that the final displacement can be predicted and it will be an important data to determine whether the lining should be added or not. However, the thing is that the tunnel collapse accident is still happened due to many other reasons despite the engineer always stays at tunnel site to install various gauges and instruments to control the measurement. In order to make sure of the effect of the primary supporting material and stability of the tunnel in excavating the tunnel it is necessary to install the instruments at the near tunnel face as quickly as possible to do the measurement but the initial displacement is lost from time to time due to missed timing of the installation because of the shotcrete laying problem. If the instrument is damaged due to debris scattered when the excavation by machine and blasting is done at the same time, it is not easy to determine the entire stability because of lack of data continuity.



Characteristic

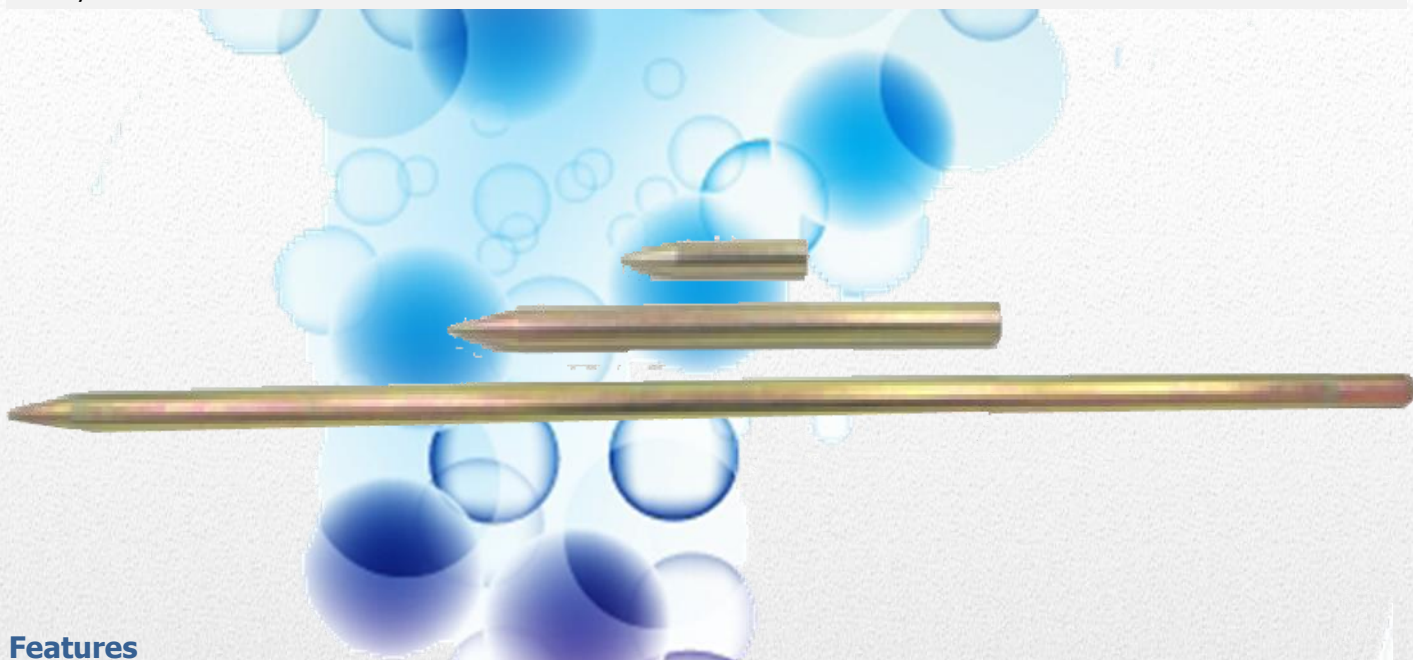
The conventional measurement target for crown settlement and displacement at the tunnel site can not do any resistance when the blasting is done and the target loss rate is as much as 20 ~ 30%. The conventional way is that they would delay the installation timing or separate the target according to the blasting time to reduce the loss rate and then they mount it again one by one to do measurement. However, spring folder type measurement target simply recovers to the original position by the spring and fixing device connected with the prism when it is hit by the debris scattered by blasting.

Specification

Model	SJ-8600(Patent: 10-0951811)
Target material	3D Reflection sheet: Polyvinyl chloride. Main body: Steel
Target size	Reflection plate (45mmx50mm), Fixing plate(50mmx60mm), Thick: 4mm
Target rotation angle	Φ56. 110 ° (One-way), Reset to the original position
Spring inner pin material	Special steel
Spring inner pin size	Spring inner pin (400mmx25mm), Target connector (50mmx25mm) Anchor bolt (145mm x 10mm), Total length when connected: 470mm
Spring inner pin rotation angle	180° (Front/Rear/Left/Right), Reset to original position

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

This pin measure settlement during civil work to use basic data to check level of settlement of ground or structure and stability.



Features

- * To measure settlement of subject ground at the work of soft ground or sheathing.
- * To measure settlement or movement at the harbors or bridge or structure

Characteristic

Surface settlement pin is used to fix measurement point at the subject ground or structure when measure level by leveler or meausre coordinates by total station. If installation point is ground, select long type pin and fix pin by mortar, and if installation point is concrete, select short type pin and insert pin after drilling and fix it by epoxy.

Specification

Model	SJ-8700
Dimension	Long type : 13mm(Ø) X 500mm(L) Short type : 13mm(Ø) X 70mm(L)
Material	Steel

※ The product spec is subject to change without prior notice in order to enhance the product's quality.

Rotary type terminal box is connected with signal cables from sensors from various locations at the side and the connected cables are connected with data logger(SJ-1000) by multi core cables. It is available to make cable work simply by that many cables are connected with 1 or 2 multi core cable in terminal box. Therefore our terminal box supply cost saving, time saving. Specially, our terminal box is useful to large scale civil work site.



Characteristic

Our terminal box is consisted of case, terminal block, connector and rotary switch. Case is waterproof type and impact resistance type. Our terminal box SJ-8512 can connected 12 channels and SJ-8524 can be connected 24 channels.

Specification

Model	SJ-1512	SJ-1524
Channel number	12	24
Operattion Temperature	-20 °C ~ 80 ° C	
Case Material	Reinforcement glassfiber plastic	
Dimension	280 X 190 X 130 mm	350 X 250 X 150 mm
Weight	2 kg	3 kg

※ The product spec is subject to change without prior notice in order to enhance the product's quality.



JooShin Corporation

Company Address

Rm.#707, A-Sung Plaza,
Hwajoongro 130 bungil 14,
Dukyang-gu, Goyang-city,
Kyeonggi-do, Korea

Tel : 82-70-8723-2200

Fax : 82-303-3130-7533

E-mail : sales@jooshin.kr

