INSTRUCTIONAL MANUAL

ACE INSTRUMENT

VW Readout unit

[Model ACE-800]

Geotechnical & Mining Instrumentations

Civil Engineering

Bridge
Structure
Dam
Tunnel
Railway
Roadway
Marine Structure
Foundation
Pile
Mine
Landfill
Slope
Excavation

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Please feel free to contact us if you have any questions or inquiries about geotechnical measuring instruments.

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1. ACE INSTRUMENT CO., LTD. holds the full responsibility of our products regardless of purchasing places and how you get it. The product passed a rigorous test and was under the quality management by top engineers.

2. If any defects of manufacturing are found or any breakdown happens within 3 years from purchasing date, we guarantee repair, adjustment and verification at no cost.
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4. In case of a product defect in manufacturing during the warranty period, the product will be replaced.

5. In case of failure or defect in the normal use of the user during the warranty period, repair, calibration and replacement of parts will be free of charge.

6. In case of failure or defect caused by negligence of the user during the warranty period, repair, calibration and replacement of parts will be charged.

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1-1 Introduction

Model ACE-800 is VW readout unit that pursues mobile convenience and designed as palm style for vibrating wire sensor output only.

The ACE-800 applied for using 4 membrane keys such as On, Off, Mode, Select even beginners can operate very easily and applied large scale LCD, that is used for acme mobile phone technology, for easy reading and customers can read mode, battery residual capacity indicator, thermistor temperature and selected frequency unit at same time to measure at ease. Also it applied backlight function for nighttime job at sites.

The ACE-800 applying selection functions for engineering unit of frequency and sweep band. It applying automatic circuit breaker that off the unit after 500 times reading (it takes around 15 minutes) to increase effectively battery lifetime and using time. It is able to using ACE-800 for 40 hours continuously per one time recharging by applying Nickel- Hydrogen rechargeable battery.

Another main function is LCD light contrast and it is possible to measure accurately even summer, winter, tropical regions and polar regions.

The exterior case of ACE-800 is made of ABS plastic. It is very reliable because it is resistant to vibration and shock, and it is designed with a waterproof shielding structure.

1-2 Feature & advantage

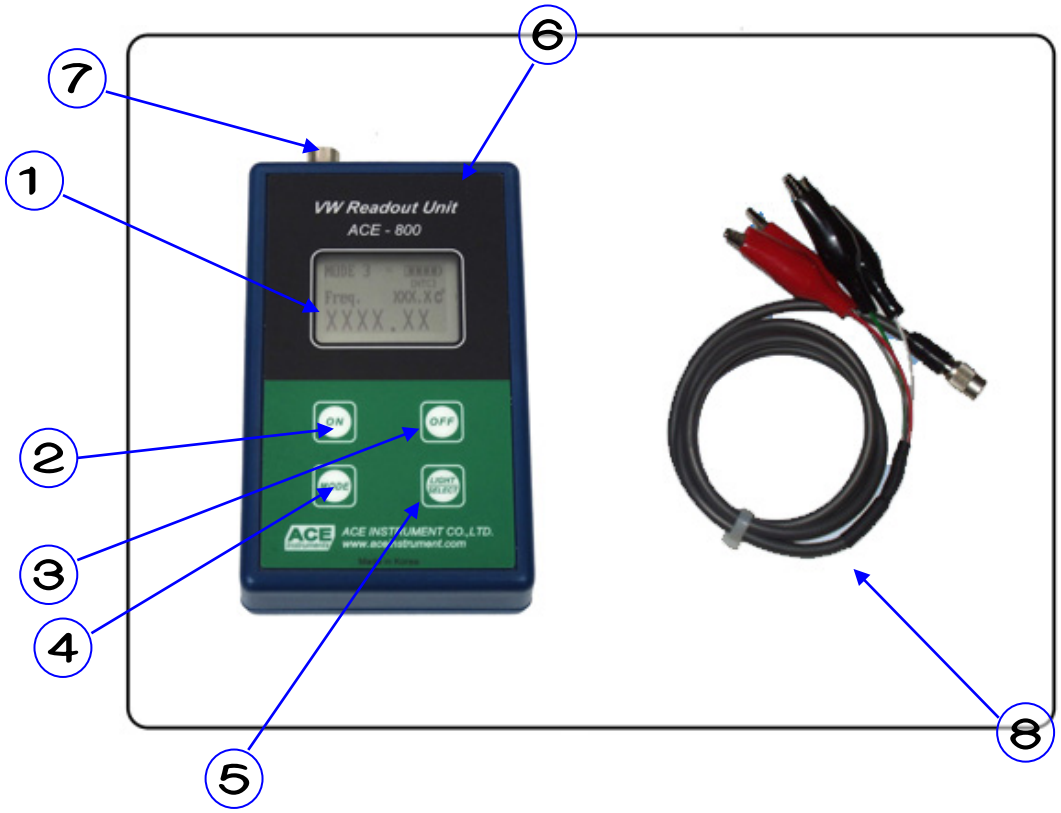
Model ACE-800 VW readout unit has the following features and advantages.

- Reliance of high analysis and high accuracy
- Able to use at high/low temperature (LCD light contrast)
- 40 hours continuous measurement (Ni-MH battery)
- Large LCD for easy reading
- With backlight function, possible to measure at night
- World smallest palm style
- Battery residual capacity indicator
- No malfunction by using membrane keys
- Recharging level indicator (LED indicator)
- Leather case

2 Specifications

Model	ACE-800
Applied sensor	Vibrating wire sensor
Frequency range	450～6,000 Hz
Displayed units	Hz, μsec, 10^3Hz^2, ℃, με0.391, με0.7756, με3.304, με4.062
Resolution	0.01%FSR (0.1 Hz)
Accuracy	0.02% FSR (0.1 Hz)
Operating temperature	-20～50℃
Temperature sensor	Thermistor (3kΩ)
Temperature resolution	0.1 ℃
Display	128×64 graphic LCD
Functions keyboard	4 membrane keys pad
Power	4.8VDC / rechargeable Ni-MH battery
Recharging part	7.5VDC / 1000mA(free volt) adaptor
Battery life	About 40 hrs continuous
Dimensions	114×72×30 mm
Weight	0.25 kg
Material of case	ABS plastic injection
Accessories	① Jumper cable ② Rechargeable adaptor ③ Leather case

3-1 Name and description of each part



LCD Display	① Shows the measurement Mode(Sweep, Display unit, Contrast), measuring data and temperature, and the remaining amount for the battery.
[ON] Button	② Push the [ON] button, and the power is on.
[OFF] Button	③ Push the [OFF] button, and the power is off. It is automatically turned off after 500 measurements to reduce the battery consumption of the VW readout unit. To continue measurement, press the [ON] button again to turn on the power before use.
[MODE] Button	④ The [MODE] button is for choosing frequency band(Sweep), measuring unit(Units), contrast or version information. Each press of the button makes the four functions in turn.
[LIGHT/SELECT] Button	⑤ [LIGHT/SELECT] button is for lighting on and off the backlight on the LCD screen. Use it for right situation of the chosen frequency band (sweep), measuring unit(units), temp. sensor, contrast or version information.
Recharging connector	⑥ The connector to the enclosed DC 7.5V/1000mA recharging adaptor to recharge the built-in battery in the ACE-800 VW readout unit.
Connector for Jumper Cable	⑦ The 4 pin connector for joining the jumper cable of the ACE-800 VW readout unit.
Jumper Cable	⑧ Link the vibrating wire sensor with the output system by Alligator clip.

3-2 Description of detail function

[MODE] [LIGHT/SELECT]

Use it for right situation in measuring with [MODE] and [LIGHT/ SELECT] when measure it.

[MODE]	[LIGHT/SELECT]	LCD Display indicator
-	1 click	Main Display Backlight ON
-	2 click	Main Display Backlight OFF
1 click	-	Sweep Mode 1 / 0.45 kHz～1.2 kHz
-	1 click	Sweep Mode 2 / 0.8 kHz～2.0 kHz
-	2 click	Sweep Mode 3 / 1.4 kHz～3.5 kHz
-	3 click	Sweep Mode 4 / 2.4 kHz～6.0 kHz
2 click	-	Display Mode 1 / Frequency
-	1 click	Display Mode 2 / Period(μsec)
-	2 click	Display Mode 3 / 10^3Hz^2
-	3 click	Display Mode 4 / με0.391
-	4 click	Display Mode 5 / με0.7756
-	5 click	Display Mode 6 / με3.304
-	6 click	Display Mode 7 / με4.062
3 click	-	LCD Contrast 12 (LCD light contrast)
4 click	-	Battery residual capacity indicator, Version Information indicator

Recharging Connector & Adaptor

To recharge the built-in battery of ACE-800 VW readout unit, link the connector with the enclosed 7.5VDC/1000mA adaptor in AC 220V power. (The charging LED turn on, when charging.)
Charge the battery 8 hours/time and always keep the remaining battery level at 4.0V or higher.

Jumper Cable Connector & Jumper Cable

Connect a jumper cable to the 4Pin connector and connect it to the vibrating wire sensor as shown in the chart below.

Function	Jumper cable color	Jumper cable alligator clip color	VW Sensor cable color
Measuring frequency	RED	RED	RED
	BLACK	RED	BLACK
Measuring temperature	GREEN	BLACK	GREEN
	WHITE	BLACK	WHITE

3-3 Description of MODE (Apply the instrument to MODE changing)

LCD light contrast

The luminosity is to be set on LCD at basic principal.
The LCD contrast is on "12" when shipping.
Set it on "7～9" in summer or hot temperature.
Set it on "14～17" in winter or cold temperature.
Able to set the luminosity from 1 to 20.

Sweep Mode changing

Tune the frequency scope of the measurement instrument within the changed sweep mode and measure it.

Apply the instrument to display mode change

Apply the measurement instrument to display mode changing as the chart below.

MODE	Measuring Unit	Main Display indicator	Apply the instruments
Mode 1	Frequency(Hz)	Freq.	All VW Sensors
Mode 2	Period(μsec)	Perio.	All VW Sensors
Mode 3	10^3Hz^2	10^3Hz^2	VW Load Cells
Mode 4	Strain(με0.391)	με0.391	VW Spot-weldable Strain gage
Mode 5	Strain(με0.7756)	με0.7756	VW Shotcrete Strain Gage
Mode 6	Strain(με3.304)	με3.304	VW Embedment Strain Gage
Mode 7	Strain(με4.062)	με4.062	VW Weldable Strain Gage

3-4 Using method of ACE-800 VW readout unit

The basic usage of model ACE-800 VW readout unit is as follows.

■ Link the jumper cable with the contacting connector of VW readout unit.
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■ Push the [ON] button to power on.
(Our company logo is on and then transferred to main screen.)

■ Confirm the frequency band and unit of the measurement instrument.
Set the basic mode of with [MODE] and [LIGHT/SELECT] button.
(See the 3-2 description of detail function and [MODE] explanation)

■ Connect with the signal cable by the Alligator clip of the jumper cable.
(See the [3-2 description of detail function])

4-1 Maintenance

Keeping	Part from other goods or cover with attention sign not to be shocked or vibrated because ACE-800 VW readout unit is a precise apparatus with built-in electronic circuit. Keep in well-ventilated room without direct light. Long exposure to direct light makes measuring malfunction due to extreme temperature change.
Carrying	Take great care not to make big measuring errors based on changing zero point due to heavy impact or vibration in carrying. Do not put any heavy things on it, settle down and take actions not to be shocked when carrying in vehicles.
Keeping jumper cable	Do not bend the jumper cable. Keep it carefully so that it will not be disconnection. When using it, do not pull it by pulling it hard or do not pull it with great force. When not using the jumper cable, put it in a bag or case and store it in a place where it will not be damaged.
Check battery voltage	Confirm the voltage of the built-in battery before or after using it. Too low voltage makes no signal of the measuring by the sensor.
Check measurement value	Please contact us if you think the measurement value is not correct when measuring the sensor.

4-2 Calibration & service

Calibration	Model ACE-800 VW readout unit is revised and shipped with exact input / output specifications of the electric circuit by using each special rectifier. Therefore it allows for highly stable and reliable values in every VW sensor.
Service	For effectively using a VW readout unit without any trouble, it is strongly recommended to read the manual and to handle it consistently. We will check any defects or performances if there are any troubles. ACE INSTRUMENT A/S team Tel) +82-31-459-8753 Fax) +82-31-459-8758 acens@naver.com www.aceinstrument.com

5. Geotechnical Instruments Installation and Operation Tips

1. Handling caution

Engineering measuring instrument is precisely manufactured and sensitive. Don't drop it and don't allow it to be exposed to external shocks. In particular, the VW measuring instrument is likely to see its zero point changed due to shocks.

2. Caution for storing calibration report

Calibration report is provided with each sensor. Information at the moment of calibration includes barometric pressure, calibration temperature, and temperature sensor in use, calibration data, conversion ratio and classification of signal cable by color. Therefore, you should be careful with storing the information until all work is done. In case the report is lost, tracking data and product might be impossible.

3. Operation by an engineer

All the process should be operated by a skilled engineer to prevent inappropriate choices such as errors of instrument choice, installation and operation which make impossible near-permanent calculation.

4. The need for shielding

It is common that sensor sends a weak electronic signal. And sensor is under the influence of electromagnetic induction, electrostatic induction static electricity electrification generated when other control machine is on. In particular, given that environmental condition of engineering work involving welding, generator, motor, antenna, and watery surface is poor, shielding and ground wire should be connected in the case of output device connection.

5. Caution for signal cable extension

There would be no problem that VW sensor outputting frequency signal is connected for extension .in the case that a sensor generating Voltage is connected for extension, electronic sensors are vulnerable to changes in resistance value. Therefore, the length of the cable plays a big influence. So, you should adjust resistance change value with adjustment value toward a sectional length of signal cable by manufacturers. Also, extension seam part should be finished up with Splice Kit (Epoxy).

6. The use of protection tube for signal cable

In the case of laying under the ground, dams, vulnerable foundation, concrete structures can have a big displacement, a source of signal cable disconnection. In the case of ground construction, given the construction condition, heavy equipment operation and frequent moving construction can be a source of disconnection or sensor damage. Therefore, caution should be taken for the protection of sensors and signal cables. And minimize the dangerous factors by using new construction pipe for drainage system.

7. Installation of Amplifier with sensors generating mV

Engineering measuring machine generating electronic signal has a 200-300 m transmission distance. In the case Junction Box and Terminal Box have a long distance from the measuring machine, an amplifier should be installed in proportion of measurement distance to prevent drop of voltage for sensor transmission.

8. Atmospheric pressure adjustment

When manometer is chosen as sensor, it is very sensitive to change in atmospheric pressure. Therefore, for precise measurement, places such as dams, valleys, the sea and reclaimed lands with high fluctuation of atmospheric pressure should adjust head height according to the difference of the pressure by using mercury barometer.

9. Lighting rod construction

In the case of large engineering work near water such as dams, lakes, the sea and large fields, valleys, lighting rods connecting each sensor individually should be constructed to protect sensors. Within the influence of over voltage, sensors are likely to function poorly.

10. Caution for filter use in pressure sensors

Pressure sensors such as negative pore water pressure have attached filters. Upon installation, make sure to let air out of the inside of the filter. Given that densities of air contraction and water are different, remained air might cause an error to measured value. Also, at places where unsaturated soil or negative pore water pressure are expected, it is recommended to use 1㎛ high-density ceramic filter.

11. Caution for bearing plate in use for load cell

For maintaining consistent measured value and high precision, the use of bearing plate is important, during installation of hard cell on Earth Anchor, heat processed steel materials should be manufactured with the enough thickness to endure unloading load and with the density of within 0.5 degree in top-down parallel lines. High quality products should be used for cone for spilt, cone-plate and mutual taper processed density.

12. Sensor temperature adjustment

An element of VW sensors uses wire rod (used for piano string) so that coefficient of linear expansion metallic materials hold can cause errors of margin and sensors of electricity and electron hold an adjustment factor. For precise measurement, adjust the difference of temperature with a mercury thermometer.

13. Auto Data Acquisition System requires UPS

In South Korea, relatively temporary blackout (0.5 seconds) is frequent. So overloading owing to simultaneous uses of equipment and accumulated power cables on sites are likely to cause ordinary and temporary blackouts, leading to computer Down and errors of built-in software.
Therefore, When Auto Data Acquisition System is operated; UPS(Uninterruptable Power Supply) must be used to minimize dangerous factors.

14. Caution for the choice of VW output unit

Manufactures of VW sensors and output units usually cover 600~3,200Hz (360~10,240 10^3Hz^2 or 1666～312 μsec) for possible measurement range. And they design sensors taking into consideration the purpose of sensors, durability, and precision. Therefore, when Mode for unit choice of output unit within this range is changed, you must select sophisticated output unit-making measurement possible.

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