



Imaging, Control, Instrumentation
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Geotechnics

2020 Catalog

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GEOTECHNICS & GEOPHYSICS

2020

Relying on over 20 years of experience on control and instrumentation systems, together with close collaboration of geotechnics and geophysics specialists, Farand Systems has designed and produced a range of measurement and test instruments. All the instruments are designed to operate both in laboratory and in field applications with durability and robustness being key features in design philosophy and production. This makes all the products capable of operation in harsh environments. Making use of state-of-the-art of electronic technology in components like sensors, processors, amplifiers, analog to digital converters etc., guarantees high quality and performance and eases service and maintenance. All these products are designed and tested to meet ASTM requirements. Some of the instruments designed and produced by Farand Systems are: Four Channel Seismograph, Digital Downhole Seismic Tester, Soil Resistivity Tester, Concrete Resistivity Meter, Ultrasonic Pulse Velocity Meter, Sensor Loggers, Pile Integrity Tester, Well Logger and Light Weight Deflectometer.

Farand Systems is also open to work on projects according to customer specific requirements.

DIGITAL DOWNHOLE SEISMOGRAPH

MODEL: FD301



General Description

Description The FD301 tester is specifically designed for downhole seismic testing. This tester which satisfies all the requirements of ASTM D-7400, comprises of a probe, a workstation and a winch. This integrated portable solution allows engineers to efficiently and easily operate the system optimally for the downhole seismic test. This is not the case with conventional seismographs in which fragmented hardware such as multi-input channels and various analog probes are used. The FD301 probe includes three geophone sensors with sensitivities both to P and S waves. The acquired P and S wave signals are pre-amplified and digitized inside the probe at their reception, and then sent over an RS485 link via a 50m (100m optional) cable. Integration of pre-amplifiers and digitizing circuits inside the probe improves signal to noise ratio. This makes the system highly sensitive to mechanical waves and enables the tester to operate over a wider range of environmental and ground conditions. Viewing the test results and reporting is easily possible using the workstation embedded rugged industrial computer, so there is no need for connecting a laptop or desktop computer to the system as common in other products. The P & S signals are displayed on the workstation monitor, facilitating the user with powerful data visualization tools. Dedicated designed software helps with editing and post processing the captured signals.

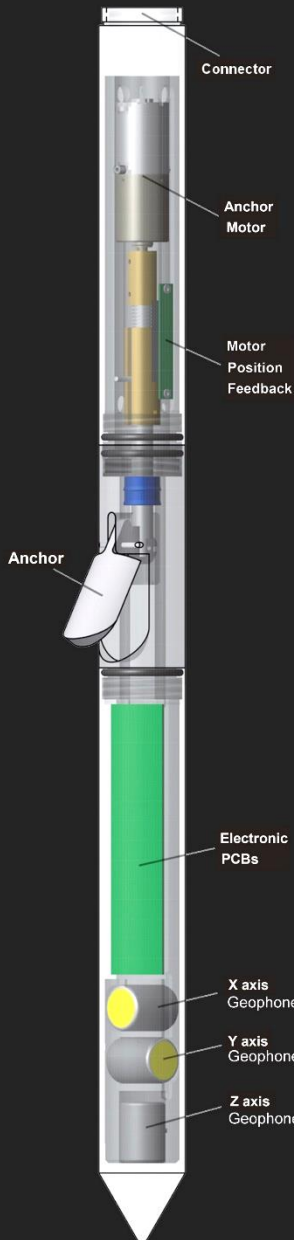
Features

- P & S Geophones
- RS485 Digital Transmission
- Slip ring Equipped Winch
- Ultra Low Noise Pre-amplifier
- Slim Probe (48 mm)
- Electro-mechanical Packer
- Portable Integrated Processing Unit
- Ultra High Noise Immunity
- Powerful Windows Visualization Software

Applications

- Bridge / Dam Foundation Analysis
- In-situation Material Testing
- Soil and Rock Mechanics
- Earthquake Engineering
- Liquefaction Analysis

Probe



Perfect packing of the probe to the borehole wall is a key issue in capturing weak mechanical vibrations and performing a high quality downhole seismic test. This is achieved by an electro-mechanical system which is integrated with the probe and can be controlled via the system workstation.

A winch is used to collect and carry the system cable to ease system set up and usage. This winch is equipped with a slip ring which eliminates the need for un - wrapping the whole cable in each test. The user can connect the free end of the cable to the probe and send it inside the bore at desired depth. The other end of the cable is fixed to the winch and can be connected to the workstation via a 2 meters cable. Perfect packing of the probe to the bore wall is a key issue in capturing weak mechanical vibrations and performing a high quality downhole test. This is best achieved by designing a built - in electro mechanical anchor in FD301 probe. This anchor can be opened and closed simply by sending the commands via the system software. Using the electromechanical packing technic eliminates the problems introduced by the conventional air cushion packers. The system power is provided by a sealed acid battery which is embedded inside the system workstation. This battery can be charged using mains AC power line or by a vehicle battery. The whole system can also be operated by simple connection to a conventional vehicle battery.

Specifications

Parameter	Range
Digitizer	24Bit x 3 channel 16 k Samples/sec. ADC
Sampling Interval	0.0625, 0.125, 0.25, 0.5, 1, 2 (msec.)
Sample Count	16384 Samples
Preamplifier Gain	24dB, 36dB, 48dB Selectable
SNR @ 16ksps	106dB
Bandwidth	10Hz to 8kHz
Sensors	3 Axis Orthogonal Accurate Geophones
Data Transmission	RS485
Trigger Input	Positive/Negative, Software Adjustable
Packing System	Electromechanical
Packing Diameter	55 to 80mm
IP Class	IP67
Cable Length	55m(105 m Optional)
Operating Temp.	-20 to 70°C
Power	12VDC, 1 A
Dimensions	40cm X 30 cm X 20 cm (Workstation) 40cm X 25 cm X 40 cm (Winch) 5.2cm (Diameter) X 80(Length) cm (Probe)
Weight	5 kg (Workstation) 8 kg (Winch) 3 kg (Probe)

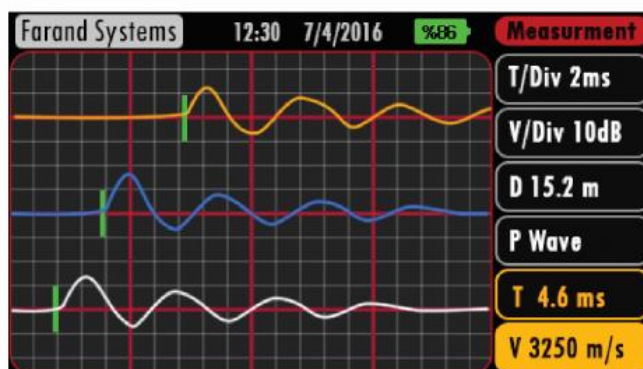
FOUR CHANNEL SEISMOGRAPH

MODEL: FD302



General Description

Downhole seismic testing is one of the most popular investigations in the study of ground layers in construction, oil industry and mining projects. This test provides the engineers and researchers of geophysics and geotechnics, with valuable data that can be acquired very efficiently at a reasonable cost. The FD302 tester is a 4 channel seismograph designed for downhole seismic testing. This tester which satisfies all the requirements of ASTM D-7400 standard, comprises of a probe and a hand held electronic processing & display module. This portable solution allows engineers to efficiently and easily operate the 4 channel seismograph for downhole seismic testing. The acquired P&S waveforms can be visualized and stored for future study.



Features

- 4.3 "Color LCD & Simple Data Visualization Tools
- Powerful Application Software and Easy Operation
- 24 bit Analog to Digital Conversion
- Ultra Low Noise Pre – amplifier
- Slim Probe (52 mm)
- Easy to Use Air Cushion Packer
- Large Storage Memory for Saving Thousands of Waveforms
- Operates on Internal Li-polymer or Vehicle Battery

Applications

- Bridge/Dam Foundation Analysis
- In - situation Material Testing
- Soil and Rock Mechanics
- Earthquake Engineering
- Liquefaction Analysis

Probe



Perfect packing of the probe to the bore wall is a key issue in capturing weak mechanical vibrations and performing a high quality downhole seismic test. This is achieved by a pneumatic packer system which is integrated with the probe and can be pressurized by easy foot pumping.

The FD302 probe includes three geophone sensors with sensitivities both to P and S waves. The acquired P and S wave signals are transmitted to the seismograph as analog signals via a 35m cable and then pre-amplified and digitized in the handheld device. Up to 4 geophones can be connected to the FD302 seismograph. There is another separate input for the trigger signal which can originate from a geophone, a capacitive microphone or simply a contact wire. The P & S signals are displayed on a color LCD panel, and the keyboard facilitates the user with simple & easy to use data visualization tools. An application software is supplied with the device to help editing and post-processing the captured signals under the Windows operating system. The waveforms are saved in the device's built-in flash memory and can be further retrieved by a laptop or desktop computer for analysis, reporting & future reference.

Specifications

Parameter	Range
Digitizer	24Bit x 3 channel 16 k Samples/sec. ADC
Sampling Interval	0.0625, 0.125, 0.25, 0.5, 1, 2 (msec.)
Sample Count	16384 Samples
Preamplifier Gain	24dB, 36dB, 48dB Selectable
SNR @ 16ksps	106dB
Bandwidth	10Hz to 8kHz
Sensors	3 Axis Orthogonal Accurate Geophones
Data Transmission	Analog
Trigger Input	Positive/Negative, Software Adjustable
Probe Diameter	52mm Diameter
Probe Length	600mm
Packing System	Air Cushion
Packing Diameter	55 to 80mm
IP Class	IP67
Cable Length	35m
Operating Temp.	-20 to 70°C
Power	12VDC, 1 A
Dimensions	22.8 cm X 15.1 cm X 5 cm
Weight	500 gr.

CONCRETE SURFACE RESISTIVITY METER

MODEL: FW411



General Description

Measurement of concrete surface resistivity has proven to be an efficient & cost effective non-destructive testing method to evaluate state of corrosion, chloride diffusion rate and permeability in concrete samples. The FW411 is a handheld instrument for accurate measurement of concrete surface resistivity using the Wenner 4 electrode method. The FW411 is comprised of a four contact probe equipped with spring loaded stainless steel pins and an electronic processing & display module. The FW411 probe is available in 38 mm & 50 mm contact spacing versions to match current penetration depth requirements in different applications. Generally larger contact spacing leads to more reasonable results in inhomogeneous materials like concrete. The 38 mm probe complies with AASHTO TP 95-11 standard to evaluate chloride ion penetration.

Features

- Ruggedized Aluminum Case
- Light Weight Handheld Device with Intuitive Menu Operation
- Temperature Compensation and Calculation of Resistivity for 25 ° C
- Excitation Frequency Selection
- Hold key for Freezing the Displayed Value
- Very High Resolution 24 bit Analog to Digital Conversion

Applications

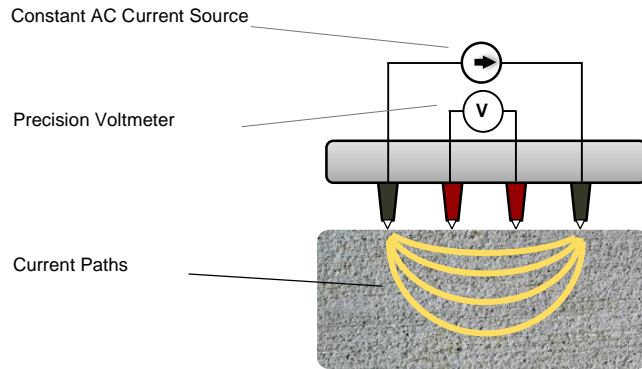
- Evaluation of Corrosion Rate In-situation
- Evaluation of Chloride Permeability & Identification of Sensitive Areas
- Assessment of Curing Efficiency
- Design of Cathodic Protection System

Features

- Constant Current, 4 Electrode Wenner Method
- Single Electronic Handheld with Replaceable Probes
- 50mm Contact Spacing & 38mm Contact Spacing Probes
- Resistivity Display and Storage for Future Reference
- Wide Resistivity Range from 1 Ohm.cm to 1 MOhm.cm

Applications

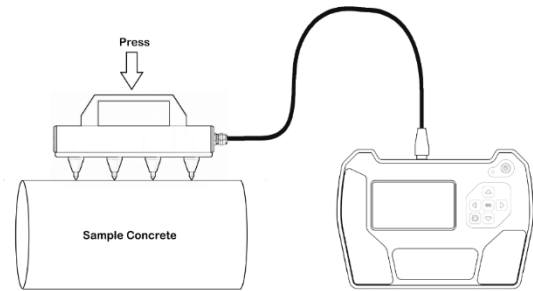
- Comparative measurement of moisture in a concrete structure
- Comparative measurement of water/ cement ratio in a concrete structure
- Evaluation of water permeability of rock samples



Test Method

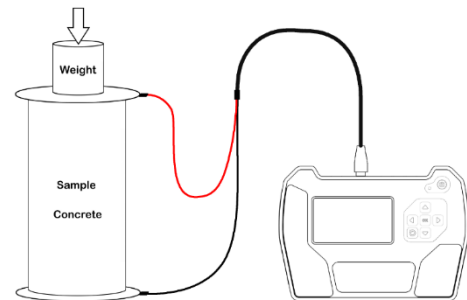
Resistivity

Measurement



Bulk Resistance

Measurement



Specifications

Parameter	Range
Resistivity Measurement Range	1 Ohm.cm ... 1 MOhm.cm
Operation Ranges	Low Range: (0... 500 Ohm.cm) High Range: (0... 1 MOhm.cm)
Measurement Accuracy	%1 (0... 500 Ohm.cm) %1 (0... 1 MOhm.cm)
Range Switching	Automatic
Measurement Method	Constant Current AC excitation
Excitation Frequency	40Hz
Temperature Measurement and Compensation range	0... 50 °C
Temperature Operating range	0... 50 °C
Power Supply	External DC Adaptor, 5V- 1A
IP Class	IP 54
Display	4.3" Color LCD, 480 x 272 pixels
Dimensions	22.8cm X 15.1 cm X 5cm
Weight	500 gr.

ULTRASONIC PULSE VELOCITY METER

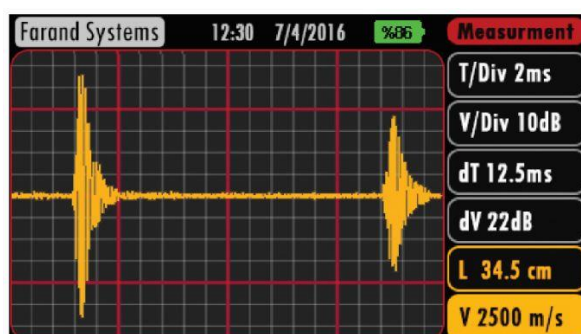
MODEL: FU202



General Description

Propagation velocity of a mechanical pulse in a material depends on several parameters including material density and its elastic properties. These parameters in turn, are related to the material's mechanical properties such as quality, homogeneity and strength.

The Ultrasonic Pulse Velocity Meter Model FU202 is a cost effective, reliable and accurate instrument for measuring the speed of sound in a given sample of rock, concrete, ceramic, wood, plastic etc. and covers all the requirements of ASTM C597 standard.



Features

- Ruggedized Aluminum Case Which is Compatible to Both Laboratory and Field Applications
- Light Weight Handheld Device with Intuitive Menu Operation
- Waveform Display and Storage for Future Reference
- Timing and Signal Level Measurement Performed by Shortcut keys

Applications

- Evaluation of Homogeneity of a Material
- Detection of Voids, Cracks or other Defects
- Evaluation of Concrete Aging and Changes Over Time

Features

- **Pulse Repetition Rate, Timing, Count and Intensity Adjustable by User**
- **Hold Key for Freezing the Waveform Display**
- **Easy Length Velocity/ /Time Period Input Settings**
- **Operating Modes:**
 - **Pulse Velocity Transmission Time / Distance**
 - **Line Scans**
 - **Compressive Strength**
- **Evaluation of concrete damage caused by overheating, freezing or chemical exposure**
- **Evaluation of the strength or poisons modulus of materials**
- **Qualifying the concrete according to the specified standard requirements**

Test Method

In ultrasonic pulse velocity testing two transducers are connected to the facets of a sample using a couplant gel. The transmitting device generates a mechanical pulse wave. This wave propagates through the sample and is received by the other transducer. The instrument measures this propagation time also known as time of flight (TOF). Knowing the length of the sample and the time of flight, ultrasonic wave speed in the material will be calculated and displayed.

Transducers

The FU202 can be used with transducers with a variety of operating frequencies. The best testing frequency depends on material type and its grain size. For concrete, 54 kHz P Wave transducers and 180 ... 250kHz S - wave transducers have proven to be the most efficient. The transducer body is designed to tolerate mechanical pressure for testing samples under axial force. The Basic configuration of FU202 comes with a couple of 54 kHz P-Wave transducers.

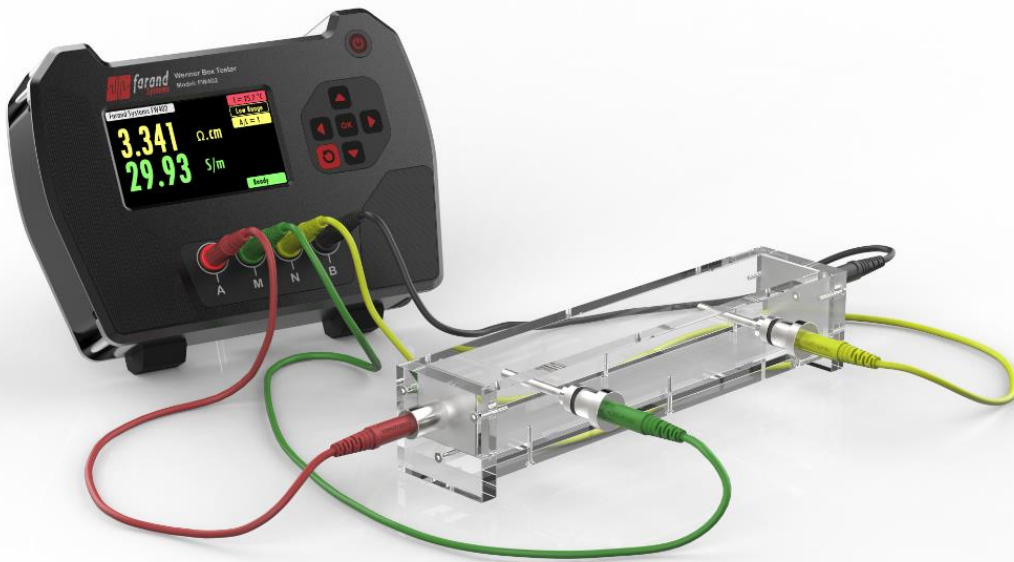


Specifications

Parameter	Range
Timing Range	0.2-10000 µs
Timing Resolution	0.2 µs
Max Sample Count	65535
Pulse Voltage	100...500V
Receiver Amplifier Bandwidth	20...500kHz
Receiver Amplifier Gain	1X – 10,000X (0-80dB) 9 steps
Battery	Lithium Polymer, 3.7 V 5 Ah
Batter Life	>5h
IP Classification	IP 54
Memory	8 GB Flash memory
Display	4.3" Color LCD, 480 x 272 pixels
Dimensions	22.8cm X 15.1 cm X 5cm
Weight	500 gr.

LABORATORY WENNER TESTER

MODEL: FW402



General Description

General Description The FW402 Wenner tester is a low cost and efficient laboratory testing instrument for measuring soil electrical resistivity using the Wenner 4 electrode method and covers all the requirements of the ASTM G57 Standard. This instrument provides the specialists with valuable information in various applications including soil corrosion investigations. The Wenner test is literally the most important test in AWA C105 which is the common standard for pipeline design. One of the advantages of the laboratory Wenner tester over the conventional field testers is that the soil samples can either undergo the test directly or can be tested under different conditions like saturation with distilled water.



Features

- Ruggedized Aluminum Case Compatible to both Laboratory and Field Applications
- Light Weight Handheld Device with Intuitive Menu Operation
- Resistor Board For Calibration Check

Applications

- Corrosion Potential Evaluation
- Water Soluble Salts Concentration Measurement
- Earthing System Design

Features

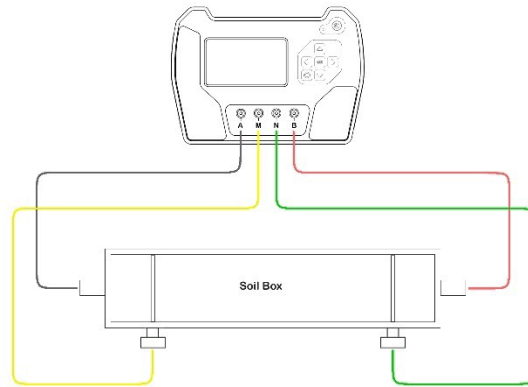
- Temperature Compensation and Calculation of Resistivity for 25 ° C
- Measurement of Resistivity & Conductivity
- Wide Dynamic Range Measurement from Distilled Water to Saturated Salt Water
- Hold Key for Freezing the Displayed Value

Applications

- Agriculture & Agrology
- Water quality assessment

Test Method

The FW402 tester is comprised of a soil box and an electronic measurement and display unit. The soil box is connected to the electronic unit via 4 cables, which are used according to ASTM G57 requirements to measure electrical conductivity based on Wenner 4 electrode method. As the sample is filled in the box and prepared according to instructions, the electrical resistivity is measured and displayed on the electronic unit.



The tester has a wide dynamic range and can measure high electrical resistivity of distilled water down to very low resistivity of saturated salt water. Since the ASTM G57 standard demands the electrical resistivity to be measured at 25 ° C, measurement errors due to ambient temperature changes become a matter of concern. The FW402 has a built-in temperature sensor which measures the ambient temperature and compensates for the resistivity measurement errors, so the displayed resistivity can optionally be calculated for 25°C. The instrument calibration can be assessed using calibration resistor board which is supplied with the FW402 soil resistivity tester.

Specifications

Parameter	Range
Resistivity Measurement Range	7 mOhm.cm ... 700 MOhm.cm
Operation Ranges	Low Range: (0... 70 Ohm.cm) High Range: (0... 700 kOhm.cm)
Measurement Accuracy	%1 (0... 70 Ohm.cm) %1 (0... 700 kOhm.cm)
Range Switching	Automatic
Measurement Method	Constant Current AC excitation
Excitation Frequency	97Hz
Temperature Measurement and Compensation range	0... 50 °C
Temperature Operating range	0... 50 °C
Power Supply	External DC Adaptor, 5V- 1A
IP Class	IP 54
Display	4.3" Color LCD, 480 x 272 pixels
Dimensions	22.8cm X 15.1 cm X 5cm
Weight	500 gr.

SENSOR LOGGERS

MODEL: FL5000



General Description

Environmental parameter logging plays a critical role in monitoring a variety of physical and chemical variables in a natural, laboratory or industrial process. The FL5000 series of sensor loggers are designed to efficiently record such parameters with an abundant collection of sensors, covering temperature, humidity, pressure, and a variety of gases, especially those which are measured to monitor and control pollutants and air quality. Each FL5000 sensor logger is comprised of a sensor, a processing and recording electronic board and a Li-polymer battery pack. Interfacing to these devices is easily achieved by a mini USB port which when connected to a laptop or desktop computer provides access to all the device settings and recorded data. A Windows application is designed to help the user easily configure the device and erase or retrieve recorded data. Sampling interval, sample count, sampling accuracy etc., system power management and time stamping procedure are some of the parameters which can be set via this application software.

Features

- Up to 32000 Recording Samples
- Adjustable Sampling Interval
- 12-bit Analog to Digital Conversion
- Internal Real Time Clock and Time Stamping
- Efficient Power Management

Applications

- Air and Water Pollution Monitoring
- Air and Water Quality Control
- HSE Health, Safety, Environment

Features

- Communication and Charging via a Simple Mini USB Connector
- Internal Long Life Li - Polymer Battery
- A Vast Collection of Sensors at Different Accuracy Levels
- Easy to Use and Configure via a Windows Application

Applications

- Agriculture and Farming
- Process Control
- Health and Safety

Sensors

Gas	Acetylene	0... %100 LFL
	Ammonia	0...100 ppm, 5...5000 ppm
	Carbon Dioxide	0... %100 LFL
	Carbon Monoxide	0...500 ppm
	Chlorine Dioxide	0...2000 ppm
	Chlorine	0... 2 ppm, 0...50 ppm
	Ethylene Oxide	0... 10 ppm
	Hydrogen	0... 1000 ppm
	Hydrogen Sulfide	±0.5 ppm, 0... 100 ppm, 0...1000 ppm
	Methane	0...%5 V/V, 0...%100 V/V
	Nitrogen Dioxide	0... 30 ppm
	Nitric Oxide	0... 2000 ppm
	Oxygen	0... %25 V/V, 0...%100 V/V
	Ozone	10 ... 1000 ppb
	Sulphur Dioxide	0... 20 ppm, 0... 2000 ppm
Temperature	VOCs	0... %100 LFL
	Low Temperature	-20...85 °C, %0.1
	Medium	-10...50 °C, %0.1
	High Temperature	25...300 °C, %0.1
Humidity	Thermocouple	-200...1300 °C, %0.1
	Humidity, Temperature, Dew	0...%100 RH, -35...80 °C
	High Accuracy Digital Humidity Sensor	0...%100 RH ±4%, -40...125 °C, ±0.2 °C
Voltage	Low Voltage Range	0... 30Vdc, 0.1%
Current	Process Control	4...20 mA, 0.1%
Vibration	Piezo Film Sensor	0...180 Hz
Pressure	Digital Barometer	260 to 1260 hPa, 0.01 hPa RMS

Specifications

Parameter	Range
Analog to Digital Conversion	12Bit ADC
Sampling Interval	1, 10, 30 , 60, 300, 600, 3600 (sec.)
Sample Count	32,000 Samples
Accuracy	%0.1 (Or limited to Sensor Type)
Data Transmission	USB
Start/Stop	Software
Real Time Clock	Software Settable
IP Class	IP67
Operating Temp.	-20 to 70°C
Power	Internal 3.7 V Lithium Polymer Battery
Dimensions	3 cm (D) X 15 cm(L)
Weight	100 gr.



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