

Smart LoRa system



Description

The model **Smart LoRa system** applies LoRa (Long Range), a low-power and long-distance communication method, to transmit sensor data measured by various types of sensor modules to a network server through a gateway. It is also a wireless measurement system that can monitor under various conditions through a real-time monitoring program.

The system configuration consists of a sensor module that measures and wirelessly transmits data from sensors, a gateway that transmits the received data to the server, a network server that stores the transmitted measurement data, and a web-based monitoring program that analyzes and manages the stored measurement data.

The sensor module consists of a vibrating wire module (VL), an electric module (AL), and a digital multi-point inclinometer module (ML) that can be selected by sensor type. VL and AL are produced for 1 channel and 4 channels respectively, and ML is produced for only 1 channel. It can be selected and used according to the type and quantity of sensors installed at the site.

The smart LoRa system uses a LoRa communication network between a dedicated gateway and sensor modules to form a local network without incurring communication charges. To transmit data to a network server, an Internet line must be connected to the gateway.

The sensor module is a low-power system that can be used for a long period of up to 5 years using one D-size lithium battery. With long-distance communication, a network can be freely configured within 1km of the city area, and communication is possible up to 6km in soft ground or open areas other than the city area.

Up to 216 sensor modules can be connected to each gateway, and multiple gateways can be used simultaneously, allowing various configurations depending on the user's choice.

M-Pro, a dedicated program for connecting a measurement sensor to a sensor module and setting sensor measurement options such as measurement interval, communication gateway targeting, and channel settings, is provided free of charge.

A web monitoring program that can be used to suit the user's needs, such as real-time data network server upload, engineering unit conversion, and graph creation, is provided as an option.

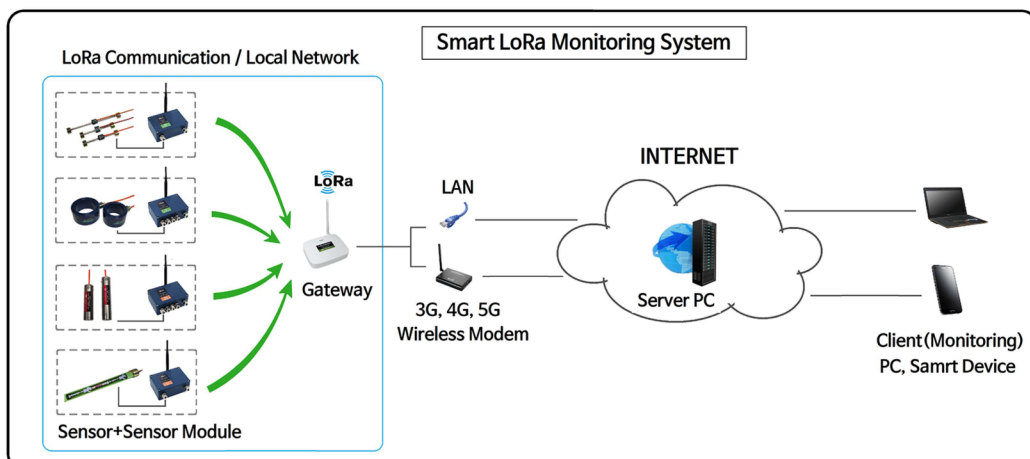
Features

- Use of low-power, long-distance LoRa communication (Long Range, LPWAN)
- Use of Low-power design allows up to 5 years without battery replacement
- Up to 6km long-distance communication between sensor module gateways is possible
- Wireless measurement system eliminates the need for long-distance sensor signal wiring
- Free communication fee with LoRa local network configuration
- Vibrating wire sensor, analog sensor, digital multi-point inclinometer can be measured
- Sensor modules for 1 channel and 4 channels can be selected
- Real-time smart monitoring using LoRa web monitoring program (S-Pro)

Applications

The Smart LoRa system is a low-power, long-distance LoRa communication system that allows configuration of wireless measurement management systems for most civil engineering, construction sites, and existing building structures, and is useful for real-time monitoring.

- Sites that require accurate real-time monitoring
- Measurement sensor data collection site distributed across a wide field
- Sites requiring remote control and unmanned control
- Automatic and accurate measurement in sites where people have difficulty entering



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Sensor module type

[Analog sensor module]

The analog sensor module can measure voltage(mV) sensors and current(mA) sensors. Measurement data is wirelessly transmitted to the gateway using the LoRaWAN protocol and stored on a network server via the Internet. There are two types of analog sensor modules: AL1(for 1 channel) and AL4 (for 4 channels), and they measure voltage(mV) and current (mA) signals from MEMS sensor, LVDT, potentiometer, pressure sensor, displacement sensor, and temperature sensor.



[VW sensor module]

The vibrating wire sensor module can measure frequencies in the 452Hz to 6,000Hz band. There are two types of vibrating wire sensor modules: VL1(for 1 channel) and VL4(for 4 channels), and all vibrating wire sensors such as vibrating wire load cell, inclinometer, strain gage, crackmeter, jointmeter, rebar stress meter, settlement gage and etc. are applicable.



[Digital multi-point inclinometer module]

The digital multi-point inclinometer module is manufactured exclusively for our company's model 4491 digital multi-point inclinometer. Only ML1(for 1 channel) is manufactured, and up to 60ea of 4491 sensor can be connected.



[Gateway]

It is used by configuring multiple sensor modules and a local network, and performs the function of receiving measurement data from sensor modules through LoRa wireless communication and transmitting it to the network server.

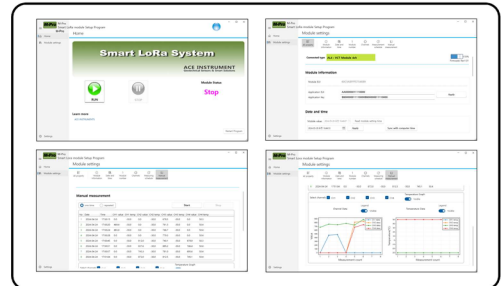
Connect the Ethernet LAN port directly to the gateway or connect a wireless modem to form an Internet network, and send and receive data using the MQTT communication protocol with the network server.



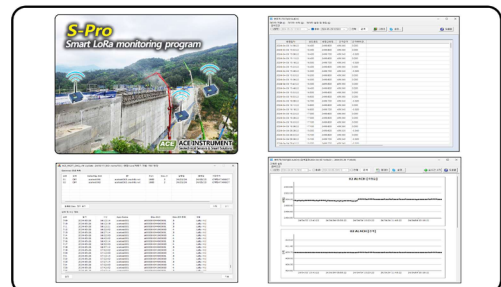
Operation program and server program

The Smart Roller system uses two programs to acquire data and configure a monitoring system.

The first is **M-Pro**, a PC operation program used in the field. After installing the sensor module, connect the sensor cable and set the measurement cycle, range, gateway and communication configuration.



The second is **S-Pro**, an Internet-based program that uploads data transmitted to the gateway to a network server and allows users to check the data in real time on a monitoring PC.



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Specification

Model	Analog sensor module		VW sensor module		Digital multi-point inclinometer module	
	AL1	AL4	VL1	VL4	ML1	
Applied sensor	mV sensor, mA sensor		VW sensor		Digital multi-point inclinometer (Model 4491)	
Applied channel	1 Ch	4 Ch	1 Ch	4 Ch	1 Ch	
Power source	DC 3.6V 19000mA (D-size) Lithium battery (standard) DC 3.6V 1000mA Rechargeable Li-ion battery & 2W 6V solar-cell (optional)					
Output voltage	DC 5V, DC 12V		-			
Operating temperature	-20~70°C					
Use time (1 hour interval reading)	5 Years	3 Years	5 Years	3 Years	1 Years (Depend on sensor quantities)	
Range	mV sensor	-5000~5000mV	VW sensor	-0.45~6.0kHz	Tilt sensor	-30~+30°
	mA sensor	-4~20mA	Temp. sensor	-50~150°C	Temp. sensor	-50~150°C
	Temp. sensor	-50~150°C				
Accuracy	±0.05%FSR					
Resolution	0.1mV, 0.001mA		0.1Hz		0.001°	
Gateway communication method	LoRaWAN local network					
Gateway communication distance	City area : average 1km, Open area : Max. 6km					
Dimensions	140 × 100 × 55mm					
Material	Nylon+Glassfiber plastic case					
Weight	200g					

[The gateway communication distance is based on an antenna of 8dBi or higher and may vary depending on the performance of the antenna used]

Gateway specification

Model	LGW (WisGate)
Communication channel	8 Ch
Connect quantity of sensor module	Max. 216 Nos
Communication frequency	EU868/CN470/US915/AS923/AU915/IN865/KR920
Sensitivity / Output	RX Sensitivity : -239dBm(Min), TX Power : 27dBm(Max)
Communication protocol	LoRaWAN Protocol
Ethernet	RJ45(10/100M) (with PoE)
Antenna	LoRa : RP-SMA female connector
Power	DC12V-1A(PoE(IEEE 802.2 af), 36~57VDC)
Dimensions	166 × 127 × 36mm
Material	ABS plastic case
Weight	300g

[The gateway is exclusively for RAK' s LoRa communication and can be prepared and used by the user]

[Digital multi-point inclinometer module]

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Smart LoRa system composition example

