**KENKUL-LoRa Sensor Networks**

**KENKUL-LoRa**
LoRa wireless sensor network system Combination: LoRa Sensor Device, LoRa-Gateway and Software. LoRa Sensor Device supply sensor's working power, and provide multiple signal input, active push data to LoRa-Gateway, the host computer can using LoRa-Gateway with interface such as RS232/485 or USB port connecting with LoRa Sensor Device easily.

**Application**
Geotechnical / Environmental Industry
Home automation
Agriculture
Construction / Bridge
Danger zone measurement
Discard area measurement

**Kenkul LoRa Network Topologies**
KENKUL LoRa use star network support up to 15 km (LOS) for wireless measurement.

**Feature**
Low cost
Low power consumption
High resolution A/D
Multiple signal input
Multiple functions configurable
Long life internal battery (Option)
Long distance and high penetrating transmission
KENKUL LoRa System Structure

| healthcare | LoRa | Configure / Test Software
| healthcare | LoRa | Free Protocol
| healthcare | LoRa | Customized Data base

KENKUL LoRa-AI
- 2 ch +/-5V Analog input
- 1 ch Rain Gauge input
- 1 ch 3K Thermistor input
- USB/Solar charge controller
- Internal 3Ah LiFePO4 Battery

KENKUL LoRa-SG
- Coming soon...
- 1 ch Rain Gauge input
- 1 ch 3K Thermistor input
- USB/Solar charge controller
- Internal 3Ah LiFePO4 Battery

KENKUL LoRa-2VW
- Coming soon...
- 2 ch 3K Thermistor input
- USB/Solar charge controller
- Internal 3Ah LiFePO4 Battery

KENKUL LoRa-Gateway (Data Logger)

Active Push Data
15 km(LOS) Transmission / Star Network

Passive Data Transmission

+/-5VDC / Full Bridge Strain Gauge / Rain Gauge / 3K Thermistor
DC LVDT Sensor / Vibrating Wire Sensor Signal Input

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# KENKUL LoRa-AI (Analog Input) Specification

## Analog sensor Input
- **Number of channels**: 2 differential channels
- **Input ranges**: ±5 V
- **ADC resolution**: 0.0001 VDC
- **ADC accuracy**: 16 Bit

## Rain gauge sensor Input
- **Number of channel**: 1 channel

## Thermistor sensor Input
- **Number of channel**: 1 channel (2 wires)
- **Temperature range**: 3K Thermistor

## Sensor power support
- **Voltage Output Maximum (100 mA)**: 5.0 VDC

## Wireless characteristics
- **Chipset**: Semtech SX 1276
- **RF data rate**: 250 kbit/s
- **Frequency band**: 902 ~ 928 MHz
- **Channels**: 27
- **TX Power**: 2/4/6/8/10/12/14/16/18/20 dBm
- **Antenna (Standard)**: 2 dBi
- **Transmission Range (LOS)**: Up to 15 km

## Internal battery power
- **Type**: 3.3V LiFePO4 3200mAh
- **Voltage range**: 3.0 ~ 3.6 V

## Power consumption
- **Idle**: 20uA@3.3 VDC (Support with 10mA sensor)
- **Work**: <20mA@3.3 VDC (Support with 10mA sensor)

## Battery life
- **1 min sample interval (with Sensor)**: Up to 2 month (1 x 3.3V 3200mAh LiFePO4 Battery)

## External power charge
- **USB**: 5 V
- **Solar power**: 5 V (Max. 6.5 V Input)

## Physical characteristics
- **Dimensions (Not include Antenna)**: 118 x 40 x 140 mm
LENKUL LoRa-SG(Strain Gauge Input) Specification

Coming soon...
KENKUL LoRa-VW (Vibrating Wire Input) Specification

Coming soon...
# KENKUL LoRa-Gateway (Data logger) Specification

## Wireless characteristics

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<table>
<thead>
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<tbody>
<tr>
<td>Chipset</td>
<td>Semtech SX 1276</td>
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<tr>
<td>RF data rate</td>
<td>250 kbit/s</td>
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<tr>
<td>Frequency band</td>
<td>902 ~ 928 MHz</td>
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<tr>
<td>Channels</td>
<td>27</td>
</tr>
<tr>
<td>TX Power</td>
<td>20dBm</td>
</tr>
<tr>
<td>Wireless sensitivity</td>
<td>-144 dBm</td>
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## USB, RS-232/485 Serial Port

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<tbody>
<tr>
<td>Baud rate (Default)</td>
<td>9600 bps</td>
</tr>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
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<tr>
<td>Parity</td>
<td>None</td>
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## Handle memory

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<tr>
<td>Max. handle LoRa Sensor Device</td>
<td>48</td>
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<tr>
<td>Active push data</td>
<td>No</td>
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## Datalogger

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<tr>
<td>Full 48 LoRa Sensor Device Storage Capacity (Arrays)</td>
<td>16000</td>
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<tr>
<td>Real Time Clock</td>
<td>Yes</td>
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## Power requirements

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Power supply</td>
<td>9 to 35 V</td>
</tr>
<tr>
<td>Idle</td>
<td>36mA@12 VDC</td>
</tr>
<tr>
<td>Work</td>
<td>40mA@12 VDC</td>
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</table>

## Physical characteristics

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<tr>
<td>Dimensions (Not include Antenna)</td>
<td>148 x 30 x 110 mm</td>
</tr>
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</table>
KENKUL LoRa Outdoor option accessory

IP65 BOX with 5V(600mA) Solar panel kits (include stainless mount, WSN module space inside)

Antenna Cable Assembly

Directional Antenna
KENKUL LoRa Sensor Device (Station)

IP65 BOX with 5V(600mA) Solar panel kits (include stainless mount)

LoRa/LoRaWAN sensor device
2~15km* Wireless transmission
5V 600mA Solar panel
3Ah LiFePO4 Battery

Option input sensors:
- Rain gauge
- Temperature
- Tiltment
- Load Cell
- Displacement sensor
- Ground water level
- Piezometer
- Soil moisture
- PM2.5 Dust sensor
- Ultrasonic water level sensor

Battery kits (option high capacity battery)

LoRa / LoRaWAN Station
sensor device inside

2~15km* Wireless transmission
Over 2 Years battery** life
@ 2 Minute transmits

Option input sensors:
- Rain gauge
- Temperature
- Tiltment
- Load Cell
- Displacement sensor
- Ground water level
- Piezometer
- Soil moisture
- PM2.5 Dust sensor
- Ultrasonic water level sensor

* Wireless transmission base on LoRa/LoRaWAN Gateway between sensor device LOS status
** Option high capacity battery for use