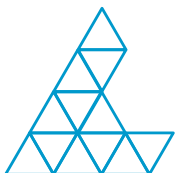


**KENKUL**

**Multi-Band GNSS-RTK  
Plus LoRa-IoT Sensing**



[www.kenkul.com.tw](http://www.kenkul.com.tw)  
[www.kenkul.weebly.com](http://www.kenkul.weebly.com)



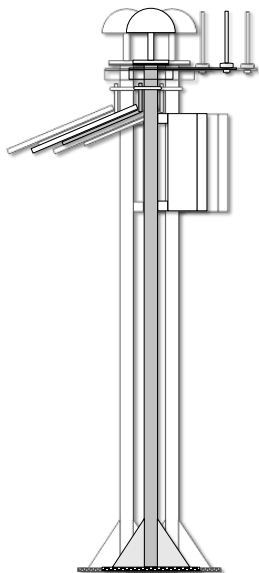
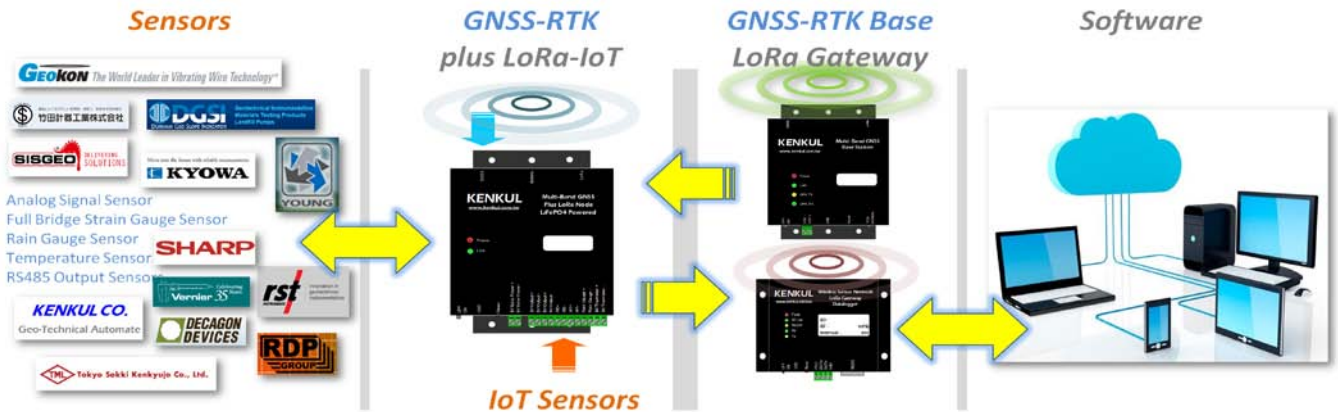
## Application

- Land sliding monitoring
- Dam monitoring
- Road, bridge and railways monitoring
- Embankments monitoring
- Landfills monitoring
- Construction attitude

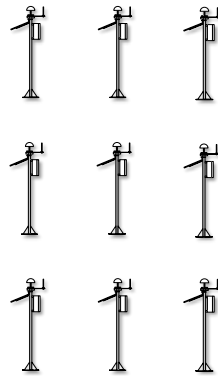


## Feature

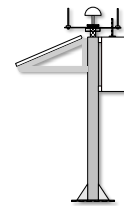
- GNSS-RTK plus LoRa-IoT sensing combo module
- Multi-Band GNSS, Quad-GNSS
- mm level GNSS-RTK accuracy
- Up to 9 GNSS-Rover connected to 1 GNSS-Base
- LoRa-IoT system for most sensing



10 mm Accuracy



9 Rover(Max.)



1 Base



# Specifications

## GNSS-RTK Rover

### Receiver Type

230 channel	Phoenix GNSS engine
GPS / QZSS	L1/L2C
BeiDou	B1I/B2I
Galileo	E1/E5b
GLONASS	L1OF/L2OF

### Accuracy

Position	1.5 m CEP(autonomous mode) 10 mm + 1ppm(RTK mode)
Velocity	0.05 m/sec *1
Time	12 ns
Moving Base Heading	0.13 degree*2

### Time to First Fix

- 1 second hot-start under open sky (average)
- 28 second warm-start under open sky (average)
- 29 second cold-start under open sky (average)

### RTK Convergence

< 10 sec

### Reacquisition

1 s

### Update Rate

- RTK 1 / 2 / 4 / 5 / 8 / 10 Hz
- Raw 1 / 2 / 4 / 5 / 8 / 10 / 20 Hz
- Moving Base RTK 1 / 2 / 4 / 5 / 8 Hz

### Operational Limits

Altitude < 80,000 m and velocity

### Protocol

- NMEA-0183 V4.1
- GGA, GLL, GSA, GSV, RMC, VTG
- RTCM 3.x or raw binary data

### Datum

- Default WGS-84 and user defin able in stand-alone mode
- Depends on base reference frame when in RTK mode

\*1:50% @ 30 m/s for dynamic operation

\*2: (1-sigma) heading accuracy using 1 meter base line



## GNSS-RTK plus LoRa-IoT sensing

### 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
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### 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
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### LoRa Wireless characteristics

Chipset	Semtech™ LoRa SX1276
RF data rate	250 kbit/s
Frequency band	902 ~ 928 MHz
Channels	27
TX Power	2/4/6/8/10/12/14/16dBm,20dBm
Antenna (Standard)	2 dBi
Transmission Range (LOS)	Up to 15 km

## GNSS-RTK plus LoRa-IoT System power

### GNSS-RTK Rover battery power

Type	3.3V LiFePO4 45(80)Ah*1
Voltage range	3.0 ~ 3.6 V

### Power consumption (Support with 10mA sensor+GNSS)

Idle	20uA@3.3 VDC
Work	<200mA@3.3 VDC

### Battery life (1 x 3.3V 45Ah LiFePO4 Battery)

10 min sample interval(with GNSS Sensor)	Up to 14 day(45Ah)
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### External power charge

USB	5 V
Solar power	6 V (Max. 8.5 V Input) 15W

## GNSS-RTK plus LoRa-IoT System physical

### Solar panel

Dimensions	350 x 350 x 17 mm
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### Post

Dimensions	1.5" x 1700 mm
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### Enclosure

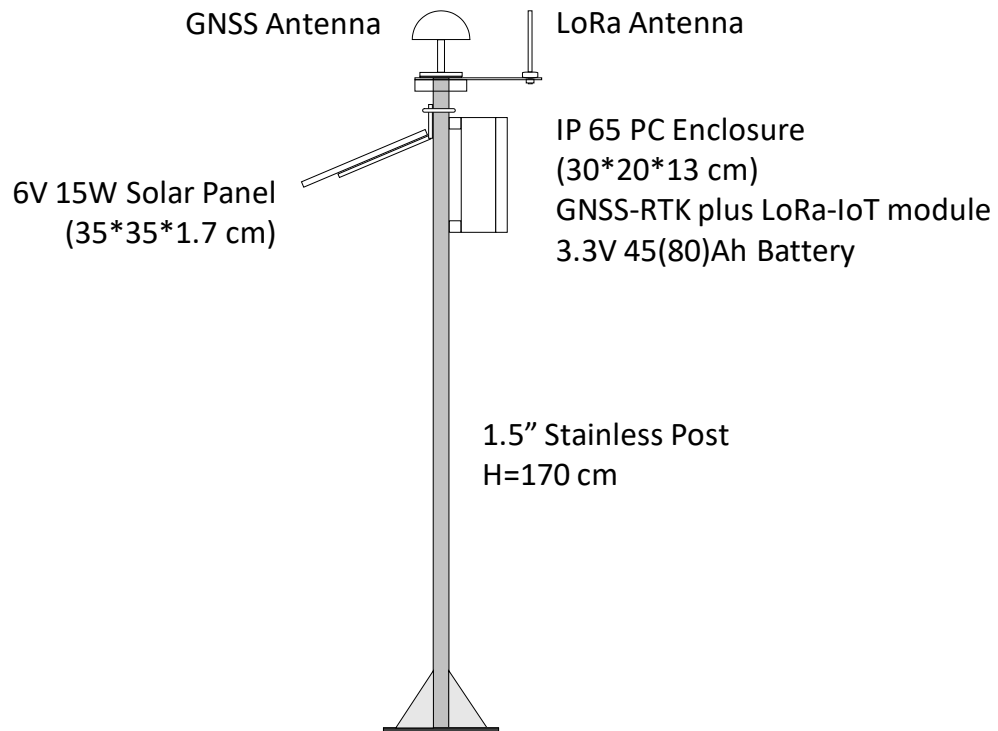
Dimensions	300 x 200 x 130 mm *2
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\*1:Option by order

\*2:Change without notice



## GNSS-RTK plus LoRa-IoT sensing (Rover)



## GNSS-RTK Base Module

### Receiver Type

230 channel	Phoenix GNSS engine
GPS / QZSS	L1/L2C
BeiDou	B1I/B2I
Galileo	E1/E5b
GLONASS	L1OF/L2OF

### Accuracy

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Time	12 ns
Moving Base Heading	0.13 degree*2

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< 10 sec

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1 s

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### Operational Limits

Altitude < 80,000 m and velocity

### Protocol

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- GGA, GLL, GSA, GSV, RMC, VTG
- RTCM 3.x or raw binary data

### Datum

- Default WGS-84 and user defin able in stand-alone mode
- Depends on base reference frame when in RTK mode

\*1:50% @ 30 m/s for dynamic operation

\*2: (1-sigma) heading accuracy using 1 meter base line



## GNSS-RTK plus LoRa-IoT Gateway

### Wireless characteristics

Chipset	Semtech™ LoRa SX1276
RF data rate	250 kbit/s
Frequency band	902 ~ 928 MHz
Channels	27
TX Power	20dBm
Wireless sensitivity	-144 dBm

### USB,RS-232/485 Serial Port

Baud rate (Default)	9600 bps
Data bits	8
Stop bits	1
Parity	None

### Handle memory

Max. handle GNSS-RTK plus LoRa IoT node	9
Active push data	No

### Datalogger

Full 9 GNSS-RTK plus LoRa Storage Capacity	16000
Real Time Clock	Yes

### Power requirements

Power supply	9 to 35 V
Idle	36mA@12 VDC
Work	40mA@12 VDC

### Physical characteristics

Dimensions (Not include Antenna)	148 x 30 x 110 mm
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### 4G Modem power consumption

Working States	Power Consumption
Communication	95~165mA@12VDC
Standby	40~50mA@12VDC
Sleep	5mA@12VDC





## GNSS-RTK plus LoRa-IoT Gateway system power

### Battery life (1 x 12V 52Ah 12V Battery)

5 min sample interval(with GNSS-RTK)	Up to 7 day(52Ah)*1
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### External power charge

Solar power	12 V 160W
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## GNSS-RTK plus LoRa-IoT Gateway system physical

### Solar pannel

Dimensions	1474 x 660 x 35 mm
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### Post

Dimensions	100*100 x 1700 mm
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### Enclosure

Dimensions	500 x 400 x 250 mm*2
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\*1:Option order 100Ah

\*2:Change without notice



## GNSS-RTK + LoRa-IoT Gateway (Base)

