GR-9028, BLE5, L1/L2 GNSS Portable RTK Base w/ Button & Rechargeable Battery



Overview

Many people suffered not able to find a suitable RTK base/caster at their working locations. No more such availability issue, just bring a GR-9028 to wherever your working place is to serve as a RTK base. GR-9028 is a portable cm-level high-precision RTK base which allows dynamic moving, easy setup, and flexible configuration.

It is based on **u-blox ZED-F9P** dual-band GNSS receiver, integrated with dual-band GNSS antenna, BLE5 module & antenna, rechargeable battery, charging circuit, charging via USB-type C interface, and power switch making it a self-contained portable RTK base.

APP **BLERTK** for both iOS and Android are available for RTK base configuration.

iOS Android

Devices like smartphones, pads, notebooks etc. could communicate with GR-9028 via BLE to get the RTCM RTK correction data. Depending on demand, budget, and application environment limits, devices could then send the data either to their own SNIP caster, a free NTRIP caster such as RTK2go/ Emlid, or could just forward the correction data directly to its rover partner, GR-9029, via BLE without intervention of internet.

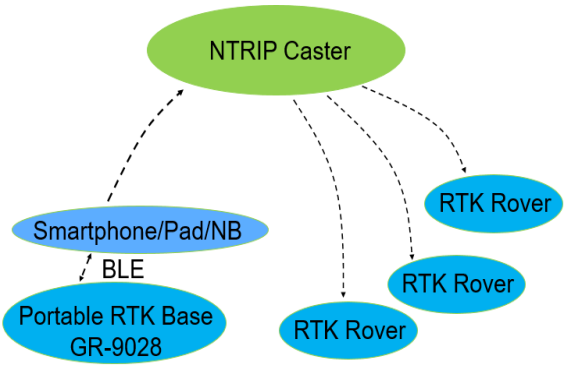
A control cable with button on it could be used to control power ON/OFF.

Applications

- Precise positioning
- Precise distance measurement
- Robotic navigation

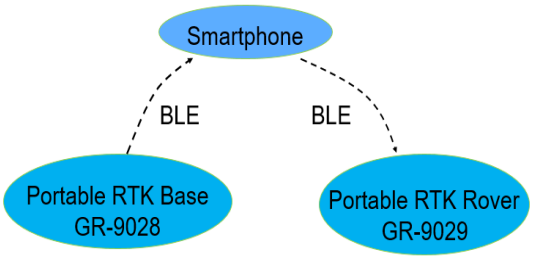
Features

- Dynamic moving - internet service is available, e.g.
  - Register a free base for GR-9028 on RTK2go
  - Bring GR-9028 to wherever a RTK base is needed, setup the RTK base with BLERTK.



  - RTK rovers receive NTRIP stream of the registered GR-9028 from RTK2go.
  - Physical test of 252Km between the registration and usage locations functions very well.
- Dynamic moving - internet service is unavailable
  - Bring GR-9028 to wherever a RTK base is needed, setup the RTK base with BLERTK.

NaviSys Technology Corp. https://www.navisys.com.tw/
Tel : +886-3-5632598 Fax: +886-3-5632597
Sales contact: sales@navisys.com.tw Technical support: service@navisys.com.tw
Address: 2F, No.56, Park Ave. II, Hsinchu Science Park, 30844, Taiwan (R.O.C.)



- Setup GR-9029 as a RTK rover with BLERTK.
- BLERTK forwards RTCM data from GR-9028 to GR-9029 RTK rover via BLE directly.

- Easy setup
  - GR-9028 would survey-in automatically as it is powered on.
  - Just a few steps of straight-forward setup is enough.
  - BLERTK receives RTCM data from GR-9028 and then forwards it to RTK2go or GR-9029.
  - The caster setting was kept internally so that it could be used directly next time.
- Flexible configuration
  - Survey-in criteria: accuracy, timing etc.
  - Easy switching between RTK2go/Emlid and GR-9029 via BLERTK.
- *Based on high-performance components*
  - *u-blox ZED-F9P dual-band GNSS*
  - *BLE5 module with antenna*
  - *Made in Japan rechargeable battery cell*
- *All in one small compact UFO style device*
  - *Disk with size of Φ116*24.6 (mm)*
- *Magnet mount option with a pedestal*
- *Supported GNSS Constellations*
  - *GPS: L1C/A, L2C*
  - *GLONASS: L1OF, L2OF*
  - *Galileo: E1-B/C, E5b*
  - *BeiDou (BDS): B1I, B2I*
- Supported Augmentation Systems
  - QZSS over L1 C/A, L2C, L1S
  - SBAS (WAAS, EGNOS, MSAS, GAGAN)
- *Accuracy survey-in down to* cm-level.
- High sensitivity+:-167dBm tracking/-148dBm acquisition
- RTCM 3.3 support
- **Spoofing detection / monitoring**
  - Multiple constellatins should be enabled.
- **Jamming / interference indicator**
  - For continuous wave (narrow-band) jammers/interference only
- BLE 5.2
  - Up to 2 Mbps
  - Advertising extensions
  - Channel Selection Algorithm #2 (CSA #2)
- Rechargeable battery
  - Lithium-ion, 900mAh
  - Charged by USB type-C connector
- A button on control cable for power switch
- LED to indicate working status

Technical Specifications

Receiver Performance Data+ - u-blox ZED-F9P

Supported GNSS Constellations	GPS/SBAS/QZSS: (MHz) L1 C/A (1575.42), L2C (1227.60) GLONASS: L1OF (1602+k*0.5625, k= -7,…,5,6), L2OF (1246+k*0.4375, k= -7,…,5,6), Galileo: E1-B/C (1575.42), E5b (1207.140) BeiDou: B1I (1561.098) B2I (1207.140)
Position Accuracy	Horizontal: RTK: 1 cm+1ppm CEP

NaviSys Technology Corp. https://www.navisys.com.tw/
Tel : +886-3-5632598 Fax: +886-3-5632597
Sales contact: sales@navisys.com.tw Technical support: service@navisys.com.tw
Address: 2F, No.56, Park Ave. II, Hsinchu Science Park, 30844, Taiwan (R.O.C.)

(RTK baseline up to 20km; 24 hours static)	SBAS: 1 m CEP PVT: 1.5 m CEP Vertical: (result with 1km baseline) RTK: 1 cm+1ppm R50
Velocity Accuracy	<0.05 m/s (speed) GPS+GLONASS/BDS <0.3° (heading) GPS+GLONASS/BDS (50% @ 30 m/s for dynamic operation)
Time Pulse Signal	0.25Hz...10MHz RMS: 30ns, 99%: 60ns
Time To First Fix (TTFF) Hot start Aided start Cold start	Autonomous (All at -130dBm) 2sec (GPS+Glonass+Galileo+BeiDou) 2sec (GPS+Glonass+Galileo+BeiDou) 25sec (GPS+Glonass+Galileo+BeiDou)
Sensitivity	GPS+Glonass+Galileo+BeiDou Acquisition: -148 dBm Reacquisition: -160 dBm Tracking & navigation: -167 dBm
Max. Update Rate RTK Convergence Time	a. GPS+Glonass+Galileo+BeiDou b. GPS+BeiDoui c. GPS RTK: 8Hz@a, 15Hz@b, 20Hz@c PVT: 10Hz@a, 25Hz@b, 25Hz@c RAW: 20Hz@a, 25Hz@b, 25Hz@c <10s@a&b, <30s@c Depends on atmospheric conditions, baseline length, GNSS antenna, multipath conditions, satellite visibility and geometry
Max. Altitude	50,000 m
Max. Velocity	500 m/s
Protocol Support Default	NMEA 0183 up to v 4.11, ASCII GGA, GLL, GSA, GSV, RMC, VTG, TXT UBX: u-blox proprietary, binary RTCM 3.3 messages output:

Settings	1005 (Stationary RTK reference station ARP) 1074 (GPS MSM4) 1077 (GPS MSM7) 1084 (GLONASS MSM4) 1087 (GLONASS MSM7) 1094 (Galileo MSM4) 1097 (Galileo MSM7) 1124 (BeiDou MSM4) 1127 (BeiDou MSM7) 1230 (GLONASS code-phase biases)
Augmentation System Support	QZSS: Support L1S SLAS Correction data broadcasted on L1 SBAS: WAAS, EGNOS, MSAS, GAGAN DGNSS: RTCM 10403.3 RTCM 3.3
Dynamics	< 4g

+ Note. According to IC Spec

BLE Data+ - nRF52832

Band	2.4 GHz ISM
Data Rate	2 Mbps and 1 Mbps Bluetooth LE
Output Power	Programmable: +4 to -20 dBm in 4 dB steps
Sensitivity	-96 dBm Bluetooth LE 1 Mbps -89 dBm Bluetooth LE 2 Mbps
RSSI	1 dB resolution
Link Budget	100 dB

Environmental Data

Operating temperature	-40 ~ 85℃ except battery: -10~60℃
Storage temperature	-40 ~ 85℃
Waterproof	IPX7

Mechanical Data:

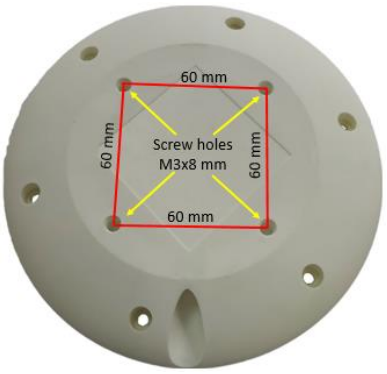
- Φ116*24.6 (mm) for disk without pedestal
- Φ116*56.8 (mm) for disk with pedestal

NaviSys Technology Corp. https://www.navisys.com.tw/
Tel : +886-3-5632598 Fax: +886-3-5632597
Sales contact: sales@navisys.com.tw Technical support: service@navisys.com.tw
Address: 2F, No.56, Park Ave. II, Hsinchu Science Park, 30844, Taiwan (R.O.C.)



- Magnet inside pedestal for fixing

- Fixing screw holes, bottom of disk:



- E.g. to fix the pedestal (magnets embedded) via screw holes (GR-9028Q).
- Mount GR-9028Q on a tripod.



- Control cable length is by default 70cm which could be customized based on MOQ.

Other Data (For Indicative Reference Only)

Working time	6 hours, fully charged new device
Charging time	1.5 hours with 2A charger
BLE distance	36m line of sight

Interface



- USB type-C connector for charging
- Button
  - Power on: a tapping for power on
  - Power off: hold until LED OFF

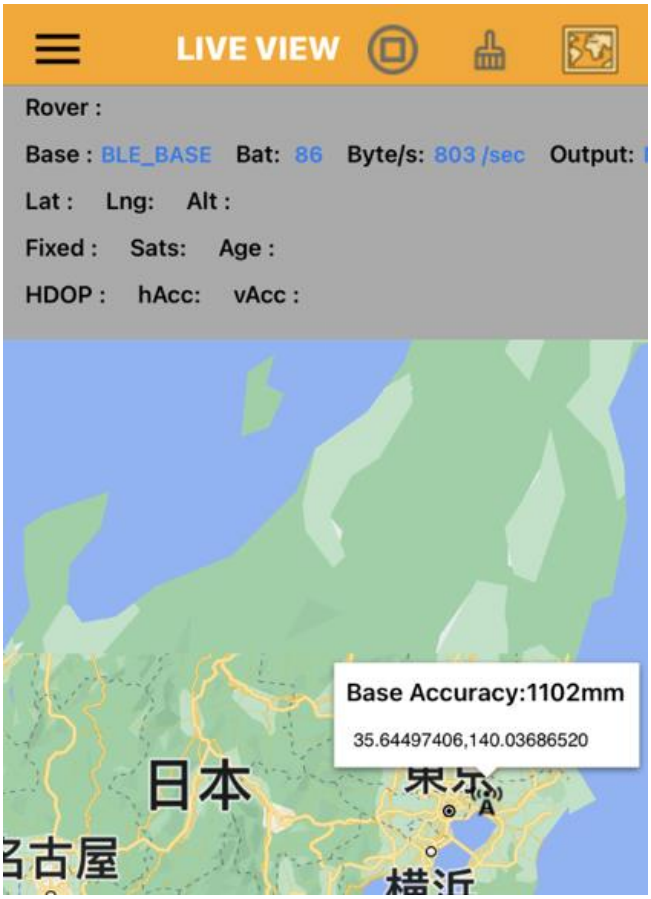
Portability Test

- Setup the caster of GR-9028 to the free rtk2go, in



Taiwan.

- Travel to Japan
- Tap the button to turn on GR-9028 and it starts survey-in process, connects to caster rtk2go automatically as shown below.



- It was verified that GR-9028 could be brought to where a RTK base is needed and starts to work quickly.

Ordering Information

GR-9028X:

X=	Pedestal
E	-
Q	V

*This document is subject to change without notice.