

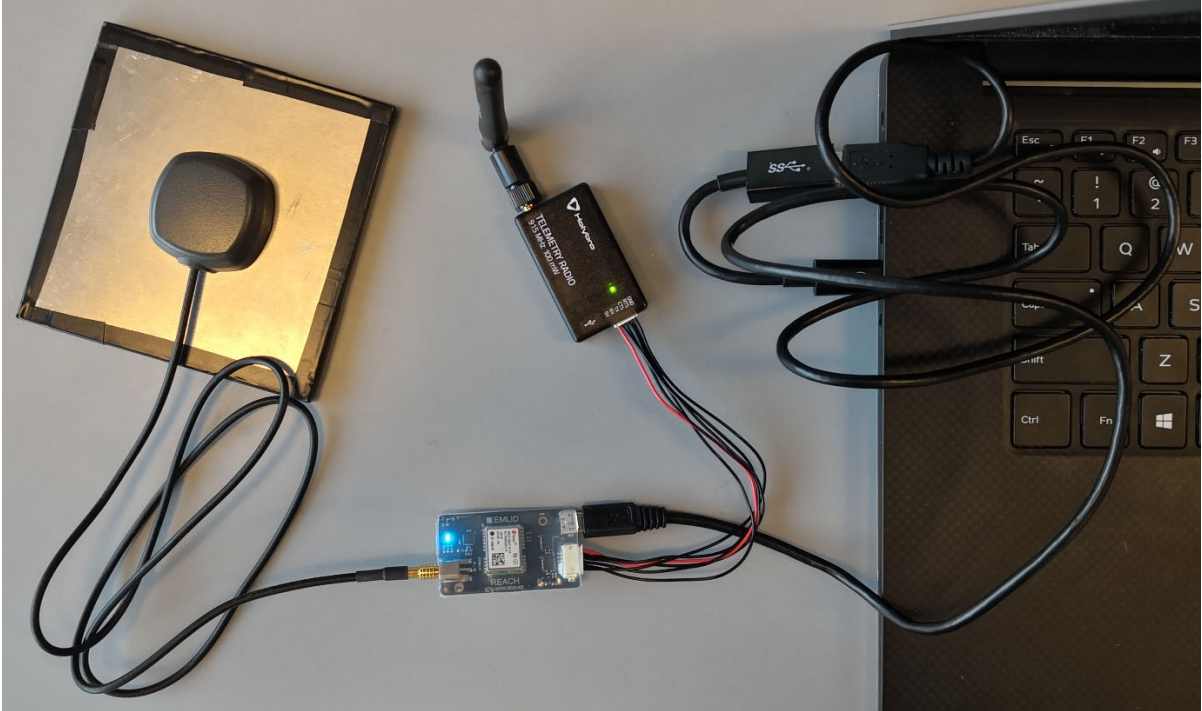
@ Instructions for setting up Emlid Reach RTK

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useful link: <https://docs.emlid.com/reach/>

## Setting up the RTK Rover:

1. All reach devices are equivalent, so pick one as rover and connect it to your laptop through USB port. Now, connect the radio and reach through UART. A red light will turn on when your rover is still initializing. If the radio boots up correctly, a blinking green light will take the place, indicating that it's searching for its paired radio. A fully connected gps rover should look like this:



**NOTE:** Some models of laptops constrain the power output of their USB ports (e.g. XPS-15), so check if your USB port can power up both reach and radio properly. If the voltage is too low, the red light will not turn green on the radio. **DO NOT** power up the reach and the radio separately and then connect them, it will damage the devices! Contact TA if you are having the power issue.

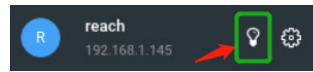
2. When reach is powered up properly (may take some time), it goes into hotspot mode (if no known Wi-Fi is detected) and broadcasts a hotspot named as **reach:xx:xx**. The default password is **emlidreach** (please don't change default name and password).
3. Once you connect to hotspot successfully, go to **http://192.168.42.1** in the browser. You will see a website showing the device's status.
4. On the device website, check if the software version is v2.16.2. If not, please contact TA. Here are some settings you want to check before saying hi to the cold wind in Boston. **Please refer to Appendix A for details.**

## Set up the RTK Base:

Now boot up the other reach as your rtk base. It's almost the same to rover gps, just that you don't have to use the USB port on your laptop as power source since you are not gathering any data from a rtk base. Similar to setting up a rtk rover, you need to connect to the hotspot of the device and check some configurations. **Details are in Appendix B.**

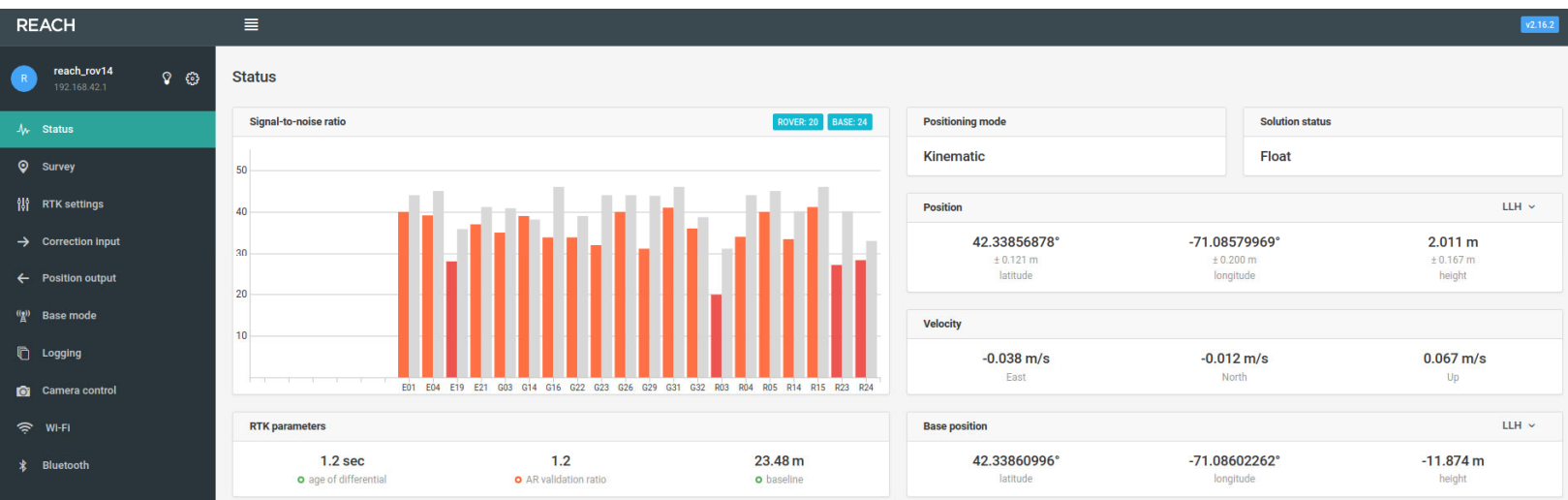
Tip: If you are confused by which device you are connecting to: click the light bulb on the main page (192.168.42.1) of the device, it will force the LED on the device to blink for a while,

so that you know whose Wi-Fi you are connecting to.



## Check the Connection between rover and base:

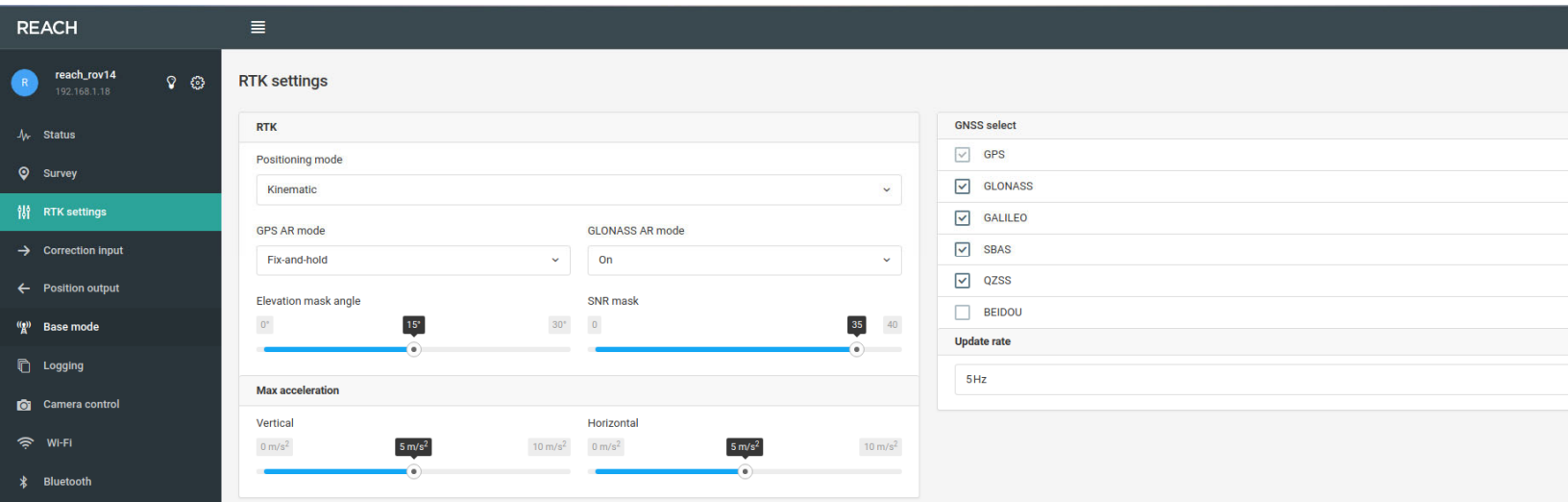
The connection between rover and base have to be tested in open space. If the rover is receiving data from the base, the state page from the rover should look like this:



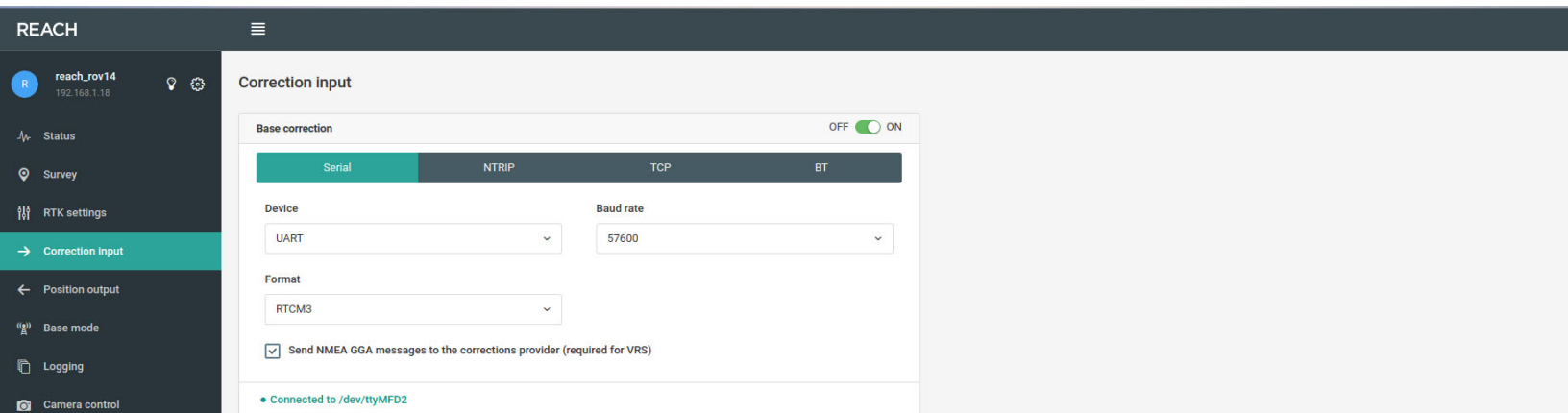
Notice that you can see the satellite information on the base side, too. The solution status turns usually from **single** -> **float** -> **fix**. Now open minicom in a terminal, you will be able to see the output similar to that in lab 1. When the base has finished accumulating its coordinate, the longitude and latitude values in GPGGA messages should be very stable. Usually, only the last two (occasionally three) digits change.

Congratulations, your rtk gps system is all set!

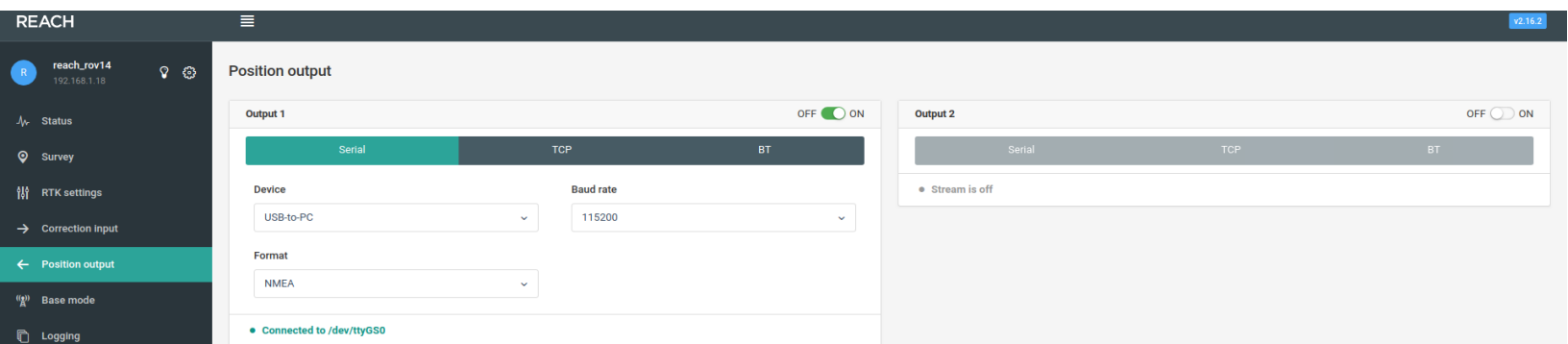
# Appendix A



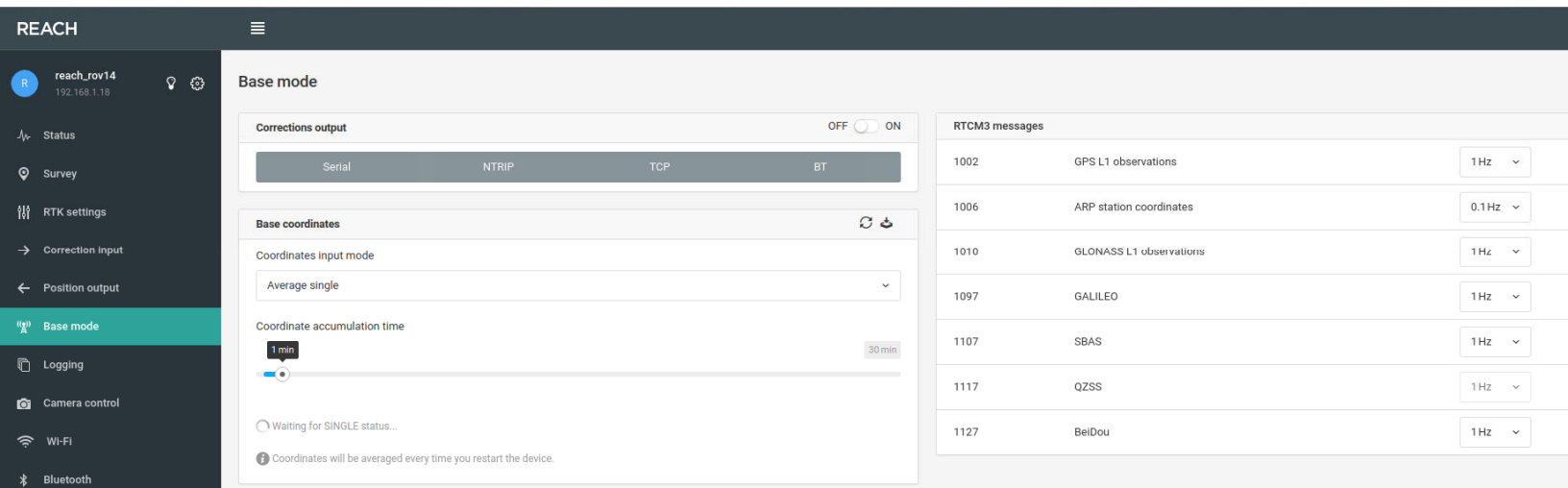
1. In **RTK Settings** tab, check as many GNSS systems as possible and set the update rate to 5 hz. Positioning mode should be set to Kinematic.



2. In **Correction Input** tab, you can configure how the rover get position error correction from the rtk base here. You are getting correction data through UART from radio, so please set it to Serial mode. All settings on this page should be the same as shown in the screenshot.

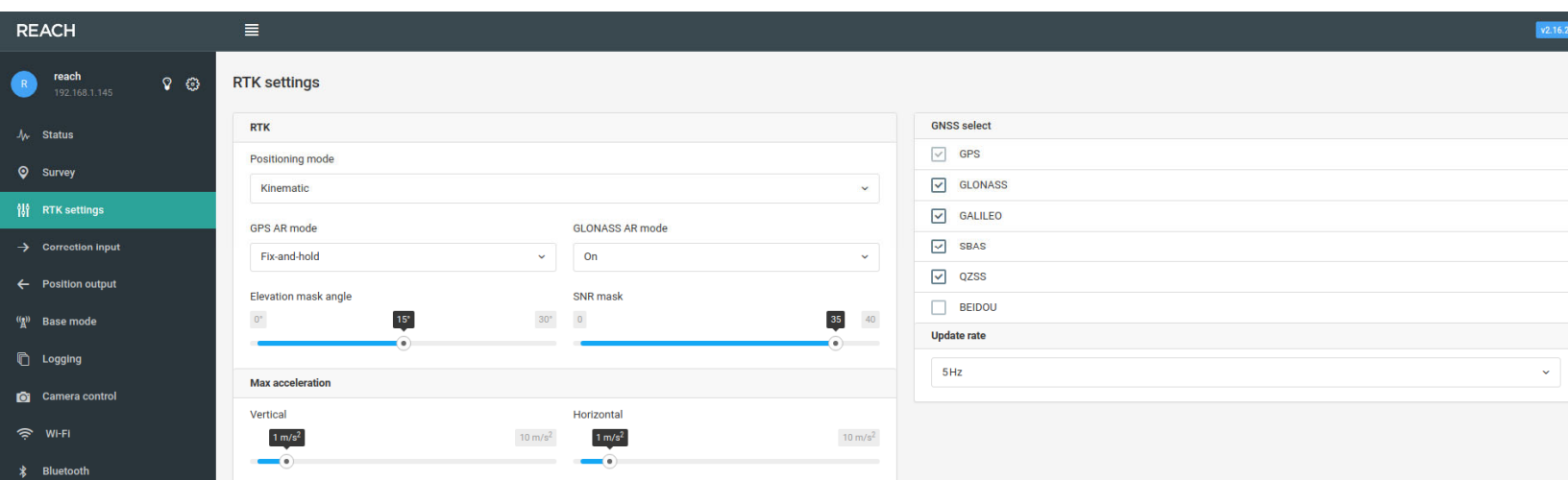


3. In the **Position output tab**, configure your rover to send data to your laptop through USB cable. The baud rate doesn't have to be 115200, but remember this setting as you are going to need it when reading data through serial in your code.

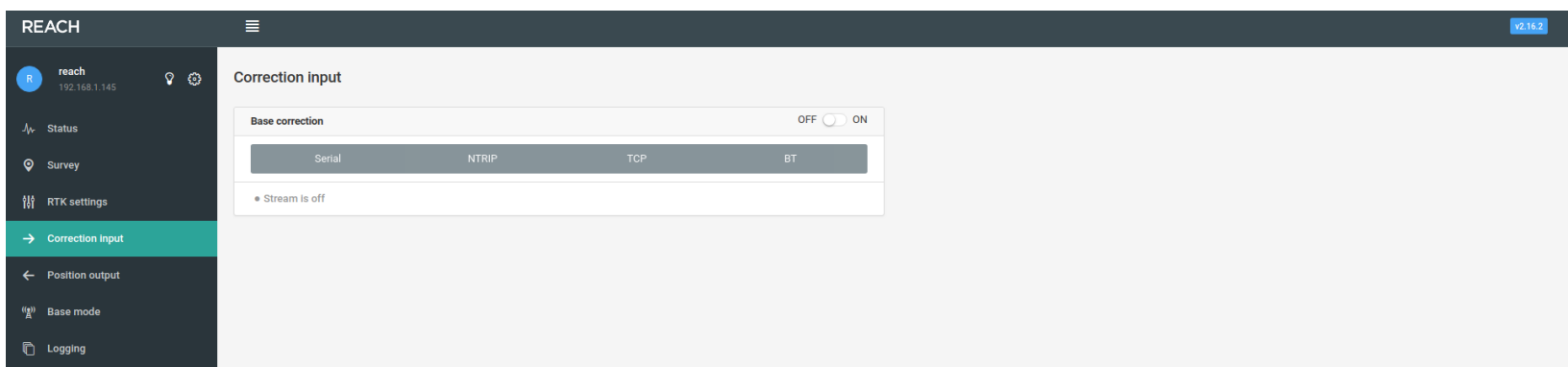


4. Turn off the base mode on the rover.
5. You may consider turning off the camera trigger and Bluetooth respectively in **Camera control tab** and **Bluetooth tab** to save some power.

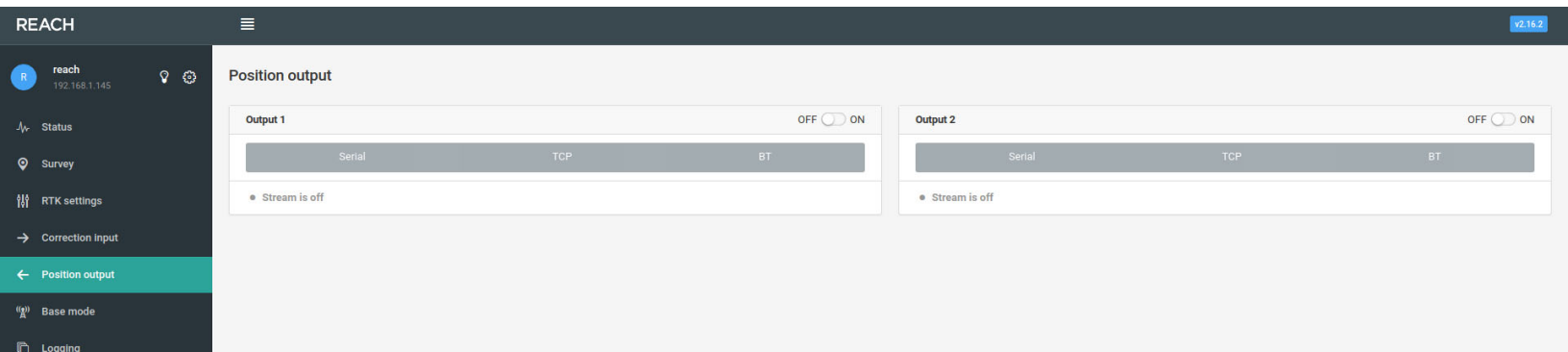
# Appendix B



1. RTK settings on base side follow the same rules of those on rover side.



2. Rtk base will send correction information to rovers, so it doesn't take any correction input.



3. We are not taking position data from rtk base, so turn position output off as well.

REACH

reach  
192.168.1.145

Status

Survey

RTK settings

Correction input

Position output

Base mode

Logging

Camera control

Wi-Fi

Bluetooth

Base mode

Corrections output

SerialNTRIPTCPBT

DeviceBaud rate

UART57600

Corrections output format is RTCM3

Base coordinates

Coordinates input mode

Average single

Coordinate accumulation time

0.1 min3 min30 min

Waiting for SINGLE status...

Coordinates will be averaged every time you restart the device.

RTCM3 messages

1002	GPS L1 observations	1 Hz	<input checked="" type="checkbox"/>
1006	ARP station coordinates	0.1 Hz	<input checked="" type="checkbox"/>
1010	GLONASS L1 observations	1 Hz	<input checked="" type="checkbox"/>
1097	GALILEO	1 Hz	<input checked="" type="checkbox"/>
1107	SBAS	1 Hz	<input checked="" type="checkbox"/>
1117	QZSS	1 Hz	<input checked="" type="checkbox"/>
1127	BeiDou	1 Hz	<input checked="" type="checkbox"/>

- The rtk base sends correction output to the radio through UART. Since the working baud rate of the radio is 57600, the baud rate of the rtk base should remain 57600, too. Coordinate accumulation time determines how much time the rtk base takes to calculate its current position. I recommend setting it to around 5 minutes, which should be sufficient for this lab.