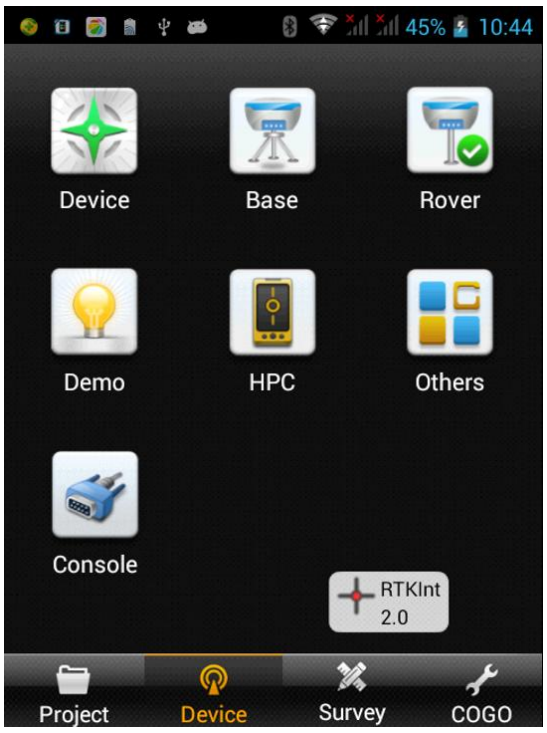
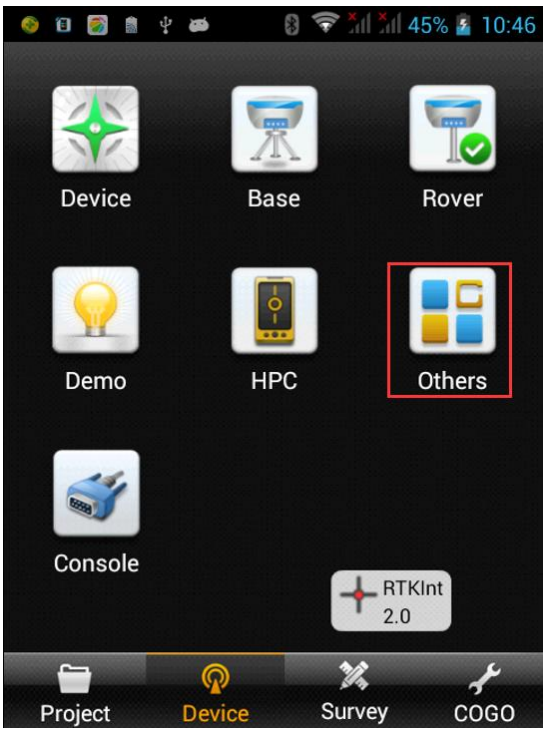
Tilt Survey Getting Started

1. Electronic bubble calibration

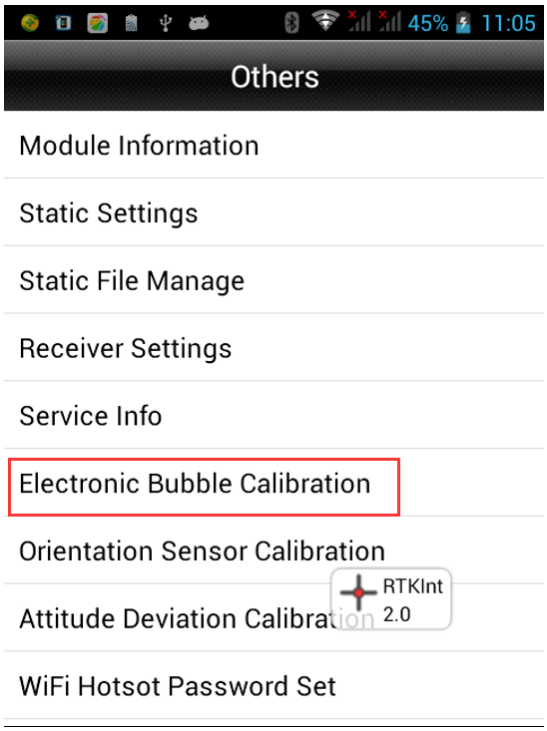
Before do a Tilt survey , please set Base and rover with UHF mode or GSM mode and connect rover with Hi-Survey OK.

(1)Connect V90 Plus(With Tilt survey function) as rover->Click “Others”



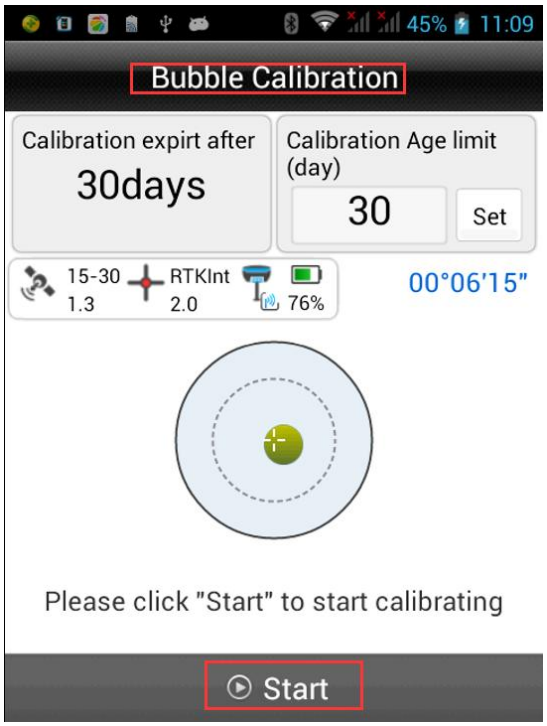


(2) Choose “Electronic bubble calibration”.

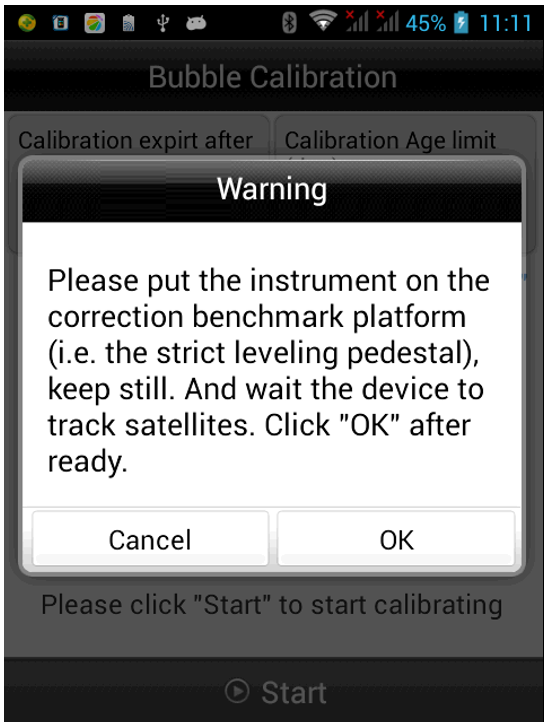
	Choose “Electronic bubble calibration”.

(3)Before you start calibration ,put the instrument on the tribrach and leveling strictly first(This step is necessary,no matter base or rover. If rover,leveling like that first then put it on the pole).

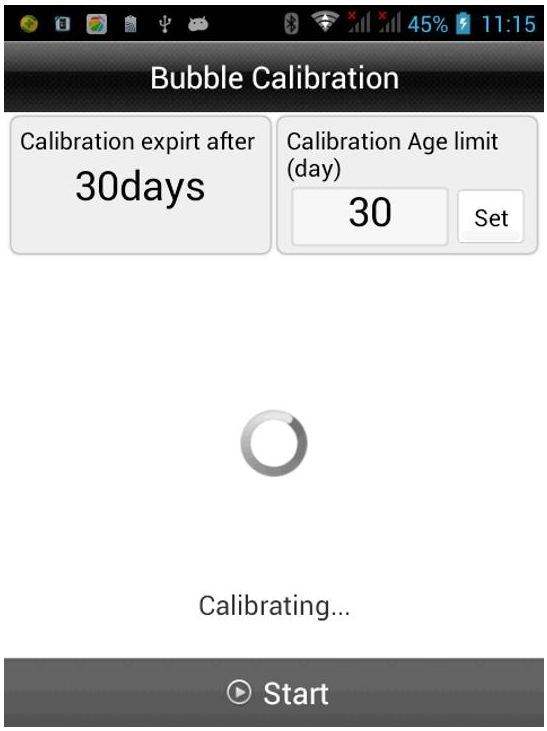
(4) Bubble calibration interface.



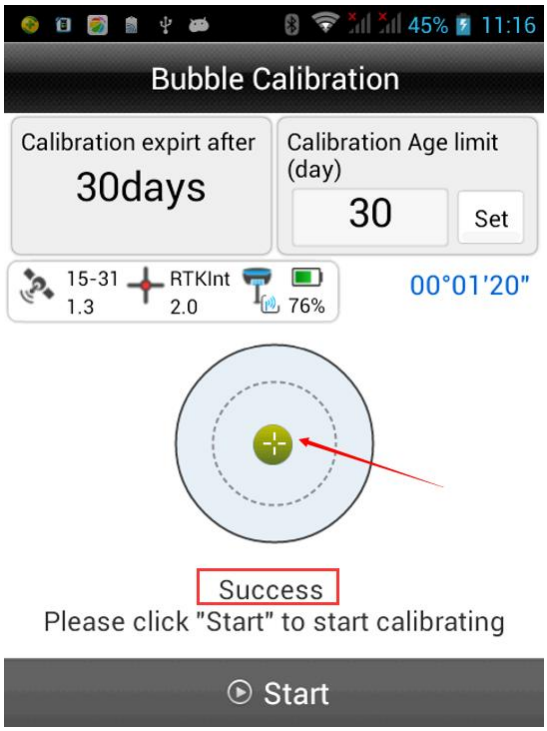
Click “Start”

	Here inform a message warning that whether the instrument is placed OK and tracked. If all ready please click”OK”

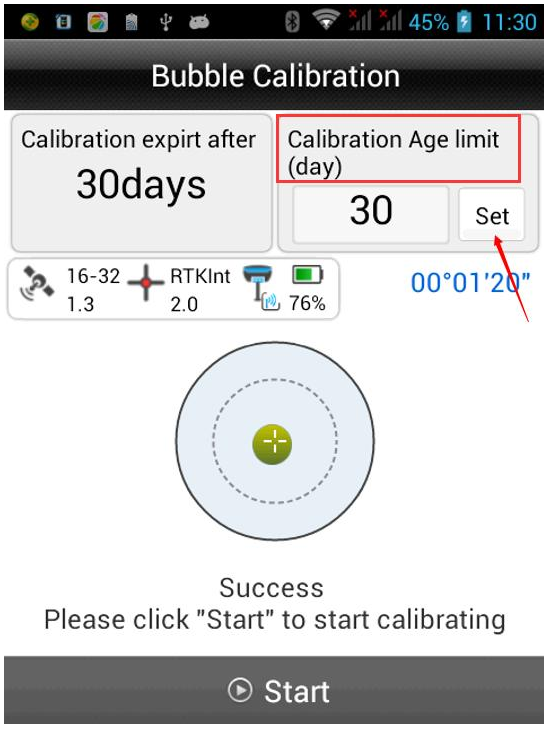
(5) Calibrating

	Calibrating

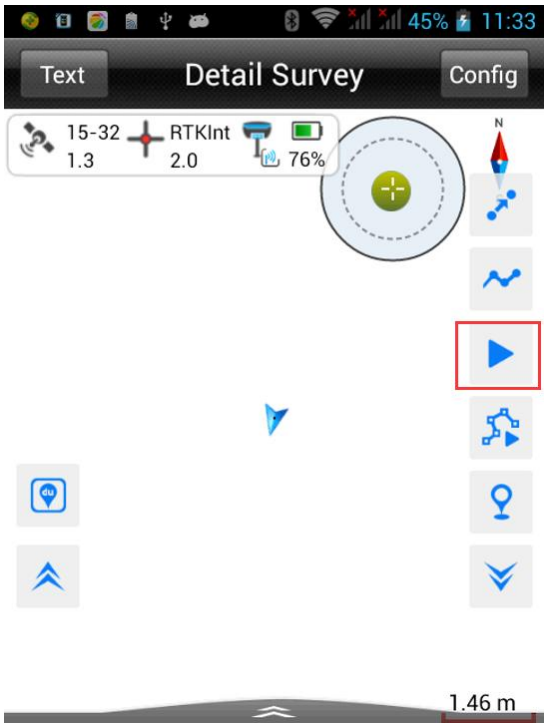
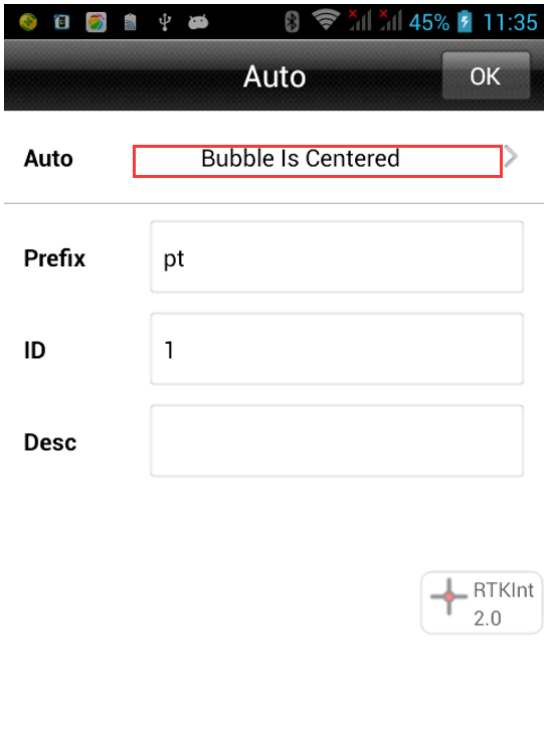
(6) Bubble calibrating success.

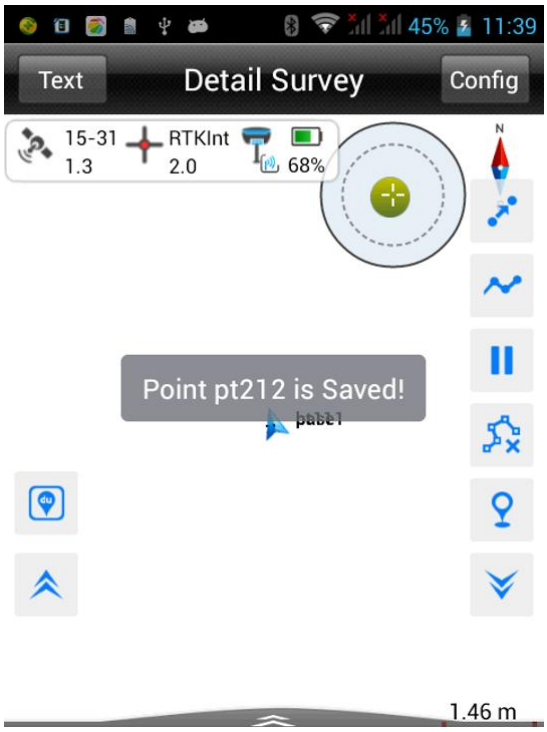
	Bubble calibration success. At this time **both electronic bubble** and the **pole bubble** are in center at the same time.

(7) Notice: Calibrate Age limit no longer than 30(day) will be better.

	Click"Set"for setting.

Auto collecting by "bubble is center":

	Go to survey interface and choose “Auto collect  ”
	Bubble Is Center chosen and click”OK” start collecting.

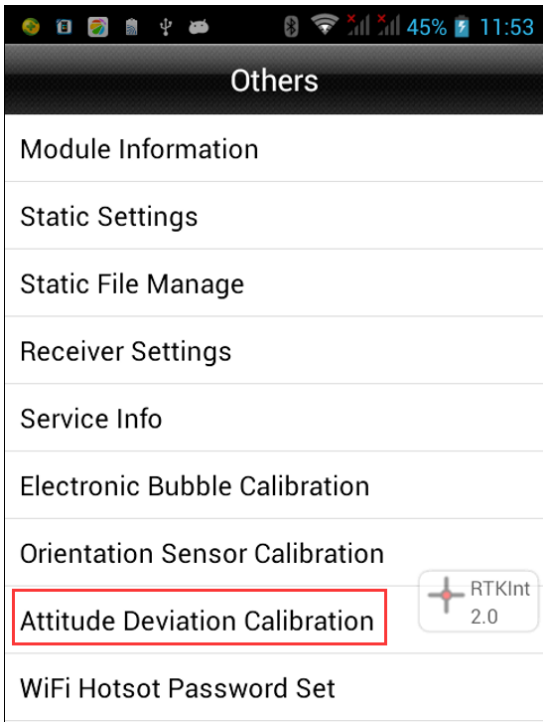
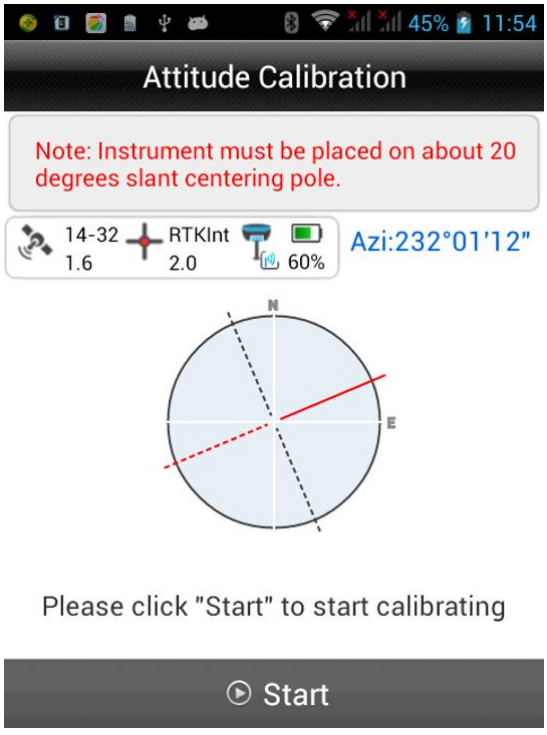
	When the electronic bubble is center it will auto collected(It is very convenient).

2. Tilt survey and its calibration process

2.1 Tilt survey module verification

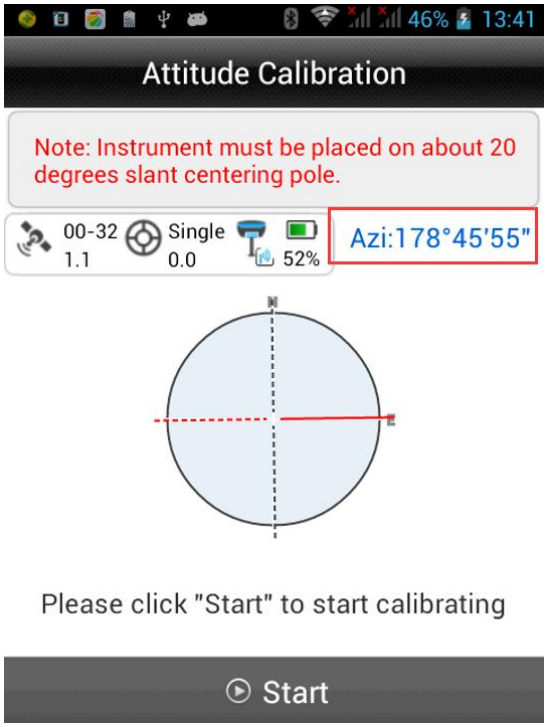
Due to the high sensitivity and direction sensor depends on the consistency of the magnetic field around the environment, in order to ensure the accuracy of measurement, the instrument Tilt survey module need to be verified before surveying.

(1) Open “Attitude Deviation Calibration” interface;

	Click”Others”->Open “Attitude Deviation Calibration
	Attitude Deviation Calibration interface

(2) Calibration method

① Put the device on the pole (about 20 degrees Tilt) and clockwise rotating itself for one circle at a slow speed. View azimuth changes at the top right corner.



Azimuth changes

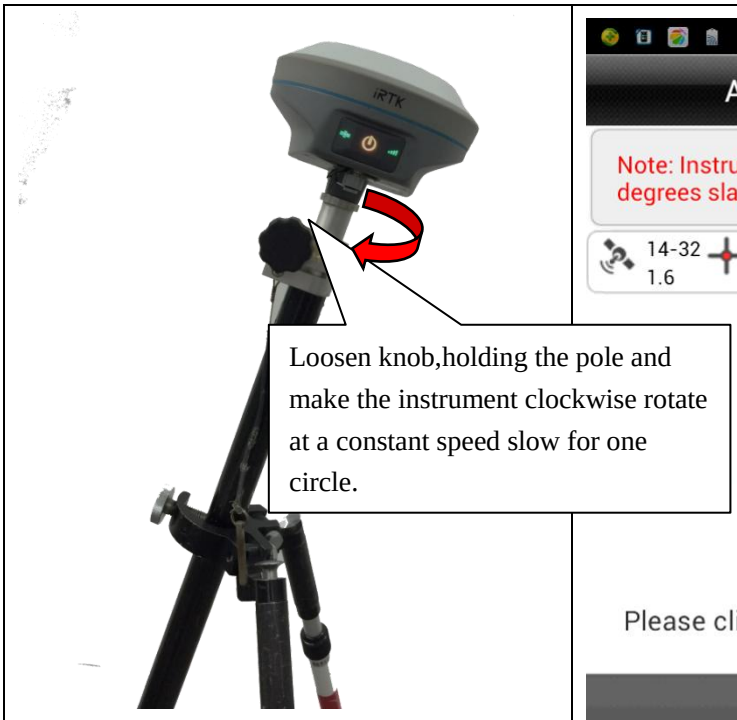
If maximum and the minimum difference **within 5°**, means module state is normal and can Tilt survey directly. Or must carry on the module calibration.

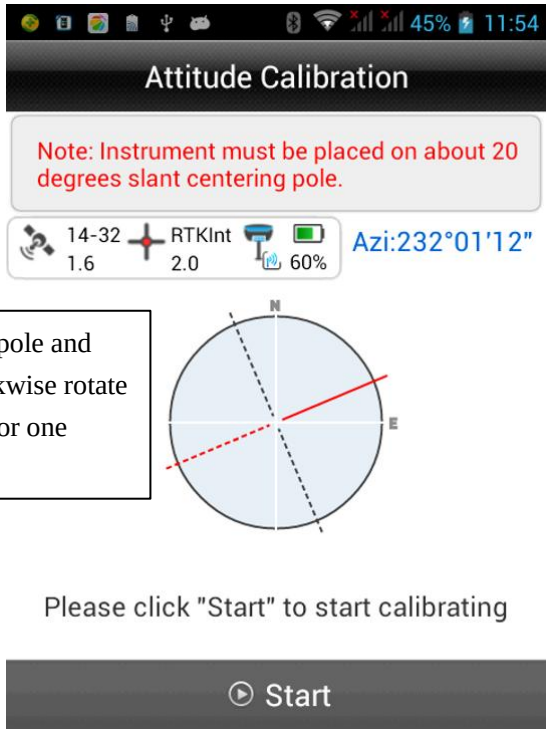
② How to rotate :

a. The pole position can't be moved;

b. Attitude calibration must rotate as clockwise;

c. About 2 ⁰/ s rotational speed, rotating **one circle takes about 3 min**;



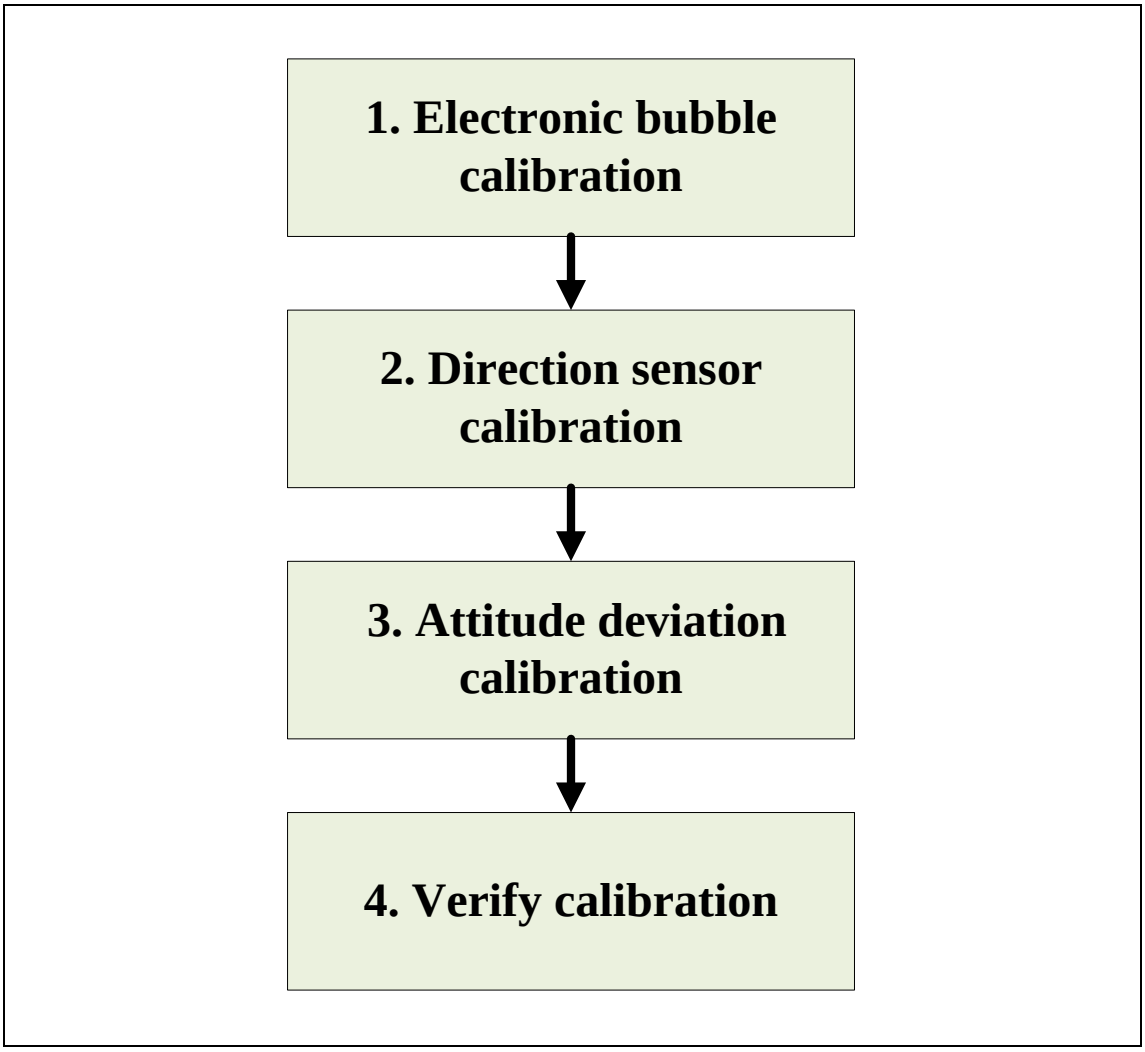


Note: When it need to calibrate?

- When change to new measurement area or the measurement area environment change a lot or there is a complex terrain with the measurement area, it need a verification with Tilt survey module.
- When use the Tilt survey for the first time, it need this calibration;
- When replace or change the battery calibration needed.

2.2 Tilt survey calibration

Whole calibration process including:



Note:

- Low magnetic disturbance environment, empty part of the surveyed area for calibration, not rooftop or high floor roof, etc.
- Calibration must under the external UHF mode(No internal UHF) to avoid the magnetic disturbance.
- Don’t change buttery in the whole calibration process.

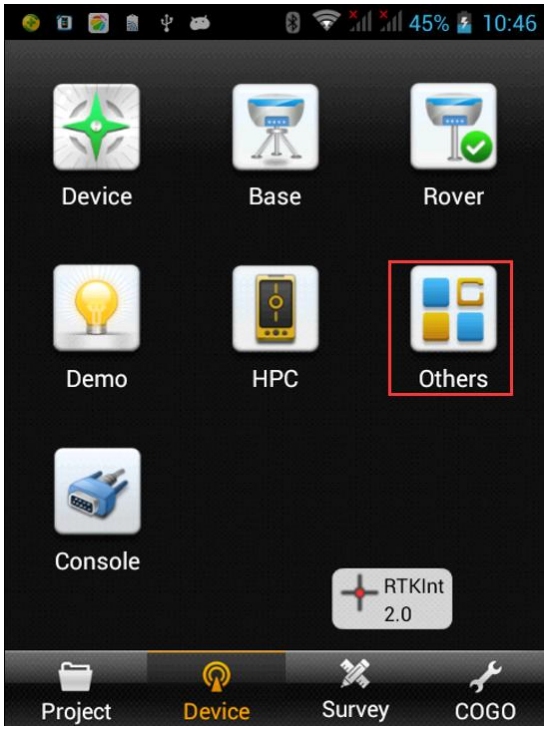
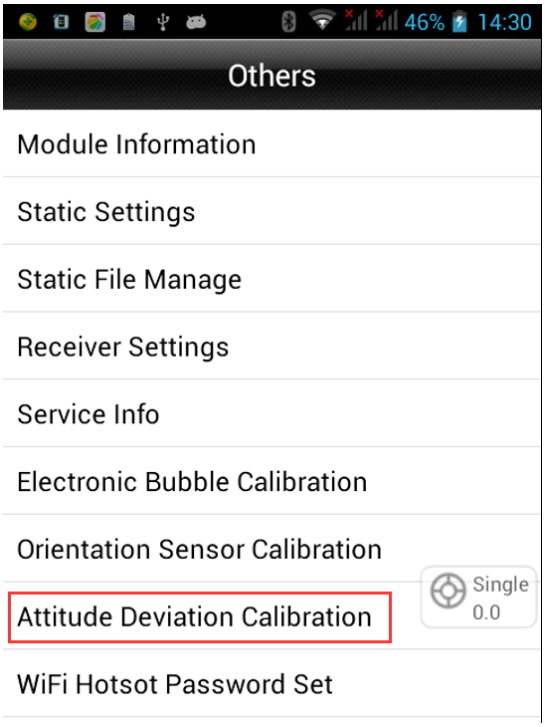
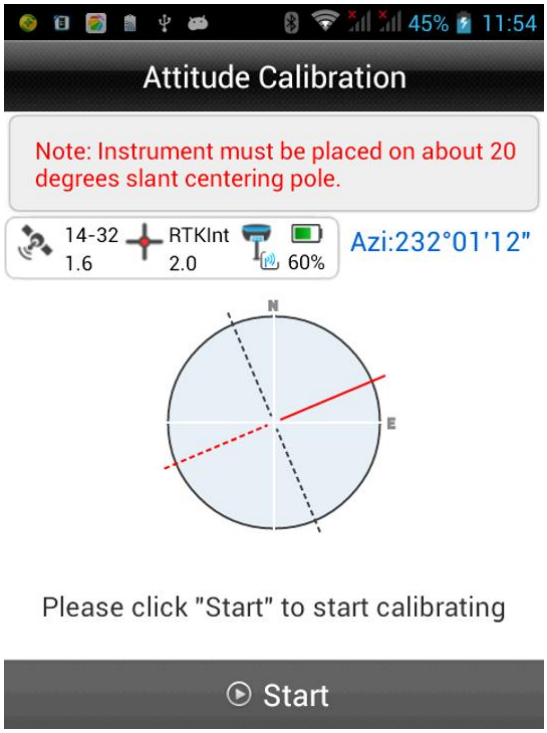
Operation Steps:

1. Electronic bubble calibration

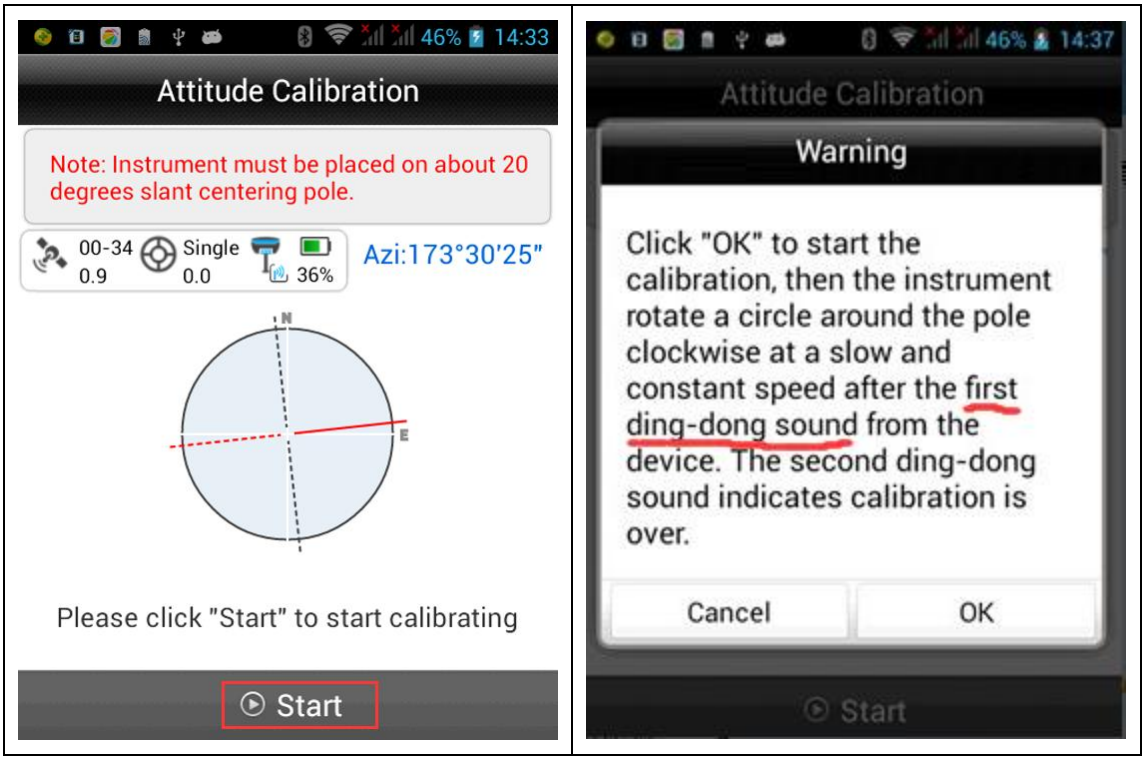
Reference to "**1.Electronic bubble calibration**"above;

2. Direction sensor calibration

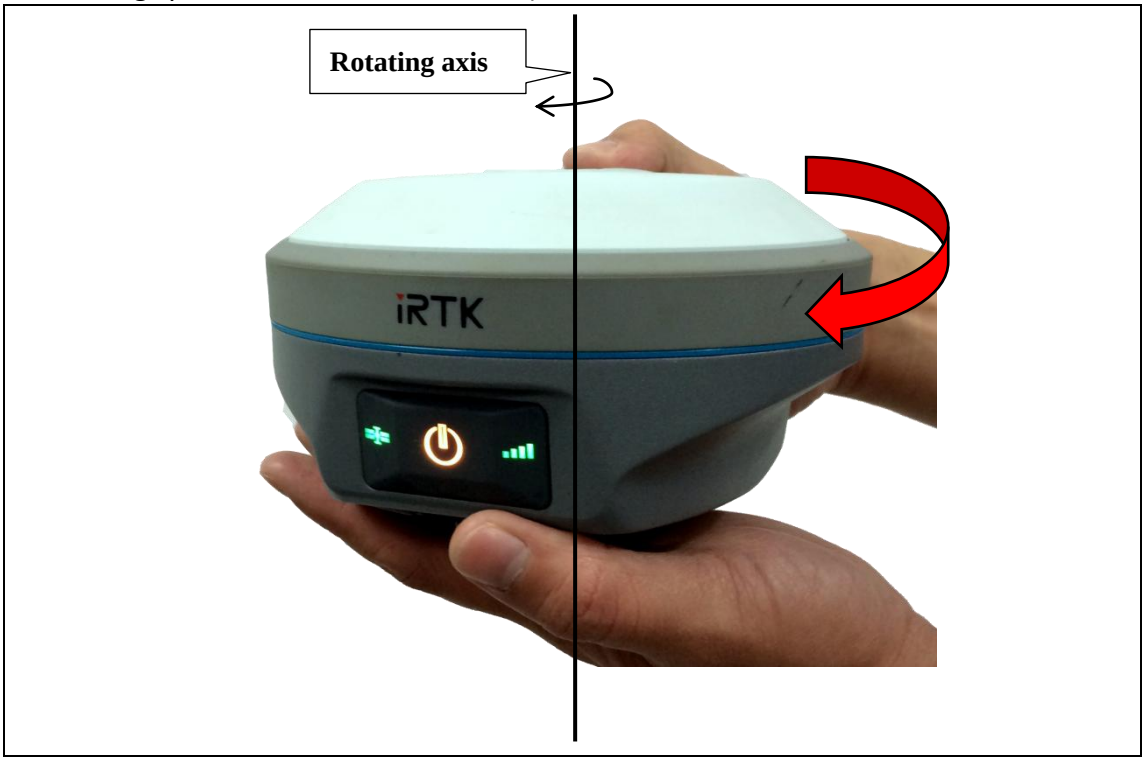
(1) Click"Other"->Attitude Deviation Calibration;

<table>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
<td>Attitude Deviation Calibration interface</td>
</tr>
</table>

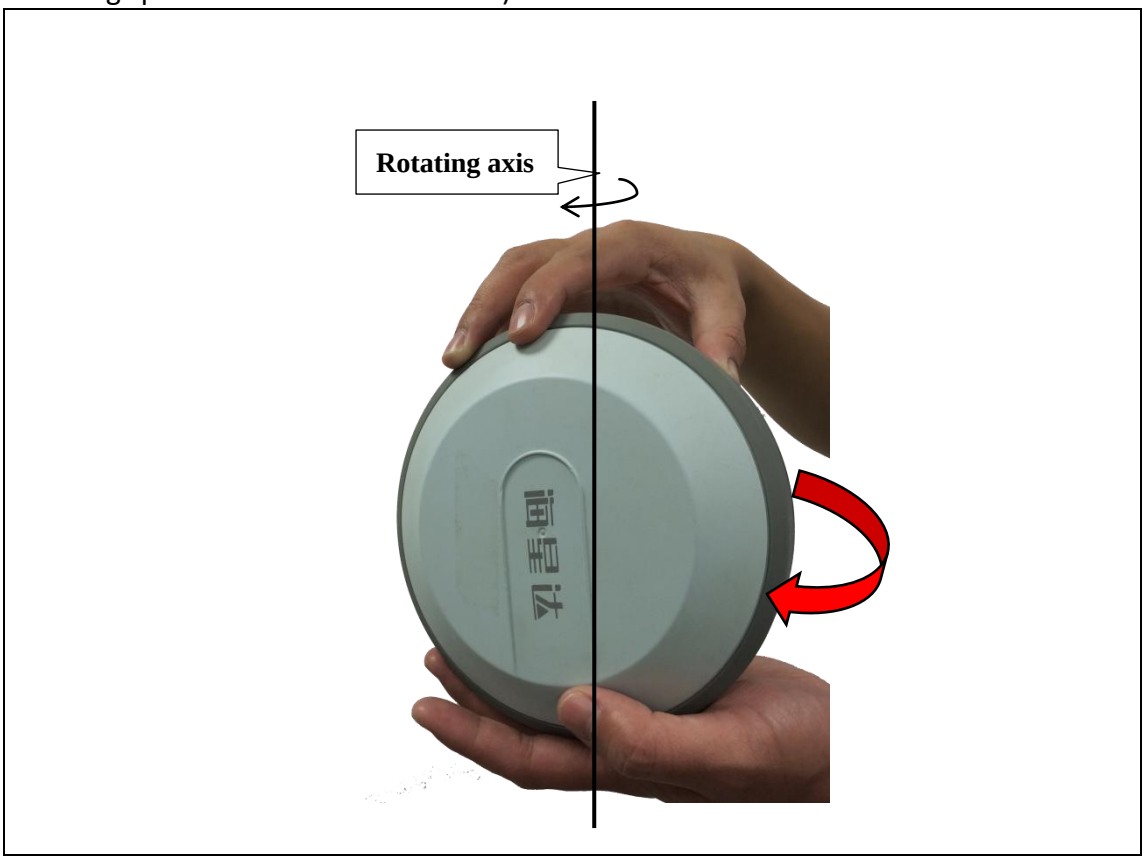
(2) Click "start" button and start calibration, the instrument needs to be rotated in horizontal, vertical and horizontal three directions for calibration.



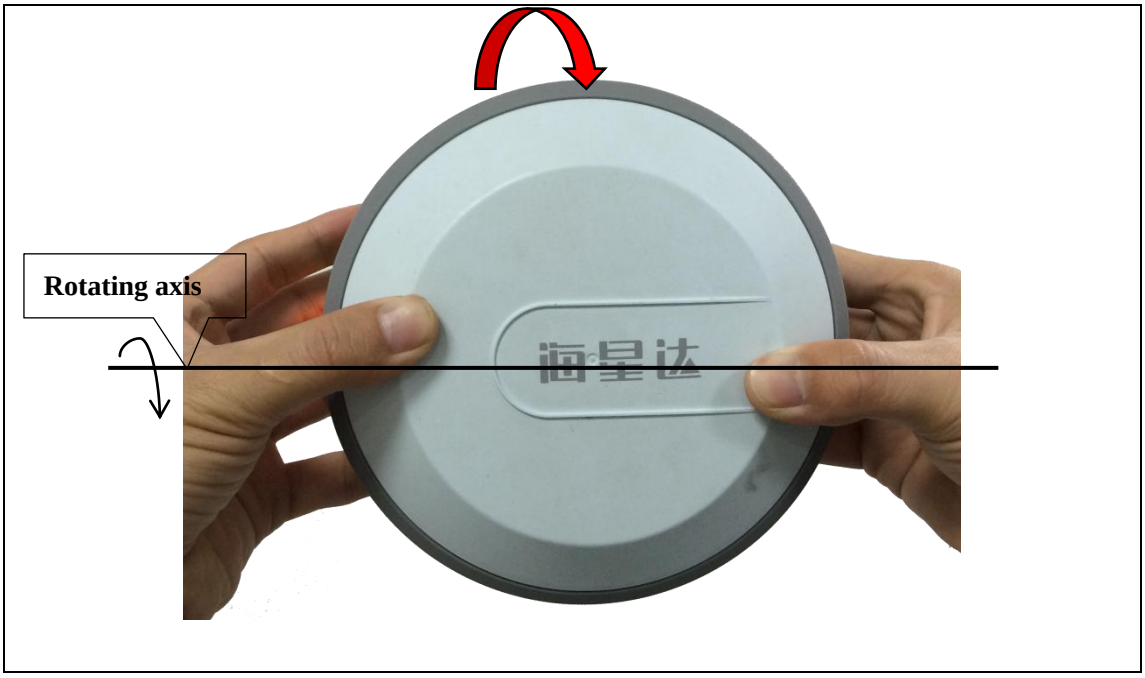
a. **Horizontal direction:** Put the receiver in horizontal, take the vertical direction as rotating axis, slowly rotates as clockwise(Rotating speed suggest no more than 20 ° / s, rotating spent one circle at least 20 s.).



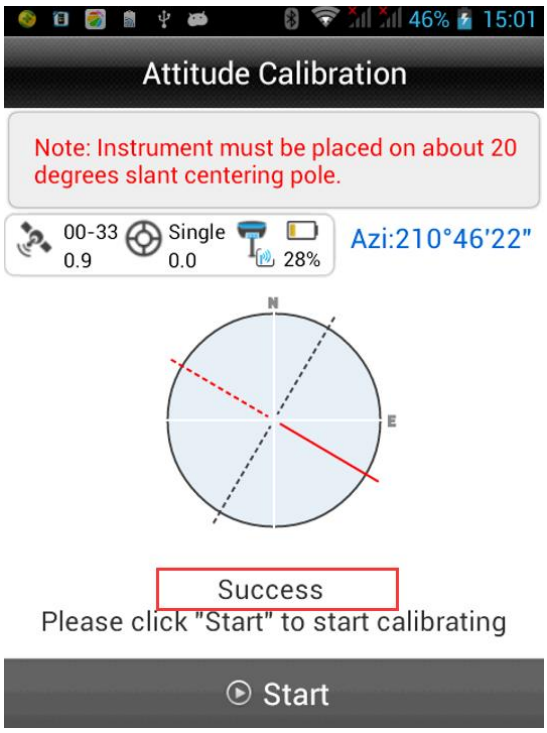
b. **Vertical direction:** Put receiver in vertical, take the vertical direction as rotating axis, slowly rotates as clockwise(Rotating speed suggest no more than 20 ° / s, rotating spent one circle at least 20 s.).



c. Flip horizontal: Put the receiver in horizontal, take the horizontal direction as rotating axis, slowly rotates as clockwise(Rotating speed suggest no more than 20 ° / s, rotating spent one circle at least 20 s.).



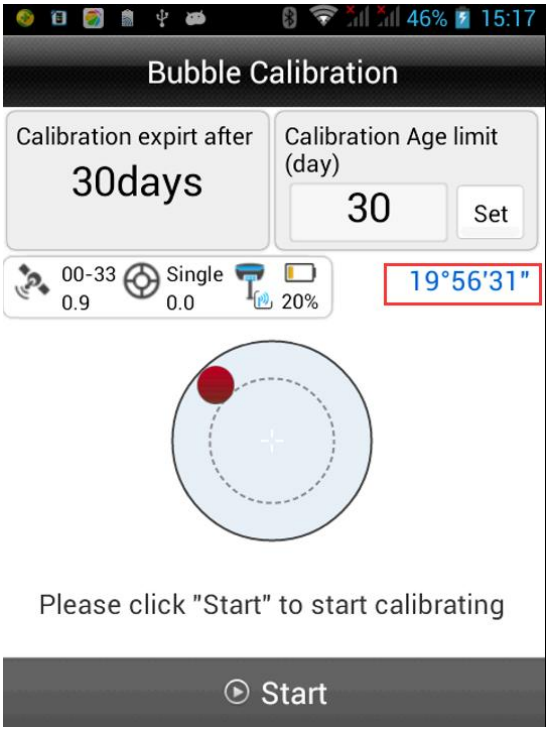
(3) After calibration in all direction,instrument issued a second "ding-dong" tip "operation successful", calibration is complete.



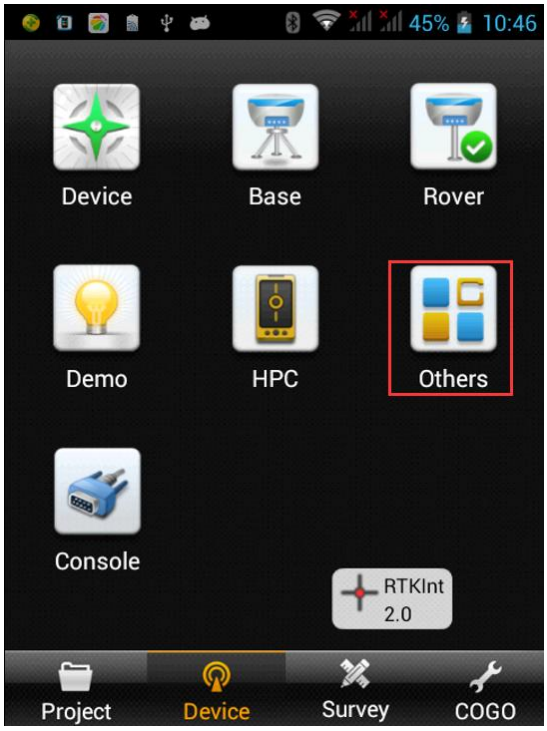
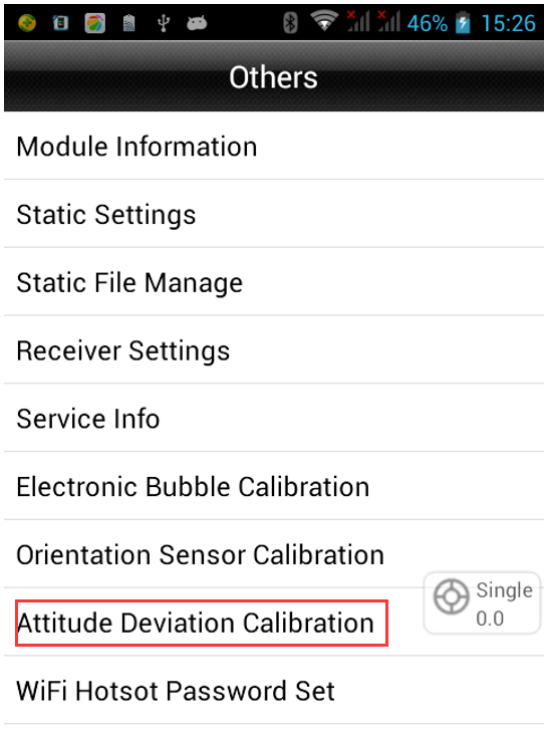
Calibration success.

3. Attitude deviation calibration

(1)In the attitude deviation calibration, place the instrument on the pole(About 20°Tilt,can check in “Bubble Calibration” interface)

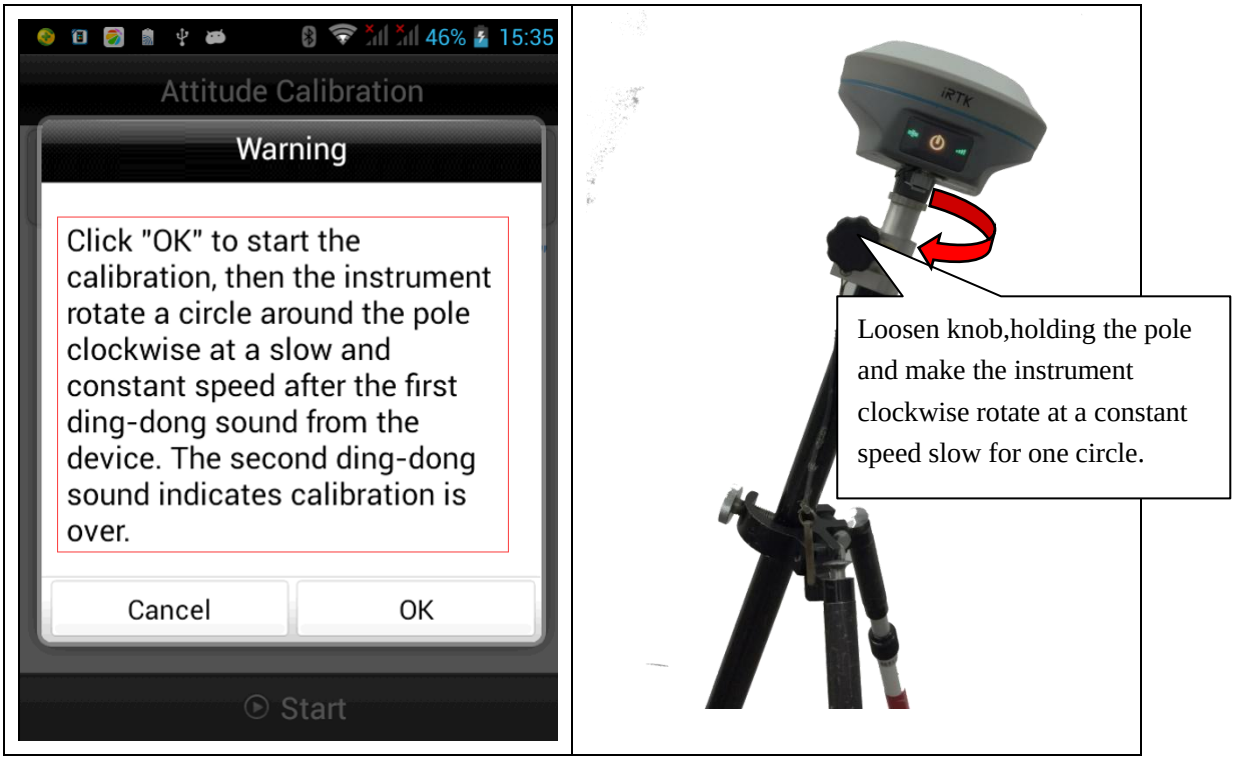


(2)After place the instrument OK, go to “Attitude Deviation Calibration”

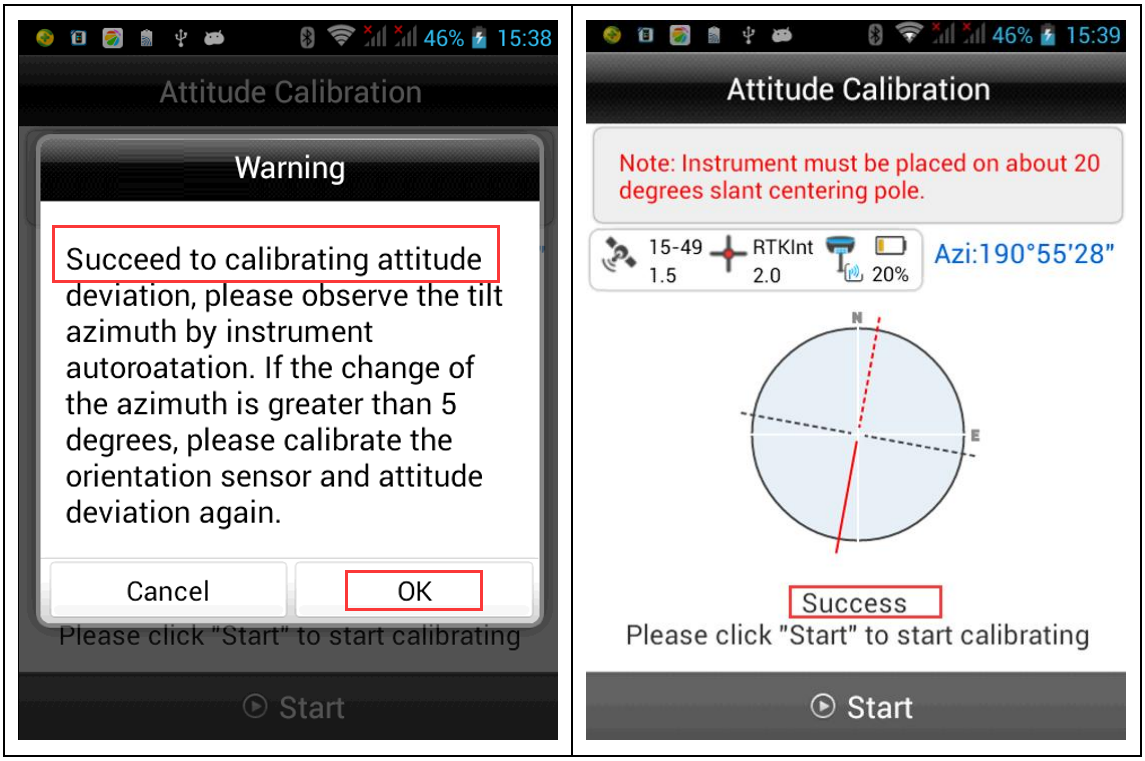
	Click”Others”
	go to “Attitude Deviation Calibration”

(3) Click “Start ” begin to calibrate.

(Note: a. The pole position can't be moved; b. Attitude calibration must rotate as clockwise; c. About 2 °/ s rotational speed, rotating one circle takes about 3 min;)



(4)If informed calibration is successful, can start survey.



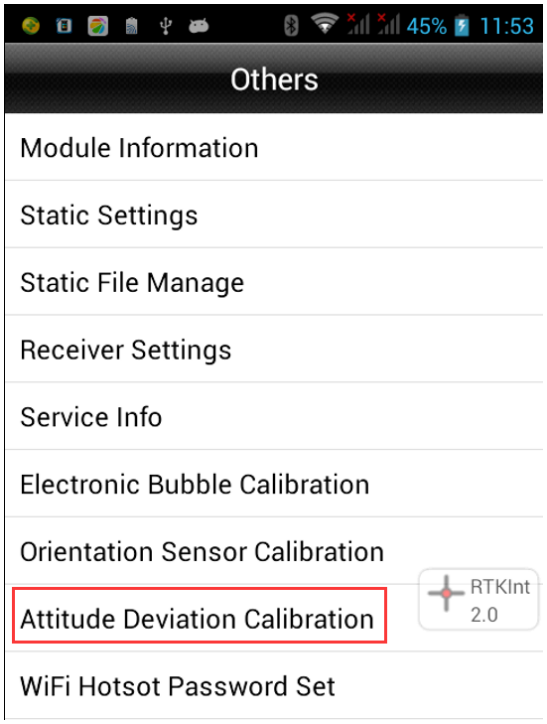
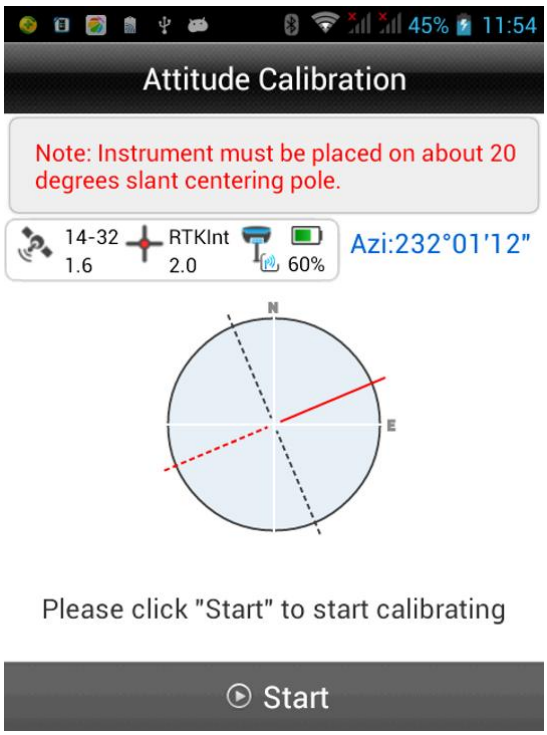
4. Verify calibration

Tilt survey module verification

Due to the high sensitivity and direction sensor depends on the consistency of the magnetic field around the environment,in order to ensure the accuracy of measurement, the instrument Tilt survey module need to be verified before

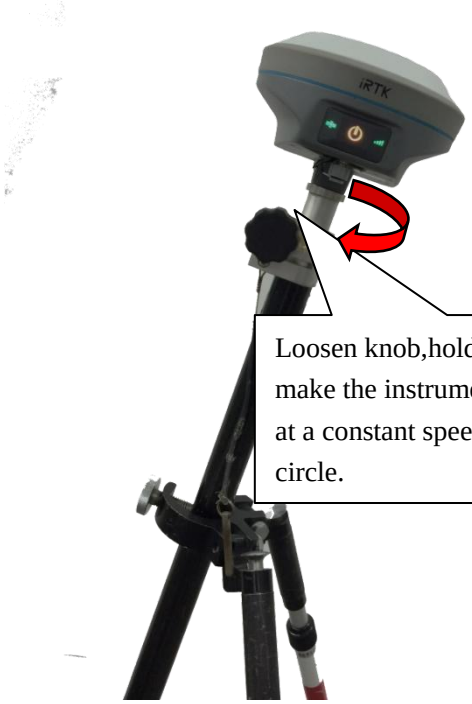
surveying.

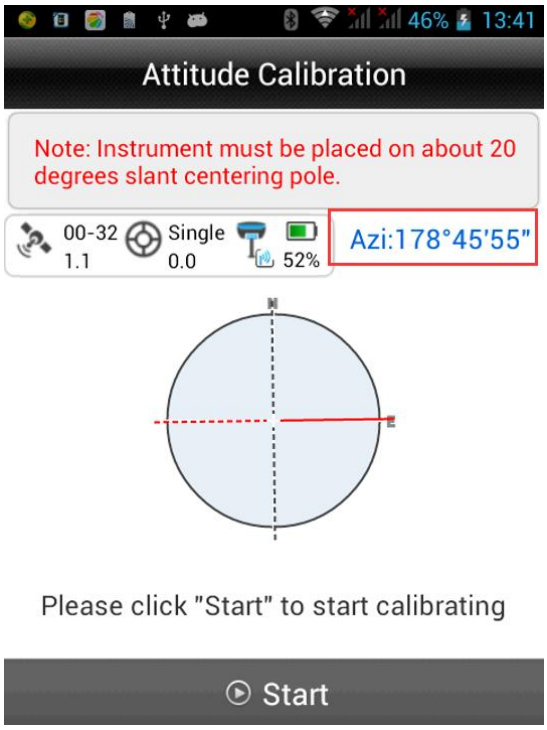
Open “Attitude Deviation Calibration” interface;

	Click”Others”->Open “Attitude Deviation Calibration
	Attitude Deviation Calibration interface

(3) Verify method

Put the device on the pole (about 20 degrees Tilt) and clockwise rotating itself for one circle at a slow speed. View azimuth changes at the top right corner.

<table>
<tr>
<td> 
</td>
<td>Put the device on the pole (about 20 degrees Tilt) and clockwise rotating itself for one circle at a slow speed.

Rotate note:
a. The pole position can't be moved;
b. Attitude calibration must rotate as clockwise;
c. About 2 ⁰/ s rotational speed, rotating one circle takes about 3 min</td>
</tr>
<tr>
<td> 
</td>
<td>Azimuth changes

If maximum and the minimum difference within 5°, means module state is normal and can Tilt survey directly. Or must carry on the module calibration.</td>
</tr>
</table>

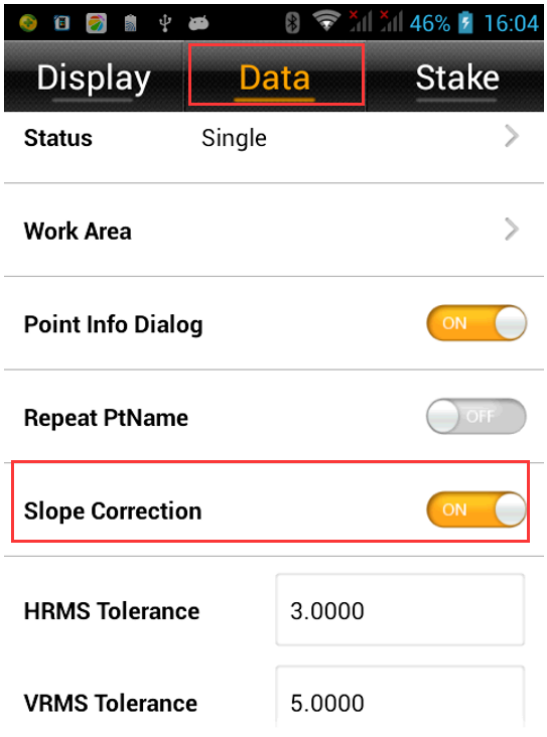
If maximum and the minimum difference of "Azi" above within 5°, means calibration OK and module state is normal and can Tilt survey directly. Or must carry on the module calibration once again.

2.3 Tilt survey

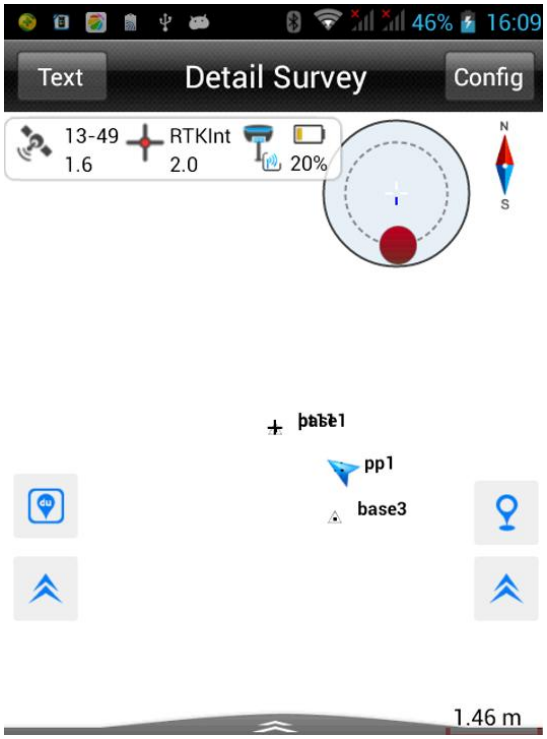
After Electronic bubble calibration, direction sensor calibration and attitude deviation calibration are successful,begin to do Tilt survey.

Tilt survey condition: Tilt within 20 degrees under motionless state.

1. Open “Slope correction”

	Detail Survey->Config
	Data -> open “Slope Correction” If “off” the “Slope Correction”,software will not make slope correction.

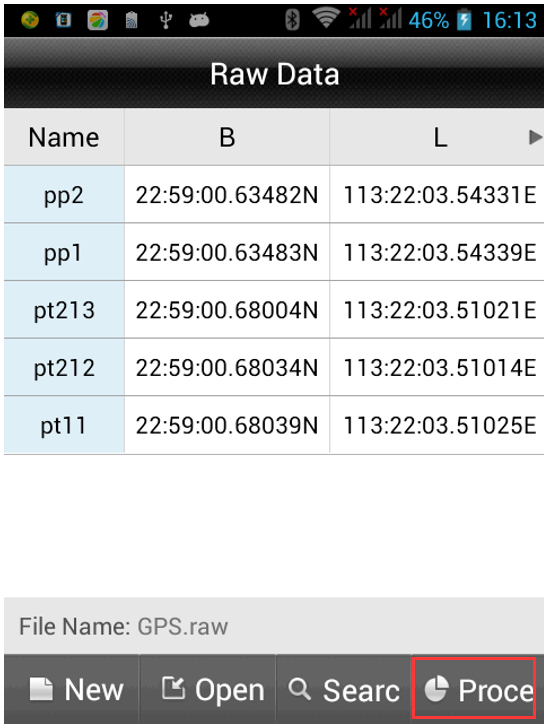
2. Start to record point

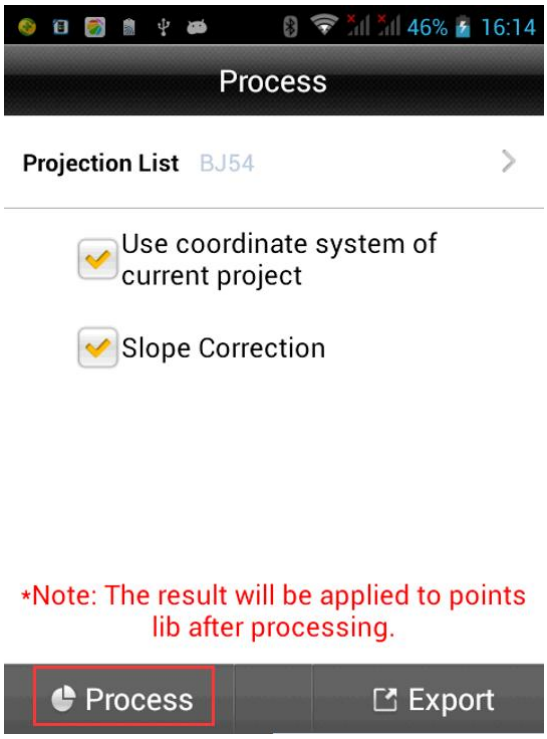
3. Add slope correction process.

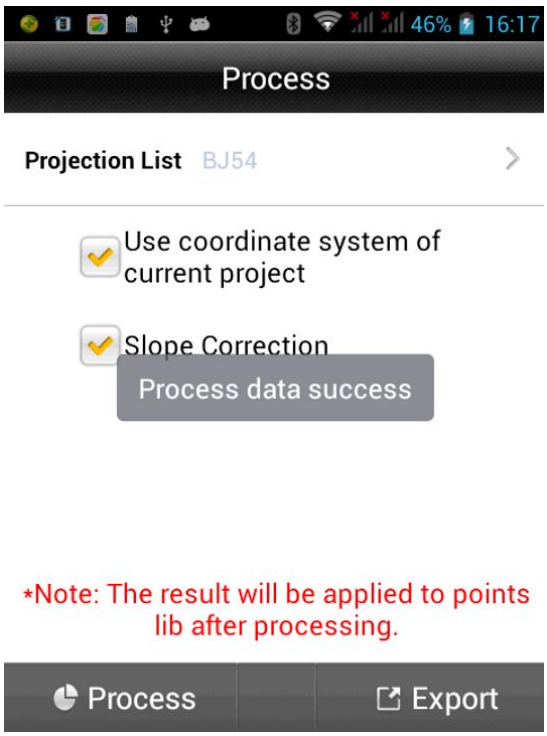
(1)Click “Raw Data”-> Choose “Proce(Process)”

	Click “Raw Data”

	Choose “Proce”

(2)Choose “Slope Correction”-> Process, then make a correction and upgrade the coordinate points.

	Choose “Slope Correction”-> Process

	Process data success.