Tilt Compensation

INSTRUCTIONS

UM981

GPS/BDS/GLONASS/Galileo/QZSS

All-constellation Multi-frequency

RTK/INS Integrated Positioning Module

Revision History

Version	Revision History	Date
R1.0	First release	Dec. 2023

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Contents

1. Firmware Upgrade

1.1　Firmware Upgrade

Upgrade the firmware to the version that supports tilt compensation.

1.2　Firmware Version

Send the command VERSIONA through COM1 to query the current firmware version.

2.　Initialization and Measurement

2.1　Lever Arm Configuration

Supply 3.3 V power to the module and receive GNSS signals. When the module works normally, input the following command at COM1:

Config imutoant offset **-0.025 0.031 0.040** 0.010 0.010 0.010
— configure the lever arm (the vector from the center of the module to the phase center of the antenna, in meters, accurate to millimeters)

☞　The relative position between the module and the antenna is fixed, and the bold values depend on the distance between the module and the antenna. Keep the center of the module as close to the phase center of the antenna as possible. For more information, see *UM981 Reference Commands Manual*.

To save your configuration, use the SAVECONFIG command.
To query the current configuration, use the CONFIG command.

☞　The lever arm only needs to be configured for the first use. For subsequent uses, the parameters can be obtained from FLASH.

2.2　Initialization Steps

Input the following commands at COM1 to perform initialization:

CONFIG INS SLANTMEAS
— enable tilt-compensation (It needs to be configured every time.)

CONFIG ANTENNADELTAHEN 2.190

— configure the antenna height (It needs to be configured every time. The height refers to the distance from the phase center of the antenna to the measurement point of the survey pole, in meters, accurate to millimeters.)

Slantstatusa 1

— output the status of tilt measurement at 1 Hz (It needs to be configured every time.)

There are different status of tilt measurement, as shown in the following examples:
#SLANTSTATUSA,40,GPS,FINE,2206,200969000,0,0,18,0;WAITING,0,0,0,0,0,0*c02862df
#SLANTSTATUSA,40,GPS,FINE,2206,200979000,0,0,18,0;STATIC,0,0,0,0,0,0*b02573df
#SLANTSTATUSA,40,GPS,FINE,2206,200986000,0,10,18,0;MOVING,0,0,0,0,0,0*94922df3
#SLANTSTATUSA,40,GPS,FINE,2206,201002000,0,15,18,0;CONVERGENCE,0,0,0,0,0,0*b86cd091

According to the output of SLANTSTATUSA, users can perform different operations:

- "WAITING" means waiting for the tilt compensation to be enabled.
- "STATIC" means to keep the survey pole static and as vertical to the ground as possible.
- "RTKNOFIX" means no RTK fix solution and waiting for RTK fix.
- "MOVING" means to move the survey pole left and right, back and forth, while keeping the pole tip on the ground.
- "INSBIGERR" means the accuracy of INS solution is low and the user needs to rock the survey pole.
- "CONVERGENCE" means the initialization is successfully finished and the pole tip can be put at the measurement point.

2.3   Tilt Compensation Output

After the initialization is finished, input the following command at COM1:

SLANTAPA ONCHANGED

— output the coordinates of the measurement point

The output example is shown as follows:
#SLANTAPA,39,GPS,FINE,2283,115797630,0,0,18,1;1,0,2283,115797600,40.07863686795,116.23635885107,34.229092,0.009176,0.008366,0.024702,24.016890,107.756493,0.000000,0*32d1306a

Put the tip of the pole at the measurement point to obtain the coordinates.