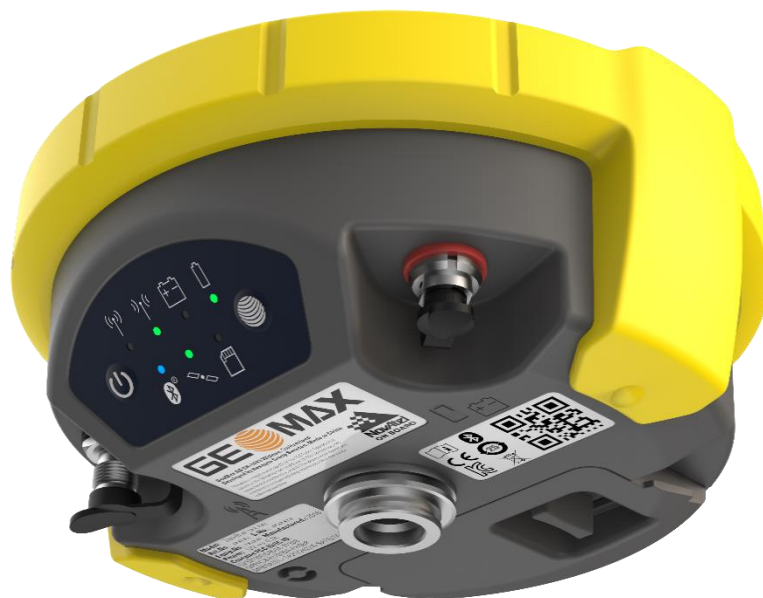


GeoMax GNSS

Zenith16 & 40 Series Installation Guide



Version 1.00
English

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1 INTRODUCTION

This guide provides complete step-by-step instructions for preparing the Zenith16/40 GNSS series for measuring work. The instructions cover all the required installation tasks for the Zenith GNSS receiver and Zenith Manager PC software.

Only the tasks required for the initial setup of a new Zenith16/40 system are described in this document. For further information regarding the operation of the Zenith16/40 components, please refer to the respective User Manuals.

The User Manual for the GNSS receiver and the Field Controllers are available from the GeoMax Partner Area.

2 GENERAL PREPARATION

2.1 COPY ZENITH16/40 FIRMWARE ON MICROSD CARD

Visit GeoMax Downloads to check for the current versions of both System and GNSS firmware's. Download the files and store them on the provided MicroSD card in the SYSTEM folder.

2.2 BATTERY CHARGING

2.2.1 Zenith16/40 receiver

Before using the receiver, the included ZBA201 batteries should be charged. Insert a battery into the ZCH201 charger and plug the adapter into an AC supply. Do not disconnect from power until the green FULL indicator flashes, indicating that the battery is fully charged.

3 PREPARATION OF THE GNSS RECEIVER

3.1 CONNECTING TO THE PC

Previously to connect the receiver to the PC the USB cable driver must be installed. Download the USB cable driver installer **Setup_GeoMax_USB_32bit.exe** from GeoMax Downloads. For 64-bit versions of Windows use the installer named **Setup_GeoMax_USB_64bit.exe**. Run this file to install the USB port software by following the instructions of the Windows installer wizard.



In addition to installing the USB port software the Windows Mobile Device Centre (WMDC) will also be installed, which is going to show whether the receiver is connected or not.



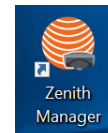
Locate the USB cable in the yellow container. Insert a fully charged battery into the GNSS receiver and switch it on. Connect the cable to the Lemo port of the receiver. When connecting the cable to a USB port of the PC, the cable's drivers will be initialized automatically and the aforementioned WMDC will appear showing that the receiver is connected.



3.2 RECEIVER CONNECTION WITH ZENITH MANAGER

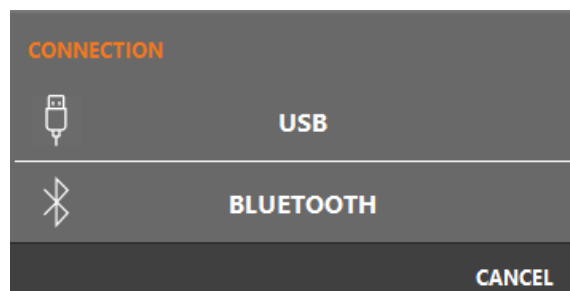
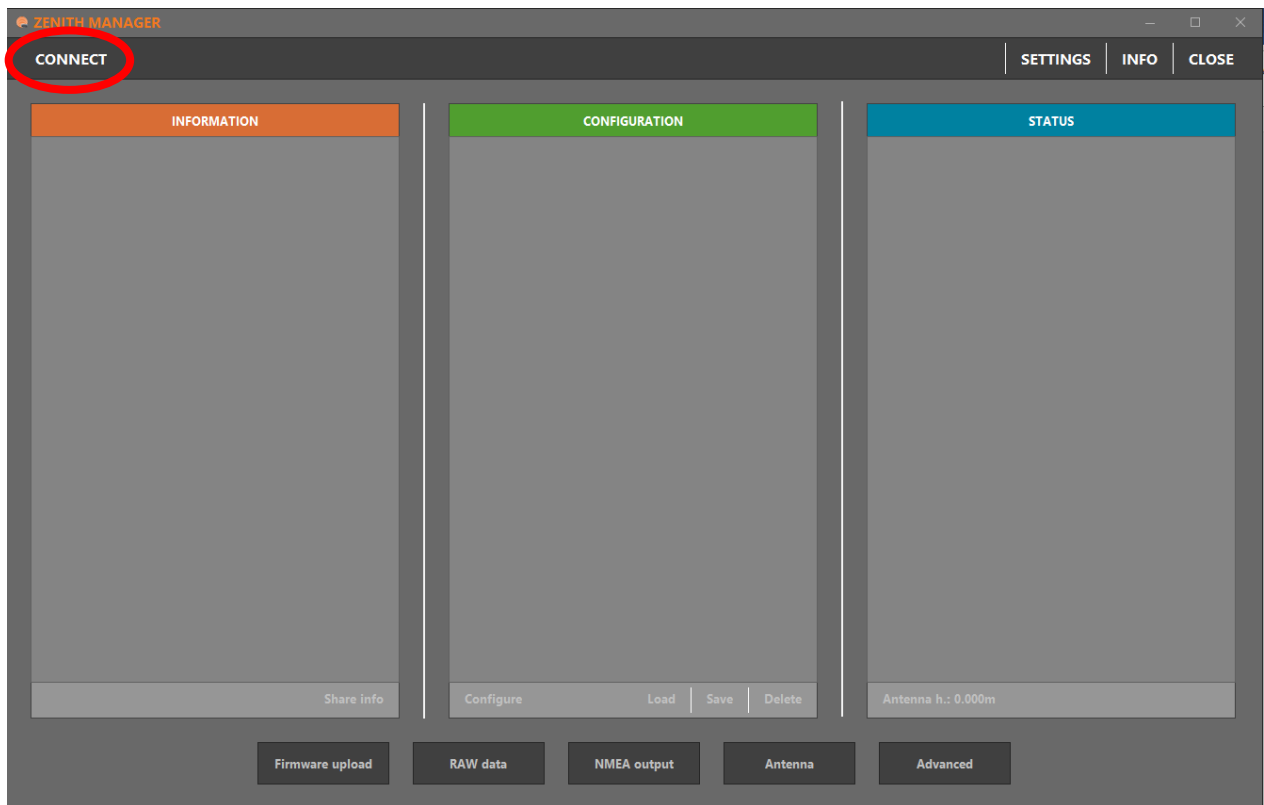
3.2.1 Installation of Zenith Manager

Locate the Zenith Manager software on the Zenith16/40 folder on the GeoMax partner area and download it to your PC. Run **Setup_Zenith_Manager.exe** and follow the instructions of the installer.



Click on the Zenith Manager icon of your desktop to launch it.

To connect to your Zenith16/40, click on the CONNECT button on the top-left side of the menu bar and choose the preferred connection type, USB (cable) or Bluetooth. To connect via USB, the receiver must be connected to the PC with the USB cable.



3.3 CHECKING THE RECEIVER FIRMWARE VERSION

Before using the receiver, it should be checked that the loaded firmware is the latest version. Once connected with Manager, the installed firmware's can be seen on the Information panel in the left side.

ZENITH MANAGER

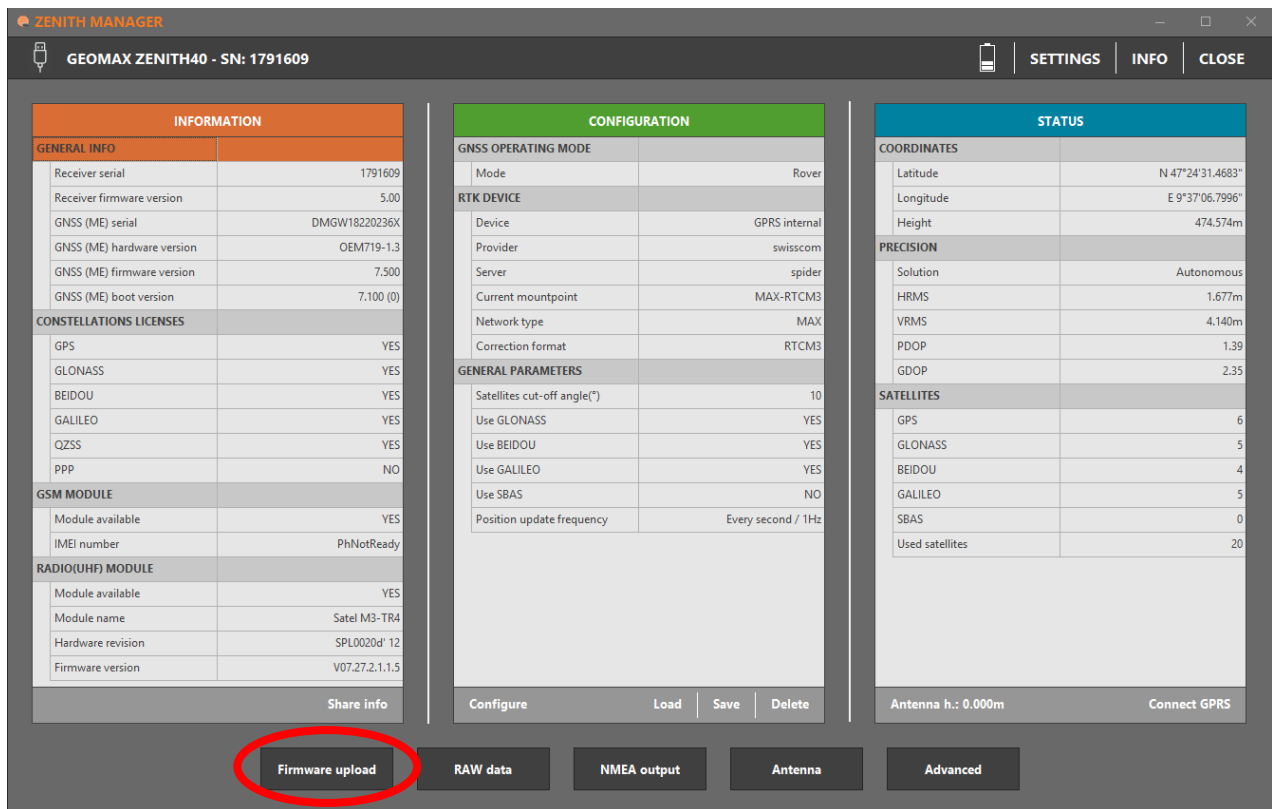
GEOMAX ZENITH40 - SN: 1791609

INFORMATION	
GENERAL INFO	
Receiver serial	1791609
Receiver firmware version	5.00
GNSS (ME) serial	DMGW18220236X
GNSS (ME) hardware version	OEM719-1.3
GNSS (ME) firmware version	7.500
GNSS (ME) boot version	7.100 (0)
CONSTELLATIONS LICENSES	
GPS	YES
GLONASS	YES
BEIDOU	YES
GALILEO	YES
QZSS	YES
PPP	NO
GSM MODULE	
Module available	YES
IMEI number	PhNotReady
RADIO(UHF) MODULE	
Module available	YES
Module name	Satel M3-TR4
Hardware revision	SPL0020d' 12
Firmware version	V07.27.2.1.1.5

Share info

If the firmware is older as the one downloaded from the GeoMax partner Area, it is recommended to perform an update. To update the receiver firmware, download the respective *.FW file, copy to the SYSTEM directory on a MicroSD card and insert it into the Zenith16/40 receiver. Select **Firmware Upload** from the bottom menu. The contents of the SYSTEM directory are displayed. Choose the required file and click **Upload** to install the firmware onto the receiver.

The upgrade takes a while. After the upgrade the receiver switches off and on automatically. Once this is done a message will be shown, that the instrument upgraded the fw successfully. To check whether the latest version has been successfully installed, the new firmware version should be displayed in the info panel.



3.4 RECEIVER CONFIGURATION

To configure the receiver either as a base or as a rover using the internal UHF radio or the internal GPRS, select **Configure** from the bottom of the configuration panel and the GNSS configuration window will appear. There it will be possible to configure the Zenith16/40 as needed.

CONFIGURATION	
GNSS OPERATING MODE	
Mode	Rover
RTK DEVICE	
Device	GPRS internal
Provider	swisscom
Server	spider
Current mountpoint	MAX-RTCM3
Network type	MAX
Correction format	RTCM3
GENERAL PARAMETERS	
Satellites cut-off angle(°)	10
Use GLONASS	YES
Use BEIDOU	YES
Use GALILEO	YES
Use SBAS	NO
Position update frequency	Every second / 1Hz
<div style="display: flex; justify-content: space-between; align-items: center; padding: 5px;"> Configure Load Save Delete </div>	

3.4.1 Changing the UHF radio settings

To meet country radio licence requirements, the internal UHF radio must be set before use to legally allowed local frequencies as defined by local or governmental authorities. Use of forbidden frequencies may lead to prosecution and penalties.

The following procedure defines the configuration of the internal UHF radio. After choosing in the GNSS configuration panel the receiver as a base or as a rover and selecting the internal radio configuration, the settings for the internal radio will be displayed. Up to 15 different frequencies can be set. A choice of required frequencies can be entered into the channel table. Check with your country specific local authorities, what frequencies and channel spacing may be used. At the Radio Settings field the internal radio can be configured with default channel, protocol type, channel spacing, transmission power and correction format.

GNSS CONFIGURATION [Close]

Settings for the internal radio

Channel: 01 - 441.000 Mhz [Edit]

Protocol: Satel 4-FSK

Channel spacing (kHz): 12.5

Trasmitter power (mW): 100

FEC [Slider]

Correction format: RTCM3

Use base ID [Slider]

Base id (0..4095): 0

< BACK FORWARD > CLOSE

The last step (the same for all configurations) will allow to enter the antenna height, the cut-off angle, to enable or disable the available satellite systems and choose the position update frequency.

GNSS CONFIGURATION [Close]

Set general parameters

Antenna height: 0.000m

Satellites cut-off angle(°): 10

Use GLONASS [Slider]

Use BEIDOU [Slider]

Use GALILEO [Slider]

Use SBAS [Slider]

Position update frequency: Every second / 1Hz

< BACK FINISH CLOSE

Click **Finish** to configure the receiver with the selected settings.

3.4.2 Changing the GPRS settings

The following procedure defines the configuration of the internal GPRS. Before proceeding with the configuration, a SIM card must be inserted into the slot located in the battery compartment of the receiver. The PIN must be disabled before using it. The configuration follows the same workflow as before, on the third step the settings regarding a GPRS configuration have to be entered, a provider with the information of the SIMCard network and a server with the NTRIP network credentials must be created. The mountpoint, network type and format can be chosen afterwards.

The screenshot shows a software interface titled "GNSS CONFIGURATION" with a sub-header "Settings for the internal GPRS". The interface includes several configuration options:

- Provider:** A dropdown menu set to "swisscom" with an "Edit" button to its right.
- Server:** A dropdown menu set to "spider" with an "Edit" button to its right.
- Mountpoint:** A text input field containing "MAX-RTCM3" and a three-dot menu icon to its right.
- Network type:** A dropdown menu set to "MAX".
- Format:** A dropdown menu set to "RTCM3".
- Send gpuid to server:** A toggle switch that is currently turned off.
- Job ID:** An empty text input field.
- User ID:** An empty text input field.

At the bottom of the screen, there are three navigation buttons: "< BACK", "FORWARD >", and "CLOSE".

After choosing the rest of the settings click **Finish** to configure the receiver.

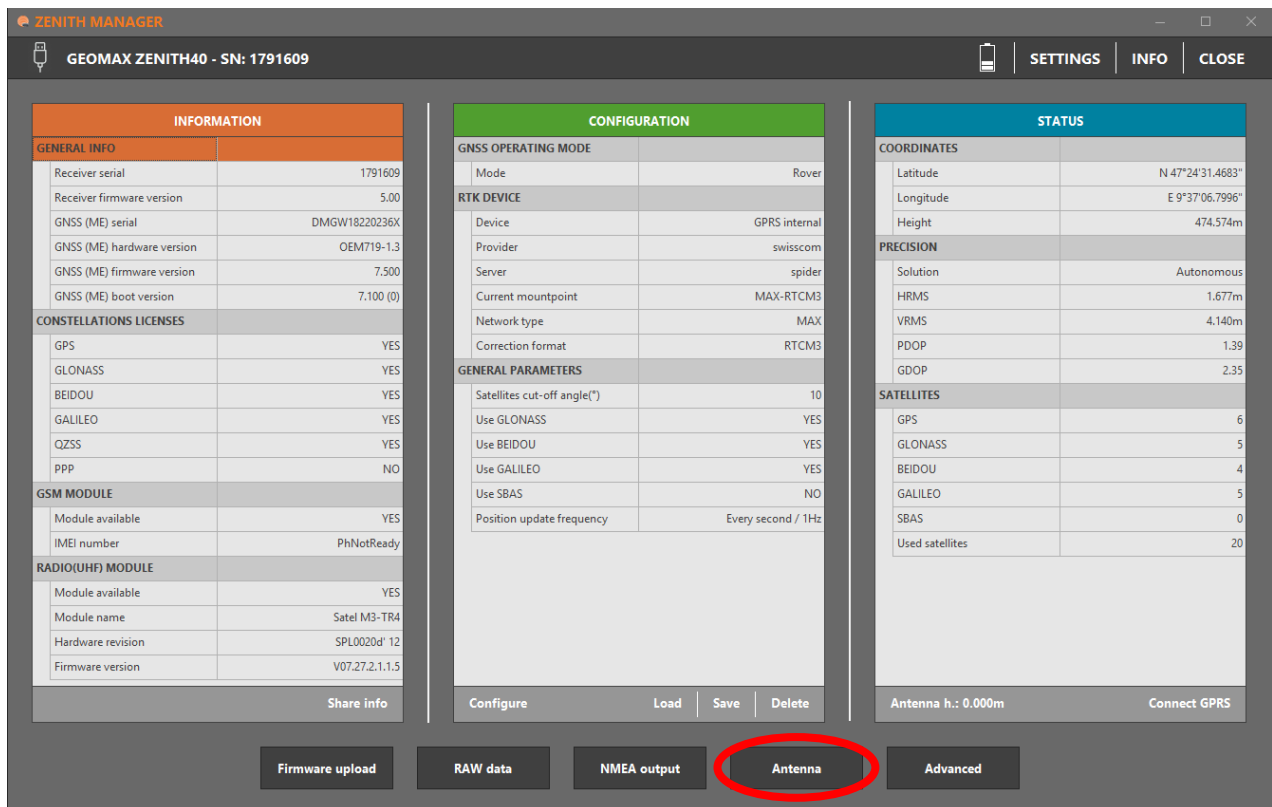
To start receiving corrections select **Connect GPRS** at the bottom in the status panel.

STATUS	
COORDINATES	
Latitude	N 47°24'31.3737"
Longitude	E 9°37'06.7918"
Height	463.712m
PRECISION	
Solution	Autonomous
HRMS	1.547m
VRMS	2.718m
PDOP	0.86
GDOP	1.48
SATELLITES	
GPS	9
GLONASS	5
BEIDOU	8
GALILEO	7
SBAS	0
Used satellites	29
Antenna h.: 0.000m	
Connect GPRS	

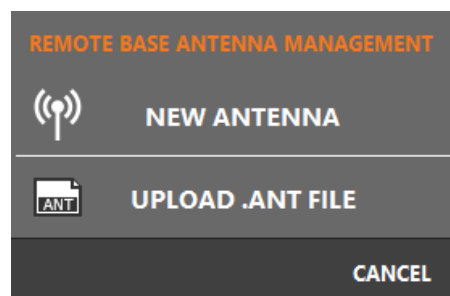
3.5 ANTENNA MANAGEMENT

All available GeoMax GNSS antennas are currently supported in the antenna management by default. If your Base-Rover set up will include a non GeoMax device, you should make sure the base antenna is recognised on the Zenith16/40. To do that, it's needed to add this specific antenna manually with the Zenith Manager. See how to do it below:

With the receiver connected to Manager, select **Antenna** from the bottom menu.



To add new antennas, there are two options:



- By uploading an .ant* file located in the PC (can be created with Infinity).
- By adding manually the following values. Enter the IGS name of the base antenna and the vertical, east and north phase centre offset for L1 and L2 in meters (m).

See the next example to know how to add a new antenna manually. The antenna used is a GS16 from Leica:

- IGS name for GS16: *LEIGS16*
- L1 vertical PCO value in meters: *0.0887*
- L1 east PCO value in meters: *-0.0002*
- L1 north PCO value in meters: *-0.0002*
- L2 vertical PCO value in meters: *0.0887*
- L2 east PCO value in meters: *0*

- L2 north PCO value in meters: 0.0018

```

LEIGS16      NONE Internal geodetic multi-frequency antenn IGS ( 5) 16/07/08
  -0.2      -0.2      88.7
  0.0  0.0  0.0 -0.1 -0.2 -0.4 -0.7 -1.0 -1.3 -1.5
 -1.5 -1.5 -1.3 -1.1 -0.6 -0.0  0.8  2.0  3.2
    1.8    0.0    88.7
  0.0 -0.0 -0.1 -0.3 -0.4 -0.6 -0.7 -0.9 -1.1 -1.1
 -0.9 -0.5  0.2  0.7  0.8  0.5 -0.1 -0.4  0.3

```

To identify which value is each, see the below image with the description. Note that the values are in mm.

ANTENNA ID	DESCRIPTION									DATA SOURCE (# OF TESTS)	YR/MO/DY
[north]	[east]	[up]									AVE = # in average
[90]	[85]	[80]	[75]	[70]	[65]	[60]	[55]	[50]	[45]		L1 Offset (mm)
[40]	[35]	[30]	[25]	[20]	[15]	[10]	[5]	[0]			L1 Phase at Elevation (mm)
[north]	[east]	[up]									L2 Offset (mm)
[90]	[85]	[80]	[75]	[70]	[65]	[60]	[55]	[50]	[45]		L2 Phase at Elevation (mm)
[40]	[35]	[30]	[25]	[20]	[15]	[10]	[5]	[0]			

ADD NEW REMOTE BASE ANTENNA ✕

IGS name of base antenna:

OFFSET

L1 vertical phase centre: <input style="width: 80%;" type="text" value="0.08870m"/>	L2 vertical phase centre: <input style="width: 80%;" type="text" value="0.08870m"/>
L1 east phase centre: <input style="width: 80%;" type="text" value="-0.00020m"/>	L2 east phase centre: <input style="width: 80%;" type="text" value="0.00000m"/>
L1 north phase centre: <input style="width: 80%;" type="text" value="-0.00020m"/>	L2 north phase centre: <input style="width: 80%;" type="text" value="0.00180m"/>

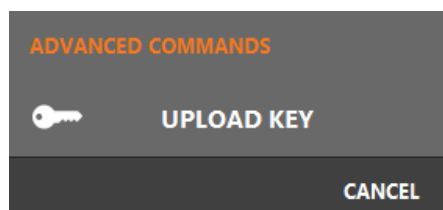
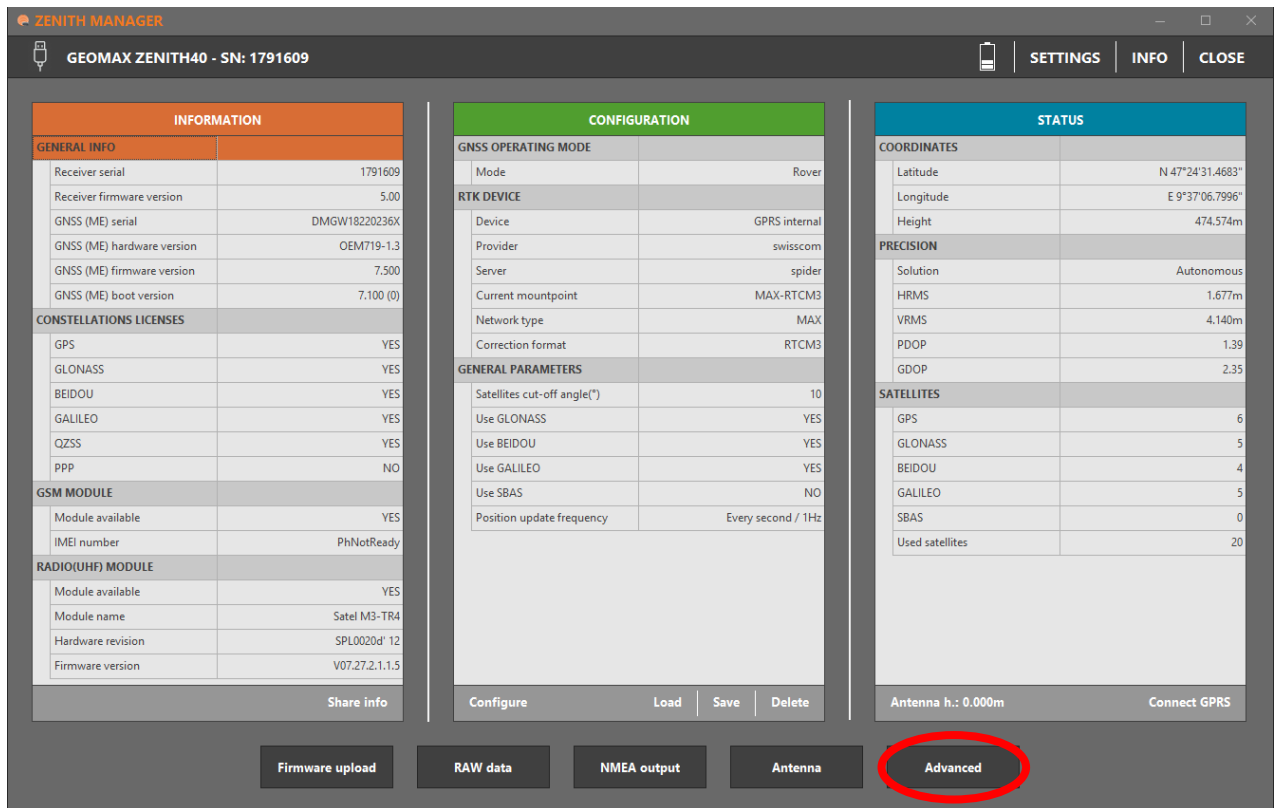
ADD NEW
CLOSE

3.6 INSTALLATION OF LICENCES

If optional receiver licenses such as 20Hz output frequency were additionally ordered, they are not activated before delivery. Therefore, when the equipment is first received, the licences still need to be installed onto the receiver. These options are activated by means of a NovAtel licence key file that would have been emailed to you at delivery of the Zenith16/40.

The licence key file can be uploaded onto the receiver by using Zenith Manager. With the

receiver connected to Manager, click **Advanced** from the bottom menu and then **Upload Key**. Select the key file L_xxxxxxx.key (where xxxxxxx is the receiver serial number) located in the PC and click **Upload**. A confirmation message will be shown once the option has been activated.



Note:

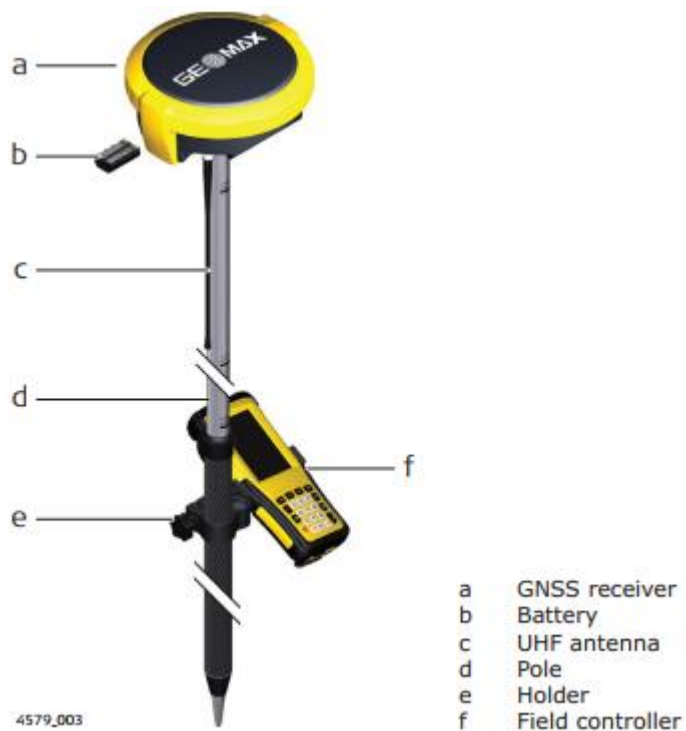
- A manual entry of the license key is **NOT** supported. The files must be uploaded!
- Same principle applies for Galileo and Beidou licenses.

3.7 DISCONNECTING FROM THE PC

Once the receiver is completely configured, it can be disconnected from the PC. From the Manager's top menu, select the **USB or the BT icon** (depending how the receiver is connected) to disconnect it and click on **Yes**. If the connection was via cable, it may now be removed and the Zenith16/40 is ready for use.

4 EQUIPMENT SETUP

4.1 ROVER SETUP



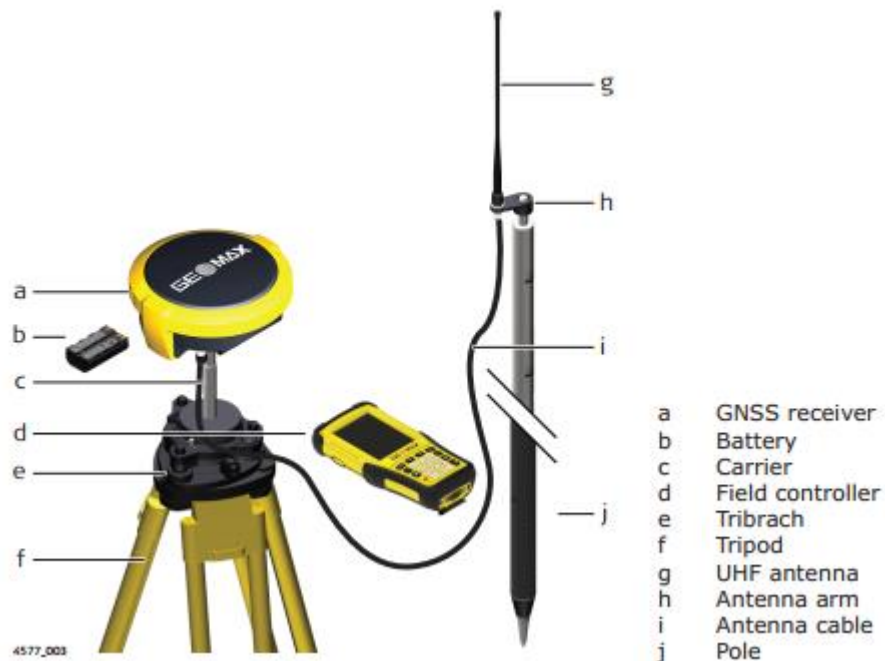
For a RTK rover, the Zenith16/40 equipment can be setup on a pole as shown above.

When working with the UHF radio, ensure the correct frequency and protocol are set as described in section 3.5. Attach a radio antenna suitable for the set frequency. The following UHF antennas can be ordered from GeoMax:

760259 ZRA100, Gainflex UHF Antenna - frequency range 435-470 MHz
766906 ZRA101, Gainflex UHF Antenna - frequency range 400-435 MHz.

4.2 BASE SETUP

The Zenith16/40 equipment can also be setup as a base station for the transmission of RTK corrections as shown below.



Attach the UHF radio antenna to the 760275 ZAR200 antenna arm. The arm has a 5/8" thread for mounting onto a telescopic pole or a tripod setup with threaded carrier. The antenna is connected to the Zenith16/40 using the 760266 ZDC202 cable. The required RTK output message can be configured using Zenith Manager or by field software.

For long range RTK, a high powered radio can be used at the base station. Available from GeoMax is the 789359 Satel EASyPro 35W radio. This radio is connected to the receiver and an external power supply, with the 797024 ZDC225 cable. The cable needs to be connected to the Lemo port of the receiver. When other UHF radio types are used, a suitable cable needs to be obtained from the respective radio supplier.