OnPOZ
Precision Positioning

EZField™
GNSS Survey

User Guide // Version 2.96

effigis
GEO SOLUTIONS

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1   Introducing EZField™

EZField™ is powerful, yet easy to use, survey software for recording of base station, static site, kinematic and semi-kinematic survey data.

EZField™ is used along the **EZSurv®** Post Processor to get the best out of your GNSS data. **EZField™** and **EZSurv®** are the easiest combination currently on the market that allow post-processing of centimeter accuracy positions using GNSS-L1 in semi-kinematic mode. Although designed for single-frequency receiver, **EZField™** can also be used along with a dual frequency receiver in OTF mode.

You can transfer your **EZField™** data to your Windows Powered Device using **Mobile File Manager** in **OnPOZ Tools**, and then import it in **EZSurv®**.

This guide describes how to use **EZField™**. It is organized in five chapters. Each chapter contains many lessons to help you progressively discover most of the features of the software.

1.1   Overview

EZField™ is designed to support all possible survey modes of operations. You can record data on a known location to be used as a Base Station to support surrounding rover units; you can record data using the static mode operation when you establish reference sites at sub-centimeter accuracy level. With your rover units, you can use the kinematic mode of operation to collect site, line and polygon features. Finally, you can use the semi-kinematic mode of operation to compute centimeter positions while moving with your GNSS-L1 receiver.

This section gives a few examples of how **EZField™** can be put to help in your survey projects.

### 1.1.1   Collecting Sites, Lines and Polygons in Kinematic Mode

The following figure illustrates a simple survey project where the kinematic mode is used on one **EZField™** device to collect sites, lines and polygons while the base mode is running on another **EZField™** device to provide base data to use for later GNSS post-processing of the kinematic data.

One EZField device is used to collect data in base mode
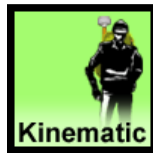
One EZField device is used to collect data in kinematic mode
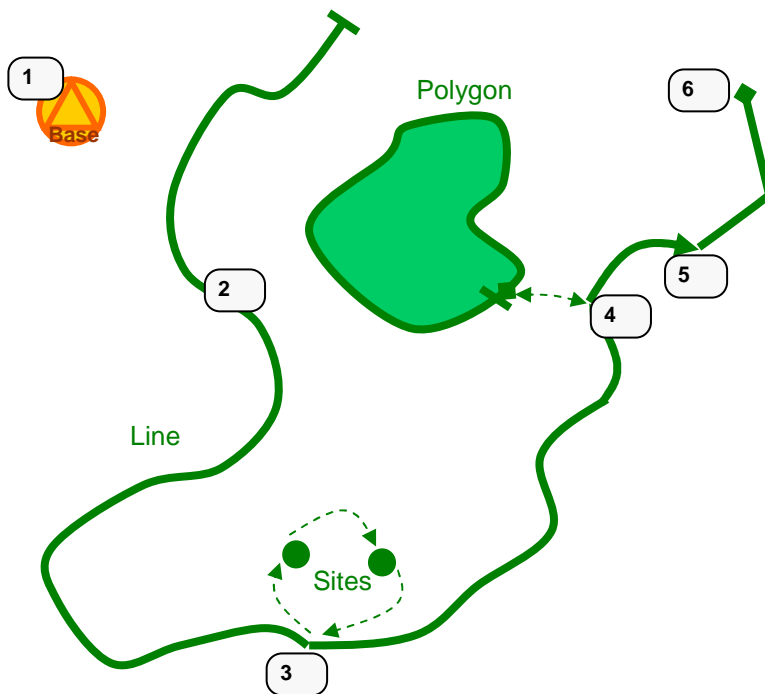
Polygon

Line

Sites

1. An **EZField™** device is running in base mode at a known coordinate for the complete duration of the survey.

2. An **EZField™** device is running in kinematic mode. First a line is started in continuous mode.

3. A pause is made in the line to collect two sites that are nearby. Then the line is resumed.

4. At any time the surveyor can close the line (or a polygon) and go out of his way to record a polygon or another line. Once done the original line can be reopened to resume it.

5. At any time the line (or polygon) can be switched from continuous to discrete mode (or from discrete to continuous).

6. Once done recording the line, it can be closed.

Once the base and kinematic data is recorded it can be imported into **EZSurv®** in order to perform differential post-processing of the collected GNSS data, for improved precision.

1.2   Collecting Reference Sites in Static Mode

The following figure illustrates a simple survey project where the static mode is used on three **EZField™** devices to collect geodetic reference sites.

Three **EZField™** devices are used to collect data in static mode

1. The **EZField™** device d1 is used to collect static data at site A while the EZField device d2 collects static data for site B and the EZField device d3 collects static data for site C.

2. The **EZField™** device d1 is moved to site D and collects static data for this site while **EZField™** devices d2 and d3 continue to collect static data for sites B and C respectively.

3. The same process continues, now device d2 is moved to site E.

4. The same process continues, now device d3 is moved to site F.

5. The same process continues, now device d2 is moved to site G.

Once the static data is recorded it can be imported into **EZSurv®** for post-processing and to perform GNSS network adjustment for calculating the precise position of the sites.

1.3   Collecting Sites, Lines and Polygons in Semi-Kinematic Mode

The following figure illustrates a sample survey project involving a base, some static sites, as well as a line, a polygon and a site collected in semi-kinematic mode.
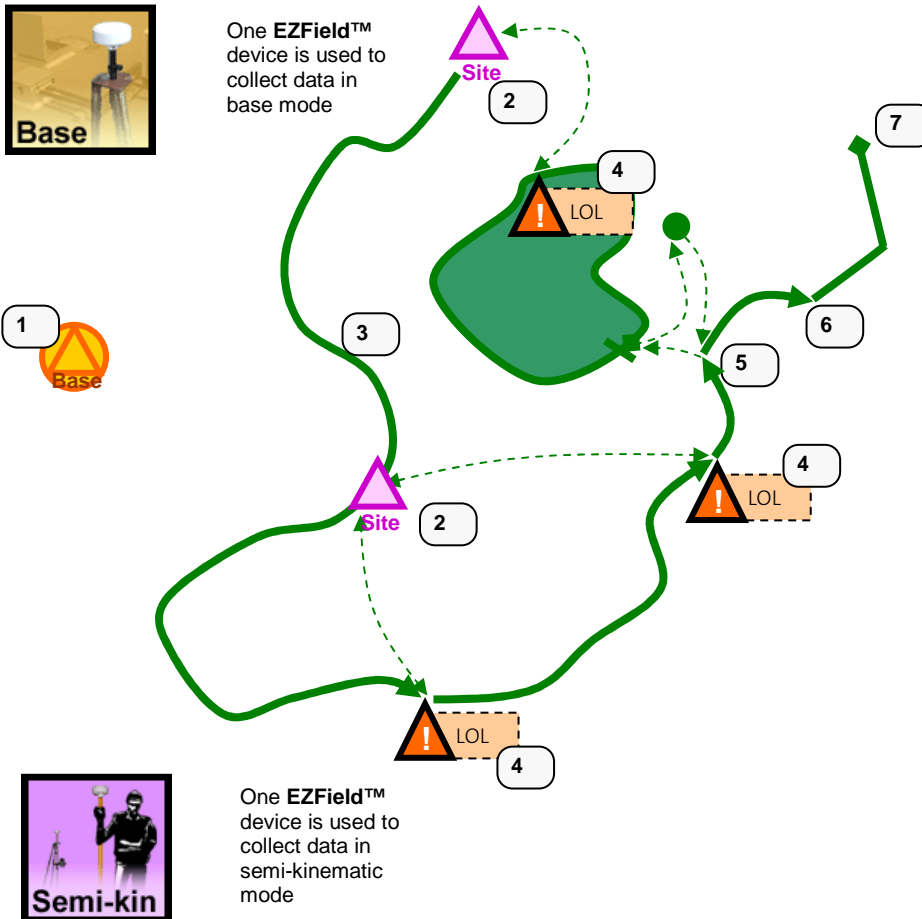
One **EZField™** device is used to collect data in base mode

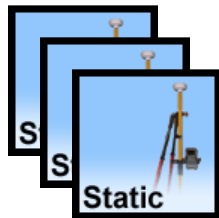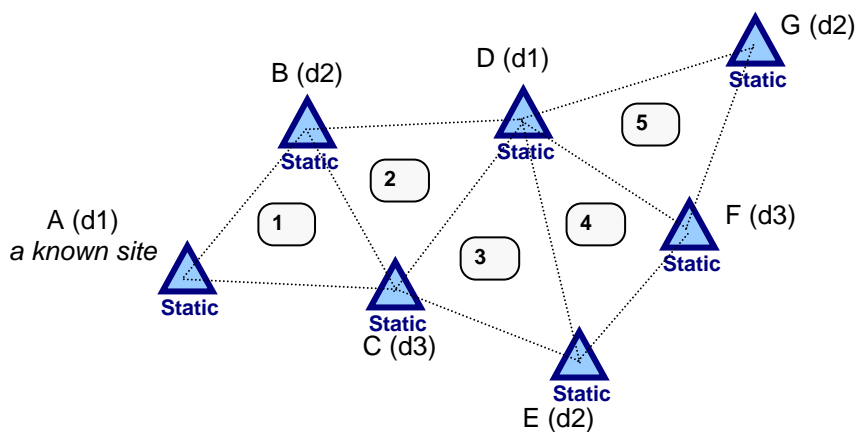One **EZField™** device is used to collect data in semi-kinematic mode

1. An **EZField™** device is running in base mode at a known coordinate for the complete duration of the survey.

2. Another **EZField™** device is running in semi-kinematic mode to collect the GNSS data for sites at known or unknown coordinates. These sites are used to re-initialize following a loss of lock (LOL) in semi-kinematic mode.

3. That same **EZField™** device running in semi-kinematic mode is also used to collect lines, polygons and sites. First a line is started in continuous mode.

4. When a loss of lock (LOL) occurs the surveyor has to go back to one of the sites to re-initialize. Once re-initialized, work can resume on recording sites, lines and polygons in kinematic mode.

5. At any time the surveyor can pause the line and go out of his way to record a polygon or a site.

6. At any time the line (or polygon) can be switched from continuous to discrete mode (or from discrete to continuous).

7. Once done recording the line, it can be closed.

Once the base and semi-kinematic data is recorded it can be imported into **EZSurv®** to post-process the position of sites, lines and polygons with centimeter accuracy.

2   Getting Started with EZField™

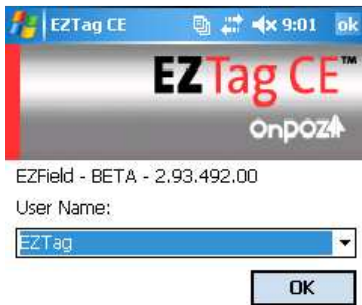## 2.1   Working with Survey Projects

This lesson will teach you the basics about working with survey projects in **EZField™**.
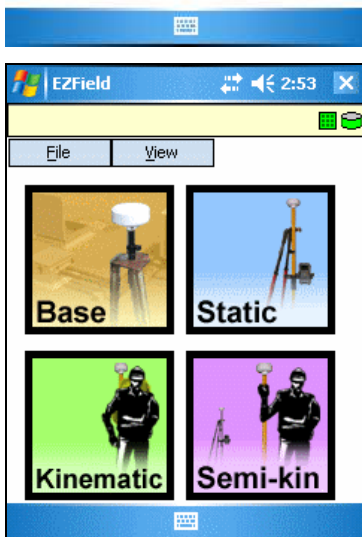
2.1.1   Starting the Application

To start **EZField™** selects **EZField** from the **Start** menu or from the **Start > Programs** menu.

Select a user and click on the **OK** button to enter **EZField™** with the selected user. The detault user name is **EZTag**.

EZField™ runs on top of **EZTag CE™**.

The **EZField™** application opens. The application offers a choice of four operating modes:

Base. Use this mode to record GNSS base station data.

Static. Use this mode to record static site data.

Kinematic. Use this mode to record rover data in kinematic mode.

Semi-kin. Use this mode to record rover data in semi-kinematic mode.

A chapter is dedicated to each mode in this document.

2.1.2   Setting the EZField™ Preferences

Before you start using **EZField™**, you should make a few simple settings from the **File > Preferences...** menu.
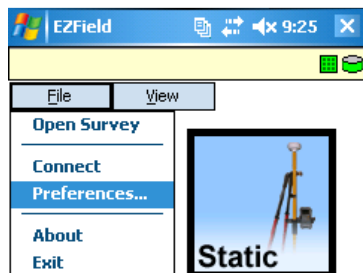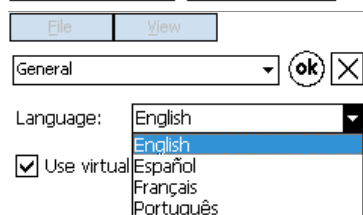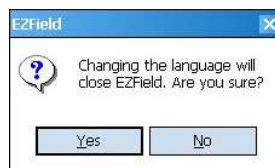
From the home page, select **Preferences...** from the **File** menu.

From each mode of operation (**Base**, **Static**, **Kinematic** and **Semi-Kinematic**) you can click the ⬆ button to get back to the home page. This button is only available when no survey is currently running.

The home page

To set the language to use for **EZField™** select **General** at the top then select the desired language from the **Language** field.

Changing the language requires the application to restart.

To set the measurement units to use for **EZField™** select **Units** at the top.
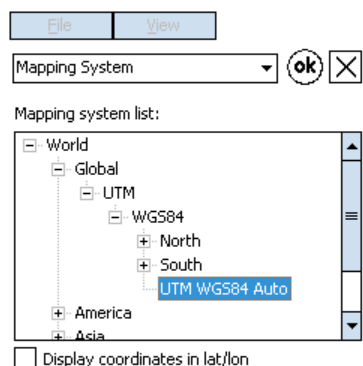
Select the linear units from the **Display** field. Choices include **International Feet**, **Metric** and **US Survey Feet**.
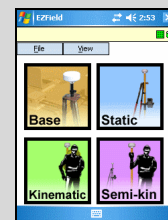
Select the angular units from the **Angle** field. Choices include **DMS** for degree, minute, second and **Degrees** for decimal degrees.

To set the projected coordinate system to use, select **Mapping System** at the top, then select the coordinate system from the list.
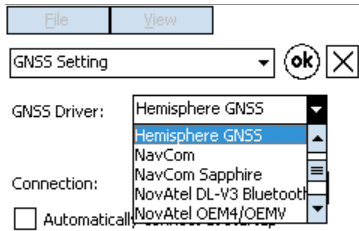
2.1.3   Selecting the GNSS Receiver

Important: If your GNSS receiver operates on a Bluetooth connection, please refer to the manual that came with your Windows Mobile device for details about how to setup the Bluetooth connection to your GNSS receiver. In this case establishing the Bluetooth connection is required before you select the GNSS receiver.

Before you start using **EZField™**, you must configure **EZField™** for the type of GNSS receiver you are using.
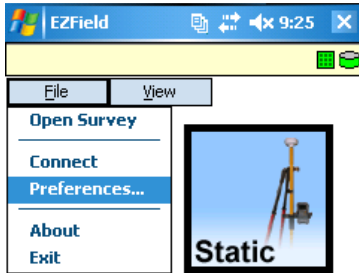
Select **Preferences** from the **File** menu to open the preferences window.

In the preferences window select **GNSS Setting**.

In the **GNSS Driver** combo box, select the driver for the type of GNSS receiver that you are using.
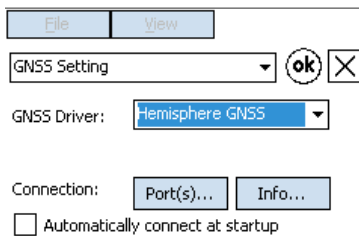
Make sure the **Automatically connect at startup** box is <u>not</u> checked.

Click the **Port(s)...** button to open the serial port selection window.
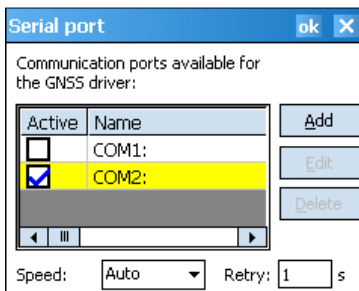
From the list, check only the serial port that is assigned to your GNSS receiver. Click **OK** to accept.

When a serial port is recognized as a Bluetooth port, the label **BTOUT** appears after the name of the port.

2.1.4   Connecting

Important: If your GNSS receiver operates on a Bluetooth connection, please refer to the manual that came with your Windows Mobile device for details about how to setup the Bluetooth connection to your GNSS receiver. In this case establishing the Bluetooth connection is required before you connect to the GNSS receiver.
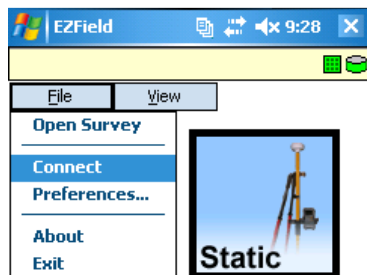
Follow these steps to connect to your GNSS Receiver.

Select **Connect** from the **File** menu to connect to the GNSS receiver.

If you are in view of the GNSS satellites the status bar of **EZField™** will gradually update to indicate that the connection is successful and that a number of satellites are visible.

The green icon on the left of the status bar indicates that there are enough (at least 4) satellites to begin operation. In this example 9 satellites are used to calculate GNSS positions.
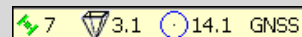
2.1.5 Selecting a Mode of Operation

To select a mode of operation among **Base**, **Static**, **Kinematic** and **Semi-kin** click on the corresponding button on the home page.
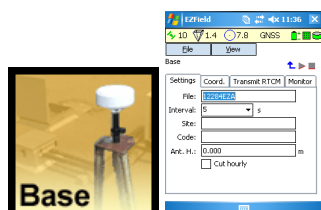
The **Base** button enters the GNSS base data collection mode.
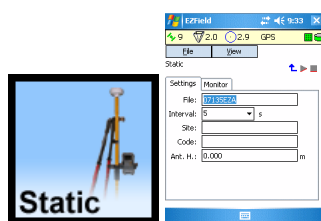
The **Static** button enters the static data collection mode.
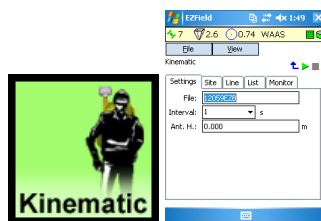
The **Kinematic** button enters the kinematic data collection mode.

The **Semi-kin** button enters the semi-kinematic data collection mode.

To return to the home page from any operation mode click on the ⬆ button.

Note that the ⬆ button is not available when a survey is running.

2.1.6   Starting and Stopping a New Survey

To start a new survey in any of the operation modes (base, static, kinematic or semi-kinematic) enter the name of the survey file in the **File** field and click on the ▶ button to start the new survey.

A default survey file name is proposed in the **File** field. You can leave it or type a new survey file name.

You cannot start a survey if the GNSS receiver is not connected.
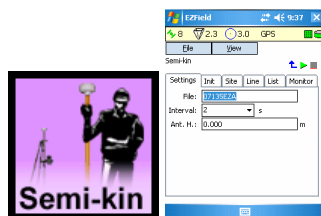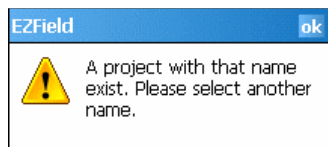
If a survey with that name already exists, a message will ask you to select a different survey file name.

Once the survey is started the ▶ will be grayed out and the red stop button ■ will become active.
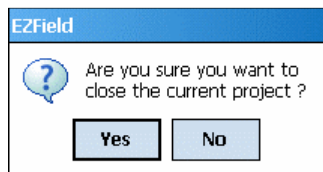
You will use the ■ button to stop the survey. A confirmation is asked when stopping a survey.

2.1.7   Opening and Closing an Existing Survey

Surveys in base and static modes cannot be reopened once closed. Surveys in kinematic and semi-kinematic modes can be reopened if you need to add data to these surveys.
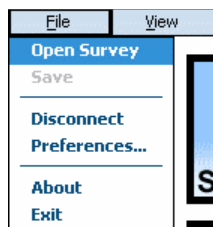
To open an existing survey first close the current survey and use the ⬆ button to go back to the home page.

Then select **Open Survey** from the **File** menu.
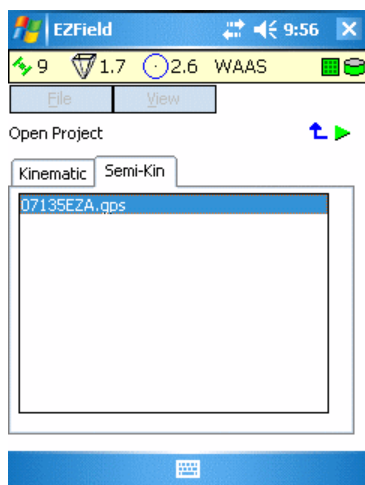
The **Open Project** window lists the available surveys. Select the desired survey from the list and click on the ▶ button so open it.

Once the survey is started the ▶ will be grayed out and the red stop button ■ will become active.
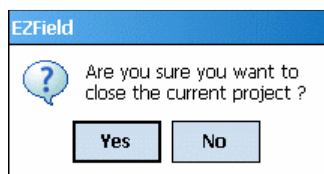
You will use the ■ button to stop the survey. A confirmation is asked when stopping a survey.

2.1.8 Viewing the Status of a Survey
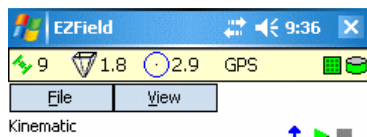
In any of the operation modes, the name of the mode (base, static, kinematic or semi-kinematic) is displayed in the **EZField™** project status area visible under the **EZField™** menu.
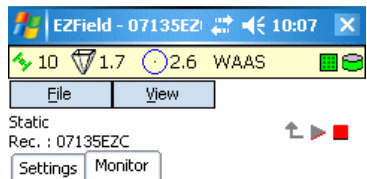
When a survey is running:

The 🡕 and ▶ buttons are disabled while the ■ button is enabled

The name of the survey and the number of objects collected is displayed

The content of the **Settings** tab is only available for viewing.
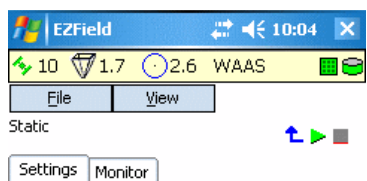
When a survey is not running:

The 🡕 and ▶ buttons are enabled while the ■ button is disabled

The content of the **Settings** tab is editable.

2.1.9   Export the Survey Features and GNSS Trace

With **OnPOZ Tools** for Windows, you can export features as well as the GNSS trace to ESRI Shapefile, AutoCAD DXF files, ASCII CSV files and Google Earth KMZ files.
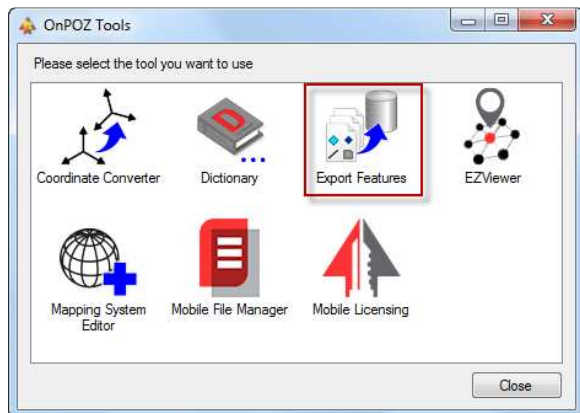
You start **OnPOZ Tools** using the **Start** menu in **All Programs > Effigis > OnPOZ Tools**.

Double-click on the **Export Features** item.
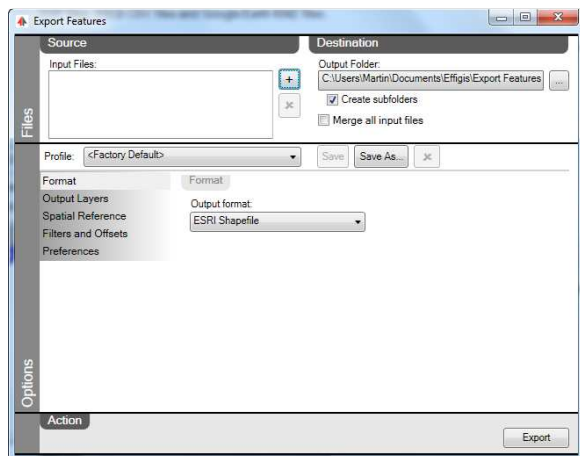
This opens the **Export Features** application.

See *EZSurv® User Guide* for more information about **Export Features**.

2.2   Using the GNSS

This lesson will teach you the basics about using the GNSS receiver in **EZField™**.

2.2.1   Using the GNSS Indicators in the Status Bar
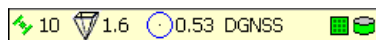
`✦ 10 ▽1.6 ◯0.53 DGNSS   ▦⬮`   The GNSS indicators are displayed at the left of the status bar.
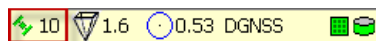
`✦ 10 ▽1.6 ◯0.53 DGNSS   ▦⬮`   The **connection/number of satellites indicator** displays the state of the GNSS receiver connection, and the number of satellites used by the receiver to computer the position of the observer.

If a receiver is connected and operating well, the indicator shows a small green satellite, followed by the number of satellites used to compute the position of the observer.

If there is a problem or if the system is searching for a GNSS receiver, the display of the connection/number of satellites indicator will vary.

The PDOP/HDOP indicator, the GNSS precision indicator and the GNSS solution type have various display modes.

See *Appendix A* for details.
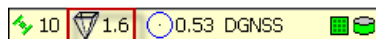
`✦ 10 ▽1.6 ◯0.53 DGNSS   ▦⬮`   The **PDOP indicator** displays the current value of the PDOP. This value helps in checking the quality of the geometry of GNSS constellations that are currently recorded by the GNSS receiver.

PDOP indicator is shown only when **Preferences > Alarms** is set to **PDOP**.

☑ | PDOP ▾ | > | 8.0 |
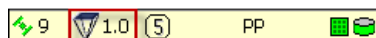
`✦ 9 ▽1.0 ⑤      PP   ▦⬮`   The **HDOP indicator** displays the current value of the HDOP. This value helps in checking the quality of the geometry of GNSS constellations that are currently recorded by the GNSS receiver.

HDOP indicator is shown only when **Preferences > Alarms** is set to **HDOP**.

☑ | HDOP ▾ | > | 8.0 |
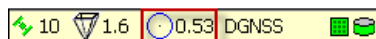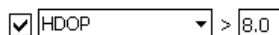
`✦ 10 ▽1.6 ◯0.53 DGNSS   ▦⬮`   The other two indicators display the RMS and the type of real time GNSS solution found by the receiver (GNSS or SBAS)
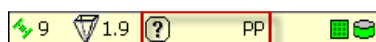
`✦ 9 ▽1.9 ⑦      PP   ▦⬮`   When a project (any type) is active, click once on the RMS indicator to see an indicator about the expected precision after post processing. Use this as a rough estimate only.

2.2.2   Viewing the GNSS Position Information

Choose **Position Information** from the **View** menu.
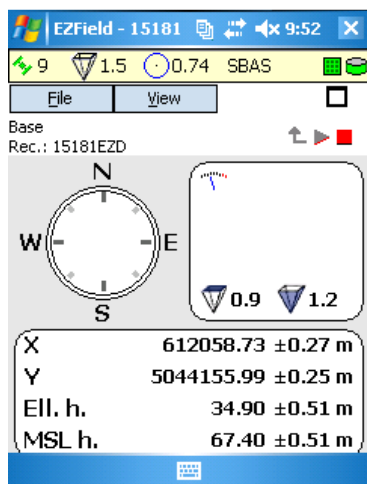
The position information window is displayed. This view contains the current position, indicators about the precision of the position, and DOP precision indicators.

Use the ☐ button to quit this view.

The direction indicator shows the approximate direction of displacement of the user.
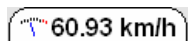
The speed indicator shows the instantaneous speed of displacement of the observer, since the last measurement.
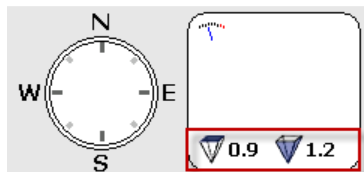
The **HDOP** and **VDOP** values are displayed to assist in judging the geometry of the satellite constellation.

The **X** and **Y** coordinates and the **height** of the current position are displayed in the current mapping system. The height is displayed in two forms:

Ell. h. shows the ellipsoidal height.

MSL h. shows the height relative to the mean sea level

Precision indicators about the position allow to evaluate the precision with which the current coordinates are computed by the GNSS receiver.

2.2.3   Viewing the Satellites Table
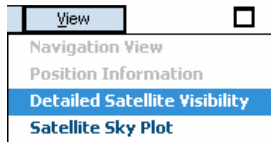
Select **Detailed Satellite Visibility** from the **View** menu.

Use the ☐ button to quit this view.

The satellite visibility window shows four columns: the **Satellite Number**, the **Angle of elevation**, the **Azimuth** and the **SNR** (Signal to Noise Ratio).

SNR is a measure of the ratio of the amplitude of the recovered GNSS carrier signal to the noise. The higher the value, the best it is.

The color of a satellite indicates the status:

Gray: the satellite is inactive, unusable or not visible.

Red: the satellite is below the mask angle or is not used to compute the solution.

Yellow: the satellite is a less than 5° above the mask an gle and is used to compute the solution.

Green: the satellite is above the mask angle and is used to compute the solution.

The geometric shape indicates the constellation for the satellite:

Circle: a **GPS** satellite.

Square: a **GLONASS** satellite.

Ellipse: a **SBAS** satellite.

Click on the header of a column to sort the list according to the values of that column. The column used for sorting is displayed in gray.

When you first click on a column header, the sort is ascending. In the example on the left, satellites number are sorted on ascending order.

Click again on the header of the column already having the sort and it will sort in descending order.

When there are more satellites than can be shown, you will see a button to go to the previous or next page.

In the example, clicking on the button at the bottom right will display the next page of satellites.

You now see the remaining satellites.

Clicking on the button at the top right will go back to the previous page of satellites.

2.2.4 Viewing the Satellites Sky Plot

Choose **Satellite Sky Plot** from the **View** menu.

Use the ☐ button to quit this view.
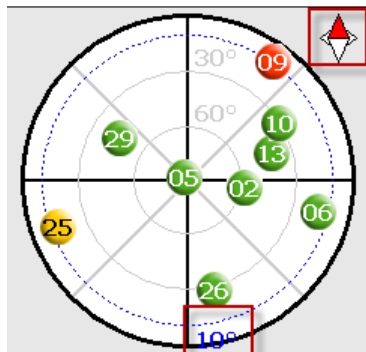
The **Satellite Sky Plot** shows a graphical plot of the position of the visible GNSS satellites in the sky.

A dotted blue line shows the mask angle. The mask angle value is shown in blue as well.

A compass displays the current heading.
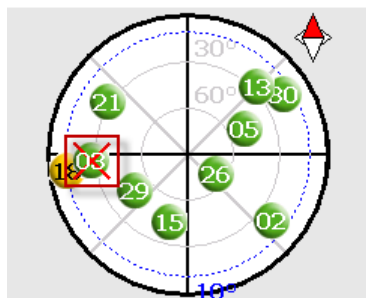
Red 'X': Indicates a satellite that is not used to compute the position.

2.2.5 Configuring the Motion Detector

A GNSS based motion detector can be activated for detecting motion in base and static modes, as well as when recording a site or vertex in kinematic and semi-kinematic modes. See the next section about how to use the motion detector.
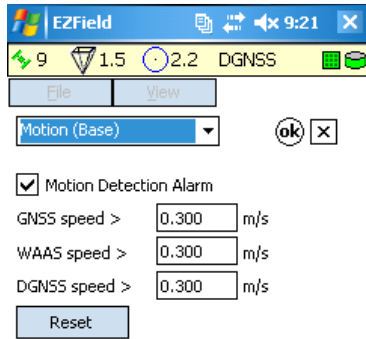
While in **Base**, **Static**, **Kinematic** or **Semi-Kinematic** mode, select **Motion** in the preferences window.

Check the **Motion Detection** Alarm box to enable motion detection (or leave it unchecked to disable it).

This option can be set independently for each mode (base, static, kinematic, semi-kinematic)

Motion is detected when the GPS receiver detects that the antenna is moving above a speed. This speeds comes preconfigured but you can adjust it manually if needed, for instance if you need more or less sensivity in detecting motions.

For convenience there are three separate speeds, corresponding to the type of GNSS solution computed by the receiver (GNSS, SBAS or DGNSS).

These options are global to all modes (base, static, kinematic, semi-kinematic); since it is related to the GNSS driver (they reflect the sensitivity of the GNSS receiver and antenna to motion).

Click the **Reset** button to return to the default speeds.

You would want to modify the speed values (or alternatively to disable the motion detection) if, while surveying, you get too many motions being detected while the antenna is not moving at all.

TIP: to set the speed, select the highest possible speeds that never generate a motion alarm while the antenna is not moving. See the next section about how motion alarms are displayed.

2.2.6   Using the Motion Detector

This section explains how the motion detector works. See the previous section about how to configure the motion detector.
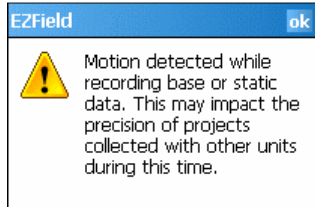
In **Base** and **Static** modes, the motion detector is active as soon as the project is started.

The motion detector will beep and display a message once to warn you that motion has been detected during the recording of the base or static data.
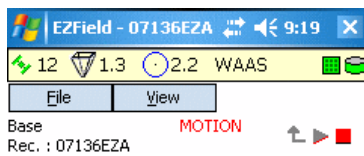
A reminding that a motion has occurred will be displayed in red letters until the project is closed.
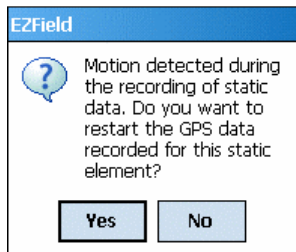
In **Kinematic** mode the motion detector warns you if the antenna has moved and lets you choose how to handle the motion detection on each occurrence.

Click **Yes** to restart the recording of the site or vertex from the start.

Click **No** to ignore the motion detection warning in which case the recording of the static data will resume.

In **Semi-kinematic** mode the motion detector warns you if the antenna has moved and restarts the captures of the GNSS data once you click **OK**.
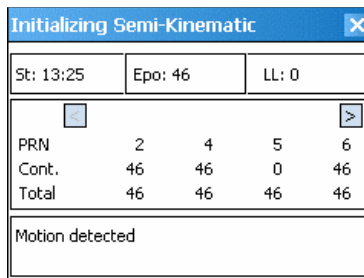
During the initializing phase in **Semi-kinematic** mode, the motion detector will simply warn the user and restart as soon as the motion has stopped.

In kinematic (or semi-kinematic) mode the motion is checked whenever you record a Site object, or add a Vertex into a Line or Polygon object.

It is also checked when an automatic vertex is added while pausing or resuming a Line or Polygon object.

3 Base and Static

The base mode is used to record data at a fixed site with known coordinates. The data collected at a base can be used later to post-process static or kinematic data recorded simultaneously with other units in the field.

3.1 Setting up to Record Base and Static Data

This lesson will teach you how to prepare for recording data in the Base and Static modes.

3.1.1   Setting up the Preferences for Recording Base or Static Data

While in the **Base** operation mode select **Preferences...** from the File menu then select **Alarms (Base)** to open the alarms preferences page for the base mode.

Usually you will want to uncheck all boxes so that no alarms are raised during the collection of the data for the base.

Now select **Base** in the preferences to open additional settings for the base.

Select the mask angle to use in the **Mask Angle** field.

Click on the **OK** button to save and exit the preferences.
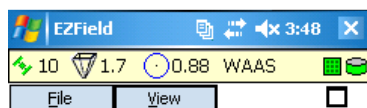
To check the visible satellites at that mask angle select **Satellite Sky Plot** from the **View** menu.
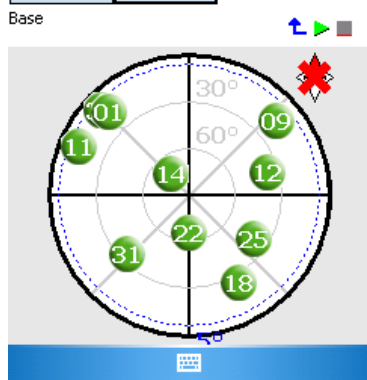
The mask angle is represented by a blue dotted line. Satellites below that angle are shown in red. Satellites above but close to that angle are shown in yellow. Satellites well above that angle are shown in green.

Click on the ☐ button to exit sky plot view.

The same procedure applies for setting the preferences the static mode except that the preferences pages are labeled **Alarms (Static)** and **Static**.

3.1.2   Entering the Parameters for Base or Static
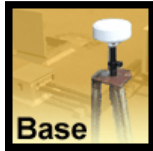
Click on the **Base** icon in the home page to enter the base operation mode.
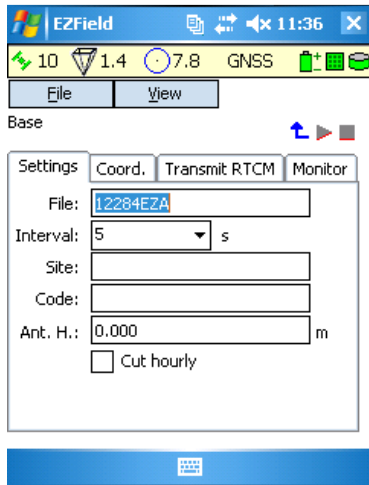
Select the **Settings** tab in the **Base** page.

By default the **File** field contains the proposed file name for the next base survey that you are going to start. You can change this name if you wish, but it has to be a name that has not been used before.

By default the **Ant.H.** field contains a default antenna height of 0 meter. You can change this value to match the height of the antenna that you are using.

Next fill in the **Interval**, **Site** and **Code** fields.

The **Interval** field defines the recording interval. The default value is 5 seconds but you can choose 1, 2, 5 or 10 seconds.

In the **Site** field enter a unique identifier of up to 16 characters for the base.

In the **Code** field enter an extra identifier of up to 4 characters to further identify the base. This is optional.

In **Base** mode only, you can check the **Cut hourly** box to have the base station data collected into GPS projects of one hour each. This is useful on a Desktop PC to operate a permanent Base. When **Cut hourly** is active the **File** field is empty and disabled, and a new file name will be generated at the beginning of each hour. In this case there will also be one sub-folder for each day.

The same procedure applies to the parameters for the static mode.

Remember that the ⬆ button returns you to the home page unless a survey is already running.

If a survey is running you need to stop it with the ■ button before you can get back to the home page.

The **Ant.H.** field records the antenna height for the project. Separate values of antenna heights are saved for each operation modes (base, static, kinematic and semi-kinematic).

This antenna height is measured from the ground up to the vertical center of the antenna.

At any time while the base is running you will be able to change the antenna height. This is useful if you realize that you made a mistake in specifying the antenna height at first. **Warning**: This is not to be used for varying physically the antenna height during the course of base recording.

From the **Settings** tab click on **Edit Antenna Height**.

Enter the correct antenna height in the **Ant. H.** field, and click **Commit** to save the change, or **Cancel** to leave the antenna height unchanged.

3.1.3   Entering the Coordinates of the Base

To operate in base mode (but not in static) you need to enter the known coordinates of the base. Usually you will do this in the field, although you can delay the entry of the coordinates until it is time to use the base for post processing GNSS data.

Select the **Coord.** tab in the **Base** page.

Under **Type**, select **Manual coordinates entry** to enable the manual entry of the coordinates of the base.

Before you enter the coordinates manually you have the option to click the **GNSS** button to capture the approximate coordinates of the base using the GNSS receiver.

If you select **Unknown Coordinates** then you will have to enter the coordinates of the base later, when post processing the GNSS data using **EZSurv®**.

You can also select the coordinates of an existing Global site from the **Type** list box. If you do so, then the name of the selected Global site will be also copied to the **Site** field in the **Settings** page.

In the **Projection** field select the coordinate system to use for entering coordinates. See the section entitled ***Setting the EZField™ Preferences*** for how to select the projected coordinate system that is displayed here.

It is best to enter the exact coordinates of the base rather than approximate it with the GNSS button.

One use of the GNSS button is to confirm that you really are at the right spot for installing the base. Then you enter the precise known coordinates manually.

If you have selected a projected coordinate system type the coordinates in the **X** and **Y** fields.

If you have selected a geographic coordinate system type the coordinates in the **Lat** and **Lon** fields in the WGS84 datum. When using a geographic coordinate system, the **Lat** and **Lon** values can be either entered using the DMS or the Degrees mode, as configured in the **EZField™** preferences. See the section entitled ***Setting the EZField™ Preferences*** for details.

When using a projected coordinate system the **X** and **Y** values are entered decimal numbers with a precision of 3 digits after the decimal point.

In DMS mode enter the number of degrees, minutes, decimal seconds and the hemisphere for the value.

In Degrees mode, you enter a single positive or negative value representing the value for the latitude or longitude. The sign of the number determines if the value is for north/south and east/west.

Enter the ellipsoidal height of the base in meters.

3.2   Recording Base and Static Data

This lesson will teach you how to record data in the Base and Static modes.

3.2.1   Recording a Base or Static Survey Project
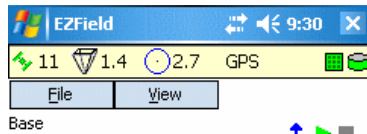
While in the base or static operation mode click on the ▶ button to start recording data.

This will open the **Monitor** tab.

The **Monitor** tab displays the status of the survey.

The **St** field displays the start time of the survey.

The **Epo** field displays the total number of epochs recorded so far.

The **LoL** field displays the number of loss of lock observed so far.

The **Elapsed** field displays the time elapsed since the start of the survey.
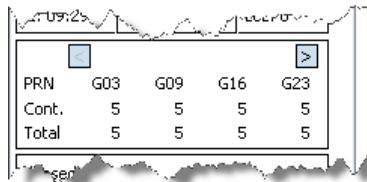
The rest of the information is displayed on one column for each of the satellites.

The **PRN** row shows the number of the satellite. Use ◁ and ▷ buttons to scroll through the list of satellites.

The **Cont** row shows the number of consecutive epochs without cycle slip recorded for this satellite while the **Total** row shows the total number of epochs recorded for this satellite.

When you have recorded the amount of data required for your survey press the ■ button to terminate recording of the current survey. Confirmation will always be requested when stopping a survey.

When using the **Cut hourly** option in Base mode, the Monitor tab will show the statistics for the current hour only and will reset at the start of each hour.

3.3   Transmitting RTCM Corrections

This lesson will teach you how to enable the transmission of RTCM corrections. This requires a radio for the actual transmission.

3.3.1 Requirements for Transmitting RTCM Corrections

The base mode can be configured to transmit RTCM corrections. To do this you will need:

- Run the base mode with a GNSS connection to a **u-blox** receiver. Transmitting RTCM corrections is not supported for other types of receivers.

- You need a radio for transmitting the RTCM corrections. The radio must be connected to an extra serial port. **EZField™** will compute the RTCM corrections and use this port to send the RTCM corrections to the radio.

In order to transmit RTCM corrections, you must also specify the exact location of the base. Select **Manual coordinates entry** from the **Type** list in the **Coord** tab of the base.

3.3.2   Setting up for Transmitting RTCM Corrections

Once the requirements for transmitting RTCM corrections are met, you can use the Transmit RTCM tab to configure the RTCM transmission.

Check the **Transmit RTCM Corrections** box to enable the calculation of RTCM corrections.

The calculated RTCM corrections will be transmitted to the radio connected to the serial port. It can be configured as follows.

Station ID – Enter an identifier that will be assigned to this base along with the RTCM corrections.

Comm. Port – Select the port to which the radio is attached.

Baud Rate – Select the baud rate for the radio.

Parity – Select the parity for the radio.

Data Bits – Select the number of data bits for the radio.

Stop Bits – Select the number of stop bits for the radio.

The **Transmit RTCM Corrections** box is grayed out and unchecked if the selected GNSS receiver is not one of the supported types. See the section entitled *Requirements for Transmitting RTCM Corrections* for details.

4   Kinematic

4.1   Setting up to Record Kinematic Data

This lesson will teach you how to prepare for recording data in **Kinematic** mode.

4.1.1 Setting the Preferences for Recording Kinematic Data

Click on the **Kinematic** icon in the home page to enter the kinematic operation mode.

While in the kinematic operation mode, select **Preferences...** from the File menu then select **Alarms (Kinematic)** to open the alarms preferences page for the kinematic mode.

Check the alarms that you need during the recording of the kinematic surveys.

Now select **Kinematic** in the preferences to open additional settings for the kinematic mode.

Set the mask angle in the **Mask Angle** field.

Check **Auto Increment site ID** to automatically increment the trailing number or letters of the identifier of each new site that you enter. Leave unchecked to manually control the assignment of site identifiers.

Use the **Vertex** fields to define the duration of vertices that are captured in lines and polygons. You can define the duration as a fixed or minimal number of **Epochs** or **Seconds**.

Click **Auto commit new Site** to automatically commit sites with fixed durations when the GNSS capture reaches 100% on these sites.

Enter a distance in the **Site validator range** field to specify the maximum distance between two sites with the same name.

Click on the **OK** button to save and exit the preferences.

Remember that the ⤴ button returns you to the home page unless a survey is already running.

If a survey is running you need to stop it with the ▪ button before you can get back to the home page.

To check the visible satellites at that mask angle, select **Satellite Sky Plot** from the **View** menu. Then click on the ▫ button to exit sky plot view.
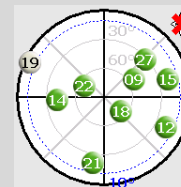
The mask angle is represented by a blue dotted line. Satellites below that angle are shown in red. Satellites above but close to that angle are shown in yellow. Satellites well above that angle are shown in green.

Use **Increment Step** to select the step for incrementing numbers. Letters are only incremented by one.

Example 1: with Increment Step activated with a step of 5, Pole15 will increment to Pole20.

Example 2: PoleB increments to PoleC

(Only trailing letters with the same case are incremented)

There is a separate **Auto commit new Site** checkbox for the Semi-Kinematic mode.

A confirmation is asked when a site with the same name as another site is captured at a distance above the distance specified in the **Site validator range** field.

4.1.2   Entering the Parameters for Kinematic Mode
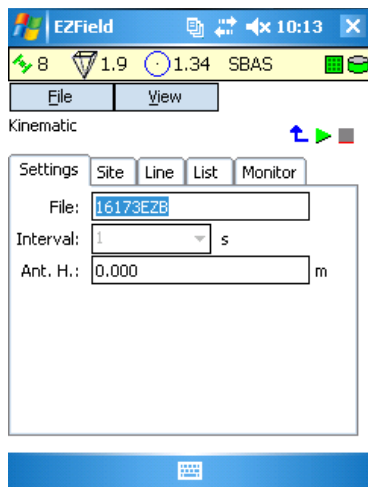
While in the kinematic operation mode Select the **Settings** tab in the **Kinematic** page.

By default the **File** field contains the proposed file name for the next survey that you are going to start. You can change this name if you wish, but it has to be a name that has not been used before.

By default the **Ant.H.** field contains a default antenna height of 0 meters. You can change this value to match the height of the antenna that you are using.

The **Ant.H.** field records the antenna height for the project. Separate values of antenna heights are saved for each operation modes (base, static, kinematic and semi-kinematic).

This antenna height is measured from the ground up to the vertical center of the antenna.

4.2   Recording Kinematic Data

This lesson will teach you how to record sites, lines and polygons in **Kinematic** mode.

4.2.1   Starting and Stopping a Kinematic Survey Project
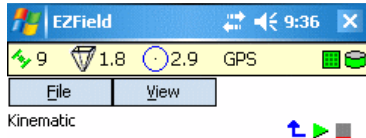
While in the kinematic operation mode click on the ▶ button to start a new kinematic survey project.

This will open the **Monitor** tab.

To open an existing kinematic survey, select **Open Survey** from the **File** menu when no project is currently running.

The **Monitor** tab displays the status of the survey.

The **St** field displays the start time of the survey.

The **Epo** field displays the total number of epochs recorded so far.

The **LoL** field displays the number of loss of lock observed so far.

The **Elapsed** field displays the time elapsed since the start of the survey.
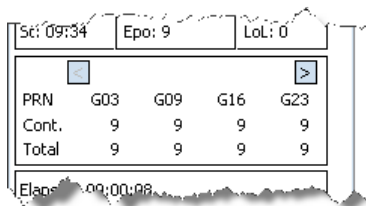
The rest of the information is displayed on one column for each of the satellites.

The **PRN** row shows the number of the satellite. Use ◁ and ▷ buttons to scroll through the list of satellites.

The **Cont** row shows the number of consecutive epochs without cycle slip recorded for this satellite while the **Total** row shows the total number of epochs recorded for this satellite.

To terminate the survey press the ■ button. A confirmation will be requested to stop the survey.

4.2.2 Recording a Site

Select the **Site** tab in the **Kinematic** page.

This page is identical in every way to the one in **Semi-Kinematic**.

EZField can automatically increment a default value for the Site field for each site. See the section entitled *Setting the Preferences for Recording Kinematic Data* for details.

Use the **Site** and **Code** fields to enter information that will identify this site.

Use the **Ant. H.** field to enter the antenna height. The default value is defined in the kinematic preferences, see the section entitled *Setting the Preferences for Recording Kinematic Data* for details.

Use the **Duration** field to select the duration for data collection of each site. The duration can be set as a minimal or fixed value in epochs or in seconds.

When the **Duration** field is set to a number of **Epochs & Up** or **Seconds & Up** the progress bar will start showing the number of seconds collected after it has reached 100% completion of the minimum number of epochs or seconds.

Click on the **Start recording** button to record a site.

A progress bar indicates the percentage of completion for this site.

While recording is in progress you can use the **Cancel** button to cancel the recording, or you can use the **Commit** button to finish and save the site before it has reached full completion.

When the site is collected the progress bar turns green and shows 100% completion. Click on the **Commit** button to save this site to your survey, or click **Cancel** to cancel this site. Note that if this is a site with fixed duration and the **Auto commit new Site** box is checked in the Kinematic preferences, the commit operation will be automatic at 100% completion.

When the **Duration** field is not **Epochs & Up** or **Seconds & Up**, a distinctive sound is heard when the capture is 100% complete.

To restart recording for this site, click on the progress bar.

4.2.3   Recording a Line or Polygon in Discrete Mode
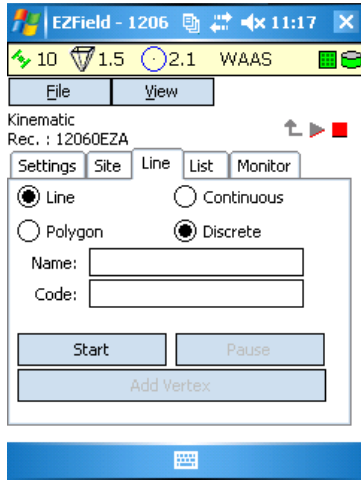
Select the **Line** tab in the **Kinematic** page.

Select either the **Line** or **Polygon** radio button to record a line or a polygon. The recording of lines and polygons works the same once this choice is made.

Use the **Name** and **Code** fields to identify the line or polygon.

Select **Discrete** to prepare for starting a line or polygon in discrete mode.

In **Continuous** mode, the line is captured continuously with the incoming GNSS positions at a 2 seconds interval. This results in a line that closely follows the path of the operator.

Click on the **Start** button to start recording the line or polygon.

Click on the **Add Vertex** button to add each vertex manually to the line or polygon.

For a line, you need to add at least two vertices. For a polygon you need at least three.

In **Discrete** mode, the GNSS position must be entered manually by the operator using the **Add Vertex** button. This results in a line that follows a path defined by locations decided by the operator along his way.

When done recording the line or polygon click on the **Stop** button.

No vertex is automatically added when stopping a line or polygon in discrete mode. If you need a vertex at the location where you stop the line or polygon, click on **Add Vertex** before clicking on **Stop**.

4.2.4   Recording a Line or Polygon in Continuous Mode

Select **Continuous** to prepare for starting a line or polygon in continuous mode.

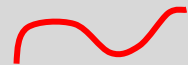Click on the **Start** button to start recording the line or polygon.

Once recording is started the **Stop**, **Pause** and **Add Vertex** buttons are available.

Click on the **Pause** button to pause the line. During a pause, the recording of the line or polygon is temporarily stopped. The **Pause** button changes to a **Resume** button, and the **Add Vertex** button is disabled.

Click on the **Resume** button to continue the line or polygon.

Click on the **Add Vertex** button to add vertices manually to the line or polygon.

When done recording the line or polygon, click on the **Stop** button.

You can mix the continuous and discrete modes as desired. Simply click on the **Continuous** or **Discrete** radio button during the recording of a line or polygon when you need to switch.

A vertex is automatically added when you click on Pause or Resume during the recording of a line or polygon in continuous mode.

A vertex is also automatically added when switching between the continuous and discrete modes.

4.2.5 Listing the Recorded Sites, Lines and Polygons
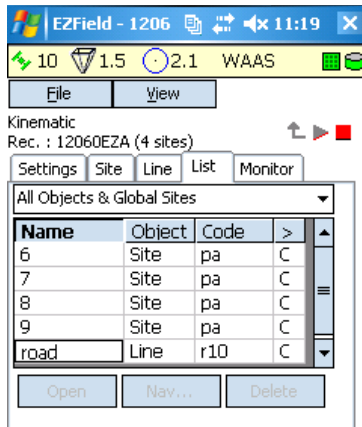
Select the **List** tab in the **Kinematic** page to view of list of the sites, lines and polygons that have been recorded in the survey, or to view the available global sites.

The **Filter** field allows selecting the type of objects to list.

The **Name** column shows the name of the site, line or polygon.

The ⟩ column displays **C, O** or **P** to indicate that the line or polygon is closed (**C**), open (**O**) or paused (**P**). Only one object is open at a time.

Double-click on the ⟩ column heading to view more columns.

The **Object** column displays the type of object (**G. Site**, **Site**, **Line** or **Poly**).

The **Code** column displays the code entered for the site, line or polygon.

The **Start** column displays the date and time at which the recording of the site, line or polygon was started.

The **Duration** column displays the duration of the capture of the site, line or polygon. When duration is displayed the **Start** column only shows the start time.

To delete an object select it from the list and click on the **Delete** button. A confirmation is asked, answer **Yes** to confirm the deletion.

To reopen a site, line or polygon select it from the list and click on the **Open** button. This reopens the **Site** or **Line** tab depending on the type of object selected. This allows you to recapture the location of a site, or to continue the capture of a line or polygon.

The **Filter** field enables filtering the list to viewing only a specific set of objects or global sites. The available choices are:
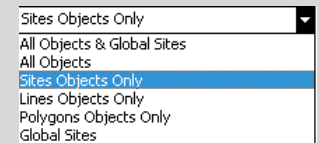
You can mix the continuous and discrete modes as desired. Simply click on the **Continuous** or **Discrete** radio button during the recording of a line or polygon when you need to switch.

Global sites (**G. Site**) cannot be deleted within **EZField™**. It must be edited with **EZSurv®**, and then transferred to **EZField™**.

4.2.6   Navigating to a Site

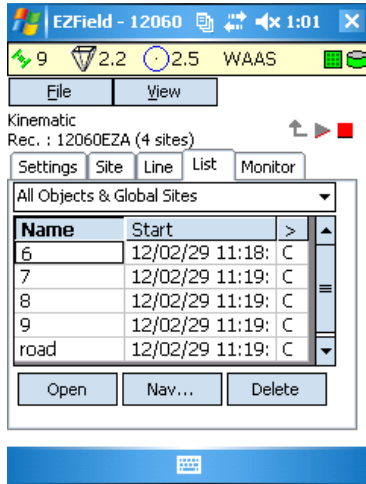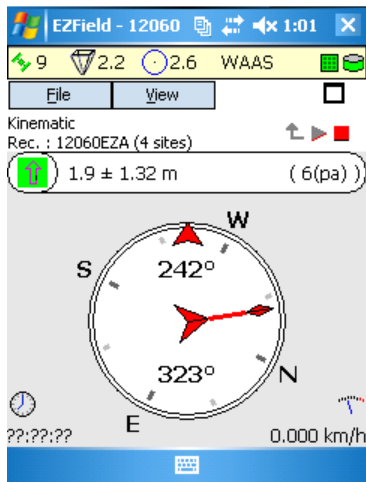Select the **List** tab in the **Kinematic** page and select a site object from the list. This enables the Nav... button.

Click on the Nav... button to start navigation to the selected site.

The Nav... button is only available for site and global sites.

The navigation view is displayed. You can alternatively enter the navigation view by selecting **Navigation View** from the **View** menu.

To walk towards the selected site, keep the arrow aligned with the top of the compass. In this example you should turn around in order to get aligned straigth with the target site.

The top of the navigation view displays the distance left, as well as the name and code of the object.

4.9 ± 3.64 m   (6(pa))

The bottom left of the view displays the estimated time left to the destination, and the bottom right displays the current speed.

00:00:08   3.400 km/h

The arrow turns green when you are walking in line with your destination site.
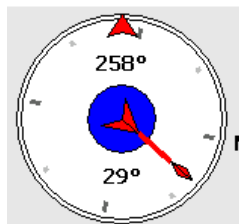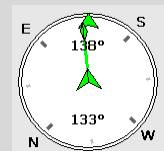
When the destination is reached the center of the compass turns blue.

Click on the ☐ button to exit the navigation view.

5   Semi-Kinematic

5.1   Setting up to Record Semi-Kinematic Data

This lesson will teach you how to prepare for recording data in **Semi-Kinematic** mode.

5.1.1 Setting the Preferences for Recording Semi-Kinematic Data

Click on the **Semi-Kin** icon in the home page to enter the semi- kinematic operation mode.

While in the semi-kinematic operation mode select **Preferences...** from the File menu then select **Alarms (Semi-Kinematic)** to open the alarms preferences page for the semi-kinematic mode.

Check the alarms that you need during the recording of the semi-kinematic surveys.

Now select **Semi-Kinematic** in the preferences to open additional settings for the semi-kinematic mode.

Set the mask angle in the **Mask Angle** field.

Check **Auto Increment site ID** to automatically increment the identifier of each new site that you enter. Specify the increment in the **Increment Step** field. Otherwise leave unchecked to manually control the assignment of site identifiers.

Use the **Vertex** fields to define the duration of vertices that are captured in lines and polygons. You can define the duration as a fixed or minimal number of **Epochs** or **Seconds**.

Click **Auto commit new Site** to automatically commit sites with fixed durations when the GNSS capture reaches 100% on these sites.

Enter a distance in the **Site validator range** field to specify the maximum distance between two sites with the same name.

Click on the **OK** button to save and exit the preferences.

5.1.2   Entering the Parameters for Semi-Kinematic Mode

While in the semi-kinematic operation mode Select the **Settings** tab in the **Semi-Kinematic** page.

By default the **File** field contains the proposed file name for the next survey that you are going to start. You can change this name if you wish, but it has to be a name that has not been used before.

By default the **Ant.H.** field contains a default antenna height of 0 meters. You can change this value to match the height of the antenna that you are using.

The **Ant.H.** field records the antenna height for the project. Separate values of antenna heights are saved for each operation modes (base, static, kinematic and semi-kinematic).

This antenna height is measured from the ground up to the vertical center of the antenna.

5.2 Recording Semi-Kinematic Data

This lesson will teach you how to record sites, lines and polygons in **Semi-Kinematic** mode.

5.2.1　Starting and Stopping a Semi-Kinematic Survey Project

While in the semi-kinematic operation mode click on the ▶ button to start a new semi-kinematic survey project.

This will open the **Init** tab.
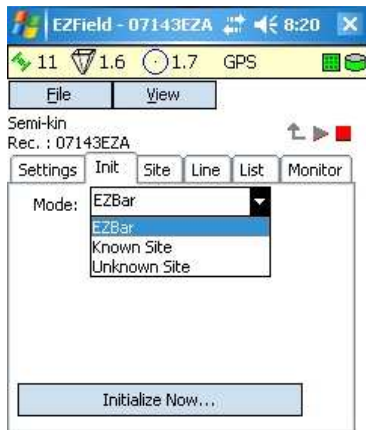
The **Init** tab is where you must initialized at the beginning of a semi-kinematic survey or following a loss of lock during the course of a semi-kinematic survey.

The **Mode** field allows you to select the initialization mode between **EZBar**, **Known Site** and **Unknown Site**.

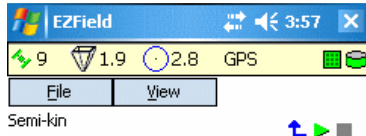The following sections describe each of the initialization modes in details.

To terminate the survey, press the ■ button. A confirmation will be requested to stop the survey.

During the recording of a semi-kinematic survey the **Monitor** tab displays the current statistics for the survey.

The **St** field displays the start time of the survey.

The **Epo** field displays the total number of epochs recorded so far.

The **LoL** field displays the number of loss of lock observed so far.

The **Elapsed** field displays the time elapsed since the start of the survey.

The rest of the information is displayed on one column for each of the satellites.

The **PRN** row shows the number of the satellite. Use < and > buttons to scroll through the list of satellites.

The **Cont** row shows the number of consecutive epochs without cycle slip recorded for this satellite while the **Total** row shows the total number of epochs recorded for this satellite.

5.2.2   Initializing on an EZBar
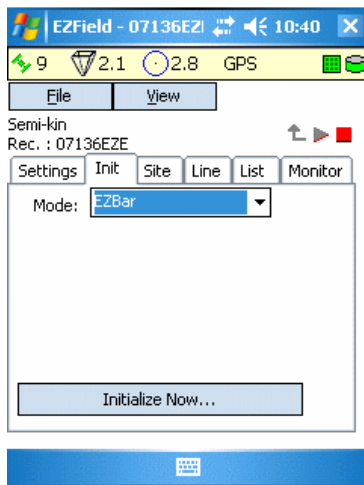
Under the **Init** tab, select **EZBar** in the **Mode** field to enter the EZBar initialization mode.

Fix the antenna of your GNSS receiver to the end of the EZBar (**the distance between your antenna and the base antenna must be exactly 20cm**).

During the course of initialization the time remaining for initialization may be displayed.

If a loss of lock occurs while initializing, then the initialization time will be longer since there **EZField™** must collect enough data without loss of lock for the initialization to be successful.
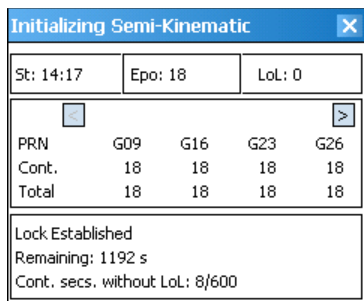
Click on the **Initialize Now...** button to start the initialization. This opens the **Initializing Semi-Kinematic** window. The initialization will take two minutes, but can take longer because an initialization on an EZBar requires a continuous period of at least 60 seconds without loss of lock.

The **Cont. Secs. without LOL** field indicates *C*/**60** where *C* is the number of continuous seconds without loss of lock. The counter starts at *1*/**60** and increases. If a loss of lock occurs before reaching *60*/**60** then the counter is reset to *1*/**60**. The initialization cannot terminate unless this counter reaches *60*/**60**, at which point this counter will be hidden.

When lock is established, it will restart automatically.

Once the initialization is complete, the window will close automatically.

When the initialization is complete the fields of the **Init** tab are disabled.

This means that you can now collect high precision rover data with the **Site** and **Line** tabs, until a loss of lock occurs.

To cancel the initialization, click on the ☒ button at the top right corner of the **Initializing Semi-Kinematic** window.
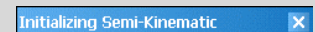
5.2.3   Initializing on a Known Site by Entering the Coordinates Manually

Under the **Init** tab, select **Known Site** in the **Mode** field to enter the known site initialization mode.

Use the **Dist from base** field to select the approximate distance from the base (**0-10km**, **10-15km** or **15-20km**).

Select **Unlisted site** from the **Site** field.

Click on the **Initialize Now...** button to open the **Unlisted site information** window.
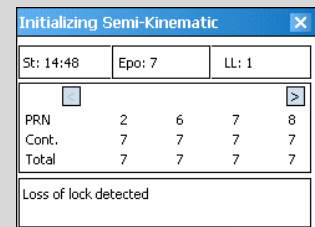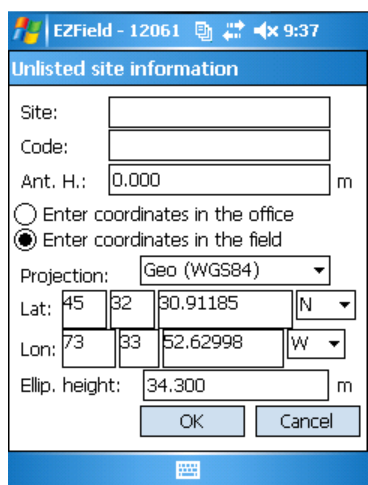
Use the **Site**, **Code** and **Ant. H.** fields to name this initialization site, to give it a code and to enter the antenna height.

If you have the precise coordinates with you in the field, click on **Enter coordinates in the field** to enter the coordinates of the initialization site. If you don't have the precise coordinates with you in the field, click on Enter coordinates in the office instead.

Select **Geo (WGS84)** in the **Projection** field and use the **Lat** and **Lon** fields to enter the latitude and longitude coordinates of the initialization site. Use the **Ellip. height** field to enter the ellipsoidal height of the initialization site. Defaults values are proposed for convenience, but you need to enter the precise coordinates of the initialization site.

If you select another value than **Geo (WGS84)** in the **Projection** field, then this means that you will be entering the X and Y coordinates in the selected projection, instead of entering latitude and longitude. To choose the projection select the **File > Preferences...** from the **EZField™** main page, and go under the **Mapping System** section.
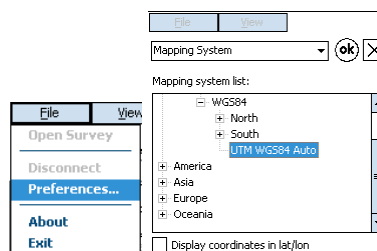
Initializing Semi-Kinematic ✕

St: 11:51	Epo: 1801	LL: 15

PRN	G05	G09	G12	G14
Cont.	33	33	33	33
Total	942	1219	946	1223

Lock Established
Remaining : 80 s
Cont. Secs. without LOL: 11/45

Click **OK** to perform the initialization. The following table lists the minimum initialization time as a function of the distance to the base.

Distance from base	Minimum initialization time
0-10 km	20 seconds
10-15 km	45 seconds
15-20 km	90 seconds

Initialization time can be higher than the minimum listed above because an initialization on a know site requires a continuous period **P** of at least half the initialization time without loss of lock, as listed in the following table:

Distance from base	Minimum continuous period P
0-10 km	10 seconds
10-15 km	22 seconds
15-20 km	45 seconds

The **Cont. Secs. without LOL** field indicates *C*/**P** where *C* is the number of continuous seconds without loss of lock. The counter starts at *1*/**P** and increases. If a loss of lock occurs before reaching *P*/**P**, then the counter is reset to *1*/**P** again. The initialization cannot terminate unless this counter reaches *P*/**P**, at which point this counter will be hidden.

These rules also hold for initializing on a know site by selecting an existing site, as described in the following section.

5.2.4   Initializing on a Known Site by Selecting an Existing Site
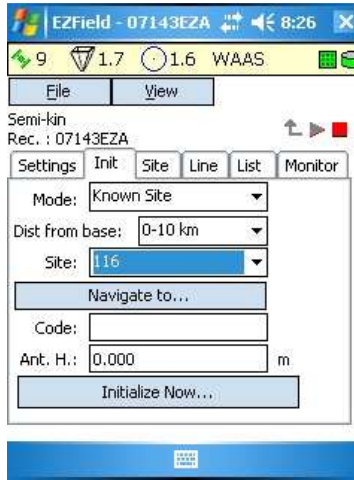
Under the **Init** tab, select **Known Site** in the **Mode** field to enter the known site initialization mode.

Use the **Dist from base** field to select the approximate distance from the base (**0-10km**, **10-15km** or **15-20km**).

Select the name of a site from the **Site** field. See later in this chapter on how to record a site.

Use the **Code** field to enter an optional code for this initialization site. Use the **Ant. H.** field to enter the antenna height.

Click on the **Initialize Now...** button to start the initialization. See the previous section for details about this step.

Global sites and regular sites with durations of 10 seconds or more are listed. Sites are sorted by distance from the antenna, starting with the closest one.

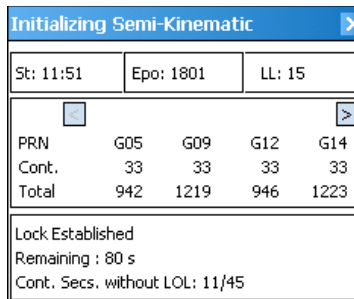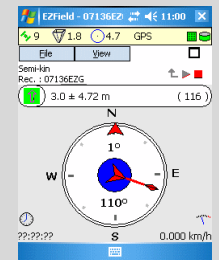Use the **Navigate to...** button to show a compass that will help you navigate to the selected site.

See the section entitled *Navigating to a Site* for details about how to use the navigation compass.

Click on the ☐ button to exit navigation view.

Using global sites from EZSurv®:

You can export a list of global sites from **EZSurv®**, as follows:

From **EZSurv®**, use the **Tools > Export > Sites...** menu and select **<Global Sites>** in the **Export Profile** dropdown box.

Select the sites to export and click **OK** to start the export.

You can also manipulate the list of global sites from EZSurv® as follows:

From **EZSurv®**, use the **Tools > Global Sites...** menu to edit the global sites directly.

Global Sites export in **EZSurv®**

Once the export is done using either method; copy the files GlobalSites.dbf and GlobalSites.cdx from your PC to the clipboard. These files are normally located under the **C:\Documents and Settings***MyUser***\Application Data\Effigis\Sites** folder on **Windows XP** or under the **C:\Users***MyUser***\AppData\Roaming\Effigis\Sites** folder on **Windows Vista**, **Windows 7**, **Windows 8**, **Windows 8.1** or **Windows 10**.

Paste the files GlobalSites.dbf and GlobalSites.cdx to the **\Application Data\Effigis\Sites** folder on the device.

Global Sites Editor in **EZSurv®**

5.2.5 Initializing on an Unknown Site

Under the **Init** tab, select **Unknown Site** in the **Mode** field to enter the unknown site initialization mode.

Use the **Dist from base** field to select the approximate distance from the base (0-10 km, 10-15 km or 15-20 km).

Use the **Site** field to enter a site name for this unknown site. Use the **Code** field to enter an optional code for this initialization site. Use the **Ant. H.** field to enter the antenna height.
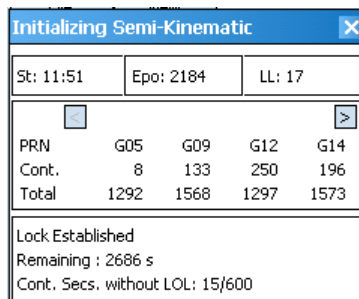
Click on the **Initialize Now...** button to start the initialization. The following table lists the minimum initialization time as a function of the distance to the base.

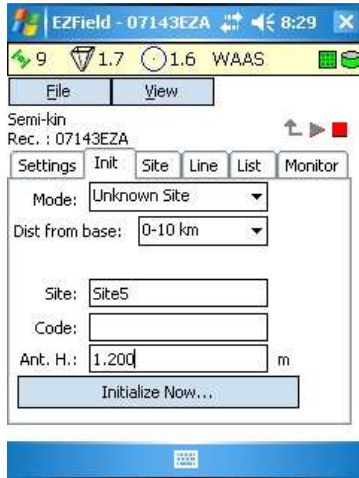| Distance from base	Minimum initialization time
0-10 km	20 minutes
10-15 km	30 minutes
15-20 km	45 minutes

Initialization time can be higher than the minimum listed above because an initialization on an unknown site requires a continuous period of at least 600 seconds without loss of lock.

The **Cont. Secs. without LOL** field indicates *C*/600 where *C* is the number of continuous seconds without loss of lock. The counter starts at *1*/600 and increases. If a loss of lock occurs before reaching *600*/600, then the counter is reset to *1*/600 again. The initialization cannot terminate unless this counter reaches *600*/600, at which point this counter will be hidden.

5.2.6   Recording Sites, Lines and Polygons

The semi-kinematic mode allows you to record sites, lines and polygons, just as in kinematic mode. Refer to section *Recording Kinematic Data* for the basics about recording sites, lines and polygons.

The following special cases apply to recording sites, lines and polygons in semi-kinematic mode:

Special case in semi-kinematic mode	Effect on recording in semi-kinematic mode
When a loss of lock occurs during the recording of a site	The site will be terminated automatically if not enough GNSS data has been collected for it. or The site will be saved if the data collected for it is sufficient. In either case a new initialization will be needed as described in the previous sections.
When a loss of lock occurs during the recording of a line or a polygon	A new initialization is needed as soon as possible if you want the best possible precision for the collected lines and polygons.
When a motion is detected during the recording of a site	The user will be informed that a motion was detected and that the site will be automatically restarted as soon as the motion stops.

Note: It is permitted to record sites while the semi-kinematic project is not initialized but, if such sites are recorded, they will not appear in the list of known sites that can be used to initialize the project.

The following special cases apply to listing and editing sites, lines and polygons from the List tab of the semi-kinematic mode:

| Special case in semi-kinematic mode	Effect on listing and editing in semi-kinematic mode
Listing initialization sites	Initialization sites are listed with the object type "[Site]"
Opening and deleting initialization sites	It is forbidden to open or delete an initialization site. However it is allowed to delete an occupation of an initialization site, but only if there has been no initialization on this site after this occupation.
Editing a site	When editing a site you cannot renew its GNSS position.
Editing a site with more than one occupation	When editing a site that has been occupied more than once, you cannot change its name nor delete it.

6   Appendix A: More about the GNSS Receiver

6.1.1   Connection Indicator
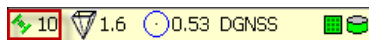
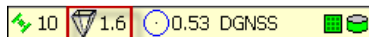|	
	The **connection indicator** is the first item of the status bar.
Nothing displayed	**EZField™** is configured for manual connection, and no search for the GNSS receiver is currently underway.
Alternating between and	**EZField™** is searching for a connection to a GNSS receiver.
	EZField™ is connected to a GNSS receiver.
Alternating between and	**EZField™** is connected to a GNSS receiver and is waiting for the receiver to be ready for use.
	EZField™ is connected to a GNSS receiver, and the data received is valid and useable.
Alternating between and	**EZField™** is connected to a GNSS receiver, but the number of visible satellites is less than the minimum number specified in the number of satellites alarm.
Alternating between and	**EZField™** has lost the connection to the GNSS receiver and is trying to get it back.
	EZField™ has failed to connect to a GNSS receiver and the program has given up trying to connect.

6.1.2   PDOP/HDOP Indicator

|	
`10  1.6  0.53 DGNSS`	The **PDOP/HDOP indicator** is the second item of the status bar.
Nothing displayed	**EZField™** is configured for manual connection, and no search for the GNSS receiver is currently under way.
	or
	EZField™ has found a receiver, but the receiver does not yet transmit useable data.
▽ or ▼	**EZField™** is connected to a GNSS receiver, and the received data are valid and useable.
Alternating between ▽ and ▼	**EZField™** is connected to a GNSS receiver, but the **PDOP** value is higher than the maximum specified on the **PDOP** alarm.
Alternating between ▽ and ▼	**EZField™** is connected to a GNSS receiver, but the **HDOP** value is higher than the maximum specified on the **HDOP** alarm.
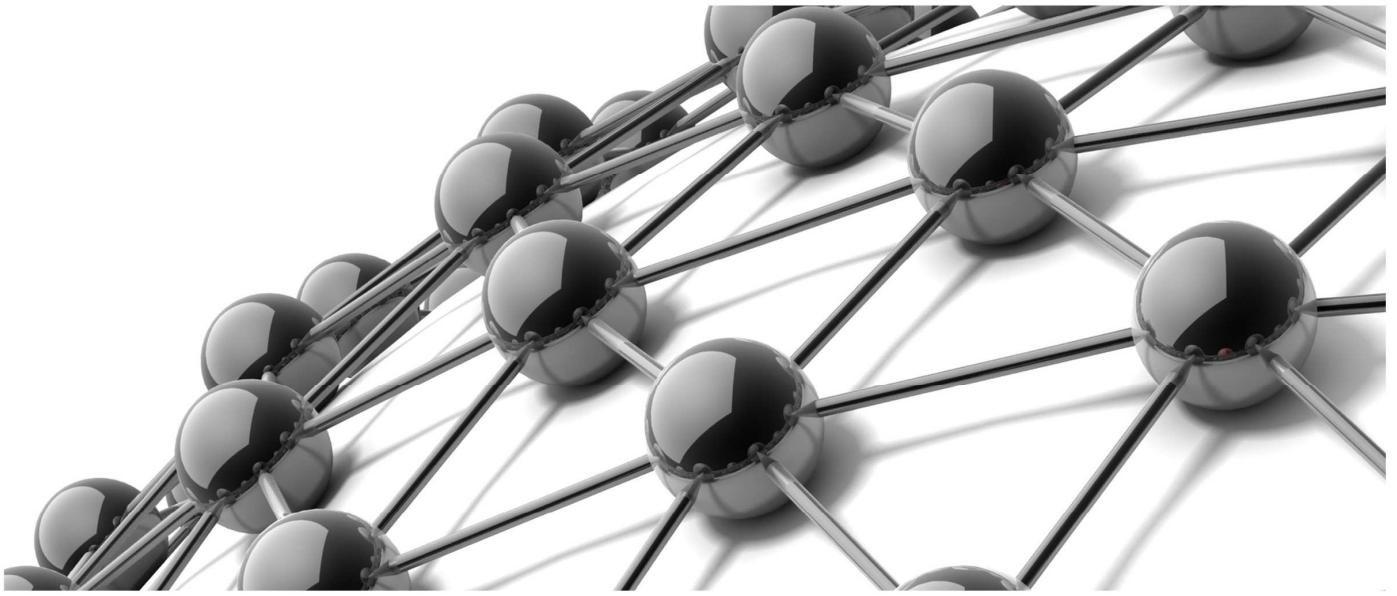
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+ 1 888 495-6577
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