FS Future Series

eXp 6000

User's Manual

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Introduction

1.1 Preface

Dear customer,

all of the engineers, sales, training and support staff at OKM GmbH would like to thank you for your purchase of the eXp 6000.

The eXp 6000 detector works on the principle of Electro-Magnetic Signature Reading (EMSR). Besides the detection of metallic objects this device is also capable of detecting natural features of the earth like formations of strata, cavities, voids, faults, ground water and other non-metallic objects. Then of course this equipment is best suited at detecting burials, graves, sepulchers, treasure, buried utilities, tanks and the like.

The eXp 6000 is able to locate, document and analyze buried objects within various structures and vessels non-intrusively without having to excavate the area. Using EMSR is particularly useful in areas where detection is a must and excavation is not possible. The facile and flexible handling of the eXp 6000 can easily and quickly give reproducible results.

With our team of specialists we guarantee that our products are under recurrent control. Our specialists try to implement new developments in terms of further quality improvements for you.

By purchasing or using one of our products, we cannot guarantee that during your research that you will be successful and have a find. The recognition of hidden and buried objects depends on a huge number of factors. As you may know there are different soil types all over the world with different levels of natural attenuation. Variable soil properties can and will hamper and alter ultimate scan measurements. Areas where there is an extreme amount of ground water, varying clays, sands and wet soils making scanning more difficult and may reduce the maximum depth capabilities of any and all detection equipment, regardless of make or model.

For more information regarding where this equipment has been used and operated, please visit our website. Our equipment is constantly being tested and when improvements or upgrades are available, we will list them also on our website.

It is necessary for our company to protect our developments and all the information learned during the “Research and Development” phases in creating our technology. We strive to stay within the given framework of legislation, patents and trademark registration.

Please take your time to read this User Manual and familiarize yourself with the operation, functionality and how to utilize the eXp 6000. We also offer training for your equipment in our factory. We strive to maintain worldwide dealer network for assistance and support. Please visit our website for more information.

1.2 Important Notes

Prior to using the eXp 6000 and its accessories, please read these operating instructions carefully. These instructions give information on how to use the detector and potential sources where precautions should be taken.

The eXp 6000 and its accessories serve for the analysis, documentation and detection of sub-surface anomalies and ground disturbances. The recorded data of the ground structure will be transmitted to a PC to give a visual representation using our proprietary software program. Any additional notes to the software should be observed. Please read the user manual of the software!

1.2.1 General Notes

Being an electronic device, the eXp 6000 has to be treated with caution and treated with care as with any electronic device. Any failure to observe the safety precautions given or any use for purposes other than the ones it is designed for may result in damage or destruction of the processing unit and/or its accessories or connected components.

The device has a built in anti-tampering module which will destroy the unit if it is improperly opened. There are no end user serviceable parts on the inside of the unit.

1.2.2 Possible Health Hazards

If used properly this device normally does not pose any health hazards. According to current scientific knowledge, the high-frequency signals are not harmful to the human body on account of their low power.

1.2.3 Surrounding Area

When moving this unit from a cold place to a warmer place, watch out for condensation. Do not immediately operate the unit until any possible condensation could have evaporated. The unit is not weather proof and water or condensation can destroy the unit.

Avoid strong magnetic fields, which may occur in places where there are large electric motors or unshielded loudspeakers. Try to avoid using this equipment within 50 meters (150 ft) of this type of equipment.

Metallic objects on the ground such as cans, tin, nails, screws or debris can influence your scan data and present negative results regarding your scan data. Also it is a good habit to remove any metallic objects off of your person like cellular telephones, keys, jewelry, etc... Do not wear steel toe boots.

1.2.4 Voltage

The power supply should not be outside the indicated range of values. Use only approved chargers, batteries and rechargeable batteries which are included in the scope of delivery.

Never use the 115/230 Volt mains supply.

1.2.5 Data safety

Data errors can occur if:

- the range of the sender module has been exceeded,
- the power supply of the device or the batteries are too low,
- the cables are too long,
- the unit is operating to close to devices which sends out disturbances or
- atmospheric conditions (electrical storms, lightning, etc...).

1.3 Maintenance and Services

In this section you will learn how to maintain your measuring instrument with all included accessories to keep it in good condition a long time and to get good measuring results.

The following list indicates what you absolutely should avoid:

- penetrating water
- strong dirt and dust deposits
- hard impacts
- strong magnetic fields
- high and long lasting heat effect

To clean your device please use a dry soft rag. To avoid any damage you should transport the device and accessories always in the appropriate carrying cases.

Prior to using your eXp 6000 please be sure that all batteries and accumulators are fully charged. Also allow the batteries to completely discharge before recharging them, regardless if you are working with the external battery or with internal accumulators. This way your batteries will have a long and durable life.

> To charge the external and internal batteries, use only the approved chargers which are part of our scope of delivery.

1.4 Danger of Explosion during Excavation

Unfortunately, the last two world wars also made the ground in many places of the world a potentially explosive scrap heap. A host of those lethal relics are still buried in the ground. Do not start digging and hacking for an object wildly when you receive a signal of a piece of metal from your device. Firstly, you might indeed cause irreparable damage to a truly rare find, and secondly, there is a chance that the object reacts in a hostile fashion and strikes back.

Note the color of the ground close to the surface. A red or reddish color of the ground is an indicator of rust traces. As regards the finds themselves, you should definitely pay attention to their shape. Curved

or round objects should be a sign of alarm, especially if buttons, rings or little pegs can be identified or felt. The same applies to recognizable ammunition or bullets and shells. Leave that stuff where it is, do not touch anything and, most importantly, do not take any of it home with you. The killing machines of war made use of diabolical inventions such as rocker fuses, acid fuses and ball fuses. Those components have been rusting away in the course of time, and the slightest movement may cause parts of them to break and be triggered. Even seemingly harmless objects such as cartridges or large ammunition are anything but that. Explosives may have become crystalline over time, that is, sugar-like crystals have formed.

Moving such an object may cause those crystals to produce friction, leading to an explosion. If you come across such relics, mark the place and do not fail to report the find to the police. Such objects always pose a danger to the life of hikers, walkers, farmers, children and animals.

Chapter 2

Technical Specifications

2.1 eXp 6000 Control Unit

Dimensions (H x W x D) ..... 320 x 190 x 95 mm
Weight ..... about 2200 g
Voltage ..... 11.8 - 14.8 VDC, 30 W maximal
Safety Class IP40
Operating Time (full charged Power Pack, 25 °C) ..... about 3 hours
Operating Temperature ..... -10 °C – 50 °C
Display ..... 6.5” Diagonal, 1024 x 768 Pixel TFT Color, 650 cd/qm
Processing Unit ..... QuadCore AMD @ 2GHz, OpenGL4.2 HD Radeon GPU
Working Memory (RAM) ..... 4 GB Kingston HyperX
Data Memory ..... 16 GB Industrial SDCard, Class 10
Feedback ..... acoustic, visual
Storage temperature ..... -20 °C – 60 °C
Air humidity ..... 5 % – 75 %
Waterproof ..... No
Data Transmission Technology ..... WiFi 802.11n a/b/g, MIMO 2x2
Data Transmission Rate ..... 11 Mbps – 54 Mbps
Operation Distance (line of sight to telescopic rod assembly) ..... max. 30 m

2.2 Telescopic Rod Assembly

Dimensions (H x W x D) ..... 640 x 140 x 250 mm
Weight ..... about 1900 g
Voltage ..... 11.8 - 14.8 VDC, 30 W maximal
Safety Class IP40
Operating Time (full charged Power Pack, 25 °C) ..... about 5 hours
Operating Temperature ..... -10 °C – 50 °C
Processing Unit ..... ARM Cortex M0+ @ 48 MHz
Working Memory (RAM) ..... 32 KB
Data Memory ..... 256 KB
Storage temperature ..... -20 °C – 60 °C
Air humidity ..... 5 % – 75 %
Waterproof ..... No
Data Transmission Technology ..... WiFi 802.11n a/b/g, MIMO 2x2
Data Transmission Rate ..... 11 Mbps – 54 Mbps
Operation Distance (line of sight to control unit) ..... max. 30 m

2.3 Computer, Minimum Requirements (not included)

Processor ..... minimum 1.5 GHz
CD-ROM Drive ..... minimum 4x
Port (Data Transmission) ..... USB
Free Memory ..... minimum 50 MB

Working Memory (RAM) ..... minimum 512 MB
Graphic Card ..... minimum 256 MB, OpenGL-compatible
Operating System ..... Windows Vista, Windows 7, Windows 8, Windows 10

2.4 Super Sensor

Length ..... 100 cm
Weight ..... about 770 g
Receiver ..... Dual / Hi-Gain – Vertical - Geophysical Phase Reader – EMSR
Sensor technology TCFX-01-A

2.5 Telescopic Probe

Length ..... 50 - 120 cm
Weight ..... about 1 kg
Receiver ..... Dual Geophysical Phase Reader – EMSR
Sensor technology TCFX-01-A

2.6 Tunnel Sensor

Length ..... 50 cm
Weight ..... about 520 g
Receiver ..... Dual Geophysical Phase Reader – EMSR
Sensor technology TCFX-01-A

2.7 LiveStream Sensor

Length ..... 50 cm
Weight ..... about 820 g
Receiver ..... Quad Geophysical Phase Reader – EMSR
Sensor technology TCFX-01-A

2.8 GPS Receiver / eGPS

Dimensions ..... 50 x 50 x 20 mm
Weight ..... about 60 g
Input voltage ..... 5 V DC
Input current (maximum) ..... 350 mA
Input current (typical) ..... 46 mA
Data transfer rate ..... 1 s
Cold start ..... 60 s
Warm start ..... 1 s

Chapter 3

Scope of Delivery

In the following section you can find all standard equipment. The scope of delivery can be different in some circumstances because of some optional accessories which should not be included in the basic equipment.

	Professional	Professional Plus
eXp 6000 Control unit incl. carrying straps	1	1
Telescopic rod assembly	1	1
Power Pack	2	4
Charger, docking station and travel adapter	2	2
Wireless Headphones	1	1
USB Stick	1	1
3D Software (Visualizer 3D)	1	1
User's manual	1	1
Carrying case	1	1
Telescopic Probe	1	1
Super Sensor	1	1
Tunnel Sensor	optional	1
LiveStream Sensor	optional	1
Android video eye glasses	optional	1
External GPS receiver	optional	1
Android Tablet PC (as external display)	optional	optional
Windows Tablet PC (for Visualizer 3D)	optional	optional

Table 1: Scope of delivery

Chapter 4

Control Elements

In this section you will learn more about the fundamental use of all control elements for the eXp 6000 measuring instrument. All connections, inputs and outputs are explained in detail.

4.1 Breakdown of the eXp 6000

The key components to the eXp 6000 are shown in figure 4.1.

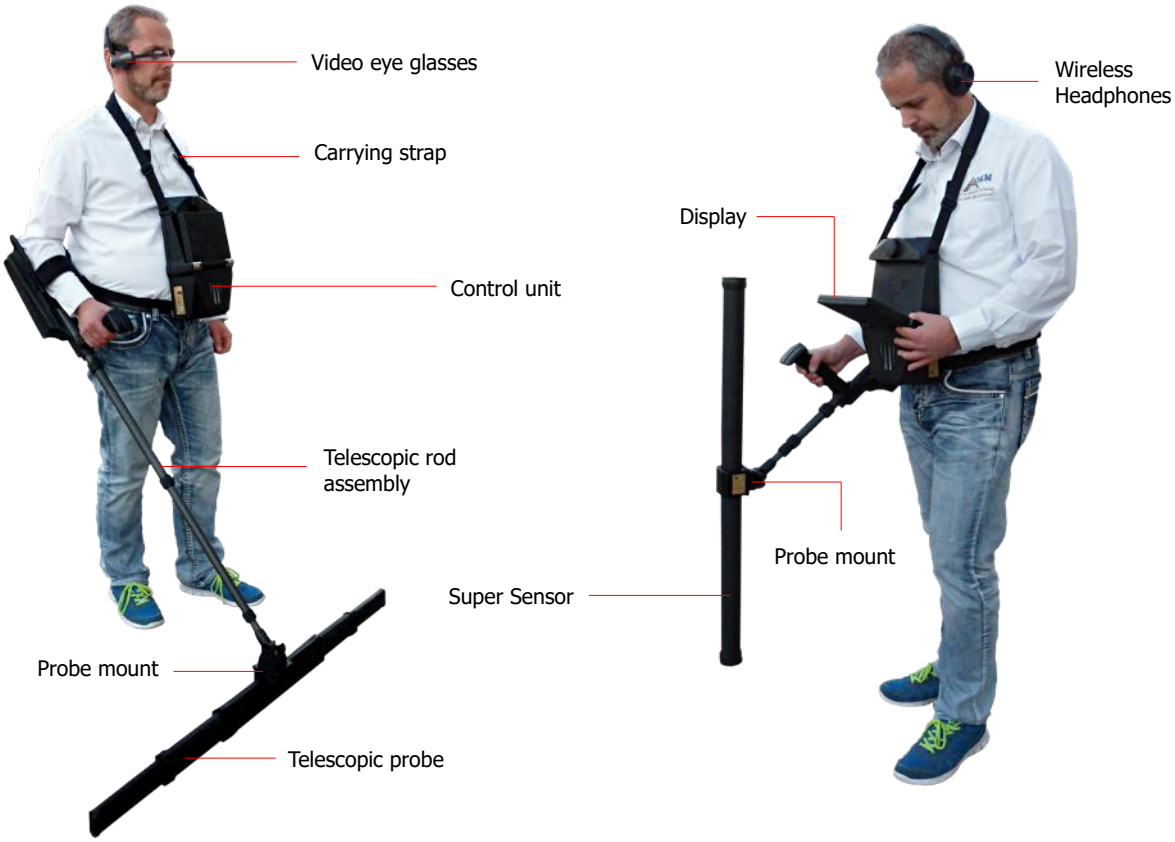


Figure 4.1: eXp 6000 with Telescopic Probe and Super Sensor

Via **display** or **video eye glasses** you can see the navigation menu and all recorded scans.

All available **probes** (e.g. Telescopic Probe, Super Sensor, ...) have to be connected via the **telescopic rod assembly**.

The **control unit** is the main processing unit that receives data from the probes (via telescopic rod assembly), calculates, renders and saves the data.

The **external GPS** can be used to start GPS navigation without activating the telescopic rod assembly.

The **wireless headphones** assist you to hear the sound output, that helps to synchronize your walking procedure.

4.2 Power Pack

The Power Pack is used as a battery for your eXp 6000. It fits into both the control unit and the telescopic rod assembly.

Figure 4.2: Control elements of the Power Pack

The **power on/off button** is located on the front panel of the Power Pack and is used to switch it on and off. The **LED** next to the power on/off button indicates the current charge state of the Power Pack.

To charge the Power Pack simply connect it to the docking station and charger as shown in figure 4.3.

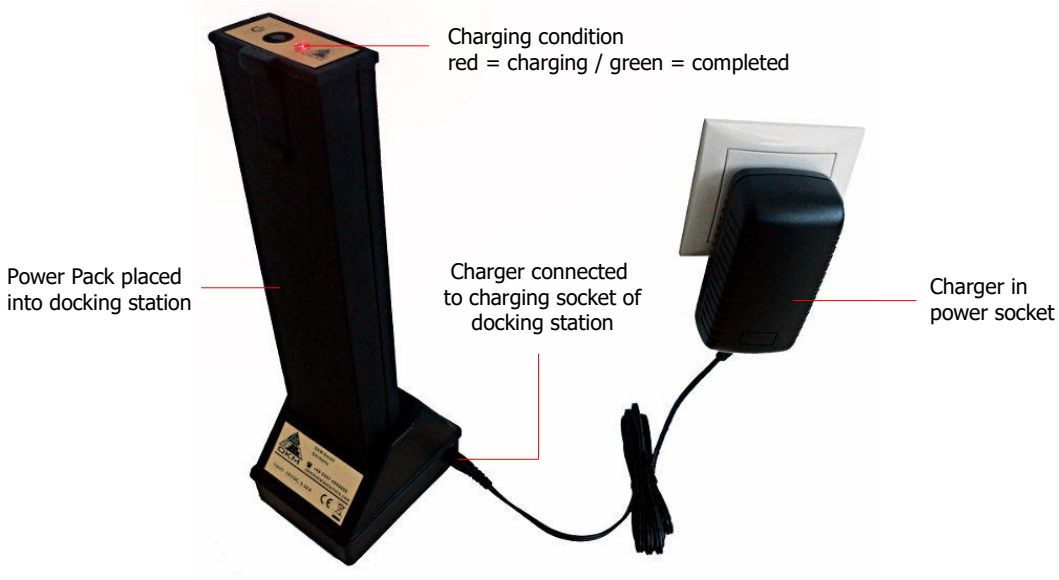


Figure 4.3: Charging the Power Pack

Additional information about the Power Pack, its technical specifications as well as information about maintenance and recharging you will find in its separate documentation.

4.3 Measuring probes and sensors

Each measuring probe that you attach to the telescopic rod assembly is optimized for its very special task. The eXp 6000 supports following probes:

- **Telescopic Probe**
  This horizontal probe is perfectly used to scan wide areas in short time. You can extend its length between 50 and 120 cm. The optimal length depends on the field dimensions and the size of the object you are looking for. This probe can be used for following operating modes:
  - *Ground Scan, Magnetometer*
- **Super Sensor**
  This vertical probe is the most sensitive probe of all and thus perfectly used for finding small amounts of metal (prospecting, mining) as well as pin pointing. This probe can be used for following operating modes:
  - *Ground Scan, Magnetometer, Pin Pointer, Mineral Scan*
- **Tunnel Sensor**
  This vertical probe has been developed to find underground caves, tunnels, tombs and the like. It can be used for following operating modes:
  - *Ground Scan, Tunnel Scan*
- **LiveStream Sensor**
  This horizontal probe is a very special one that can be used to scan a high amount of data. Thus it is able to generate live images to visually pinpoint underground objects. This probe can be used for following operating modes:
  - *Ground Scan, Live Scan*

Figure 4.4 shows the control elements exemplary for the Telescopic Probe.

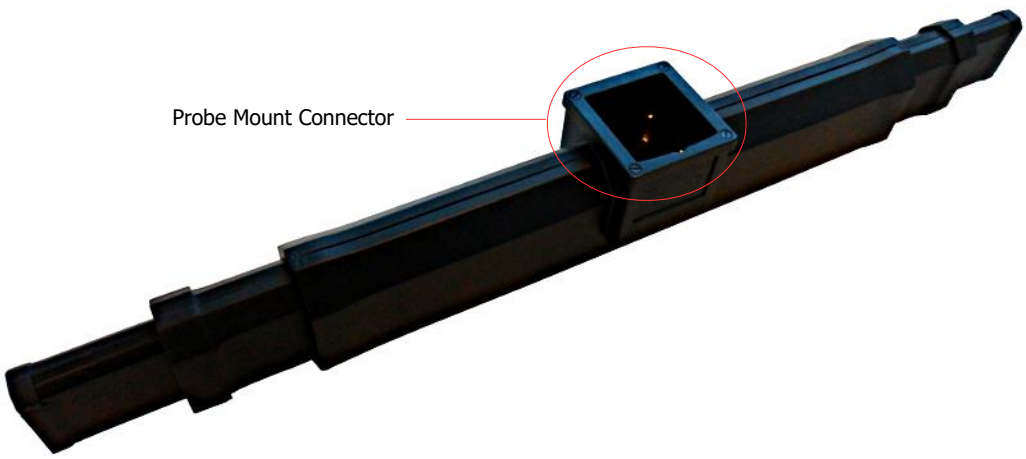


Figure 4.4: Control elements of the telescopic probe

All measuring probes are equipped with a **probe mount connector** that mounts the probe to the telescopic rod assembly. To mount the probe, simply push it onto the **probe mount** of the telescopic rod assembly.

Each of the measuring probes is additionally equipped with an internal gyroscope to get control of the probe's orientation during a scan. Further details about the orientation information are explained in section 7.3.1 “Orientation of the probe” on page 77.

4.4 Telescopic rod assembly

The telescopic rod assembly is used to mount all available probes and establish a wireless connection to the control unit of the eXp 6000.

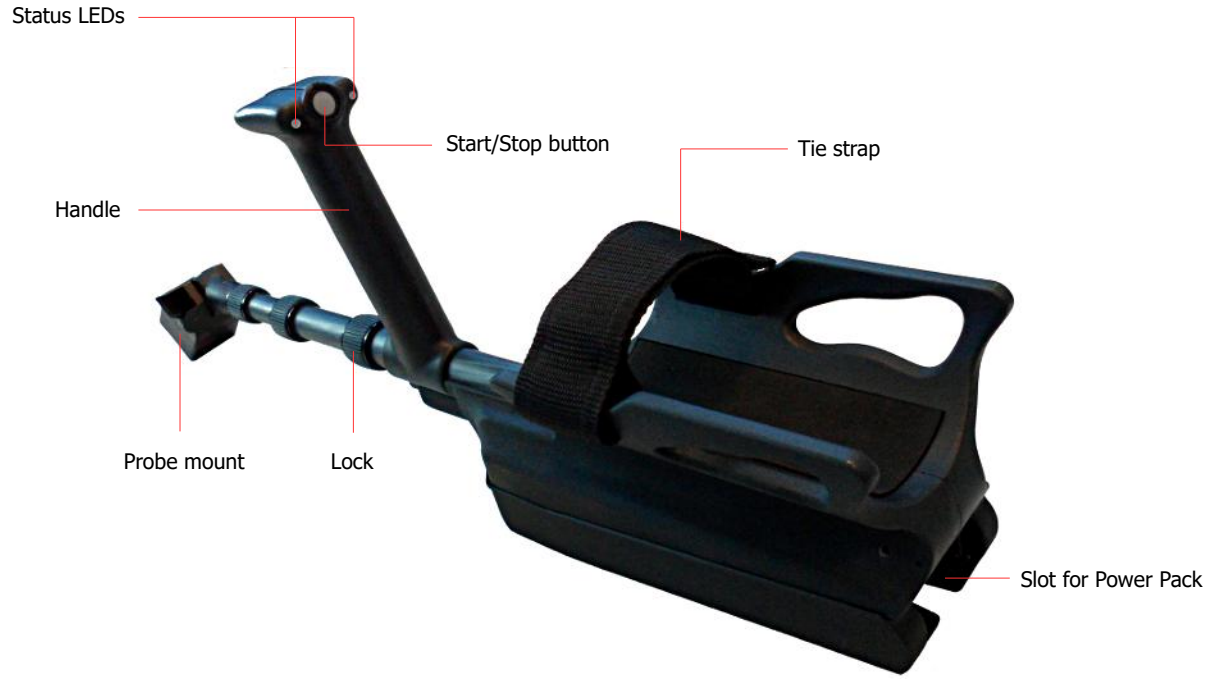


Figure 4.5: Control elements of telescopic rod assembly

The **Status LEDs** are indicating the current state of connection, whereas following states are possible:

- **White:** For a short moment after powering on, the LEDs shine white.
- **Green:** The LEDs shine permanently green if a valid probe has been mounted but no wireless connection to the control unit has been established.
- **Green / Red:** The LEDs shine green and red in rotation if no valid probe has been mounted and no wireless connection to the control unit has been established.
- **Blue / Red:** The LEDs shine blue and red in rotation if no valid probe has been mounted but a wireless connection to the control unit has been established.
- **Blue:** The LEDs shine permanently blue if a valid probe has been mounted and a wireless connection to the control unit has been established. This is the final state in which you are able to conduct your measurements.

The **Start/Stop button** is used to start a new measurement, run another scan line and stop the first scan line in automatic mode.

The **Probe mount** is used to mount the probes to the telescopic rod assembly. Please make sure that all connector pins and sockets are clean before assembly.

The **Tie strap** of the telescopic rod assembly can be used to fix the armrest to your arm for better hold.

Before you can power on your telescopic rod assembly you have to plug in a Power Pack into the designated **Slot for Power Pack**. Then push the power on/off button of the Power Pack.

The **Lock** can be used to adjust the length of the telescopic rod assembly for your personal preferences.

4.5 Control Unit

The control unit is the processing center of the eXp 6000. Via control unit, various functions can be selected, all measured values can be recorded and stored. Figure 4.6 shows all important controls of the control unit.

Figure 4.6: Control unit

Before you can use the control unit you have to place a proper Power Pack into the designated **Slot for Power Pack**. Then push the power on/off button of the Power Pack.

All the functions are controlled by the **Multi-function control knob** or by using the touch capabilities of the **display**. To operate the device, rotate the knob to the desired function and push down on the knob to select. Alternatively you simply tip with your finger onto an item on the screen.

If you do not want to use wireless headphones you can also plug in common wired headphones with a phone jack into the **Headphone socket**. Additionally you will hear any sounds directly through the internal **speaker**, if not disabled.

Via **USB port** a common USB stick can plugged in into the control unit to copy the stored scan images to another computer for further evaluation with the Visualizer 3D software program or to update the internal firmware if necessary.

The **HDMI port** can be used to connect HDMI video eye glasses. Another way to connect goggles is to use wireless Android video eye glasses (see section 5.5 “Connecting Android devices (Video eye glasses or Tablet PCs)” on page 32).

The **carrying strap** is used to carry the control unit around your neck. Additionally you may use the **belt strap** to fix the control unit to your body.

Please make sure that the **air ventilation** is not covered at any time during the operation of the eXp 6000 control unit. If the air can not circulate properly the control unit may overheat.

Chapter 5

Assembly & Preparation

This section explains how to assemble the eXp 6000 and to prepare the unit for operation.

Before using the eXp 6000 for a field measurement you should do some preparations. The eXp 6000 consists mainly of two separate main parts:

- **Control Unit**
  This is the main controller of the eXp 6000 where you select your operating modes and view your current measurement data. Furthermore all your scans will be saved in its internal memory before transferring it to a computer for detailed analyses.
- **Telescopic Rod Assembly**
  This is the “handle” for all your measuring probes and sensors. The integrated electronics take care that all measured data will be transferred wireless to the control unit.

5.1 Control Unit

Place one of the fully charged Power Packs into the designated slot of the eXp 6000 control unit as shown in figure 5.1.

Figure 5.1: Placing the Power Pack into the control unit

Push it into the slot completely until it has locked. Then push the power on/off button on the front panel of the Power Pack until the LED lights up. After a short while the boot up screen will appear on the display of the control unit.

You will carry the eXp 6000 control unit around your neck. Additionally you can fix the whole unit with the belt strap around your body.

Adjust the display angle according to your personal preferences.

5.2 Telescopic Rod Assembly

Depending on the task you want to fulfill, you have to attach one of your measuring probes to the probe mount of your telescopic rod assembly. Figure 5.2 shows this process exemplary for the Telescopic Probe.

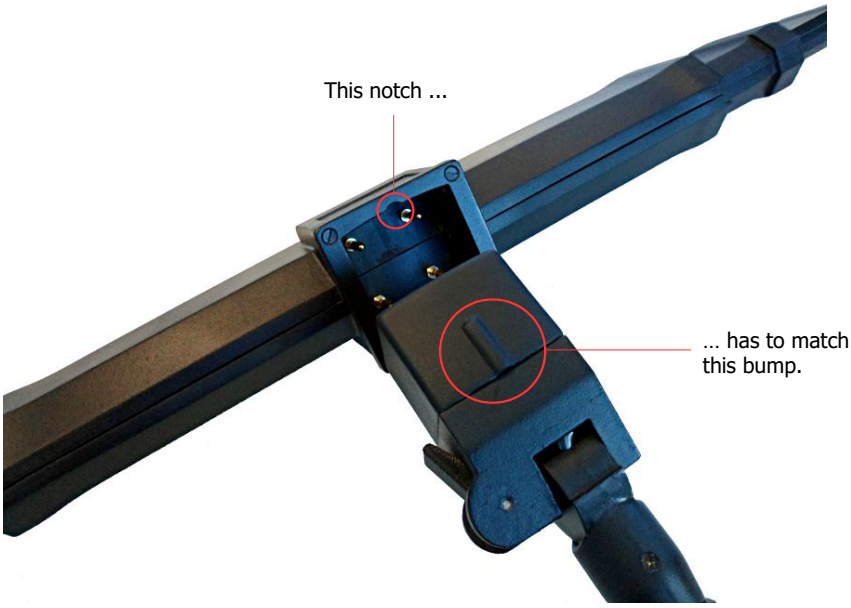


Figure 5.2: Mounting the Telescopic Probe onto the telescopic rod assembly

Please pay attention that each measuring probe can only be attached in “one” way or direction according to the frame on top of the probe mount. The little notch of the frame has to match the bump of the probe mount.

Now you have to place another fully charged Power Pack into the designated slot of the eXp 6000 telescopic rod assembly as shown in figure 5.3.

Figure 5.3: Placing the Power Pack into the telescopic rod assembly

Push it into the slot completely until it has locked. Then push the power on/off button on the front panel of the Power Pack until the LED lights up.

For your personal comfort you should extend the telescopic rod assembly to your preferred length.

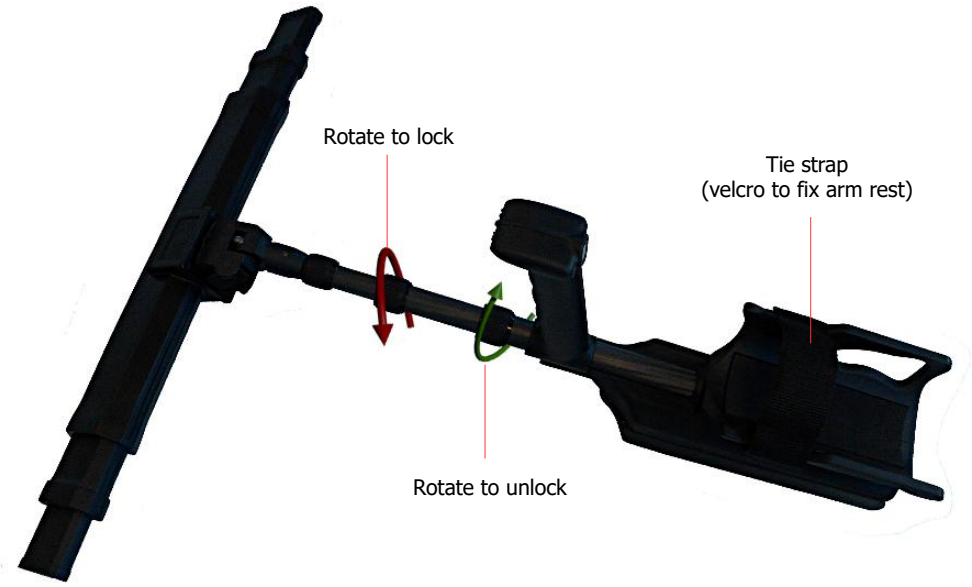


Figure 5.4: Extending the telescopic rod assembly

Additionally you may use the **tie strap** to fix the arm rest to your arm. Thus working with the telescopic rod assembly is more comfortable.

5.3 Connecting external GPS receiver

In case you are using the navigational functions to navigate yourself to a scan area, you don't need to utilize the telescopic rod assembly but can use the external GPS receiver (eGPS) instead. Simply connect it with the USB port of the eXp 6000 control unit as shown in figure 5.5.

Figure 5.5: Connecting the external GPS receiver

That eases the process of navigating by carrying less equipment. Further details concerning GPS navigation is available in section 6.8.5 “GPS navigation” on page 67.

5.4 Connecting wireless headphones

The eXp 6000 can be operated with any Bluetooth headphones available on the market. Your eXp 6000 comes with Bluetooth headphones as shown in figure 5.6.

Figure 5.6: Bluetooth headphones with accessories

To operate the eXp 6000 with your wireless Bluetooth headphones you must pair your headphones with the control unit. You can do this while booting the eXp 6000 or by searching for Bluetooth headphones manually afterwards:

1. Make sure that your Bluetooth headphones are powered on and in pairing mode. Entering the pairing mode depends on your Bluetooth headphones (e.g. hold the power on/off button or the Bluetooth pairing button pressed until the LED indicates pairing mode).
2. Now power on the eXp 6000 and wait for the Bluetooth connection to be established. If the connection fails simply continuing with step 3 to manually establish a connection.
3. Select the speaker icon in the main toolbar and then press the button “Search for Bluetooth headphones”.
4. Now the dialog from figure 5.7 appears with a countdown of 90 seconds in which the eXp 6000 control unit is searching for available Bluetooth headphones. Make sure that your Bluetooth headphones are still in pairing mode.
5. After a short time the Bluetooth headphones are paired and you can hear the sound signals via headphones. Now the Bluetooth headphones icon should be visible in the main toolbar.

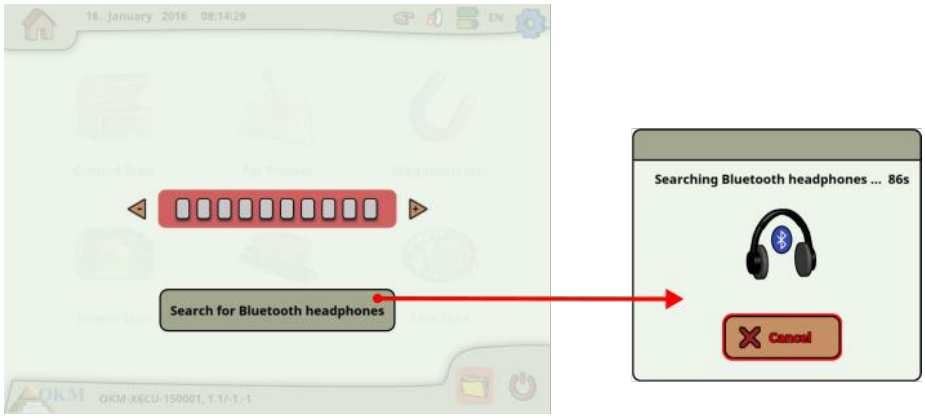


Figure 5.7: Pairing the Bluetooth headphones

5.5 Connecting Android devices (Video eye glasses or Tablet PCs)

You may also pair any Android device with your eXp 6000 control unit to stream the display information to an Android Tablet PC or Android video eye glasses. By doing so, another person (e.g. supervisor, trainer, etc.) can watch the operator's activities. The connection procedure is very simple.

1. Download and install the eXp 6000 application (if your Android device was not purchased along with the eXp 6000)
2. Power on your eXp 6000 control unit
3. Start the Android application and wait for a connection

Then you can view the contents of the eXp 6000 control unit directly on your Android device and can also remote control the eXp 6000 if this option is allowed (see section 6.7 “Settings” on page 58).

Please make sure to disable the options “Smart network switch” under WiFi settings as well as “mobile data” under Mobile networks, otherwise a connection to the eXp 6000 is not possible.

5.5.1 Download and install the Android application

If you want to install the application for the first time on a new Android device or you are going to reinstall the application after a factory reset, you have to download the application from “Google Play” first.

Therefor find the “Play Store” application on your Android device where you are going to install the eXp 6000 application and tap on it. You will find it in the applications menu of your Android devices as shown in figure 5.8.

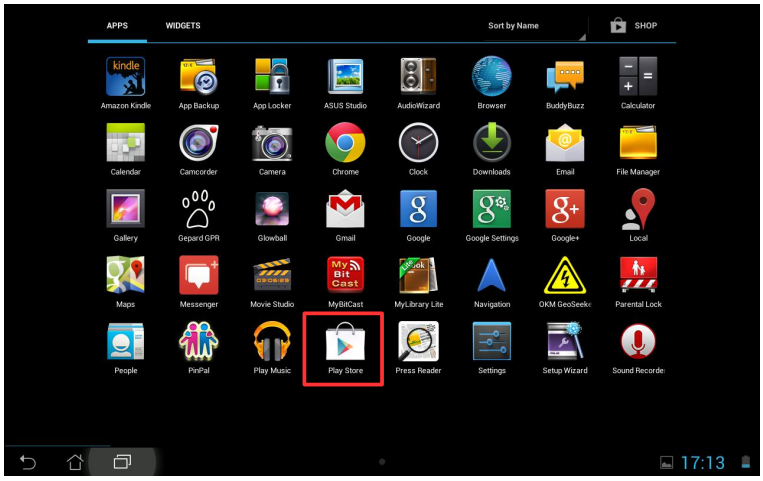


Figure 5.8: Installation of the application via Google Play Store

If you don't have any Google Account so far, you must create one to be able to download the eXp 6000 application. Simply follow the instructions on your Tablet PC to download and install the application. To find the application in the Google Play market, simply search for “eXp 6000”.

After installation you have to first start the eXp 6000 control unit and then the Android application.

5.5.2 Run the Android application

Running the application is very simple. Find the eXp 6000 application icon in the applications menu of your Android device and tap on it.

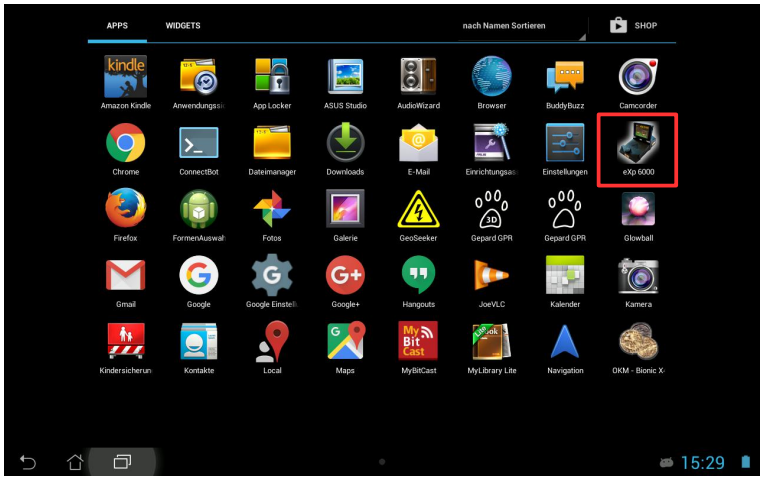


Figure 5.9: Android's application menu with eXp 6000

Please make sure the eXp 6000 control unit is powered on and running properly before tapping on the applications icon to start the application. After a short moment the application connects to the control unit and you will see the screen output of the eXp 6000 also on your Android device screen.

If you are using an Android Tablet PC with touch screen itself, you can use this as a replacement of the eXp 6000 display. All touch events will be send to the control unit if that option is enabled in the settings screen of the eXp 6000 according to section 6.7 “Settings” on page 58.

5.5.3 Using the Android M100 Smart Glasses

In figure 5.10 the Android M100 Smart Glasses are shown, that are part of the Professional Plus package.

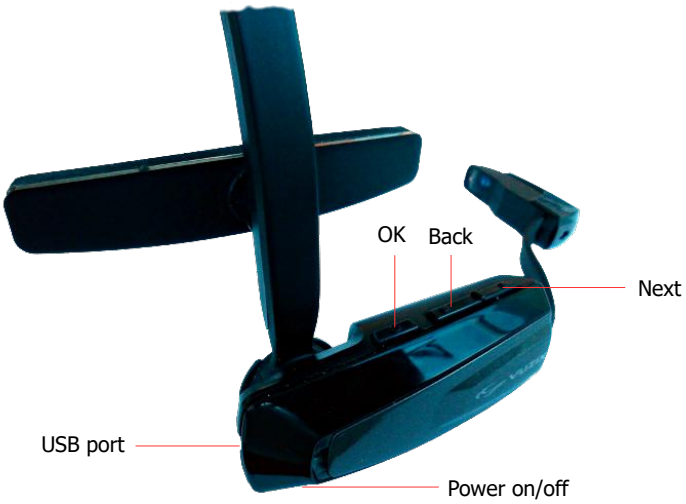


Figure 5.10: Android M100 Smart Glasses

Using the hardware buttons (OK, Back and Next) you will navigate through all the menus and operating modes. Alternatively you may also use the multi-function control knob of the eXp 6000 control unit to select any of the functions.

The power on/off button is on the bottom side of the video eye glasses. Press this button for a longer time to power on or off.

The layout of the video eye glasses (caused by its lower resolution) is different and more compact as shown in figure 5.11.

Figure 5.11: Layout for the video eye glasses

For beginners it is recommended to operate the eXp 6000 with display and video eye glasses in parallel for the first time to see the differences between the layouts and its button functionalities.

Chapter 6

Operating modes

In this section you will learn more about the different operating modes of the eXp 6000. Every function is explained in its proper subsection.

Selecting the correct operating mode depends primarily on the desired output. So for example there are some functions which have to be used for an initial first measurement in an unknown area to get a general overview, whereas others are more suitable for a more detailed search and analysis with a special processing software program.

After starting the eXp 6000 you will see the main menu (“home screen”) as shown in figure 6.1.

Figure 6.1: Main menu (“home screen”)

In the home screen and many other screens you will find detailed information about the current status of your eXp 6000 like:

- **Screen Icon**
  This symbol indicates the active screen, so you will know at every time where you are.
- **Time & Date**
  This is the place where you will see the current time and date according to your settings. The time and date setting is very important because it will also be stored along with your scan images.
- **Layout**
  This icon is only accessible via touch screen and a shortcut to change the screen layout.
- **Volume**
  This icon symbolizes your active sound device (mute, speaker or headphones).

- **Battery Status**
  The battery icons are indicating the current charge conditions of the control unit's Power Pack (top icon) as well as the Power Pack of the telescopic rod assembly (bottom icon).
- **Language**
  This icon shows the 2-letter code of your active language.

Starting from the main menu you can select one of the following primary operating modes:

- **Ground Scan**
  Measurement with graphical evaluation, whereby measured data can be stored in the internal memory of the device for later review.
- **Pin Pointer**
  This scanning tool is used to give the exact position of the detected anomaly.
- **Magnetometer**
  Search an area with the integrated magnetometer.
- **Tunnel Scan**
  Ground measurement to detect tunnels, voids and other cavernous anomalies.
- **Mineral Scan**
  Ground measurement for the detection of naturally occurring mineralization.
- **Live Scan**
  Ground measurement as direct live data stream.
- **Settings**
  Change the language, date, time, volume, screen layout and other settings.
- **File Explorer**
  Browse your recorded files or transfer it to some PC.
- **Shutdown / Exit**
  Power off the device and shut down the integrated PC module.

Via the multi-function control knob or the touch capabilities of the display you can select and confirm your desired operating mode.

6.1 Ground Scan

This operating mode allows you to do a measurement with a graphical representation whereby all measured values will be stored in the internal memory of the device. Also you have the possibility to recall and see previously stored graphics. This mode can be used with all probes.

The Ground Scan mode is your primary function. This is the mode where you are going to find the targets and locate areas of disturbed soils. When something is buried, then whoever buried it had to dig a hole. Look for that disturbance in the soil first. If a hole was created at 1.5 m (4½ feet) deep, after a couple of seasons the hole will appear to be over 2 m (6 ft) in diameter at the surface. Start with a scan that has an impulse approximately every 30 – 60 cm (1 foot to 2 feet) forward and to the sides (distance between two single scan lines). Don't go too fine on the first scans until you have a possible anomaly. Look for the holes! Usually without a hole you could be looking at mineralization.

In figure 6.2 the complete workflow of a ground scan is illustrated. The blue lines are indicating additional steps that are only processed when utilizing the LiveStream Sensor.

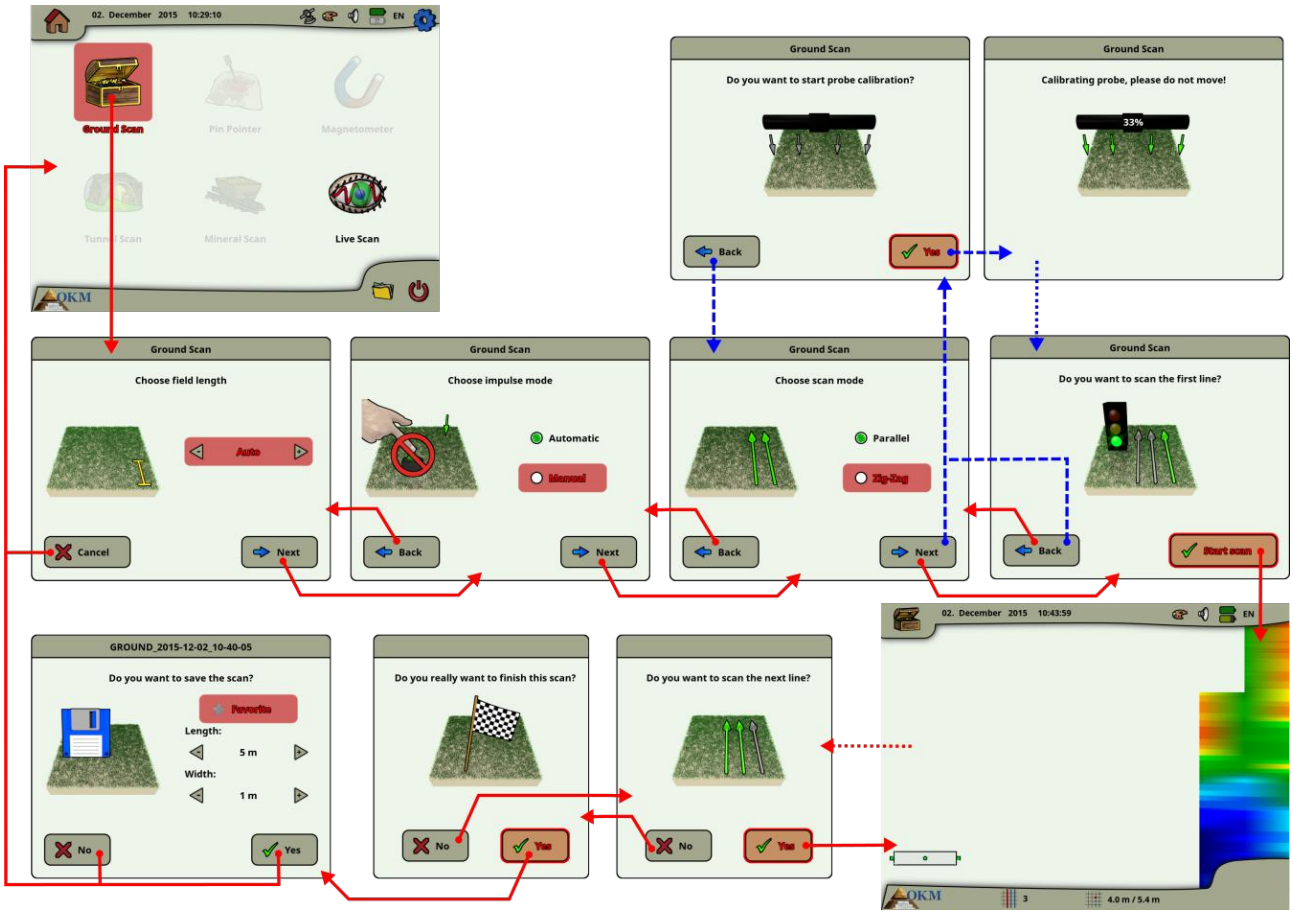
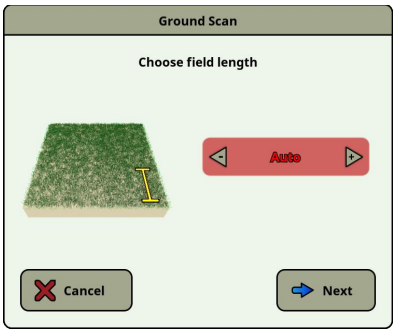


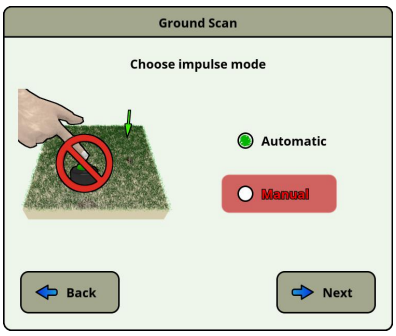
Figure 6.2: Workflow of Ground Scan

After activating this operating mode you have the possibility to adjust certain settings. There are different parameters which influence the measurement. You can modify the following parameters (the underlined values correspond to the setting made by the factory):



Field Length (Auto, 5 m, 10 m ..., 50 m)

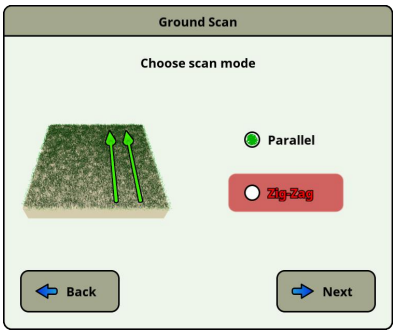
Number of measured values per scan line. If you select “Auto” the number of impulses can be adapted to the current length of your first scan line. During the first line the device will read values continuously without stopping. As soon as you want to finish your first line, you have to depress either the multi-function control knob or the start/stop button of the telescopic rod assembly to stop the measuring process of the current line. The device will store the number of impulses and use it for all further scan lines of the same scan. By selecting the value 5 m, 10 m, 20 m, ..., or 50 m you can preset the distance or the number of impulses you need in one measured line.



Impulse Mode (Automatic, Manual)

This is the mode that determines how the measurement points will be recorded: automatically or manually. For the smooth and flat terrain, most use the automatic mode, for rough terrain the manual mode can be used.

- In the automatic mode, the eXp 6000 will take the measurements automatically as predetermined in the “Field Length” selection.
- In the manual mode, the eXp 6000 will record a measurement point only by depressing the start/stop button of the telescopic rod assembly.
  The eXp 6000 uses 40 impulses per meter.



Scan Mode (Parallel, Zig-Zag)

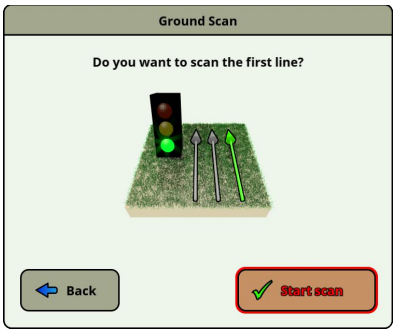
The scan mode defines the method of scanning an area. In the parallel mode a measurement starts always from the starting line (recommended), whereas in the Zig-Zag mode measurements start at the end of the line which was scanned before.

In the last scanning method (Zig-Zag) you have to take care not to change the orientation of the antenna, which means that you are not allowed to turn yourself and thus must walk backwards each second line. The measuring probe must remain in the same direction for every measured line. Rotating the probe will create an error.

Further details about the scan modes can be found in section 7.2.1 “Scan Mode” on page 73.

With connected LiveStream Sensor some additional dialogs will appear after selecting the scan mode. Please refer to section 6.6 “Live Scan“ on page 56 for more information concerning that probe

calibration.



After adjusting all your scan settings, you will be asked if you want to scan the first line. Select the "Back" button if you want to readjust your settings or select the "Yes" button to start scanning the first line right away.

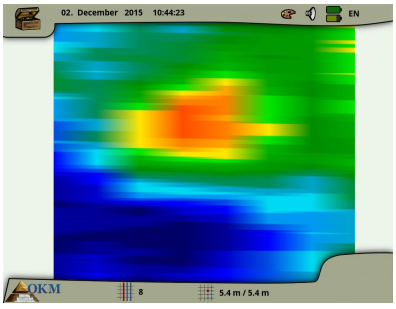
Alternatively you can also use the start/stop button of the telescopic rod assembly to start the measurement, which is of more comfort, because now it is important to start walking immediately. The eXp 6000 is now recording data. As soon as your first scan line is finished a new message will appear.

Keep in mind that in automatic scan mode you have to stop the first scan by pushing the start/stop button again on the end of the line.

Before you are going to scan the next scan line, you have to go to the starting point of the upcoming line, which depends on your active scan mode (parallel or zig-zag). See details in section 7.2.1 “Scan Mode” on page 73.

Now you have to select the button "Yes" or push the start/stop button of the telescopic rod assembly to start scanning another line of your field.

Repeat this procedure until your complete area is scanned. Step by step a graphical representation will appear on the screen of the eXp 6000. If you have scanned all your lines and you want to finish your current scan select the “No” button.



The graphic where a target is present should primarily be a green color for the background. The blue area represents cavernous objects in the ground. The red/orange object (in this example) is a ferromagnetic object. Metallic objects are normally represented in red for non-ferrous items, red and blue for ferrous items and blue for cavities, water reserves and earth interferences.

Areas where ground mineralization is present is often shown with the full variety of colors. It is important that when doing a scan, that the objects in the ground do not move.

Remember: “Real Targets Don't Move!”

If you decide to not continue scanning a next line, the finish dialog appears.

At this point you have the chance to continue your scan by selecting the "No" button. Otherwise select the "Yes" button to finish the scan definitely.

Now you can decide if you want to save the scan physically on the hard disk of your control unit. You may also set following options:

- **Favorite**
  Select this option if you want to highlight this scan as a favorite. If the star is highlighted then it will be very easy to find this file later on by activating the favorite filter in the file explorer (see section 6.8 “File Explorer” on page 64).
- **Length / Width**
  Here you can enter the real length and width of your scan area. These values can also be changed later on in the Visualizer 3D software after transferring the scan file to an USB stick (see section 6.8.6 “Copy files to USB stick” on page 69).

Select the “Yes” button if you want to save this scan permanently, otherwise select the “No” button.

Please make sure to keep the initial orientation of the probes during a scan. It is also very important to keep the measuring probes level to the ground. The eXp 6000 will assist you in that task by showing a special indication in the bottom left corner of the screen. Further details about the orientation information are explained in section 7.3.1 “Orientation of the probe” on page 77.

6.2 Pin Pointer

This operating mode is used to identify and give the location of buried treasures, metals and cavities. Therefore it is necessary to connect the Super Sensor. If you don't have the Super Sensor, contemplate very seriously on acquiring one. This is an extremely powerful and functional antenna that can assist you in verifying real targets. There are three basic modes in which you will use this function: pin pointing an object, discrimination of metals, tunnel recognition and then also estimating the size of the object. The function can also be used over freshwater from a boat.

In this mode there is no given manner or direction you must maintain. You can walk as you wish in every direction. It is still important that the antenna must always remain in the same direction. This operating mode is most effective after you have already detected a possible object and now want to know more details about it.

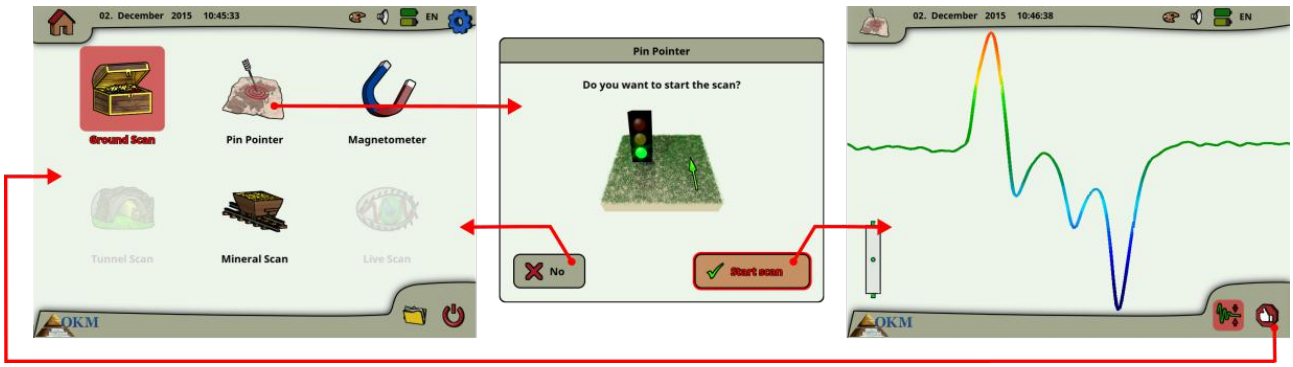
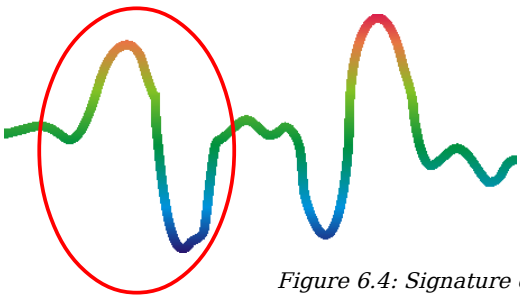


Figure 6.3: Workflow of Pin Pointer

The Super Sensor should point vertically towards the ground. It should not be turned or pivoted.

Now you can slowly move the Super Sensor from one side to the other above the possible object. The Super Sensor cannot swing, it must remain in the vertical orientation. Please try to capture the complete object, which means you should measure beyond the edges of the object. Repeat this measurement a few times to get a clear signature of the object. There are 3 different signatures, from which you can recognize a specific characteristic of any target.



Ferromagnetic metals

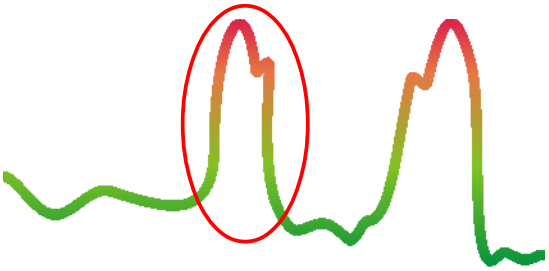
Ferromagnetic targets have a positive-negative-signature.

Figure 6.4: Signature of a ferromagnetic metal target

The figure 6.4 shows a typical signature of a ferromagnetic metal like iron. The signature includes a positive (red) and a negative (blue) amplitude. When looking closely you can see even 2 ferromagnetic signatures. The first signature starts with a positive amplitude and the second signature starts with a negative amplitude. The order is not important, it depends on the direction of movement of the Super

Sensor. If you keep moving the probe from one side to another, these 2 signatures will change continuously.

Take care to move the Super Sensor slowly and at the same height above the ground and above a detected object to get a clear signature.

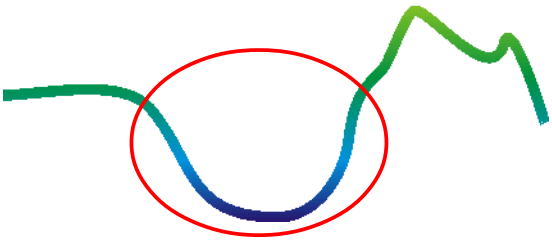


Non-ferromagnetic metals

Non-ferrous targets have a pure positive signature.

Figure 6.5: Signature of a non-ferromagnetic metal target

The figure 6.5 represents a signature of a non-ferrous target. You can recognize that there is only a positive amplitude (red). Additionally to the main amplitude there is another small peak, which is typically for precious metals. Also here the order of amplitude and the small peak is not important and depends on the scan direction.



Non-metallic targets

All non-metallic items have a pure negative signature.

Figure 6.6: Signature of a non-metallic target

The last of the typical signatures is represented in figure 6.6. It is the signature of all non-metallic targets and structures. These can be voids, tunnels or buried plastic pipes or boxes. You can recognize that there is only a negative amplitude (blue).

6.3 Magnetometer

By selecting the Magnetometer operating mode from the main menu, you can scan the sub-surface for ferromagnetic targets and areas of the soil with a low iron content. Also, you may view the oscilloscope output on the monitor to be able to identify ferromagnetic materials in the ground.

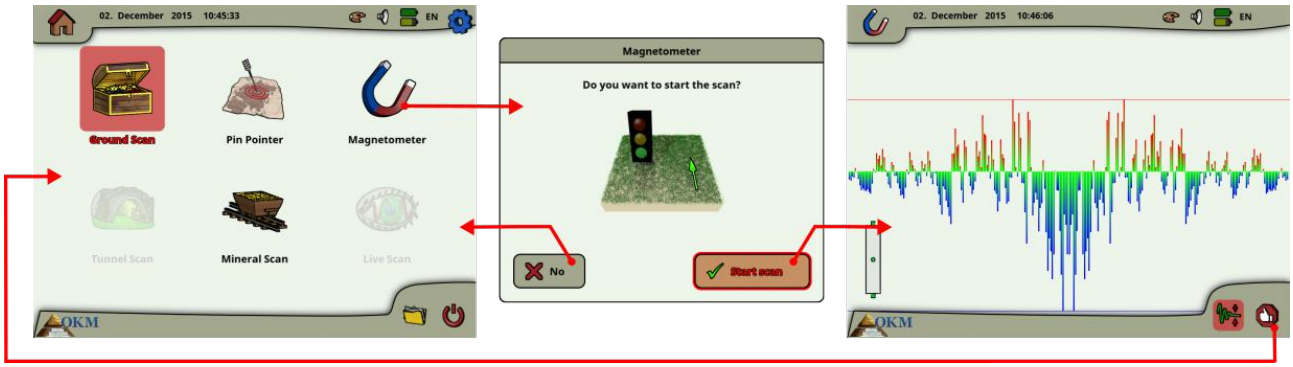


Figure 6.7: Workflow of Magnetometer

The Magnetometer mode can be used with all the antennas except the Tunnel Sensor. As soon as you confirm the operating mode “Magnetometer”, the integrated magnetometer will be adjusted to the current ground value of the antenna location.

Activate the Magnetometer only above a neutral soil. Afterwards all the signals that go in the upward direction (red) are the positive magnetic poles on a ferromagnetic object and all the signals that go downward (blue) are the negative magnetic poles. When activating the Magnetometer mode, be sure that you are not above a piece of iron or metallic object, this can cause a false ground balance and produce erroneous results.

If you realize that the function was activated over a piece of metal, simply restart the process again in a clear area of the soil.

6.4 Tunnel Scan

This operating mode is used to identify tunnels, voids and caverns. To use this mode, it is necessary to connect the Antenna for Tunnel Detection. If you do not have the optional Antenna for Tunnel Detection, one must be obtained prior to using this mode. This is an extremely powerful function and can assist you in identifying tunnels, voids and caverns.

After activating this operating mode you have the possibility to adjust the impulse mode setting. In figure 6.8 you can see the corresponding sub-menu.

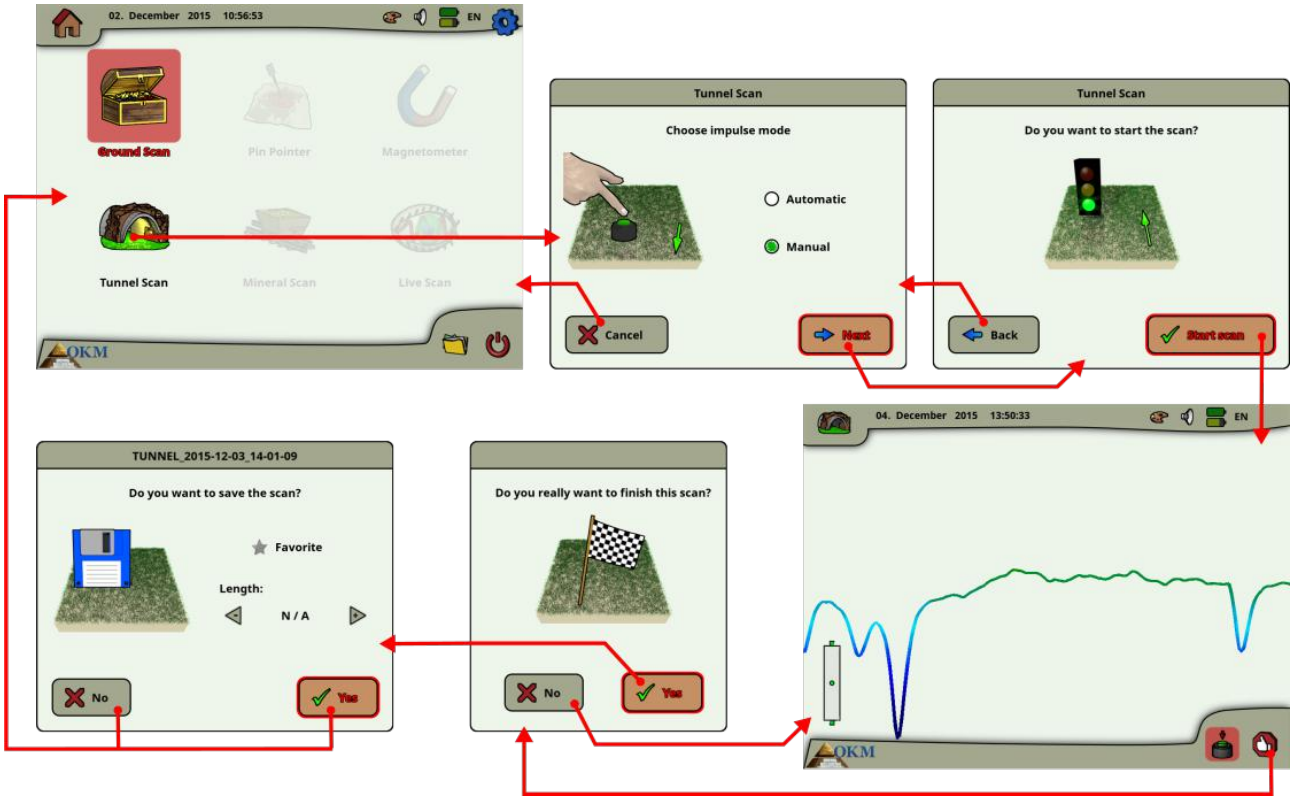


Figure 6.8: Tunnel Scan

Please refer to section 7.3.3 (“Manual or automatic impulse mode?”) on page 80 for further explanations concerning the impulse mode setting.

Then go to your start position and select the option “Start Scanning” (Green Tick) to start the measurement. A message will appear and ask if you are ready to start your measurement. Rotate the multi-function control knob and select “Yes”. As soon as you depress the knob, it is important to begin walking immediately for the eXp 6000 is now recording data.

6.4.1 Scan Technique

When looking for tunnels, voids or caverns below the surface, the procedure is basically the same as when looking for natural minerals. The primary difference is that the signal strength will be much stronger and the typical coloration will be a darker blue.

A tunnel signal in the Visualizer 3D software, is typically represented by a depression from the top of the scan. The software will show in many cases the curvature or the top of the tunnel, opening or void, like that in Figure 6.9. The relative soil will still show the natural mineralization that is in the ground. Though a tunnel is normally much wider than a buried treasure, the signal strength is much lower for a void. The void is similar to an air pocket under the surface and other signals may mask a tunnel signal. In the event that a tunnel signal is realized, conducting the control scans is necessary for a proper analysis.

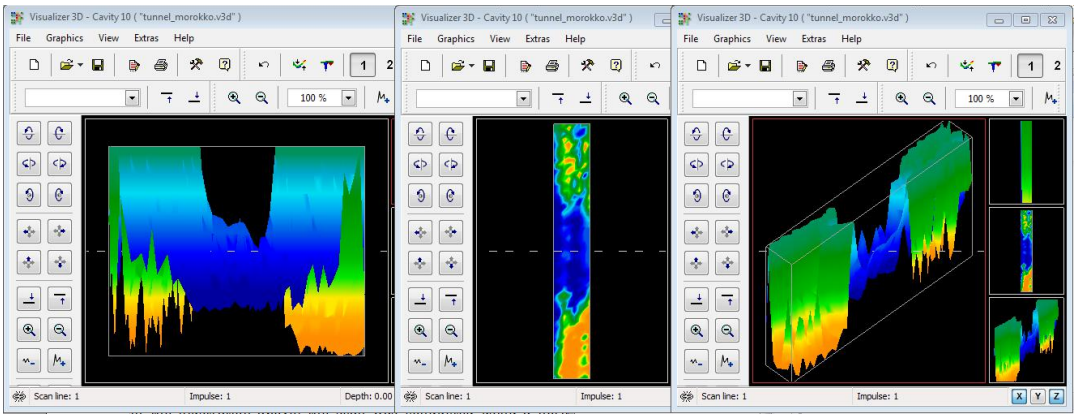


Figure 6.9: Tunnel shown in multi-line scan

In the Figure above, the scan was conducted using a normal traditional ground scan with multiple scan lines. When conducting a traditional ground scan, the parallel method of scanning must be used. With the three views, one can clearly see where the tunnel is.

The Figure 6.10 to the right is another example of how a tunnel may appear. Though the overall signal values are not very strong, the repeatability of the object has made it so that the form of the tunnel is easily recognized.

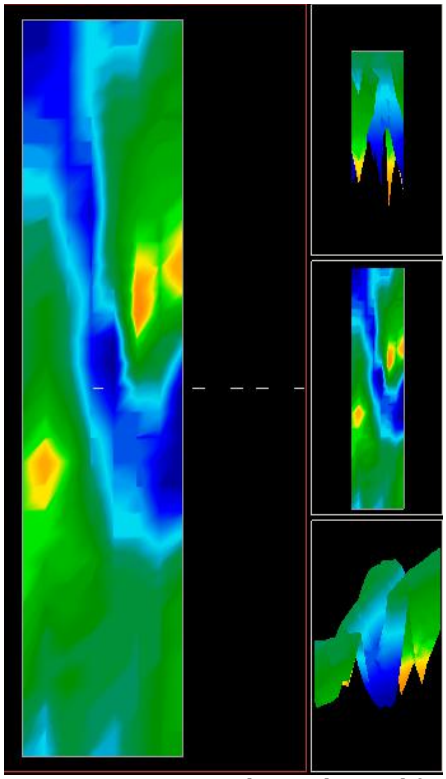


Figure 6.10: Customer submitted tunnel found in Turkey

To best find a tunnel there are two possible scanning methods that can be used. The first scanning method is the Parallel method which is explained earlier in this manual. When using this method, the “Ground Scan” function will be used.

The second method is the Single line method. Selecting the “Tunnel Scan” will create the precedence to conduct only a single line. The scan line starts at the beginning and at the end of the line the scan can be saved into the internal memory. A multiple line scan is not possible.

It is important to set your starting point and be sure that you are walking a straight line. While walking the line it is also very important that the height of the antenna does not change. Since the Tunnel Sensor is shorter than the Super Sensor, it is important that the antenna is being held in the

vertical position. Do not bend over to bring the antenna closer to the ground. It is designed to be higher above the ground to eliminate some of the smaller signals that can create false anomalies within the scan.

Prior to beginning the scan, some important items that one needs to remember is:

- Create a path and be sure that it is free and clear of obstacles.
- The path must be straight.
  Pulling a line or rope from the beginning to the end of the path is advised.
- Be sure that during the scan the antenna is held at the same height.
- The speed or distance between impulses needs to be the same.
  Changing the speed will result in an inaccurate scan.
- Complete the control scan.
  A control scan is a repeat of a scan using all the exact same parameters.

When all the scanning is done correctly, conducting the data analysis is much easier.

The single line method is also a very accurate way of locating deeper voids and tunnels. When the single line method is used, the chances of making an error is greatly decreased. This method is used for an initial investigation of an area.

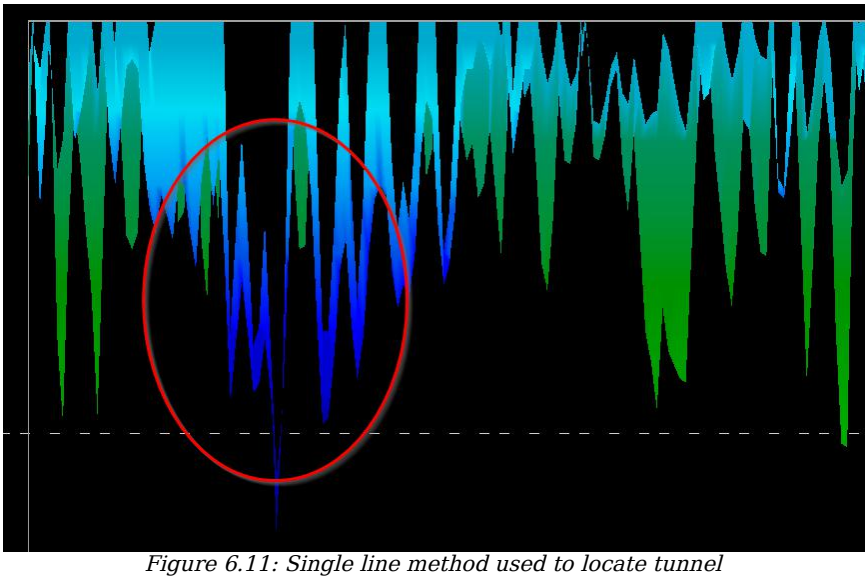


Figure 6.11: Single line method used to locate tunnel

In the example from figure 6.11 the void is circled to show the location. A scan like the one above will be repeated several times to ensure that the void is real and that it also does not move.

The repeating of the scans is also known as control scans.

A note to remember is that the bigger the tunnel opening or void is, the deeper the tunnel can be detected. If the tunnel is very small then the maximum depth will be decreased and may be difficult to find. The depth of a tunnel cannot be accurately determined. The Visualizer 3D software is designed to measure depth starting from the surface disturbance to the object itself.

6.5 Mineral Scan

The following procedures do not apply to those who are looking for buried treasures or a cache of items. This is only for the purpose of prospecting and locating naturally occurring mineral fields and their deposits with the OKM eXp 6000. If you are looking for buried items of great value or other man made objects that have been placed into the ground, then this function is not correct for your application. Please choose a different function that will give you the desired results.

The examples contained within this section are actual scans from actual locations and the data is derived from actual field experience. Results from your particular area may differ. As with all equipment, relevant data is dependent on the soil type in your area which may alter the final reading. Scan measurements and examples used in this supplement are derived from users located in different parts of Africa, Asia, South America and North America.

When prospecting for mineral deposits or other naturally occurring minerals or formations located in the ground, it is important to work in a clean environment, free of debris and obstacles. Debris may contaminate the area and lower the probability of success. The presence of debris may also lead to false or misleading signals. Obstacles will most likely have to be avoided. Create a path where unnecessary movement of the Super Sensor can be avoided. Additional movement of the Super Sensor may result in inaccurate data. Be sure to always work with data that can be repeated. More information about control scans in section 8.2 “Control Scans” on page 85.

The Visualizer 3D software or the OKM line of geophysical equipment can not identify element specific materials, minerals or items that occur naturally in the ground. It can identify and locate the presence of ferrous, non-ferrous, fracture zones and other naturally occurring anomalies. The actual detection of precious metals is based on results from various known mineral fields and mines. It is completely possible that other non-ferrous minerals may resemble or have a likeness similar to other naturally occurring minerals.

When conducting searches for fields of mineralization, it is important to identify areas of higher probability with the assistance or research of a geologist or a known geological location. Locating and prospecting in known fields or areas of higher probability will greatly increase your chances of success. Different geological formations may give different results in any particular area. If possible it is always best to start the training and/or field testing of the equipment in or on a known area to properly identify the mineral signature in the software. Different locations will have other geologic properties and may or may not be able to give an accurate reading or measurement. Varying ground features, mineralization and sub-straits may increase or decrease the resceptibility of the Super Sensor.

The Visualizer 3D software will identify patches of mineralization. When conducting scans with the OKM eXp 6000, it is presumed that the user or operator is familiar with the proper operating technique.

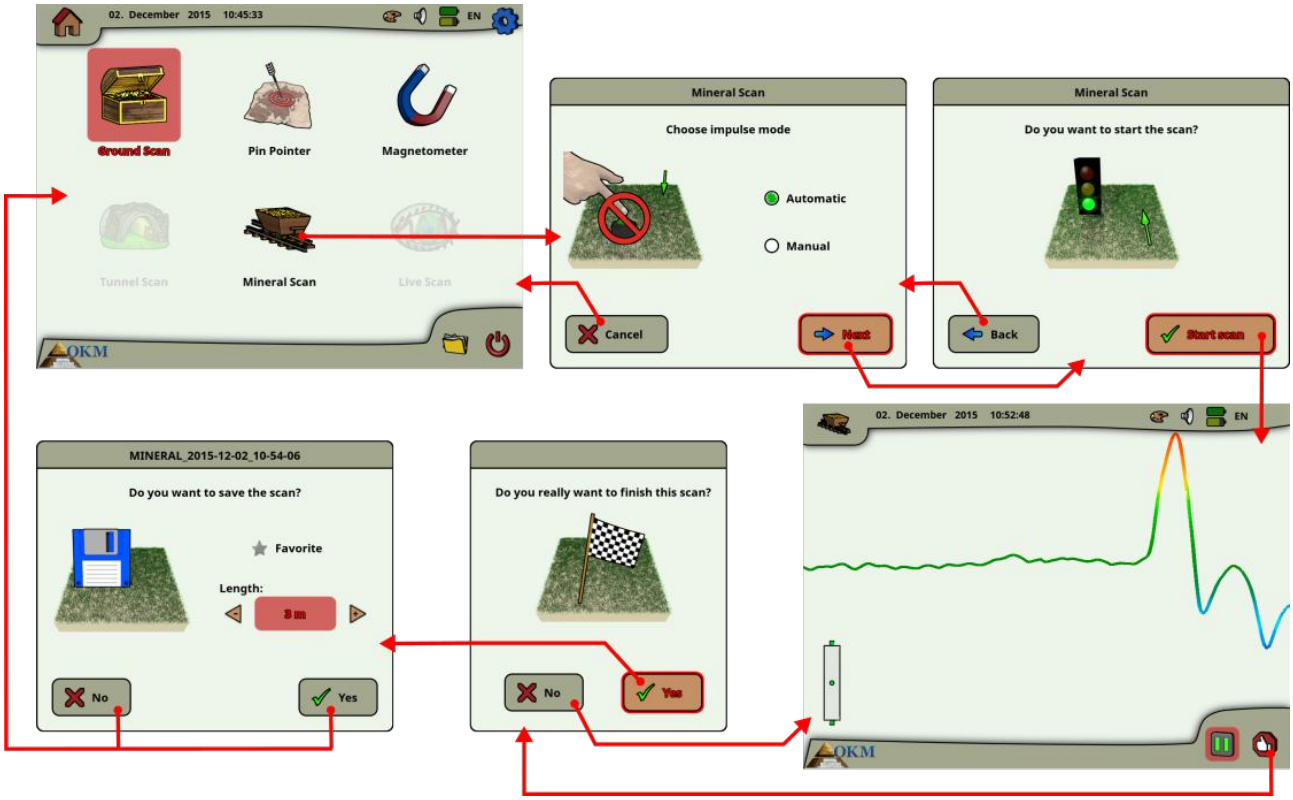


Figure 6.12: Workflow of Mineral Scan

The operating mode “Mineral Scan” can only be used with the Super Sensor to be able to see also finer or smaller mineral deposits.

After activating this operating mode you have the possibility to adjust the impulse mode setting. In figure 6.12 you can see the corresponding sub-menu.

Please refer to section 7.3.3 (“Manual or automatic impulse mode?”) on page 80 for further explanations concerning the impulse mode setting.

Then go to your start position and select the option “Start Scan” to start the measurement. A message will appear and ask if you are ready to start your measurement. Rotate the multi-function control knob and select “Yes”. As soon as you depress the knob, it is important to begin walking immediately for the eXp 6000 is now recording data.

6.5.1 Scan Technique

The following technique applies only to the Mineral Scan mode with the Super Sensor

(1) Ensure that all batteries and power packs have enough of a charge to complete the scan entirely.

(2) Per the area to be prospected, ensure that you can travel the desired path without any interruptions, pauses or large obstacles (see explanation below).

The scan needs to be conducted in the following manner. Create a path where a single line can be traversed. This path needs to be a longer path, usually greater than 20 meters in length. The normal

length for areas of prospection may be between 50 and 100 meters; up to 200 m long. Areas of very rough terrain will certainly be shorter.

This measurement needs to be a single line only!

Mark your starting and stopping points. Pull a line from the beginning point to the ending point to ensure that you are traveling a **STRAIGHT line!** Not walking a straight line **WILL** give you a false reading.

Enable GPS (external or internal) to get better accuracy of your starting and stopping points. This is very important for locating the position after the data has been successfully analyzed.

(3) Assemble the eXp 6000 and attach the Super Sensor.

(4) Start the eXp 6000 and select “Mineral Scan” from the main menu (see Figure 6.12).

(5) Select either Automatic or Manual for the Impulse Mode depending on the terrain that is to be prospected. Push the multi-function control knob.

(6) Ensure that your Super Sensor remains the SAME height above the ground and that it remains vertical during the duration of the scan. For areas of rough terrain or difficult to pass, be sure to use the Manual mode. Attempt to maintain the height between 5 cm and 10 cm (2” to 5”) above the ground with no more than a ± 5 cm (2”) variance during the scan to receive a good measurement (changing the height of the Super Sensor may give you a false reading).

(7) The dialog window “Do you want to start the scan?” will appear. Click on “Start scan” to begin scanning. Start moving forward as soon as the button is pushed, do not delay.

(8) At the end of the scan push the multi-function control knob to stop your scan (be careful to not shake the Super Sensor when pushing the button to start or stop for it can have a negative effect on the scan).

(9) The dialog window “Do you want to save the scan?” will appear. Select “Yes” to save the scan and “No” to not save the scan.

Though you will be able to see the scan on the eXp 6000 monitor, it is recommended to complete the analysis on the PC. The Visualizer 3D software will give you more tools to better identify mineral deposits.

It is very important to conduct the Control Scans.

6.5.2 Scan Analysis

After transferring the scan images to your computer (as described in section 6.8.6 “Copy files to USB stick” on page 69), you will now see a scan that is a straight line. This scan is now ready to begin the analysis.

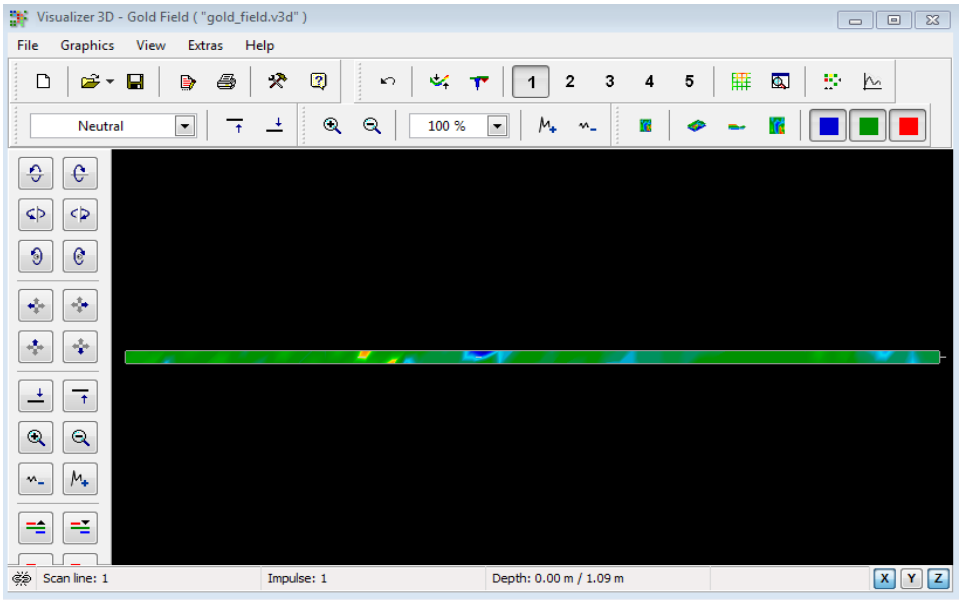


Figure 6.13: Visualizer 3D Screen shot

To see the differences within the scan rotate it to the side.

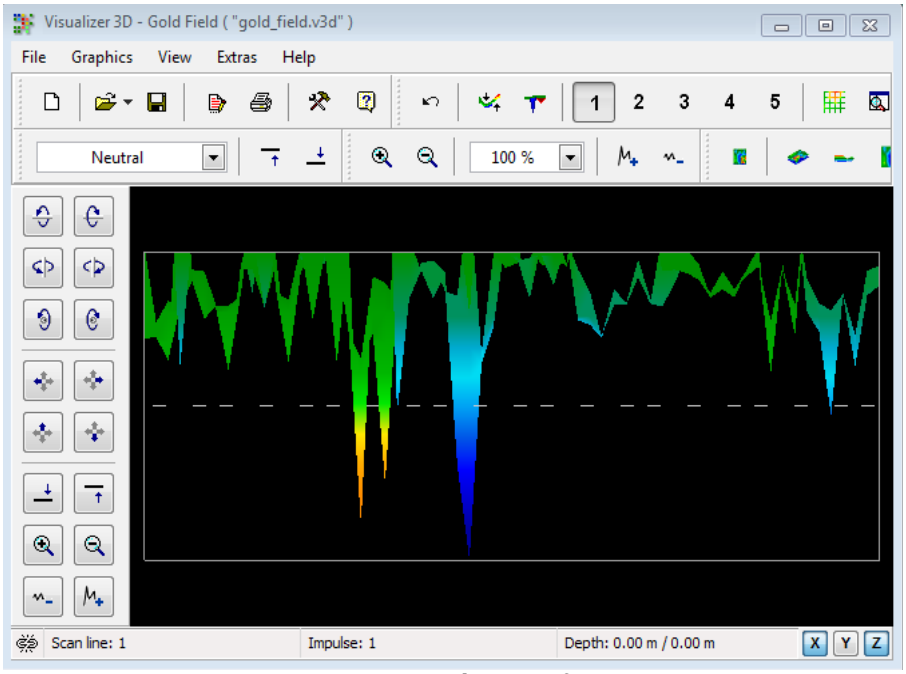


Figure 6.14: Side View of Scan Area

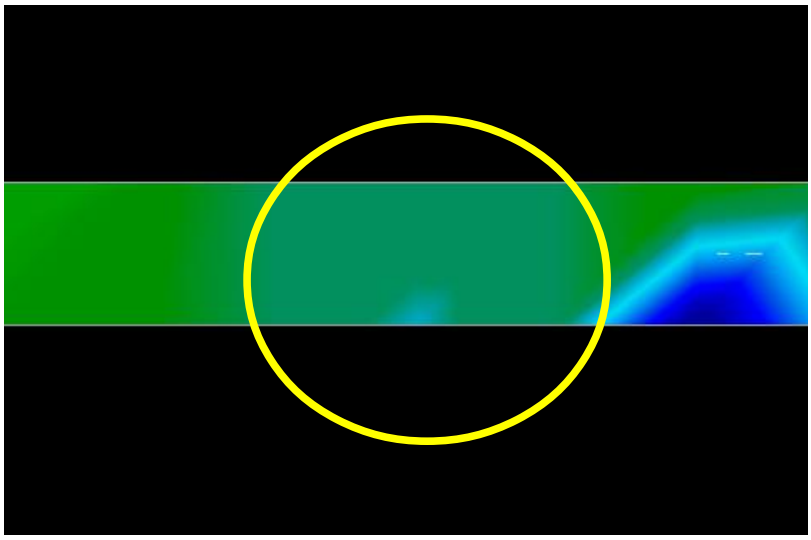


Figure 6.15: Natural Mineral Field

The above image (Figure 6.15: Natural Mineral Field) has the highlighted section of how a natural mineral field appears like. Please note the above colors, they are difficult to notice when in direct sun or bright light. Please do the analysis in an area where the computer can be shaded from most of the natural light to better recognize the colors. The image is from practical experience in the field.

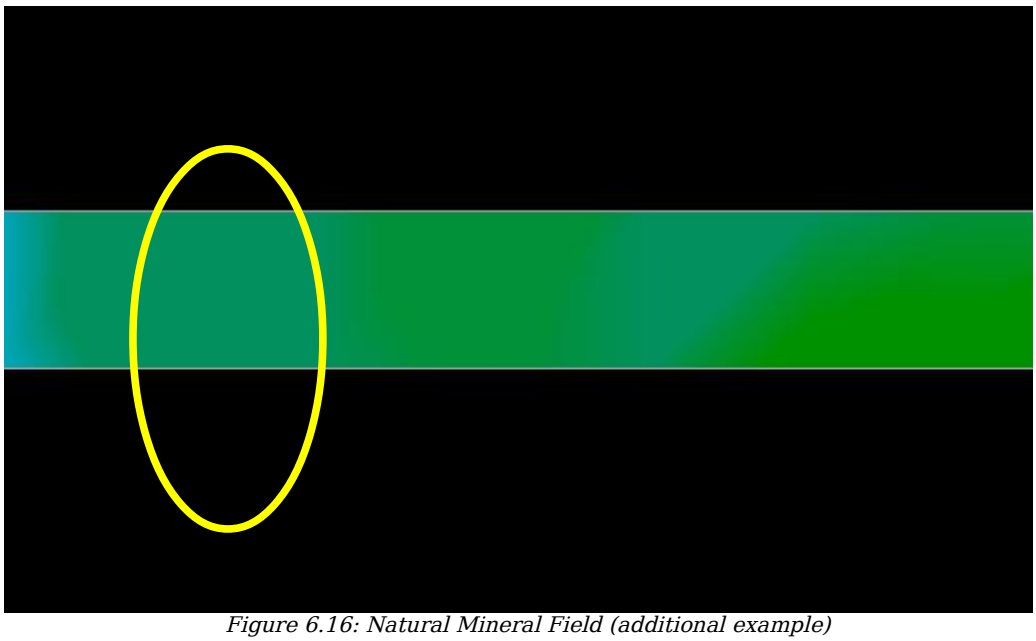


Figure 6.16: Natural Mineral Field (additional example)

Practical experience and the repeatability factor from several locations world-wide have made this color the one to watch for within the scans. As stated previously it is not an easy to recognize color.

Another signature to look for is the signature showing the presence of a non-ferromagnetic substance, like in the example below (Figure 6.17: Example showing the typical signal of non-ferrous metal). The scan image needs to be viewed from the side view. Click on the “Minimize the difference in height” in order to be able to fit the scan on the screen. If the values are too high then noticing the differences will not be possible.

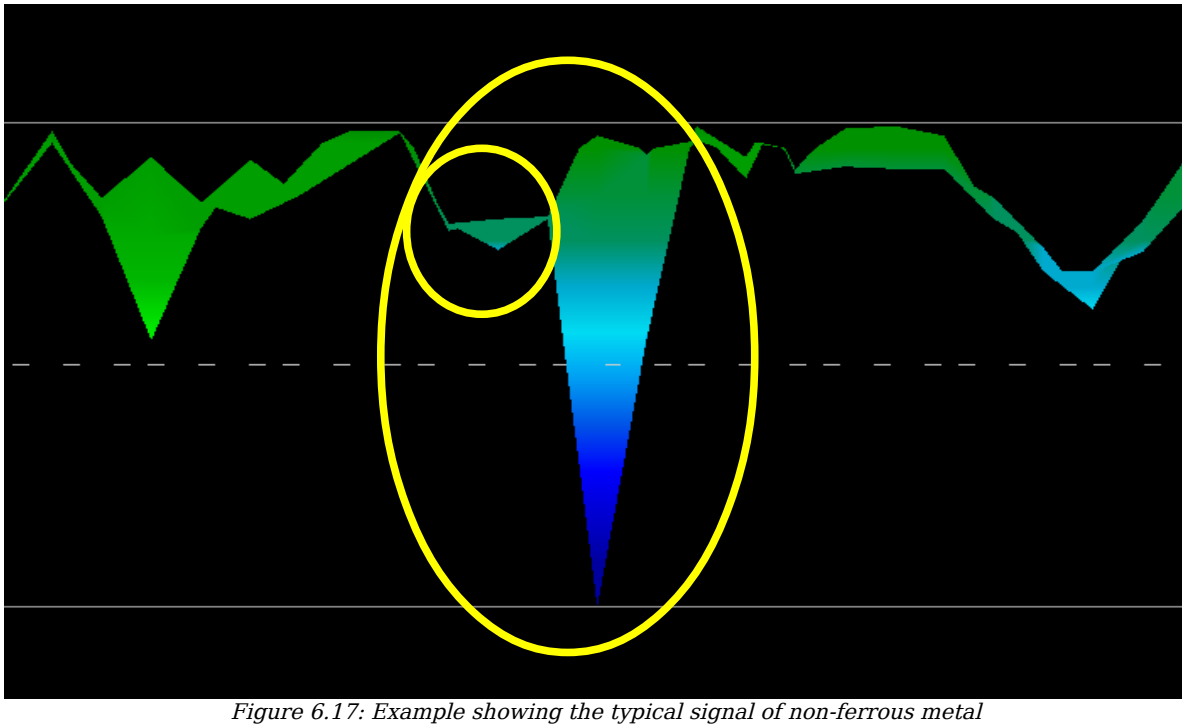


Figure 6.17: Example showing the typical signal of non-ferrous metal

In the above example, the smaller area is attached to the larger area, this is very typical and occurs quite often when working with minerals located within hard rock.

After an initial area has been located, to determine the size of the field or potential mineral field then a conventional scan as stated in section Ground Scan on page 38 needs to be conducted. When conducting a conventional scan be very careful to not rotate the antenna. Rotational errors are very easily done and can be frustrating. By using the “Parallel” the rotational factor is greatly minimized and almost removed. Another key factor when conducting any of the scans is to absolutely maintain the same height as much as possible (± 3 cm).

6.5.2.1 Additional Examples

In the following examples are other instances of naturally occurring gold that have been found. These particular examples are from a user in North Sudan.

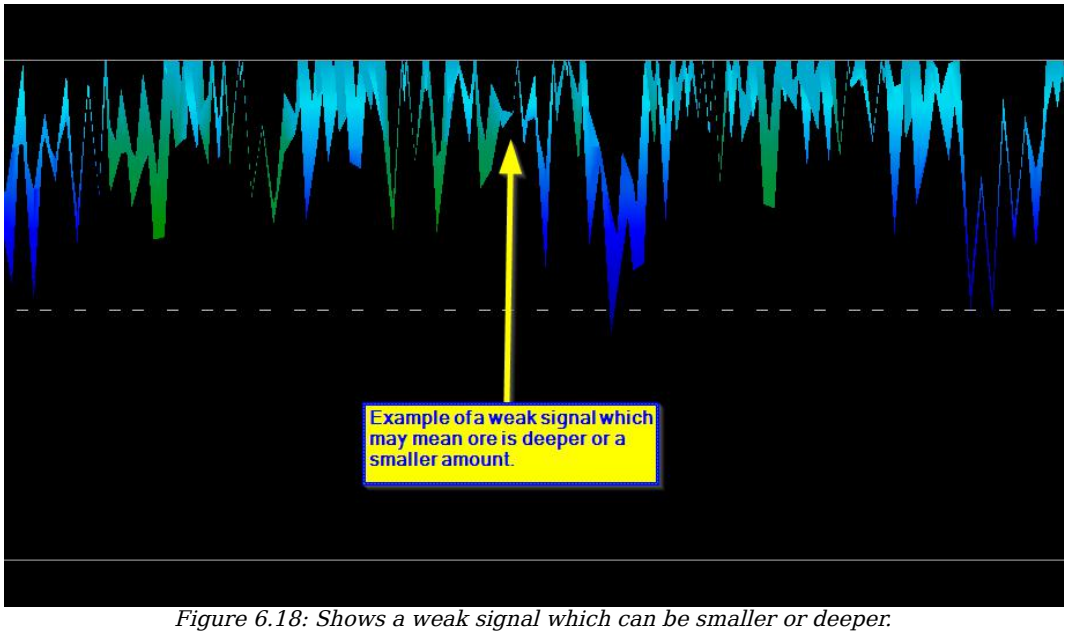


Figure 6.18: Shows a weak signal which can be smaller or deeper.

These additional examples yielded gold that was embedded in the rock alongside with quartz and black sand.

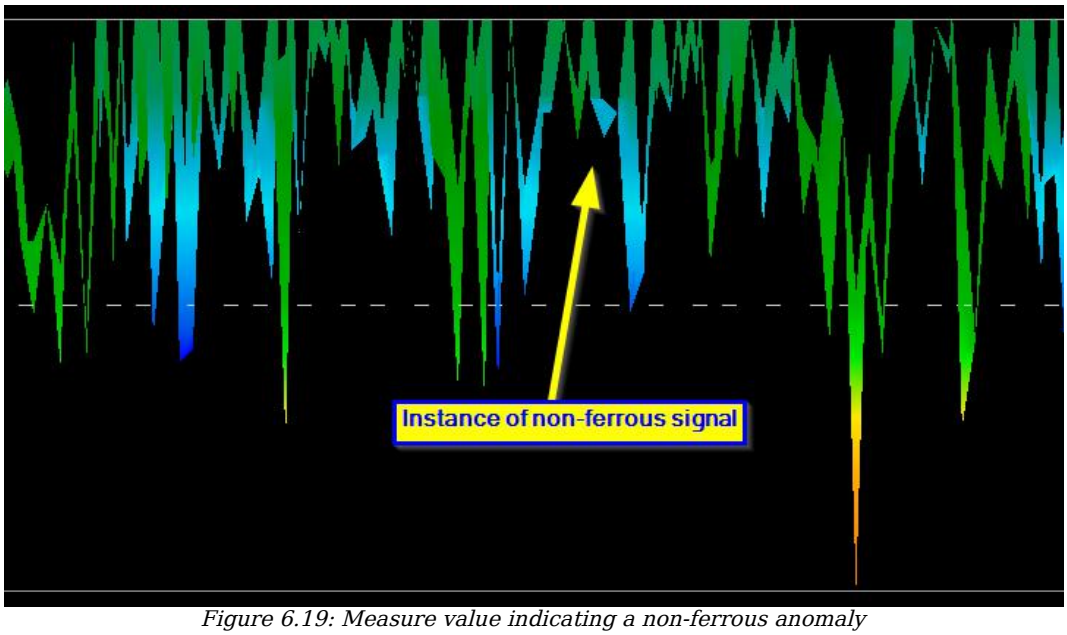


Figure 6.19: Measure value indicating a non-ferrous anomaly

6.5.3 Determining Position of Anomaly

After an anomaly has been found it is very important to know how to find the location. This is done very simply by entering in the field length into the “Characteristics” window (F9 key).

After the length has been entered into the system, you can navigate to the desired position using the arrow keys on the keyboard.

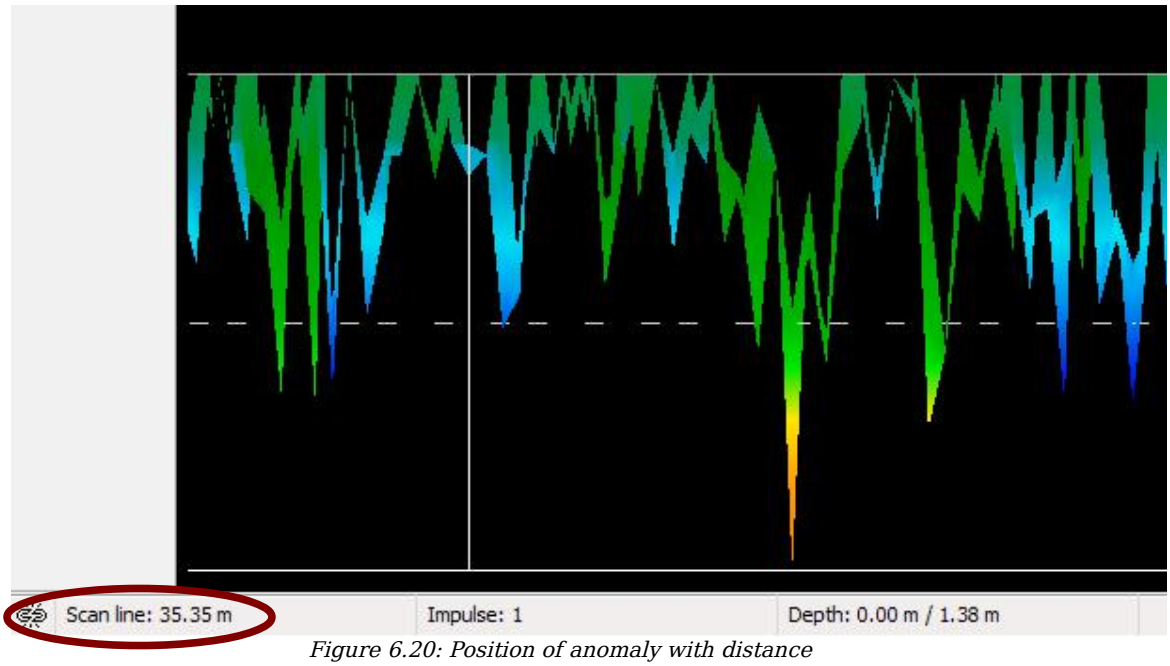


Figure 6.20: Position of anomaly with distance

In Figure 6.20: Position of anomaly with distance you can see in the bottom left hand corner the distance is being shown. The beginning of a scan is normally always on the bottom right hand side of the software window. The positioning line was put into place using the arrow keys. Afterward the signal position can be found using simple distance measuring tools.

6.6 Live Scan

To work in the operating mode "Live Scan" you have to connect the LiveStream Sensor to your eXp 6000. In this operating mode you do not have to keep a defined scan direction. You can walk forwards or backwards over your measured area. On the screen you will see immediately what is currently situated right under the measuring probe. The graphical representation is very similar to the operating mode of Ground Scan but much more data will be processed at once.

In figure 6.21 the workflow of a live scan is illustrated.

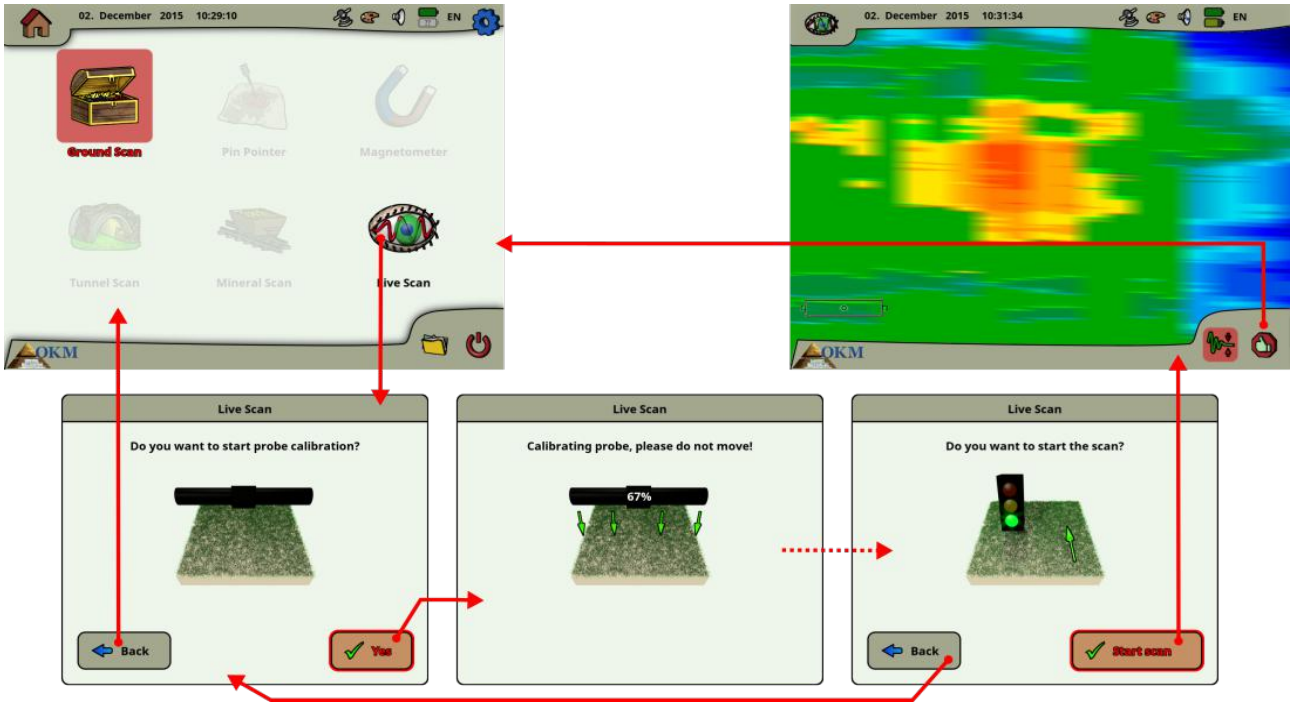
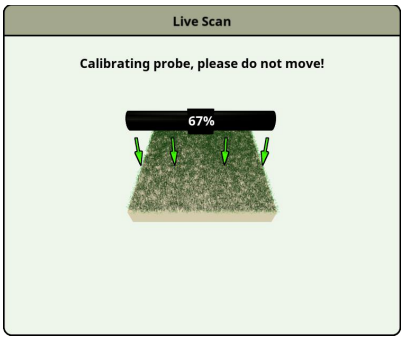


Figure 6.21: Workflow of Live Scan

Right after selecting “Live Scan” from the main menu you have to calibrate the measuring probe. This procedure is processed as follows:

As soon as you see this dialog you have to hold your LiveStream Sensor right over neutral ground, which means normal underground without any potential objects. Hold the measuring probe approx. 5 to 15 cm above the ground and push the "Yes" button.

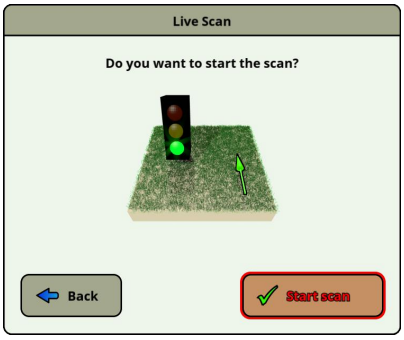
Alternatively you can also push the start/stop button on the telescopic rod assembly or the multi-function control knob on the control unit.



Now the eXp 6000 calibrates your measuring probe according to the current underground to receive optimal data afterwards.

Please do not move your probe during this procedure.

The progress indicator informs you about the process. Normally it will just take some seconds to finish the calibration.



After the calibration has been processed the eXp 6000 ground scanner is ready to start the measurement. Now you have to go to your starting point and push the "Start scan" button.

Alternatively you can also push the start button on the telescopic rod assembly or the multi-function control knob on the control unit.

Now you should walk a straight line that can be forward, backward or even in both directions. All measured data will flow over the screen (from top to bottom), even when you are not moving. The measured values are updated constantly. If you are situated right over a target it will be visible on screen.

6.7 Settings

The eXp 6000 offers many settings which can be configured. Within the main menu you have to select the settings icon which is a small gear in the top right corner of the screen. You may access this option from several screens during the operation of the eXp 6000. After selecting the settings icon you will see the settings screen as shown in figure 6.23.

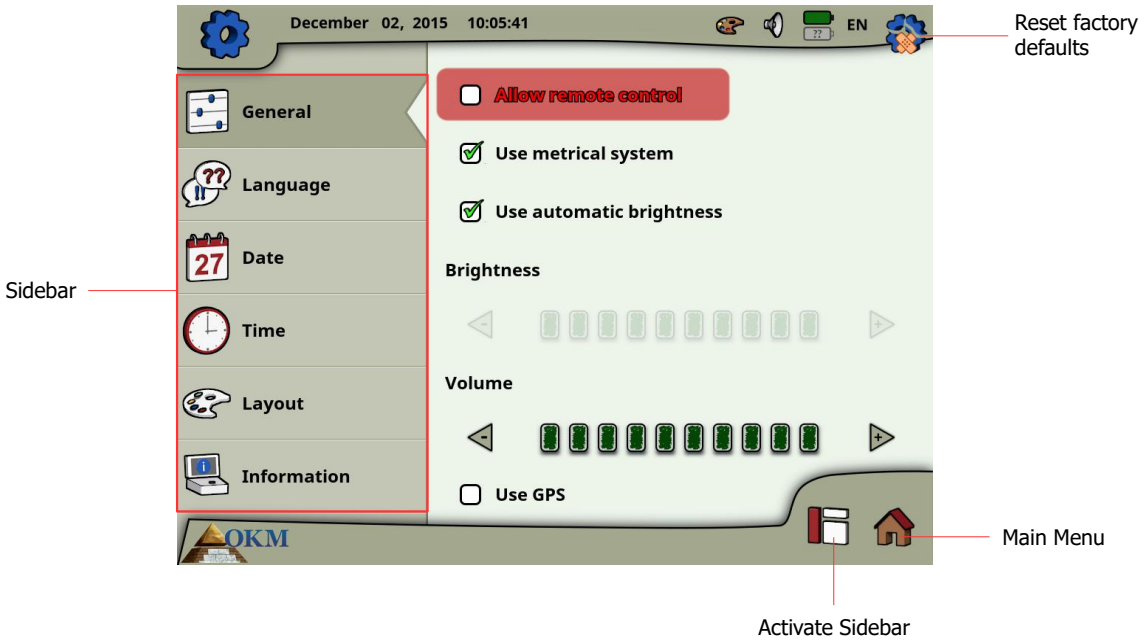


Figure 6.22: General settings

First you have to select one of the following categories that are available in the left sidebar:

- **General**
  This is the place where you can set general options like Brightness, Volume, GPS and Measure system (metrical or imperial).
- **Language**
  Here you select your preferred language in that you like to operate the eXp 6000.
- **Date**
  You will set up all information concerning the date here.
- **Time**
  You will set up all information concerning the time here.
- **Layout**
  Here you can select the current layout (day, night, default).

- **Information**
  The information panel lists detailed information about firmware and software versions as well as battery status.

Just tap a category or use the multi-function control knob to select a category and push the control knob to activate it. Now you can adjust specific settings that are described in the following sections.

6.7.1 General

This is the place where you are configuring GPS, measure units, display brightness and volume settings.

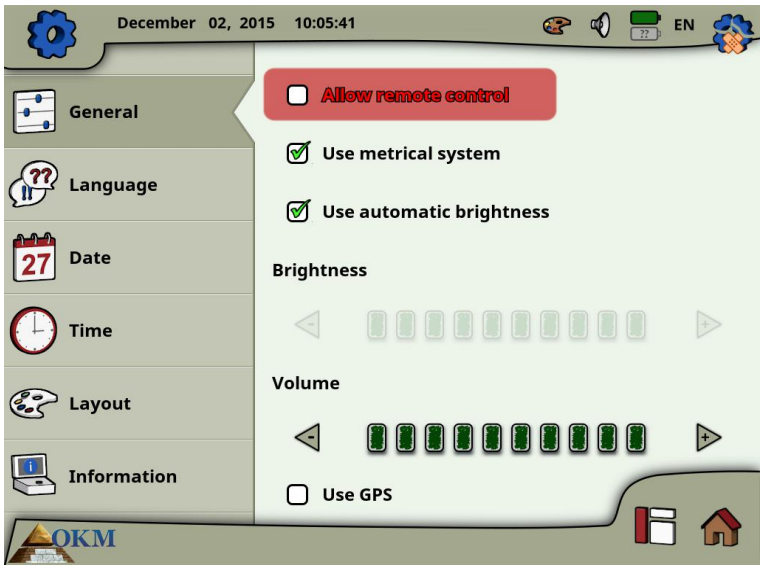


Figure 6.23: General settings

- **Allow remote control**
  You can allow remote control to connected Android devices like Tablet PC's and video eye glasses. If this option is enabled you can control your eXp 6000 control unit by using an external Android device.

- **Use metrical system**
  At certain times you have to select length or width of scan areas. This can be done in meters (metrical system) or feet (imperial system). You have the choice which of the two measure systems you want to use:

  - If the checkmark is set, the metrical system (meter) is enabled.
  - If the checkmark is not set, the imperial system (feet) is enabled.

- **Automatic brightness**
  If this checkmark is set, the brightness of the display will be regulated automatically according to the environment lighting. The display's brightness will increase the brighter the surrounding light is and vice versa.

- **Brightness**
  If the brightness is not regulated automatically, you have to set it up by yourself manually. Simply select your preferred level of brightness.
- **Volume**
  Adjust your preferred level of volume here.
- **Use GPS**
  Here you can enable or disable the internal GPS functionality. Set the checkmark to enable the GPS. If GPS is enabled all position coordinates will be stored along with your scan data. In that way you will be able to navigate to your scan field later on as described in section 6.8.5 “GPS navigation“.

6.7.2 Language

The eXp 6000 control unit comes with a variety of different languages to make it as easy as possible to operate the device and its functions.

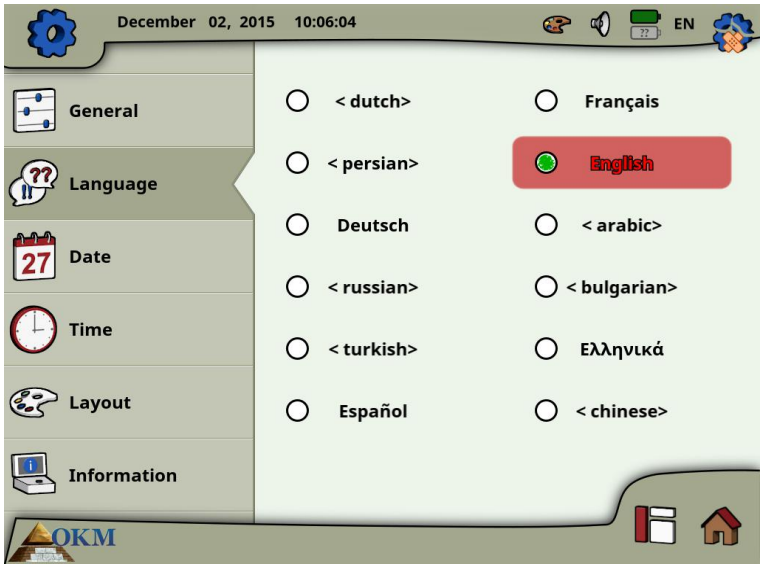


Figure 6.24: Language settings

Select your preferred language from the list. The following languages were available at the time this manual was printed:

- German
- English
- French
- Spanish
- Italian
- Polish
- Norwegian
- Arabic
- Turkish
- Farsi
- Russian
- Bulgarian
- Greek
- Dutch
- Chinese
- Vietnamese

In the future more languages could be added to this list.

6.7.3 Date

Here you can set all date information like format, day, month and year.

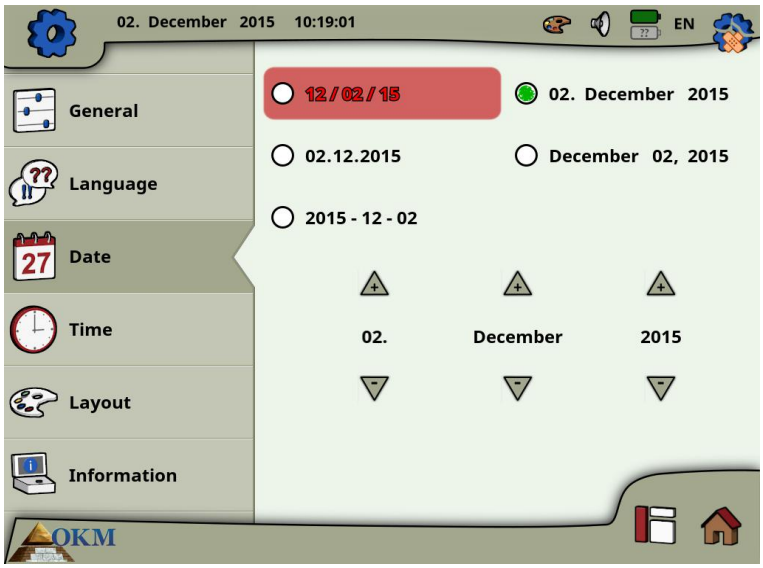


Figure 6.25: Date settings

First you select one of the available date formats and then you adjust the day, month and year options to your local time. This date will be used for naming files for saving.

6.7.4 Time

Here you can set all time information like format, hour and minute.

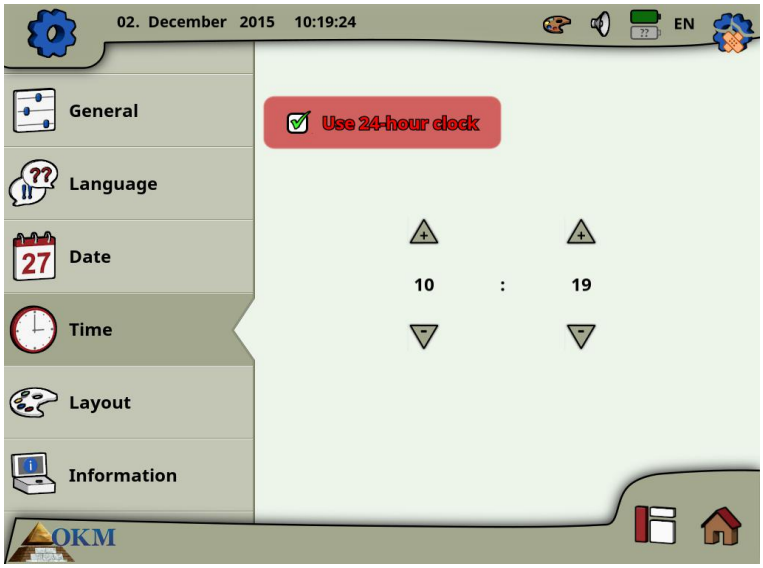


Figure 6.26: Time settings

First you select one of the available time formats and then you adjust the hour and minute options to your local time. This time will be used for naming files for saving.

6.7.5 Layout

The eXp 6000 control unit provides different layout themes to support the operator with the best view experience, even under strange light conditions.

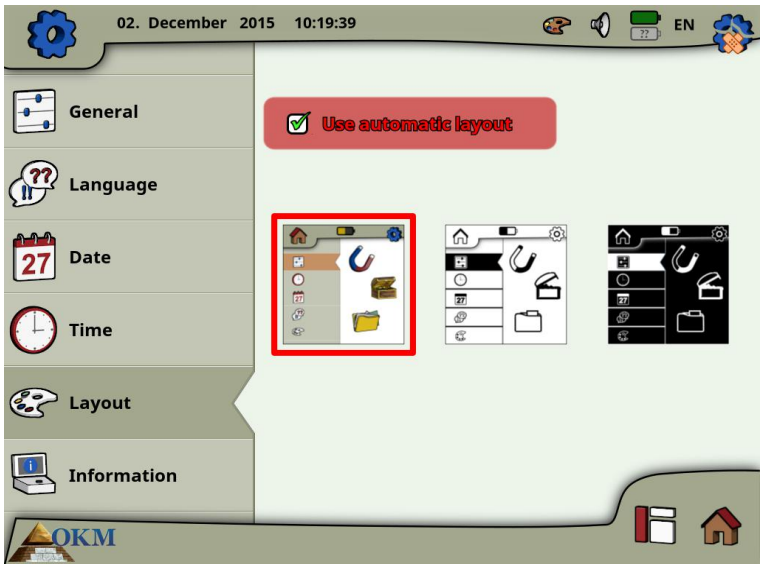


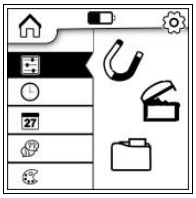
Figure 6.27: Layout settings

If you set a checkmark for the option “Choose skin automatically”, the eXp 6000 control unit selects the current layout automatically by measuring the light condition of the environment. If the light changes during operation the layout itself may change.

You can select between the following different layout themes:

Default

This is the default theme with the best display quality concerning design. But probably this is the skin which is hardly readable in bright sunlight.



Daylight

This is a layout theme which has been optimized for the use under very bright light conditions like strong sunlight. The high contrast between white and black improves the readability.

Nighttime

This is a layout theme which has been optimized for the use under very dark light conditions like nighttime. The high contrast between black and white improves the readability without emitting to much bright light.

Anytime during the operation of the eXp 6000 you may touch the layout icon to open a dialog to change the current skin immediately.

6.7.6 Information

The information panel provides detailed information about the current firmware and software versions of your eXp 6000 as well as information about the current charge conditions of the batteries. The battery and status information of the probe or telescopic rod assembly are only available if an active wireless connection has been established.

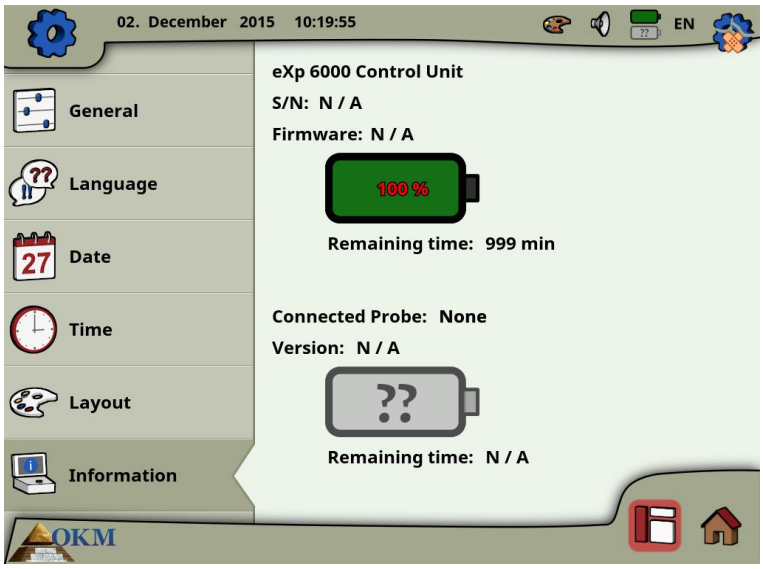


Figure 6.28: Information screen

The firmware and serial information could be helpful in case of technical questions to OKM's support team.

6.7.7 Restore factory defaults

As soon as you've entered the settings screen the original settings icon in the top right corner has changed into a restore factory defaults icon . After selecting this new icon the message box from figure 6.29 appears.

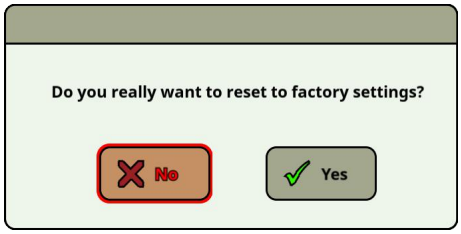


Figure 6.29: Restore factory defaults

Confirm with “Yes” to reset all options to the factory defaults. All your personal settings will be lost after that.

6.8 File Explorer

The file explorer is the place where all your previously saved scan files are organized. Here you have the possibility to reopen, delete and transfer your scan images.

6.8.1 Screen overview

The screen of the file explorer and its control elements is shown in figure 6.30.

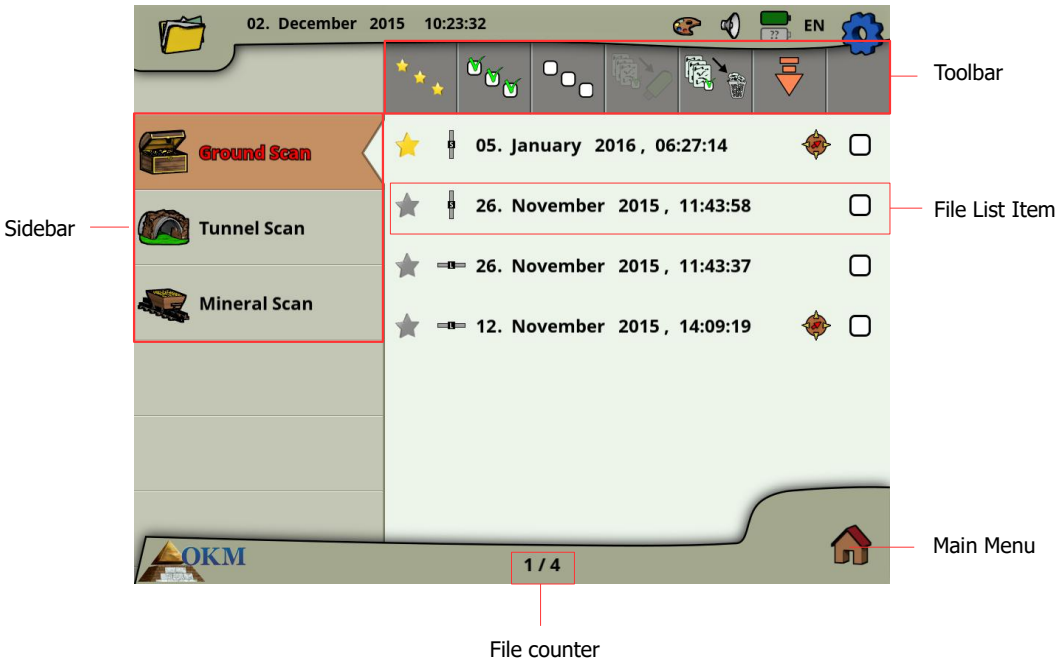


Figure 6.30: Browse scan images in file explorer

In the **sidebar** you can switch between the operating modes in which the files are categorized.

The **toolbar** provides several action buttons that are described in subsection 6.8.1.1 "Toolbar".

The **file list item** displays information concerning each scan file and is described in subsection 6.8.1.2 "File List Item".

The **file counter** indicates the current file number as well as the maximum file number.

Select the **Main Menu** icon in the lower right corner of the screen to go back to the main menu ("home screen").

6.8.1.1 Toolbar

The toolbar contains following action buttons:

Show favorites only

This button is used to force the listing of favorite files only. After selecting this button only files that have been marked as favorite will be listed.

Show all files

This button is used to force the listing of all files, not only favorites. After selecting this button all files will be listed.

Mark all files

This button is used to mark all files at once. This might be useful if you are going to delete or copy all files.

Unmark all files

This button is used to unmark all files at once.

Copy marked files to USB stick

Use this button to copy all files that have been marked to an external USB stick.

Delete marked files

Use this button to delete all files that have been marked permanently from the eXp 6000 control unit.

Leave Toolbar

This button becomes important if you are operating the eXp 6000 control unit exclusively with the multi-function control knob. Then you have to select this button to bring the focus back to the file list.

6.8.1.2 File List Item

One file list item represents one scan file that has been conducted and saved. In figure 6.31 all elements of a list item are shown.

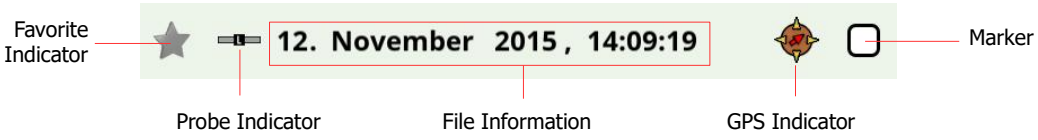


Figure 6.31: File list item

The **favorite indicator** shows if the file is marked as a favorite ⭐ or not ⭐.

The **probe indicator** tells you which probe or sensor has been used to conduct this scan image. The following probe indications are possible:

- = Telescopic Probe
- = Super Sensor
- = Tunnel Sensor
- = LiveStream Sensor

The **GPS indicator** shows if the file has been conducted with GPS enabled or not.

In the **file information** you will read the date and time when the scan was conducted and which probe you have used for scanning.

The **marker** can be filled with a checkmark (marked) or could be empty (unmarked). You can mark several files to delete or copy files in one step.

6.8.2 Browse files

After selecting and activating a file entry by pushing the multi-function control knob or by tapping onto the file list item, the dialog from figure 6.32 appears on screen.

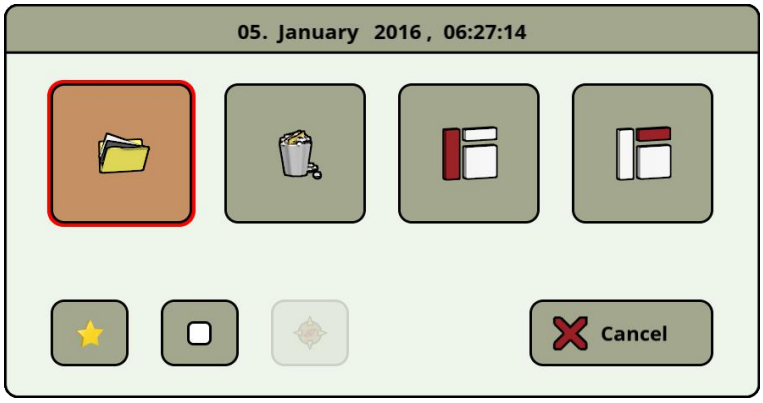


Figure 6.32: Select an action for a file

Here you have the choice of several actions of how to proceed with the file. Following actions are available:

Open file

Select this action to open the file and view its scan data directly on the screen of the eXp 6000 control unit.

Delete file

Select this action to delete the file permanently from the hard disk of the eXp 6000.

Activate sidebar

This action closes the dialog box and activates the sidebar where you may choose another file category (Ground Scan, Mineral Scan, Tunnel Scan).

Activate toolbar

This action closes the dialog box and activates the top toolbar where you may select further actions as described in section 6.8.1.1 "Toolbar" on page 64.

Set/Unset as favorite

Use this button to mark or unmark the selected file as a favourite. By using the touch screen capabilities you can do that also by touching the little star icon left to each file list entry.

Set/Unset marker

Use this button to mark or unmark the selected file as "selected". By using the touch screen capabilities you can do that also by touching the little checkbox icon right to each file list item. This may be necessary to handle more files at once (e.g. deleting or transferring files).

Start GPS navigation

This action is only available if the selected scan image was conducted with GPS enabled. Use this button if you need to navigate to the scan area where the selected file has been conducted. More information concerning GPS navigation is described in section 6.8.5 "GPS navigation" on page 67.

6.8.3 Open files and view scan images

After selecting a file and pushing the multi-function control knob or by simply touching the file's name the dialog from figure 6.32 shows up on screen. Now select the open button to open the scan image.

The control unit starts reading the recorded data from the file and displays it simultaneously on the screen. By turning the multi-function control knob to the right or left you can slow down or speed up this process. So you can follow the complete scanning process once more.

If you don't want to see this step-by-step procedure, please push the multi-function control knob to load all the data completely at once.

6.8.4 Delete files

There are two possible ways to delete files from your eXp 6000:

- **Delete a single file**
  After selecting a file and pushing the multi-function control knob or by simply touching the file's name the dialog from figure 6.32 shows up on screen. Now select the delete button to delete this single file only.
- **Delete a bunch of marked files**
  Before you can delete more files at once you have to mark the files. Therefor you have to set the checkmark of the checkbox right to the file's name. The easiest way to do that is by using the touch capabilities of the display. After all designated files have been marked touch the delete button in the toolbar on top of the screen.

6.8.5 GPS navigation

For all scan images that have been scanned with enabled GPS you may use the internal navigation system to locate your scan area. Each GPS enabled file is indicated by the GPS navigation icon right to the file's name. To start the navigation touch onto the file entry or select it by using the multi-function control knob. The dialog from figure 6.32 appears on screen.

There you will find a button with the same GPS navigation icon . Push that button to initiate the GPS navigation screen as shown in figure 6.33.

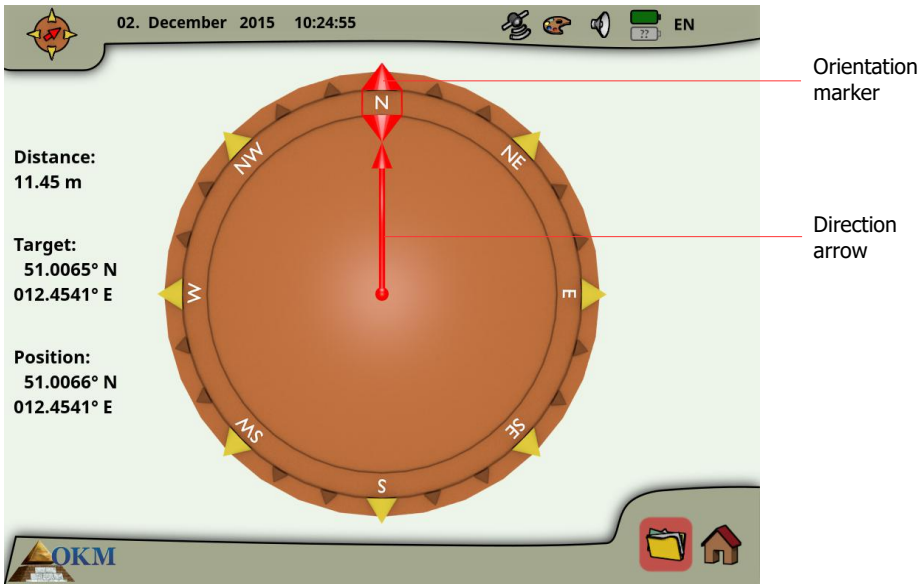


Figure 6.33: GPS navigation

The **position** indicates the GPS coordinates of your current position, while the **target** is the place where you have conducted your scan.

The **distance** tells you how far you have to go to reach your target GPS position.

The **direction arrow** points into the direction where your scan area is located. If the arrow points directly to the **orientation marker** you are walking into the right direction. In any other case you have to correct your direction by turning yourself right or left, depending on the arrow's angle.

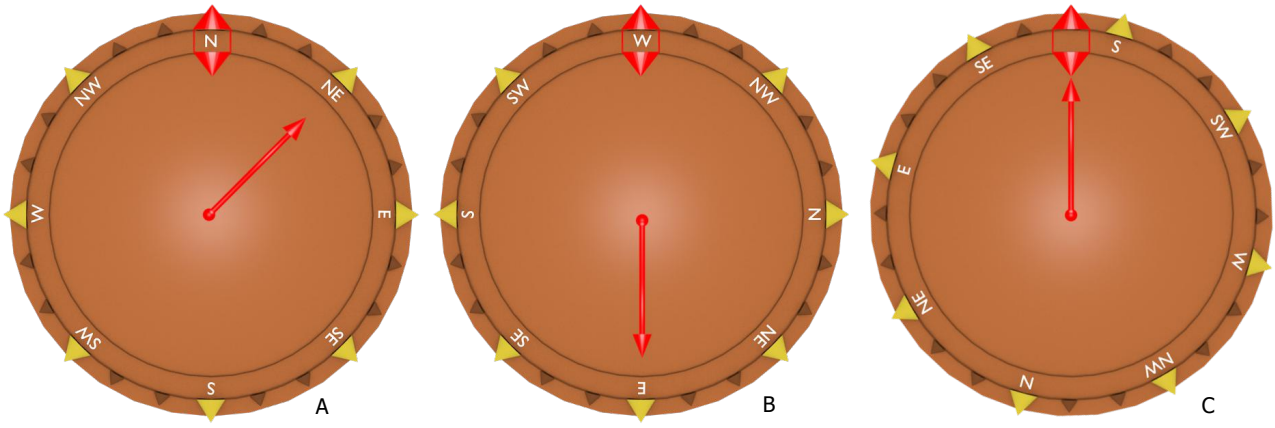


Figure 6.34: GPS navigation

The examples from figure 6.34 will explain how to correct your walking direction to find your target:

A In this example you are walking into North but you should go into Northeast. So you have to turn yourself 45° to the right.

B Here you are walking into West but you should go into East. So you are walking into the opposite direction. Turn yourself around by 180° and walk into the opposite direction (East).

C This example shows that you are walking into a South direction which is exactly the right way to your scan area because the direction arrow and the orientation indicator are pointing to each other.

6.8.6 Copy files to USB stick

If you want to analyze your recorded scan images with the Visualizer 3D software you must copy your files to an USB stick first.

1. Connect an USB stick to the USB port of your eXp 6000 control unit.
2. Start your file explorer and mark all scan files that you want to copy to the USB stick. If you are going to copy all existing files you may use the mark all button to mark all files at once.
3. Now push the copy button in the toolbar on the top of the screen. In the dialog you will be asked if you really want to start copying all marked files. Confirm by selecting "Yes" and wait until all data has been transferred to the USB stick.
4. Disconnect the USB stick to free the screen lock and continue operating your eXp 6000.

After that you may connect your USB stick to any Windows computer to open the files for detailed analysis with Visualizer 3D software.

6.9 Shutdown / Exit

Whenever you wish to shut down your device, it is important to use the “exit” function by selecting the shutdown icon in the right bottom corner of the screen.

Do not power off the eXp 6000 by turning off the Power Pack. Powering off the Power Pack may cause damage to the unit. After selecting the shutdown icon the screen from figure 6.35 will appear.

Figure 6.35: Shutdown

Now it is safe to power off the Power Pack and thus switch off the eXp 6000 control unit completely.

6.10 Software Update

The eXp 6000 is able to update its software after changed or improved by OKM. For that you need to download a specific update file from OKM's website. As soon as a new update is available OKM is publishing the file on the website.

The process of updating the software is as follows:

1. Download the update file from the internet.
2. Copy the file to an external USB storage (e.g. USB stick).
3. Plug-in the USB storage into the USB port of the eXp 6000.
4. The eXp 6000 control unit will detect the update file automatically and you have to follow the instructions on your screen.

Chapter 7

Field procedure

This chapter gives practical instructions about the general procedure of scanning an area. The different scanning methods and procedures will be explained in detail.

7.1 6 Major Rules to Follow

Following the 6 PRIMARY RULES below will greatly increase your chances of success with the OKM line of equipment. Failure to follow the major rules will most likely result with errors.

1. Do not turn or rotate the antenna or Super Sensor - this means that when the antenna is facing one direction, it must remain in that direction. If a vertical antenna like the Super Sensor is used then it must remain vertical, not tilted to the side. A horizontal must be horizontal and not tilted.
2. Do not change the height of an antenna during a scan. The antenna should always stay at the same relative height throughout the scan (between 5 cm to 10 cm above the ground is recommended).
3. Move the antenna at the same speed! When in Automatic mode, the speed of the antenna during a scan line must remain the same. When in Manual mode the distance between the impulses must be the same.
4. Keep each scan line Straight! Walk straight, not in a curve. This is done very easily by NOT looking at the antenna or the unit and looking at a target that is further away. Constantly watching the antenna or unit will make you walk in circles.
5. Be sure that your scans are large enough to see the potential target or field of targets (initial scans should not be smaller than 4 m x 4 m). When a scan is too small then the overall size of the target can not be seen and errors in the analysis may happen due to the lack of size.
6. Be sure to conduct the “Control Scans”!!! When you pass over a field it is important to repeat the process at least 2 or more times to ensure that the field does have a target or does not have a target. Failure to complete the control scans has made many users dig in areas where there was no target.

Remember: **REAL TARGETS DON'T MOVE!**

7.2 General scanning procedure

In general every scan always starts on the bottom right corner of your scan area. Starting from this point, you should walk scan path by scan path, whereby every following path is situated on the left side of its previous path. During walking these lines, the measurement values will be recorded and depending on the selected operating mode either transferred directly to a computer or saved into the memory of the device.

The device stops at the end of each finished scan line, so that the user can find the starting position of the next line. In this way, all paths will be recorded and the area will be measured.

Figure 7.1 shows all 4 possible starting positions and the corresponding first scanning path. Depending on the composition of your terrain you can determine the optimal starting point for your measurement by yourself.

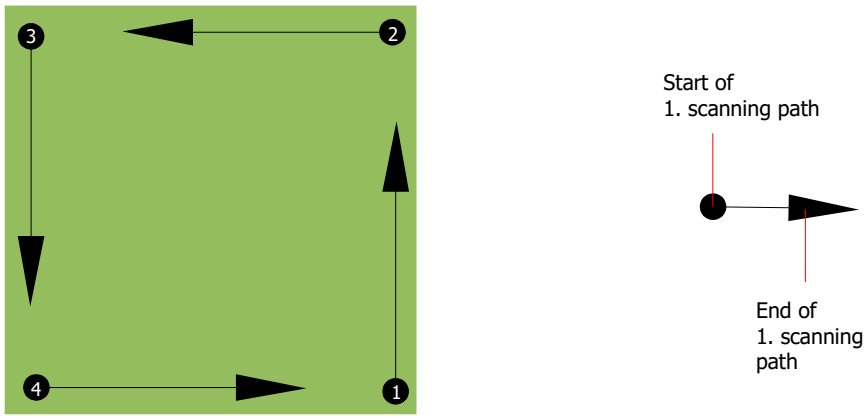


Figure 7.1: Starting position of a scan area

The scanning paths may be referred as “Zig-Zag” or “Parallel” traverses. Also the number of impulses (measure points), which are recorded during one scanning path can be adjusted individually depending on the size of your scan area (length of scanning path).

7.2.1 Scan Mode

There are two general techniques to surveying an area with the eXp 6000:

- **Zig-Zag**
  The starting position of two scanning paths next to each other is on the opposite side of the measured area. You will record data on your scanning path and on the return path as well.
- **Parallel (recommended)**
  The starting position of two scanning paths is always on the same side of the measured area. You will only record data in one way and in one direction, while you should return and walk back to the starting position of the next scanning path without recording data.

Figure 7.2 represents both techniques schematically.

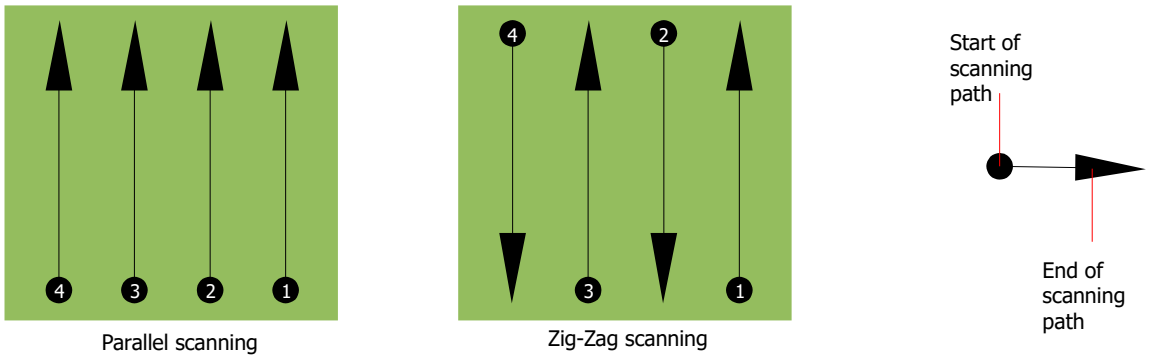


Figure 7.2: Scan modes to measure an area

Doing the scan in “Parallel” mode you will start on the bottom right corner of your scan area (point ❶) to walk and record a scan path towards the upper right corner of the area. After recording the first line, you should walk back to the starting point and move to the left of the first scan line to start the scan path 2 (point ❷), to start there the second scanning path. In this way all other paths will be scanned, until you have reached the left side of your measure area.

Doing the scan in “Zig-Zag” mode you will start also from the bottom right side of your measure area (point ❶) to walk and record a scanning path towards the right upper corner of the measure area. Different from the parallel measurement, you should continue recording data while walking back the second scanning path. So you go to the starting point of the second scanning path (point ❷) and scan in the opposite direction. In this way, all other paths will be scanned in the scan mode “Zig-Zag” until you have reached the left side of your measure area.

The distance between the scanning paths should be consistent during one measurement but can vary from measure area to measure area. If you mostly look for smaller targets than you should also select a smaller distance between the lines. A standard rule is: The smaller the distance between the paths, the more accurate your scans will be. When you are conducting your first scans the lines should not be to close together to locate possible targets.

7.2.2 Regulation of the number of impulses per scanning path

It is possible to select the distance (number of impulses) before starting the measurement or selecting the automatic mode (“Auto”) to adjust the number of measure points after finishing the first scanning path.

When the distance has been configured, the device will stop automatically when this number has been reached and waits for the start of the new scanning path.

In the automatic mode you should stop the measurement of the first scanning path by yourself, by pressing the appropriate button, as soon as you have reached the end of the first scanning path. This effective amount of measure points will be used for all further scanning paths of this measurement. Starting from the second scanning path, the device now stops automatically after the assumed number of impulses has been reached.

There is no special rule for selecting the right number of impulses. But there are different aspects which should be considered. These are some considerations

- the length of your measured area and
- the size of the objects you are searching for.

A preferable distance between two impulses is about 15 cm to 30 cm. The smaller the distance between two impulses, the higher the precision of the graphical representation. If you are looking for small objects you have to select a smaller distance, for big objects you can increase the distance between the impulses.

Figure 7.3 shows the effects of the distance and the number of impulses per scanning path for some objects.

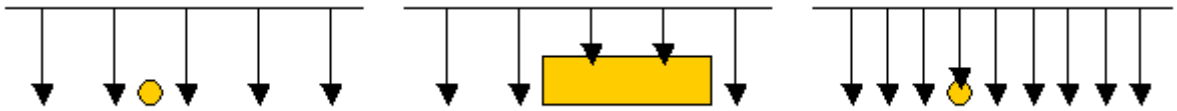


Figure 7.3: Effects of changing the number of impulses and their distance

Figure 7.4 shows the difference between very few impulses (left side) and much more impulses (right side) on the same length of scanning path. Therefor the second record (right side) shows much more details and also smaller objects can be seen.

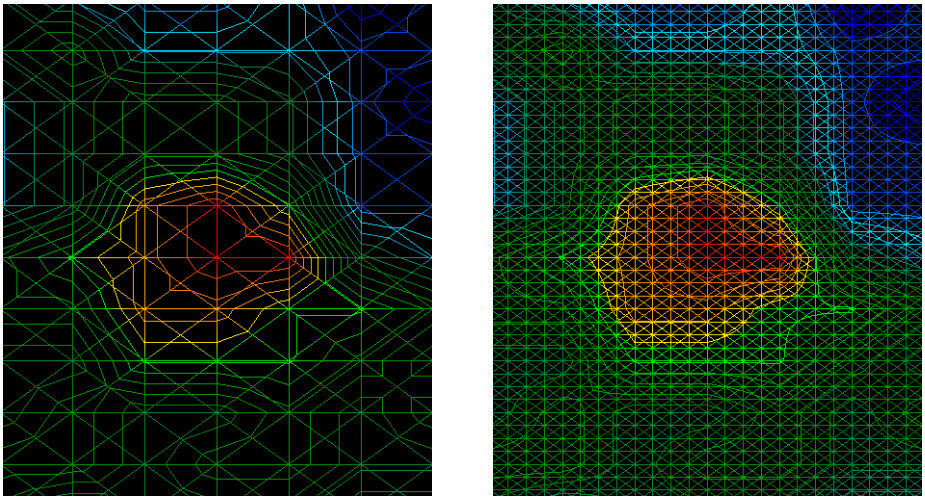


Figure 7.4: Comparison of low and high number of impulses

Do not hesitate to record more measurements with different numbers of impulses. For example you can scan a large area before doing a second detailed precision measurement. Especially if searching for bigger objects you can proceed like this. With this manner you can measure a larger area very quickly and afterward you make new scans localizing the suspect targets.

When conducting a scan it is important to not only make note of how many impulses are being used but to get a clear picture of what you are scanning, it is very important to watch your speed. Every scan line should be measured at the same speed as the previous line.

Figure 7.5 shows what can happen, if you walk at different speeds during your scan.

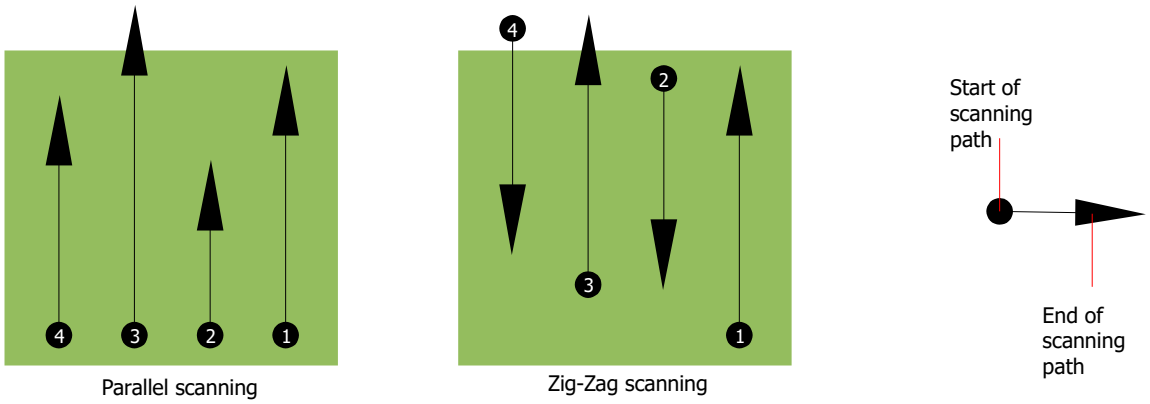


Figure 7.5: Different walking speeds during scanning

Using a different walking speed in the scanning paths, will cause displacements in the scanning path. As a matter of fact, a target can get cut into several smaller items or completely lost because it was missed. Later when the data is downloaded for further analysis, speed errors can make a target completely unidentifiable and may be discarded.

In general, the following rule is valid: Keep scans at practical sizes where you can see the beginning and stop lines and can comfortably traverse an area to keep your speed and the distances reasonable.

7.3 Special notes for field procedure

There are some aspects which you should take note of when conducting scans. In principle, a scan is only as good as the path that was taken. Making errors while scanning will show up in the final graphical representation also as an error. This will cause frustration and lost time.

Before you start with a measurement in the field, you should think of what you are looking for and if the selected area is suitable. Measuring without a plan will usually produce unacceptable results. Please consider the following advice:

- What are you looking for (graves, tunnel, buried objects, ...)? This question has direct effects on how a scan is conducted. If you are looking for larger targets, the distance between the single measure points and scanning paths can be larger, as if you are looking for small targets.
- Inform yourself about the area, where you are searching. Does it make sense to detect here? Are there historical references which confirms your speculation? What type of soil is on this area? Are there good conditions for data recording? Is it allowed to search at this place (eg. private property)?
- Your first measurement in an unknown area has to be large enough to get representative values. All further control measurements should be adjusted individually.

- What is the form of the object you search? If you are looking for an angular metal box, the identified object in your graphic should have a form according to this.
- To get better values concerning depth measurements, the object has to be in the center of the graphic, which means it has to be framed by normal reference values (normal ground). If the object is on the side of the graphic and not totally visible an estimated depth measurement is not possible and also measurement of size and form are limited. In this case, repeat the scan and change the position of your scan area, to receive an optimal position of the anomaly inside of the graphic.
- There should not be more than one object in a scan. This will influence the depth measurement. It is useful to scan partial areas over such targets.
- You should do at least two controlled scans to be more sure about your results. This is also important to recognize areas of mineralization.
- Most important rule when dealing with mineralization. **REAL TARGETS DON'T MOVE!** If your target moves then it is most likely mineralization.

7.3.1 Orientation of the probe

During a measurement the probe should always have the same distance to the ground. Generally we recommend a height of about 5 – 10 cm from the surface of the ground if possible.

In the event that you are going to go over stones, wood or high grass that is higher, start your scan with the sensor higher right from the beginning. In circumstances like these, then perhaps you will need to start the scan with the probe at a height of 2 feet (50 cm) and keep it at that level for the entire scan. It is important to maintain the height, this will eradicate many errors. As a rule, do not change the height during a scan for it may create unnecessary errors.

Another important aspect is the physical orientation of the probe. During the “Parallel” scan mode the orientation of the probe does not change because you are always measuring in the same direction.

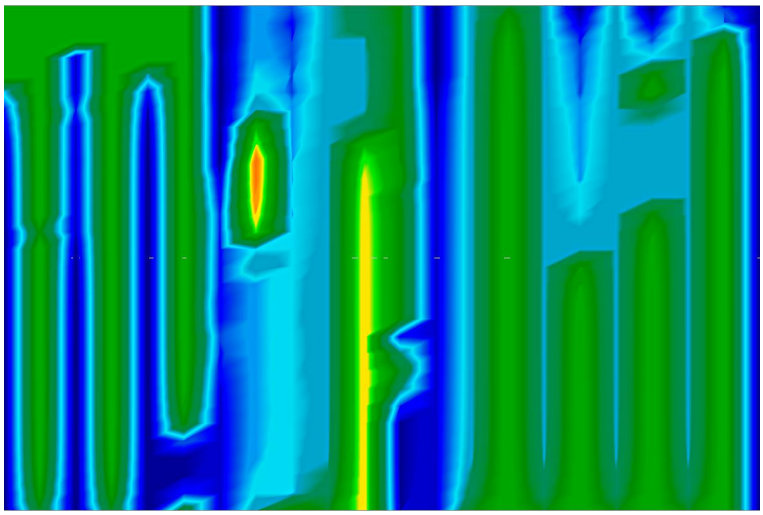


Figure 7.6: Example of erroneous scan in Zig-Zag mode (“rotational errors”)

Even in the “Zig-Zag” scan mode the orientation of the probe must not be changed. That means you are not allowed to turn yourself with the device and the probe at the end of the scanning path. Instead you should walk backwards and continue scanning. Otherwise your obtained graphic includes red or blue stripes as shown in figure 7.6. These stripes throughout a scan are commonly referred to as “Rotational Errors”.

The eXp 6000 will give you an indication of the probe's horizontal orientation at all times during a scan. It will display an image on the left bottom corner of the screen as shown in figure 7.7.

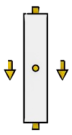
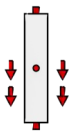
Figure 7.7: Orientation indication of the connected probe

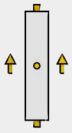
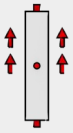
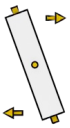
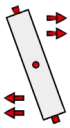
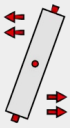
Please keep in mind that this orientation indication **does not** avoid rotational errors but informs you about the inclination of the probe in relation to the ground surface. The symbol shown in figure 7.7 indicates a good orientation of the connected horizontal probe.

The next two sections describe the symbolism of the indication, that helps you to conduct scans of better quality. Just experiment with the deviation before conducting a scan to get a feeling for the strength of correction.

7.3.1.1 Super Sensor, Tunnel Sensor

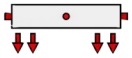
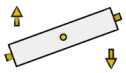
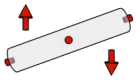
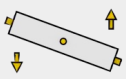
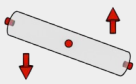
The following table explains the symbolism of all vertical probes. There are images with 1 arrow (low inclination) and 2 arrows (high inclination).

Low inclination	High inclination	Correction
		You have to lower the probe (decrease the distance to the ground).

		You have to raise the probe (increase the distance to the ground).
		You have to turn the probe to the right side.
		You have to turn the probe to the left side.

7.3.1.2 Telescopic Probe, LiveStream Sensor

The following table explains the symbolism of all horizontal probes. There are images with 1 arrow (low inclination) and 2 arrows (high inclination).

Low inclination	High inclination	Correction
		You have to lower the probe (decrease the distance to the ground).
		You have to raise the probe (increase the distance to the ground).
		You have to turn the probe to the right side.
		You have to turn the probe to the left side.

7.3.2 Parallel or Zig-Zag?

For skilled users of the eXp 6000 both scan modes are suitable. According to experience the best graphics have been received in the “Parallel” mode, because you are starting at the same point and walking in the same direction. It is also easier to control your walking speed and direction.

Especially in uneven terrain like mountain sides or other inclines, the parallel mode is preferred. When it comes to speed, the experienced user will very often use the Zig-Zag mode only for the initial scan to determine if there are anomalies in the area worth further research.

7.3.3 Manual or automatic impulse mode?

Large even or passable surfaces are commonly measured in the automatic mode. The manual impulse mode is mostly used for difficult uneven terrain, areas where there is quite a bit of growth and if the measurement result needs to be very accurate.

In terrains with difficult access like mountain cliffs and sides, slippery surfaces or overgrown areas, it is wise to use the manual impulse mode. Because each impulse will be released manually, you have enough time to position the probe in the correct way and record the measured value. In this way, you can also measure accurately previously marked dots of a predefined grid.

7.3.4 Tips from the trainers themselves

When conducting scans, there are some extremely important items that need to be noted. First of all it is crucial that you relax. When you are tense, you are putting too much pressure on yourself to do the scan correctly; often resulting in errors.

- Newly buried targets are difficult to see. Many users receive the equipment and the first thing they do is go out and bury an object. When an object goes into the ground it changes the natural signature of the soil and creates some kind of noise. Usually the buried object has a weaker signature than the unnatural noise and therefor is not detectable. Initial scan images will not show the buried item but visualize the noisy area in blue or green colors. After the item has been seasoned, meaning it has been in the ground for a complete cycle of seasons (usually a year), the noise is reduced and the signature of the buried object becomes visible again.
- Train on known targets. In the training course at the factory we have several objects that have been buried for years, just like real targets in the field. These targets can be quickly and easily identified because they are not natural to the soil. Other targets that you can use in your own area are buried utilities. Pipes, tanks, electrical, sewers, graveyards, etc... Most of these items can be found in every community, town or city. This is where you need to begin your training if you are going to self-train.
- Get professional training. When you take advantage of receiving the training, either from the factory or a qualified dealer, you will understand not only the use and operation of the OKM detector but also the software so much easier and be able to identify targets as well as errors.
- Do not rely on just one scan measurement. So many users go out into the field and they make a measurement and see a target. Instead of repeating the scan and reproducing it several times, they go out and get a shovel and dig. On very rare occasion will the first scan be perfect. Even the trainers do multiple scans to ensure that they are not looking at areas of mineralization or an error.

- Soil Mineralization – Oh! Very frustrating! We will all experience it. When you are in an area that is known to have pockets of high ground mineralization, be prepared to conduct more scans than normal.
    - Clay is probably the number one foe. Depending on the iron content of the clay will determine how strong the attenuation will be. A quick analysis of the iron content is how dark it is, it can vary from a light gray up to a dark orange. The darker the clay, the more iron it has.
    - Sand is usually very clear and easy to hunt in. There are two factors of sand that need to be noted. Sand where the ground water is very shallow, meaning that the ground water is usually just a couple of meters from the surface or desert sand where it is very arid. In desert sand, the targets can be situated 3x deeper than indicated.
    - Farmland is another area to take note of. In modern farms, so many nutrients and fertilizers are introduced creating an unnatural area of mineralization.
    - Rocky mountainous areas. Areas with many mountains are also riddled with patches of mineralization. Mountainous areas are created from faults in the earth and this is probably the biggest area for natural treasures as well as mineralization.
- All scans have a red … and a blue. When you view the scans in the Visualizer 3D software every scan has a red spot. The scans represent the strongest signals (red) as well as the weakest signals (blue).
    - A real target will usually have a much stronger signal than that of a mineralized field. It will also not move. If you think that a red spot in the software is a real target, conduct a set of control scans and see if the target remains in the same place, or moves. If it moves, then it is not real.

Chapter 8

Scanning Techniques

Here you can find additional information on accessories that can compliment the basic unit. Keep in mind that the mentioned accessories are not included in the normal scope of delivery.

8.1 Super Sensor

The Super Sensor is a high resolution antenna, which is specially adjusted to detect metals. Yet it is also possible to recognize larger voids with this antenna. A particular characteristic is to distinguish ferrous metals from non-ferrous metals. This discrimination is possible in the operating mode Pin Pointer. Compared to the Telescopic Probe the Super Sensor can find much smaller and deeper situated metal objects.

Figure 8.1: Carrying the Super Sensor

The Super Sensor can be used in the following operating modes:

- Ground Scan
- Pin Pointer
- Magnetometer
- Mineral Scan

To use the Super Sensor with eXp 6000, simply connect it to the telescopic rod assembly and always hold the antenna vertical to the ground. Figure 8.1 shows how the Super Sensor has to be held correctly.

The Super Sensor should not be swung nor change height, either up or down, during the measurement. The smoother the antenna is held, the better your scan results will be. The distance between the ground and lower part of the antenna should be about 10 cm, but can be enlarged depending on the terrain conditions.

The eXp 6000 control unit will assist you by indicating the proper orientation of the Super Sensor at all times during a scan. This behavior is explained in section 7.3.1 “Orientation of the probe” on page 77.

The orientation of the antenna should not be changed during the complete measurement!

8.2 Control Scans

Always conduct a set of control scans on any area prior to excavation. A control scan is a very accurate measurement to ensure that the area being prospected is a viable area and to verify that the target is real. This is done by doing additional scans.

To ensure consistency of the scans the same person should do the scans, they should be done using the same starting and the same stopping points. The control scans have the same amount of impulses and the same amount of scan lines in every scan. Both methods, single line and conventional, need to be conducted to ensure that the field of mineralization is correct. This is very important for it is easier to conduct an additional set of scans rather than dig a hole with nothing in it.

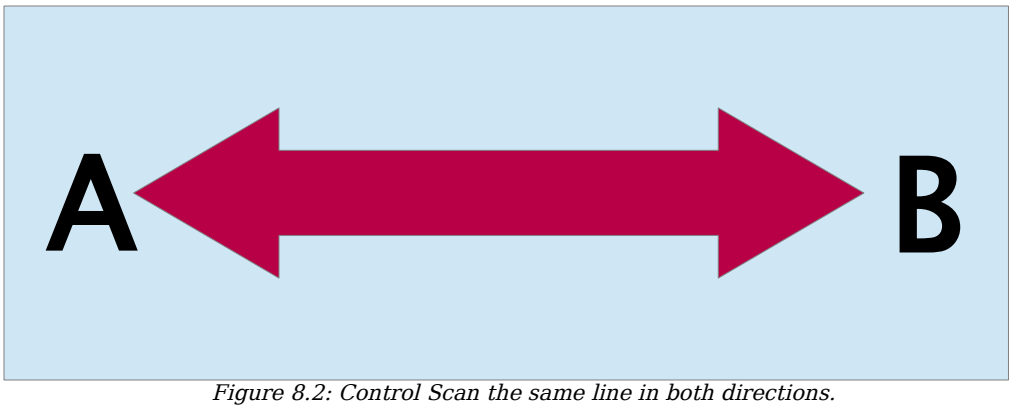


Figure 8.2: Control Scan the same line in both directions.

In the example (Figure 8.2) the easiest way to conduct an initial control scan is to scan the exact same line in both directions. This method is used when prospecting for naturally occurring mineral fields.

This is done by doing the first scan completely. At the end of the line, either download the existing data to the laptop or change to another control chip (only for certain detectors available). Many users will have multiple control chips for their unit to conduct more scans over a given area without having to download the data after measurement.

There is a couple of very important reasons, one, if the target moves then it is most likely an area without a valid target and two, you can get a much better perception of the actual size or area of the target.

Having the same person perform the measurements is important. This way the scans will be done exactly the same, with the same speed and the same amount of impulses. It is important that others watch the operator as the scans are being performed to ensure that no mistakes are being made and the scan lines are straight. The other users need to ensure that the Super Sensor is not rotating or tilting and that it is remaining the same height over the ground.

If multiple operators are going to conduct scans, then it should be noted in the Characteristics window of the Visualizer 3D software as to which operator performed the scan. This way subtle differences between the operators can be noted.

When working an area that is encompassing a traditional scan, the control scans need to be done in sets of 3.

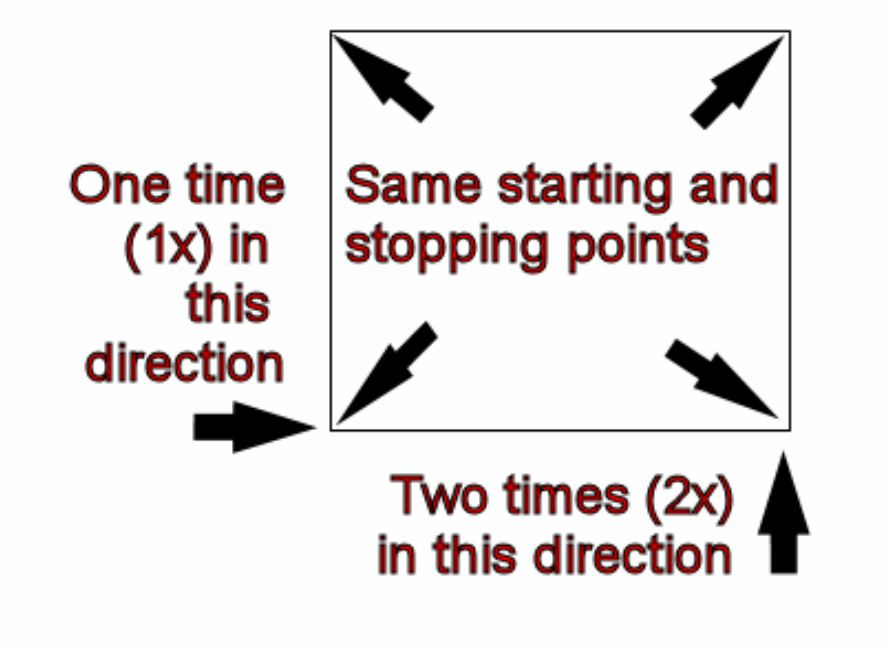


Figure 8.3: Traditional control scan procedure

Per Figure 8.3 above, the procedures are laid out to conduct the traditional control scan. It is imperative that the **EXACT SAME STARTING POINTS** and the **EXACT SAME STOPPING POINTS** are used. If the same points are not used then the scans will potentially have errors from the beginning. When looking for naturally occurring mineralization and deposits thereof, the slightest variable can make the difference in an accurate detection.

When looking for traditional buried objects this method is also used to ensure that the item is actual. The only difference is that with a traditionally buried object that the signal values will be greatly increased for the actual object(s).