

FS Future Series

eXp 5000

Version 2.3



User's Manual

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CHAPTER 1

Introduction

1.1 Preface

Dear customer,

in the first instance we want to thank you that you made your decision on a product of OKM Ortungstechnik GmbH.

With the eXp 5000 you purchased a product which is based on a electromagnetic pulse method which can be used to locate anomalies in the target area. Thus the device is able to detect natural features such as formations of strata, cavities, groundwater level as well as sepulchers or buried objects such as pipes, tanks, boxes or suchlike.

The eXp 5000 is able to locate, to document and to analyze buried objects with different structures, without making necessary any excavation. Particularly in areas next to the surface there are many advantages to geoelectric, seismic and magnetic procedures and it is further more a useful complement to these methods. The eXp 5000 has a facile and flexible handling and provides fast and easy 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.

Of course by selling our products we cannot guarantee that you really make a find during your research. The recognition of hidden objects and structures depends on a huge number of factors - like you know. Determining factors are the dielectric constant of the ground, the grade of mineralization and the dimensions of an object relating to its depth. Specially in very wet soil, clay and sand with high conductivity of the ground, recording of the measured results can be falsified strongly.

With this product you purchased a device which stood the tests in regular operation like all other products of us. If you are interested in where our devices have gone into action please visit our homepage.

For our company it is necessary that we protect our developments within the framework of existing legislation to a patent or trademark registration. Therewith we offer you a higher warranty while using our products.

Please take your time consecutively, read this user's manual and familiarize yourself with the utilization and operation of this eXp 5000.

1.2 Important Notes

Please read these operating instructions carefully and closely before using eXp 5000 and its accessories! These instructions give information on how to use the device and point out potential sources of danger.

eXp 5000 and its accessories serves for documentation and analysis of detect objects deposited and changes performed in the ground. The registered data of the ground structure will be transmitted to a PC for visual representation in a special software program using the components we offer. Any additional notes relating to this has to be observed. Please read attentively the manual according to the software you are using!

1.2.1 General Notes

Being an electronic device, eXp 5000 has to be treated with the caution and care necessary when such devices are used. Any failure to observe the safety precautions given or any use for purposes other than the ones it is conceived for may result in a damage or destruction of the processing unit and connected components.

The device will get destroyed if it is opened improperly.

1.2.2 Possible Health Hazards

If used properly the 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

Having been transferred from a cold to a warmer place, the device should not be operated immediately afterwards. Any condensation, which may have formed, might cause the device to get destroyed. Avoid strong magnetic fields, which may occur in places such as near machines or loudspeakers, and avoid using a detector within a radius of 50 meters.

Metallic objects on the ground such as cans, doses, catches, nails, screw or others can influence negatively your measurement and have to be removed. Also you have to remove keys, telephones, chains and rings and all other magnetic and metallic objects from yourself.

1.2.4 Voltage

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

Never use the 230 Volt mains supply.

1.2.5 Data safety

There can be errors in the process of data collection if

- the range of the sender module is been exceeded,

- the power supply of the device is too low,
- the cables you are using are too long,
- other electronic devices send out disturbances or
- atmospheric events occur (lightning, ...).

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

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

Beware that all batteries and accumulators are always charged fully while operating with your system. You should only load the batteries when they are completely discharged no matter if you are working with the external power supply or with the internal accumulators. In this way a long durability of the used batteries is guaranteed.

To load the external and internal batteries you have to use only 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 an insulted way 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 or children.

CHAPTER 2

Install/Uninstall USB drivers on Windows

In this chapter you will learn how to install the USB drivers, that are necessary to transfer data from the machine to your computer software. Please make sure to read the proper section appropriate to your Windows operating system.

2.1 Windows XP

The instructions in this section are only valid for the operating system Windows XP.

2.1.1 Install USB drivers on Windows XP

The installation of the USB drivers in Windows XP is relatively simple. After you have connected the device with your computer, switch it on and the message from figure 2.17 appears on your screen.



Illustration 2.1: Install USB drivers: Windows XP, Step 1

If you prosecute Windows XP with Service Pack 2, you will be asked in dialog from figure 2.2 if Windows Update has to search for drivers up to date. Mark entry "No, not this time" and click on *Next*.

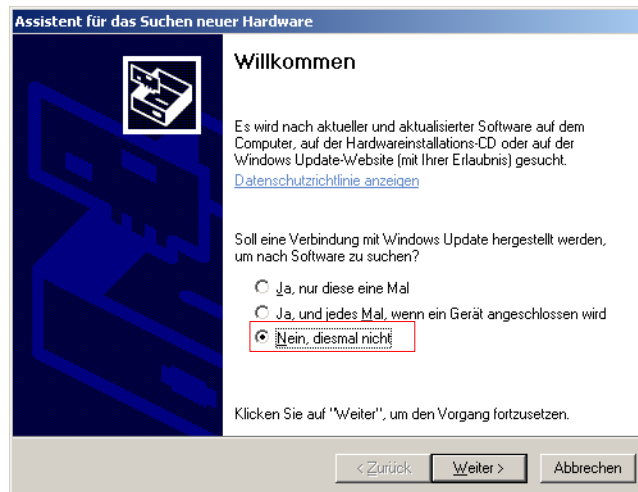


Illustration 2.2: Install USB drivers: Windows XP, Step 2

In other versions of the operating system Windows this window should not appear.

In the following dialog window like figure 2.3 select the entry "Install software from a list ..." and click on button *Next*.

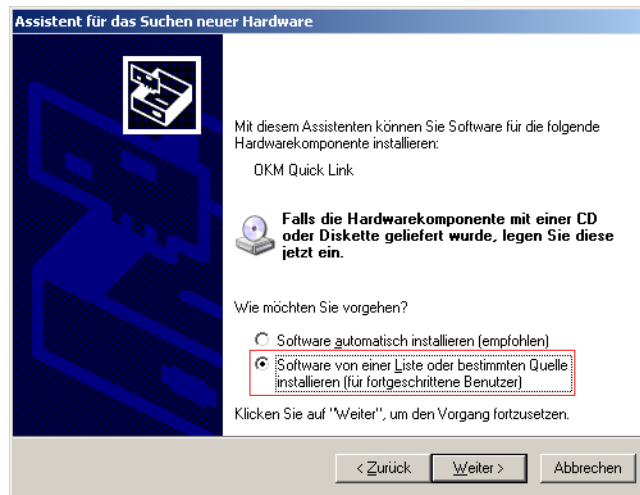


Illustration 2.3: Install USB drivers: Windows XP, Step 3

In the next dialog window from figure 2.4 mark the entry No search, select driver individually and click on Next.

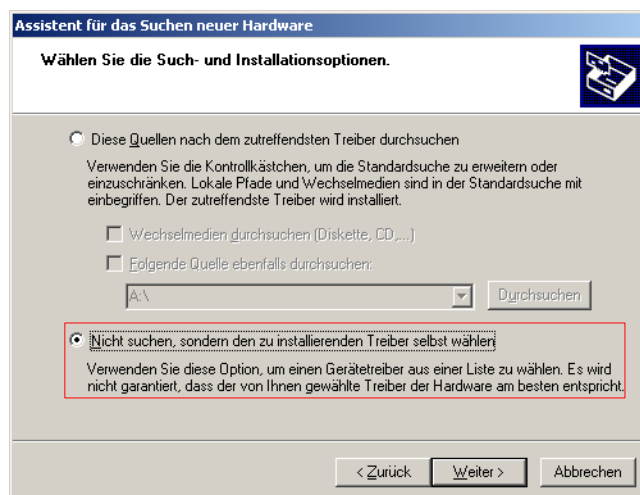


Illustration 2.4: Install USB drivers: Windows XP, Step 4

Another window will open, represented in figure 2.5, where you have to select the driver file. Therefore click on Data carrier. ... Immediately another window appears where you click on the button Search ... Then select the file **OKM_LE.INF**, which you can find in the directory **\drivers\usb_cable** of your software CD. Afterwards you have to click on Open, OK and Next, to start the installation of the files.

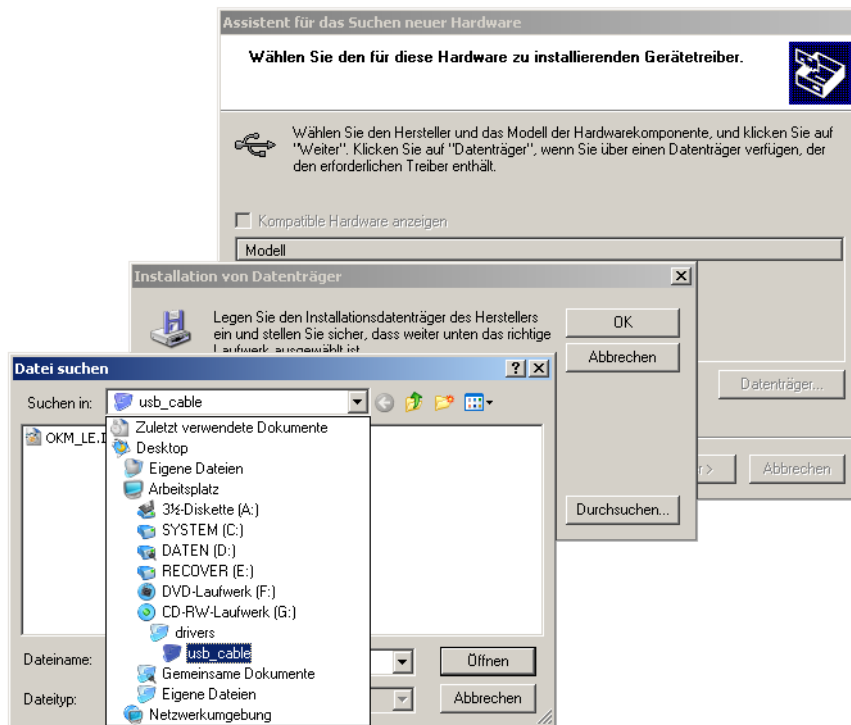


Illustration 2.5: Install USB drivers: Windows XP, Step 5

After successful installation of the driver a message like in figure 2.6 will appear on your computer screen. Now the drivers of your device are installed and you can transfer data to your PC.



Illustration 2.6: Install USB drivers: Windows XP, Step 6

2.1.2 Uninstall USB drivers on Windows XP

If you need to delete the USB drivers from your operating system because of a wrong installation for example, please open the device manager of Windows XP. Therefore please click on Start > control panel, like represented in figure 2.7.

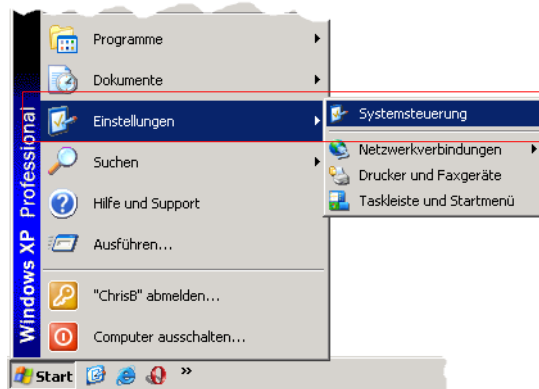


Illustration 2.7: Uninstall USB drivers: Windows XP, Step 1

After that a dialog like in figure 2.8 appears. There you can find the entry system and click twice on it.

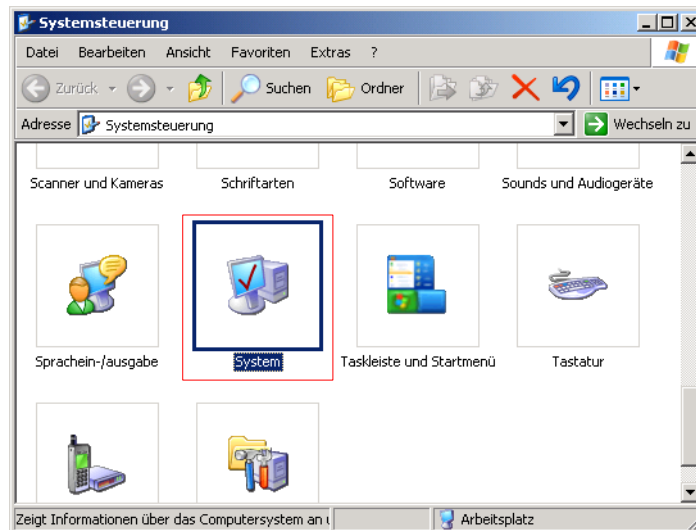


Illustration 2.8: Uninstall USB drivers: Windows XP, Step 2

The dialog from figure 2.9 appears on your screen. Click on the tab hardware and after that the button device manager.

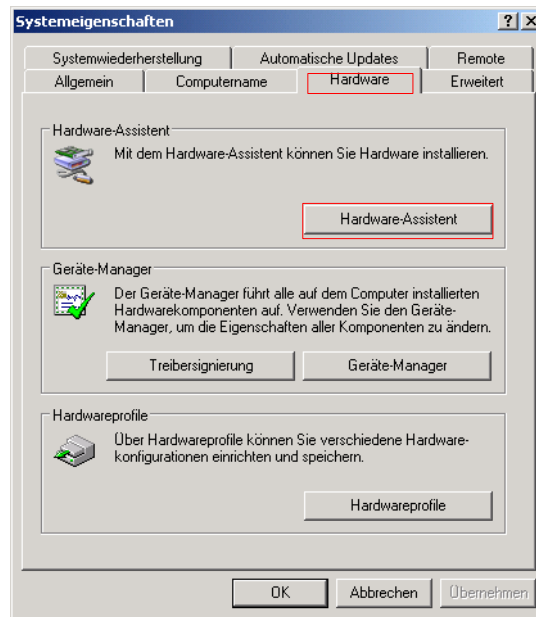


Illustration 2.9: Uninstall USB drivers: Windows XP, Step 3

A list of devices like in figure 2.10 will be represented. There you can find the entry USBController. By clicking the plus symbol next of this entry, all available USB devices will be shown.

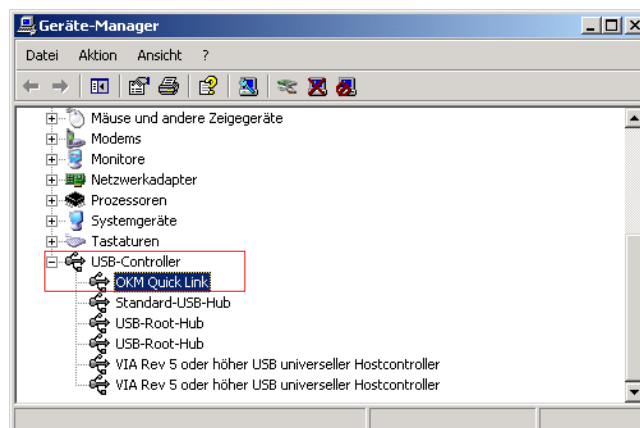

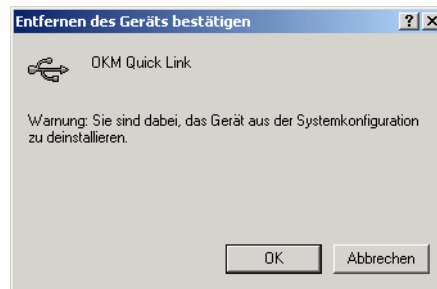


Illustration 2.10: Uninstall USB drivers: Windows XP, Step 4

Mark the device which you like to delete, which means "eXp 5000". Eventually the device can be listed as "OKM Quick Link". Then click on the button.  Alternatively you can select in the menu Action the entry Uninstall.



*Illustration 2.11: Uninstall USB drivers:
Windows XP, Step 5*

The dialog from figure 2.11 appears. Click there on the button OK. Now all drivers will be deleted from your computer. If needed you can now install the USB driver again in the correct way.

2.2 Windows Vista

The instructions in this section are only valid for the operating system Windows Vista.

2.2.1 Install USB drivers on Windows Vista

The installation of the USB drivers in Windows Vista is relatively simple. After you have connected the device with your computer, switch it on and the message from figure 2.12 appears on your screen. Click on **Locate and install driver software (recommended)**.

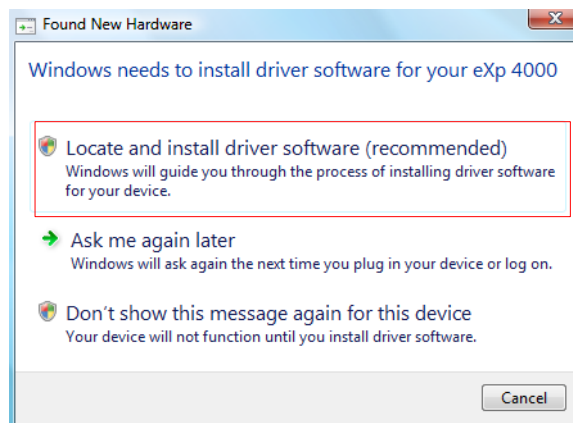


Illustration 2.12: Install USB drivers: Windows Vista, Step 1

At the next window, shown in figure 2.13, click on **Don't search online**.

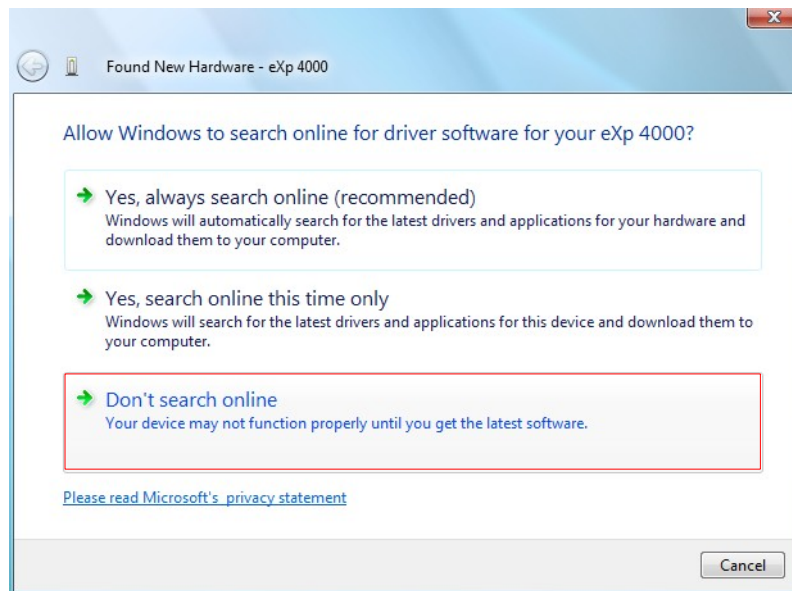


Illustration 2.13: Install USB drivers: Windows Vista, Step 2

When the window from figure 2.14 is visible, insert the software CD with the USB drivers into your CD drive and click on the button **Next**. Windows is now searching for the correct USB drivers automatically.

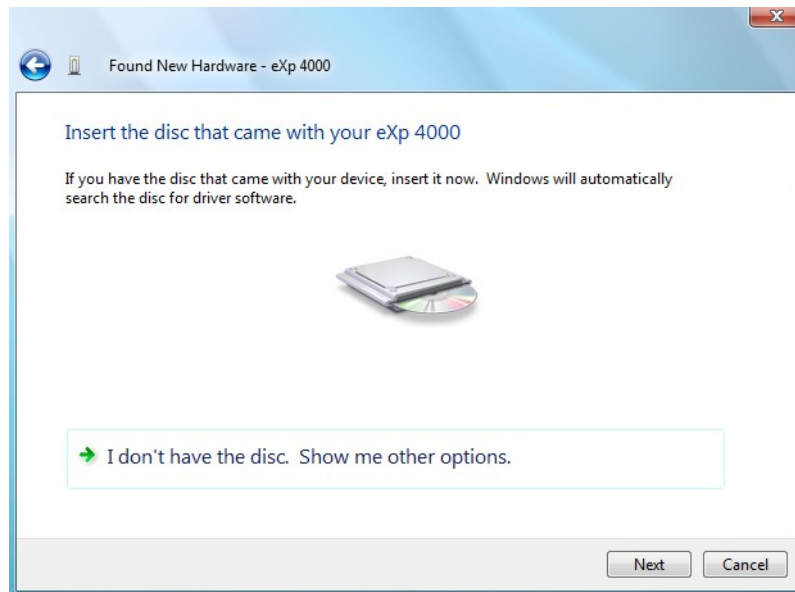


Illustration 2.14: Install USB drivers: Windows Vista, Step 3

When the installation has finished the completion screen from figure 2.15 is displayed. Press **Close** to close this window.

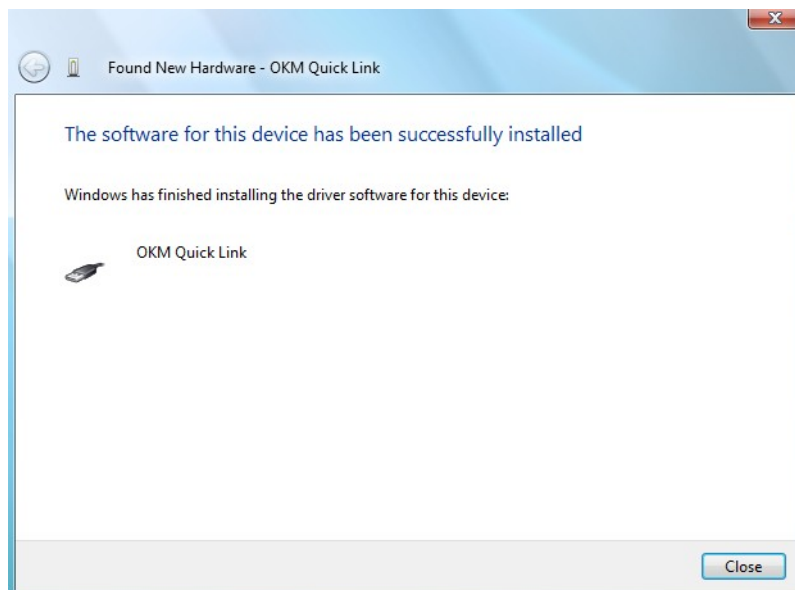


Illustration 2.15: Install USB drivers: Windows Vista, Step 4

Now you have completed the installation of the USB drivers in Windows Vista, which will be confirmed by presenting the message from figure 2.16.

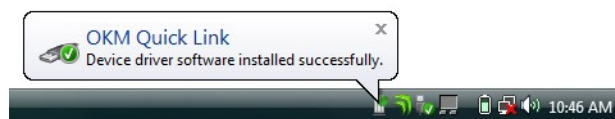


Illustration 2.16: Install USB drivers: Windows Vista, Step 5

2.2.2 Update USB drivers on Windows Vista

If you need to update the USB drivers on your operating system or the initial installation failed, please open up the Device Manager of Windows Vista. Therefore press the Windows start button and click on **Control Panel**.

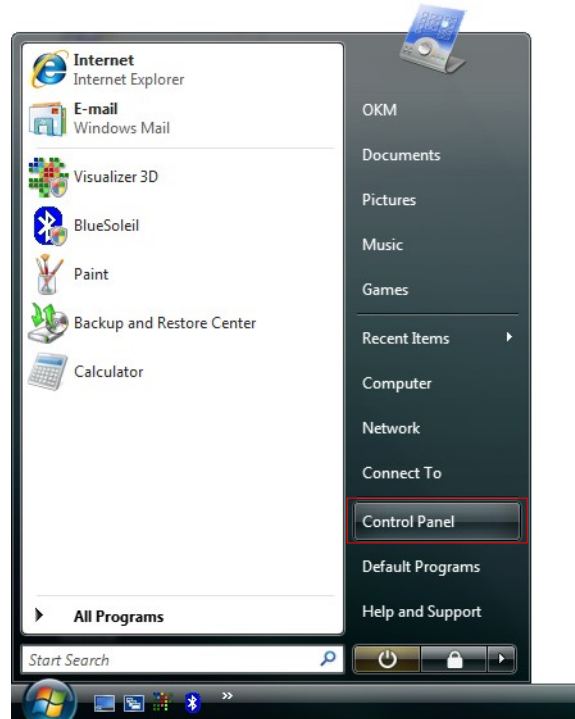


Illustration 2.17: Update USB drivers on Windows Vista, Step 1

At the next screen, shown in figure 2.18, select **View hardware and devices** which can be found on the bottom of the left sidebar.

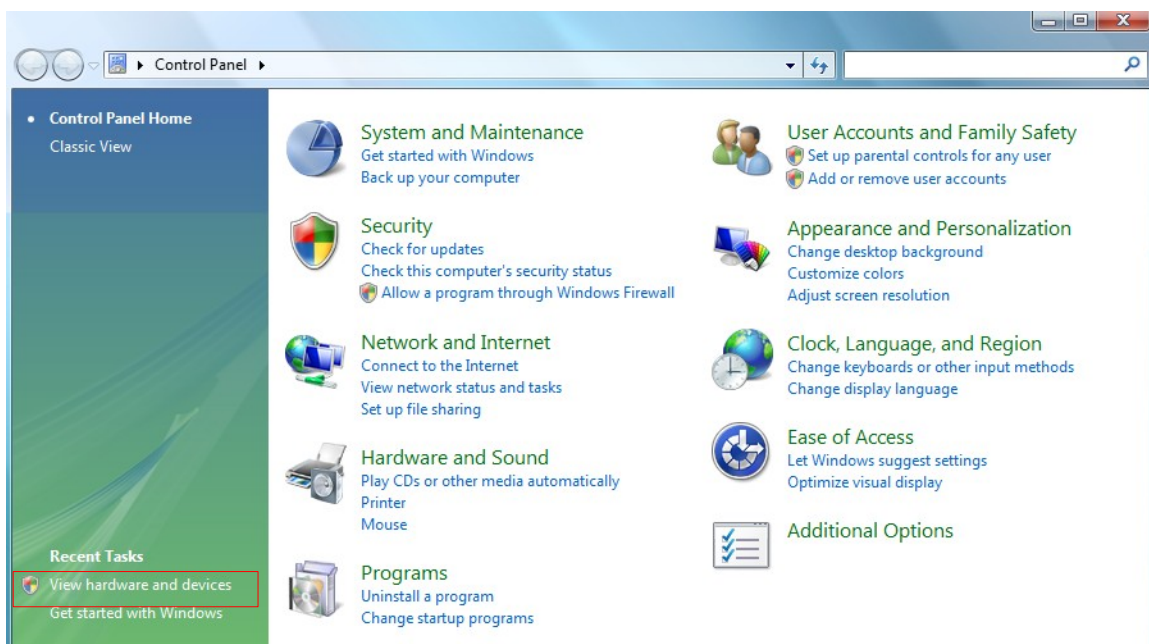


Illustration 2.18: Update USB drivers on Windows Vista, Step 2

In the Device Manager (see figure 2.20) there will be a device under *Other devices* with a yellow warning symbol to indicate a problem i.e. no driver installed. If the drivers has been installed already it will show up under *Universal Serial Port Controllers*. The text next to this device will depend on the device attached. In this example the device was an eXp 4000 device. Right click on the device (eXp 4000 in this example) to bring up a menu as shown below.

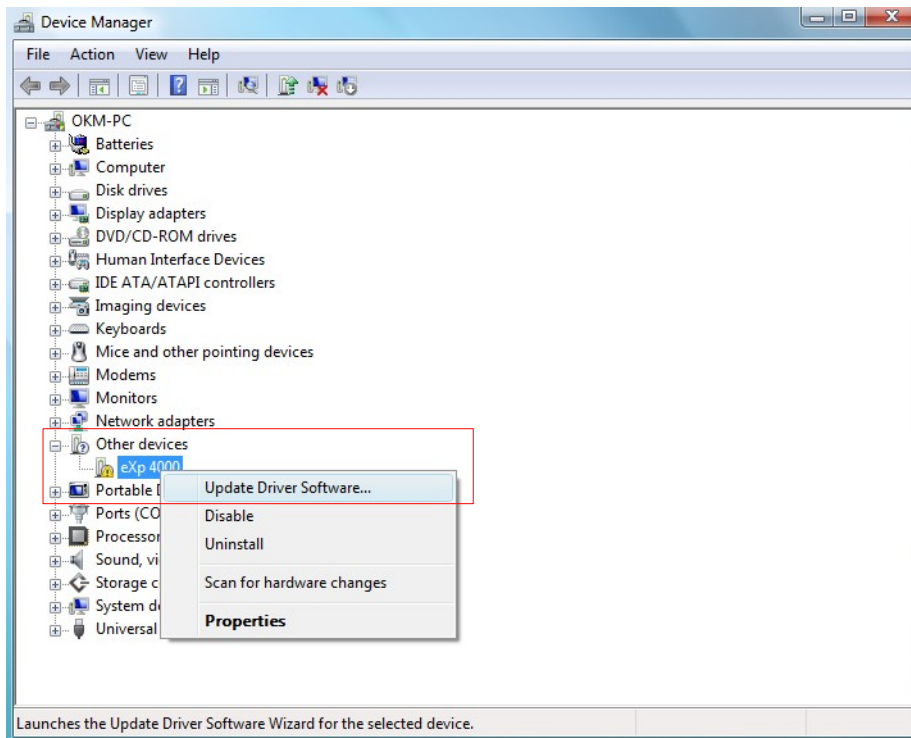


Illustration 2.19: Update USB drivers on Windows Vista, Step 3

From the displayed menu select **Update Driver Software...** which then displays the option for an automatic or manual search. Select the second option to browse manually.

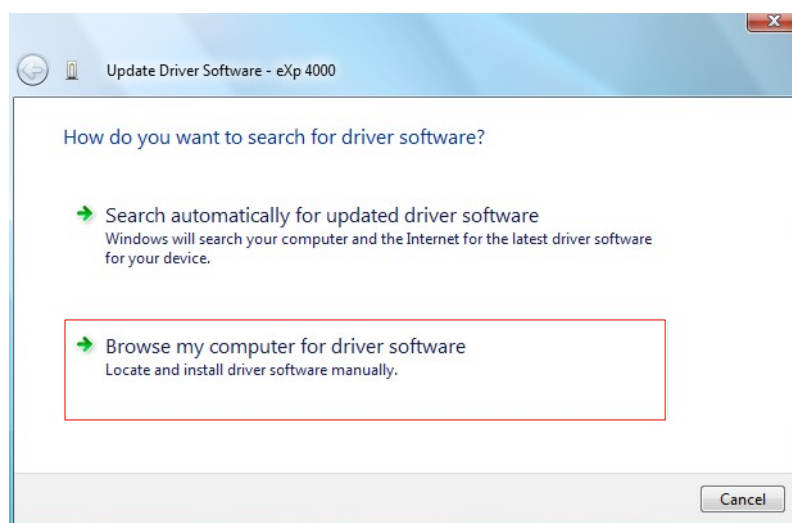


Illustration 2.20: Update USB drivers on Windows Vista, Step 4

In the address box put the exact location where the drivers have been saved to. Usually this may be your software CD or a folder on the PC if you downloaded the drivers from our website. It is not necessarily the exact same location as shown in the screenshot of figure 2.32.

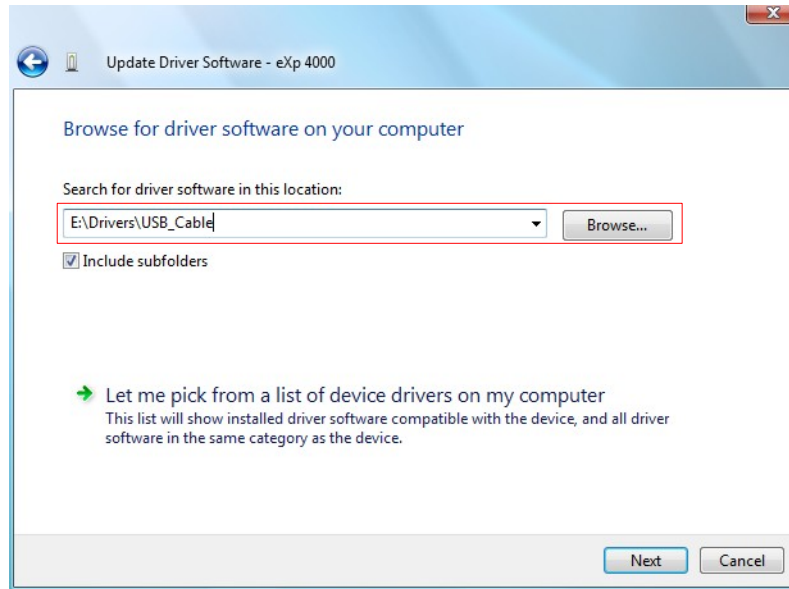


Illustration 2.21: Update USB drivers on Windows Vista, Step 5

After entering the drivers location select **Next** to start the installation.

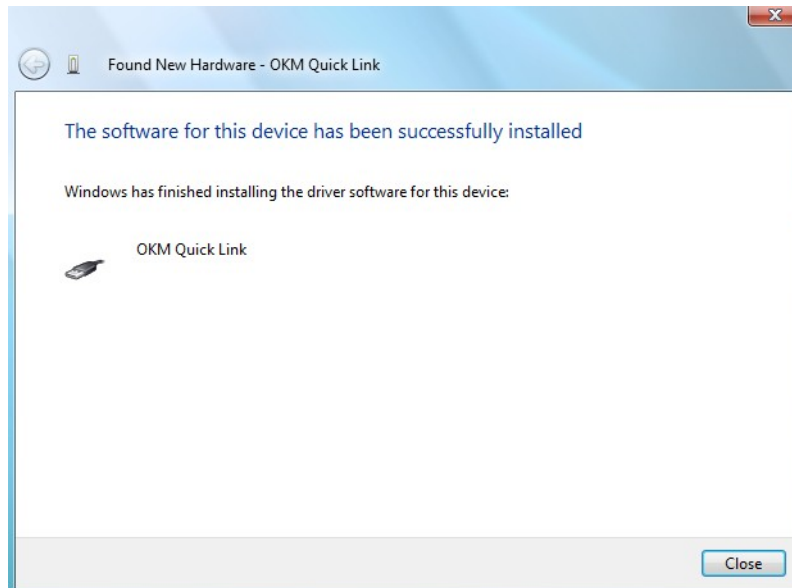


Illustration 2.22: Update USB drivers on Windows Vista, Step 6

When the installation has finished the completion screen from figure 2.31 is displayed. Press **Close** to close this window and go back to the Device Manager.

The Device Manager will now show a device under *Universal Serial Bus Controllers* indicated in the screenshot below as *OKM Quick Link*.

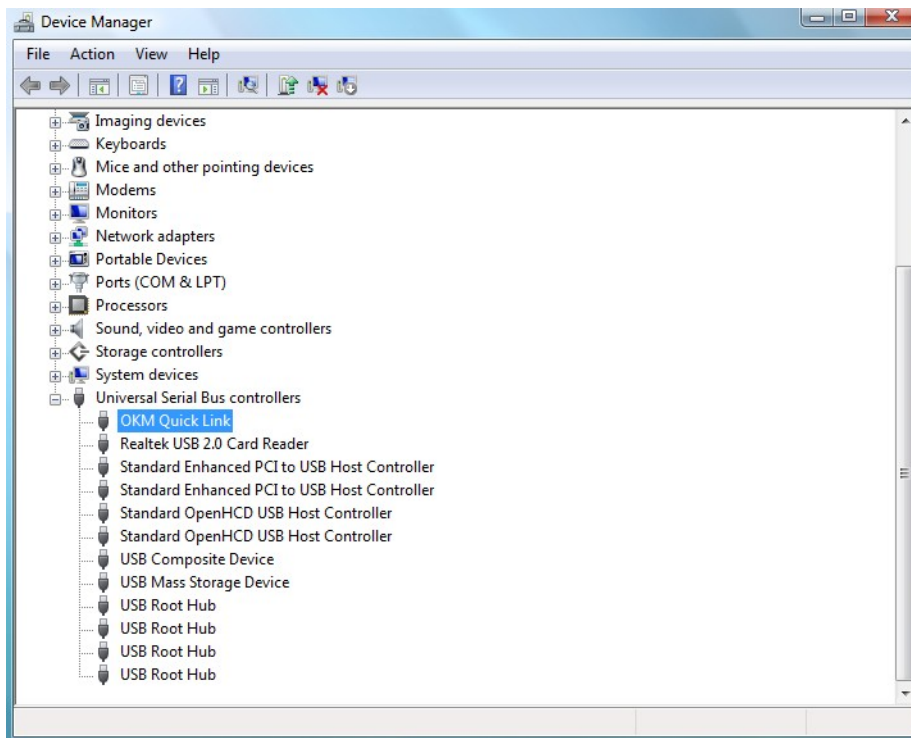


Illustration 2.23: Update USB drivers on Windows Vista, Step 7

The USB drivers are correctly updated/installed now and you can close the Device Manager window.

2.2.3 Uninstall USB drivers on Windows Vista

If you need to delete the USB drivers from your Windows Vista operating system, please open up the Device Manager as described in the previous subsection.

Installed devices can be removed using the Device Manager by simply right-clicking on the mouse and selecting **Uninstall**. This will delete the associated registry entries for that device only.

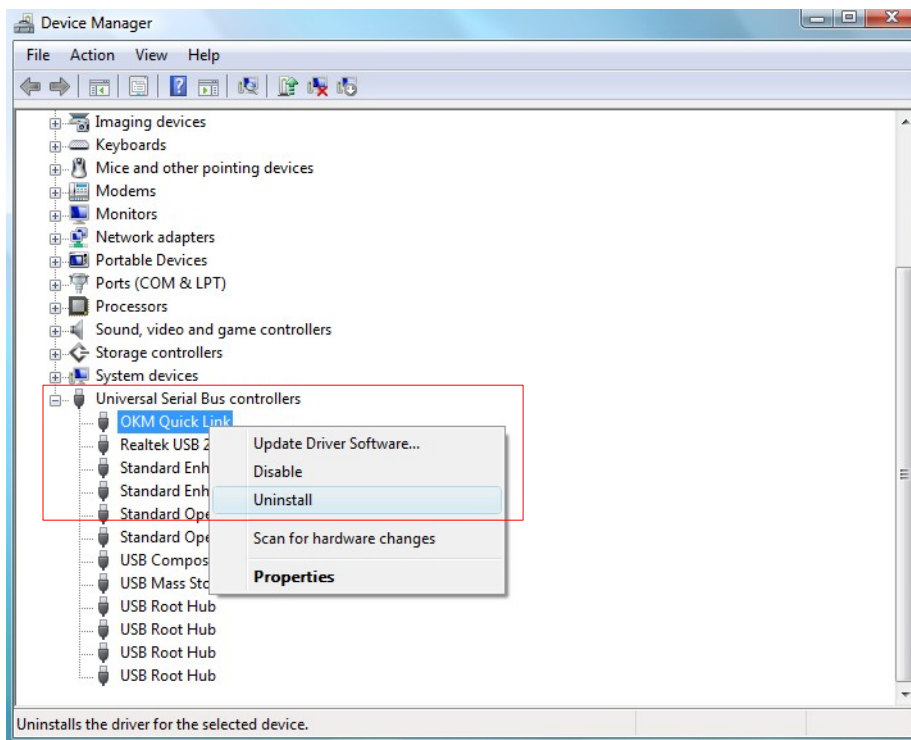


Illustration 2.24: Uninstall USB drivers on Windows Vista, Step 1

Windows Vista provides an automatic method to delete driver files via check box *"Delete the driver software for this device"* on the uninstall dialog box. Just mark the check box and click **OK** to remove the installed USB drivers of your device.



Illustration 2.25: Uninstall USB drivers on Windows Vista, Step 2

2.3 Windows 7

The instructions in this section are only valid for the operating system Windows 7.

2.3.1 Install USB drivers on Windows 7

The installation of the USB drivers on Windows 7 is a little bit different as known from previous Windows versions. Connect the device to a spare USB port on your PC and make sure everything is switched on. Windows 7 is now trying to install the latest USB drivers and displays the message from figure 2.26.

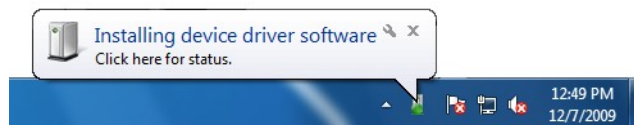


Illustration 2.26: Install USB drivers on Windows 7 - Step 1

Shortly after this Windows 7 will bring up a new message as shown in figure 2.27 to inform you about the fact that it could not install any drivers for your device successfully.

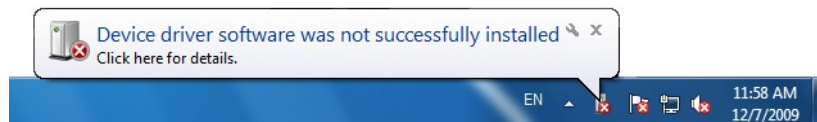


Illustration 2.27: Install USB drivers on Windows 7 - Step 2

Press the Windows 7 start button to bring up the start menu and select **Control Panel** as shown in figure 2.28.

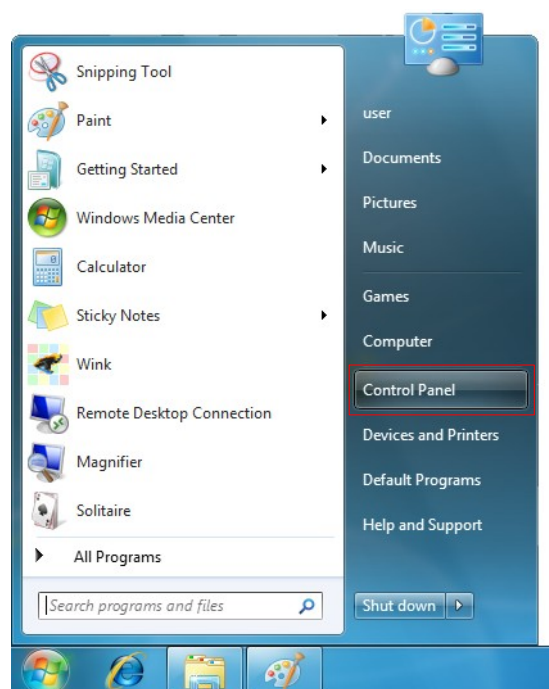


Illustration 2.28: Install USB drivers on Windows 7 - Step 3

This will open up the control panel window as shown in figure 2.1. From the control panel window you have to select **Hardware and Sound**.



Illustration 2.29: Install USB drivers on Windows 7 - Step 4

At the next screen, shown in figure 2.19, select **Device Manager** which can be found under *Devices and Printers*.

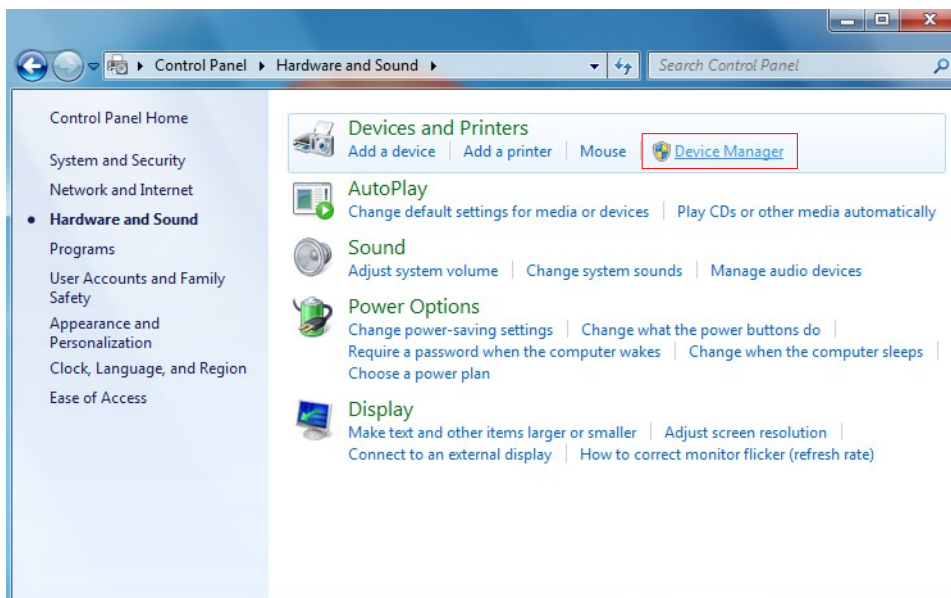


Illustration 2.30: Install USB drivers on Windows 7 - Step 5

In the Device Manager (see figure 2.20) there will be a device under *Other devices* with a yellow warning symbol to indicate a problem i.e. no driver installed. The text next to this device will depend on the device attached. In this example the device was an eXp 4000 device. Right click on the other device (eXp 4000 in this example) to bring up a menu as shown below.

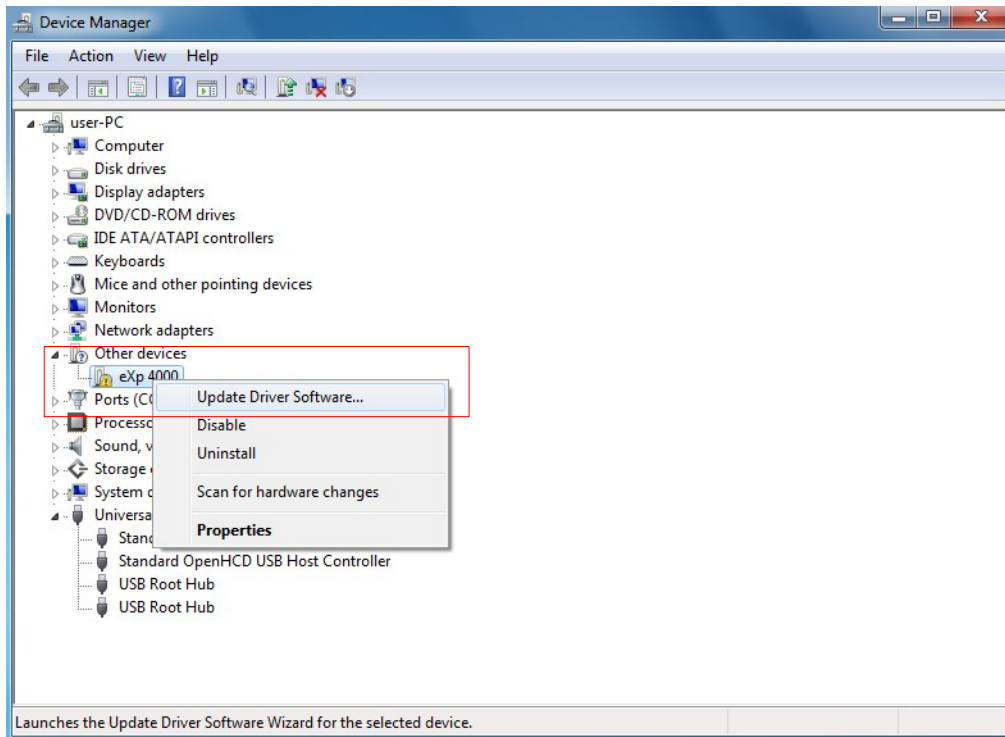


Illustration 2.31: Install USB drivers on Windows 7 - Step 6

From the displayed menu select **Update Driver Software...** which then displays the option for an automatic or manual search. Select the second option to browse manually.

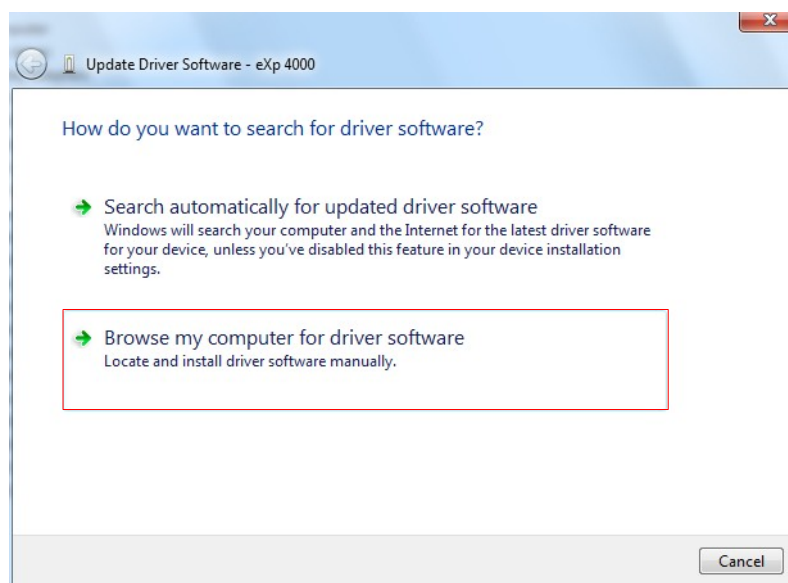


Illustration 2.32: Install USB drivers on Windows 7 - Step 7

In the address box put the exact location where the drivers have been saved to. Usually this may be your software CD or a folder on the PC if you downloaded the drivers from our website. It is not necessarily the exact same location as shown in the screenshot of figure 2.29.

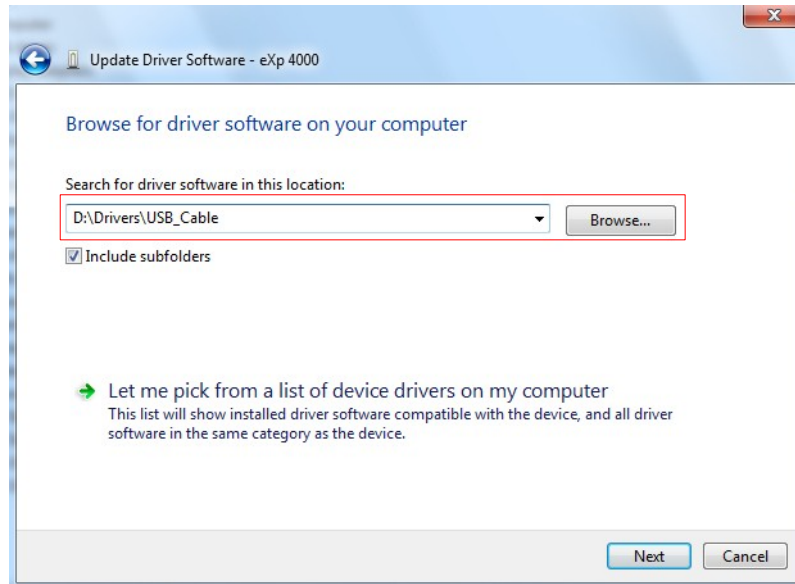


Illustration 2.33: Install USB drivers on Windows 7 - Step 8

After entering the drivers location select **Next** to start the installation.

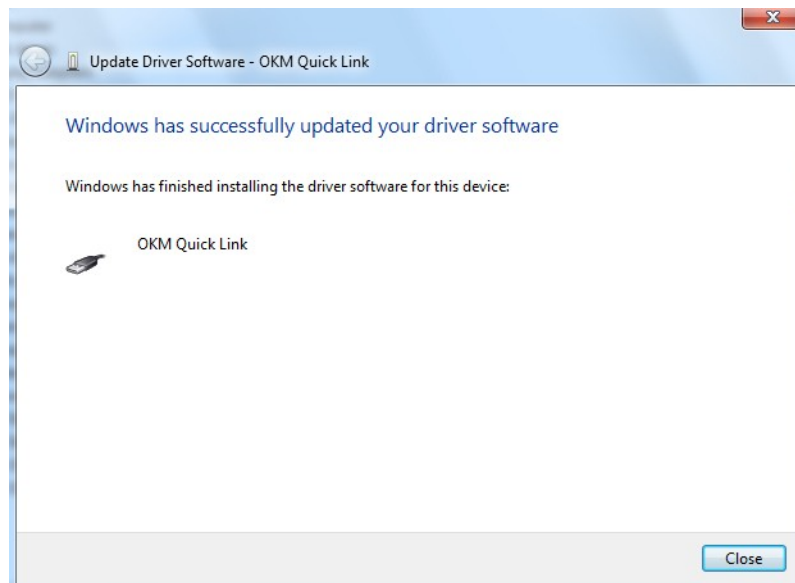


Illustration 2.34: Install USB drivers on Windows 7 - Step 9

When the installation has finished the completion screen from figure 2.30 is displayed. Press **Close** to close this window and go back to the Device Manager.

The Device Manager will now show a device under *Universal Serial Bus Controllers* indicated in the screenshot below as *OKM Quick Link*.

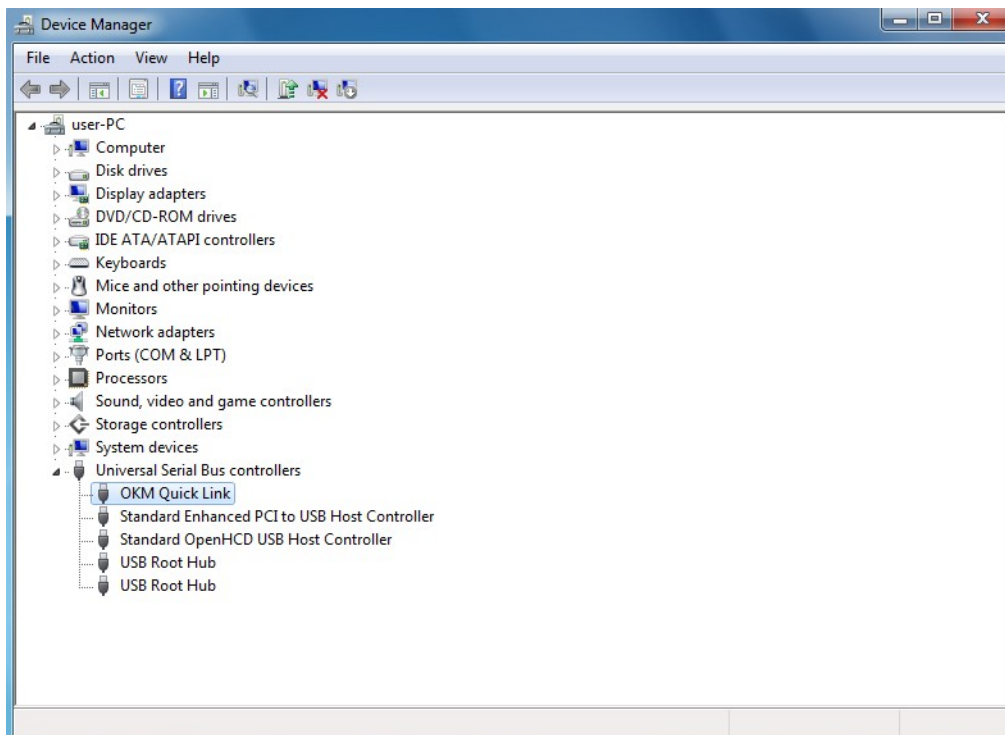


Illustration 2.35: Install USB drivers on Windows 7 - Step 10

The USB drivers are correctly installed now and you can close the Device Manager window.

2.3.2 Uninstall USB drivers on Windows 7

If you need to delete the USB drivers from your Windows 7 operating system, please open up the Device Manager as described in the previous subsection.

Installed devices can be removed using the Device Manager by simply right-clicking on the mouse and selecting **Uninstall**. This will delete the associated registry entries for that device only.

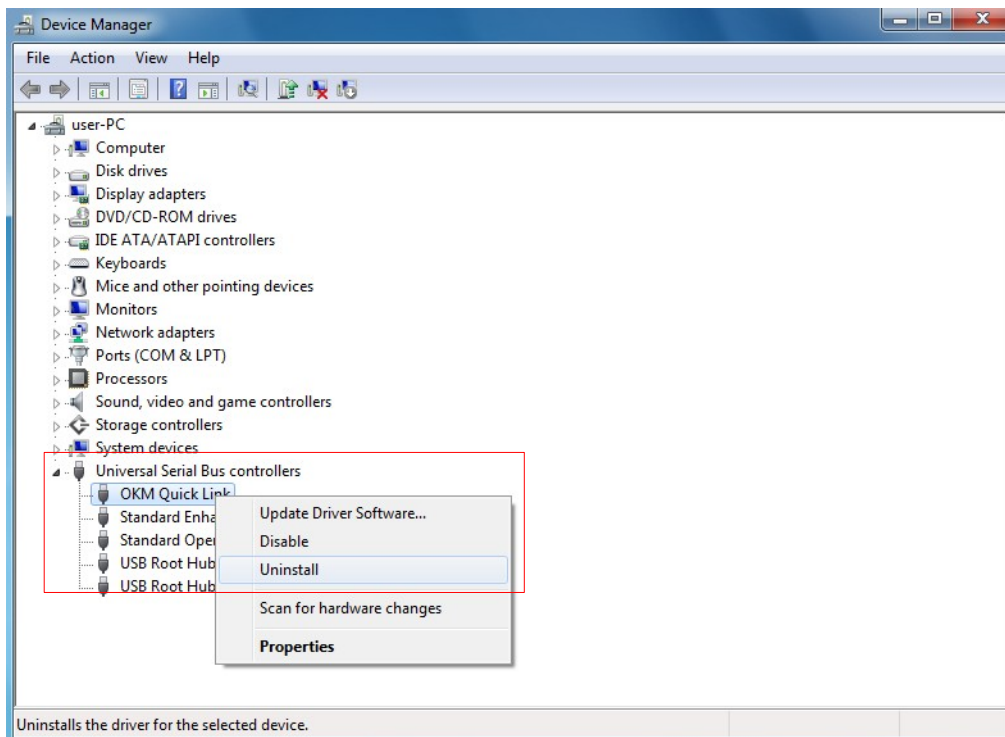


Illustration 2.36: Uninstall USB drivers on Windows 7 - Step 1

Windows 7 provides an automatic method to delete driver files via check box "Delete the driver software for this device" on the uninstall dialog box. Just mark the check box and click **OK** to remove the installed USB drivers of your device.



Illustration 2.37: Uninstall USB drivers on Windows 7 - Step 2

CHAPTER 3

Technical Specifications

The following technical indications are medial values. During operation small variations are quite possible.

3.1 Control Unit

Dimensions (H x W x D)	75 x 130 x 177 mm
Weight	about 1 kg
Voltage	9.6 - 14.4 VDC, 22 W maximal
Safety Class	IP40
Operating Time (full charged Power Pack, 25 °C)	about 3 hours
Operating Temperature	0 °C – 40 °C
Video Eyeglasses	640 x 480 Pixel, Color
Computer	1 GHz Processor, INTEL i586- compatible
Working Memory (RAM)	256 MB
Data Memory	256 MB
Feedback	accustic, visual
Storage temperature	-20 °C – 60 °C
Air humidity	5 % – 75 %
Waterproof	No
Sensor technology	TCFX-01-A

3.2 Data Transmission

Technology	USB
Maximal Data Transmission Rate	19200 Baud

3.3 Computer, Minimum Requirements

The computer is not part of the scope of delivery. The indicated values should help you for a correct selection of a suitable computer for analysis of your measured results.

Processor	minimum 1500 MHz
CD-ROM Drive	minimum 4x
Port (Data Transmission)	USB
Free Memory	minimum 50 MB
Working Memory (RAM)	minimum 256 MB
Graphic Card	minimum 128 MB, OpenGL-compatible
Operating System	Windows XP, Windows Vista, Windows 7

CHAPTER 4

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.

	Basic	Gold Edition	Professional
Control unit incl. carrying strap	1	1	1
Video eyeglasses with integrated headphones	1	1	1
Telescopic rod assembly for GPR antenna	1	1	1
Power Pack with charger and travel adapter	1	2	1
GPR antenna 50 cm	1	1	1
GPS receiver	1	1	1
User's manual	1	1	1
Carrying case	1	2	2
3D Software (Visualizer 3D)	1	1	1
USB cable	1	1	1
Super sensor	-	1	1
Antenna for metal discrimination (DDV system)	-	1	1
Livestream sensor	-	1	1
GPR antenna 25 cm	-	-	1
GPR antenna 75 cm	-	-	1
GPR antenna 100 cm	-	-	1
Antenna for tunnel detection	-	-	1
FS-Thermoscan	-	-	1

Table 1: Scope of delivery

CHAPTER 5

Assembly

In this section is explained how to assemble the device and how to prepare a measurement.

Before you can use the device eXp 5000 for a field measurement you should do some preparations. Please pay attention to the following steps!



Illustration 5.1: Connection of GPS receiver

Step 1

If you like to record and save GPS data of your measurements you should connect the delivered GPS receiver.

Without this GPS receiver you are able to do measurements, but cannot receive any additional GPS data.



Illustration 5.2: Connection of probe

Step 2

Connect the probe which you like to use to the control unit. No matter which probe you are using, you will always use the same plug in for each scan probe.

You can only use one probe at a time for one measurement.



Illustration 5.3: Connection of video eyewear

Step 3

The video eyewear consists of 2 connectors, video and audio. Take care to plug in the USB cable directly above the 15-pole video connector.

Please do not confound it with the USB port for data transfer!



Illustration 5.4: Connection of Power Pack

Step 4

Now you can connect the Power Pack to the control unit. After powering on the Power Pack you can put it in your pocket.

Now you should power on the device by using the Power On/Off button.



Illustration 5.5: Attach control unit to linkage

Step 5

You can carry the main unit of eXp 5000 around the neck or attach it to the linkage of the probe.

If you attach it to the linkage, you simply slide the main unit into the handle and tape the GPS receiver on the lower part of the linkage.

CHAPTER 6

Control Elements

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

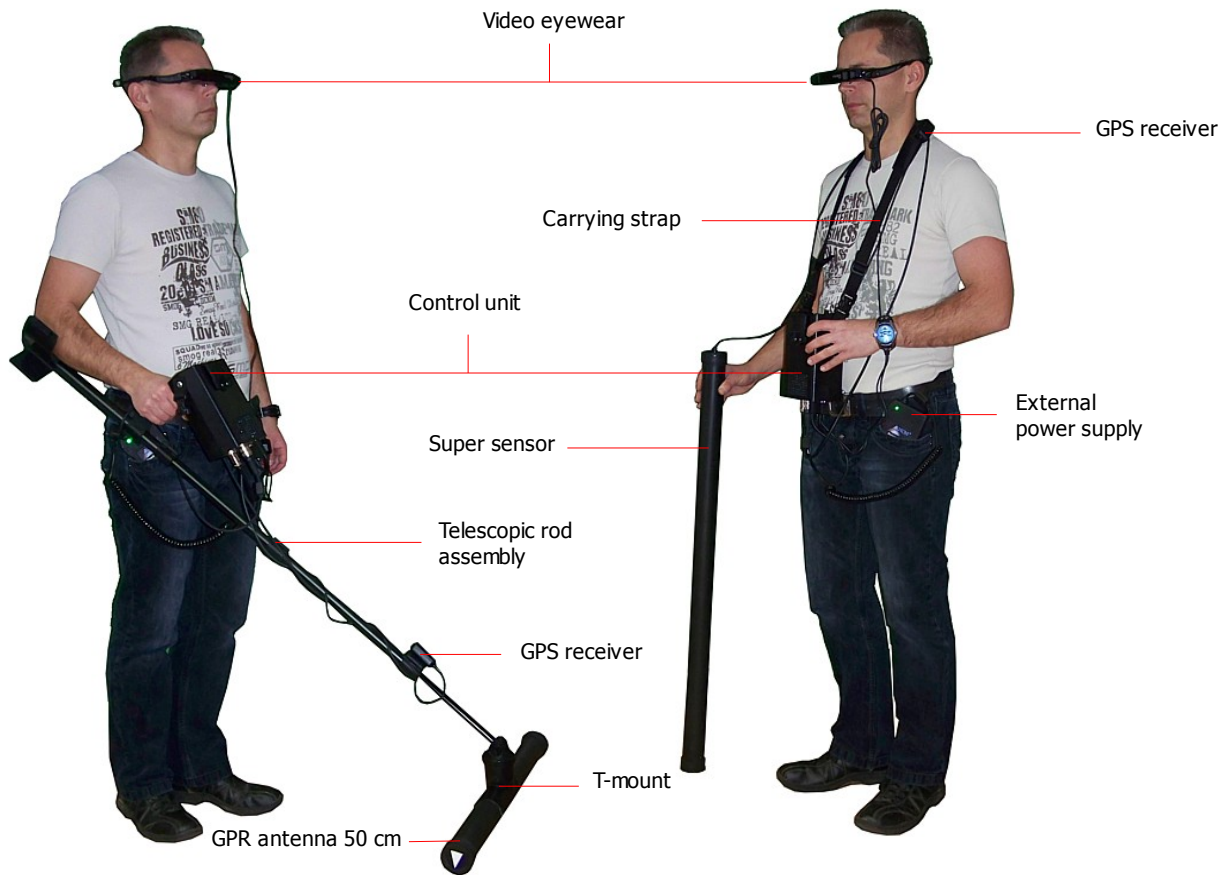


Illustration 6.1: Control unit with video eyewear, power supply and antenna

Via the Video eyewear you can see the menu navigation of the Control unit and all measurement recordings. The GPS antenna is used to receive gps data and should not be placed near to the Control unit. You can attach it to the Telescopic rod assembly or on the top of the Carrying strap.

The horizontal antennas like e.g. the GPR antenna 50 cm has to be connected via the T-mount to the Telescopic rod assembly. The vertical antennas like e.g. the Super sensor can simply be hold in the hand. In this situation it is recommended to wear the control unit with the Carrying strap.

6.1 Control Unit

The control unit is the calculation center of the device. Via the control unit the programs can be selected, all measured values can be recorded and stored.

6.1.1 Front View

Figure 6.2 shows the front side of the control unit with its control elements.

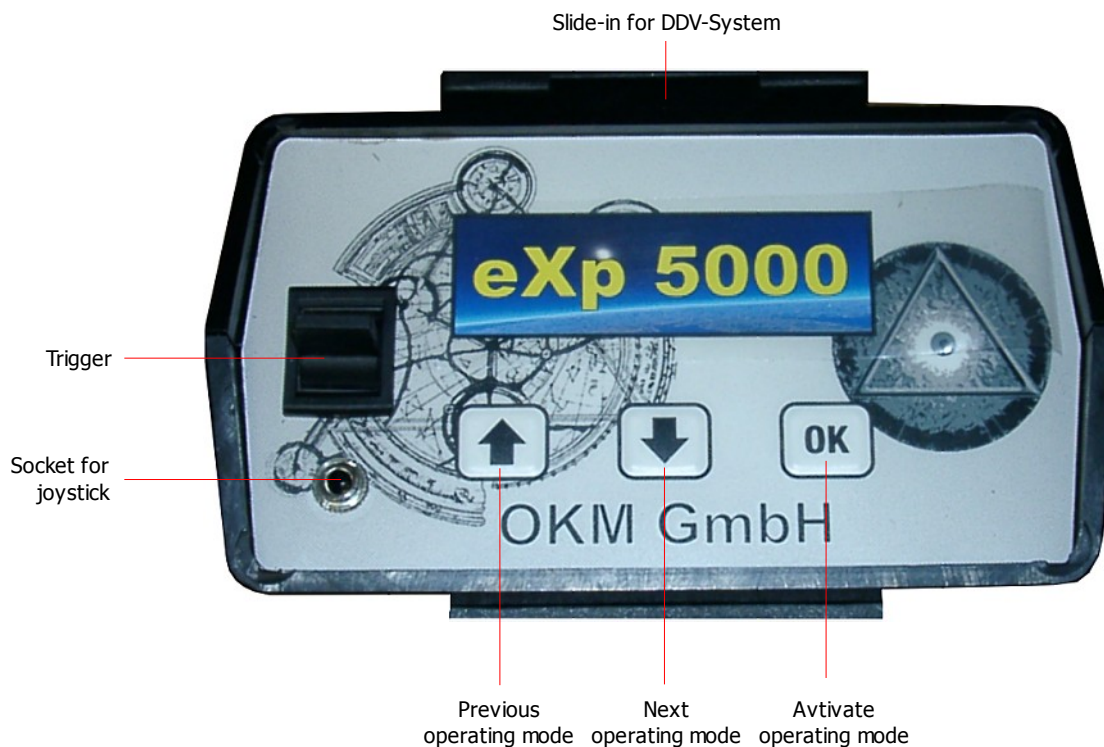


Illustration 6.2: Control Unit, Front View

The Slide-in for DDV system is used to hold the DDV system. On the detector unit the fitting counterpart is connected with which the detector unit slides-in.

The Trigger is used to power on the device. Therefore it has to be pushed upwards. Before you operate your measuring instrument you have to connect the delivered video eyewear and external power supply and power it on. During a measurement in "Ground Scan" manual measurements can be done with the Trigger. Therefore the button has to be pushed down. If you let it go the button will revert automatically. Alternatively you can connect the joystick with the Socket for joystick to do manual measurements.

With the keys ↓ and ↑ you can select the operating mode. To confirm your selection you have to press the button **OK**.

6.1.2 Back View

Figure 6.3 shows the back view of the measuring instruments and its connections.

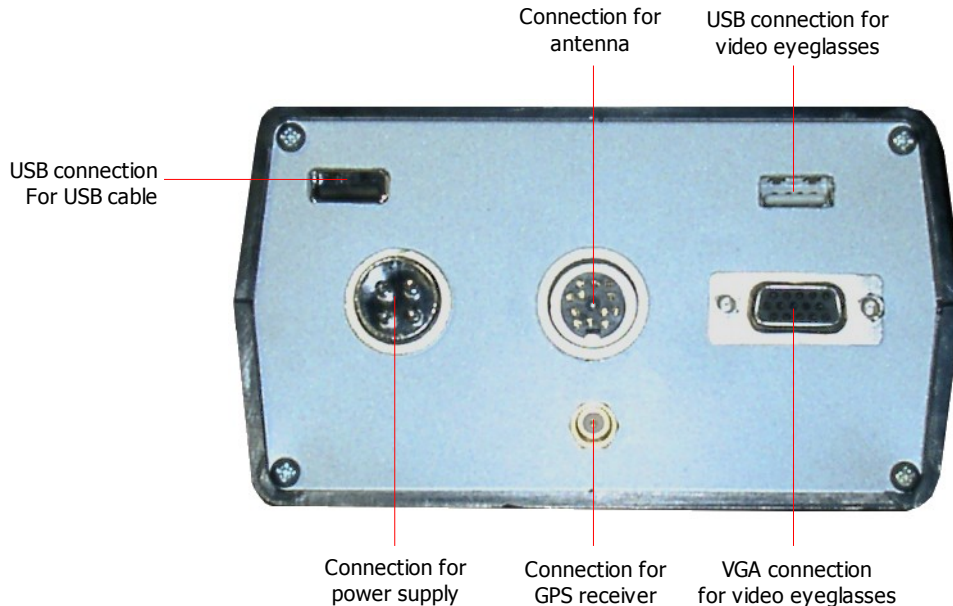


Illustration 6.3: Control Unit, Back View

The connection for power supply is used to connect the battery. Here the external power supply has to be plugged in.

On the connection for antenna different antennas and the DDV system can be connected.

The USB connection for video eyeglasses and the VGA connection for video eyeglasses is used to connect the video eyewear. Via the USB connection for video eyeglasses the video eyewear receive the necessary power supply and transmit the sound.

Via the USB connection for USB cable the device can be connected to a computer via the USB cable. This is necessary if data should be transferred from the device to a computer.

6.2 Video eyeglasses

The video eyeglasses are used as the display for this device. All menus and graphical representations are represented via these video eyeglasses. Connect the VGA plug of the video eyeglasses to the Connection of video eyeglasses on the back side of the control unit.



Illustration 6.4: Video Eyeglasses

The audio and sound output is realized via the Headphones of the video eyewear. The volume can be adjusted via the menu "Settings".

Via the VGA plug and USB plug the video eyewear is connected with the eXp 5000.

CHAPTER 7

Operating Modes

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

The right selection of an operating mode depends primarily of your planned measurement. So for example there are some special functions which have to be used for a first measurement in a unknown area to get a general overview, against which others are more suitable for a detailed search and analysis with a special processing software program.

The device contains the following operating modes:

- **Magnetometer**
Research of an area with the integrated magnetometer.
- **Ground Scan**
Measurement with graphical evaluation, whereby measured data can be stored in the internal memory of the device.
- **Metal Detector**
Activate optional DDV system to discriminate between metals.
- **Discrimination**
Examination of detected objects regarding to their characteristics on iron contents.
- **Live Scan**
Measurement with Live representation. No data record is possible in this mode.
- **Settings**
Setting of date, time and headphones volume.
- **Exit**
Power off the device and shut down the integrated PC module.

If you are connecting the optional FS-Thermoscan to eXp 5000, there will be two more operating modes available. Without FS-Thermoscan those functions are inactive and not visible.

- **Thermograph**
This operating mode is used to view and analyze differences in temperature measured with FS-Thermoscan.
- **Thermo Scan**
In Thermo Scan you can create graphical infra red images to visualize the distribution of temperatures of a field.

Both operating modes will be visible in the main menu as soon as the optional device FS-Thermoscan is connected to eXp 5000. These options are useful for seeking cavities.

Via a touchpad on the top of your device you can select and confirm your appropriate operating mode.

7.1 Magnetometer

You select operating mode Magnetometer in the main menu to determine the subsoil taking the earth magnetic field into account. Also you can recognize through the graphical representation of an oscilloscope like picture on the monitor if you are placed above a metallic object.

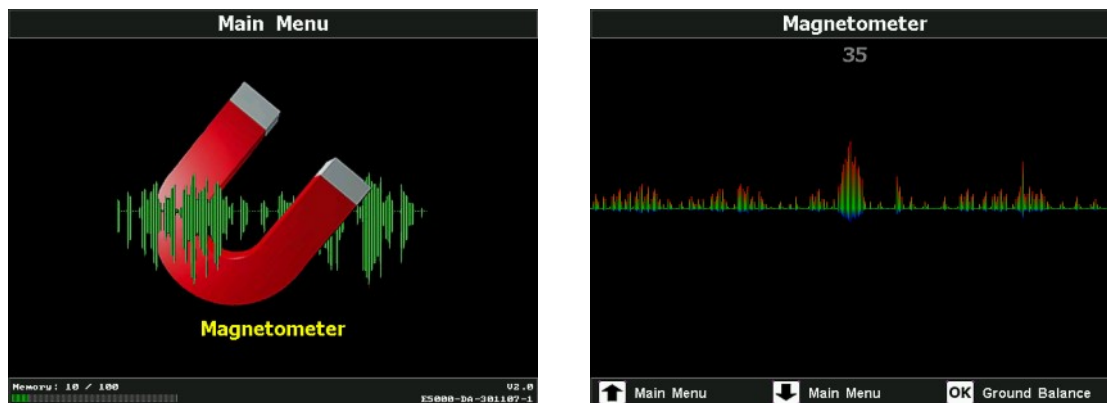


Illustration 7.1: Magnetometer: Main Menu, Representation of Values

This mode can be used with all antennas except the DDV system and livestream sensor. As soon as you confirm the operating mode "Magnetometer" the integrated magnetometer will be adjusted to the current basic ground value of the place where it is situated in this moment. During the initialization process the message "Ground Balance, Please Wait" appears on the display. Only if this message disappears you can start your research.

If you power on the device above neutral ground all metals will be shown with a deflection to the top in your monitor. If the device is situated above a metal while activating the magnetometer, all equivalent metal parts will not be recognized.

By a new press on the button **OK**, you can initiate a manual soil reconciliation. Therefore you have to start on a place with neutral ground. With the buttons **↓** and **↑** you are leaving the magnetometer mode and turn back to the main menu.

7.2 Ground Scan

This operating mode allows you to do a measurement with 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 previous stored graphics or to use the GPS system for navigation to these measurements. This mode can be used with all antennas except the DDV system.

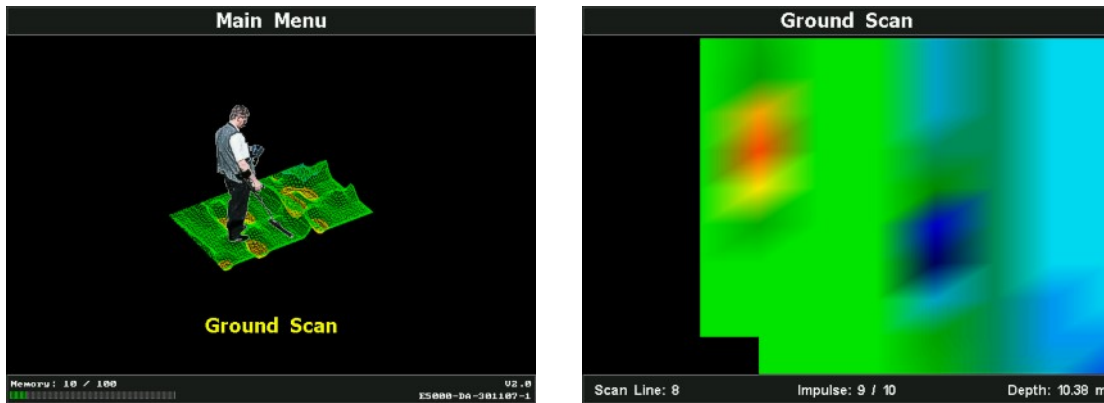


Illustration 7.2: Ground Scan

In the first submenu which is shown in figure 7.3, you can choose between the following alternatives:

- **New Scan**
Set up and record a new graphic.
- **Browse Scans**
See or delete stored graphics. If the measurement has been made while using GPS, you can navigate to the measured area.
- **Back To Main Menu**
Finish Ground Scan and go back to the main menu.

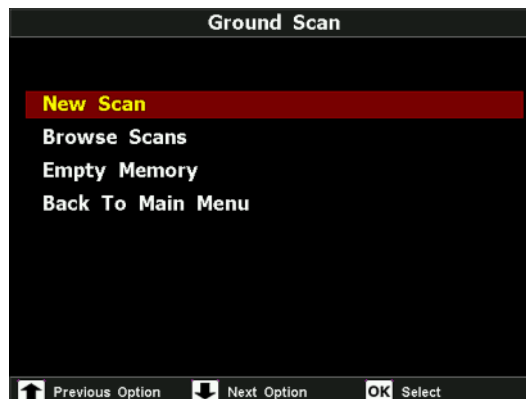


Illustration 7.3: Ground Scan – Submenu

7.2.1 New Scan

After activating this operating mode you have the possibility to adjust certain settings. There are different parameters which influence the measurement. In figure 7.4 you can see the corresponding submenu.

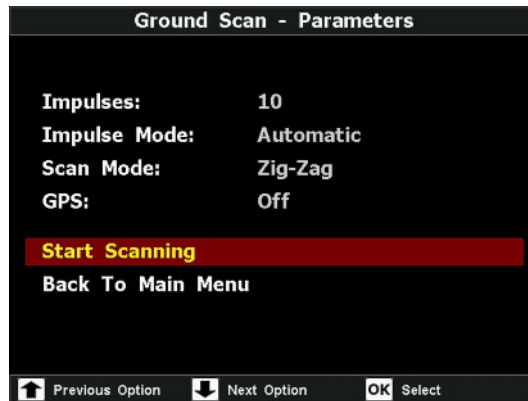


Illustration 7.4: Ground Scan – Parameter

You can modify the following parameters (the underlined values correspond to the setting made by the factory):

- **Impulse Mode (Automatic, Manual)**

If you are working in mode Manual the measured values will only be recorded when using the joystick. If you select mode Automatic, the measured values will be recorded and represented continuously.

- **Impulses (10, 20, ..., 100)**

Number of measured values per search line.

- **Scan Mode (Parallel, Zig-Zag)**

Scan Mode defines the method of scanning an area. In mode Parallel measurement starts always from the starting line, whereas in mode Zig-Zag measurement starts at the end of the line which

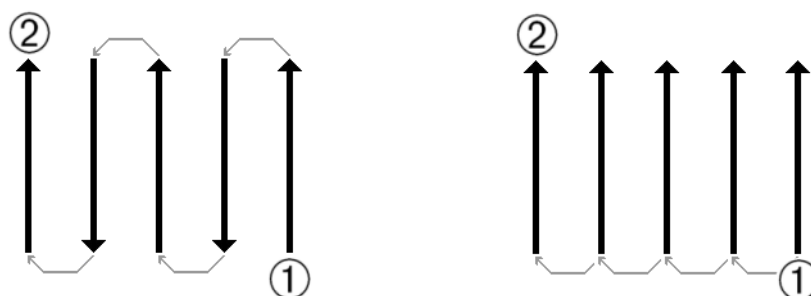


Illustration 7.5: Zig-Zag or Parallel

was scanned before, like represented in figure 7.5. In the last scanning method (Zig-Zag) you have to take care not to change the orientation of the antenna, which means if the white arrow on the side of the probe shows to north direction for example it has to show to north direction in every measured line.

- **GPS (Off, On)**

If GPS is activated (On), the GPS-coordinates (longitude and latitude) will be stored automatically according to every measured value. This data is important if you want to use the GPS navigation.

Select the parameter, which you want to change with the keys \downarrow and \uparrow , until it is highlighted in red color. Now press the key **OK**. The marking will change, so that only the current value is highlighted in red color. Now you can change the value of the selected parameter by using the keys \downarrow and \uparrow . To finish this process you have to press again the key **OK**.

Go to your start position and adjust all necessary parameters to your needs. Then you have to select option *Start Scanning*, to start the measurement. The message from figure 7.6 will appear and ask you if you want to start your first measure line now.

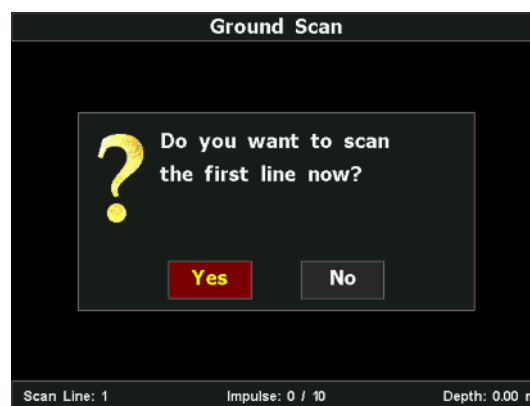


Illustration 7.6: Start first scan line?

While using the keys \downarrow and \uparrow select option "Yes", if you want to start the measurement. Confirm your selection by pressing the key **OK**. While the device is now sending out the impulses regularly you have to walk continuously your first measured line. As soon as your first scan line is finished a new message will appear, where you have to select "Yes" if you want to scan another measured line.

Repeat this procedure until you scanned your complete area. Step by step a graphical representation similar to figure 7.7 will built up.

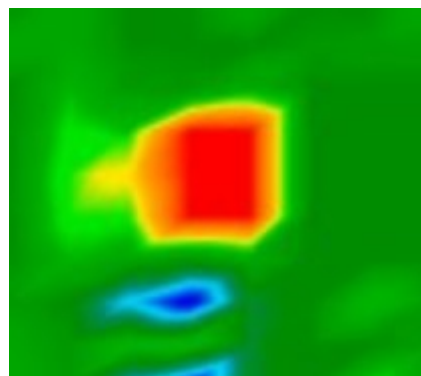


Illustration 7.7: Graphical Representation of a Measurement in Operating Mode Ground Scan

The graphic should represent green color values in majority, which represent normal ground. In this green area red and blue objects can be placed. Metallic objects are normally represented in red and cavities, water reserves and earth interferences in blue color. Beware that mineralisations of the ground are also shown in red color.

7.2.2 Browse Scans

After confirm menu option "Browse Scans" with the key **OK** you will see a list of all stored measurements, like represented in figure 7.8. Select the measurement which you like to see with the



Illustration 7.8: Select Stored Measurement

keys **↓** and **↑**. Every measurement with GPS data is indicated with the additional lettering GPS. Only these measurements are convenient for the GPS navigation.

For the selected measurement the following options represented in figure 7.9 are provided.

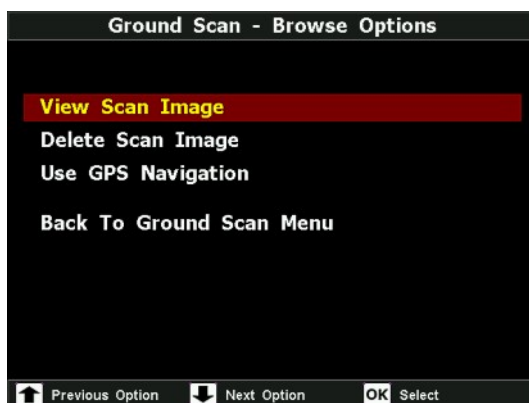


Illustration 7.9: Submenu: Browse Scans

- **View Scan Image**

The selected measurement will be displayed once again. Press any key to go back to the selection menu.

- **Delete Scan Image**

The current selected measurement will be deleted, if you confirm the following message with "Yes". Following you will go back to the menu Ground Scan.

- **Use GPS Navigation**

Start the navigation to the stored GPS data from this measurement. After you confirmed the this option, you will see a representation like in figure 7.10. If the GPS Receiver have no or insufficient data the message "Searching for Satellites ..." will appear and the program is waiting until sufficient data is available.

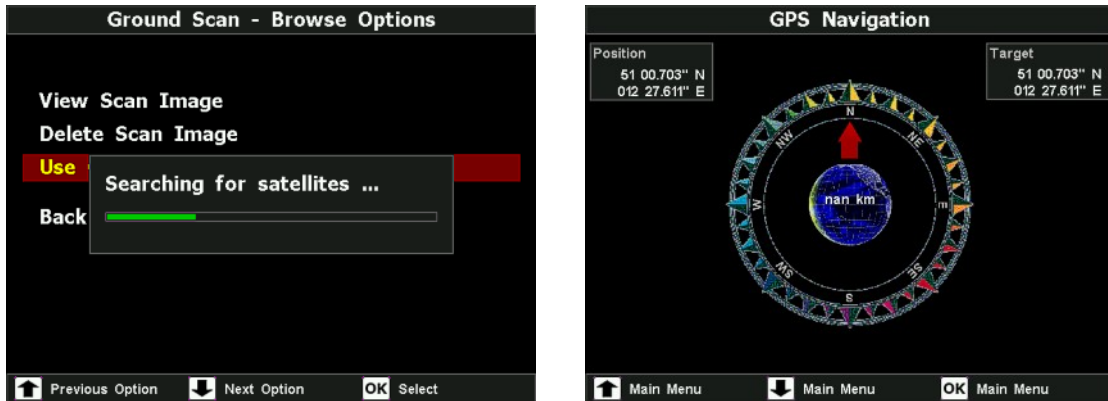


Illustration 7.10: GPS Navigation

If sufficient satellites and their data are available the navigation will start. The arrow indicates you in which direction you have to walk to reach the selected measured field. In the upper left corner you can see your current position and behind in parenthesis the destination point is displayed. On the lower left side you can read the distance to your destination point. This indication is only correct if sufficient satellites are available and you do move forward. Only by moving and with the corresponding data the direction and distance of your destination can be determined. You can press any key to come back to the selection menu.

- **Back To Ground Scan Menu**

You go back to menu Ground Scan.

7.3 Metal Detector

To use this operating mode you have to connect the optional DDV system at first. The detector is specialized to find small objects (e.g. coins) which are located near to the surface.

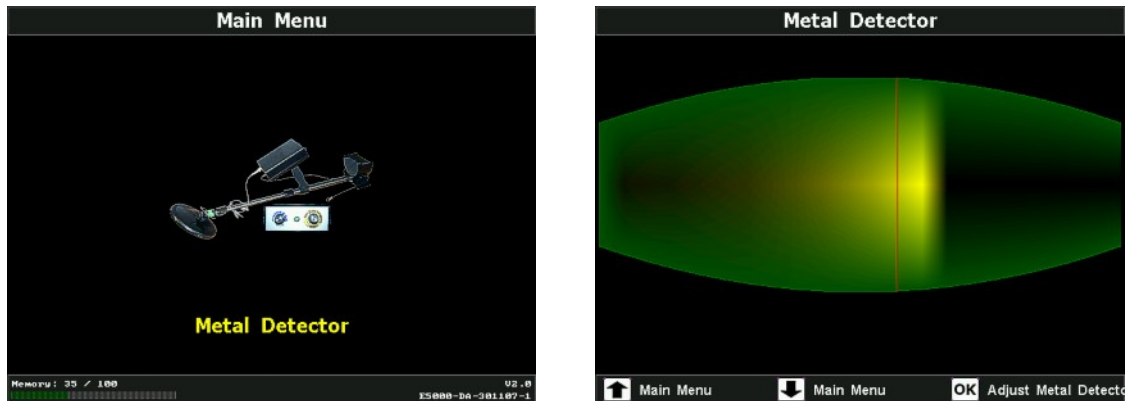


Illustration 7.11: Metal Detector

Also with the detector you have the possibility to determine the material of possible objects. So for example you can find out if an object consists of gold, silver or iron.

Further information about the correct usage of the detector and the principle of discrimination you can find in section "Optional Equipment / DDV system" of this users manual!

7.4 Discrimination

This operating mode is used to identify metals and cavities. Therefore it is necessary to connect the optional available Supersensor. There is no given manner fixed or a scan direction. You can walk as you want to determine the soil. This operating mode is most effective if you already detected possible objects and now want to know more details about them.

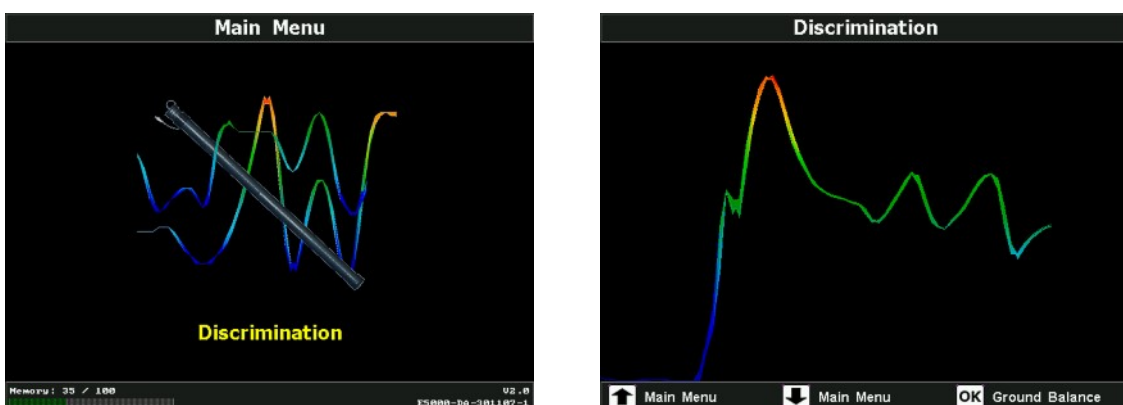


Illustration 7.12: Discrimination

The Supersensor should point vertical towards the ground. It should not be turned or pivoted.

Now you can slowly move the Supersensor from one side to another above the possible object. 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.

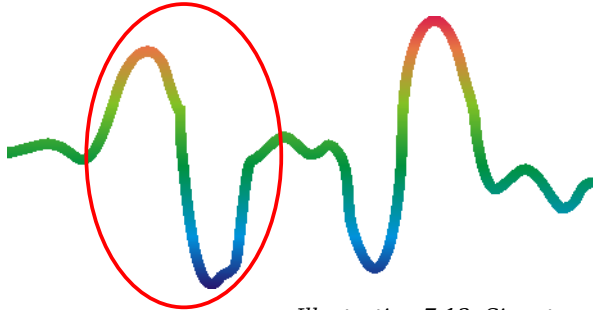


Illustration 7.13: Signature of a ferromagnetic metal target

The figure 7.13 shows a typical signature of a ferromagnetic metal like e.g. 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 Supersensor. If you keep moving the probe from one side to another, these 2 signatures will change continuously.

Take care to move the Supersensor slowly and equal above the ground and above a detected object to get a clear signature.

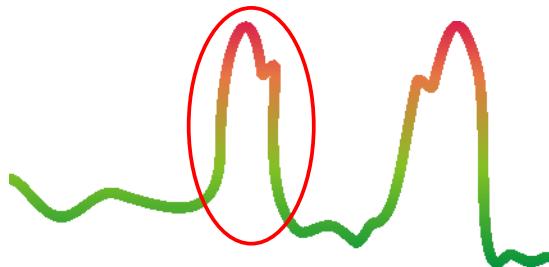


Illustration 7.14: Signature of a non-ferromagnetic metal target

The figure 7.14 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.

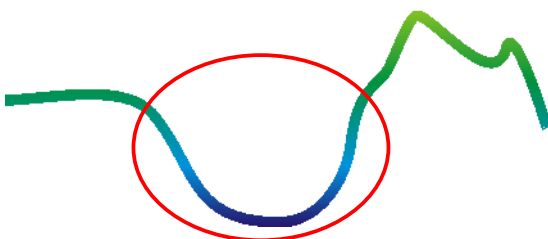


Illustration 7.15: Signature of a non-metallic target

Ferromagnetic metals

Ferromagnetic targets have a positive-negative-signature.

Non-ferromagnetic metals

Non-ferrous targets have a pure positive signature.

Non-metallic targets

All non-metallic items have a pure negative signature.

The last of the typical signatures is represented in figure 7.15. 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).

7.5 Live Scan

To work in the operating mode "Live Scan" you have to connect the LiveStream-Sensor to your device. This probe is marked with a white arrow which is fixed on the upper side of the probe. During a measurement this white arrow should always be directed to the left side.



Illustration 7.16: Live Scan: Orientation of the LiveStream-Sensor

Also you should take care that the arrow which is situated on the straight side of the probe is always directed to the ground. Be sure that the probe is correctly aligned before activating this operating mode.

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 probe. The graphical representation is similar to operating mode Ground Scan.

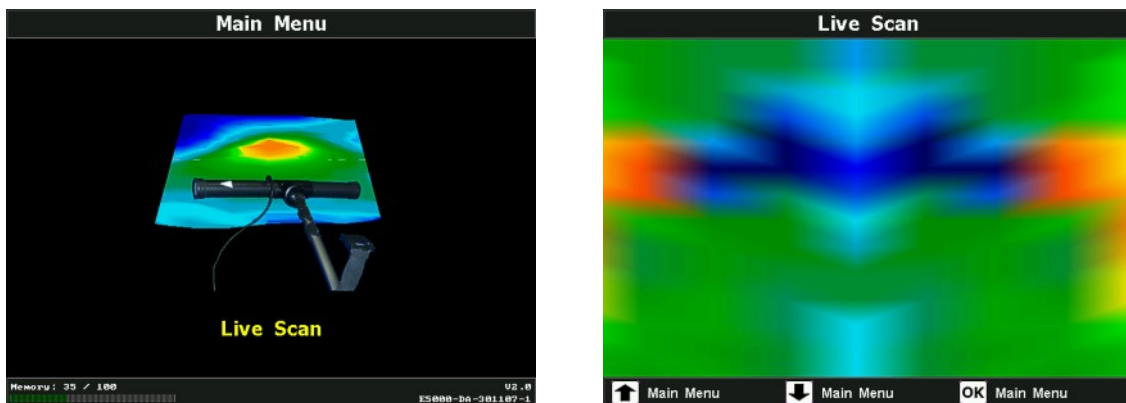


Illustration 7.17: Live Scan: Main Menu, Representation of Measured Values

All measured data will flow over the screen. Also when you are not moving, the measured values were updated constantly. If you are situated right over a target it will be visible on the screen, also if you are not moving.

The measured values in operating mode Live Scan cannot be stored.

7.6 Settings

In this operating mode you have the possibility to set the date and time. The correct adjustment of date and time are very important, because both settings are stored together with the graphical measurement in menu Ground Scan. This allows you to identify each measurement according to date and time.

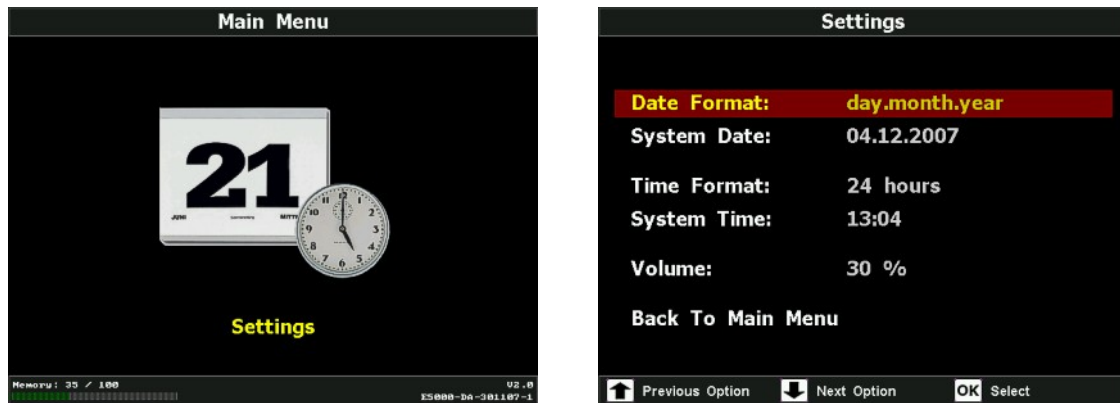


Illustration 7.18: Settings

You can select between the following possibilities:

- **Date Format**
Setting of date format (day.month.year, day/month/year, day/month/year).
- **System Date**
Setting of date.
- **Time Format**
Setting of time format (24 Hours, 12 Hours + am/pm).
- **System Time**
Setting of time. Preset is Central European Time (CET).
- **Volume**
Setting of headphones volume.
- **Back To Main Menu**
Leave Settings and go back to Main Menu.

Select the parameter, which you want to change with the keys \downarrow and \uparrow , until it is highlighted in red color. Now press the key **OK**. The marking will change, so that only the current value is highlighted in red color. Now you can change the value of the selected parameter by using the keys \downarrow and \uparrow again. To finish this process you have to press again the key **OK**.

7.7 Exit

You have to select option "Exit", to finish the operation with this device. As soon as you confirmed this selection the integrated pc module will shut down and the device will power off itself.

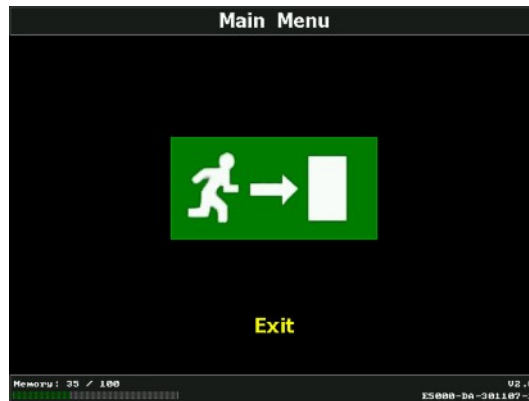


Illustration 7.19: Exit

Please wait until the device has powered off itself. After the device is switched off you can power off the external power supply.

7.8 Thermograph

This operating mode is only visible and usable if the optional device FS-Thermoscan is connected.

Detailed information about this functionality is available in the user's manual of FS-Thermoscan!

7.9 Thermo Scan

This operating mode is only visible and usable if the optional device FS-Thermoscan is connected.

Detailed information about this functionality is available in the user's manual of FS-Thermoscan!

CHAPTER 8

Field procedure

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

8.1 General scanning procedure

In general every measurement always starts on the bottom right corner of your scan area. Starting from this point, you should walk scanning path by scanning 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 scanning path, so that the user can find the starting position of the following path. In this way, all paths will be registered and the area will be measured.

Figure 8.1 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.

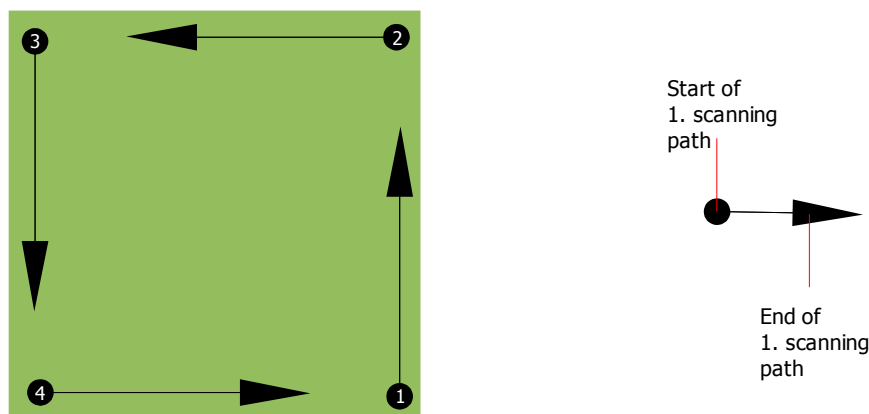


Figure 8.1: Starting position of a scan area

The scanning paths may be referred to 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).

8.1.1 Scan Mode

There are two general techniques to survey an area with eXp 5000:

- **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**
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 8.2 represents both techniques schematically.

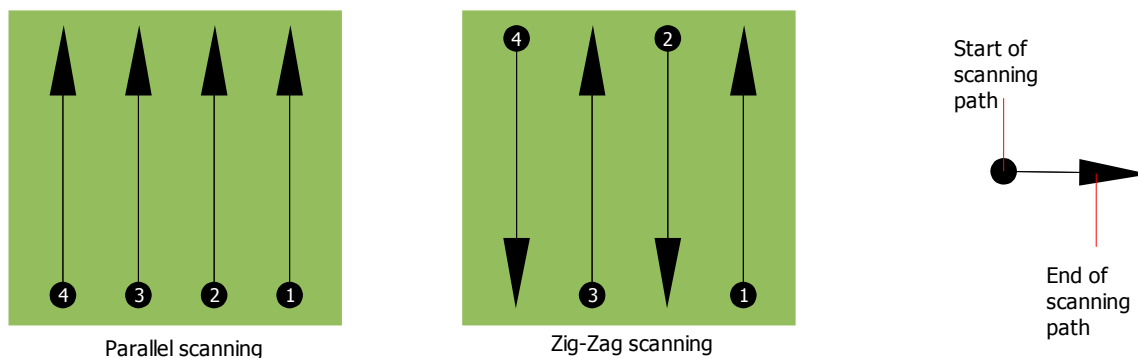


Figure 8.2: Scan modes to measure an area

During the measurement in scan mode "Parallel" you will start on the bottom right corner of your measure area (point ❶) to walk and record a scanning path towards the right upper corner of the measure area. After recording the first scanning path, you should walk back to the starting point of scanning 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.

During the measurement in scan mode "Zig-Zag" 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 constantly 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 small distance between the paths! A standard rule is: The smaller the distance between the paths, the more accurate will be your scan result!

8.1.2 Regulation of the number of impulses per scanning path

It is possible to select the 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 number of measure points 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.

Keep in mind the number of impulses which you have recorded per scanning path. This amount should be entered later in the software program, when transferring the data to a PC, to receive correctly all measured data from your measuring instrument!

There is no special rule for selecting the right number of impulses. But there are different aspects which has to be considered. These are for example

- 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 20 cm. The smaller the distance between two impulses is, the more exactly the graphical representation will be. 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 8.3 shows the effects of the distance and the number of impulses per scanning path for some objects.

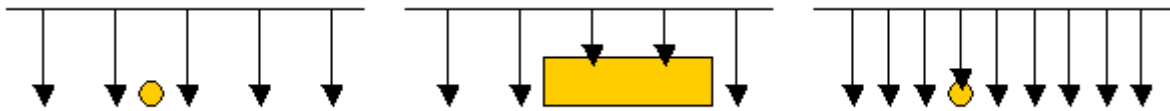


Figure 8.3: Effects of changing the number of impulses and their distance

Figure 8.4 shows the difference between very few impulses (left side) and much more impulses (right side) on the same length of scanning path. Therefore the second record (right side) shows much more details and also smaller objects can be seen.

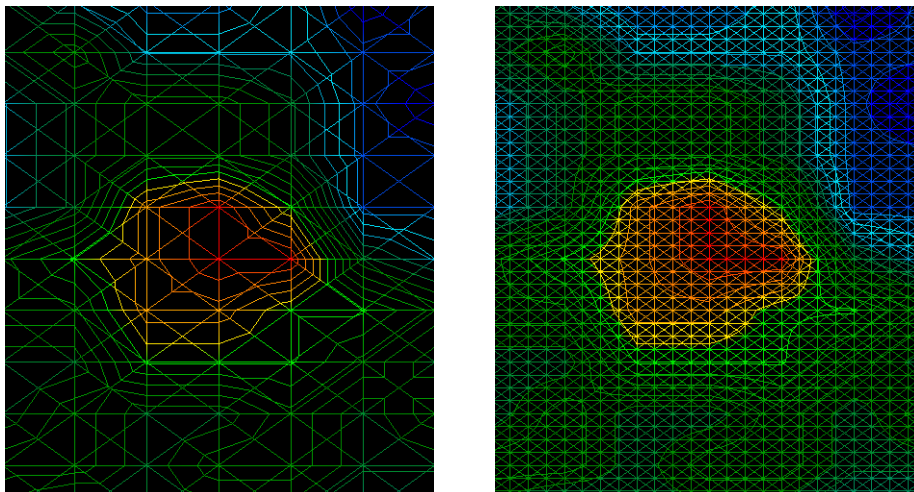


Figure 8.4: Comparison of low and high number of impulses

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 for the search of

bigger objects you can proceed like this. With this manner you can measure a larger area very quickly and afterwards you can record only subsections of interest.

When walking the scanning paths you should not only take care of the number of impulses, you also need to take care of your walking speed. Every scanning path should be measured with the same speed, like the previous scanning paths.

Figure 8.5 shows what can happen, if you use different walking speeds in each scanning path.

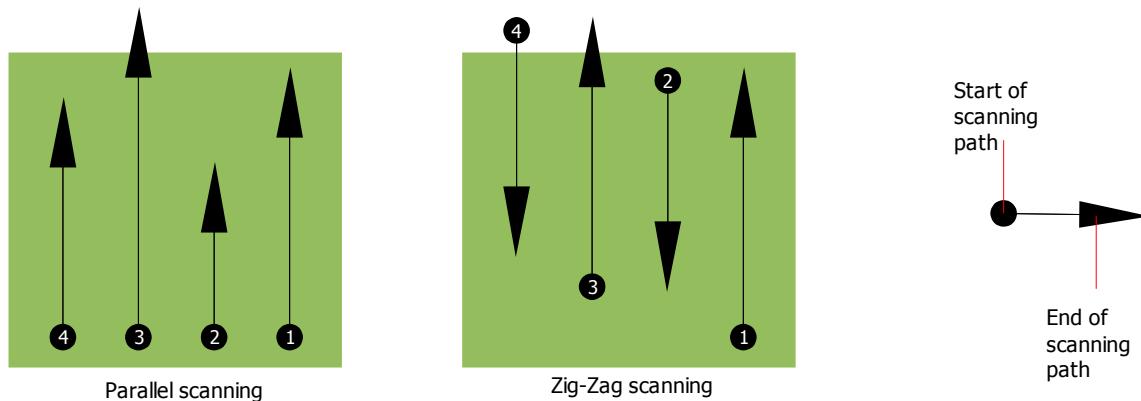


Figure 8.5: Different walking speeds during scanning

Using a different walking speed in the scanning paths, will cause displacements in the scanning path. Thereby it can happen that some places inside your scan area are not measured at all or other unmeant places outside of your scan area will be included. Later when the recorded data will be transferred to the software and combined to a 3d image, there might be unmeant falsifications.

In general, the following rule is valid: The smaller and equally you are walking while measuring each scanning path, the smaller will be the distance between the measure points and the more accurate will be your scan result!

8.2 Special advices for the field procedure

There are some aspects which you should take care of during the measurement. In principle the obtained 3d graphic can be only as good as the measurement you have recorded. A false measurement can create falsified graphics.

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 any plan will not give acceptable results. Please consider the following advice:

- What do you like to locate (graves, tunnel, buried objects, ...)? This question has direct effects on the realization of a measurement. If you look for large 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 (e.g. 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 exact values concerning the depth measurement, 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 a correct depth measurement is not possible and also measurement of size and form are limited. In this case, repeat the measurement 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 graphic. This will influence the exactness of depth measurement. It is useful to scan partial areas over such targets.
- You should do at least two control scans to get sure about your results. So you also can recognize and isolate mineralized deposits.

8.2.1 Orientation of probe

During one measurement the probe should have always the same distance to the ground. Generally we recommend a distance of about 10 – 15 cm from the surface of the ground.

If there are some obstacles like stones, wood or high grass inside of your scan area than you should start the measurement right from the beginning in a higher distance of the probe to the ground. In such circumstances you can measure in a distance of e.g. 50 cm above the ground. Important is that you keep this distance during the complete measurement. In any case you should avoid to move up and down the probe!

Another important aspect is the physical orientation of the probe. During the scan mode "Parallel" the orientation of the probe does not change because you always measure in the same direction. Even in the scan mode "Zig-Zag" 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.

8.2.2 Parallel or Zig-Zag?

For skilled users of eXp 5000 both scan modes are suitable. According to experience the best graphics has been received in the mode "Parallel", because always the same direction of scanning is used and the walking speed can be coordinated in the most adequate way.

Specially in uneven territories like mountain sides, acclivities or other inclined layers the parallel mode is preferred.

8.2.3 Manual or automatic impulse mode?

Large even surfaces can be measured in the automatic mode. The manual impulse mode is mostly used in difficult territories or if the measurement result should be much accurate.

In terrains with difficult access like cliffy mountain 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.

CHAPTER 9

Optional Equipment

Here you can find additional information about all equipments which are available as optional accessories to the basic package. Keep in mind that the mentioned parts and devices in this section must not belong to your scope of delivery.

9.1 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 nonferrous metals. This discrimination is possible in the operating mode Discrimination. Compared to the standard Horizontal GPR-antennas the Super Sensor can find much smaller and deeper situated metal objects.

9.1.1 Usage

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

- Magnetometer
- Ground Scan
- Discrimination

To use the Super Sensor with the device, you just have to connect it to the main unit. Therefore you have to plug in the connector of the antenna in the appropriate input of the device. Hold the antenna always vertical to the ground in your hand, whereby the cable should come out at the upper end of the antenna. The figure 9.1 shows how the Super Sensor has to be held in a correct way.



Illustration 9.1: Position of Super Sensor

The Super Sensor should not be swung nor moved up and down during the measurement. The more even you hold the antenna the better will be your measured graphical results. 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 orientation of the antenna should not be changed during the complete measurement!

9.2 DDV system

With the DDV system (Disc Detector Visualization System) a powerful metal detector is on your disposal, which not only supports your underground research with a visual representation but also offers you various filter possibilities.

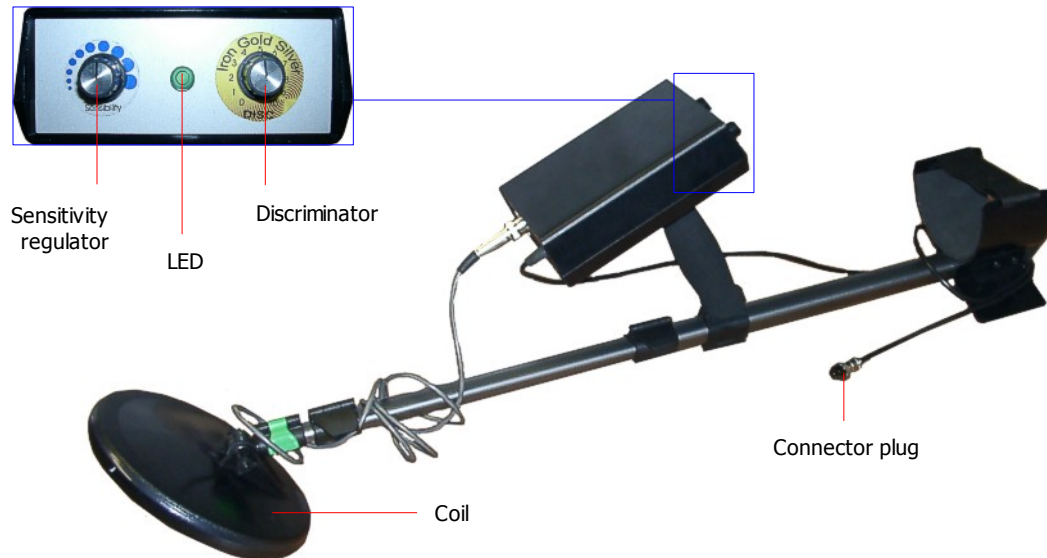


Illustration 9.2: Control Elements of the Detector

To use the DDV system just plug in the connector plug into the control unit of your eXp 5000. Then select the operating mode "Metal Detector" in the main menu.

Attention: As soon as you confirm this option the ground balance will start. Detailed information you can find in section 9.2.3 on page 74!

Now you have to pivot the detector coil continuously right above the ground, trying to keep the same distance to the soil. Adopt the rhythm of the graphical representation on the screen. As soon as you pass above a metallic object a yellow colored trace will appear in your graphic and you can hear an acoustical sound through the headphones.

9.2.1 Calibration

The manual calibration is only possible for product version *V1.1* and following. In case of need all former product versions have to be calibrated from the manufacturer. The version of your device you can read inside the main menu.

Before using the metal detector for the first time the DDV system has to be adjusted on the eXp 5000. If you purchased the DDV system together with the main unit the metal detector has already been

calibrated in the optimal way. Anyway you have the possibility at any time to recalibrate the DDV system. Therefore you have to activate at first the operating mode "Metal Detector".

Place the DDV system on the ground like shown in figure 9.3. Take care that no metal is situated near to the coil! Press the key **OK**, to start the calibration.

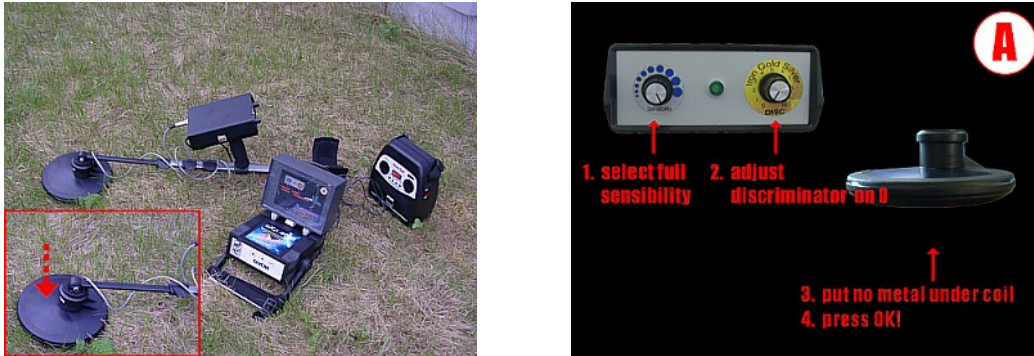


Illustration 9.3: Calibration of the DDV system, step 1

In the first step of calibration you have to turn the sensitivity regulator completely to the right side and so adjust it on full power. The discriminator has to be adjusted on the value 0. Take care that no metal is located near to the coil! Now press the key **OK**, to start the calibration. Wait until this process is finished.



Illustration 9.4: Calibration of the DDV system, step 2

In the second step of calibration you have to leave the sensitivity regulator in the same position and place a piece of iron (e.g. screw or nail) under the detectors coil. Alternative choice is to place the metal directly on the top of the coil, like you can see in figure 9.2. Now press again the key **OK** and wait until this process is also finished.

After finishing the calibration a visual signal (yellow light) should be visible on the screen. If the headphones are connected you will also hear an acoustical signal. The DDV system is now calibrated to work correctly on-site.

9.2.2 Adjust the discriminator

The discriminator serves to filter certain materials. So it is possible to "exclude" for example worthless iron and steel objects. Or people who are hunting for treasures and gold are able to exclude other materials with the help of this discriminator.



Illustration 9.5: Adjustment of discrimination

In figure 9.5 the regulator to adjust the discrimination is represented. This regulator can filter certain materials. Table 2 explains the adjustment in the case of normal ground conditions¹.

Adjustment	Indicated materials
0	All metallic objects
3	Iron, gold, bronze, silver, aluminium
5	Gold, bronze, silver, aluminium
7	Silver, aluminium
10	Aluminium

Table 2: Standard adjustment of the discrimination

When you adjust the regulator for discrimination on gold, the detector reacts besides gold also on bronze, silver and aluminium. To find out if there is really gold in the ground you have to follow the following instructions:

1. Switch the discriminator on gold and start your soil examinations until you reach a place where the detector reacts positive, which means you can hear an accustical sound signal.
2. Now switch the discriminator on silver and examine this place again. Following there will be two possibilities:
 - The detector reacts positive! The material under the ground is not gold, but could be silver or aluminium.
 - The detector does not react! There is probably golden material in the ground but also bronze is possible.

Please consider that you always should do the ground balance, which is explained in this following section.

¹ The indications from table 2 concern the use in normal type of soil. In extreme conditions (mineralisation, salt deposits, ...) they can variate from this normal value.

9.2.3 Ground Balance

A correct soil reconciliation (Ground Balance) is absolutely necessary that the adjusted discrimination can work properly. If the soil reconciliation is not done correctly the operation of the device and the integrated discriminator cannot work properly.

In the following section you can find a list of all necessary working procedures to do a correct soil reconciliation:

1. Power on the eXp 5000 and connect the DDV system.
2. Adjust the discriminator on the material you like, see previous section.
3. Put the device with coil approx. 10 cm above the ground.
4. Select the operating mode "Metal Detector" and confirm it.

If you hear an acoustic signal from the DDV system after these indications, then the ground balance is not finished correctly. Repeat these steps until there is no acoustic signal from the metal detector.

The following causes can prevent a correct soil reconciliation:

- You are staying above a metallic object.
- You confirm the operating mode "Metal Detector" without holding the coil directly above the ground.
- During the confirmation of the operating mode "Metal Detector" you are holding the coil to high and then minimize the distance to the ground.
- You are turning the discriminator during ground balance.

Only if you are doing a correct soil reconciliation the functionality of discrimination can be guaranteed!

CHAPTER 10

Error Messages

In this chapter you will find possible error messages which can appear during the work with the device.

In case you are scanning very large areas in the operating mode "Ground Scan" the stored files will also be very large, which could fill up the internal memory completely. As soon as the free memory cell is less than 20% the message shown in figure 10.1 will appear.

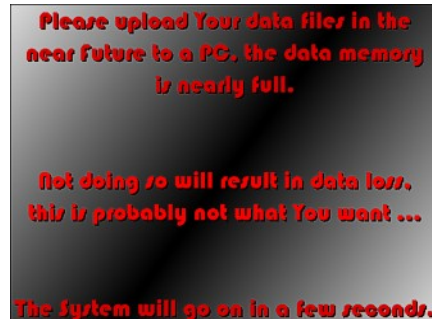


Illustration 10.1: Only a small amount of memory available

If there is no more free memory available you will see a message like in figure 10.2. You can free memory space by transferring all stored data via software to your computer or by selecting the option "Empty Memory" to delete all stored data without having transferred them to your computer.

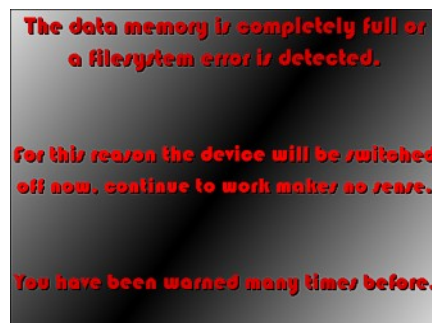


Illustration 10.2: No free memory available

If message 10.3 appears the device cannot control the operating voltage. This also means it cannot warn you in case of a low status of the battery. Also the automatic shutdown of the device may be affected. It is advised to let the device check from the manufacturer to avoid further damages.

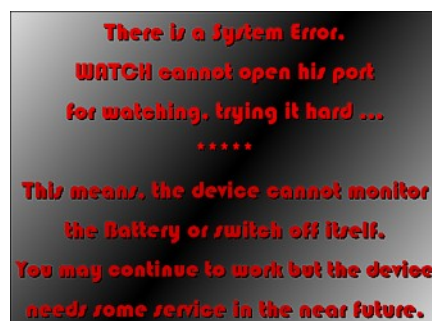


Illustration 10.3: Internal Hardware Error

Message 10.4 appears if the battery is low because of a long operating time with the device and not enough voltage is available. You should power off the device and charge the external power supply as soon as possible. If you continue operating with the device it could be possible that data gets lost.



Illustration 10.4: The external power supply has to be charged

Because there is a PC module integrated in the device you have to shutdown it like a normal computer. Therefore you have to use option "Exit" from the main menu. The message like in figure 10.5 remind you to wait until the device powered off by itself.

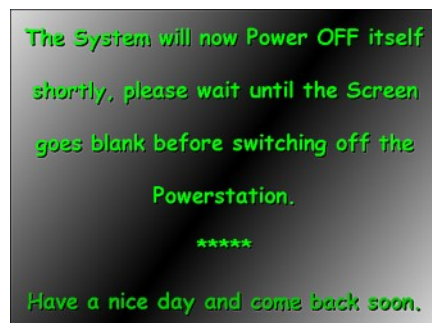


Illustration 10.5: Shutting down the system

If the device itself is not able to power off, a message like in figure 10.6 is shown. In this case you simply power off your external power supply.

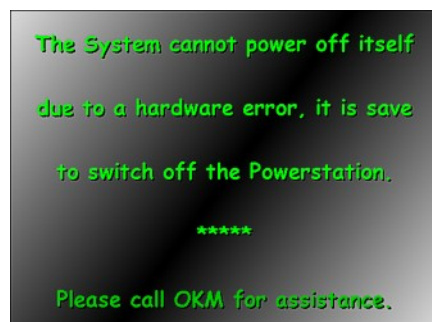


Illustration 10.6: Shutting down the system is not possible