

FS Future Serie®

Localizer 3000

User's manual

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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 Localizer 3000 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 seplchers or buried objects such as pipes, tanks, boxes or suchlike.

The Localizer 3000 is able to locate, to document and to analyse 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 usefull complement to these methods. The Localizer 3000 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 hugh number of factors - like you know. Determining factors are the dielectricity constant of the ground, the grade of mineralisation 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 utilisation and operation of this Localizer 3000.

2 Important Notes

Please read these operating instructions carefully and closely before using *Localizer 3000* and its accessories! These instructions give information on how to use the device and point out potential sources of danger.

Localizer 3000 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!

2.1 General Notes

Being an electronic device, *Localizer 3000* 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.

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.

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.

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.

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 to low,
- the cables you are using are to long,
- other electronic devices sends out disturbances or
- atmospherics occurs (lightnings, ...).

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)	430mm x 380mm x 190mm
Weight	about 3kg
Voltage	9.6 - 14.4 VDC 22W maximal
Safety class	IP40
Operating Time (Full Charged Battery, Delivered Power Supply, 25°C)	about 3 hours
Operating Temperature	0°C - 40°C
Display	300mcd Background lighting 6.4" Diagonale 640 x 480 Pixel TFT Color
Computer	300 MHz Processor INTEL i586- compatible
Working Memory	64 MB RAM
Data Memory	128 MB
Feedback	accoustic, visual

Table 1: Technical Specifications (Control Unit)

3.2 Data Transmission

Technology	USB
Maximal Data Transmission Rate	19200 Baud

Table 2: Technical Specifications (Data Transmission)

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
COM-Port (Data Transmission)	USB
Free Memory	minimum 20 MB
Working Memory (RAM)	minimum 128 MB
Grafic Card	minimum 64 MB, OpenGL-compatible
Operating System	Windows 98SE, Me, 2000, XP

Table 3: Technial Specifications (Computer, Minimum Requirements)

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.

- 1 Control Unit
- 1 External Power Supply with Cable
- 1 Charger for External Power Supply
- 1 Headphones
- 1 Manual
- 1 Carrying Case
- 1 3D Software (Visualizer 3D)
- 1 USB Connection Cable
- 2 Differential Sensors

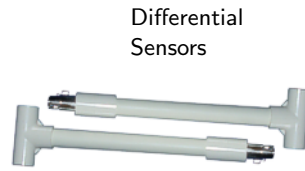
- 1 Metal Detector [optional]
- 1 Super Sensor [optional]

Table 4: Scope of Delivery

Beware that pictures in this manual could be different to delivered parts.



Control Unit



Differential Sensors



Detector for Metal Discrimination



USB Connection Cable



Headphones



Charger for External Power Supply



External Power Supply
incl. Cable

Figure 1: Scope of Delivery

5 Assembly

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

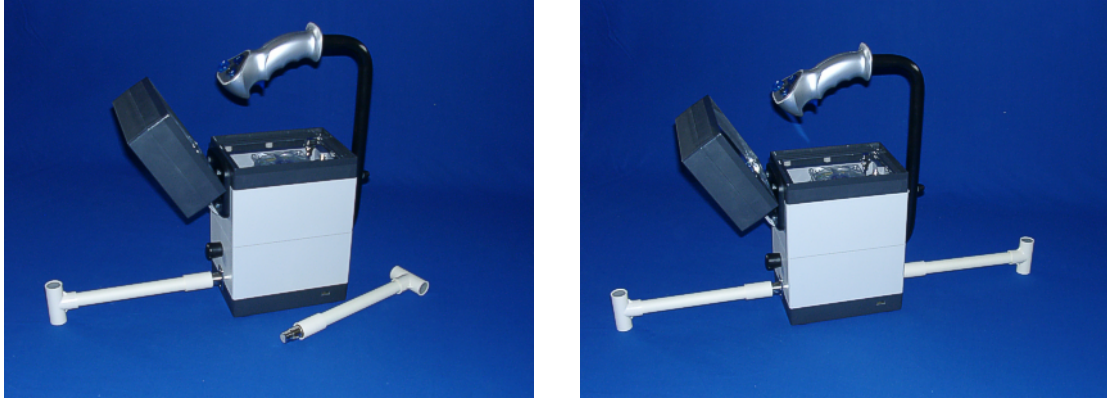


Figure 2: Assembly and Connection of the Probes

Figure 2 shows how to assemble the differential probes to the device. Therefore just put the probe into the appropriate attachment on the main unit. Then connect the probe cable to the control unit. Do it without any unnecessary application of force!



Figure 3: Connection of External Power Supply

Figure 3 shows how to connect the external power supply with the device. The cable is placed inside a storage case on the back side of the battery and is wired to this power supply. While connecting the external power supply take care to connect at first the cable with the control unit. The external power supply has to be powered on afterwards.



Figure 4: Connection of the USB Cable

Figure 4 shows how to plug in the USB connection cable to the computer. Further information about the use and installation of the USB driver you can find in section 6 on page 16.



Figure 5: Connection of Detector and Super Sensor

In figure 5 it is represented how to connect the Detector and the Super Sensor to the device. Do it without any unnecessary application of force!

6 Installation of Device Driver

Before you can transfer data from the device to your computer you have to install the USB driver. Therefore you have to connect the active computer and the control unit via the USB connection cable. When you switch on the power supply a message like in figure 6 will appear on your computer screen.



Figure 6: Installation of Device Driver: Step 1

If you prosecute Windows XP with Service Pack 2, you will be asked in dialog from figure 7 if Windows Update has to search for drivers up to date. Mark entry *No, not this time* and click on *Next*.

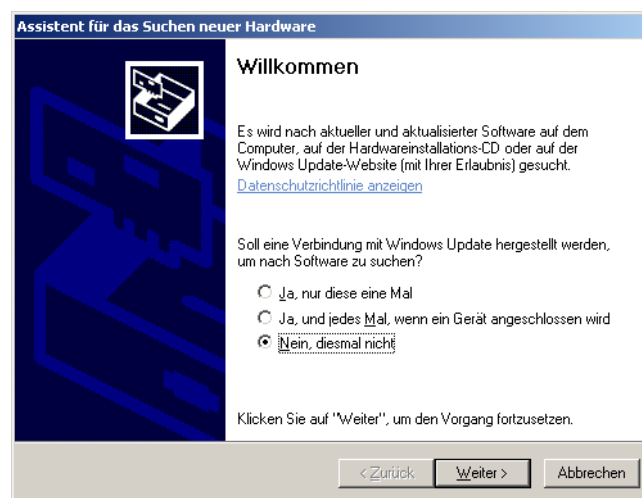


Figure 7: Installation of Device Driver: Step 2

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

In the following dialog window like figure 8 select the entry *Install software from a list ...* and click on button *Next*.

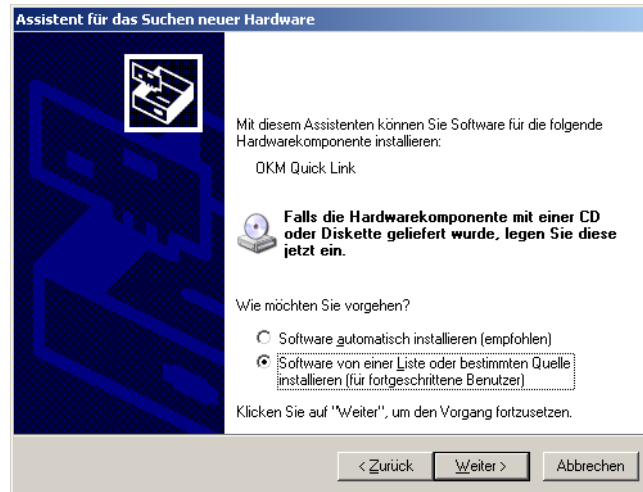


Figure 8: Installation of Device Driver: Step 3

In the next dialog window from figure 9 mark the entry *No search, select driver individually* and click on *Next*.

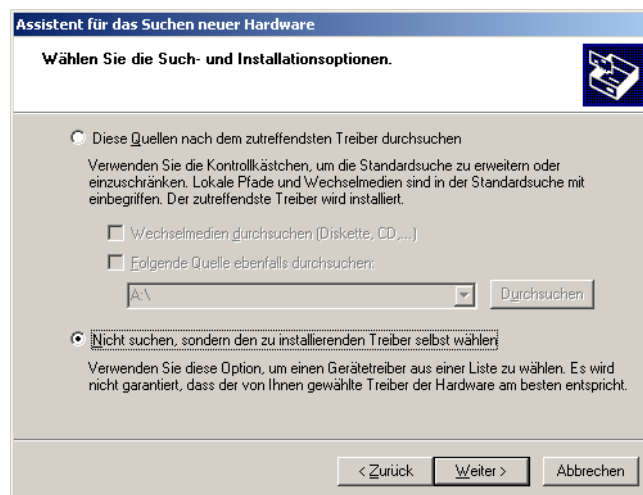


Figure 9: Installation of Device Driver: Step 4

Another window will open, represented in figure 10, 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.

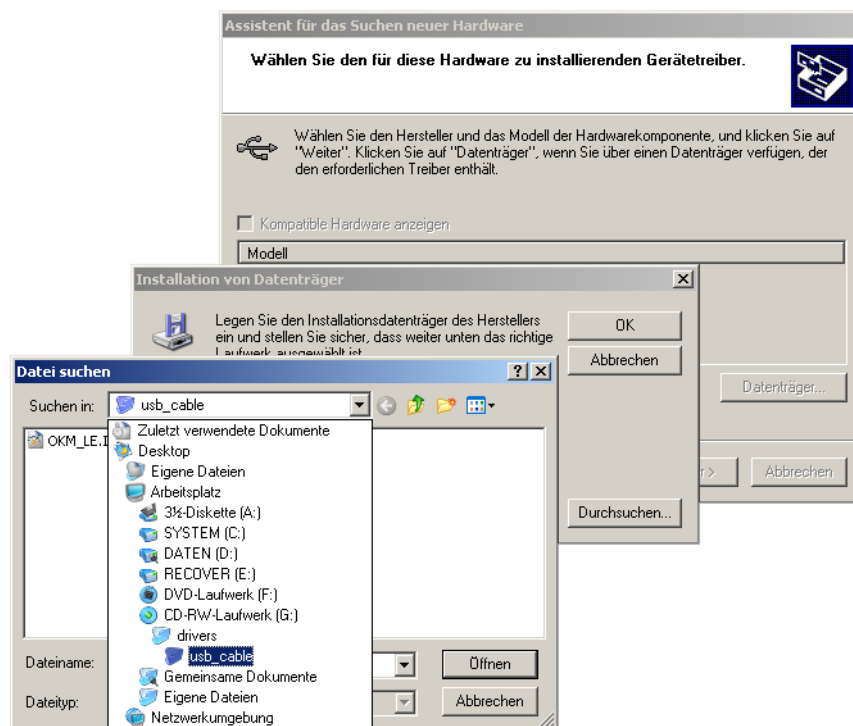


Figure 10: Installation of Device Driver: Step 5

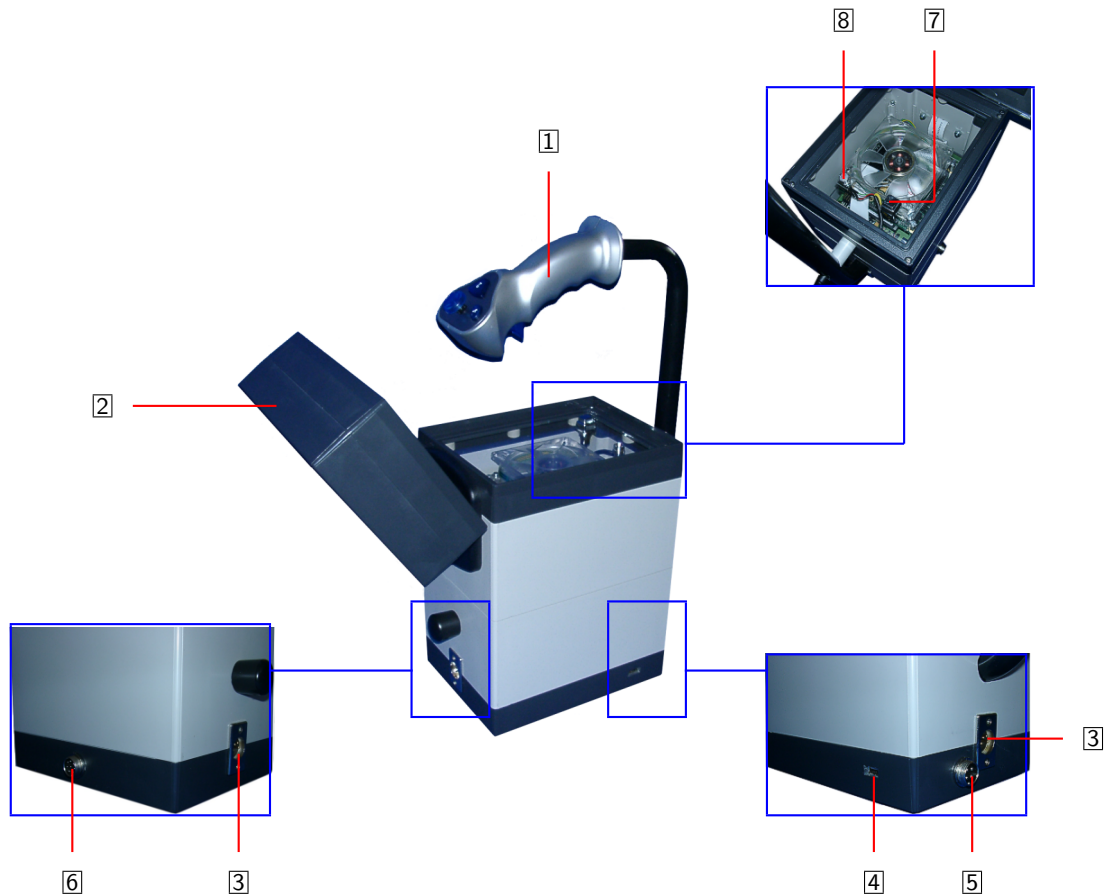
After successful installation of the driver a message like in figure 11 will appear on your computer screen. Now the drivers of your device are installed and you can transfer data to your PC.



Figure 11: Installation of Device Driver: Step 6

7 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.



- | | | | | | |
|---|----------------------------------|---|-------------------------------------|---|-----------------|
| 1 | Control Handle | 4 | Connection of Data Cable | 7 | Power On Button |
| 2 | Monitor | 5 | Connection of Power Supply | 8 | Voltage Lamp |
| 3 | Connection of Differential Probe | 6 | Connection of Detector/Super Sensor | | |

Figure 12: Side View

With the Control Handle the Localizer 3000 can be operated. Further information you can find in section 7.1, where all control elements of the joystick are explained in detail.

In the Connection of Differential Probes a Differential Probe can be plugged in. Beware that these probes are optional accessories and has to be purchased separately.

The Connection of Data Cable is used to plug in the data cable to transfer measured data to your

pc. This cable is delivered together with the software and is also optional accessory.

The Connection of Power Supply the external power supply has to be connected. Please take care that the power supply is full charged before usage.

In the Connection of Detector/Super Sensor either the detector or the super sensor can be connected. Beware that these parts are optional devices and has to be purchased separately. The super sensor can only be connected to newer models¹.

With the Power On Button you can switch on the device.

The Voltage Lamp is shining as soon as the device is powered on. Depending on the current state of charge of the external power supply the lamp will shine green (full charged), orange or red (nearly empty).

7.1 Control Handle (Joystick)

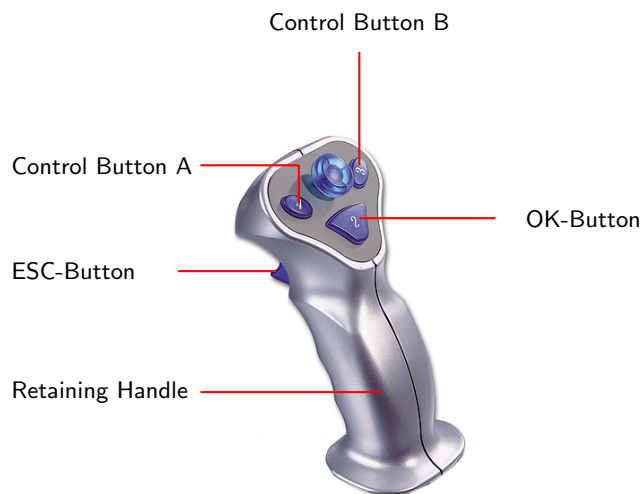


Figure 13: Control Elements of the Control Handle

The Control Button A and Control Button B are used to navigate through the menus. The Control Button A is used to switch to the previous menu option. Control Button B is used to go to the next menu option.

The OK-Button is used to confirm the selected option. With the ESC-Button you can finish the current operation process. During execution of certain operations the buttons can have other functions. Additional information you can find in the corresponding subsections.

¹Only if the menu to select the connected antennas is included in your device where you can select the super sensor than you can use it.

8 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.

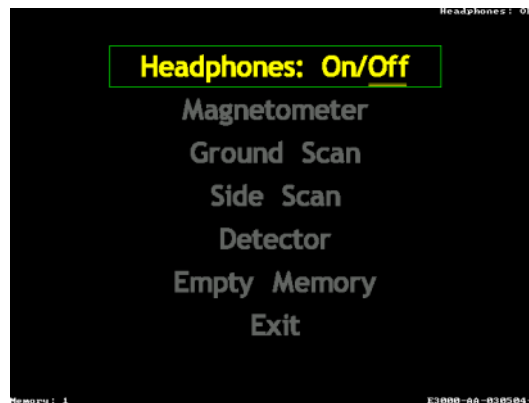


Figure 14: Main Menu

You can select the operating mode in the main menu of the device like represented in figure 14. The device possesses the following operating modes:

- **Headphone: On/Off**
Activate or deactivate the headphones.
- **Magnetometer**
Research or the underground with the integrated magnetometer.
- **Ground Scan**
Measurement with graphical evaluation, whereby measured data are stored in the internal memory of the device.
- **Side Scan**
Start the measurement with graphical representation in live time mode.
- **Metal Detector**
Activate optional DDV system.
- **Empty Memory**
Delete all measurements stored in the internal memory.
- **Exit**
Power off the device.

8.1 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 a oscilloscope like picture on the monitor if you are placed above an metallic object.

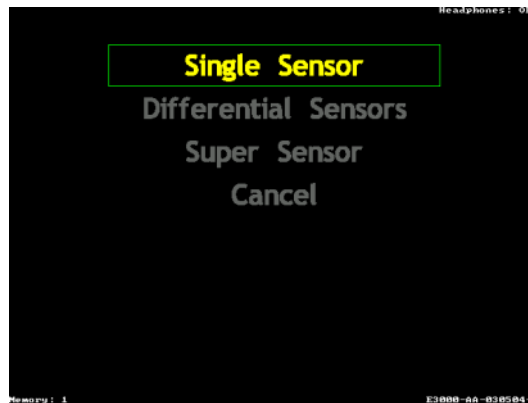


Figure 15: Select Sensor

At first you should select which antenna you want to use for the measurement. Select the corresponding antenna and be sure that this antenna is connected to the device. Figure 15 shows the appendant menu. You have the following options:

- *Single Sensor*
Use integrated single sensor.
- *Differential Sensor*
Use connected optional differential sensors for measurement.
- *Super Sensor*
Use connected optional super sensor.
- *Cancel*
Back to main menu.

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. Figure 16 represents again this Ground Balance.

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 *Activate Operating Mode*, you can initiate a manual soil reconciliation. Therefore you have to start on a place with neutral ground. With Control Button A, Control Button B or ESC-Button you are leaving the magnetometer mode and turn back to the main menu.

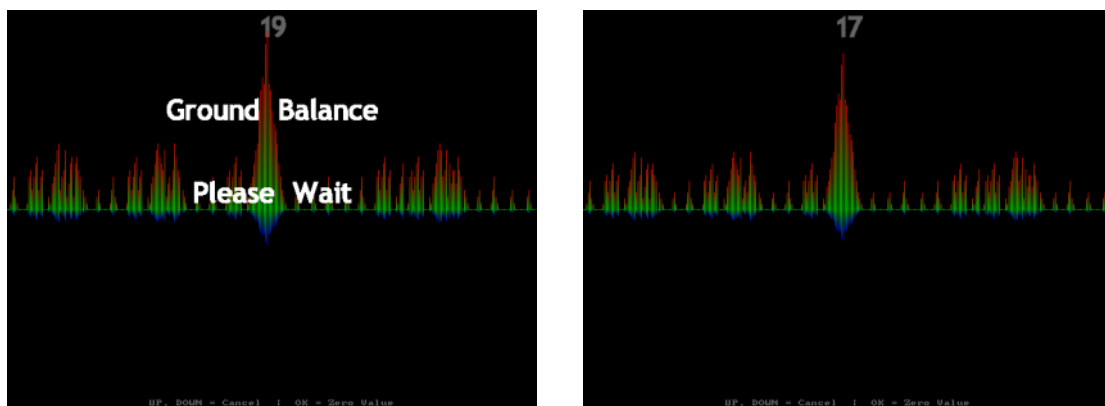


Figure 16: Ground Balance in Magnetometer

8.2 Ground Scan

To get a complete image of the underground you have to use operating mode *Ground Scan*. At first you should select which antenna you want to use for the measurement. Select the corresponding antenna and be sure that this antenna is connected to the device. Figure 15 shows the appendant menu. You have the following options:

- *Single Sensor*
Use integrated single sensor.
- *Differential Sensor*
Use connected optional differential sensors for measurement.
- *Super Sensor*
Use connected optional super sensor.
- *Cancel*
Back to main menu.

After you selected the probe you want to use you have to select the number of impulses measured values per search line. As soon as you confirmed the number of impulses another menu will be shown, where you can select the scan mode. Here you have the following possibilities:

- *Automatic*
The recording of measured values is automatically in regular intervals. You have to scan this area continuously line by line.
- *Manual*
The recording of measured values is made manually. You can decide by yourself when the measurement should start. Therefore you can use the OK Button on the Joystick.
- *Cancel*
With this option you will get back to the main menu.

Then you will be asked if you want to start the measurement. Select *Yes* and confirm by pressing the OK Button. 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 the program is waiting until you are ready to start the next scan line, see figure 17 on the left side.

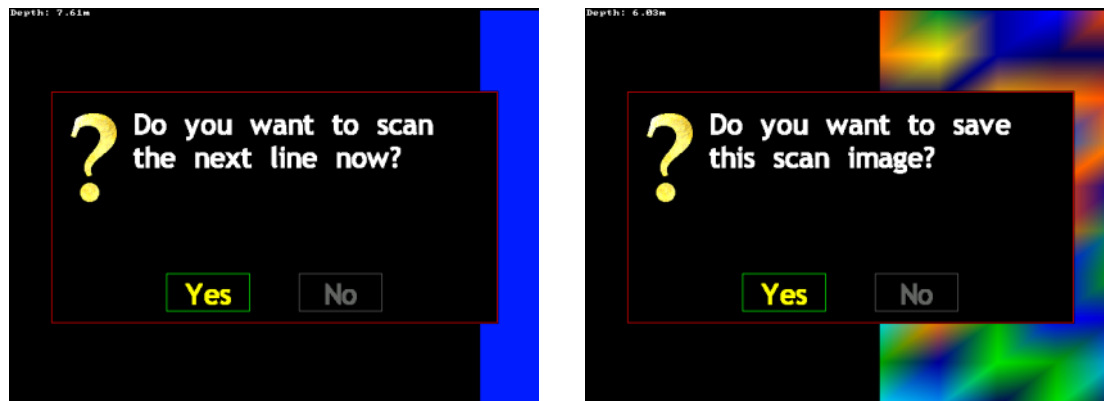


Figure 17: Graphical Representation of a Measurement in Ground Scan

When the measured area is completely scanned and you want to finish the measurement please select *No* in the appropriate dialog. Another window will be displayed where you will be asked if you want to save this measurement, like represented in figure 17 on the right side. If you decide to save this measurement you have the possibility to transfer this image later to a connected pc with the optional software program.

You can store as much measurements as you want in operating mode *Ground Scan* without overwriting your previous measurements. Every new measurement will be stored separately in the internal memory. The number of all stored measurements inside the device you can see on the lower left side of the screen in the main menu.

8.3 Side Scan

The data which is determined in mode *Side Scan* is volatile and can not be stored. With this operating mode the current ground conditions are represented as a live picture. So unknown areas can be explored fast and efficient on possible metal deposits.

If a possible object has been located you should do some further measurements by using operating mode *Ground Scan*, to determine the exact position and situation of the object. Please read therefore section 11.2 on page 35!

8.4 Detector

To use this operating mode you have to connect the optional DDV system to the control unit. The detector is most suitable to localize small metal objects (like coins) which are placed near to the surface.

With the detector you have the possibility to check possible finds on their type of material. So for example you can find out if an object is composed of gold, silver or iron.

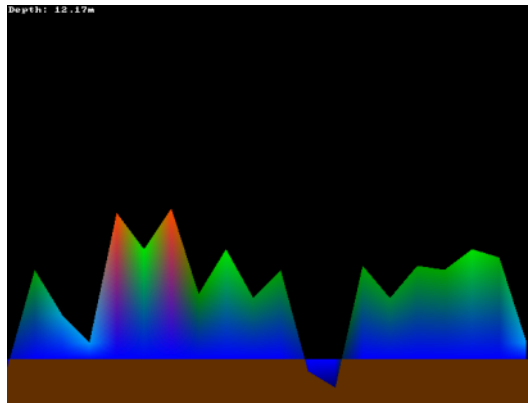


Figure 18: Graphical Representation of Side Scan

Detailed information about the utilisation of the detector and the related discrimination you can find in section 9.1 on page 26 and in section 10 on page 31 of this manual!

8.5 Empty Memory

The operating mode *Empty Memory* is used to delete all data which are stored in the internal memory of the device. If you confirm this option you will be asked again if you really want to delete all data. If you confirm now by pressing *Yes* all data will be deleted and cannot be rebuilt or transferred to a computer.

8.6 Exit

Select option *Exit* to finish operating with the device. As soon as you confirm this option the integrated PC module will shut down and the device will power off.

9 Optional Devices

In this section you can find important notes about all available optional accessories.

9.1 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.

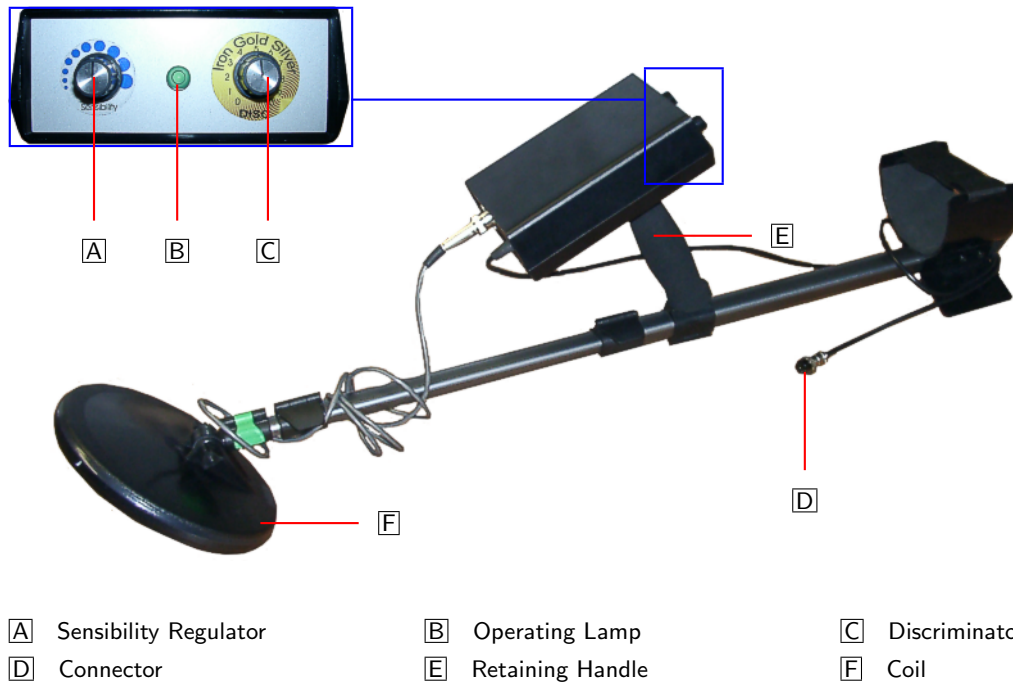


Figure 19: Control Elements of the Detector

To use the DDV System just plug in the connector [D] into the Connection for Probe of the control unit. 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 9.1.3 on page 29!

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.

9.1.1 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 Localizer 3000 . 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 20. Take care that no metal is situated near to the coil probe **F**! Press the key *OK*, to start the calibration.

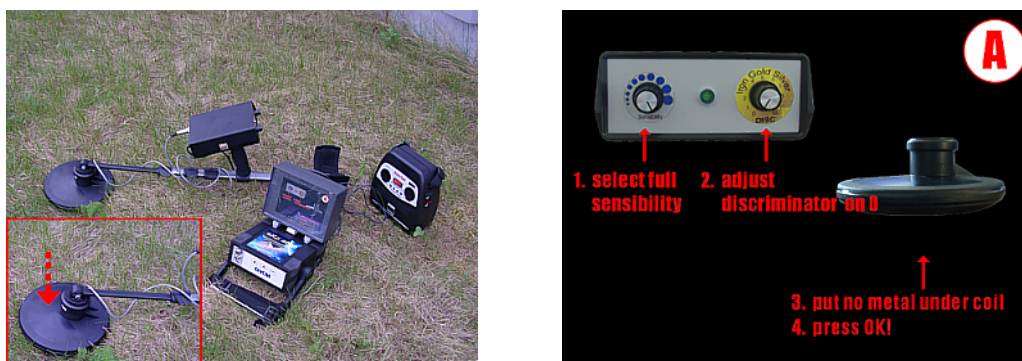


Figure 20: Calibration of the DDV system, step 1

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

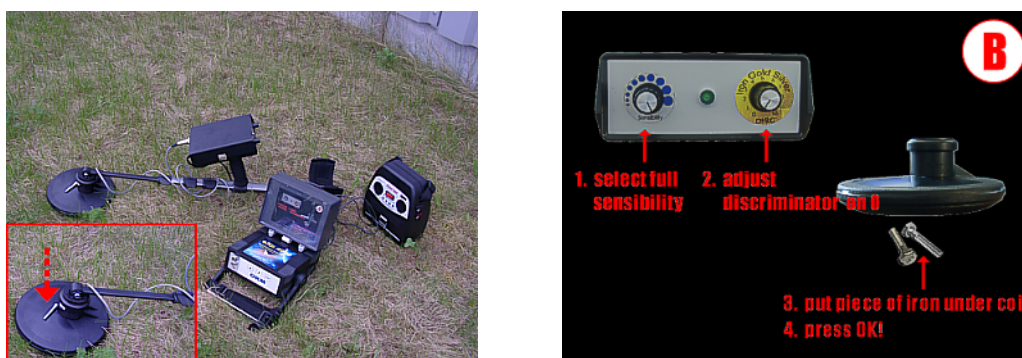


Figure 21: Calibration of the DDV system, step 2

In the second step of calibration you have to leave the regulator in the same position and place a piece of iron (e.g. screw or nail) under the detector coil. Alternative choice is to place the

metal directly on the top of the coil probe, like you can see in figure 21. 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.

9.1.2 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.



Figure 22: Adjustment of discrimination

In figure 22 the regulator to adjust the discrimination is represented. This regulator can filter certain materials. Table 5 explains the adjustment in the case of normal ground conditions².

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

Table 5: 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:

²The indications from table5 concern the use in normal type of soil. In extreme conditions (mineralisation, salt deposits, ...) they can vary from this normal value.

- 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.

9.1.3 Ground Balance

A correct soil reconciliation 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 Localizer 3000 and connect the DDV System.
2. Adjust the discriminator \square on the material you like, see previous section.
3. Put the device with coil \square 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 \square directly above the ground.
- During the confirmation of the operating mode *Metal Detector* you are holding the coil \square to high and then minimize the distance to the ground.
- You are turning the discriminator \square during ground balance.

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

9.2 Super Sensor

The Super Sensor is a high-resolution sensor which can be connected optional to the Connection of Detector/Super Sensor of the Localizer main unit. With this sensor the device is able to locate objects and cavities until a depth of 25m. You can work with the Super Sensor in the following operating modes:

- Magnetometer
- Ground Scan
- Side Scan

When you selected one of the mentioned operating modes you have to select the *Super Sensor* as probe in the next step. Now you can operate the device as usual.

Hold the Super Sensor perpendicular to the ground, so that the cable is placed on the upper side of the probe. Try to avoid unnecessary turning of the probe. The distance to the ground should be as small as possible (usually about 5 – 10cm) and should stay constantly. The probe should not be moved up or down unnecessarily during the measurement.

10 Discrimination

In this section the regulation of the discrimination and the soil reconciliation is explained.

10.1 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.



Figure 23: Adjustment of discrimination

In figure 23 the regulator to adjust the discrimination is represented. This regulator can filter certain materials. Table 6 explains the adjustment in the case of normal ground conditions³.

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

Table 6: Standard adjustment of the discrimination

Beware: 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 regulator on gold and start your soil examinations until you reach a place where the detector reacts positive.
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.

³The indications from table6 concern the use in normal type of soil. In extreme conditions (mineralisation, salt deposits, ...) they can vary from this normal value.

- 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 soil reconciliation, which is explained in this following section.

10.2 Soil Reconciliation

A correct soil reconciliation 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 device and wait until the acoustic signal disappears.
2. Adjust the discriminator on the material you like, see previous section.
3. Put the device with coil probe about 5cm above the ground.
4. Select the operating mode you like and confirm.

If you hear an acoustic signal from the metal detector after these indications, then the soil reconciliation 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 with integrated discriminator without holding the probe directly above the ground.
- You are holding the probe during your confirmation of the operating mode with integrated discriminator to high and then minimize the distance to the ground.
- You are turning the regulator for discrimination during soil reconciliation.

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

11 Analysis and Evaluation of Measurements

Before measurement you have to know what kind of objects or cavities you are looking for and if the area you choose is suitable for this. Measurement without a plan will not give you the results you would like. For this reason please consider the following indications:

- What are you looking for (graves, tunnels, buried objects, ...)? This question has its effects on your concrete manner to measure an area. If you are looking for big objects you can enlarge your distance between the measure points (impulses), for small objects use small distances (see section 11.3 on page 36).
- Inform yourself about the area you select for measurement. Is it useful to search at this place? Are there historical indications, which confirm your speculations? What type of soil is on this area? Are there good conditions for data recording?
- Your first measurement in a unknown area has to be large enough to get representative values (f. ex. 20 impulses, 20 search lines).
- 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 centre 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.
- There should not be more than one object in a graphic. This will influence the exactness of depth measurement.
- You should do at least two control scans to get sure about your results. So you also can recognize and isolate mineralized ground (see section 11.1 on page 33).

11.1 Metal or Mineralisation

At the beginning it is not always easy to make a difference between real objects and mineralized ground. In principle metals are represented in red color, but mineralized accumulations can also include red signals.

Here some advice how you can differentiate between a real object and a mineralisation:

- **Form**
If the object represented in your graphic has a special form (f. ex. rectangle, circle, ...), you can conclude of a possible real found.
- **Color**
If there are many yellow and orange color values around the object, it will be probably a mineralisation.
- **Depth**
With a small depth of about 0,10m or 0,40m there is a high possibility that there is only a mineralisation of the ground.

- **Color Filter**

If position and form of the object are changing with the use of the color filter it is probably a mineralisation.

- **Control Scan**

If position, depth and form of the object stay nearly the same, also in further control scans you can conclude of a real object. Also if some graphics look similiar you always have to compare all indications.

Figure 24 shows a real object (left side) and a mineralized accumulation (right).

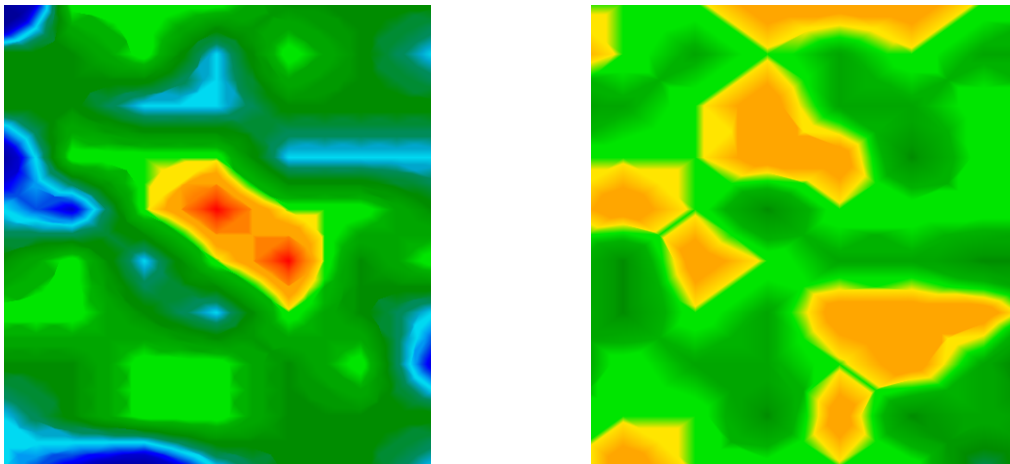


Figure 24: Comparison of object and mineral

11.2 General Procedure

The main rule for scanning an area is:

**The more exactly you scan an area
the better will be your graphical evaluation.**

You have to scan in a given manner that the software can calculate the measured values in the right way. Your device has following possibilities:

- **Zig-Zag**

Figure 25 shows all different ways of scanning in a scheme. The measurement starts at your starting point ① and ends at point ②.

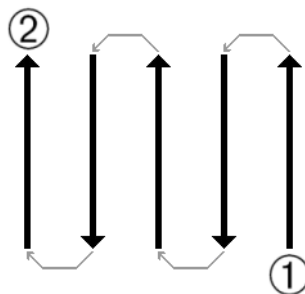


Figure 25: Given manner

If you have finished one scan line, the next line has to be on the *left* side. Do not change the direction of your probe.

The more you repeat your scanning above a possible object (control scans), the better you can decide afterwards if it is a real object or not. Temperature, other radio transmission, sun energy, mineralisation of the ground, loam, salt, water, etc. can influence negatively the measure results.

Before you start to dig, take your time to do some control scans. Repeat exactly the same scan about 3 - 5 times, to be sure about your results. Only if all these graphics have almost the same values you can be sure about your results.

Figure 26 is a graphical representation of a measured area. The blue rectangle marks a possible object in the ground.

To be absolutely sure that there is an object in the ground you have to do a control scan. Measure exactly the same area, same starting point and the same number of impulses and lines. Take also the same distance between the measure points. Figure 27 and 28 shows two possible measurements.

It is easy to recognize that the control scan in figure 27 is totally different from the first measurement in figure 26. This means only a mineralisation of the ground, not a concrete metallic object.

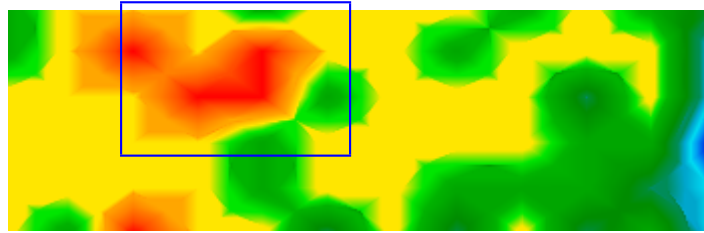


Figure 26: First measurement of an area

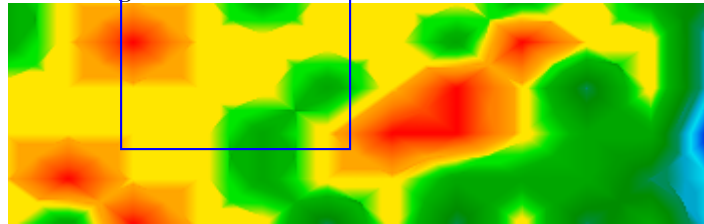


Figure 27: Control scan, Variant A

Even if the control scan in figure 28 is not exactly the same to the first one, you can see that the blue marked parts show nearly the same values. This is a reference for the existence of an object.

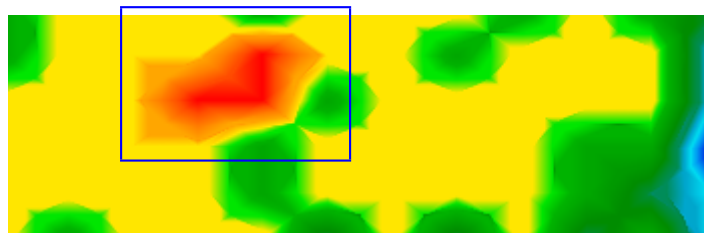


Figure 28: Control scan, Variant B

Before you can determine the depth of the detected object you have to scan a further image. It only should cover the blue marked area. All other metals and mineralized ground should be ignored because it would disturb the measurement. After this you can determine the correct depth.

11.3 Regulation of the Number of Impulses

There is no special rule for the 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.

The optimal distance between two impulses is about 20cm until 30cm. The smaller the distance between two impulses is the more exactly will be the graphical representation. If you are looking

for small objects you have to select a small distance, for big objects you can increase the distance between each impulse.

Figure 29 shows the effects of the distance and the number of impulses per scan line for some objects.

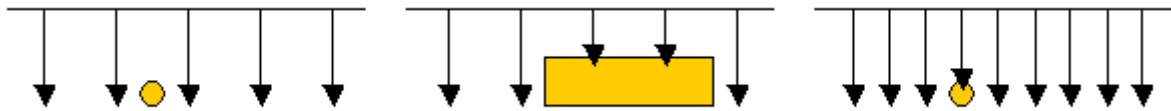


Figure 29: Effect of number of impulses and their distance

Figure 30 shows the difference between very few impulses (left side) and much more impulses on the same scan line length (right side). The second record (right side) shows much more details and also smaller objects can be seen.

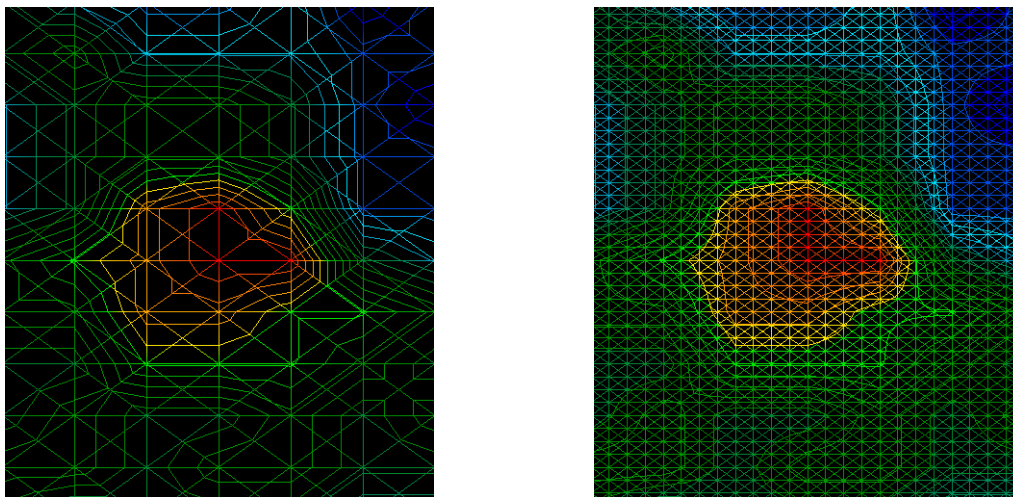


Figure 30: Comparison of small and high number of impulses

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 relatively fast a large area and afterwards you can record the interesting subsection.

Further information about the graphical analysis you can find in the appropriate software manual.

12 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 colour 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.

13 Error Messages

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

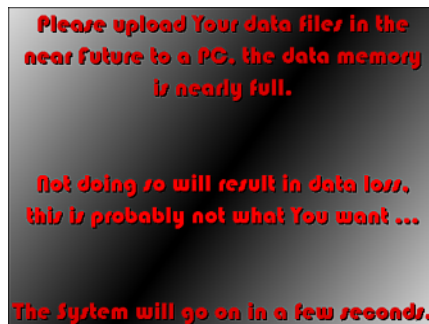


Figure 31: Only a small amount of memory available

Because every scan in the operating mode *Ground Scan* will be stored in the internal memory of course the memory place will decrease over time. As soon as the free memory cell is less than 20% the following message like in figure 31 will appear.

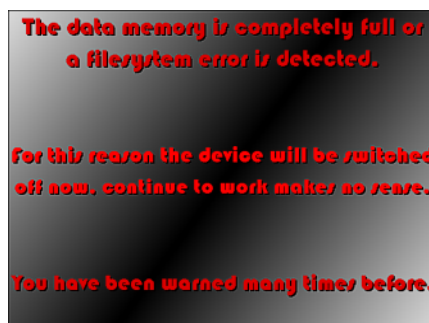


Figure 32: No free memory available

If there is no more free memory available you will see a message like in figure 32. You can create more memory space if you transfer all stored data with optional software to your computer or if you select option *Empty Memory* to delete all stored data without having transferred them to your computer.

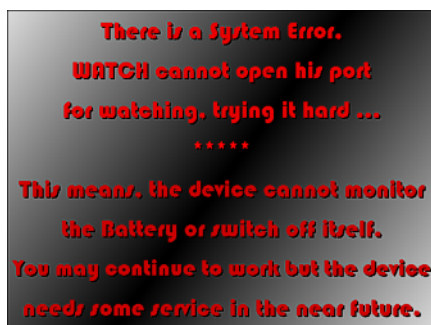


Figure 33: Internal Hardware Error

If message 33 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. Ask your dealer for further help.

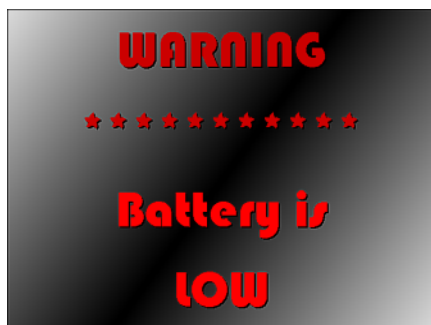


Figure 34: The external power supply has to be charged

Message 34 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 can get lost.

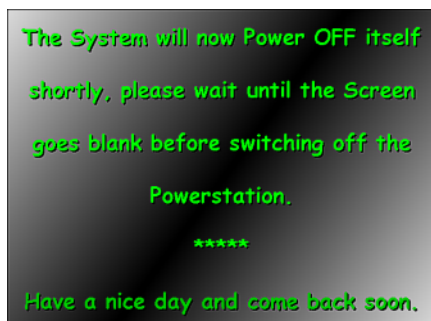


Figure 35: Shutting down the system

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 following message like in figure 35 remind you to wait until the device powered off by itself.

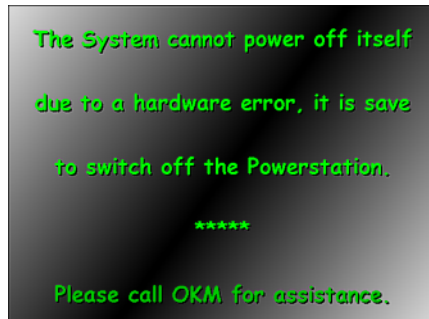


Figure 36: Shutting down the system is not possible

If the device itself is not able to power off, a message like in figure 36 is shown. In this case you simply power off your external power supply.

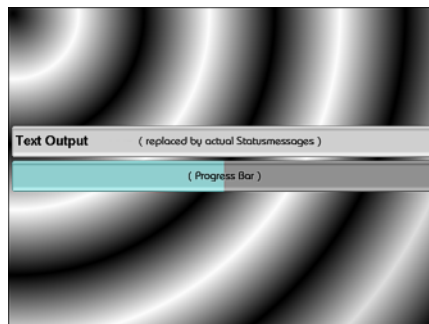


Figure 37: Progress of Data Transmission

If you transfer data from the device to your computer you can see how many of the files are already transferred. Figure 37 shows the progress of data transmission.

14 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.

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