



# **PRORADAR X1PRO**

## **USER MANUAL**

Dear Customer; we would like to thank you for preferring the products of **DRS**. We strongly recommend you to read this user manual carefully in order to understand how the products operate and to test them in order to gain experience. This is a scientific and electronic device and the user must comply with all instructions in the user manual.

We would like to wish you best for your works.

## **CAUTION! PLEASE READ THIS MANUAL BEFORE USING THE PRODUCTS.**

The information herein can be changed at any time without prior notice.

This user manual cannot be duplicated, distributed and copied without prior consent of DRS Electronics.

### **General Information**

**DRS** products must be used carefully as all other electronic devices. Attention must be paid on scanning heads, main unit and scan sensor, they must be protected against impacts and tough objects and no excessive power must be applied to connectors.

### **Injury**

If DRS products are operated properly, they don't cause any injury and health problem. DRS products do not cause any threat to the human body. As in all other electronic devices, DRS products must be kept away from children too. Please pay attention that resistivity scanning probes do not contact with your body during the scan.

Ensure that all precautions are taken against any risk. Do not use your device during the rain or when the ground is extremely wet.

Open your device after being sure that probes are fixed to the ground and cable clips are installed properly. Probes must never touch each other and must not be touched when the device is open. More than half length of the probes must be driven to the ground.

Be sure that main unit battery of the device is fully charged before the scan. Insufficient battery may cause you to be mistaken. Probes should be cleaned with a damp cloth at the end of scan.

**CAUTION! SCANNING PROBES HAVE 110 V POWER. DON'T TOUCH SCANNING PROBES DURING THE SCAN AND WHILE CABLES ARE CONNECTED.**

### **Repairing**

All repairs arising out of technical problems are free of charge for a period of two (2) years as of the date you purchased the product. Please consult to your vendor for service requests or questions about the product. The unit is examined and, if necessary, repaired by a qualified technician. All repairs after two years are charged.

**In case you damage the product or open its box, the warranty shall be void.**

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# 1 - ASSEMBLY

## 2 - PREPARATION OF PC SOFTWARE FOR RECEIVING THE DATA

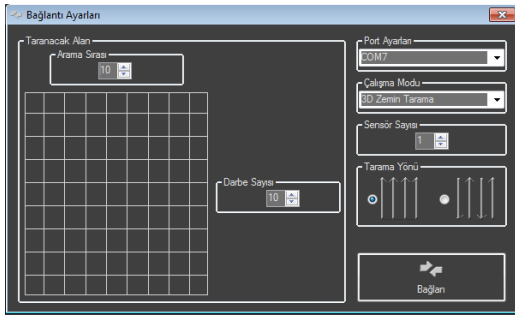
Please open 3D GROUND MONITORING software, installed in your Tablet PC.



Please click Program Connection Settings button.



You will be asked to enter information about the area to be scanned on the displayed window.



### On the Area to be Scanned:

**Scanning Order** = You must enter the number of lines to be scanned.

**No. of Hits** = Please enter the number of sampling (no. of steps on the device screen). You must enter the number, based on the size of area to be scanned.

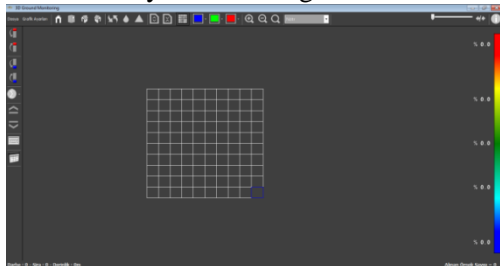
**Port Setting** = Select the port to be connected with the device via Bluetooth.

**Operation Mode** = You can make selection among 3D Ground Scan, Horizontal Live Scan, Vertical Live Scan and Resistivity options.

**No. of Sensors** = You must make selection according to the sensor you use as Scanning Sensor.

**Scanning Direction** = Select the scanning direction as PARALLEL or ZIGZAG at your discretion.

Click CONNECT option after making all selections. Following screen will appear when device is connected. Program will wait as ready for scanning.

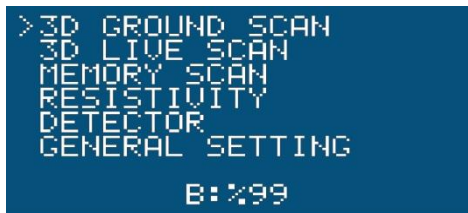


The squares on this screen are prepared according to the number of hits and scans that you selected. Each square is equal to a signal.

Select the operation mode on the device's main menu. Connection settings must be same in order to scan in automatic, manual, live graphic and resistivity modes.

### 3- OPERATION MODES

Main menu of PRORADAR Series products is shown below. You can begin scanning with PRORADAR Series, which have different operation modes, by selecting the operation mode on the main menu.



**LONG RANGE MODE:** Inside 500 square meter area you can calibrate metal or Cavity.

**3D GROUND SCAN :** 3D Ground Scan Modes concurrent with PC.

**3D LIVE SCAN :** 3D Live Scan Modes concurrent with PC.

**MEMORY SCAN :** Memory saving function and transferring the data in the memory to PC.

**RESISTIVITY :** Underground resistivity measurement mode.

**DETECTOR :** Surface magnetic metal detection mode.

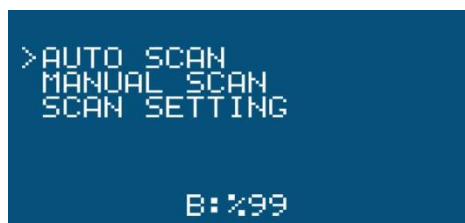
**GENERAL SETTING:** General settings menu of device's main menu.

**LONG RANGE MODE:** Inside 500 square meter area you can calibrate metal or Cavity.

Select the operation mode that you want by using the direction keys of wireless controller and then press OK button.

#### 3.1 3D GROUND SCAN

You can perform automatic or manual scan concurrently with PC in 3D Ground Scan menu. You must select the number of signals, number of lines and signal time range from SCAN SETTINGS before automatic or manual scan.

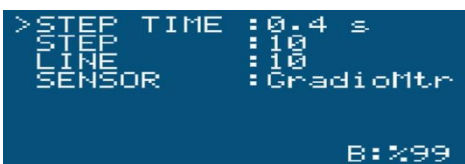


**AUTO SCAN :** Automatic 3D Ground Scan Mode

**MANUAL SCAN :** Manual 3D Ground Scan Mode

**SCAN SETTING :** Scan Settings

##### 3.1.1 SCAN SETTINGS



You must make pre-scan settings from SCAN SETTINGS menu under 3D Ground Scan menu.

**STEP TIME :** Enter the signal time range (step time) for Automatic 3D Ground Scan mode.

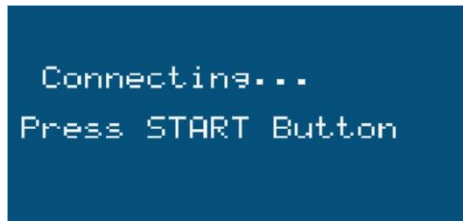
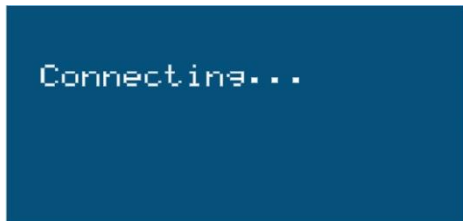
**STEP** : Enter the number of signals for each line in 3D Ground Scan mode

**LINE** : Enter the number of lines to be scanned in 3D Ground Scan mode.

**SENSOR** : Your device has intelligent sensor recognition features. It can automatically recognizes the installed sensor and adjusts the data output accordingly.

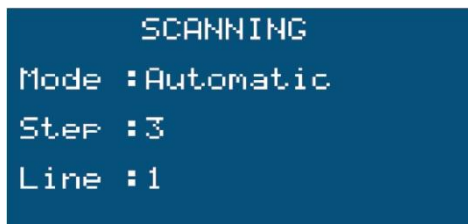
### 3.1.2 3D AUTOMATIC GROUND SCAN

This is a 3D Ground Scan mode, in which signals are sent automatically. You had to set step time in advance. The device scans automatically according to signal time range, no. of signal steps and scan line order that you have selected and begins data transfer to PC. Change your mode to AUTO SCAN and press OK button to start scanning. PC connection screen will appear and you will be asked to press START button. **You must make PC connection settings and connect PC with your device before each scan.**



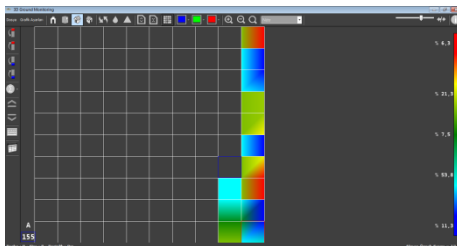
Press START button on wireless connector.

When you press START button, automatic data transfer screen will appear and data transfer will begin.

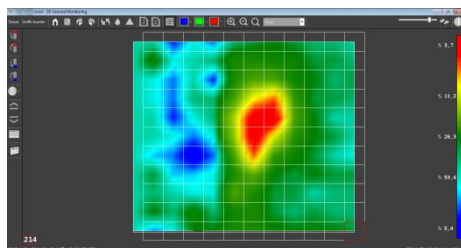


Data transfer will automatically begin. When the number of signals (steps) that you selected is reached, the device will stop and ask you to press START button again. You must do this every time the number of signals is reached.

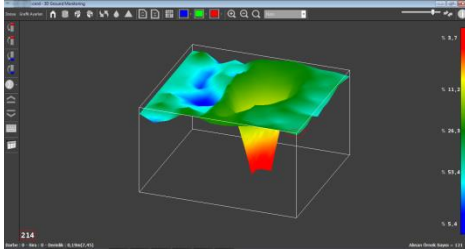
The data will be retrieved as grids as shown below. Data retrieval will stop when the number of lines and hits that you have already entered is reached and all squares are filled with graphics. Then our program will automatically convert them to 3D.



Graphics will initially be retrieved in grid format.



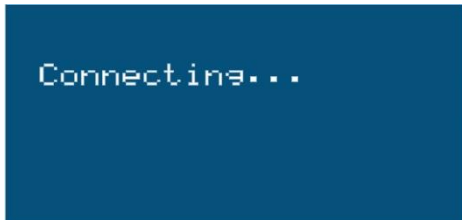
When data transfer is completed, the software will convert graphics to 3D automatically. Please see the following picture for details.



You can examine the data in 3D when you stop data transfer.

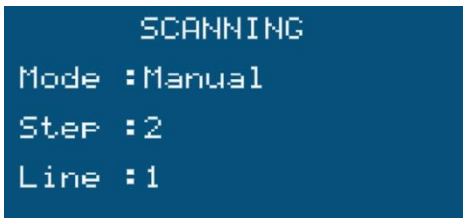
### 3.1.3 3D MANUAL GROUND SCAN

This is a 3D Ground Scan mode, in which signals are sent manually. The device will transfer data as you press START button. The device scans manually according to the no. of signal steps and scan line order that you have selected and begins data transfer to PC. Change your mode to MANUAL SCAN and press OK button to start scanning. PC connection screen will appear and you will be asked to press START button. **You must make PC connection settings and connect PC with your device before each scan.**



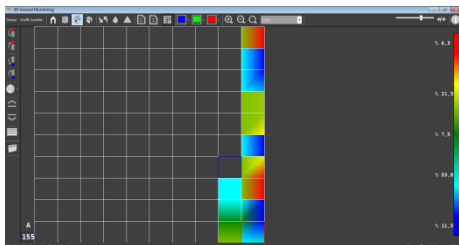
Press START button on wireless connector.

When you press START button, automatic data transfer screen will appear and data transfer will begin.

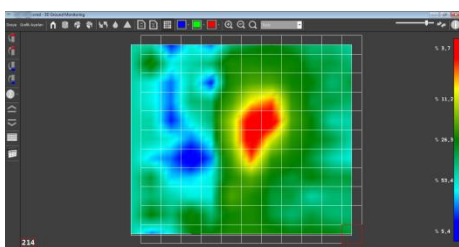


Data transfer will manually begin. You must press START button for every transmission of signal. When the number of signals (steps) that you selected is reached, the device will stop and ask you to press START button again. You must do this every time the number of signals is reached.

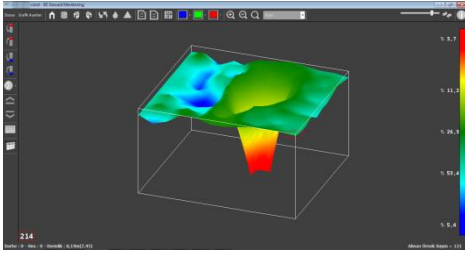
The data will be retrieved as grids as shown below. Data retrieval will stop when the number of lines and hits that you have already entered is reached and all squares are filled with graphics. Then our program will automatically convert them to 3D.



Graphics will initially be retrieved in grid format.



When data transfer is completed, the software will convert graphics to 3D automatically. Please see the following picture for details.

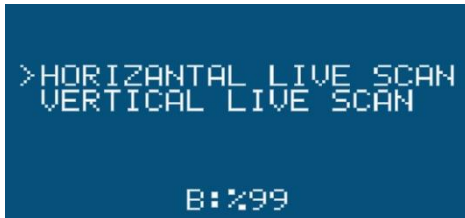


You can examine the data in 3D when you stop data transfer.

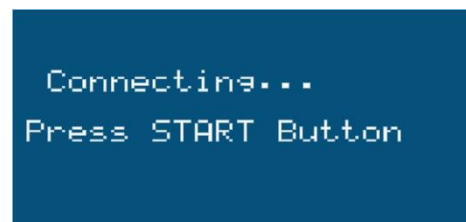
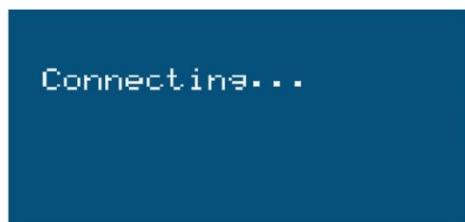
## 3.2 3D LIVE SCAN

You can perform Horizontal or Vertical section scanning automatically in concurrent with PC in 3D Ground Scan menu. You can initiate live graphic mode by selecting Horizontal or Vertical from 3D Live Scan menu.

Select Horizontal or Vertical scan mode. Press OK button on the mode to be selected.

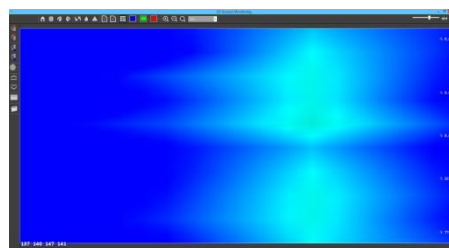
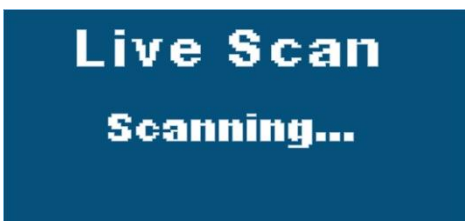


After your selection, PC connection screen will appear and you will be asked to press START button. **You must make PC connection settings and connect PC with your device before each scan.**



Press START button on wireless connector.

When you press START button, automatic data transfer screen will appear and data transfer will begin.





Graphic will continue to be displayed in live scan mode. When you press and hold Back key, the device will return to main menu and graphic transfer will stop.

### 3.3 MEMORY SCAN MODE

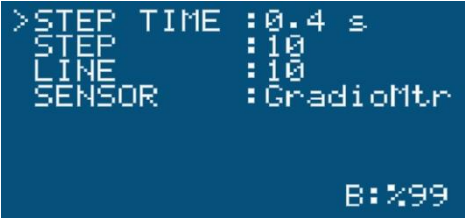
In Memory Scan mode of the device’s main menu, you can save the retrieved data directly to the device’s memory without requiring any PC. You can then transfer these data to PC’s program. Select Memory Scan mode from the device’s main menu in order to use this mode.



- MEMORY SCAN** : You can save the data of 16 different areas to the memory.
- UPLOAD TO PC** : You can transfer the data in the memory to PC.
- ERASE MEMORY** : You can delete the saved data.
- FORMAT MEMORY** : You can delete and format the entire memory.
- SCAN SETTING** : You can select the scan settings.

#### 3.3.1 SCAN SETTINGS

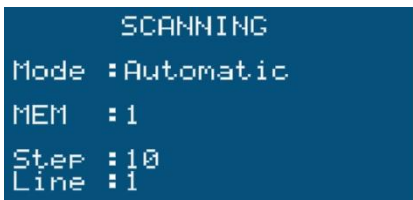
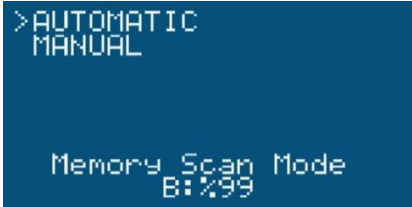
You must make pre-scan settings from SCAN SETTINGS menu under Memory Scan menu.



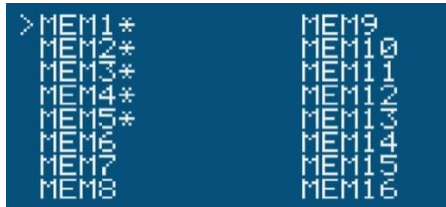
- STEP TIME** : Enter the signal time range (step time) for Automatic 3D Ground Scan mode.
- STEP** : Enter the number of signals for each line in 3D Ground Scan mode.
- LINE** : Enter the number of lines to be scanned in 3D Ground Scan mode.
- SENSOR** : Your device has intelligent sensor recognition features. It can automatically recognizes the installed sensor and adjusts the data output accordingly.

#### 3.3.2 MEMORY SCAN

When you select Memory Scan, the following screen will appear. You will be asked to select any memory you want on this screen. You must select the number of memory that you want the data to be saved and then press OK button. Select either AUTOMATIC or MANUAL scanning option on the memory you selected. Scanning screen will be displayed according to the operation mode that you selected and you must press START button on the joystick in order to start to save the data to one of 16 memories that you selected. You must press START button every time for each signal during memory scan.

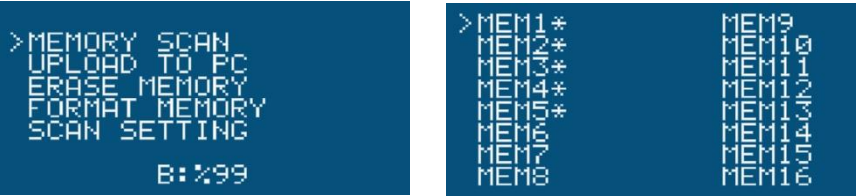


The data that you saved to the memory stays saved in the main memory of the device. There is an asterisk (\*) adjacent to the memory that is full. Please see the following picture for details.

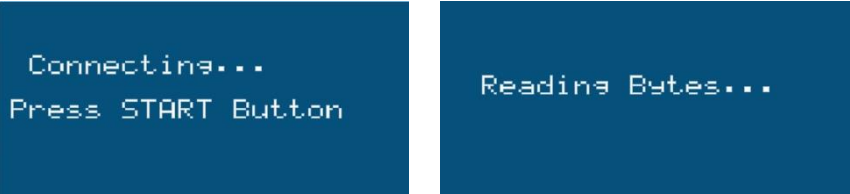


3.3.3 UPLOADING THE DATA IN MEMORY TO PC (UPLOAD TO PC)

You must set your scan settings of PC program as described above in order to upload the data, which you saved to your memory, to PC. After establishing wireless data transfer (Bluetooth) connection between your device and PC, press OK button on wireless controller after selecting UPLOAD TO PC option in MEMORY SCAN menu. You must select the number of memory that you want the data to be transferred and then press OK button. The memory that is full is marked with an asterisk (\*) sign.



When you select the number of memory, the data of which you want to transfer, PC connection screen will be displayed. You should make connection settings and make connection with the device in advance. The data in the memory will be read and transferred to PC after the connection screen.

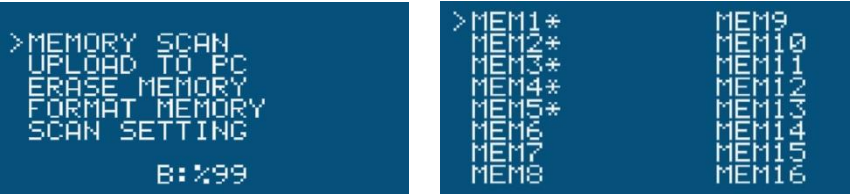


When transfer is completed, a dialog box will be displayed asking whether the erase the memory or not. If you select YES, the memory will be erased. If you select NO, the data will stay at the memory until you erase it.



3.3.4 ERASING THE MEMORY

You must select ERASE MEMORY mode from MEMORY SCAN menu in order erase memories individually. Press OK button on ERASE MEMORY mode. Memory menu will be displayed. The memory that is full is marked with an asterisk (\*) sign. You must select the number of memory that you want to erase and then press OK button.



A warning message, asking whether you want to erase the selected memory or not, will appear. If you select YES, the memory will be erased. If you select NO, the data will stay at the memory until you erase it.

3.3.5 FORMATTING THE MEMORY

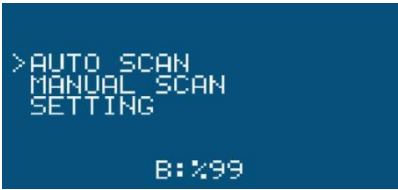
You must select FORMAT MEMORY mode from MEMORY SCAN menu in order erase memories completely. Press OK button on FORMAT MEMORY mode. Memory menu will be displayed. The memory that is full is marked with an asterisk (\*) sign. You must select the number of memory that you want to erase and then press OK button.



A warning message, asking whether you want to erase the selected memory or not, will appear. If you select YES, the memory will be erased. If you select NO, the data will stay at the memory until you erase it.

3.4 RESISTIVITY MODE

Select Resistivity from main menu and press **OK** to work in Resistivity mode. Resistivity menu is as follows:



**START SCAN** : Automatic scan is made. Scan is made between 6 lines in total with 4 probes.

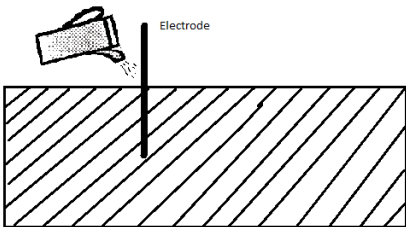
**SETTING** : This menu is used to set resistivity sampling and measurement time.

**MANUAL SCAN** : Use manual scan menu to select the desired line and scan only that

line.

3.4.1 Before Starting to Measure

Check that battery is full. Prepare the probes in advance on the area to be scanned in the form of a square according to your scanning method. Be sure that cable clips are correctly and properly fixed and if the area to be scanned is composed of very dry soil, slightly wet the area, on which the probes will be fixed, before operating the device.



The equipment needed for operation are plastic gloves to protect from electric shock, hammer to drive the probes to the earth, cable pliers to remove probes from earth, screwdriver to replace fuses, white towel to protect panel from sunlight, and measurement tape to determine the distance of probes to each other and their length. These tools will help you during your work.

3.4.2 AUTOMATIC SCAN MODE

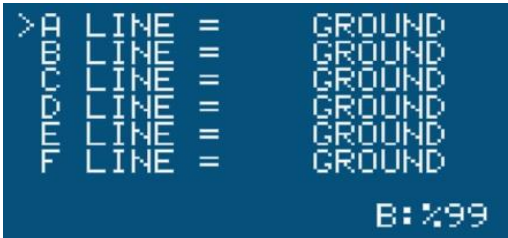
Press OK on START SCAN option of resistivity menu for automatic scan. **DON'T TOUCH PROBES when scan begins.**



When automatic scan begins, respectively **LINE A** ( 1st and 2nd Probes), **LINE B** (2nd and 3rd Probes), **LINE C** (3rd and 4th Probes), **LINE D** (4th and 1st Probes), **LINE E** (1st and 3rd Probes), **LINE F** (4th and 2nd Probes) will scan. The screen to the right hand side will be displayed during the scan. The material found on the scanned area will be displayed on screen in real time and

you can examine it later on Details page.

Details page will be displayed after automatic scan is completed. The Details page shows which material is seen at which line.



If probes are not connected, a message, such as NOT CON. (Not Connected), is displayed.

If you press OK button on the line that you want to examine, you will be directed to the Details page of that line.

The materials defined in resistivity system are listed below.

MATERIAL	OHM	SCALE
SILVER	170-250	610-585
GOLD	250-320	584-575
COPPER	320-400	574-550
IRON	400-650	549-490
MINERAL	650-900	489-440
WATER	900-2K	439-295
SOIL (NORMAL)	2K - 5K	294-105
TUNNEL/GAP/PIT	5K +	105-20

\*Values are given in terms of OHM.

These values may vary, based on mineralization, conductivity, fault, humidity, and temperature level of the soil.

If the device finds any material at any line at the end of automatic scan, it will be displayed after the scan is completed. When you select the line and press OK button, you will be directed to the Details page of that line. You can see different materials in the Details page.

If cable connections are not made or there is any discontinuing cable connection, a message, such as NOT CONNECT, will be displayed.

3.4.3 MANUAL SCAN

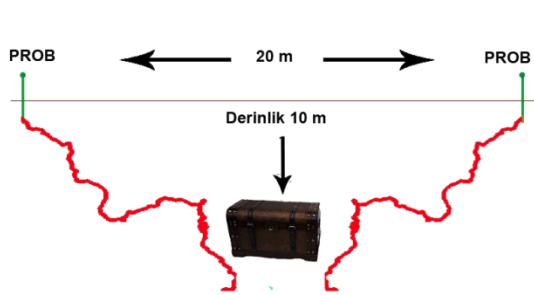
Manual Scan is used only to measure the area between any two selected probes. For example, if you only want to scan LINE A, i.e. between Probes 1 and 2, select SCAN LINE A in Manual Scan. Only the area between the probes that you have selected will be scanned. **CAUTION !! REGARDLESS OF SELECTION OF SCAN A-B-C-D-E-F LINES IN MANUAL SCAN, THE VOLTAGE GENERATED DURING THE SCAN IS VERY HIGH. THEREFORE, PLEASE DON'T TOUCH THE PROBES.**

### 3.4.4 SETTINGS

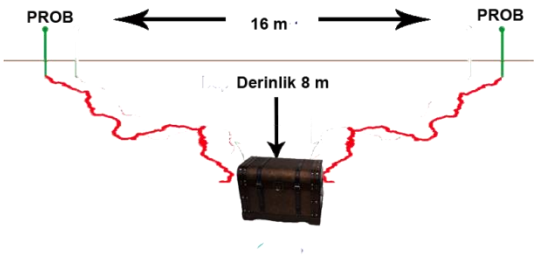
You can set the sampling and measurement time between probes in Settings section. Normal range is set to 30 in both settings. This measurement time range must be increased for deep measurements, soils with high amount of minerals and mining fields. For example, both settings must be 50.

### 3.4.5 RESISTIVITY DEPTH MEASUREMENT

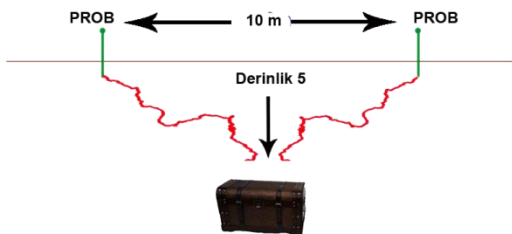
During the depth measurement, initially the scan must be completed. After scan is completed and values are read, the distance between probes must be reduced and another measurement must be made. Please review the below examples.



As shown in the adjacent image, the distance between two probes is set as 20m. Total possible depth for resistivity system is 10 meters. Materials at 10 meters depth are detected. However since the depth of metal bag is less than 10 meters as shown in the image, the device will not detect the metal.

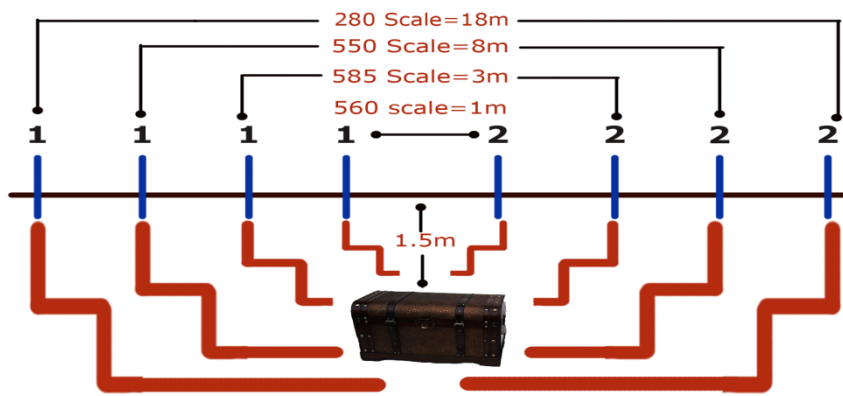


The distance between probes in the adjacent example is set as 16 meters. The system will scan at 8m. depth. Since metal bag is at 8 meters, the system will automatically detect it and display the type of metal. The distance between probes must be reduced to learn exact depth of the metal.



As in the below image, the distance between probes is set as 10 meters and system detects 5m. depth. Since there is not any metal at 5m. depth, the device will not detect the metal.

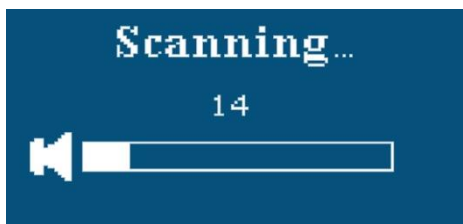
You must increase the distance between 2 probes as shown in the below example in order to find net depth and type of the metal and you can also find the exact depth of metal, gap and water. You should also read the values in the above given scale and compare them with numeric values displayed on the device. You must take the closest scale value of the object that you search as basis when reading the values.



As shown in this example, the first read value is 560 and second read value is 585. If it is assumed that metal bag is gold, the second read value exactly matches with the value of gold. The value will decrease when the distance between probes is increased. Attention must be paid that the displayed value must be closest to the value of searched material.

### 3.5 SOUND DETECTOR MODE

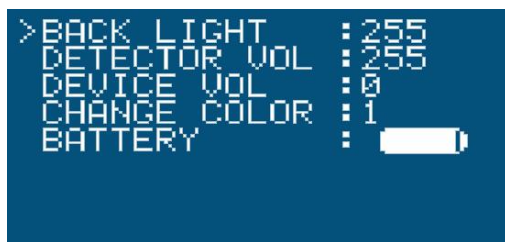
In the detector mode, a sound warning is generated for all metals. It can detect highly magnetizable materials until 1 meter depth. If you select this mode, the following screen will be displayed.



In this mode, a sound warning is generated for all metals.

### 3.6 GENERAL SETTINGS

Background light, brightness and background color of the device can be set and battery level can be displayed at General Settings menu.



**Background Light:** You can adjust background light with direction keys.

**Detector Volume:** You can adjust detector's sound settings with direction keys.

**Device Volume:** You can adjust device's sound settings with direction keys.

**Change Color:** You can set background color with direction keys. This function provides a clearer display to users for night and day operations.

**Battery:** This screen is used to display remaining time of device's battery.

## 2- 3D GROUND MONITORING SOFTWARE - OVERVIEW

Minimum system requirements needed to install 3D Ground Monitoring software to your computer are displayed in the following table:

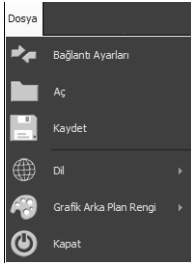
*Operating System:*.....Windows Xp, Windows 7, Windows 8

*Memory (RAM)*..... Min. 512 MB

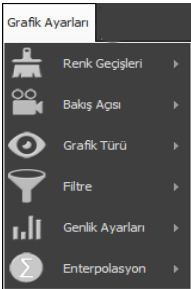
*Graphic Card:*..... Min. 256 MB (OpenGL Compatible)

*Disk Space:*..... Min. 300 MB

## 2.1 MENUS AND BUTTONS



File Menu. You can access New Connection, File Opening, Saving, Program Language Changing, Software Background Color Changing features from this menu.



You can set different graphic color tons, graphic perspective, Difference Graphic Options, such as Grid and Raw Data Graphics, and expansion settings of filters from Graphic Settings menu.



Buttons that you can use to change graphic perspectives:



The button used to undo the changes to graphics.



The button used to blur the graphic and removes the problems between data.



The button used to sharpen the graphic and removes the problems between data.



Buttons used to expand and narrow the graphics.



The button used to examine the graphic in the form of a cage and grid.



The button that removes Gap, Soil and Metal data in order to allow you to examine single data.



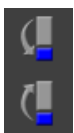
Buttons used to maximize and minimize graphics and return them to their real sizes.



Soil menu to select the type of soil.



Buttons that you can use to increase and decrease ton of color in metal data.



Buttons that you can use to increase and decrease ton of color in gap data.





Buttons that you can use to move the line of depth up and down.



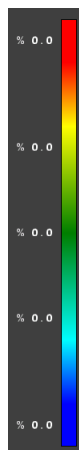
Interpolation button



Virtual keyboard button



Button to read digital values.



Right color bar ensures that you view the values in terms of percentages. It represents the percentages of metal, mineral, soil, hard soil and gap from top to bottom.

## 2.2 EVALUATION OF MEASUREMENTS

Meanings of Graphic Colors When Standard Colors are Used

**Red;** Metal

**Blue;** Gap

**Green;** Soil

**Orange and Yellow;** Mineral .

These details are different in case different color options are used. It might be difficult to differentiate metal and mineral at first look. Sometimes you may see reddish colors for minerals too. But there are some differences between metal and mineral and they can be displayed with analysis. Some of these differences:

If graphic represent a special shape, this means metal data (such as square, rectangular, circle, etc.). If orange and yellow tones around the object in the graphic are too much, it is possibly mineral data.

If the object is at a depth, such as 10 cm, 30 cm, there is a high probability that it is a mineral.

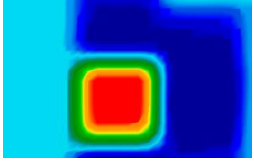
You must have and confirm that you have the same data in controlling measurements. Images of metal and mineral are given in the below graphic sample.

METAL	GAP	MINERAL
<i>Has a clear shape</i>	<i>Has a clear shape</i>	<i>No shape and scattered around the graphic</i>
<i>The graphic has ceiling-floor structure</i>	<i>The graphic has ceiling-floor structure</i>	<i>No ceiling-floor structure</i>

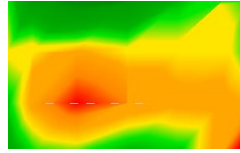


<i>Its color is red in graphic</i>	<i>Its color is dark blue in graphic</i>	<i>Its color is orange in graphic</i>
<i>Graphic obviously goes down and becomes flat at the bottom</i>	<i>Graphic obviously goes down and becomes flat at the bottom</i>	<i>Graphic is generally superficial and does not create a plane</i>
<i>Graphic has BLUE reflections</i>	<i>Graphic has GREEN reflections</i>	<i>No reflection in the graphic</i>

Differences between metal, gap and mineral are described in the below table. The features of this table are described with examples on graphics. Please examine it carefully.



*Metal data*

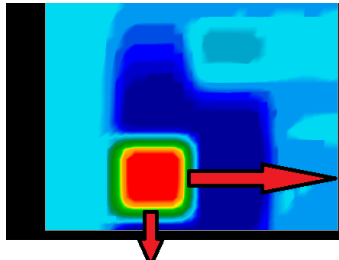


*Mineral data*

### 2.2.1 METAL GRAPHIC

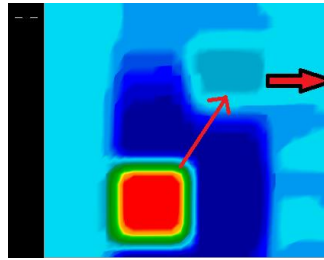
The sample graphic below is the data of precious metal, located within a gap, which is created by user for testing purposes. It gives information about the analysis of precious metals within a square metal box.

Real metal objects represent a clear shape, which distinctively separates metals from minerals. The adjacent graphic shows the metal within a gap and it has a square shape. There is a yellow thin layer around the square, which is displayed in red, and this must be available in all metal data. Yellow layer must have the same shape of the red object.



Metal verilerinin etrafında, sarı ince bir tabaka vardır. Sarı ince tabaka nesnenin şekli (kırmızı verinin) ile aynı olmalıdır.

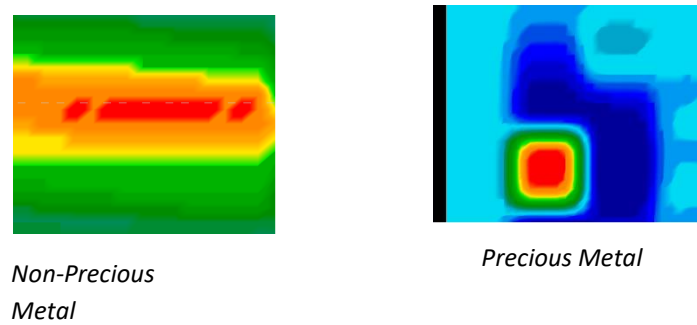
Metallerin belirgin bir şekli vardır. (Dikdörtgen,kare,daire gibi)



Metal verilerinde, nesnenin şekli ile aynı olan MAVİ renkte yansıma olmalıdır.

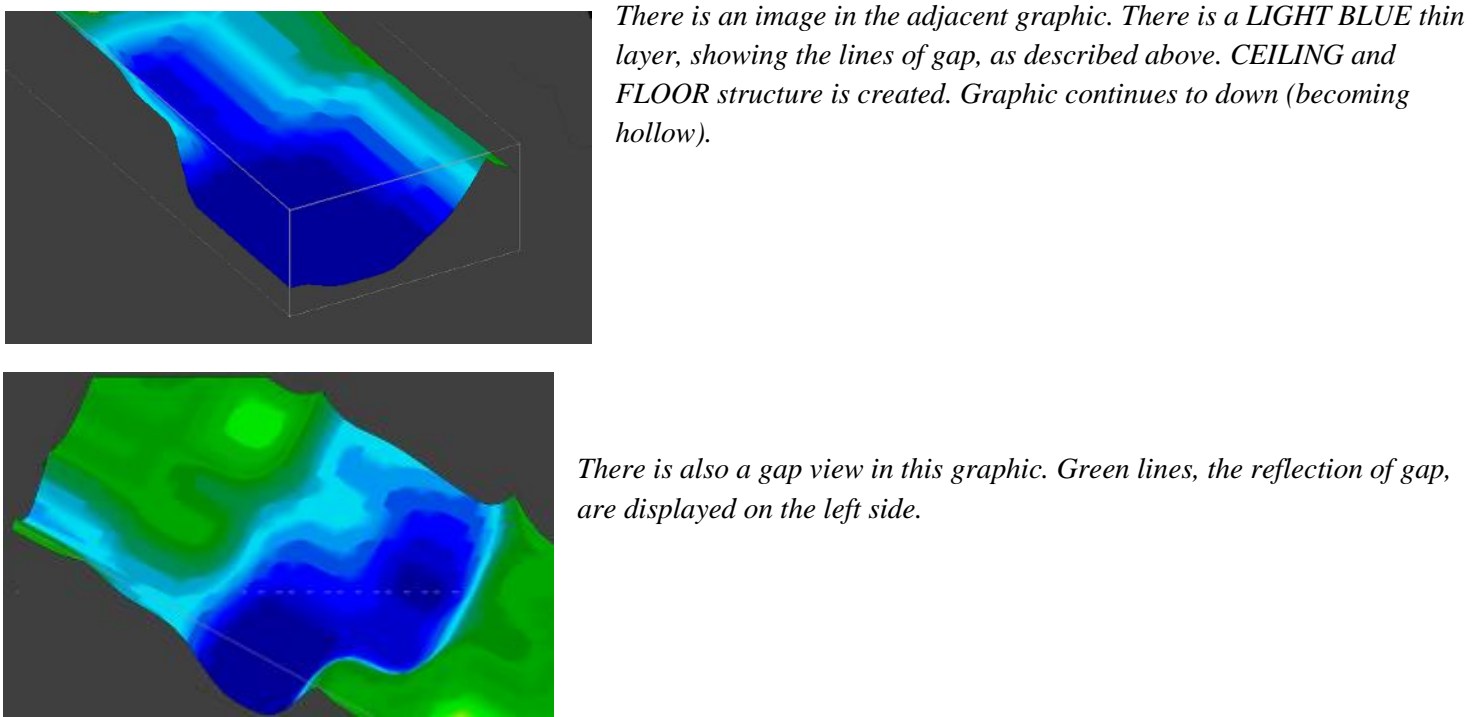
When metal is queried with F7 and gap is queried with F6 in the software, there must be a reflection in **BLUE** color, which represents a metal object (data is retrieved with north and south magnetic poles in the read values). There is no reflection in minerals.

**In order for you to separate precious and non-precious metals:** Precious and non-precious metals have same features in the graphic (reflection, becoming hollow, yellow thin layer, ceiling-floor structure). Precious metals keep their red color and additionally there is a yellow thin layer around them.



2.2.2 GAP DATA GRAPHIC

All features described until here are the features of metal data. Gap data do also have same features. They go downwards (becoming hollow) and there must be ceiling-floor structure. But the color of gaps (rooms, tombs, tunnels, etc) is **BLUE**. When the graphic is examined, there is a **LIGHT BLUE THIN LAYER** with same lines of BLUE color (similar to yellow thin layer in metals). Furthermore, the north-south magnetic pole (reflection) of the gap is **GREEN**.



Gap data are similar to the data of metal objects. They have the same features. While there is a yellow thin layer around the metal object, there is a light blue thin layer around gap data. While metal reflects in blue, gap data reflects in green. The gap can be defined (such as tomb, room, tunnel, etc.) by taking depth, width and length measurements Since metal data are described in details and gap data has same features, no extra description is required. Please contact with our expert team for issues that you think insufficiently described.

2.2.3 MEASUREMENT OF DEPTH IN GRAPHICS

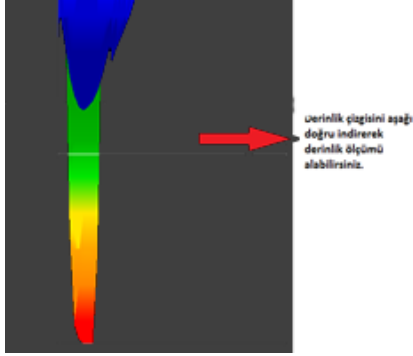
Data of the object that you search must be in the middle of the graphic in order to measure depth in graphic. If there are data on the edges, you must center them and perform another control scan. There is a small margin of error in depth measurements (such as 0.50 cm). You must know the type of soil being measured in order to minimize errors. You must select the type of soil from soil option menu of the software.



If you don't exactly know the soil type of scanned area, you must calculate the depth **before saving** graphic data to the software. Stop retrieving data from your device and make necessary analyses. After analyses are completed change your view to bird's-eye view. Move the depth measurement lines to the center of the displayed object by using right-left / up-down keys of the keyboard. You can see the depth in the depth bar indicator at the bottom.

### Detailed Depth Measurement of Object

You must change to side view and use Move Downward button for the depth line in order to measure detailed depth of the object in the graphic. You can find total measurement between ceiling and floor of the object by using up - down depth button.



*When you use Move Downward button for the depth line in the graphic, the depth line will move down. The depth is shown in meters on the bar, which indicates depth in the software. When you reach to the starting point of the object (red color starting point), you reach to the ceiling of buried object. As you move the depth line to the bottom of the object, you will learn total sizes of the object.*