

KOMPLEX®

SML 2
SML 2 RTK

USER MANUAL

www.komplex.sk

DEAR CLIENT,

Thank you for choosing our brand-new marker locator SML 2.
In case of any questions please contact us at komplex@komplex.sk.

Have a nice day.

Komplex® team

PRODUCT NAMES IN THIS MANUAL

Throughout this manual, both the **SML 2** and **SML 2 RTK** versions are referred to simply as **SML 2** when the description applies to both. Sections applicable only to the RTK version are marked with the green-highlighted phrase SML 2 RTK .

TABLE OF CONTENTS

General safety information ... 4
Safety instructions for operating the SML 2 ... 4
Safety instructions for the SML 2 battery ... 4
Symbols on the charging adapter ... 4
Operating temperature ... 4
Storage temperature ... 4
Charging the SML 2 ... 4
Battery specifications ... 4
Smartphone safety instructions ... 5
Operating environment ... 5
Body-worn use ... 5
SAR values ... 5
Listening to audio ... 5
Smartphone battery and charging ... 5
Maintenance and care ... 5
Description of the parts of the device ... 6
SML 2 ON/OFF button colors ... 6
Removing the smartphone from the holder ... 7
Disconnecting of the antenna ... 7
Smartphone description ... 8
Turning the device ON ... 9
Application first launch ... 10
Entering user email and password ... 10
Registration ... 10
Reset password ... 10
Creating PIN code ... 11
Bluetooth communication ... 11
SML 2 application main menu ... 12
LOCATE Menu ... 13
Marker type selection ... 13
Detection of underground markers ... 15
Locating Analog markers ... 16
Locating Smart Markers ... 16
New Smart Marker detection ... 17
Detection of a known Smart Marker ... 17
Projects menu ... 18
Creating a Project ... 18
Creating a line ... 19
New line ... 20
Editing the line ... 20
Deleting the line ... 21
Saving a new marker into the database ... 21
New marker ... 22
Marker details ... 23
Adding a picture to the marker ... 24
GPS navigation to marker ... 25
List of markers ... 27
Editing a marker ... 28
Map menu ... 30
Positioning solution status indication in map views ... 31
Settings menu ... 32
Wi-Fi connection ... 32
Read ID timeout ... 33
Cyclic Read ID timeout ... 33
GPS position source menu ... 34
Using RTK corrections ... 35
Data synchronization ... 37
Marker location principle ... 40
Smartphone Technical Data ... 41
SML 2 Technical data ... 42
Scope of delivery ... 44

GENERAL SAFETY INFORMATION

This user manual provides information on handling the SML 2 underground marker locator and important safety regulations. Please read this user manual carefully before you start using the product.

Following the safety instructions in this chapter is necessary for safe operation of the device. Failure to comply with the safety instructions may result in a risk to the health of the operator, damage to the device or loss of warranty.

SAFETY INSTRUCTIONS FOR OPERATING THE SML 2

The device may only be operated by qualified and properly trained personnel. All local regulations, standards and internal guidelines must be observed. Always read this user manual before use.

Only use the supplied industrial smartphone to operate the SML 2.

The device must not be operated by children.

The device must not be exposed to rain, water, or moisture.

The device must be connected to the PE protective conductor during charging (Class I equipment)

SAFETY INSTRUCTIONS FOR THE SML 2 BATTERY

The SML 2 locator contains a built-in rechargeable battery RRC2054. The battery cannot be removed from the SML 2. Do not remove or replace the battery.

Follow the safety instructions for the battery and the charging adapter in this document.

OPERATING TEMPERATURE

Charging: 0 °C to +45 °C
Using: -20 °C to +60 °C

STORAGE TEMPERATURE

< 1 year: -20 °C to +20 °C
< 3 months: -20 °C to +45 °C
< 1 month: -20 °C to +50 °C

CHARGING THE SML 2

Only ccharge with the supplied charging adapter. Only connect the charging adapter to a power supply with a rated voltage of 100-240 V ~ 50-60 Hz.

Do not use the marker location or ID reading function while charging the SML 2!

SYMBOLS ON THE CHARGING ADAPTER

	Caution / Warning		Follow the Instructions for Use.
CE	Compliance with the relevant EU legislation	PS E	Japan, PSE
UK CA	Mark of conformity to applicable EEC Directives		Thailand, TISI
TP	Russia, GOST-R		Morocco, CMIM
	Canada and USA, UL	UN	UN transportation test
	Australia and New Zealand, RCM		Dispose of this product according to local regulations.
CQC	China, CQC		Recycle
	India, BIS		Recycle symbol for Taiwan
KC	Korea, KC		China RoHS
	Taiwan, BSMI		For Canada and USA: call 1-800-822-8837 for recycling information

BATTERY SPECIFICATIONS

- Type RRC2054
- Voltage 14.40 V
- Capacity ≥3.40 Ah
- Max. charging current ≥2.00 A
- Max. charging voltage 16.80 V
- Max. discharge current 5.00 A
- Size (L x W x H) 85.35 mm x 77.65 mm x 23.0 mm (max.)
- Weight 230 g

SMARTPHONE SAFETY INSTRUCTIONS

OPERATING ENVIRONMENT

- Operate the smartphone at temperatures from **-20 °C to 50 °C** and humidity from **10 % to 90 %**.
- Store at temperatures from **-20 °C to 50 °C** and humidity from **5 % to 85 %**.
- Charge at temperatures from **0 °C to 40 °C**.
- The device enclosure complies with IP69 standards for water and dust resistance.

BODY-WORN USE

- The minimum distance between the user's body and the device, including the antenna, is **10 mm**.
- Accessories such as belts or holsters must not contain metal parts.
- In Europe, a minimum distance of **0.5 cm** must be maintained between the device and the body when worn.

SAR VALUES

- USA (1 g): max. **1,52 W/kg** (1,6 W/kg limit)
- EU (10 g): max. **1,48 W/kg** (2 W/kg limit)

LISTENING TO AUDIO

- Prolonged listening at high volume may damage your hearing.
- Do not use the device while walking, cycling or driving.

SMARTPHONE BATTERY AND CHARGING

- Only use the supplied charger.
- Do not open, incinerate, or short-circuit the battery.
- Do not use the device or battery near flammable sources.
- Do not charge at temperatures below 0 °C or above +40 °C.

MAINTENANCE AND CARE

- The device is designed for industrial use and has an IP65/67 protection rating but may be damaged by extreme temperatures or immersion in water.
- Clean the surface with a damp, non-abrasive cloth. Do not use bleach or chemicals.
- Clean the LCD screen with a soft cloth, without sharp objects.
- If the device is not used for a long time, back up your data and remove the battery.

DESCRIPTION OF THE PARTS OF THE DEVICE

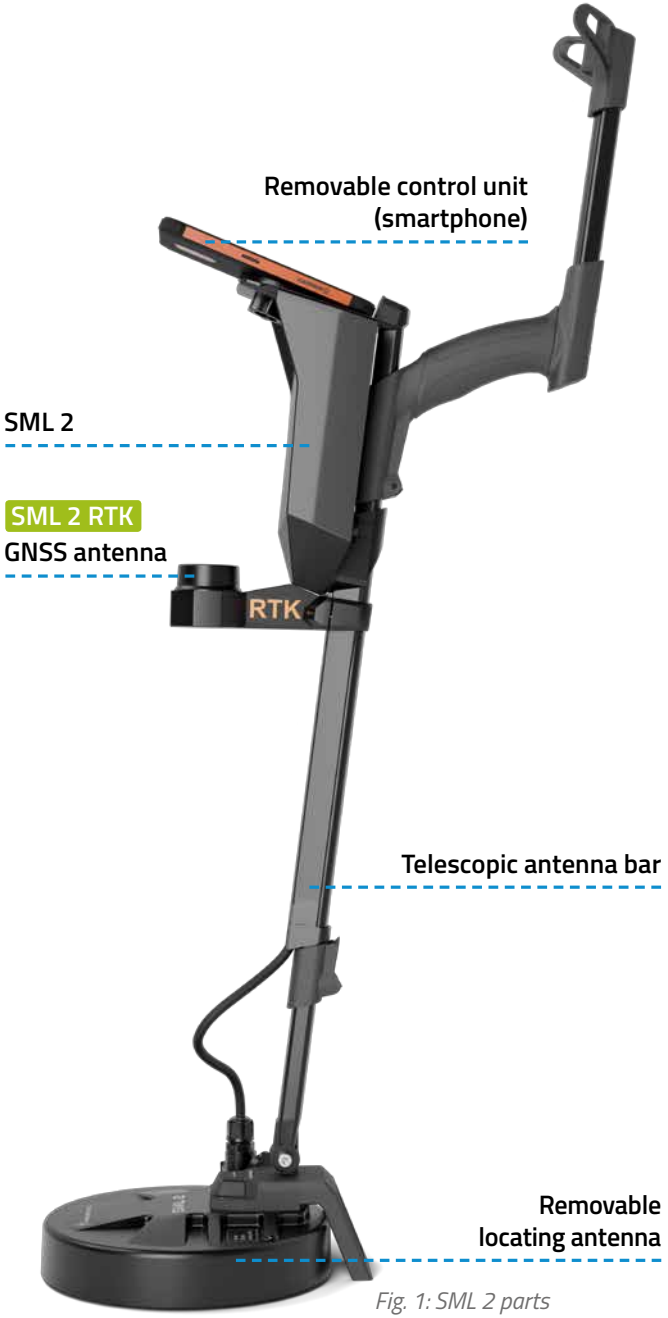


Fig. 1: SML 2 parts

SML 2 ON/OFF BUTTON COLORS

- Green – SML 2 ON, smartphone not connected
- Blue – SML 2 ON, smartphone connected
- Red – SML 2 OFF, charging,
  or SML 2 and antenna disconnected
- Blinking red – SML 2 charged
- Orange – SML 2 ON and charging
- Pale blue – Locating
- Violet – Reading of ID
- Blinking yellow – SML 2 ON and charged

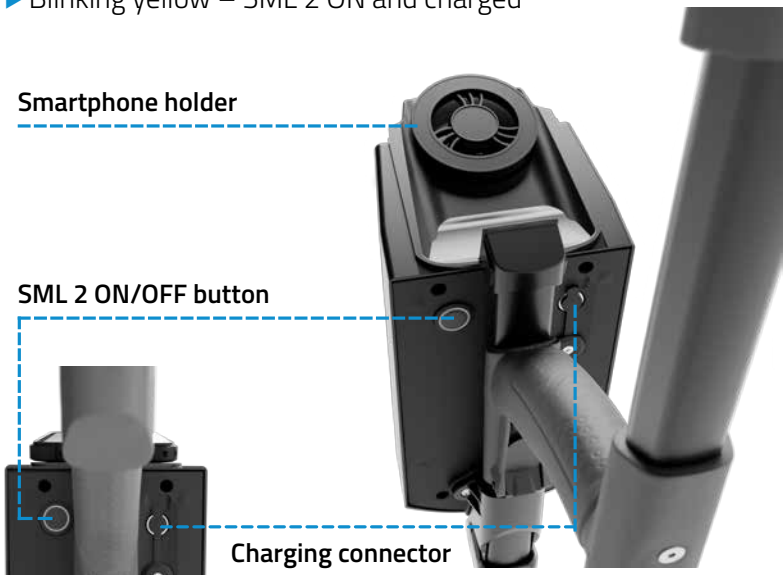


Fig. 2a: SML 2 rear view



Fig. 2b: SML 2 rear view

REMOVING THE SMARTPHONE FROM THE HOLDER

1. Grab the smartphone and rotate as indicated by the red arrow
2. Release the smartphone in the direction of the green arrow (Fig. 3)



Fig. 3: Removing the smartphone from the holder

DISCONNECTING THE ANTENNA

1. Disconnect the antenna connector marked by yellow circle in Fig. 4
2. Press both buttons in the direction of the red arrows
3. While continuously pressing both buttons, drag the antenna in the direction of the green arrow



Fig. 4: Antenna disconnection

SMARTPHONE DESCRIPTION



Fig. 5a: Smartphone description



Fig. 5b: Smartphone description – rear view

1. ON/OFF button
2. Volume control
3. SIM card slot
4. „Step back" button
5. „Home" button = switching to Android menu
6. „List of all active applications in Android" button
7. Charging connector
8. Camera

The supplied smartphone is a fully-fledged industrial Android smartphone, with all functionalities of a standard smartphone. This allows you to use this unit not only as a highly professional marker locator SML 2 but also as **a robust waterproof cell phone in the field**.



▲ *Fig. 6: Smartphone home screen*

TURNING THE DEVICE ON

1. Press the ON/OFF button to turn on the SML 2 (Fig. 2a, 2b). The ON/OFF button turns green.

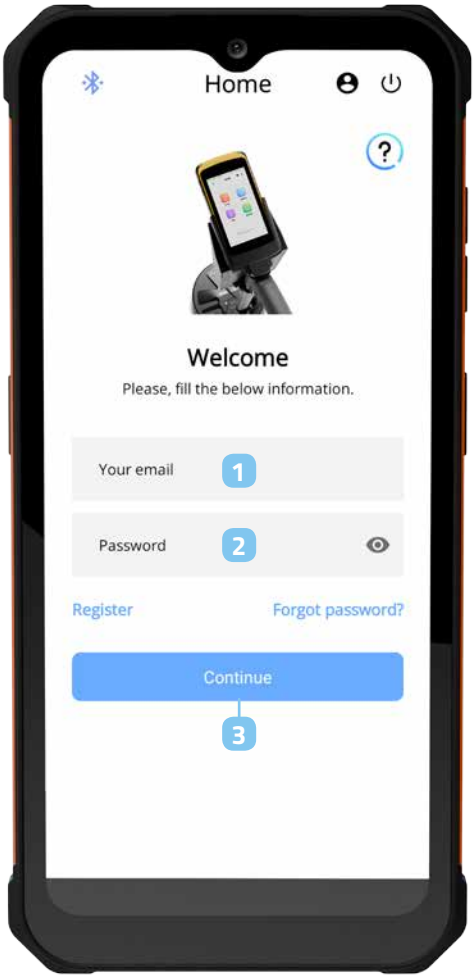
2. Press and hold the ON/OFF button shown in Fig. 5a, 5b to turn on the smartphone

3. In the Android home screen, click on the SML 2 icon to run the SML 2 locator application (Fig. 6).

APPLICATION FIRST LAUNCH

After SML 2 Application first launch, the screen shown in Fig. 7 will appear. Use this screen to enter login information of your user account.

Ensure that the smartphone is connected to the internet.



▲ *Fig. 7: Log in screen*

ENTERING USER EMAIL AND PASSWORD

1. ▶ Field „Your email" – enter the email address that you used for registration of your account.
2. ▶ Field „Password" – enter the password to your account.
3. ▶ After entering your email and password press the „Continue" button.

REGISTRATION

If you haven't created a user account yet, use the „Register" option, or visit **www.markerdatabase.net** directly for registration.

RESET PASSWORD

Use „Forgot password" to reset your password.

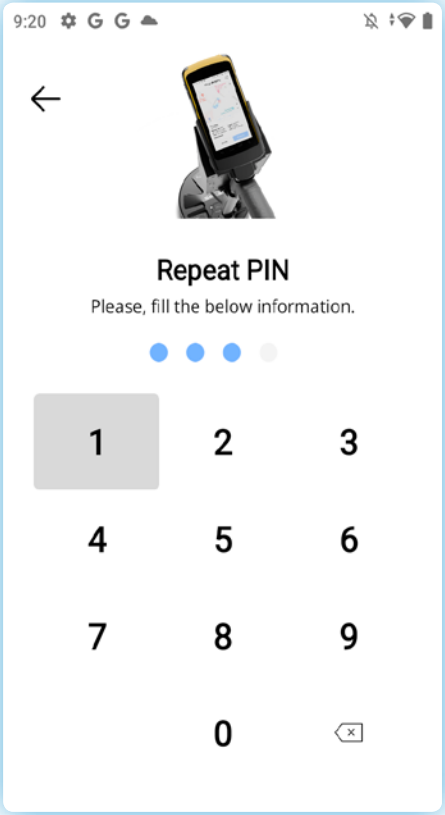
CREATING PIN CODE

After successful login, the screen for creating PIN code will appear (Fig. 8). PIN code is used for quick and safe login of the application to your user account.

In case of logging in to your account after you were logged out or other user account was logged in, you need to create the PIN code again.

Insert 4 digit number code to create your PIN code. Repeat the PIN code for confirmation.

▼ *Fig. 8: Creating PIN code*



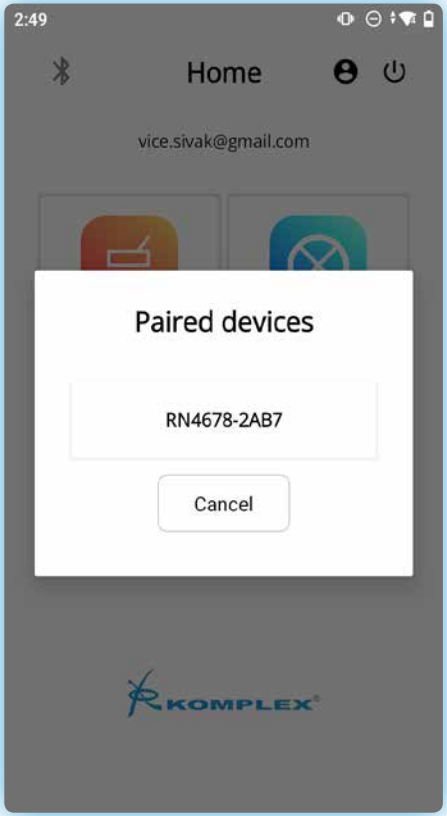
BLUETOOTH COMMUNICATION

After creating PIN code successfully, the screen with list of active Bluetooth devices will appear. (Fig. 9). Ensure that your SML 2 is ON = ON/OFF button is green.

For successful Bluetooth connection between the smartphone and SML 2, in the list of active Bluetooth devices, choose the device that appeared after you turned ON your SML 2 (Fig. 9).

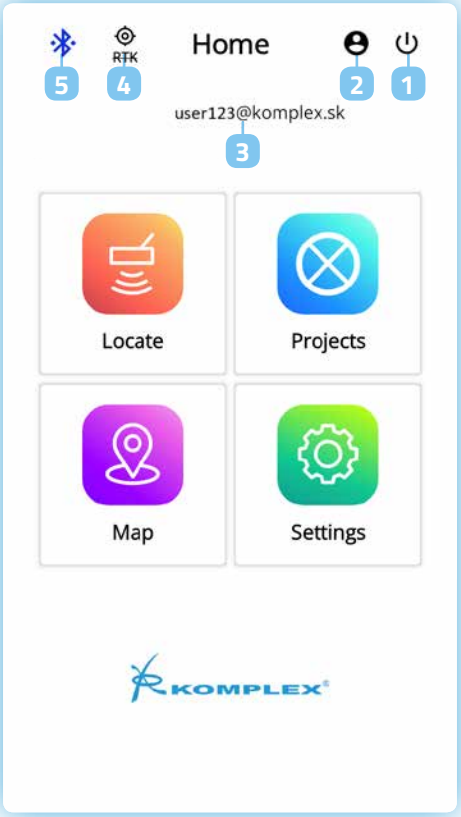
After successful Bluetooth connection the ON/OFF button on SML 2 will change from green to blue.

At the same time the Bluetooth icon in the application main menu will change from grey to blue (Fig. 10).



When you turn ON your SML 2 next time, the Bluetooth communication will be established automatically.

▲ *Fig. 9: List of Bluetooth active devices*



SML 2 APPLICATION MAIN MENU

BUTTONS DESCRIPTION

1 ▶ SML 2 application turning OFF

2 ▶ User account change/log out

3 ▶ Logged user

4 ▶ SML 2 RTK Positioning solution status.
See page 31 for more details

5 ▶ Bluetooth communication icon*

▶ LOCATE: Markers locating menu

▶ PROJECTS: Database Menu
– access to data about Projects, Lines, markers

▶ MAP: Map menu

▶ SETTINGS: Application settings menu

◀ *Fig. 10: Main menu*

* Bluetooth connection between the smartphone and SML 2 is necessary for locating of underground markers in the LOCATE menu, as the the smartphone and SML 2 communicate via the Bluetooth. A successful Bluetooth connection is indicated by the blue color of the Bluetooth icon in the main menu of the application.

If the Bluetooth icon is grey, the Bluetooth connection is not active. Try to turn the application ON/OFF and SML 2 and repeat activating the connection by clicking on the Bluetooth icon or clicking on the LOCATE button.

** SML 2 RTK This icon indicates the current state of the selected positioning solution:

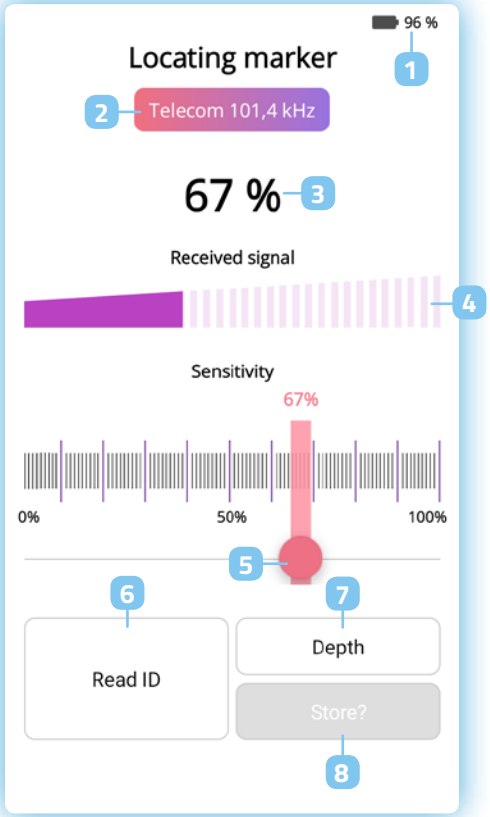
No icon – Phone GPS is selected to determine the current geographic position.

RTK Locator GNSS module is selected but coordinates have not been received yet; RTK is disabled.

RTK Locator GNSS module is selected, coordinates are being received; RTK is disabled.

RTK Locator GNSS module is selected, coordinates are being received; RTK is enabled but correction data have not been received yet.

RTK Locator GNSS module is selected, coordinates are being received; RTK is enabled and correction data are being received.



▲ *Fig. 11a: LOCATE menu*

LOCATE MENU

The LOCATE menu is used for locating underground markers. To enter the Locate menu press the LOCATE button in the main menu of the application (Fig. 10).

Description of symbols and buttons of the LOCATE menu is shown in Fig. 11a.

1 ▶ SML 2 battery status

2 ▶ Frequency of the connected antenna. „No antenna" = no antenna is connected. The frequency of the antenna must correspond to the frequency of the located markers

3 ▶ Sensitivity value in %

4 ▶ Graph of the signal received from marker

5 ▶ Sensitivity slider. The default value is 100 %. By systematic decreasing of the sensitivity level, we achieve more precise locating of the underground marker position.

6 ▶ ID number reading. Holding the „Read ID" button will activate cyclic reading of ID.

7 ▶ Marker type selection for depth measurement

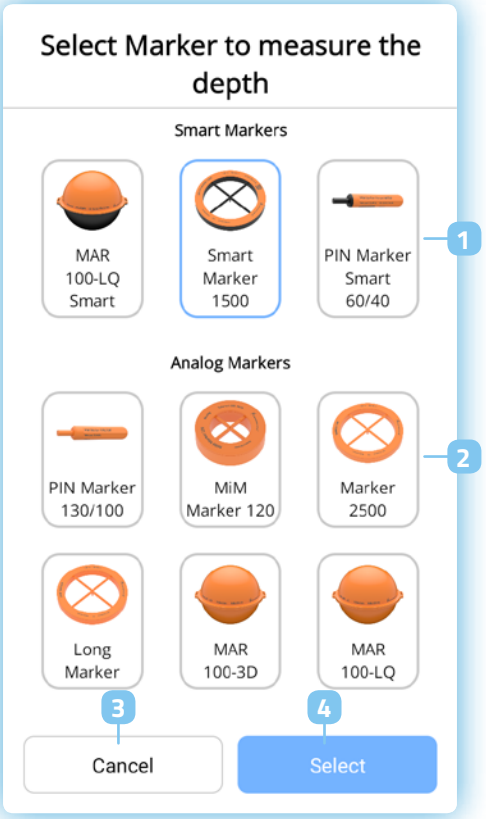
8 ▶ Storing marker data into the database. The button is active after the ID reading is finished.

MARKER TYPE SELECTION

The marker depth is only displayed when a marker type is selected.

Press the DEPTH button on the Locate screen (Fig. 11a, Fig. 11c) to display the marker type selection menu (Fig. 11b).

The description of the DEPTH menu items and buttons is shown in Fig. 11b.



▲ *Fig. 11b: DEPTH menu*

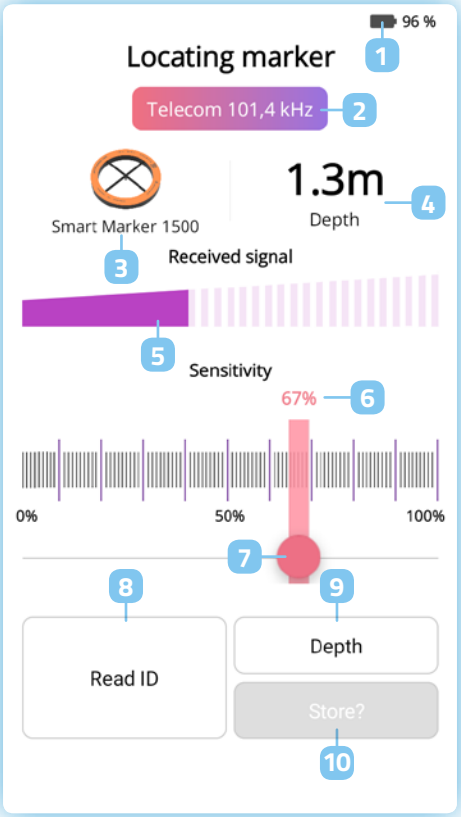
1 ▶ Smart Marker menu. After tapping a marker symbol to select the marker type, the symbol frame will turn blue.

2 ▶ Analog marker menu. After tapping a marker symbol to select the marker type, the symbol frame will turn blue.

3 ▶ Cancel the marker type selection and return to the Locate screen.

4 ▶ Confirm the marker type selection and return to the Locate screen.

Tap a marker symbol to select the marker type and then tap the „Select" button to start Locating with depth measurement (Fig. 11c).



▲ *Fig. 11c: LOCATE menu with depth measurement*

Description of the symbols and buttons of the LOCATE menu with depth measurement is shown in Fig. 11c.

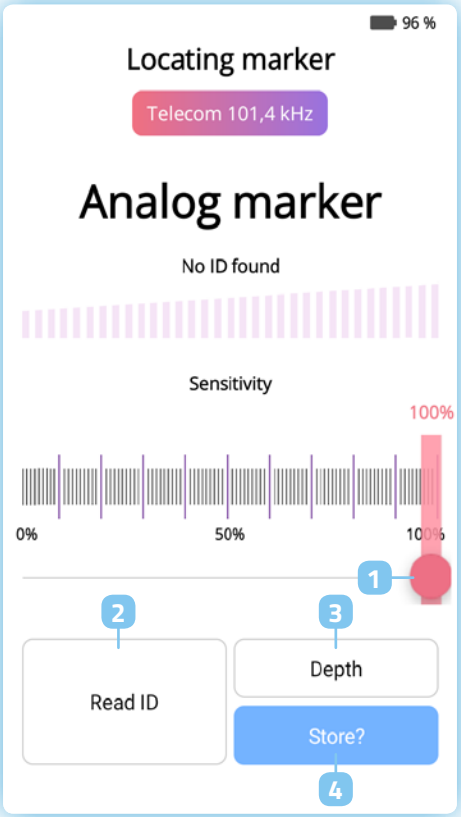
1 ▶ SML 2 battery status
2 ▶ Frequency of the connected antenna
3 ▶ Selected marker type
4 ▶ Detected marker depth
5 ▶ Graph of the signal received from marker
6 ▶ Location sensitivity value in %
7 ▶ Sensitivity slider
8 ▶ ID number reading
9 ▶ Marker type selection for depth measurement
10 ▶ Storing marker data into the database

DETECTION OF UNDERGROUND MARKERS

Detection occurs in two phases:

1. Analog locating of marker = determination of the marker position
2. Reading the marker ID.

In case that the ID reading is not successful, locator will display „Analog marker" (Fig. 12). Unsuccessful ID reading can be caused by the fact that the located marker is Analog marker or in the case of Smart Marker, the installation depth of the marker is bigger than the maximum depth specified by the manufacturer.



▲ *Fig. 12: Analog marker*

LOCATING ANALOG MARKERS

Analog marker is a marker without RFID chip with an ID number. Analog marker doesn't send ID number to locator.

After pressing the „Read ID" button and after the ID reading timeout, the information „Analog marker" will be shown on the screen. (Fig. 12)

1. ▶ For locating the marker after an attempt to read the marker ID, move the sensitivity slider
2. ▶ ID number reading
3. ▶ Marker type selection for depth measurement
4. ▶ Storing marker into the database

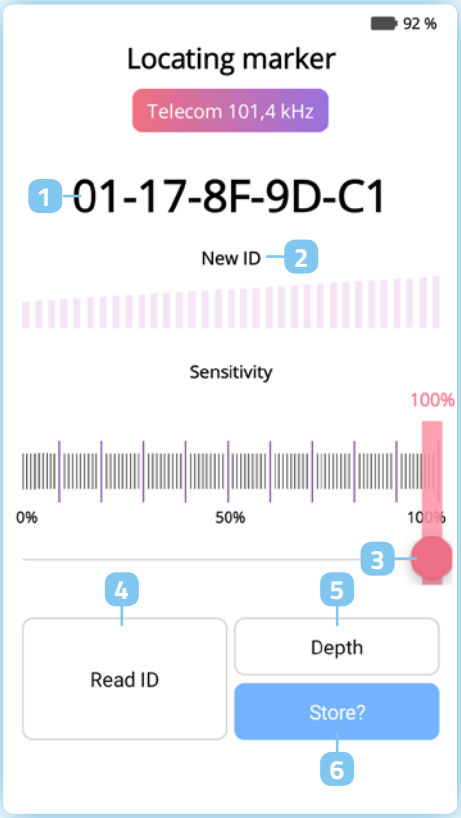
LOCATING SMART MARKERS

If the located marker is a Smart Marker, the ID number will be shown on the screen after pressing the „Read ID" button. ID number is serial number of the Smart Marker. This makes it possible to clearly identify and distinguish Smart Markers.

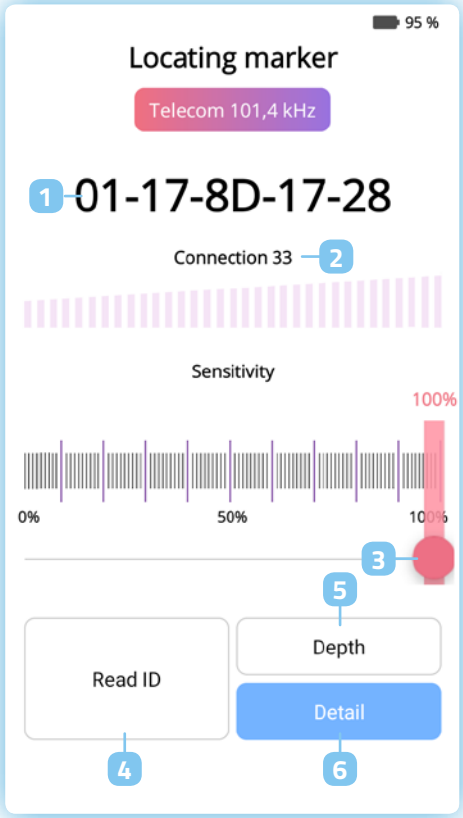
Inside the Smart marker, only the ID number is stored. All other data is stored in the database in SML 2 or on the server: www.markerdatabase.net.

After reading the ID of the Smart marker, two cases can occur:

1. Smart Marker is New and doesn't exist in the database (Fig. 13)
2. Smart Marker is known = it exists in the database (Fig. 14)



◀ *Fig. 13: New Smart Marker*



◀ *Fig. 14: Existing Marker*

NEW SMART MARKER DETECTION

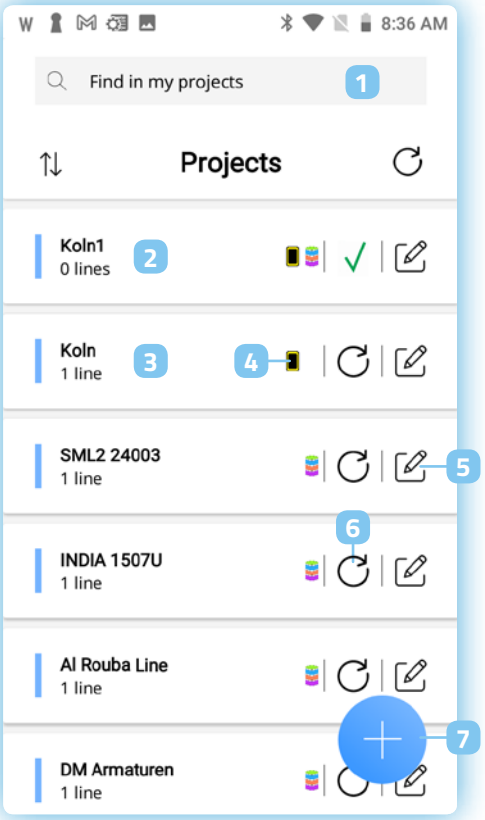
Description of the screen – New Smart Marker

1. ▶ ID number of the Smart Marker
2. ▶ Information that the Smart Marker is unknown
3. ▶ For locating the marker after reading its ID number, move the sensitivity slider
4. ▶ ID number reading
5. ▶ Marker type selection for depth measurement
6. ▶ Storing marker into the database

DETECTION OF A KNOWN SMART MARKER

Description of the screen – Existing Smart Marker

1. ▶ ID number of the Smart Marker
2. ▶ Description field = Brief information about the Smart marker, the information is created by the user during first detection of the marker or later in the database.
3. ▶ For locating the marker after reading its ID number, move the sensitivity slider.
4. ▶ Reading the ID number. Holding the „Read ID" button will activate Cyclic ID reading
5. ▶ Marker type selection for depth measurement
6. ▶ Opening the „Marker Detail" screen with detailed information about the marker



▲ *Fig. 15: List of projects*

PROJECTS MENU

The PROJECTS menu is used for work with data about Projects, Lines and underground markers in the smartphone database as well as in **www.markerdatabase.net** server database.

To enter the PROJECTS menu click the PROJECTS button in the main menu of application (Fig. 10).

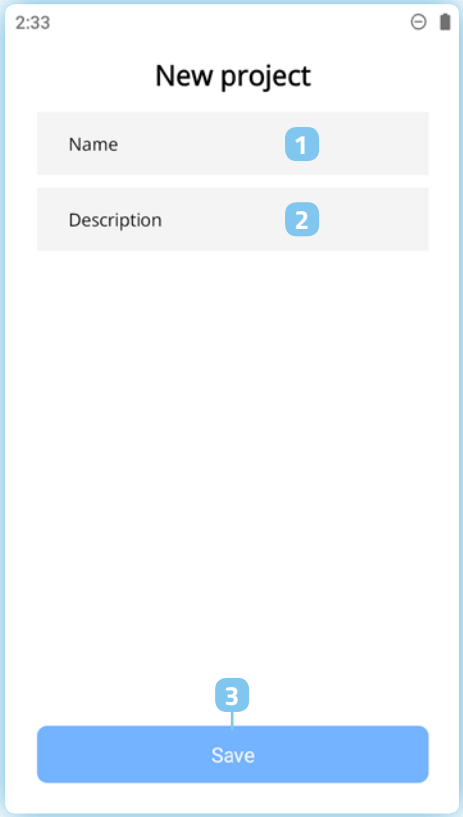
CREATING A PROJECT

To create a new Project use the „+" button in the list of Projects (Fig. 15).

1 ▶ Searching in the projects
2 ▶ Project name
3 ▶ Quantity of lines in the project
4 ▶ Data synchronization status
5 ▶ Project edit*
6 ▶ Synchronize data with server
7 ▶ Adding a new project

After pressing the „+" button the screen for creating a new project will appear (Fig. 16).

* Deleting the projects is only possible on www.markerdatabase.net using your user account. Deleting a project with your SML 2 is not possible.



▲ *Fig. 16: New project*

1 ▶ Name of the project

2 ▶ Description of the project

3 ▶ Saving the project

After successfully creating the new project, continue with creating a new Line in the project. Every Line in the database must have different name.

For creating a new line press the "+" button in the list of lines (Fig. 17).



▲ *Fig. 17: List of lines*

CREATING A LINE

1 ▶ Searching in the lines

2 ▶ Name of the project where the line belongs

3 ▶ Displaying all markers from the line on the map

4 ▶ Line name

5 ▶ Quantity of markers in the line

6 ▶ Data synchronization status**

7 ▶ Synchronization of the data with server

8 ▶ Editing or deleting the line*

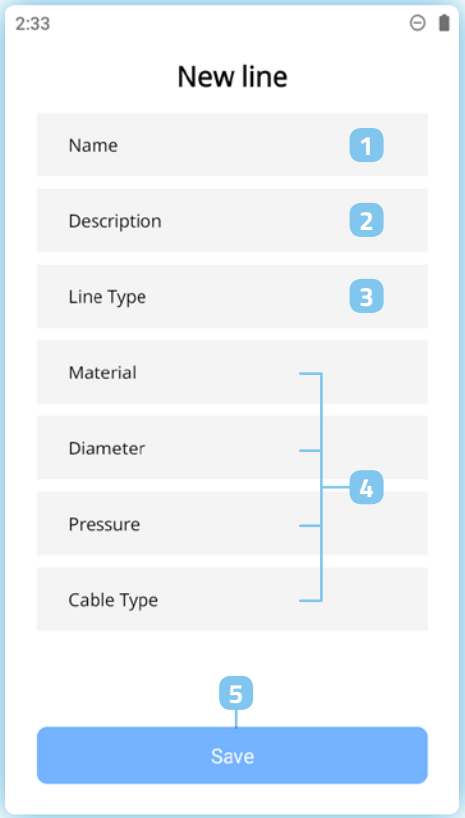
9 ▶ Gallery of pictures for the line

10 ▶ Adding a new line

After pressing the „+" button, the screen for creating a new line will appear (Fig. 18).

*Deleting the line is possible after selecting the Edit icon (Fig. 17). For confirmation of the line deletion, the application will ask you to insert the whole name of the line (Fig. 20).

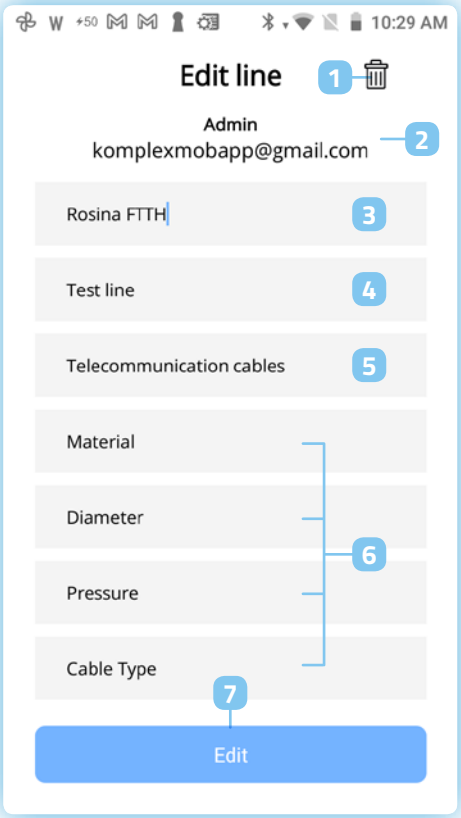
**Synchronization status is available only when smartphone is connected to the internet.



▲ *Fig. 18: Creating a new line*

NEW LINE

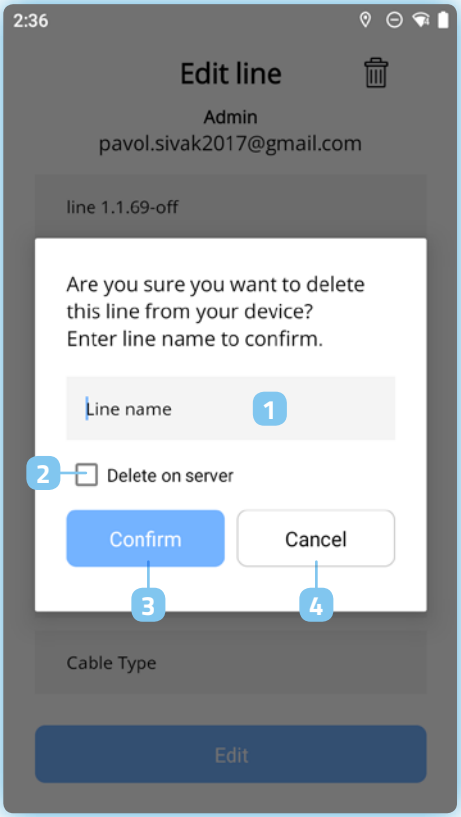
1. ▶ Line name
2. ▶ Line description
3. ▶ Line type
4. ▶ Other information about the line
5. ▶ Saving the information



▲ *Fig. 19: Editing the line*

EDITING THE LINE

1. ▶ Deleting the line
2. ▶ Line administrator
3. ▶ Line name
4. ▶ Line description
5. ▶ Line type
6. ▶ Other information about the line
7. ▶ Saving the changes



▲ *Fig. 20: Deleting line*

DELETING THE LINE

1 ▶ To confirm the line deletion insert the whole name of the line

2 ▶ If the option is checked, the data will be deleted from the smartphone memory as well as on the server. If the option is not checked, the line will be deleted only from the smartphone memory.

3 ▶ Confirm deleting

4 ▶ Cancel deleting

SAVING A NEW MARKER INTO THE DATABASE

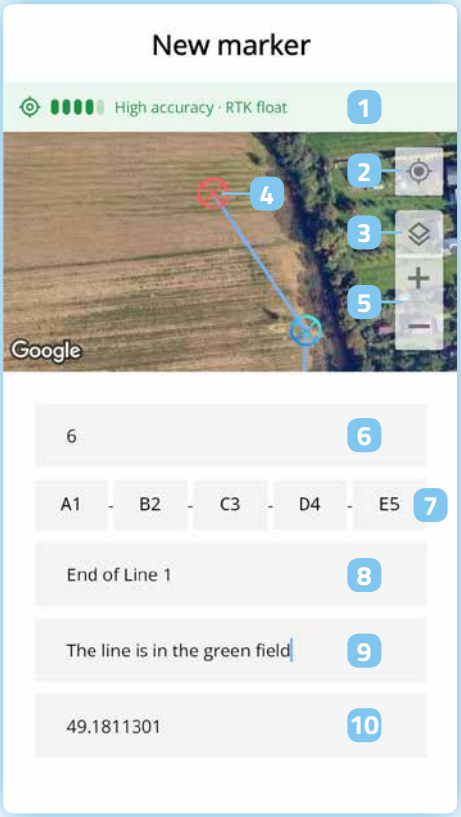
Analog markers as well as Smart markers can be stored into the database. Saving a marker into the database is possible in the following ways:

- ▶ Using an RFID loop antenna
- ▶ Manually via SML 2 application or **www.makerdatabase.net** server

Markers can only be stored into an existing line of an existing project. You can create the Project and Line before storing the markers or during storing the first marker. For more information about creating the projects and lines see page 18.

To store the Analog marker or the Smart marker into the database, press the „Store" button, shown in Fig. 12 and Fig. 13 respectively.

After pressing the „Store" button, the screen shown in Fig. 21a and Fig. 21b will appear.



▲ *Fig. 21a: Storing a new marker*

NEW MARKER

1 ▶ **SML 2 RTK** Positioning solution status. See page 31 for more details

2 ▶ Centering the map on the current position

3 ▶ Map type

4 ▶ Current marker

5 ▶ Map zoom

6 ▶ Order number of the marker

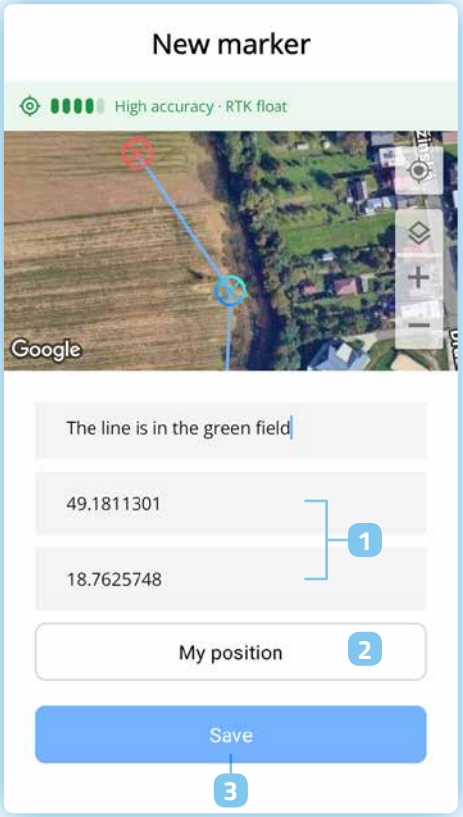
7 ▶ ID number *(in case of an analog marker, the text „Analog" will be stored automatically)*

8 ▶ Brief description of the marker

9 ▶ Advanced description of the marker

10 ▶ GPS coordinates

Move the screen bellow the map up to display the second part of the screen shown in Fig. 21b.



▲ *Fig. 21b: Storing a new marker*

1 ▶ GPS coordinates

2 ▶ Placing the marker on the current position. The position of the marker on the map ican also be set by touching the map with your finger at the desired position.

3 ▶ Storing the data

After storing the data, the „Marker detail" screen will appear (Fig. 22).



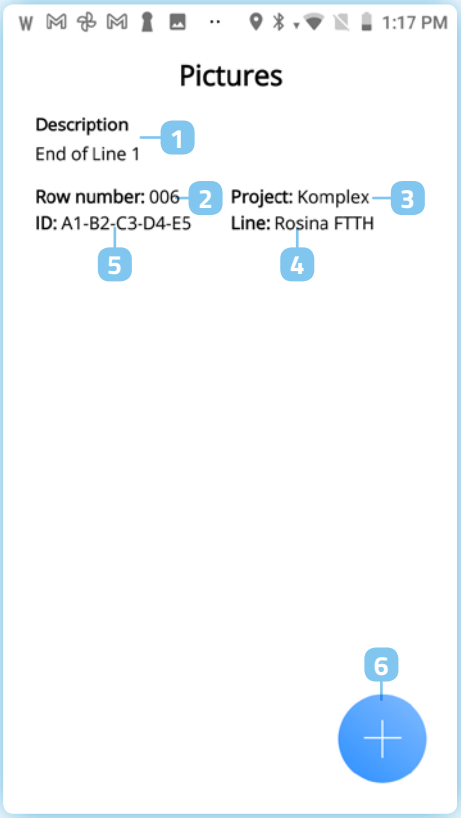
▲ *Fig. 22: Marker details*

MARKER DETAILS

1. ▶ ID number of the marker. In case of analog marker, the text „Analog" will appear.
2. ▶ Editing the marker (Fig. 30a, 30b)
3. ▶ SML 2 RTK Positioning solution status. See page 31 for more details
4. ▶ Centering the map on the current position
5. ▶ Map type
6. ▶ Current marker
7. ▶ Map Zoom
8. ▶ Display next marker
9. ▶ Information about the marker
10. ▶ Picture gallery, adding a new picture
11. ▶ Run GPS navigation to marker

Ater pressing the "Pictures" button the screen shown in Fig. 23 will appear.

Ater pressing the "Navigate" button the screen shown in Fig. 26 will appear.



▲ *Fig. 23: Adding a picture to the marker*



▲ *Fig. 24: Adding a picture to the marker*

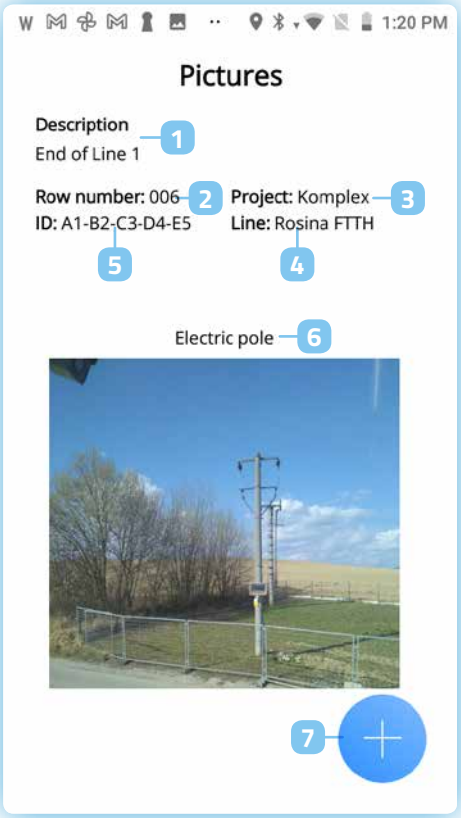
ADDING A PICTURE TO THE MARKER

1. ▶ Brief description of the marker
2. ▶ Marker order number
3. ▶ Name of the project which the marker belongs to
4. ▶ Name of the line which the marker belongs to
5. ▶ ID number of the marker. In case of analog marker, the text „Analog" will be displayed
6. ▶ Add new picture

After pressing the "+" button,
the screen shown in Fig. 24 will appear.

1. ▶ Picture title
2. ▶ Picture
3. ▶ Cancel adding a picture
4. ▶ Saving the picture

After pressing the "Save" button,
the screen shown in Fig. 25 will appear.



▲ *Fig. 25: Marker picture screen*

1 ▶ Description of the the marker

2 ▶ Marker order number

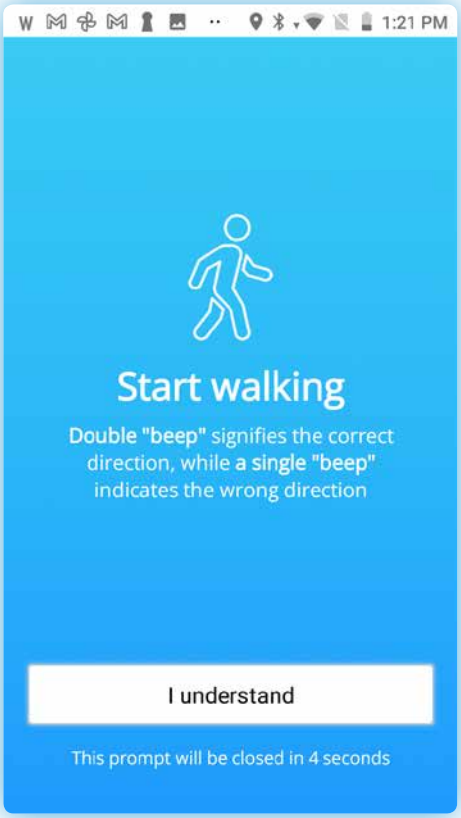
3 ▶ Name of the project where the marker belongs to

4 ▶ Name of the line where the marker belongs to

5 ▶ ID number of the marker. In case of analog marker, the text „Analog" will be displayed

6 ▶ Picture title

7 ▶ Adding the next picture



▲ *Fig. 26: Informative screen for navigation*

GPS NAVIGATION TO MARKER

Informative screen with navigation instructions.

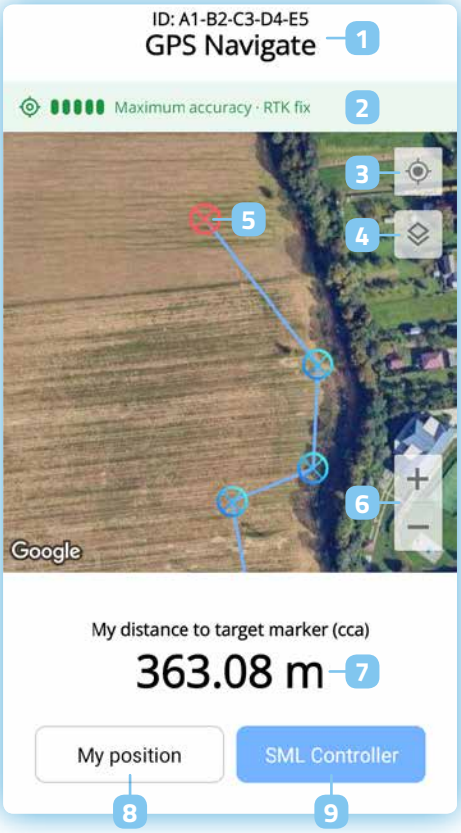
The screen will disappear automatically after 5 seconds or after clicking on the „I understand" button.

Navigation instructions:

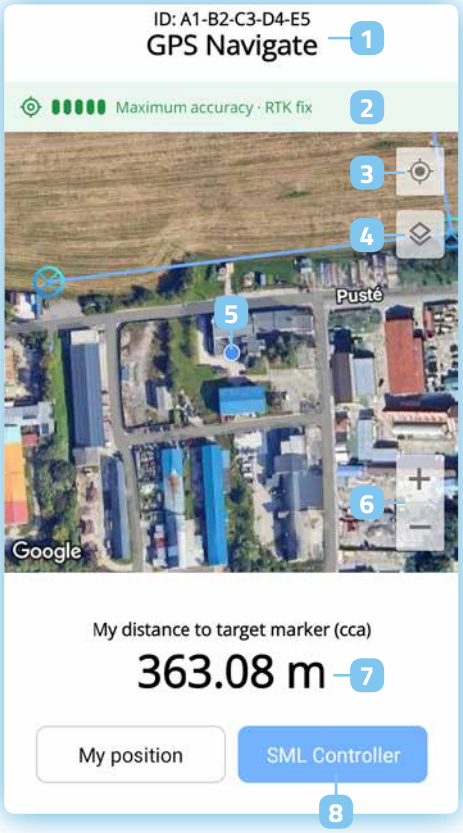
▶ Double beep = you are moving in the right direction to the marker

▶ Single beep = you are moving in wrong direction

After the informative screen disappears, the screen shown in Fig. 27 will appear.



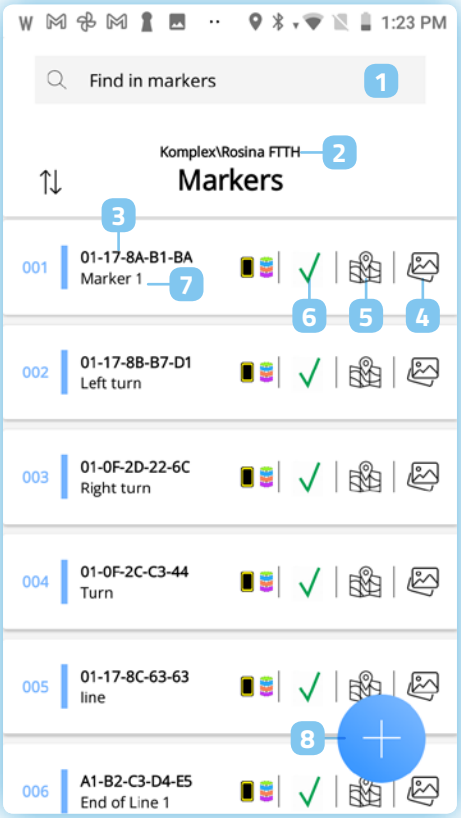
◀ *Fig. 27: GPS navigation screen*



▲ *Fig. 28: Map view after centering*

1. ▶ ID number of the target marker
2. ▶ SML 2 RTK Positioning solution status. See page 31 for more details
3. ▶ Centering the map on the current position
4. ▶ Map type
5. ▶ Target marker
6. ▶ Map Zoom
7. ▶ Distance remaining to the target marker
8. ▶ Centering the map on position of the user holding the smartphone (Fig. 28)
9. ▶ Switching to LOCATE menu – after approaching to the target marker it is necessary to use the RFID loop antenna for precise detection of the marker. Use the "SML Controller" button to go to LOCATE menu.

1. ▶ ID number of target marker
2. ▶ SML 2 RTK Positioning solution status. See page 31 for more details
3. ▶ Centering the map on the current position
4. ▶ Map type
5. ▶ User's current position
6. ▶ Map Zoom
7. ▶ Distance remaining to the target marker
8. ▶ Switching to LOCATE menu – after approaching the target marker it is necessary to use the RFID loop antenna for precise detection of the marker. Use the "SML Controller" button to go to LOCATE menu.



▲ *Fig. 29: List of markers*

LIST OF MARKERS

1 ▸ Searching in the list of markers according to ID number or description

2 ▸ Name of the project and line where the marker belongs to

3 ▸ ID number of the marker. In case of analog marker, the text "Analog" is displayed

4 ▸ Marker pictures gallery

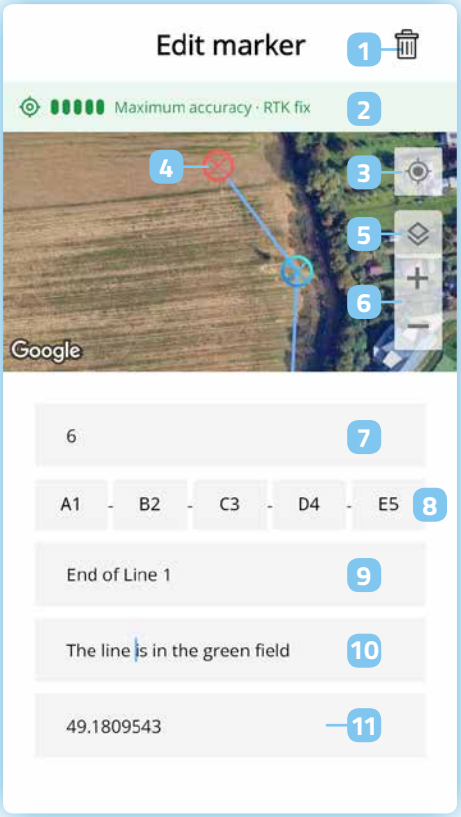
5 ▸ Showing marker on the map

6 ▸ Data synchronization status*

7 ▸ Marker description

8 ▸ Adding a new marker manually

*Data synchronization status is available only if the smartphone is connected to the internet.

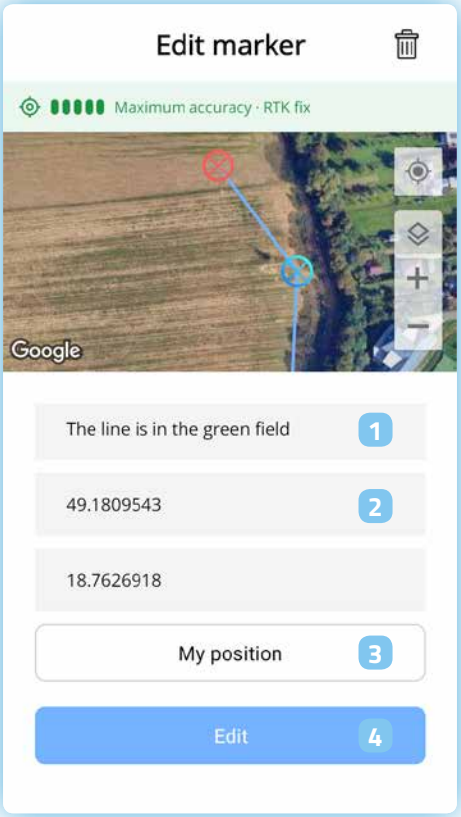


▲ *Fig. 30a: Editing the marker*

EDITING A MARKER

1. ▶ Deleting the marker
2. ▶ SML 2 RTK Positioning solution status. See page 31 for more details
3. ▶ Centering the map on the current position
4. ▶ Current marker
5. ▶ Map Type
6. ▶ Map Zoom
7. ▶ Marker order number
8. ▶ ID number of the marker. In case of analog marker, the text „Analog“ is stored automatically
9. ▶ Marker description
10. ▶ Advanced marker description
11. ▶ GPS coordinates

Move the screen bellow the map up to display the second part of the screen shown in Fig. 30b.



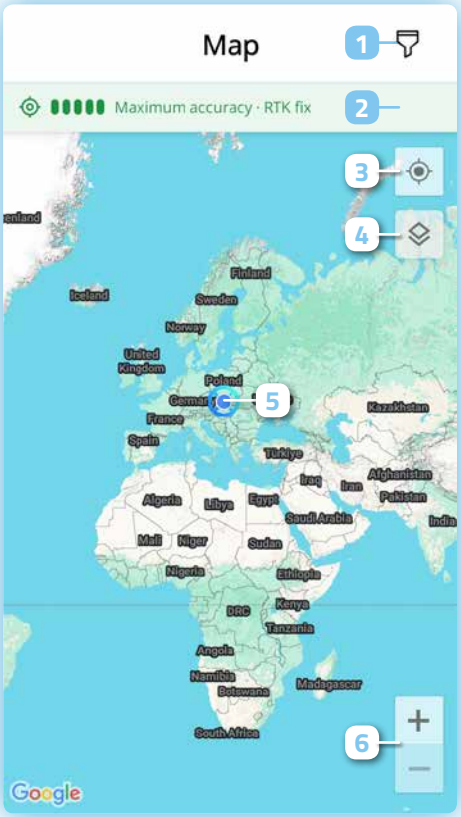
▲ *Fig. 30b: Editing the marker*

1 ▶ Advanced marker description

2 ▶ GPS coordinates

3 ▶ Placing the marker on the current position. **The position of the marker on the map can also be set by touching the map with your finger at the desired position**

4 ▶ Storing the data



▲ *Fig. 31: Map with markers stored in the smartphone memory*

MAP MENU

The Map menu is used for displaying all markers and lines stored in the smartphone memory. Lines with markers that are not stored in the smartphone memory will not be displayed on the map in the Map menu. To access the Map menu, press the "Map" button in the main menu of the application (Fig. 10).

After opening the Map menu, the screen shown in Fig. 31 will be displayed.

1 ▶ Display filter. It is used to mark the lines that you want to display on the map. After clicking on the filter icon, the screen shown in Fig. 32 will appear

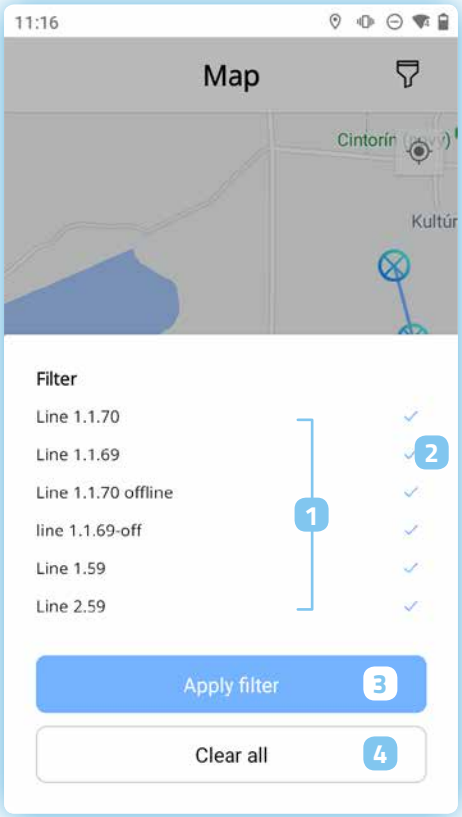
2 ▶ SML 2 RTK Positioning solution status. See page 31 for more details

3 ▶ Centering the map on the user position

4 ▶ Map Type

5 ▶ Markers stored in the smartphone memory. **By clicking on a specific marker, the marker detail screen will display automatically.**

6 ▶ Map Zoom



▲ *Fig. 32: Filter for displaying the markers*

1 ▶ List of lines stored in the smartphone memory

2 ▶ Checked line will be displayed on the map

3 ▶ Apply the filter

4 ▶ No filter will be applied

Note: By clicking on a specific marker, the marker detail screen will display automatically.

POSITIONING SOLUTION STATUS INDICATION IN MAP VIEWS

The SML 2 RTK locator has a built-in GNSS module and GNSS antenna providing more accurate geographic coordinates compared to the standard smartphone GPS. It also allows using RTK corrections for centimeter-level geographic positioning accuracy.

The positioning solution operating status may vary according to the environment, SML 2 app settings, RTK correction availability, locator connection status, internet connection status etc. The positioning solution status is indicated in the status bar in the upper part of map views throughout the app:

- No positioning solution status bar: Phone GPS is selected in Settings – GPS position source



- The locator is not connected to the smartphone via Bluetooth. Check whether the locator is ON and try to reconnect it using the Bluetooth icon in the app main menu.



- Locator GPS is selected in Settings – GPS position source menu, ie. the locator GNSS module should be ON but it needs some time for initialization before it's able to start sending coordinates to the app.



- The locator GNSS module is running and supplying coordinates with basic accuracy.



- The locator GNSS module is running and supplying coordinates. RTK (NTRIP connection) is enabled in Settings – GPS position source but the RTK corrections are not comming yet from the NTRIP caster.



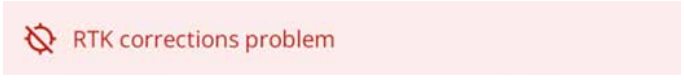
- The locator GNSS module is running and supplying coordinates with enhanced accuracy (differential positioning mode). The green color means that RTK corrections are comming from the NTRIP caster.



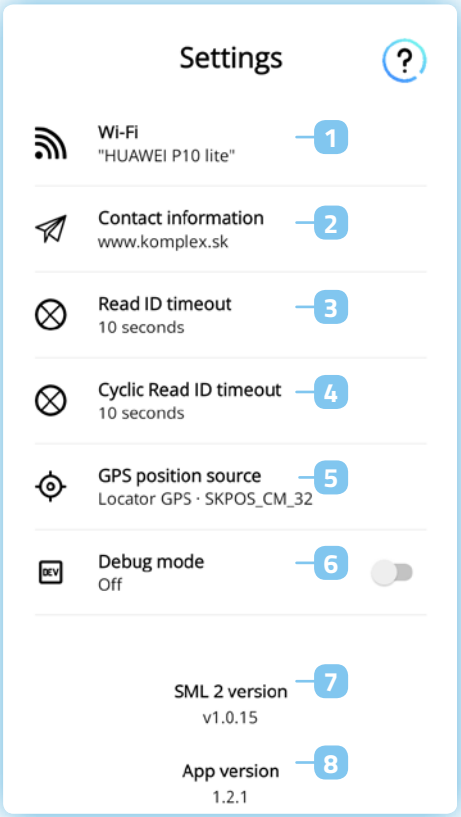
- The locator GNSS module is running and supplying coordinates. RTK corrections are comming but the satellite signal quality is not high enough to achieve full accuracy (RTK float mode).



- The locator GNSS module is running and supplying coordinates. RTK corrections are comming and the satellite signal quality is high enough to achieve full



- A problem occurred during the communication with the NTRIP caster due to internet connection problems or invalid NTRIP user login data etc.



SETTINGS MENU

The SETTINGS menu is used for setting some functionalities of the SML 2 application. To open the SETTINGS menu press the "Settings" button in the main menu of the application (Fig. 10).

The screen shown in Fig. 33 will be displayed.

◀ *Fig. 33: Settings menu*

1 ▶ Turn Wi-Fi connection On/Off. The Wi-Fi control screen is shown in Fig. 34.

2 ▶ Go to www.komplex.sk.

3 ▶ Setting the timeout for reading the ID number. Timeout is the time during which SML 2 tries to read the marker ID number. If the ID number cannot be read within this time, SML 2 considers the marker to be analog. After selecting this menu, the screen shown in Fig. 35 will be displayed.

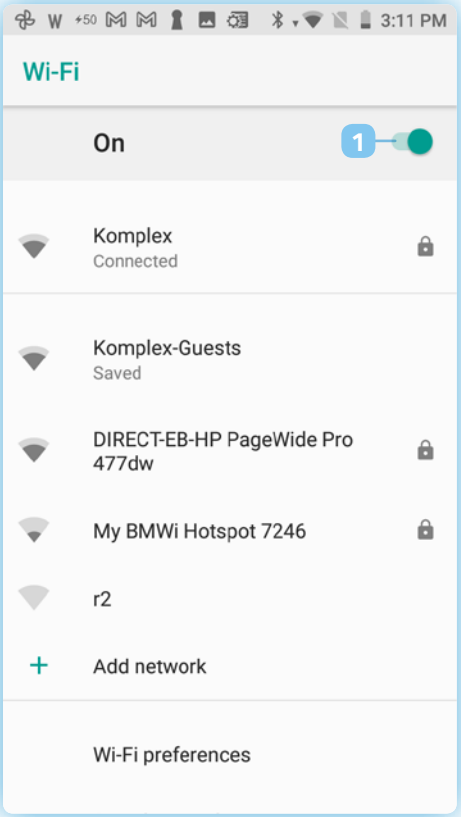
4 ▶ Setting the timeout for cyclic reading of the ID number. Timeout is the time during which SML 2 tries to read the marker ID number. If the ID number cannot be read within this time, SML 2 considers the marker to be analog. After selecting this menu, the screen shown in Fig. 36 will be displayed.

5 ▶ **SML 2 RTK** Setting the source of geographic coordinates. Tap to open the menu shown on Fig. 37.

6 ▶ Enable/disable creating log files for diagnostic purposes. Keep disabled during normal use.

7 ▶ SML 2 locator firmware version.

8 ▶ SML 2 app version.



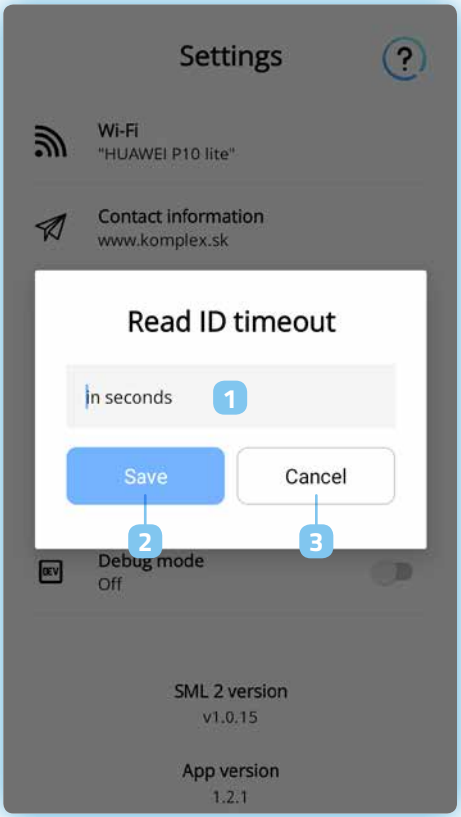
▲ *Fig. 34: Wi-Fi menu*

WI-FI CONNECTION

1 ▶ Turn the Wi-Fi module On/Off

If a SIM card inserted in the smartphone control unit allows connection to the Internet, your SML 2 will automatically be connected to your database on the server **www.markerdatabase.net**.

This means that all your data will be stored in smartphone memory and also on your server account.



▲ *Fig. 35: Read ID timeout*

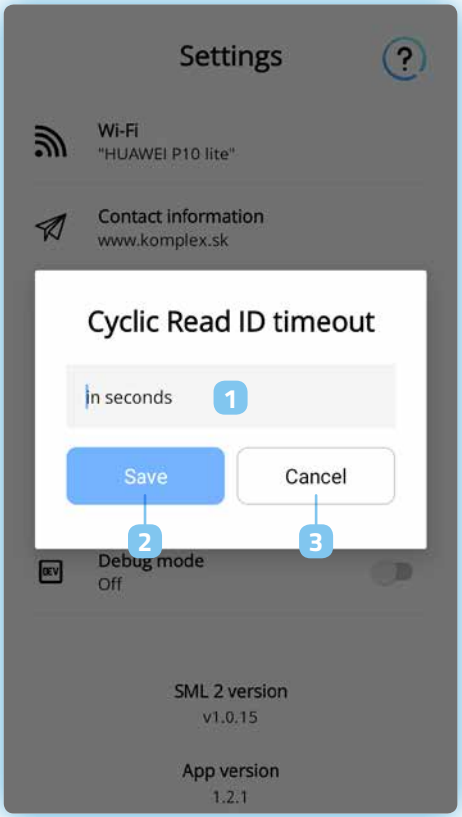
READ ID TIMEOUT

1 ▶ Type the desired timeout in seconds here

Timeout is the time during which SML 2 tries to read the marker ID number. If the ID number cannot be read within this time, SML 2 considers the marker to be analog.

2 ▶ Save the timeout

3 ▶ Cancel setting the timeout



▲ *Fig. 36: Cyclic Read ID timeout*

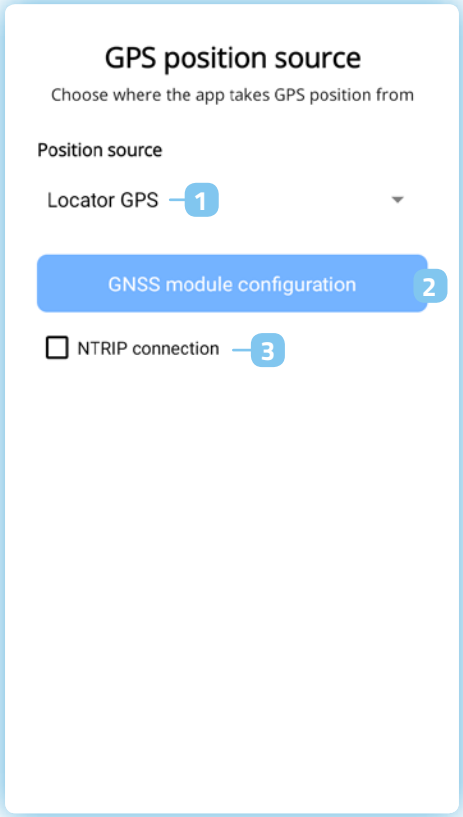
CYCLIC READ ID TIMEOUT

1 ▶ Type the desired timeout in seconds here

Timeout is the time during which SML 2 tries to read the marker ID number. If the ID number cannot be read within this time, cyclic ID reading will be terminated.

2 ▶ Save the timeout

3 ▶ Cancel setting the timeout



▲ *Fig. 37: GPS position source menu*

SML 2 RTK

GPS POSITION SOURCE MENU

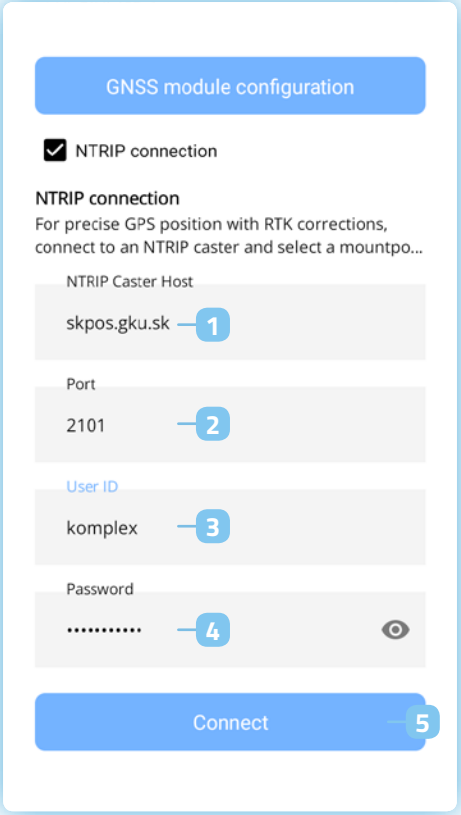
Use this menu to select the source of geographic co-ordinates used in map views. To open the GPS position source menu, press the "GPS position source" button in the Settings menu (Fig. 33).

The screen shown in Fig. 37 will be displayed.

1 ▶ Select "Phone GPS" to use the phone built-in GPS receiver. Select "Locator GPS" to use the GNSS module built in the SML 2 locator.

2 ▶ This button is only shown when "Locator GPS" is selected in the Position source menu above. Press to open GNSS module configuration menu. Its description is outside the scope of this document as using it requires expert knowledge. The GNSS module comes precon-figured so that it works optimally in your SML 2.

3 ▶ This checkbox is only shown when "Locator GPS" is selected in the Position source menu above. Check to use RTK corrections broadcasted via internet connection for centimeter level precision of GPS positioning. After checking this box, NTRIP connection details can be set (Fig. 38)



▲ *Fig. 38: NTRIP connection details*

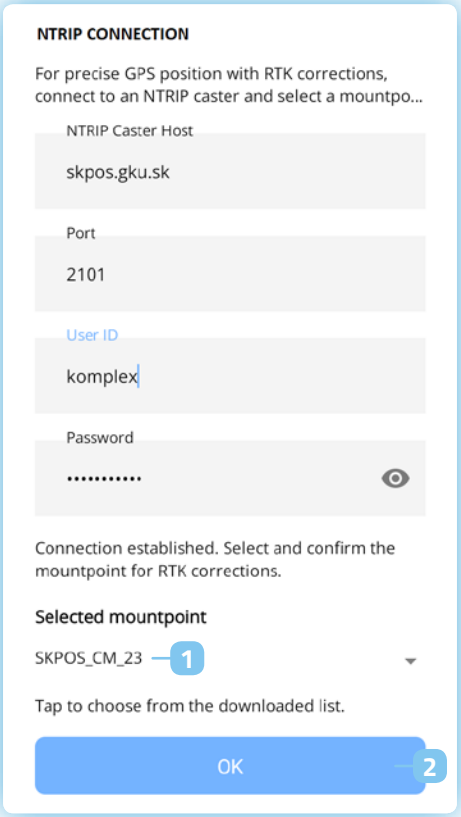
SML 2 RTK

USING RTK CORRECTIONS

The SML2 RTK locator supports centimeter-level positioning accuracy using RTK corrections received via internet connection (NTRIP technology). To use RTK, the phone needs to be connected to the internet, and you need to register a user account at your local NTRIP service provider. To ensure a stable internet connection, we recommend using a SIM card with an active mobile data plan in the SML2 smartphone.

Enter the details obtained from the NTRIP service provider in the fields described below:

1. ▶ Enter the hostname or IP address of the NTRIP caster
2. ▶ Enter the port number of the NTRIP caster
3. ▶ Enter your user ID provided by the NTRIP service provider
4. ▶ Enter the password you chose during the NTRIP user account registration process
5. ▶ When connecting to the NTRIP caster for the first time or when the automatic re-connection fails, press the Connect button to connect to the caster so that the app can download the list of mountpoints (RTK base stations). The screen shown on Fig.39 will appear



▲ *Fig. 39: Selecting a mountpoint*

SML 2 RTK

1 ▶ Currently selected mountpoint. If the mountpoint shown does not suit your needs*, tap to view the list of available mountpoints and select the one you need

2 ▶ Press to confirm the selected mountpoint

* Mountpoints may represent physical base stations with fixed coordinates, or virtual base stations providing corrections calculated to your approximate geographic position. The mountpoints may provide corrections in different data formats and with different accuracy. Always check the NTRIP provider's documentation to select the mountpoint that suits your needs.

DATA SYNCHRONIZATION

Your underground markers data is stored in the following storage locations:

- Smartphone memory
- Server www.markerdatabase.net – only if the smartphone is connected to internet

Data on www.markerdatabase.net can be created manually without SML 2, through your PC.

Storage location where the data is stored is shown in SML 2 application by symbols shown in Fig. 40.



- Data is stored in the smartphone memory



- Data is stored on server www.markerdatabase.net

▲ *Fig. 40: Symbols of storage location*

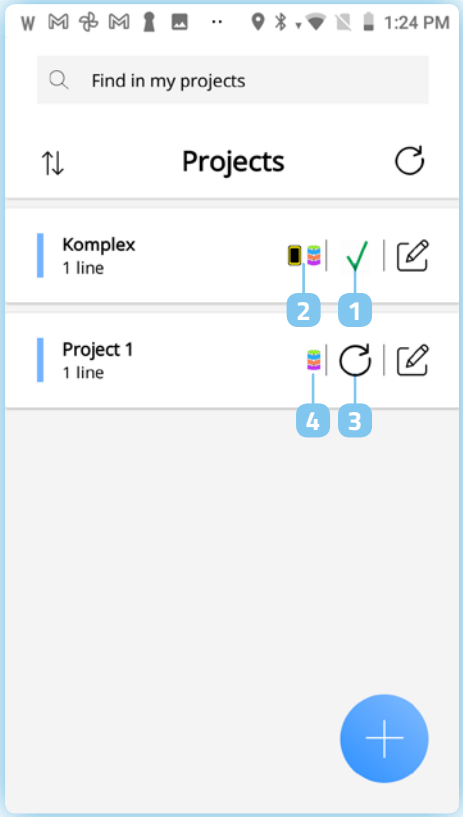
Synchronization status symbols are shown in Fig. 41.



- Synchronization is done = data is stored in the smartphone memory and on server as well
- Synchronization is required. Starting synchronization. Synchronization is only possible for lines and markers. After all markers and lines in a project have been synchronized, the synchronization status symbols for the project will change automatically.

▲ *Fig. 41: Synchronization symbols*

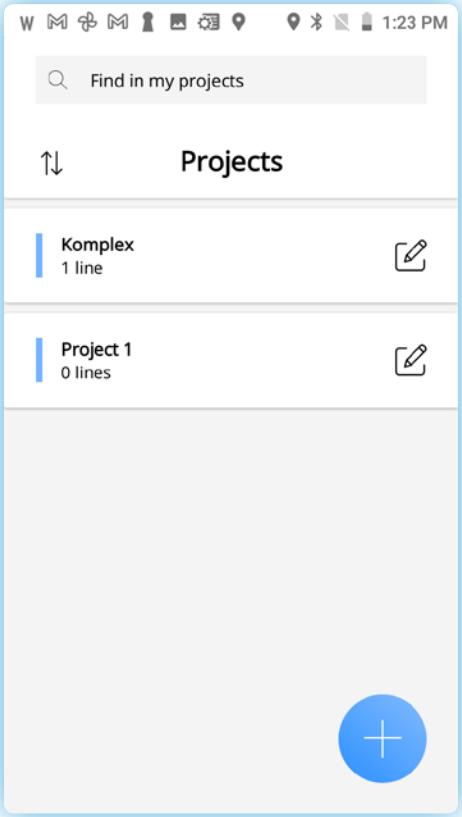
Synchronization symbols are displayed only if the smartphone is connected to the internet = Online mode. Online mode can slow down the work with the data in the Project menu due to synchronization.



▲ *Fig. 42: Project synchronization symbols*

Example of different synchronization statuses of the projects is shown in Fig. 42.

The synchronization symbols are the same for Project, Lines and markers.



▲ *Fig. 43: List of projects in offline mode*

1 ▶ All lines and markers in project are synchronized

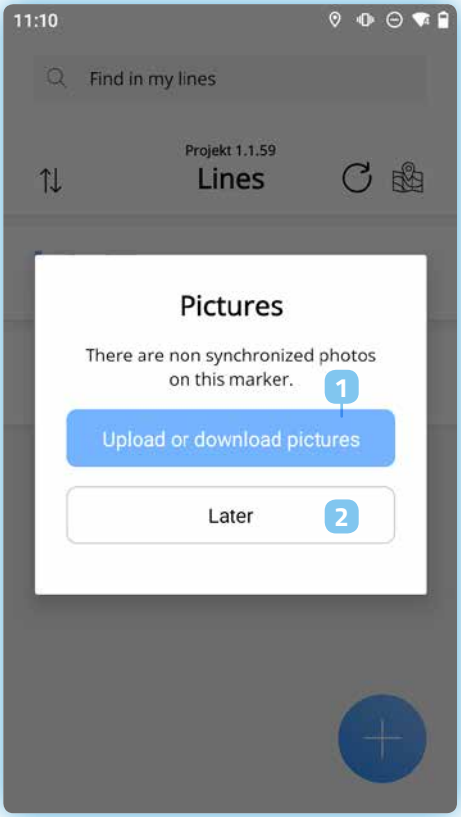
2 ▶ Data is stored in the smartphone memory and on server as well

3 ▶ Synchronization required, starting synchronization

4 ▶ Data is located on server only (www.markerdatabase.net)

The same project list in Offline mode is shown in Fig. 43.

If the data includes photos, SML 2 will ask you before synchronization if you want to synchronize the photos as well – Fig. 44.

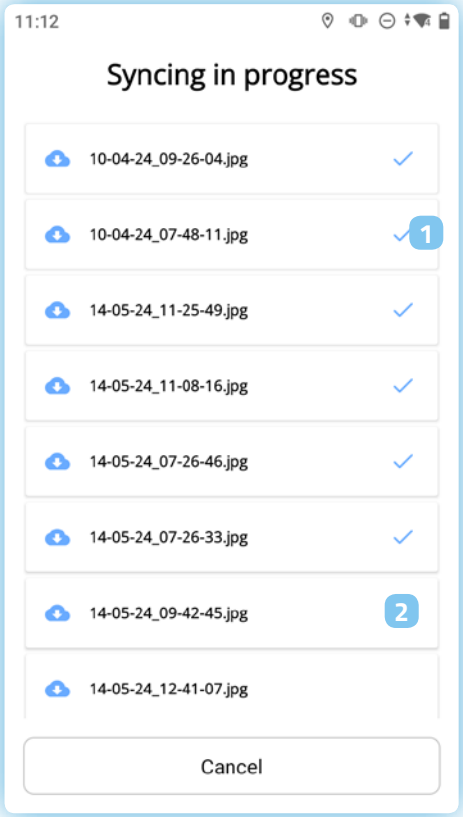


◀ *Fig. 44: Pictures synchronization confirmation*

1 ▶ Confirmation of synchronization of pictures

2 ▶ No confirmation of synchronization of pictures

After confirming the photo synchronization, an informative screen will appear with the synchronization status of each photo. An example of such a screen is shown in Fig. 45.



◀ *Fig. 45: Pictures synchronization status*

1 ▶ Picture has been synchronized

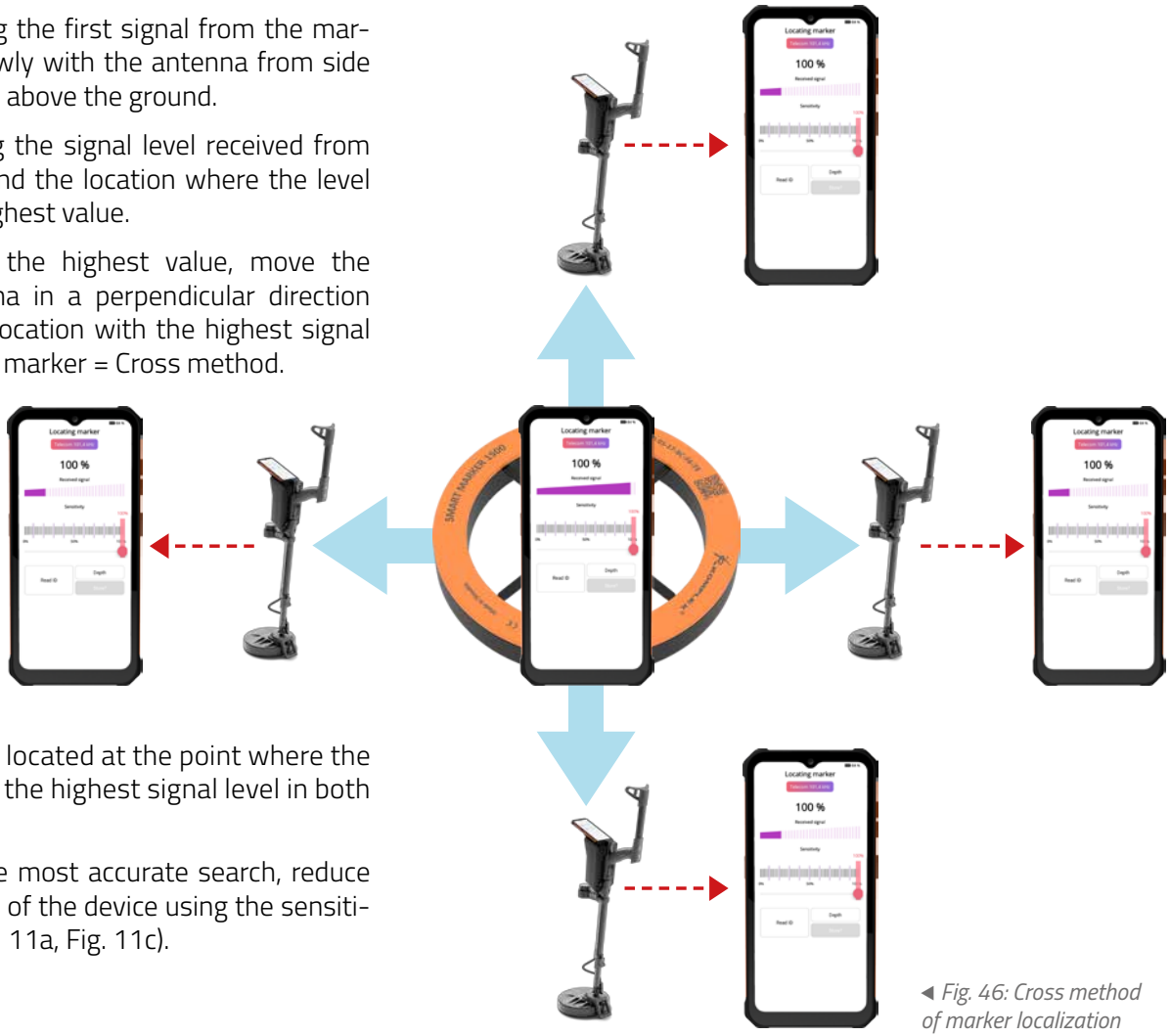
2 ▶ Picture synchronization in progress

MARKER LOCATION PRINCIPLE

The principle of locating of underground markers is based on searching for the maximum signal response from the marker.

PROCEDURE:

1. After turning On the SML 2, choose "Locate" menu in the application main menu.
2. After receiving the first signal from the marker, move slowly with the antenna from side to side closely above the ground.
3. By monitoring the signal level received from the marker, find the location where the level reaches its highest value.
4. After finding the highest value, move the SML 2 antenna in a perpendicular direction and find the location with the highest signal level from the marker = Cross method.



◄ *Fig. 46: Cross method of marker localization*

5. The marker is located at the point where the device shows the highest signal level in both directions.
6. To achieve the most accurate search, reduce the sensitivity of the device using the sensitivity slider (Fig. 11a, Fig. 11c).

MARKER LOCATION PRINCIPLE

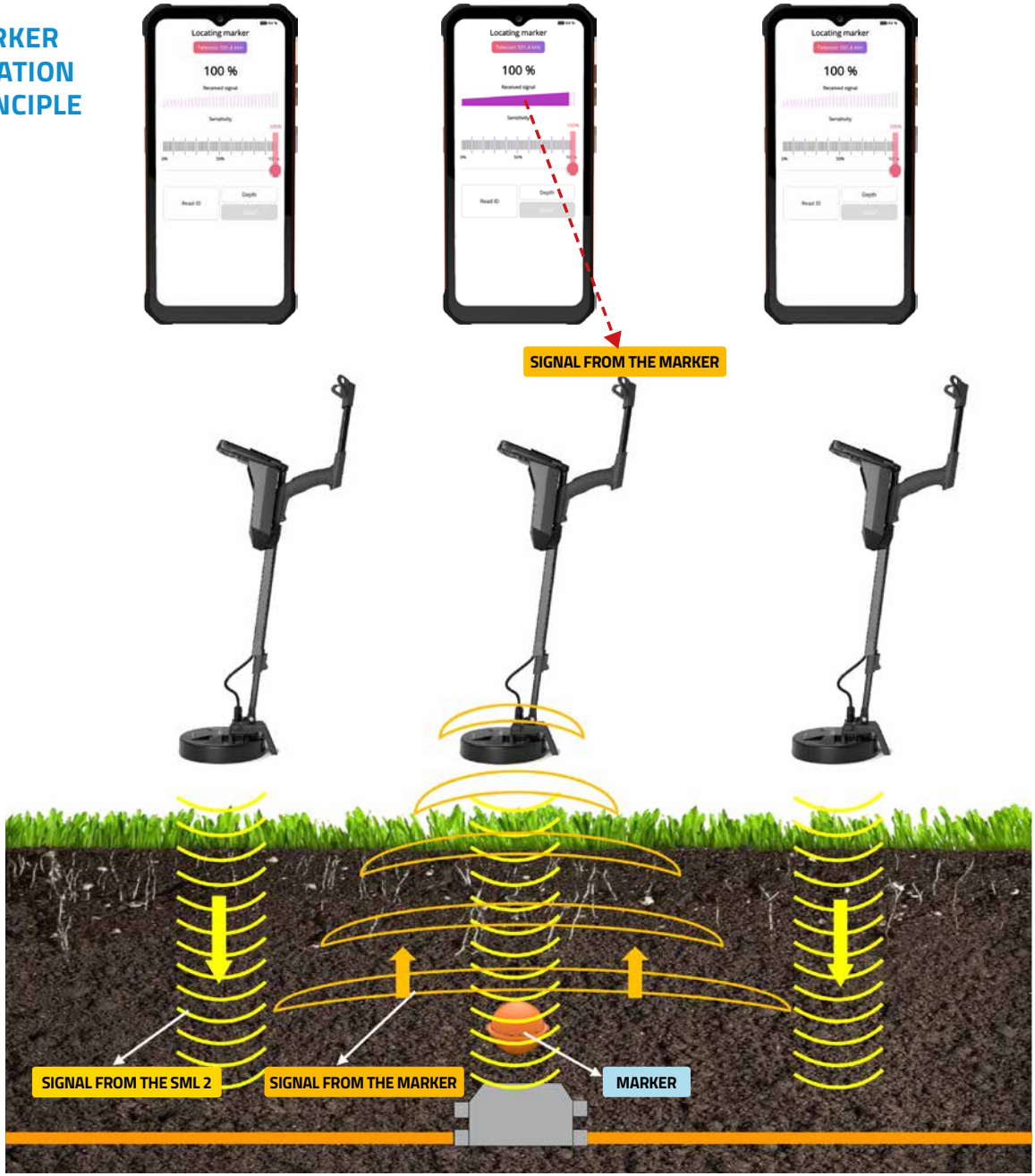


Fig. 47: Searching of maximum signal from marker

TECHNICAL SPECIFICATIONS SML 2 AND SML 2 RTK

		SML 2 RTK	SML 2
Operating system	Android 14	✓	✓
CPU	Hello G36 2.2 GHz	✓	✓
Memory	Min. 16 GB Flash/4 GB RAM	✓	✓
Expansion	Micro SD card slot	✓	✓
SIM/Supported SIM card	2 SIM slots/Micro SD, SDHC, SDXC (max. 256 GB)	✓	✓
Working hours	Min. 12 hours	✓	✓
Operating power	Rechargeable 6 500 mAh; Li-ion battery/3.75 V 5 300 mAh	✓	✓
Wireless communication	WWAN (2G, 3G, 4G, 5G LTE), WLAN, WPAN, Bluetooth®	✓	✓
GPS	Integrated GPS module with standard GPS location accuracy	✓	✓
GPS	**Integrated GNSS receiver with RTK support enabling centimeter-level positioning accuracy**	✓	✗
GNSS/RTK communication parameters	– Positioning: GNSS + RTK – Correction mechanism: RTK – Correction protocol: NTRIP Client – Correction data format: RTCM 3.x – Transmission interface: TCP/IP – **Communication interface: LTE/4G/5G/Wi-Fi** – Correction source: NTRIP Caster/reference station network – **NTRIP Client v2.0 support for receiving RTCM 3.x RTK correction data**	✓	✗
Camera	Autofocus 13 megapixels	✓	✓
Display	6.56'' IPS LCD; capacitive touch	✓	✓
Operating frequency*	83.0 kHz, 101.4 kHz, 121.6kHz, 134.0 kHz, 145.7 kHz *For each frequency is necessary to use corresponding antenna	✓	✓
Weight *(Locator with one antenna)*	Max. 2,5 kg	✓	✓
Adjustable length of antenna bar	Yes: 85-116 cm	✓	✓
Data storing modes	**Online mode:** Automatic data uploading to cloud based storage **Offline mode:** Data storing into the device's internal memory. Data can by uploaded to cloud based storage memory after changing back to online mode.	✓	✓
Digital maps support	Google maps integrated	✓	✓
37 x 90 x 26 cm (W x L x H)	Max. 7 kg	✓	✓

NOTES



SCOPE OF DELIVERY

- SML 2 – 1 pc
- Rechargeable battery for SML 2 – 1 pc – already inbuilt
- Industrial smartphone – 1 pc
- Single-frequency RFID loop antenna – 1 pc
  (types and number of antennas according to the purchase order)
- Battery charger for SML 2 – 1 pc
- Battery charger for the smartphone – 1 pc
- Transport bag – 1 pc
- Unlimited license for Marker Database® software

Each frequency requires a different RFID loop antenna.

MARKER® database

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