Leica mojoMINI2
User Manual

Version 1.1
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a Leica mojoMINI 2 system.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "6 Safety Directions" for further information. Read carefully through this User Manual before you switch on the product.

To ensure safety when using the system, please also observe the directions and instructions contained in the User Manual and Safety Handbook issued by the:

- Agricultural machinery manufacturer.

Product identification

The type and serial number of your product are indicated on the type plate. Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type: _____

Serial No.: _____

Symbols used in this manual

The symbols used in this manual have the following meanings.

Type	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious personal injury.
⚠ **WARNING**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious personal injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate personal injury, appreciable material, financial and environmental damage, or all of these.
☞	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Trademarks

- Windows is a registered trademark of Microsoft Corporation
- SD is a trademark of the SD Card Association

All other trademarks are the property of their respective owners.

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The images in this manual are for reference purposes only. Individual screens and icons may differ from the actual items.

1.1 In the Box

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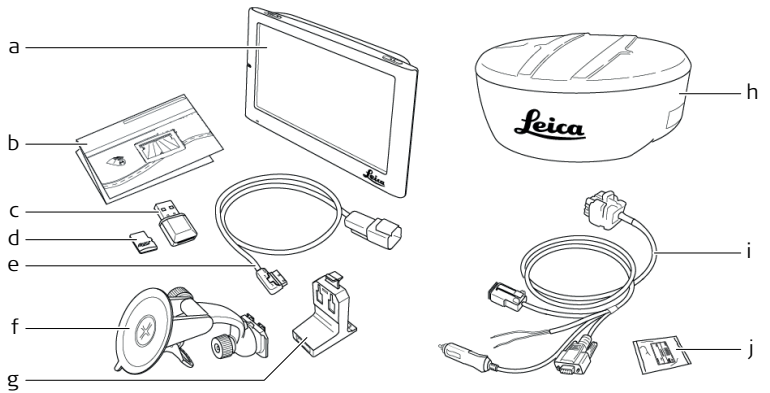
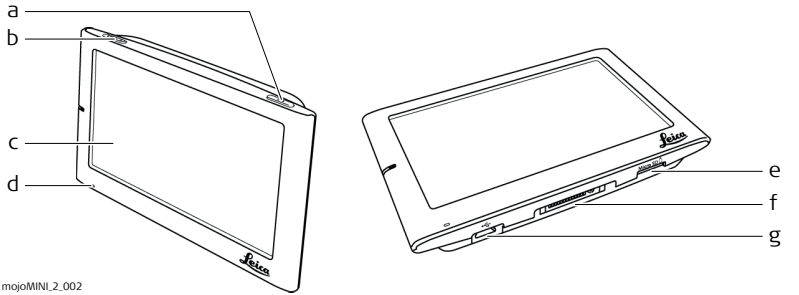


a) mojoMINI 2 display
b) Product documentation
c) USB, micro SD card reader
d) Micro SD memory card
e) mojoMINI 2 cable
f) Mounting bracket with suction cup
g) Mounting cradle
h) GeoSpective 2 smart antenna
i) GeoSpective 2 cable
j) GeoSpective 2 mounting kit

1.2 mojoMINI 2 Display

Components



mojoMINI_2_002

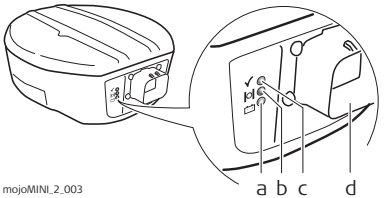
a) Sleep button
b) On-Off (Power) switch
c) LCD screen
d) Charge indicator
e) USB Charger connection
f) Cradle connection
g) Micro SD Card slot

Description

Component	Function
LCD screen	The mojoMINI 2 is operated by touching images on the screen, either with a fingertip or with a stylus.
Charge indicator	When the battery is charging the light is red. When the battery is fully charged the light is blue.
Sleep button	To enter standby mode, or to return from standby mode, press the power button for a few seconds.
Micro SD Card slot	Insert the micro SD card into this slot.
On-Off (Power) switch	Use this switch to reset the system. For **storage** ensure this switch is in the **OFF** position to prevent the internal battery from being drained. Ensure the switch is in the **ON** position **to operate** the mojoMINI 2.
USB-style charging port	Not used in the normal operation of the mojoMINI 2.
Cradle connection	The connection to the cradle for communications and power.

1.3 GeoSpective 2 Smart Antenna

Components



a) Power LED
b) Position status LED
c) Position type LED
d) Power/Data port

LED description

Red	Yellow	Green	Condition
Off	Off	Off	Power is not available.
On	Off	Off	Power available but no satellites are tracking yet.
On	Flashing	Off	Tracking at least one satellite but not a valid position.
On	On	Off	Position valid in basic autonomous mode.
On	On	On	Position valid in an enhanced accuracy mode (WAAS/EGNOS/MSAS).

1.4 Precautions

General precautions

The following precautions should be followed when using the mojoMINI 2.

- To reduce the risk of electric shock, do not open any covers. There are no user-serviceable parts inside. Refer all servicing to qualified personnel.
- If the mojoMINI 2 will not be used for a length of time, unplug any external power source.
- Keep liquids away from the mojoMINI 2: do not place containers of liquid on or near it.
- Clean the mojoMINI 2 only with a dry cloth.
- Do not block any ventilation openings. Do not block air flow around the mojoMINI 2.
- Do not install near any heat sources (for example: radiators, stoves, electronic amplifiers).
- Ensure that the power cords are not damaged.
- Unplug the mojoMINI 2 during storms.

⚠ WARNING This product should not be used in aircraft navigation.

2 System Installation

2.1 Before Installation

General installation information

Installation does not require specialist knowledge. This user manual contains sufficient information for installation and safe use.

- The following instructions are to be used as a general guide during the installation of the mojoMINI 2.
- Install the system in a clean and dry environment. Failure to do so may result in product malfunctions.
- Ensure that the cables do not chafe or rub.

Two major components

- The two major components of the mojoMINI 2 system are the mojoMINI 2 display and the GeoSpective 2 smart antenna.

2.2 Installing the GeoSpective 2 Smart Antenna

Equipment required

The GeoSpective 2 smart antenna is a high-performance GPS receiver, which is used in conjunction with the mojoMINI 2.
For installation and setup, you will need:

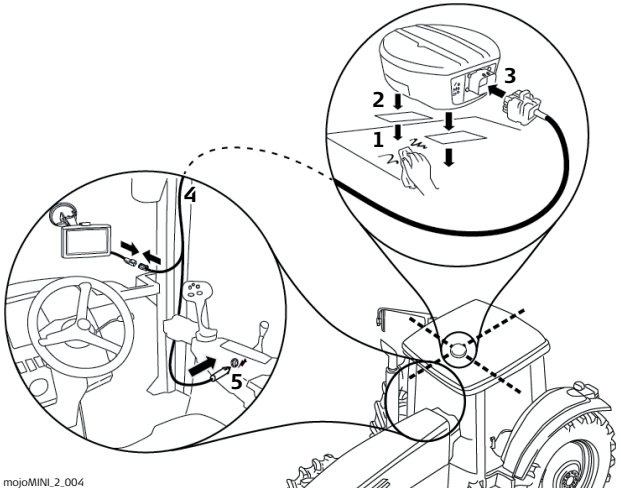
- the GeoSpective 2 smart antenna;
- alcohol wipes;
- adhesive strips;
- a GeoSpective 2 cable, to connect the GeoSpective 2 smart antenna to the vehicle's cigarette lighter outlet and the mojoMINI 2.

WARNING

- If the power supply voltage is outside the specified range, the GeoSpective 2 smart antenna will not operate.
- If the power supply voltage exceeds +36 V DC, then the GeoSpective 2 smart antenna may be permanently damaged. This damage is not covered by warranty.

Mounting requirements

- When installing the GeoSpective 2 smart antenna, choose a location that has a clear view of the sky, so that all satellites above the horizon can be tracked.
- Mount the GeoSpective 2 smart antenna on a secure, stable structure where it will not present any danger. Most installations are on the tractor cab roof.



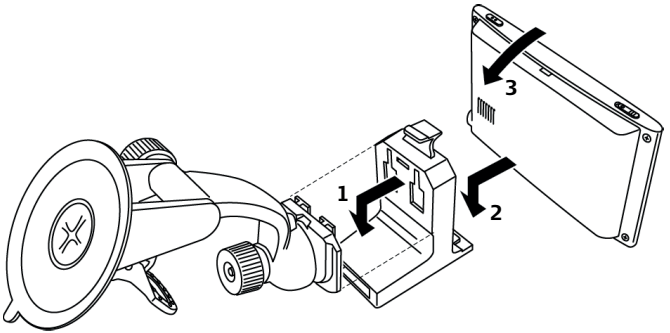
1. Clean the mount points with the alcohol wipes provided.
2. Mount the GeoSpective 2 smart antenna on the roof of the vehicle. Use the adhesive tape provided or the built-in magnets.

3. Plug the GeoSpective 2 cable into the port at the back of the smart antenna. The connector fits one way only.
4. Thread the GeoSpective 2 cable into the vehicle's cab taking care not to kink the cable and to locate it so chafing does not occur.
5. Plug the GeoSpective 2 cable into the vehicle's cigarette lighter outlet.

2.3 Installing the mojoMINI 2

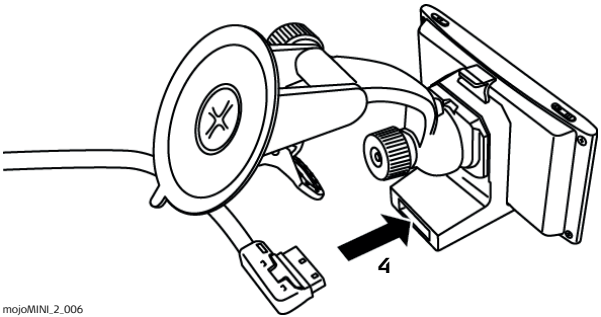
mojoMINI 2 installation

The mounting bracket for the mojoMINI 2 is held in place on the windscreen of the vehicle by a suction cup.



mojoMINI_2_005

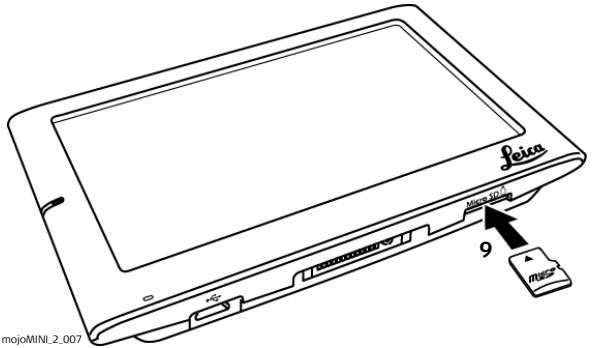
1. Slide the mounting cradle onto the end of the mounting bracket.
2. Set the bottom edge of the mojoMINI 2 unit onto the mounting cradle.
3. Push the top edge of the mojoMINI 2 under the clip at the top of the mounting cradle.



4. Plug the rectangular connector of the mojoMINI 2 cable into the socket of the mounting cradle.

⚠ CAUTION To prevent permanent damage, ensure the cable is disconnected from power before connecting the mounting cradle.

5. Clean the area of the windshield where the suction cup will be placed.
6. Lift the suction cup lever, and press the suction cup to the windshield.
7. Push down the suction cup lever, to attach the cup firmly to the windshield.
8. Rotate the unit until the screen is comfortably visible.



9. Insert the micro SD card into the slot at the bottom right of the mojoMINI 2.

CAUTION To prevent loss of data or damage to the card or device, the card should only be inserted or removed when the device is turned off.

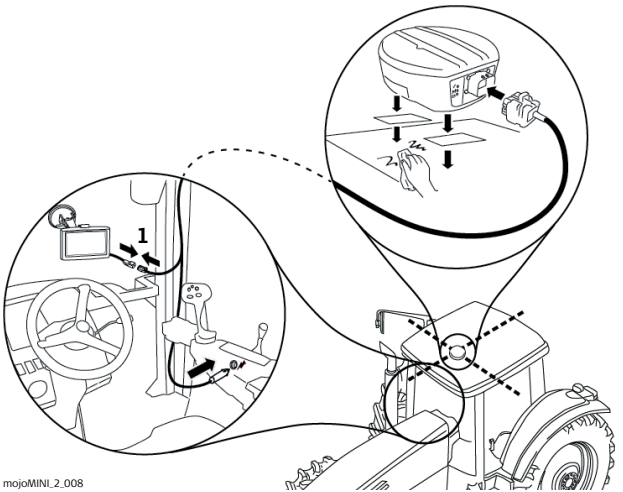
CAUTION Take care when inserting the card. The card must be inserted in the correct orientation to prevent permanent damage to the card or device.

⚠ **WARNING**	Do not mount the mojoMINI 2 where it may obscure the driver's view of the road or field.
⚠ **WARNING**	Do not mount the mojoMINI 2 where it may be struck by a deploying airbag.

2.4 Connecting the mojoMINI 2 to the GeoSpective 2 Smart Antenna

Connecting mojoMINI 2 to GeoSpective 2 smart antenna

To connect the mojoMINI 2 and the GeoSpective 2 smart antenna:



1. Connect the mojoMINI 2 cable to the grey square plug of the GeoSpective 2 smart antenna's cable.
2. Ensure all cables are carefully routed so no kinking or chafing occurs, as this may degrade performance, and so they do not hinder the operator of the vehicle.

2.5 Other Connections for the GeoSpective 2 Smart Antenna

The GeoSpective 2 smart antenna's cable offers two other connections:

- NMEA output through the D9 port; and
- Ground speed radar simulation through the spade connectors.

If these outputs are required, make the appropriate connections.

The default NMEA configuration is:
- Port - 9600 Baud, 8 Data Bits, Parity None, 1 Stop Bit
- Messages - GGA @ 5Hz, VTG @ 5Hz

The NovAtel Connect utility, available from www.novatel.com, can be used to customize the NMEA output on the COM1 port.

3 System Start Up and Settings

This chapter details how to start the mojoMINI 2 system and explains the main navigation screen - the screen that the operator will view the majority of the time. How to configure the lightbar, and the screen background and brightness is also discussed, along with how to use the calculator feature.

Please ensure that your mojoMINI 2 and GeoSpective 2smart antenna have been installed in accordance with the installation instructions in Chapter "2 System Installation".

3.1 Start-Up

Starting the mojoMINI 2 system

To start the mojoMINI 2 system:

1. Turn the vehicle on or at least turn the key to Accessories, so the cigarette lighter outlet is powered.
   This provides power to the mojoMINI 2 and the GeoSpective 2 smart antenna.
2. On the mojoMINI 2, turn the On-Off (Power) switch to the On position.

   The mojoMINI 2 starts up, and the screen displays a Field button  in a grey band in the middle of the screen (as shown below).

3.2 Changing the Brightness

Brightness

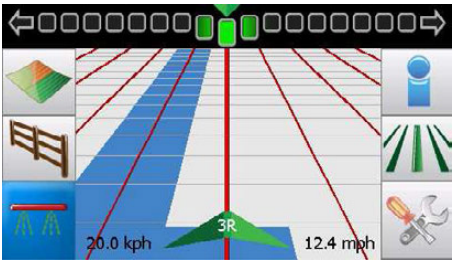
To change the brightness of the screen, carry out the following procedure:

1. On the opening screen, tap the tools icon at the bottom left of the screen.
2. Tap the right arrow to make the screen brighter, and tap the left arrow to make the screen dimmer.
3. To return to the opening screen, tap the return button.

3.3 Main Navigation Screen

Overview

The main navigation screen is the screen that the operator will view most of the time during normal operation.



The main navigation screen has five main parts: the lightbar, main display, information area, left menu bar and right menu bar.

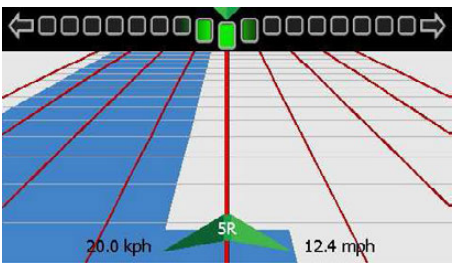
1. **Lightbar**
   The lightbar is located at the top of the screen. The operator can configure the lightbar to be either a Smart lightbar or a Crosstrack only lightbar. Refer to Section "3.4 Lightbar Configuration" for information on setting up the lightbar.

2. **Main Display**
   The main part of the screen shows waylines in perspective and highlights the nearest line.
3. **Information Area**
   The information area is located at the bottom of the screen. Centred in this area is the wayline row number. To the left of this is the current speed as kilometres per hour (kph), and to the right is the current speed as miles per hour (mph).
4. **Left Menu Bar**
   The menu bar located on the left side of the screen provides buttons for:
   - Field button,  , to start a new field or continue an existing field. Refer to Chapter "4 Field Navigation" for details.
   - Boundary button,  , to record a field boundary. Refer to Section "4.8 Field Boundaries" for details.
   - Coverage button,  , to start and stop recording coverage. Refer to Section "4.7 Recording Coverage" for details.
5. **Right Menu Bar**
   The menu bar located on the right side of the screen provides buttons for:
   - Information button,  , to access GPS status and the calculator.

- Guidance button,  , to access setting AB, A+ Heading, Contour and Pivot waylines. Refer to "4 Field Navigation" for details on setting up waylines and wayline management.
- System Settings button,  , to set up the day/night mode and SBAS mode. Refer to Section "3.5 Day/Night Settings" for details on day/night mode, and Section "4.12 SBAS" for details on SBAS.

Display Area Optimization

If the operator does not touch the screen for 20 seconds, the menu buttons on the left and right of the screen disappear to give the operator a greater display area.



To get the menu buttons to reappear, tap the screen anywhere under the lightbar.

3.4 Lightbar Configuration

Overview

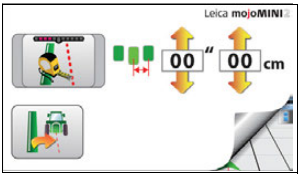
The lightbar has two modes that the operator can select from: Smart lightbar and Crosstrack lightbar.

Smart lightbar	uses both crosstrack error and heading error to guide you to the line.
Crosstrack - Chase	the lightbar represents where the line is relative to where the vehicle is, and to steer to the line, you steer towards the light - that is, you "chase" the light.
Crosstrack - Pull	the lightbar represents the position of the vehicle relative to the line, and to steer the vehicle onto the line, you steer away from the light to "pull" the light to the line.

Lightbar setup step-by step

To setup the lightbar, carry out the steps below:

1. Tap the lightbar at the top of the screen. The Lightbar setup screen appears.



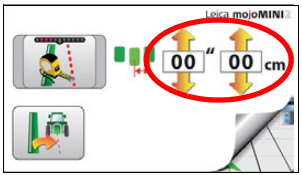
2. Select the desired lightbar mode by tapping the Lightbar Mode button until the button matching the mode appears.

Smart Lightbar 

Crosstrack Chase 

Crosstrack Pull 

3. If a Crosstrack lightbar is selected, configure the amount of crosstrack error per lightbar segment but tapping the up arrow  or down arrow  on the imperial or metric measurement.



   This setting determines how much crosstrack error is represented by each segment in the lightbar. A small number makes the lightbar more sensitive and hard to follow, but more accurate. A large number makes the lightbar less sensitive and easy to follow, but less accurate. This value has a range of 0.4"/1cm to 8.0"/20cm per segment.
4. To return to the main navigation screen, tap the bottom right corner of the screen.

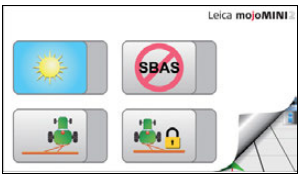
3.5 Day/Night Settings

Day/night settings

The screen background may be set to bright (daylight setting) or dull (night setting).

To change from one background setting to the other, carry out the following procedure:

1. On the main navigation screen, tap on the **settings** icon  .
2. The Settings screen appears.



3. The icon that displays on the top left indicates the current background setting, where:
   -  is Day, and
   -  is Night.

   To change the background of the display, tap on the **day** or **night** icon.

3.6 Calculator

The Calculator

The calculator is a standard one-memory calculator with a square-root function and a number of quick-conversion buttons.

To open the calculator, either:
- tap the calculator icon at the bottom of the opening screen; or
- tap the calculator icon on the Field Navigation information screen.

Unit Conversions

The calculator screen contains buttons for unit conversions:
- hectares to acres, and acres to hectares
- kilograms to pounds, and pounds to kilograms
- litres to US gallons, and US gallons to litres.

Enter the number that you wish to convert, and tap the conversion button. The answer appears immediately.

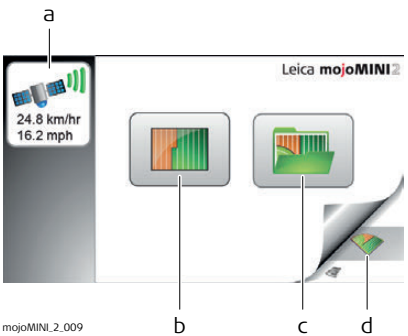
- The gallon used in conversions is the US gallon, not the Imperial gallon (which is about 20% larger than the US gallon).

4 Field Navigation

4.1 Starting Field Navigation

Starting field guidance

On the mojoMINI 2 opening screen, tap on the **Field icon**  .
The Field screen appears:



a) GPS and speed status
b) Start new field
c) Continue last field
d) Return button, returns to the start screen

Press  to start a new field or  to continue your last field with the previous wayline.

Some features may not be available until the mojoMINI 2 has a GPS position. The GPS status icon has many possible states, indicating the current status:


Good Data, poor signal strength


Good Data, low signal strength


Good Data, medium signal strength


Good Data, good signal strength


Configuration error


Configuring


Invalid data


No data

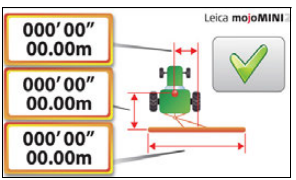
4.2 Starting a New Field

Setting the vehicle offsets

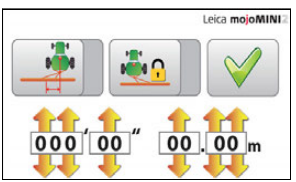
After selecting the start new field option set the implement offset, implement width and distance from the antenna to the implement by tapping the measurement you want to change.

All measurements are important for spacing out the waylines and accurately displaying treatment coverage.

1. When the start new field option is selected, the Vehicle Measurements screen appears.



2. To set the implement offset measurement, tap in the first measurement box.
   The Implement Offset screen appears.



3. The left-most button indicates whether the implement is offset to the left or the right.

    - implement is offset to the left

    - implement is offset to the right

   If your implement is centered behind the antenna, it does not matter which offset button is active.

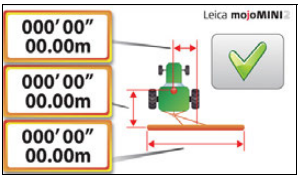
   Tap the button to change it to the one that represents your configuration.
4. To enter the implement offset measurement, tap the up or down arrows on the screen. The measurement is shown in both metric and US units: either may be adjusted, and the other changes accordingly.
5. The middle button is for configuring whether the implement is locked, that is, it does not swap to the other side of the vehicle when the vehicle turns around, or whether it is not locked.

    - implement is locked and does not swap to the other side of the vehicle upon turning.

    - implement is not locked and does swap to the other side of the vehicle upon turning.

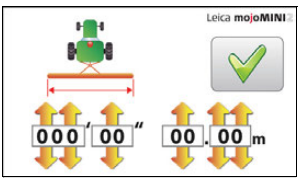
   Tap the button to change it to the one that represents your configuration.

6. To return to the vehicle measurements screen and continue the implement setup, tap the ✓ button.
7. For the implement width (3rd measurement shown in the picture) and the distance from the antenna to the implement (2nd measurement shown in the picture), select the measurement to change, and specify the value by tapping the up or down arrows on the screen. The measurements are shown in both metric and US units: either may be adjusted, and the other changes accordingly.

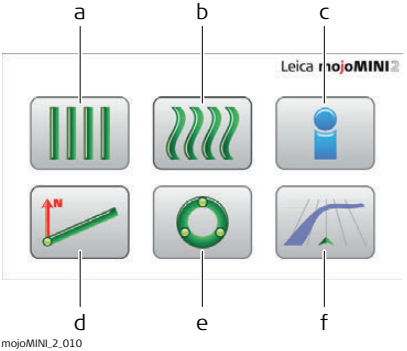


8. Tap on ✓ after setting each measurement.

   When you are finished tap on ✓ while all measurements are being displayed to continue to the next screen.



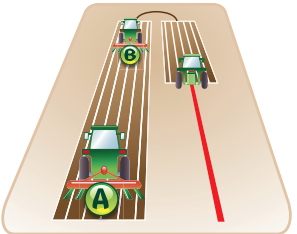
9. Tap on the appropriate guidance type.



a) AB Parallel guidance
b) Fixed Contour guidance
c) Information
d) A+ Heading guidance
e) Pivot guidance
f) Navigation Screen: Go straight to the field view without setting guidance

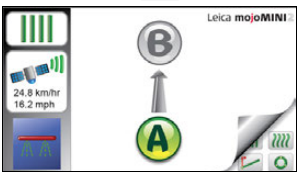
4.3 Setting AB Waylines

Setting an AB wayline



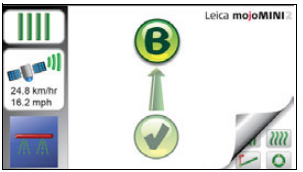
To set an AB parallel wayline (a straight line between two selected points), carry out the following procedure:

1. On the guidance screen, tap on the **AB Parallel** guidance icon .
2. The first AB Parallel guidance screen appears.
3. Drive to the position in the field where you want to set (waypoint A) and tap **A** on the screen.



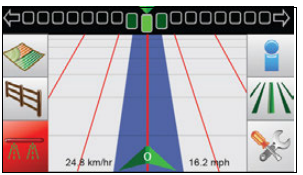
Treatment coverage can be turned on or off by tapping while setting the wayline.

4. Drive to the desired endpoint (waypoint B) and tap **B**.



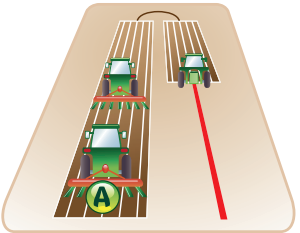
The distance between points A and B must be at least 30 metres (100 feet). The greater the distance between the waypoints, the better the accuracy of the working line will be.

5. Turn the tractor until the red line is vertical, and drive along the wayline.



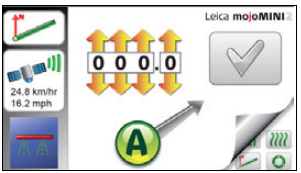
4.4 Setting A+ Heading Guidance

Setting an A+ wayline



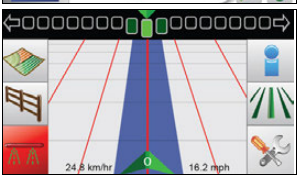
To set an A+ Heading wayline (starting point plus compass bearing), carry out the following procedure:

1. On the guidance screen, tap on the **A+ Heading** guidance icon .
2. The first A+ Heading guidance screen appears.
3. Drive to the position in the field where you want to start (waypoint A) and tap **A** on the screen.



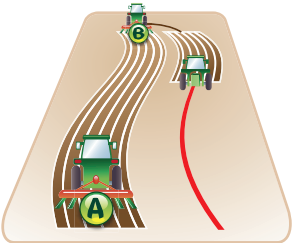
Treatment coverage can be turned on or off by tapping while setting the wayline.

4. Use the upper arrows to enter the compass bearing of the wayline, in degrees. (0° is north, 90° is east, 180° is south, and 270° is west.)
5. Tap on ✓.
6. Turn the tractor until the red line is vertical, and drive along the wayline.



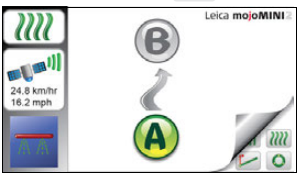
4.5 Setting Fixed Contours Guidance

Setting a fixed contour



To set a Fixed Contour wayline, carry out the following procedure:

1. On the guidance screen, tap on the **Fixed Contour** guidance icon .
2. The first Fixed Contour guidance screen appears.
3. Drive to the position in the field where you want to start (waypoint A) and tap **A** on the screen.



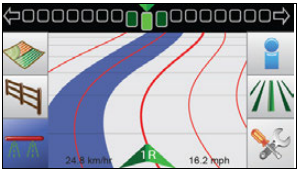
Treatment coverage can be turned on or off by tapping while setting the wayline.

4. Drive along the curved line to the desired endpoint (waypoint B) and tap **B**.

While the mojoMINI 2 is recording contour data, the pause symbol is shown. If you want to pause the recording at any time, tap the pause symbol. The resume symbol will appear. Tap the resume symbol when you are ready to continue recording.

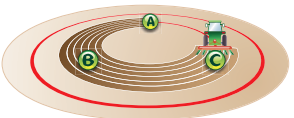
If you are recording a contour that contains one or more straight-line sections joining curved sections, pause the recording at the beginning of each straight-line section and resume recording at the end of the straight line. The mojoMINI 2 will calculate a straight line to fill the gap between the two points.

5. Turn the tractor until the red line is vertical, and drive along the wayline.



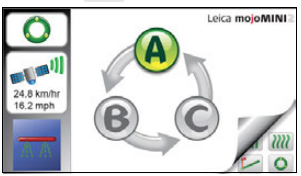
4.6 Setting Pivot Guidance

Setting a pivot wayline



To set up Pivot (circular) guidance, carry out the following procedure:

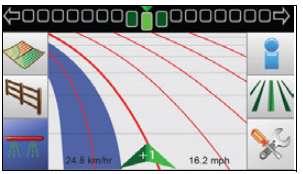
1. On the guidance screen, tap on the **Pivot** guidance icon .
2. The first Pivot guidance screen appears.
3. Drive to the starting point of the circle in the field (waypoint A) and tap **A** on the screen.



Treatment coverage can be turned on or off by tapping while setting the wayline.

4. Drive part way around the circle to waypoint B, and tap **B**.
5. Drive further around the circle to waypoint C, and tap **C**.

6. Turn the tractor until the red line is vertical, and drive along the wayline.



The row number indicator at the bottom of the screen shows the position of the tractor, and the number of rows inside or outside the original pivot wayline. The row numbers are minus (-) for pivot lines which are smaller than the primary line and positive (+) for lines that are larger.

4.7 Recording Coverage

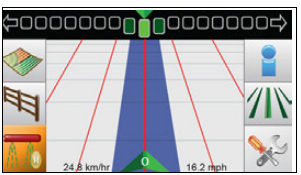
Overview

The mojoMINI 2 can record and display the covered area (max. 300 ha / 740 ac). Recording coverage is useful for showing where you have already been and how much ground you have covered. When used with the field boundary feature coverage recording can be used to calculate how much ground is still to be covered.

Start and stop coverage recording

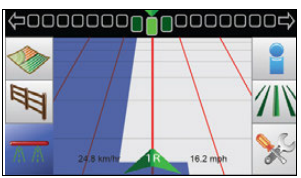
To record coverage, carry out the following steps:

1. To turn coverage on tap  . If you are not moving the coverage will not be turned on but will be paused as shown.

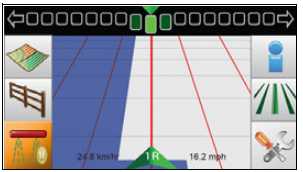


If the menu buttons are not visible, tap the screen.

2. Once you have started to move and have covered some ground the system will display covered ground in blue as shown.



3. If you stop the vehicle while coverage is turned on it will again be paused.



- When the vehicle is not moving coverage can be switched between **off** and **paused** by tapping  .
- When the vehicle is moving coverage can be switched between **off** and **on** by tapping  .

4.8 Field Boundaries

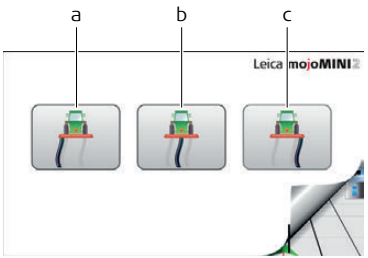
Overview

By recording a field boundary the operator is able to determine accurately, how much product is required for the field. This significantly reduces waste and problems related to the disposal of excess product.

Recording a field boundary

To record a field boundary, carry out the following steps:

1. To set a field boundary go to the main field navigation screen and tap .
2. You will then have the option to set the boundary on the left wing of the implement, in the center where the GPS antenna is located or the right wing of the implement. These three options are represented by the three buttons below:



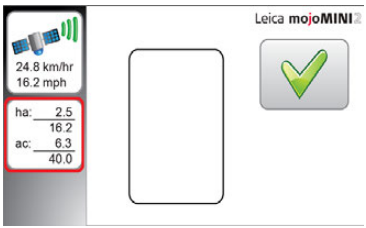
mojoMINI_2_011

a) Left implement tip
b) Antenna point
c) Right implement tip

3. Tap the button which is suits the current job you are doing.

4. Drive around the field boundary, the path will be recorded and displayed on screen.
5. As you approach the start of the boundary the Close Boundary button will flash. You can choose to tap and the boundary will close by joining the current boundary recording point to the start of the boundary recording.
6. After you close the boundary you will be taken to the information screen which will show the area within the boundary.

ha:	2.5	---Treated area (ha)
	16.2	---Total field area (ha)
ac:	6.3	---Treated area (ac)
	40.0	---Total field area (ac)



- The boundary can be closed automatically if you drive across the very start of the boundary.
- You can set a guidance pattern as well as start and stop coverage recording while you are recording a boundary.

4.9 Continue Last Field

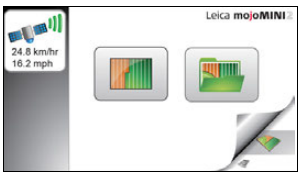
Overview

If you stop work before completing a field you may want to come back and continue that field. This situation can also apply if you turned the mojoMINI 2 off before completing the field. The continue last field option allows the operator to pick up exactly where they left off. The field overview quickly gives the operator a reminder of the shape of the field and what areas have not been covered.

Continuing a field, step-by-step

To continue working in a field, carry out the following steps:

1. On the initial field guidance screen tap  .



2. A top down view of the work done before the mojoMINI 2 was last turned off is displayed.

   Tap on to continue.

The continue last field screen displays how much area is already covered and the area remaining within the boundary. This can be helpful for calculating how much product you still need to apply to the field.

3. You will then be taken to the main navigation screen where you can continue work.

When continuing the last field it is possible that the wayline will not be in the same place. This can be fixed using nudge (refer to "4.11 Nudging").

4.10 Data Export

Overview

Data export allows the operator to export the current wayline, field boundary and coverage data as a KML file, to the mojoMINI 2's micro SD card.

KML files can be viewed on a personal computer using Google Earth.

Ensure you have a micro SD card inserted in the mojoMINI 2.

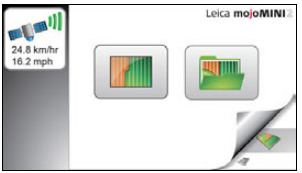
CAUTION To prevent loss of data or damage to the card or device, the card should only be inserted or removed when the device is turned off.

CAUTION Take care when inserting the card. The card must be inserted in the correct orientation to prevent permanent damage to the card or device.

Exporting Data

To export the current wayline, field boundary and coverage data, carry out the following steps:

1. On the main navigation screen, tap the **treatment** button.
   The Field screen appears.



2. Tap the **Continue last field** button.
   The Continue Field screen appears showing the current coverage map and boundary, if created.

3. Tap the Export button to export the data to the mojoMINI 2's micro SD card.
   An hourglass displays briefly while the export is in progress.

If a micro SD card is not inserted in the mojoMINI 2, or the SD card is corrupted, an error screen is displayed.

4. Tap the button to return to the main navigation screen.

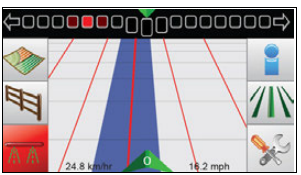
4.11 Nudging

Adjusting for position drift

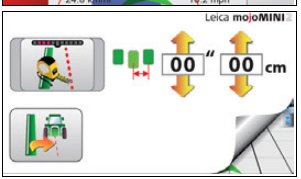
When continuing the last field it is possible that the wayline will not be in the same place due to drift in the GPS position. Nudge can be used to realign the waylines and coverage data to the correct position in the field.

Misalignment can be seen when the vehicle is in the right place but waylines, coverage and boundary on the mojoMINI 2 are not in the right place.

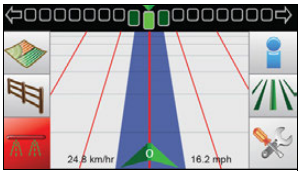
1. Position the vehicle on the wheel tracks of a previously completed pass.
2. On the main navigation screen, tap the light bar at the top of the screen.



3. Tap the nudge button  .



4. The main navigation screen is displayed and the wayline is where the vehicle is.



4.12 SBAS

Overview

Space Based Augmentation Systems (SBAS) can be configured for use by the mojoMINI 2 as a correction source for position data, for regions that support SBAS.

Depending on the location where the system is being used, and also on the configuration of the mojoMINI 2, some users may experience different performance depending on whether or not they are utilising SBAS (which include WAAS in North America and EGNOS (European Geostationary Navigation Overlay Service) in Europe).

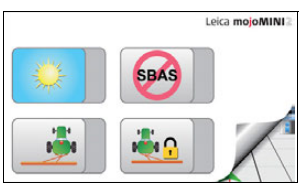
☞ An SBAS configuration file can be used and modified to allow for future changes in the satellites used by SBAS providers. Refer to the Leica mojoMINI 2 Downloads page on www.virtualwrench.com for further information.

Turning SBAS on and off, step-by-step

To turn SBAS on and off, carry out the following steps:

1. At the main navigation screen, tap the **settings** icon  .

   The Settings screen appears.



The settings screen has an SBAS Mode button that has three possible states:

- SBAS Off

- SBAS On: EGNOS

- SBAS On: WAAS

2. To select the SBAS mode suitable for your system, tap the SBAS Mode button until the appropriate button appears.
3. To return to the main navigation screen, tap the return button in the bottom right corner of the screen.

5 Care and Transport

5.1 Transport

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Shipping, transport of batteries

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

5.2 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "7 Technical Data" for information about temperature limits.
For storage ensure the mojoMINI 2 display reset switch is in the OFF position to prevent the internal battery from being drained.

Li-Ion batteries

- Refer to "7 Technical Data" for information about storage temperature range.
- A storage temperature range of 0 to +30°C/+32 to 86°F in a dry environment is recommended to minimise self-discharging of the battery.
- At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
- After storage recharge batteries before using.

5.3 Cleaning and Drying

Product and accessories	Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.
Damp products	Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C / 104°F and clean them. Do not repack until everything is completely dry. Always close the transport container when using in the field.
Cables and plugs	Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

6 Safety Directions

6.1 General Introduction

Description

- The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.
- The person responsible for the product must ensure that all users understand these directions and adhere to them.

6.2 Intended Use

Permitted use

- Field guidance.
- Data communication with external appliances.
- Measuring raw data and computing coordinates using satellite signals.

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at a work site.

WARNING

Adverse use can lead to injury, malfunction and damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

WARNING Unauthorised modification of agricultural machinery by mounting or installing the product may alter the function and safety of that agricultural machinery.
Precautions:
Follow the instructions of the machinery manufacturer. If no appropriate instruction is available, ask the machinery manufacturer for instructions before mounting or installing the product.

6.3 Limits of Use

Environment Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

DANGER Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

6.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

Manufacturers of non Leica Geosystems accessories

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

⚠ WARNING

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

6.5 Hazards of Use

⚠ WARNING

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.
Precautions:
All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

⚠ CAUTION

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.
Precautions:
Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

⚠ WARNING

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.
Precautions:
Do not use the product in a thunderstorm.

⚠ WARNING Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.
Precautions:
Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

⚠ WARNING Only Leica Geosystems authorised service workshops are entitled to repair these products.

⚠ CAUTION If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.
Precautions:
When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.
Avoid subjecting the product to mechanical stress.

⚠ CAUTION The product uses the GPS P-Code signal which by U.S. policy may be switched off without notice.

⚠ CAUTION During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.
Precautions:
Before shipping the product or disposing of it, discharge the batteries by running the product until the batteries are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

⚠ CAUTION

Installing near mechanically moving machine components may damage the product.
Precautions:
Deflect the mechanically moving machine components as far as possible and define a safe installation zone.

⚠ CAUTION

Beware of inadequate steering if machine is defective like after a crash or other damaging events or alterations to the machine.
Precautions:
Periodically perform control measurements and field adjustments on the machine as specified in the User Manual.

⚠ WARNING

While steering or navigating the machine accidents may occur due a) the operator not paying attention to the surroundings (persons, ditches, traffic, etc), or b) malfunctions (... of a system component, interference, etc.).
Precautions:
The operator assures that the machine is operated, guided and monitored by a qualified user (e.g., a licensed driver). The user has to be able to take emergency measures, for example an emergency stop.

WARNING Batteries not recommended by Leica Geosystems may be damaged if charged or discharged. They may burn and explode.
Precautions:
Only charge and discharge batteries recommended by Leica Geosystems.

WARNING Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.
Precautions:
Only use chargers recommended by Leica Geosystems to charge the batteries.

WARNING High mechanical stress, high ambient temperatures or immersion into fluids can cause leackage, fire or explosions of the batteries.
Precautions:
Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

WARNING If battery terminals come in contact with jewellery, keys, metallised paper or other metals, short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets.
Precautions:
Make sure that the battery terminals do not come into contact with metallic objects.

⚠ DANGER

If the product is used with accessories, for example, masts, staffs, or poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

Precautions:

- Do not use the product in a thunderstorm as you may increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or in close proximity to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorised specialist.
- If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by unplugging all systems components and disconnecting all connecting cables and supply cables.

WARNING

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced, which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion, environmental contamination, or all of these.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:

The product must not be disposed with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorised personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or obtained from your Leica Geosystems dealer.

6.6 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatability is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

WARNING

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards that are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

CAUTION

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

⚠ CAUTION

Disturbances caused by electromagnetic radiation can result in erroneous measurements. Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation produced by, for example, nearby radio transmitters, two-way radios, or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

⚠ WARNING

If the product is operated with connecting cables attached at only one of their two ends, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.
Precautions:
While the product is in use, connecting cables must be connected at both ends.

Radios or digital cellular phones

Use of the product with radio or digital cellular phone devices:

⚠ WARNING

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.
Precautions:
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed or that humans or animals may be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

6.7 FCC Statement, Applicable in U.S.

WARNING

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

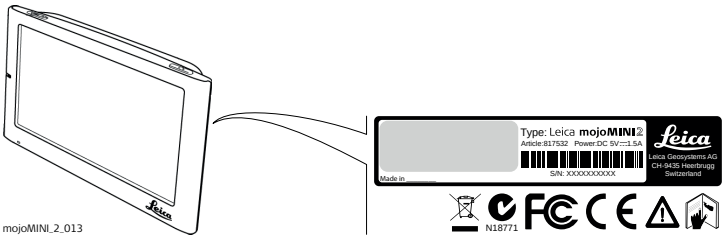
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

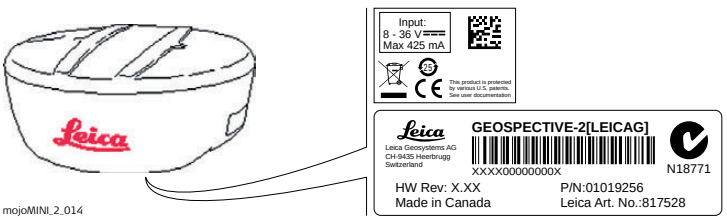
6.8 Labelling

Labelling mojoMINI 2



mojoMINI_2_013

Labelling GeoSpective 2 smart antenna



mojoMINI_2_014

7 Technical Data

7.1 GeoSpective 2 Smart Antenna Performance

Performance

Item	Description	
Channel configuration	10 GPS L1 + 4 GLONASS (with SBAS disabled) 8 GPS L1 + 4 GLONASS (with SBAS enabled)	
		Absolute
Horizontal position accuracy (RMS)[1]	Autonomous SBAS	1.5 m 0.9 m[2]
Measurement precision	L1 C/A code L1 carrier phase	5 cm RMS(GPS), 35 cm RMS(GLO) 0.6 mm RMS(GPS), 1.5 mm RMS(GLO)
Maximum data rate	Measurements Position	up to 10 Hz up to 10 Hz
Time to first fix	Cold start[3] Hot start[4]	< 85 s < 55 s
Signal re-acquisition	L1	< 1.0 s (typical)
Time accuracy		20 ns RMS(GPS), 40 ns RMS(GLO)
Velocity accuracy		0.05 m/s RMS

1. Typical values. Performance specifications subject to GPS system characteristics, US DOD operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length, multipath effects and the presence of intentional or unintentional interference sources. Export licensing restricts operation to a maximum velocity of 515 meters per second.
2. GPS only. Clock aligned to GPS system time.
3. Typical value. No almanac or ephemerides and no approximate position or time.
4. Typical value. Almanac and recent ephemerides saved and approximate time entered.

7.2 GeoSpective 2 Smart Antenna Specifications

Input-output connectors

Connector	Description
GeoSpective 2 COM/PWR	+8 to +36 V DC at 2.5 W (typical while logging)*
Serial Com port	RS232 F compliant (Rx and Tx signals only)
Emulated radar output	High= supply voltage -0.5 V minimum Low= 0.5 V minimum Load= 3K Ohm minimum Default Radar Frequency Step 36.1 Hz/kph

* When tracking GPS satellites.

Connector protection

Item	Protection Standard
Electrical conducted/coupled disturbance tolerance	ISO 7637:2002 (Survives all pulse types)

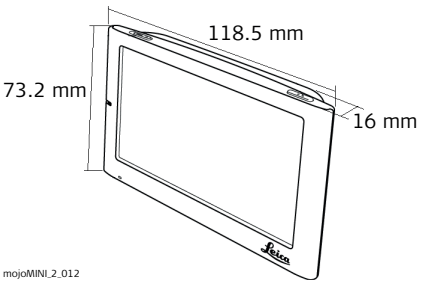
Size and weight

Weight:
490 g maximum

Environmental specifications

Item	Specification
Operating Temperature	-40°C to +75°C
Storage Temperature	-55°C to +90°C
Humidity	MIL-STD-810G Method 507.5
Immersion	MIL-STD-810G Method 512.5
Vibration	Random MIL-STD-810G Method 514.6 E-1 Sinusoidal ASAE EP455, 5.15.2 Level 1 Shock MIL-STD-810 G Method 516.6

7.3 mojoMINI 2 Specifications

Type	Navigation device, 4.3" TFT with touch screen, 480 x 272 pixel resolution
Interfaces	1 x micro SD Card slot 2 x RS-232 serial connection (cradle) 1 x mini USB port (USB 2.0)
Power Supply	Input Voltage: 12 to 24 V on cradle
Size and weight	 mojoMINI_2_012 Weight: 142 g approx.

Environmental specifications

Item	Specification
Operating Temperature	-10°C to +60°C
Storage Temperature	-20°C to +70°C
Humidity	< 95%

7.4 Conformity to National Regulations

Conformity to national regulations

- FCC Part 15 (applicable in US).

Hereby, Leica Geosystems AG, declares that the mojoMINI 2 and the GeoSpective 2 smart antenna are in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

- The conformity for countries with other national regulations not covered by the FCC part 15 has to be approved prior to use and operation.

Frequency band	1575.42 ±3 MHz
Output power	None
Antenna	Internal patch antenna

8 International Limited Warranty, Software Licence Agreement

International Limited Warranty

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or collect from your Leica Geosystems distributor.

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Appendix A Troubleshooting

WARNING Never try to repair the unit yourself: it is dangerous to do so.

Possible problems The following suggestions may be useful in solving simple problems. If you suspect that something is wrong, turn the power off immediately and disconnect the power source.

Problem	Possible Cause	Possible Solution
Cannot turn the unit on.	The mojoMINI 2 cable is not connected to the GeoSpective 2 cable.	Connect the mojoMINI 2 cable to the GeoSpective 2 cable using the square grey connectors.
	The battery needs recharging.	Connect the mojoMINI 2 cable to the GeoSpective 2 cable using the square grey connectors. Ensure the vehicle's cigarette lighter socket has power.

Problem	Possible Cause	Possible Solution
The mojoMINI 2 is connected to the GeoSpective 2 cable, and pressing the standby button has no effect.	The mojoMINI 2 has not been used for a long time, and the battery is completely discharged. Power switch may be turned off.	Turn the vehicle ignition key to the point that provides power to the cigarette lighter outlet.
The screen is dark.	The brightness may be turned down.	Adjust the brightness.
	The screen has been exposed to extreme temperature.	Turn off, and disconnect the screen. Leave the device at room temperature for a few hours for the LCD to recover.
When turned on, the screen lights up, but does not display the start screen. Grey and white vertical lines may be seen.	The internal battery level is very low and the device is not connected to a stable power source.	Connect to power, and allow the device to charge before switching on.

Problem	Possible Cause	Possible Solution
The mojoMINI 2 cannot receive GPS signals, or the signals received are weak and cannot be used.	The view of the sky may be obstructed by buildings or metal objects.	Ensure the GeoSpective 2 smart antenna has a clear view of the sky.
The reception of GPS signals is intermittent or unstable.	The view of the sky may be intermittently obstructed.	Remove the obstruction.
	Bad connection to the receiver.	Check the connection to the receiver and if necessary, clean all cable connections.
	Loose cigarette power socket causing the GeoSpective 2 Smart Antenna to restart.	Cut off the cigarette lighter plug and hardwire to a fuse power source.

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- when it has to be **right**

Leica Geosystems