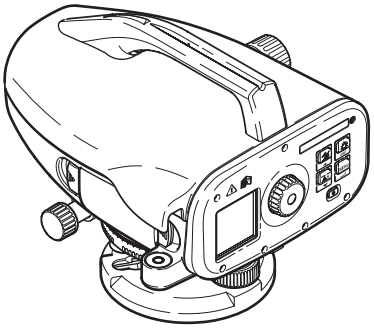
Sprinter 150/150M/250M

User Manual



Version 1.0
EN, DE, FR, ES, IT, PT, NL, NO, SV, FI, DA

- when it has to be **right**

Leica Geosystems

EN

User Manual (English)

1. Introduction

Purchase

Congratulations on the purchase of a new Leica Geosystems electronic level. It is designed to make levelling works easier and quicker on any construction site.

Product

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "12. Safety Directions" for further information.

Read carefully through the User Manual before you use the product.

Product identification

The model and the serial number of your product are indicated on the type plate.

Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorized service workshop.

Type: _____ Serial no.: _____

Validity of this manual

This manual is valid for Sprinter 150/150M/250M.

☞ Sections only valid for Sprinter 150M/250M are marked accordingly with an asterisk (*).

Trademarks

All trademarks are the property of their respective owners.

Available documentation

Name	Description
Sprinter 150/150M/ 250M User Manual	All instructions required in order to operate the product to a basic level are contained in this User Manual. Provides an overview of the system together with technical data and safety directions.

Symbols

The symbols used in this Manual have the following meanings:

⚠ **DANGER**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.

⚠ **CAUTION**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and / or appreciable material, financial and environmental damage.

☞ Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Table of Contents

2. Instrument Components

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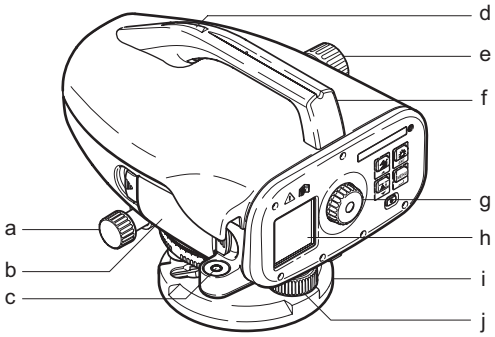

a) Horizontal fine motion screw
b) Battery compartment incl. phone jab interface for USB cable
c) Circular level
d) Gunsight
e) Focusing knob
f) Handle
g) Eyepiece
h) LCD display
i) Base plate
j) Levelling foot-screw

Container Contents
Sprinter, batteries (4x), allen key, user manual, strap, CD-ROM* (incl. DataLoader), USB cable*.

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Accessories
Tripod, aluminum staff (region dependant), fibre glass staff (to achieve 0.7 mm accuracy with Sprinter 250M). (Optional: sunshade, 4 rechargeable batteries and charger)

3. Measurement Preparations

3.1 Change Battery

Insert 4 AA dry cells according to the positive and negative signs as indicated on the holder.

☞ Always replace with a complete battery set!

☞ Do not use old and new batteries together.

☞ Do not use batteries from different manufacturers or batteries of different types.

3.2 Set-up Instrument

Levelling
- Set up the tripod. Extend the legs to a suitable length and ensure that the tripod head is approximately level. Tread the tripod shoes firmly into the ground to ensure stability.
- Mount the instrument on the tripod by screwing the tripod screw onto the base of the instrument.
- Use the three levelling foot screws to center the circular bubble in order to level the instrument.

Eyepiece Adjustment
Point the telescope to a uniform light surface such as a wall or a piece of paper. Turn the eyepiece until the cross hairs are sharp or distinct.

Target Image Focusing
Use the gunsight to aim the objective lens at the staff. Turn the horizontal fine motion screw until the staff is nearly centered in the field of view and then turn the focusing knob to focus on the staff. Ensure that staff image and reticle are sharp or distinct.

Power ON
The instrument is ready to measure.

☞ Technical hints:
- First check and adjust the electronic and optical line-of-sight errors, then the circular level on the instrument and then the staff: before starting work in the field, after long storage periods, after long transportation.
- Keep the optics clean. Dirt or condensation on the optics can limit measurements.
- Before starting work, let the instrument adjust to the ambient temperature (approx. 2 minutes per °C of temperature difference).
- Avoid measuring through window panes.
- Staff sections have to be fully extended and properly secured.
- Touching the upper third of the tripod, can damp vibrations at the instrument due to wind.
- Use the lens hood to cover the objective when backlight disturbs.
- Evenly illuminate the measuring area of the staff with a flashlight or spotlight in darkness.

4. User Interface

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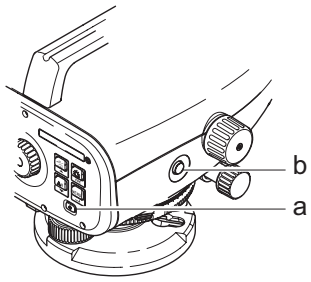

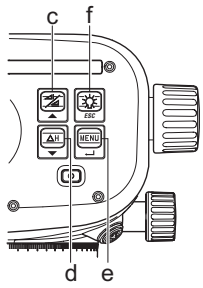

Key	Symbol	1st level functions	2nd level functions
a) On/Off		Power On or Off switch	NONE
b) MEAS		Measuring trigger key	Press and hold for 3 seconds to start and stop tracking measurement / timer measurement*
c) Height / Distance		Alternating between Height and Distance display	Cursor up (in Menu / Settings mode), Switch between intermediate sight I and foresight F in line leveling program BIF*

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Key	Symbol	1st level functions	2nd level functions
d) dH	ΔH ▼	Height Difference and Elevation measurement	Cursor down (in Menu / Settings mode)
e) MENU	MENU ↵	Activation and Selection of settings	ENTER key for confirmation purpose
f) Backlight	☼ ESC	LCD backlight illumination	ESC key to decline termination of program / application or to exit setting (in Menu / Settings mode)

Modes

MEAS	Measurement Mode
MENU	MENU
ADJ	Adjustment Mode
TRK	Tracking
SET	Settings

BF B F	BF line levelling *
BFFB B F FB BF F B BFF B BFFB	BFFB line levelling *
B IF B I F BI F	BIF line levelling *
	Cut & Fill *
dH	Height Difference
	Measurement interval / timer activated *

Icons

	LCD backlight ON		Battery icon at various capacities
	Upright staff measuring mode		Data stored to internal memory *
	Inverted staff measuring mode		Tilt warning OFF
	External power connected *		Measurement averaging activated

Measurement and Data Display Symbols

PtID: / RfID:	Point ID * / Reference Benchmark ID *		Measured staff height
BM:	Benchmark elevation		Measured distance
dH:	Height Difference		Mean height difference in BFFB *
Elv:	Elevation		Fill / raise height to reach design elevation *
D.Elv:	Design Elevation *		Cut / lower height to reach design elevation *

EN **Menu Setting**

Menus	Selections (sub-selections)	Descriptions
1. Program*	Line Levelling (BIF, BF, BFFB)	Select line levelling method. ☞ Sighting and measurement sequence in line levelling is indicated with highlighted 'alphabet' of the respective line levelling icons.
	Cut ↘ & Fill ↗	Cut & Fill application.
2. Intermediate Sight*	ON / OFF	Enable / disable Intermediate Sight in BIF line levelling.
3. Input PtID*	Input user point ID.	
4. Input BM	Input Reference Benchmark elevation.	
5. Input D.ELV*	Input design elevation in Cut & Fill application.	
6. Data Manager*	View Data	Viewing recorded data / deleting of a recorded data by pressing ENTER key.
	Download Data (GSI / ASCII)	Transferring of recorded data to PC via RS232, in GSI-8 or ASCII format.
	Delete All Data	Deleting of all recorded data in the on-board / internal memory.
7. Recording*	Memory	Measurement recorded to on-board / internal memory. ☞ In line levelling application, recording mode has to be set prior to first backsight measurement.
	Off	Measurement not stored.
	Ext	Measurement recorded to external device in GSI-8 format via RS232 cable.
8. Adjustment	Adjustment program.	
9. Inverse Staff	ON [Inverted], OFF [Upright], AUTO [Auto recognition of staff orientation]	Recognition mode setting of staff orientation.

Menus	Selections (sub-selections)	Descriptions
10.Settings	Contrast (10 levels)	LCD display contrast setting.
	Unit (M, Int. ft, US ft, Ft in 1/16 inch)	Unit setting.
	AutoOff (ON 15 min. / OFF)	ON 15 min., instrument will be switched off about 15 minutes after the last key press. OFF, the instrument will not auto switch off.
	Rounding (Standard / Precise)	Minimum reading display setting. In metric: • Standard = 0.001m for height and 0.01m for distance • Precise = 0.0001 m for height and 0.001m for distance In Ft (Int. and US ft): • Standard = 0.01 ft for height and 0.1 ft for distance • Precise = 0.001 ft for height and 0.01 ft for distance In Ft in 1/16 inch: • Precise & Standard = ft-inch-1/16 inch for height and distance
	Beep (ON / OFF)	Trigger key acoustic signal setting.
	RS232* (Baudrate: 1200, 2400, 4800, 9600, 19200, 38400; Parity: None, Odd, Even; Stop Bit: 1, 2; Data Bit: 7, 8)	Communication settings for RS232 interface.
	Tilt Warning (ON / OFF)	Electronic tilt warning setting.
	Backlight (ON / OFF)	Backlight setting.
	Averaging	Input number of measurement for averaging of measurements.
	Language (List of interface language selections)	Interface language setting.
	Timer*	Input measurement time interval 00 hr: 00 min (applicable to Ht / Dist application only). ☞ Press height / distance or dH or backlight or menu key. A message "stop Tracking" will be displayed.

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5. Set of Characters

Benchmark Elevation (BM), Design Elevation* (D.Elv)
BM and Design elevation numeric input consists of 0 ~ 9, space, decimal, Ft in 1/16 inch separator, the "+" and "-" signs.

Point ID* (PtID)
Point ID alphanumeric input consists of a ~ z, 0 ~ 9 and space.

Accepting character in the existing value
If there is no change for any particular character in the existing entry field, press ENTER key to accept the old entry.

Clearing all the existing entry field
Highlight the first entry field with "SPACE" character and press ENTER key to clear the entire last input value.

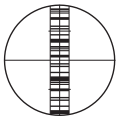
To discard entry
Press ESC key to discard entry and restore old value.

Point ID increment
Point ID will be automatically incremented by 1from the last point ID, if point ID input field is not updated manually.

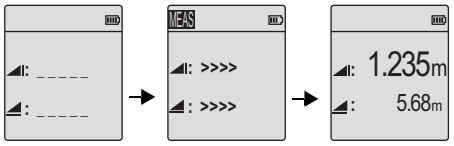
6. Operation

Height and Distance measurement (electronic)
Example of an electronic measurement:

☞ Always aim at the center of bar code staff and focus the staff image for accurate measurement.



6.1 Height and Distance Measurement



Measurement Standby Mode | Measuring in progress | Measurement with height and distance

Step	Key	Description
1.	⏻	Press to switch on the instrument, Leica logo is displayed follow by the default measurement standby mode.
2.	●	Aim at staff and focus. Lightly trigger the measurement key to activate measurement.
3.		Height and distance measurement is displayed.

6.2 Height Difference and Reduced Level Measurement (internal Memory not active)

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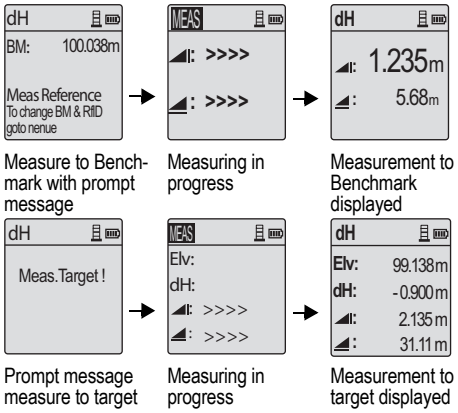


Measure to Benchmark with prompt message

Measuring in progress

Measurement to Benchmark displayed

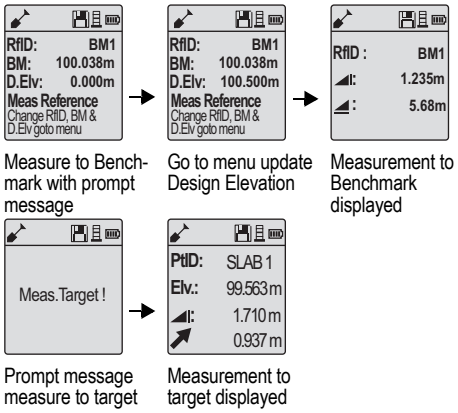
Prompt message measure to target

Measuring in progress

Measurement to target displayed

Step	Key/Screen	Description
1.	ΔH	Press key to start height difference and reduced level function.
2.		A message "Meas. Reference" with input reduced level is displayed.
3.		Press measuring key to initiate measurement with respect to the Reference staff / Benchmark.
4.		Reference height and distance measurement is displayed; follow by a message "Meas. Target!" prompted.
5.		Again, press measure key to start measurement with reference to target point.
6.		The following results are displayed accordingly;- target reduced level (RL), target height difference (dH) with respect to the reference staff, height and distance of target point.

EN 6.3 Cut & Fill Measurement* (internal Memory active)



Step	Key/Screen	Description
1.	MENU	Press Menu key and select Cut & Fill application in the Program sub-menu.
2.		A message "Meas. Reference" with input Benchmark reduced level value and Design Elevation is displayed.
3.		Press measuring key to initiate measurement with respect to the Reference staff / Benchmark.
4.		Reference height and distance measurement is displayed; follow by a message "Meas. Target!" prompted.
5.		Again, press measure key to start measurement to target point.
6.		The following results are displayed accordingly- target reduced level (RL) / Elevation, height of target point and cut / fill value at target point with respect to the Design reduced level / Design Elevation.

6.4 BIF Line Levelling Measurement* (internal Memory active)

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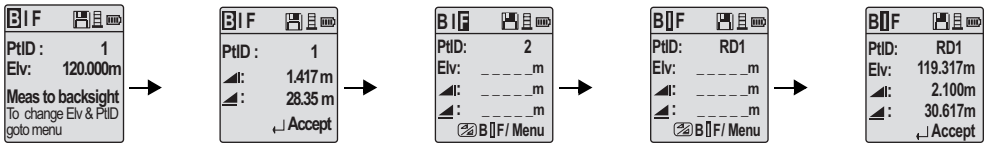


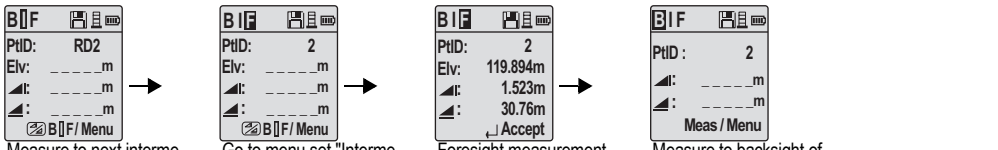
Measure to backsight with prompt message

Backsight measurement displayed with prompt message

Measure to foresight with prompt message

Go to menu set "Intermediate Sight" to ON OR press Height & Distance key, measure to intermediate sight

Intermediate sight measurement displayed with prompt message



Measure to next intermediate sight with prompt message

Go to menu set "Intermediate Sight" to OFF OR press Height & Distance key, measure to foresight

Foresight measurement displayed with prompt message

Measure to backsight of next change point with prompt message

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Step	Key/Screen	Description
1.		Initialize the BIF method.
2.		Initiate measurement to Benchmark.
3.		Backsight measurement displayed.
4.		To start 'Intermediate sight' measurement, go to menu set 'Intermediate Sight' to ON or press Height & Distance key.
5.		Intermediate sight measurement displayed.
6.		Go to menu set 'Intermediate Sight' to OFF or press Height & Distance key, then measure to the foresight staff.
7.		Foresight measurement displayed.
8.		System refreshes a standby display for measurement to the backsight of next change point.

6.5 BF Line Levelling Measurement*

Step	Key/Screen	Description
1.		Initialize the BF method
2.		Initiate measurement to Benchmark
3.		Backsight measurement displayed.
4.		Measure to the foresight staff.
5.		Foresight measurement displayed.
6.		System refreshes a standby display for measurement to the backsight of next change point.

6.6 BFFB Line Levelling Measurement*

Step	Key/Screen	Description
1.	MENU ↵	Initialize the BFFB method.
2.	●	Initiate measurement to Benchmark.
3.	● ↵	Backsight measurement displayed.
4.	MENU ●	Measurement to foresight.
5.	● ↵	Foresight measurement displayed.
6.	●	Measure to the foresight staff (second sighting).
7.	● ↵	Foresight (second sighting) measure-ment displayed.
8.	●	Measure to the backsight staff (second sighting).
9.	● ↵	Backsight (second sighting) measure-ment displayed.
10.	●	System displays current 'Change Point' measurement report. Press ENTER key to accept the result.
11.	●	System refreshes a standby display for measurement to the backsight of next change point.

☞ Mean (average) of height difference in double-sighting of backsight and foresight for BFFB line levelling method. $\overline{dH}$

6.7 Timer Measurement*

Set measurement time interval 00 hr:00 min in Menu\Settings\Timer. Press and hold measuring key for 3 seconds to start timer measurement, Timer icon will be shown at the top left of LCD display to indicate current measurement mode. To stop timer measurement, press and hold measuring key for 3 seconds.

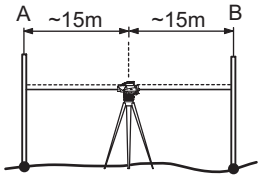
EN 7. Data Transfer DataLoader*

1. Double left click on the Sprinter_Dataloader .exe setup launcher (by default, the DataLoader will be installed in C: \ Program files \ Leica-Geosystems).
2. Connect the USB cable with phone jab to the connector port (which is located in the battery compartment of the instrument) and USB jab to the USB port at the PC.
3. Power On the instrument, wait for the double beeps and USB icon will be shown on the LCD of the instrument.
4. Start the DataLoader from default C: \ Program files \ Leica-Geosystems.
5. Left click on 'USB Connect' button in the DataLoader and all info relevant to instrument will be displayed.
6. Left click on 'Data Listing' / 'Field Book' button in the Data Export window to download the data from the instrument to PC in Window Ms-Excel ®.

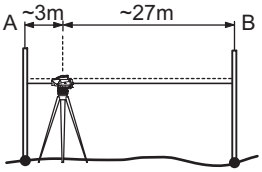
☞ For further DataLoader details and RS232 data transfer instructions please refer to the Sprinter CD-ROM*.

8. Check & Adjust

8.1 Electronic Collimation Adjustment



To activate "Adjustment" program, go to Menu\Adjustment.
Step 1: Aim at Staff A and press MEAS key. Measurement display, press ENTER key to accept.
Step 2: Aim at Staff B and press MEAS key. Measurement display, press ENTER key to accept.
Now shift the Sprinter towards staff A and set it up at about 3 m to staff A.



Step 3: Aim at Staff B and press MEAS key. Measurement display, press ENTER key to accept.
Step 4: Aim at Staff A and press MEAS key. Measurement display, press ENTER key to accept.
The new electronic collimation error is displayed. To accept new correction, press ENTER key, otherwise press ESC key to decline adjustment result.

☞ Optical collimation error can be corrected by adjusting the reticle.

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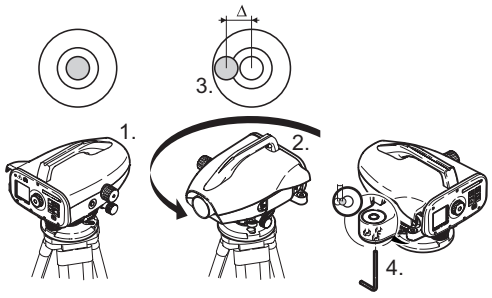
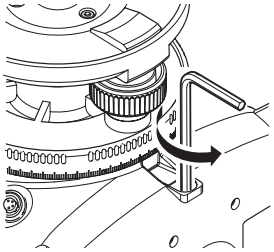
8.2 Circular Level



Step	Description
1.	Level instrument.
2.	Turn instrument by 180°.
3.	Center bubble if it extends beyond the centering circle.
4.	Correct half of the error with the Allen key.
☞	Repeat steps 1 to 4 until the circular level bubble is centered at any random telescope pointing.

8.3 Optical Collimation / Reticle Adjustment



Step	Description
1.	Turn Allen key until design value is reached.
2.	Check collimation.

If the collimation error exceeds 3 mm over 60 m distance, the collimation needs to be adjusted.

9. Error Messages

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No.	Error message	Counter measure / causes
E99	System Error, Contact Services !	Hardware faults or file errors or adjustment errors or setting errors rendering instrument not working properly.
E100	Low Battery !	Change to new or freshly charged batteries.
E101	Point No. Not Incremented!	Change the PtID. Max. PtID is 99999999 and do not end any 8 characters string with an alphabet character.
E102	Too Bright !	Darken staff or reduce lighting on staff or shade the objective telescope.
E103	Too Dark !	Light up staff uniformly.
E104	No Staff !	Check targeting.
E105	Invalid Entry!	Check the entry / input.
E106	Out Of Level !	Level the instrument.
E107	Memory Full!	Set internal memory to OFF and continue measurement without recording OR download stored data to an external device and continue measurement with internal memory ON after deleting all recorded data in the internal memory.
E108	Data File Error !	Data file error.
E109	Low Memory!	Prepare to download data to external device, in order to continue further measurement with recording ON after deleting all recorded data in the internal memory.
E110	Target Too Close !	Move staff or instrument further apart.
E111	Target Too far !	Move staff or instrument closer together.
E112	Too Cold !	Stop working, external temperature is outside the instrument operating temperature.
E113	Too Hot !	Stop working, external temperature is outside the instrument operating temperature.

No.	Error message	Counter measure / causes
E114	Invalid Measurement !	Make another measurement. If further measurement proved to be futile, check staff position and Inverse Staff setting, check the lighting condition at the staff and stray light, check focusing and targeting, check if sufficient length of barcode in the field of view.
E115	Temperature Sensor Error !	Cover the objective telescope with a hand and switch ON the instrument. Hardware communication failed.
E116	Adjustment Error !	Carry out the adjustment with guided steps, make sure instrument is level and staff is truly vertical in normal position. Collimation is out of correction range.
E117	BM Change Not Allowed!	Exit to default measurement mode by pressing HEIGHT/DISTANCE key, and change the Benchmark elevation in the INPUT BM menu mode.
E119	Staff Blocked	Not enough barcode length for measurement.
E120	Image sensor Error!	Contact services.
E121	Adjustment Inverse Staff Not Allowed!	Check the staff orientation and staff setting.
E123	PtID Change Not Allowed	Exit the message by pressing ESC key.

10. Operation Messages

Operation message	Counter measure / remark
Start Tracking!	Tracking mode starts.
Stop Tracking!	Tracking mode stops.
Tracking Hold!	Press measure key for 3 seconds to restart tracking mode. Tracking will hold after 10 unsuccessful measurements.
Abort Measurement!	Current measuring process is terminated.
Downloading Data!	Downloading of data from the internal memory to an external device is in progress.

Operation message	Counter measure / remark
Download Completed!	System is successfully downloaded the internal memory data to an external device.
No Data In Memory!	No data is stored in the internal memory.
Delete. Are You Sure?	Questionnaire prompted user to confirm the deletion of a data (in View Data mode) / all the data (in Delete All Data mode) in the internal memory.
Data Deleted!	System confirmation a data or all the data in the internal memory is deleted.
Can't Delete!	Reference Benchmark and line levelling measurement not allowed to be deleted by single data deletion method.
Change BM. Are You Sure?	Question to prompt user if changing of Reference Benchmark elevation to confirm.
Change Design Elevation. Are You Sure?	Question to prompt user if changing of Design elevation to confirm.
Wait! File System Clean Up!	Cleaning up of temporary files/system files.
Shut Down!	System is switching OFF.
Sand Clock Icon	Please wait! System task is in progress.
Meas Target	Aim to target staff and press measuring button.
Setting...	System parameter setting in progress.
Change Point not completed! Quit Application?	Prompt message to quit application during line levelling process. Complete current line levelling change point measurements, then leave the application program. Pressing ENTER key to quit application; otherwise, press ESC key to return to current application.
Quit This Application?	Prompt message to quit current application, pressing ENTER key to quit application; otherwise, press ESC key to return to current application.

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11. Care and Transport

11.1 Transport

Transport in the field
When transporting the equipment in the field, always make sure that you

- either carry the product in its original transport container,
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.

Transport in a road vehicle
Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.

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.

Field adjustment
After transport inspect the field adjustment parameters given in this user manual before using the product.

11.2 Storage

Product
Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "13. Technical Data" for information about temperature limits.

Field adjustment
After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.
If the equipment is to be stored for a long time, remove the alkaline batteries from the product in order to avoid the danger of leakage.

11.3 Cleaning and Drying

Product and Accessories

- Blow dust off lenses.
- Never touch the glass with your fingers.
- 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.

12. Safety Directions

12.1 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.

12.2 Intended Use

Permitted use

- Measuring distances.
- Recording measurements.
- Electronic and optical height measurements to a staff.
- Optical height readings.
- Optical distance measuring with stadia readings.
- Data communication with external appliances.

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, for example screwdriver, unless this is specifically permitted for certain functions.
- 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 the working site, for example when measuring on roads.
- Aiming directly into the sun.

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.

12.3 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.

12.4 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.

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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.

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.

12.5 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.

DANGER
Because of the risk of electrocution, it is very dangerous to use staffs in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

CAUTION
Strong magnetic fields in the immediate vicinity (e.g. transformers, melting furnaces...) may influence the compensator and lead to measuring errors.

Precautions:
When measuring near strong magnetic fields, check results for plausibility.

CAUTION
Be careful when pointing the product towards the sun, because the telescope functions as a magnifying glass and can injure your eyes and/or cause damage inside the product.

Precautions:
Do not point the product directly at the sun.

WARNING
During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

Precautions:
The person responsible for the product must make all users fully aware of the existing dangers.

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
If computers intended for use indoors are used in the field there is a danger of electric shock.

Precautions:
Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica Geosystems 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
When using a vertical staff supported by one brace there is always the danger of falling, for example by wind gusts and therefore danger of damage to equipment and danger of personal injuries.

Precautions:
Never leave a vertical staff supported by a brace unsupervised (person at the staff).

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.

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CAUTION
During the operation of the product there is a hazard of squeezing extremities or entanglement of hairs and/or clothes by rotating parts.

Precautions:
Keep a safe distance of the rotating parts.

WARNING
If you open the product, either of the following actions may cause you to receive an electric shock.

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs.

Precautions:
Do not open the product. Only Leica Geosystems authorized service workshops are entitled to repair these products.

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.

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 they 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.

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
Short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets if battery terminals come in contact with jewellery, keys, metallized paper or other metals.

Precautions:
Make sure that the battery terminals do not come into contact with metallic objects.

CAUTION
Long term storage may reduce lifetime or damage the battery.

Precautions:
During long term storage, maintain battery life by periodic recharge.

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 or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized 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 unauthorized personnel.
Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http:// received from your Leica Geosystems dealer.

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

12.6 Electromagnetic Compatibility EMC

Description
The term Electromagnetic Compatibility 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 which 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.

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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, for example, near 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, for example external supply cables, interface cables, 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, for example product to external battery, product to computer, must be connected at both ends.

12.7 FCC Statement, Applicable in U.S.

WARNING
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 frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication.

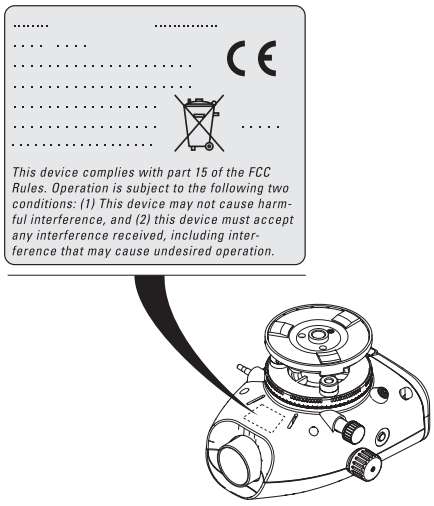
However, there is no guarantee that interference will not occur in a particular installation.

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.

Labelling



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13. Technical Data

Height measurements	Standard deviation per km double run (ISO 17123-2):
	• Electronic measurement with Sprinter aluminum barcode staff:
	  • 1.0 mm (Sprinter 250M)
	  • 1.5 mm (Sprinter 150/150M)
	• Optical measurement with standard aluminum E-scale/Numeral staff: 2.5 mm
	• Standard Deviation for single staff reading: 0.6 mm (electronic) and 1.2 mm (optical) at 30m

Distance Accuracy (Standard Deviation)	10 mm for D<= 10 m Distance in m x 0.001 for D>10 m
Range	Distance measuring range for electronic measurements with standard aluminum barcode staff: 2 m to 100 m.
Optical - Shortest focusing distance	50 cm
Measuring time single measure (Electronic)	Typically 3 seconds and less in normal daylight condition; needs longer measuring time in uniform dim light condition (20 lux).
Circular Bubble	Circular Bubble Sensitivity: 10'/2 mm
Compensator	Magnet damped pendulum compensator with electronic range monitoring • Tilt Warning Range (Electronically): ± 10' • Compensator range (Mechanically): ± 10' • Setting accuracy: 0.8" max. (Standard Deviation) • Magnetic field sensitivity: < 10" (Line-of-sight difference in horizontal constant magnetic field at a field strength of up 5 Gauss)
RS232 Port*	For RS232 cable connection to external battery and communication to PC / data collector.
Phone Jab Port*	For USB cable connection to communication to PC.

Internal Memory Storage*	Capacity: up to 1000 points.
Data Transfer*	Program: To DataLoader via USB, to Leica Geo Office and HyperTerminal via RS232 on PC, using a Windows® application
Power Supply	• Sprinter 150: internal battery • Sprinter 150M/250M: internal battery and external via RS232 port.
Battery Power	Battery internal: AA dry cells 4 x 1.5 V; powered via RS232 port: Nominal voltage 12 V ⎓ , voltage range 4 - xx V ⎓ , GEV71 power cable to a 12 V car battery; current rating max. 300 mA.
LCD	• Type: Monochrome display with backlight capability • Dimensions: 128 x 104 pixels
Telescope	• Magnification (Optical): 24 x • Free objective diameter: 36 mm • Clear Objective Aperture: 2 ° • Multiplication constant: 100 • Addition constant: 0
Hz Circle	Circle Engraving: Plastic horizontal circle of 360° (400 gon). Graduation and numerals scale resolution at 1°(upper scale) and at 50 gon intervals (lower scale)
Side Drive	Movement & Play in side drive: Continuous horizontal dual drive
System	• MMI capability • Measuring / applications • Keyboard: 5 rubber keys
Temperature Range	• Operating Temperature: -10°C to +50°C • Storage Temperature: -40°C to +70°C

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Environmental Specifications	• Protection against water, dust and sand: IP55 (IEC 60529) • Protection against Humidity: Up to 95% humidity no condensation. The effects of condensation are to be effectively counteracted by periodically drying out the product.
Dimensions	Instrument: • Length (incl. front of lens tube to fully extended eyepiece) 219 mm • Width (from the external face of focusing drive to the external side of circular bubble holder) 196 mm • Height (incl. hand grip, base fully extended) 178 mm Container: • Length 400 mm • Width 220 mm • Height 325 mm
Weight	2.55 kg (including 4 AA batteries)

14. International Warranty, Software Licence Agreement

International Warranty

The International Warranty can be downloaded from the Leica Geosystems AG home page at
received from your Leica Geosystems dealer.

Software Licence Agreement

This product contains software that is preinstalled on the product, or that is supplied to you on a data carrier medium, or that can be downloaded by you online pursuant to prior authorization from Leica Geosystems. Such software is protected by copyright and other laws and its use is defined and regulated by the Leica Geosystems Software Licence Agreement, which covers aspects such as, but not limited to, Scope of the Licence, Warranty, Intellectual Property Rights, Limitation of Liability, Exclusion of other Assurances, Governing Law and Place of Jurisdiction. Please make sure, that at any time you fully comply with the terms and conditions of the Leica Geosystems Software Licence Agreement.

Such agreement is provided together with all products and can also be found at the Leica Geosystems home page at
or your Leica Geosystems dealer.

You must not install or use the software unless you have read and accepted the terms and conditions of the Leica Geosystems Software Licence Agreement. Installation or use of the software or any part thereof, is deemed to be an acceptance of all the terms and conditions of such licence agreement. If you do not agree to all or some of the terms of such licence agreement, you may not download, install or use the software and you must return the unused software together with its accompanying documentation and the purchase receipt to the dealer from whom you purchased the product within ten (10) days of purchase to obtain a full refund of the purchase price.