Leica
GEOSYSTEMS

Leica Rugby 60DG

User Manual

English
Version 1.0

Kuker-Ranken
1-800-454-1310
www.KukerRanken.com



HEXAGON

Introduction

Purchase

Congratulations on the purchase of a Leica Rotating Laser product.



This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to 1 Safety directions for further information.

Read carefully through the User Manual before you switch on the product.

Product identification

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

Always refer to this information when contacting your agency or Leica Geosystems authorised service centre.

Validity of this manual

This manual applies to the Rugby 60DG lasers. Differences between the models are marked and described.

Available documentation

Name	Description/Format		
Rugby 60DG Quick Guide	Provides an overview of the product. Intended as a quick reference guide.	✓	✓
Rugby 60DG User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	-	✓

Refer to the following resources for all Rugby 60DG documentation/software:

- The QR code card
- https://myworld-portal.leica-geosystems.com/

Table of contents

1 Safety directions 5
- 1.1 General 5
- 1.2 Definition of use 7
- 1.3 Limits of use 7
- 1.4 Responsibilities 7
- 1.5 Hazards of use 8
- 1.6 Laser classification 11
  - 1.6.1 General 11
  - 1.6.2 Rugby 60DG 11
- 1.7 Electromagnetic compatibility (EMC) 12

2 Description of the system 14
- 2.1 System components 14
- 2.2 Rugby 60DG laser components 15
- 2.3 Case components 15
- 2.4 Setup 15

3 Operation 17
- 3.1 User interface 17
- 3.2 Turning the Rugby 60DG on and off 17
- 3.3 The LCD display 18
- 3.4 Grade entry 18
- 3.5 Axis identification 20
- 3.6 Conversion of slope into percent of grade 20
- 3.7 Alignment of the axes 20
- 3.8 Precise alignment of the axes 21
- 3.9 Laydown operation 22

4 RC60 remote control 23
- 4.1 Description of the remote control 23
- 4.2 Pairing the Rugby 60DG with the RC60 remote control 24
- 4.3 Connecting screens for the remote control 24

5 Receiver 26
- 5.1 Overview 26
  - 5.1.1 Rod Eye 105B, digital RF receiver 26
- 5.2 Using the Rod Eye 105B receiver with the Rugby 60DG 26
- 5.3 Pairing the Rod Eye 105B with the Rugby 60DG 27

6 Rugby 60DG menu 28
- 6.1 Access and navigation 28
- 6.2 Menu set 1 29
- 6.3 Menu set 2 32
- 6.4 Menu set 3 34

7 RC60 menu 39

8 Applications 40
- 8.1 Checking grades 40
- 8.2 Entering grades 40
- 8.3 Beam Catching (grade matching) 41
- 8.4 Beam Lock (grade matching and monitoring) 42
- 8.5 Agriculture levelling 43

9 Batteries 44
- 9.1 Operating principles 44
- 9.2 Battery for Rugby 60DG 44

10 Accuracy adjustment 47
- 10.1 Checking the level accuracy 47
- 10.2 Adjusting the self-levelling accuracy 48
- 10.3 Adjusting the vertical accuracy 49

11 Troubleshooting 50

12 Care and transport 54

12.1 Transport 54
12.2 Storage 54
12.3 Cleaning and drying 54

13 Technical data 56

13.1 Conformity to national regulations 56
13.2 Dangerous goods regulations 57
13.3 General technical data of the product 58
13.3.1 RC60 remote control 60

1 Safety directions

1.1 General

Description

The following directions 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.

About warning messages

Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur.

Warning messages...

- make the user alert about direct and indirect hazards concerning the use of the product.
- contain general rules of behaviour.

For the users‘ safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described here.

DANGER, **WARNING**, **CAUTION** and **NOTICE** are standardised signal words for identifying levels of hazards and risks related to personal injury and property damage. For your safety, it is important to read and fully understand the following table with the different signal words and their definitions! Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
⚠ **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.
NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in 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.

Additional symbols



Operator's manual.
Instruct the operator to read the user manual and safety instructions.

CE mark Europe (European Conformity) certifying that the product complies with essential requirements of the EU directives and harmonized EU standards.



UK Conformity Assessed.
Manufacturer declaration for the compliance with the relevant UK regulations.



Disposal
In accordance with EU Directive 2012/19/EU on waste of electrical and electronic equipment and its implementation in national legislation, non-usable electrical appliances must be collected separately and disposed of in an environmentally friendly manner.



IP Class acc. IEC 60529.



Bluetooth®



Packaging is manufactured using corrugated cardboard.
EU Packaging Waste Directive 97/129/EC.



Packaging is manufactured using corrugated cardboard.
EU Packaging Waste Directive 97/129/EC.



Product must not be opened or modified or tampered with.



Indicates the temperature limits at which the product may be stored, transported or used.



Upper limit of temperature.



USB



Generic warning.



Warning against flammable substances.



Warning against explosive material.



Laser Warning.
Laser class 2 acc. IEC 60825-1.



Laser Warning.
Laser class 2 acc. IEC 60825-1:2014.
Class 2 consumer laser product acc. EN 50689:2021



Battery recycling mark.



California Energy Commission mark.

1.2 Definition of use

Intended use

- The product casts a horizontal laser plane or a laser beam for the purpose of alignment
- The laser beam can be detected by means of a laser detector
- Remote control of product
- Data communication with external appliances

Reasonably foreseeable misuse

- Use of the product without instructions
- Use outside of the intended use and limits
- Disabling of safety systems
- Removal of hazard notices
- Opening the product using tools, for example a screwdriver, unless this is permitted for certain functions
- Modification or conversion of the product
- Use after misappropriation
- Use of products with recognisable damage or defects
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems
- Inadequate safeguards at the working site
- Deliberate dazzling of third parties
- Controlling of machines, moving objects or similar monitoring applications without additional control and safety installations

1.3 Limits of use

Environment

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

⚠WARNING

Working in hazardous areas or close to electrical installations or similar situations

Life Risk.

Precautions:

- ▶ Local safety authorities and safety experts must be contacted by the person responsible for the product before working in such conditions.

1.4 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 safe condition.

Person responsible for the product

The person responsible for the product has the following duties:

- To understand the safety instructions on the product and the instructions in the User Manual
- To ensure that the product is used in accordance with the instructions
- To be familiar with local regulations relating to safety and accident prevention
- To stop operating the system and inform Leica Geosystems immediately if the product and the application become unsafe
- To ensure that the national laws, regulations and conditions for the operation of the products are respected

1.5 Hazards of use

NOTICE

Dropping, misusing, modifying, storing the product for long periods or transporting the product

Watch out for erroneous measurement results.

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 as well as before and after important measurements.

⚠ DANGER

Risk of electrocution

Because of the risk of electrocution, it is dangerous to use poles, levelling staffs and extensions 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.



NOTICE

Remote control of product

With the remote control of products, it is possible that extraneous targets will be picked out and measured.

Precautions:

- ▸ When measuring in remote control mode, always check your results for plausibility.

⚠ WARNING

Lightning strike

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

This 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, accident prevention and road traffic.

⚠CAUTION

Not properly secured accessories

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 can 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.

⚠WARNING

Inappropriate mechanical influences to batteries

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 it, discharge the batteries by 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

Distraction/loss of attention

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

Unauthorised opening of 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 authorised Leica Geosystems Service Centres are entitled to repair these products.

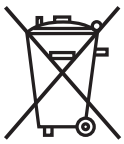
⚠WARNING

Improper disposal

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 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 of 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 received from your Leica Geosystems distributor.

⚠WARNING

Improperly repaired equipment

Risk of injuries to users and equipment destruction due to lack of repair knowledge.

Precautions:

- ▸ Only authorised Leica Geosystems Service Centres are entitled to repair these products.

⚠WARNING

Exposure of batteries to high mechanical stress, high ambient temperatures or immersion into fluids

This can cause leakage, fire or explosion of the batteries.

Precautions:

- ▸ Protect the batteries from mechanical influences and high ambient temperatures.
- ▸ Consider the product's IP class restrictions in chapter 13 Technical data.
- ▸ Do not drop or immerse the product into fluids.

⚠WARNING

Short circuit of battery terminals

If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metallised paper or other metals, the battery 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/conductive objects.

1.6 Laser classification

1.6.1 General

General

The following chapters provide instructions and training information about laser safety according to international standard IEC 60825-1 (2014-05) and technical report IEC TR 60825-14:2022. The information enables the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.

☞ According to IEC TR 60825-14:2022, products classified as laser class 1, class 2 and class 3R do not require:
- laser safety officer involvement
- protective clothes and eyewear
- special warning signs in the laser working area

if used and operated as defined in this User Manual due to the low eye hazard level.

☞ National laws and local regulations could impose more stringent instructions for the safe use of lasers than IEC 60825-1 (2014-05) and IEC TR 60825-14:2022.

1.6.2 Rugby 60DG

General

The rotating laser built into the product produces a visible laser beam which emerges from the rotating head.

The laser product described in this section is classified as laser class 1 in accordance with:

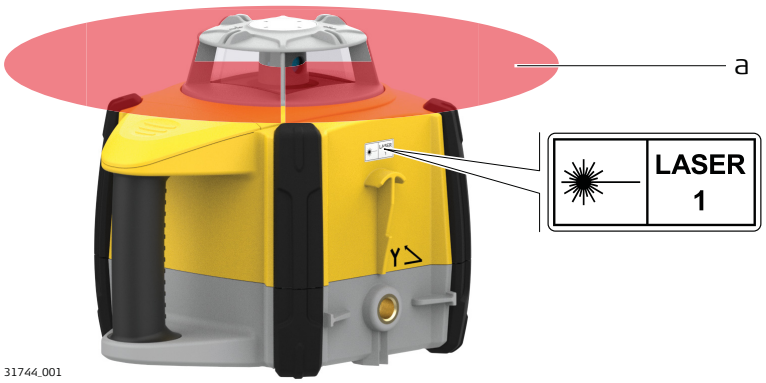
- IEC 60825-1 (2014-05): “Safety of laser products”

These products are safe for momentary exposures but can be hazardous for deliberate staring into the beam. The beam may cause dazzle, flash-blindness and after-images, particularly under low ambient light conditions.

Rugby 60DG:

Description	Value
Maximum average radiant output power	0.4mW / 2.2 mW
Pulse duration (effective)	500ms / 2.9 ms, 1.4 ms
Pulse repetition frequency	1 Hz / 5 Hz, 10 Hz
Beam divergence	0.2 mrad
Wavelength	635nm

Labelling



a) Laser beam

1.7 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.

⚠CAUTION

Electromagnetic radiation

Electromagnetic radiation can cause disturbances in other equipment.

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.

⚠CAUTION

Use of the product with accessories from other manufacturers. For example, field computers, personal computers or other electronic equipment, non-standard cables or external batteries

This may cause disturbances in other equipment.

Precautions:

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

⚠CAUTION

Intense electromagnetic radiation. For example, near radio transmitters, transponders, two-way radios or diesel generators

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 function of the product may be disturbed in such an electromagnetic environment.

Precautions:

- Check the plausibility of results obtained under these conditions.

⚠CAUTION

Electromagnetic radiation due to improper connection of cables

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. For example, external supply cables or interface cables.

Precautions:

- While the product is in use, connecting cables, for example product to external battery or product to computer, must be connected at both ends.

⚠WARNING

Use of product with radio or digital cellular phone devices

Electromagnetic fields can cause disturbances in other equipment, installations, medical devices, for example pacemakers or hearing aids, and aircrafts. Electromagnetic fields 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 can be disturbed or that humans or animals can 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 medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircrafts.
- Do not operate the product with radio or digital cellular phone devices for long periods with the product immediately next to your body.

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2 Description of the system

2.1 System components

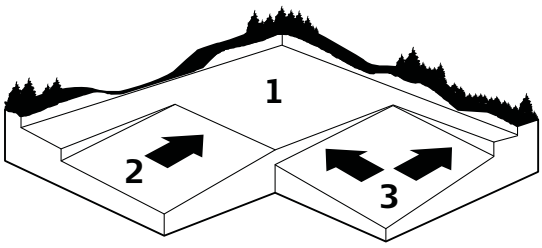
General description

The Rugby 60DG is a laser tool for general construction, levelling and slope applications such as:

- Setting forms,
- Levelling to grade,
- Controlling depths for excavations.

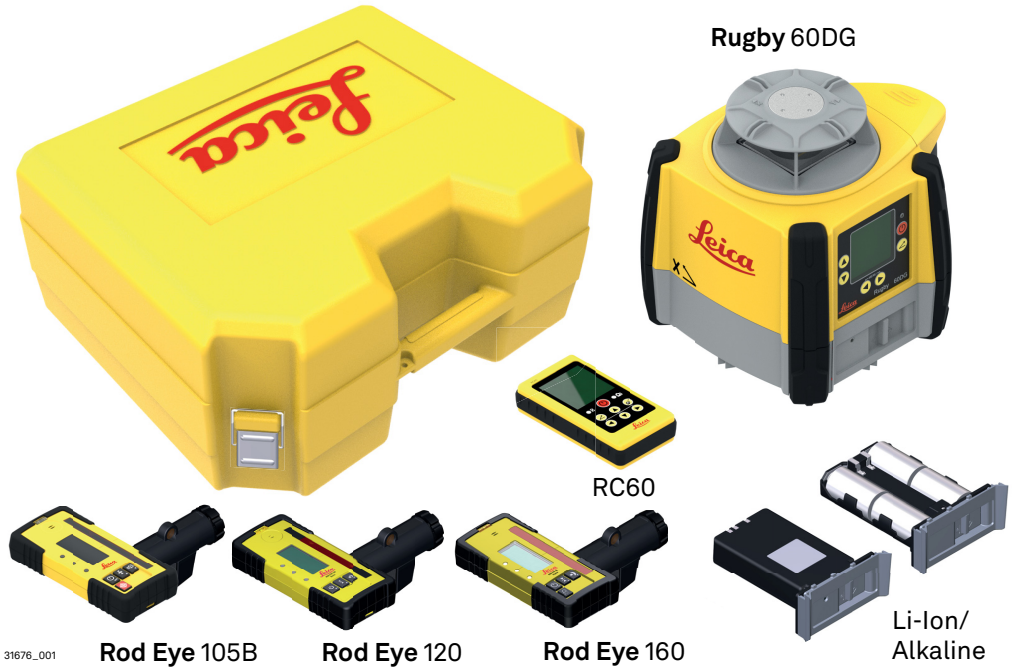
If set up within the self-levelling range, the Rugby 60DG automatically levels to create an accurate horizontal, vertical or sloped plane of laser light.
Once the Rugby 60DG has levelled, the head starts rotating and the Rugby 60DG is ready for use.
30 seconds after the Rugby 60DG has completed the levelling, the H.I.Alert system becomes active and protects the Rugby 60DG against changes in elevation caused by movement of the tripod to ensure accurate work.

Area of application



The Rugby 60DG is a dual grade laser; it produces an accurate plane of laser light for applications which require level (1), single slope (2) or dual slope (3).

Available system components



☞ The delivered components depend on the package ordered.

2.2 Rugby 60DG laser components

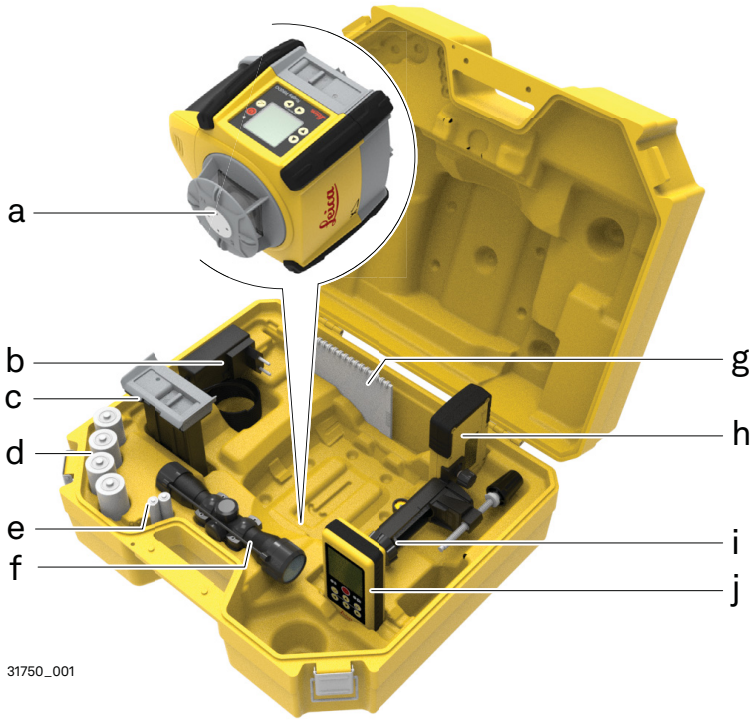
Rugby 60DG laser components



a Plate for optional scope
b Carry Handle
c LCD Display
d Control Panel
e Battery compartment
f Charge LED (for Li-Ion battery pack)

2.3 Case components

Case components



a Rugby 60DG laser
b Charger (for Li-Ion versions only)
c Li-Ion battery pack or Alkaline battery pack
d 4 x D-cell battery (for alkaline versions only)
e 2x AA-cell battery
f Optional scope assembly
g Quick Guide and QR card for user manual
h Receiver mounted on the bracket
i Second receiver (can be purchased separately)
j RC60 remote control

2.4 Setup

Location

- Keep the location clear of possible obstructions that could block or reflect the laser beam.
- Place the Rugby 60DG on stable ground. Ground vibration and extremely windy conditions can affect the operation of the Rugby 60DG.
- When working in a very dusty environment place the Rugby 60DG up-wind so the dirt is blown away from the laser.

Setting up on a tripod



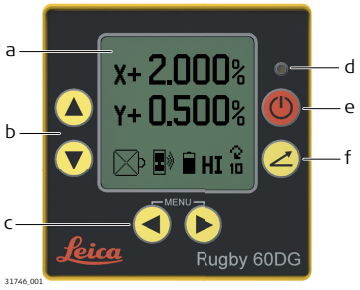
31751_001

1.	Set up the tripod.
2.	Place the Rugby 60DG on the tripod.
3.	Tighten the screw on the underside of the tripod to secure the Rugby 60DG on the tripod.
☞	• Attach the Rugby 60DG securely to a tripod or laser trailer, or mount on a stable level surface. • Always check the tripod or laser trailer before attaching the Rugby 60DG. Make sure all screws, bolts and nuts are tight. • If a tripod has chains, they should be slightly loose to allow for thermal expansion during the day. • Secure the tripod on extremely windy days.

3 Operation

3.1 User interface

Overview



a LCD display
b Up and down arrow buttons
c Left and right arrow buttons
d Status LED
e Power button
f Grade button

Description

Component	Function
LCD display	Displays all required user information.
Grade button	Press to start grade entry mode.
Left and right arrow buttons	Press to display and move the cursor for grade entry. Press both simultaneously to enter the Rugby 60DG menu.
Up and down arrow buttons	Press to change the grade displayed. Press both simultaneously to reset the grade value to zero.
Power button	Press to turn on or off the Rugby 60DG.
Status LED	Indicates the level status of the Rugby 60DG.

3.2 Turning the Rugby 60DG on and off

Turn on and off

Press the Power button to turn the Rugby 60DG on or off.

After turning on:

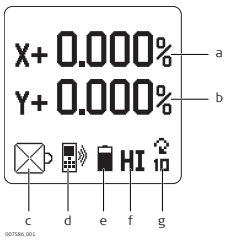
- The LCD display turns on and displays the current status of the Rugby 60DG.
- If set up within the +/-5° self-levelling range (horizontal or vertical), the Rugby 60DG automatically levels to create an accurate horizontal plane of laser light.
- Once levelled, the head starts rotating and the Rugby 60DG is ready for use.
- The H.I.Alert system becomes active 30 seconds after completing the self-levelling. The H.I.Alert system protects the Rugby 60DG against changes in elevation caused by any movement or settling of the tripod.
- The self-levelling system and the H.I.Alert function continue to monitor the position of the laser beam to ensure consistent and accurate work.

☞ The H.I.Alert function turns on automatically every time the Rugby 60DG is turned on.

3.3 The LCD display

Main display

The LCD display shows all the information that is required to operate the Rugby 60DG.



a X-axis grade value
b Y-axis grade value
c Beam masking
d Radio indication
e Battery level indication
f H.I. indication
g Head speed

Start-up screens



Leica start-up

When the Rugby 60DG is turned on, the Leica Start-up screen is shown followed by the Rugby 60DG Information screen displaying the following information:

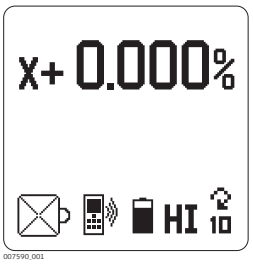
- Model and type
- Serial number
- Software revision level
- Hours of use

3.4 Grade entry

Direct grade entry

1. To start grade entry mode, press the Grade button once.
   ☞ To restore the last set grade(s), press and hold the Grade button for 1.5 seconds.

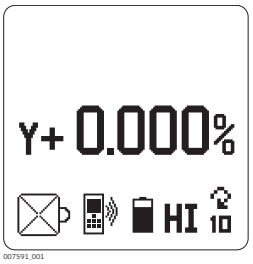
2. *The X-axis grade value is displayed*:



3. To change the grade value, press the Up or Down Arrow buttons.

4. To enter grade on the Y-axis, press the Grade button a second time.

   Only the Y-axis grade value is displayed:



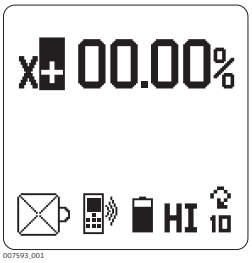
   To change the grade value, press the Up or Down Arrow buttons.

   To exit grade entry mode, press the Grade button until the main display is shown.
   OR:
   Wait for 8 seconds. The Rugby 60DG automatically returns to the main display.

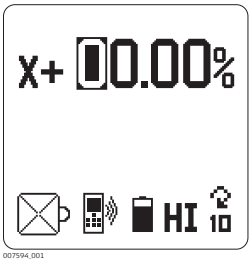
Grade entry by digit

While in grade entry mode, you can easily change the plus/minus sign or individual digits.

1. Press the Grade button to enter the grade entry mode.
2. Press the Left or Right Arrow buttons to create a cursor. The cursor always appears on the plus/minus sign.



3. Press the Up or Down Arrow buttons to change the plus/minus sign.
4. Press the Left or Right Arrow buttons to move the cursor.



Press the Up or Down Arrow buttons to change a digit.

To exit grade entry mode, press the Grade button until the main display is shown.
OR:
Wait for 8 seconds. The Rugby 60DG automatically returns to the main display.

Reset grade value to zero

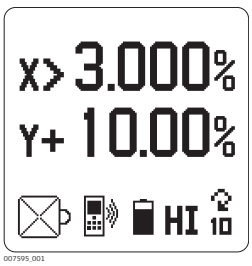
While in grade entry mode, you can quickly change the grade value back to zero by pressing the Up/Menu button and Down/Sleep button simultaneously.

Grade capability

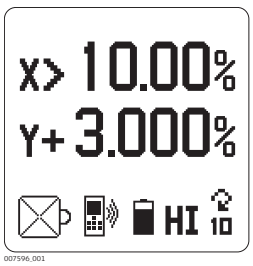
The Rugby 60DG can have up to 10.00% grade simultaneously in both the X and Y axes or up to 15.00% grade in one axis.

Entering grades above 10.00% in one axis is only possible if the cross axis grade is ±3% or lower.

If you try to enter grades greater than 3% or 10%, a notice appears on the screen when you press the button.



X > 3.000%



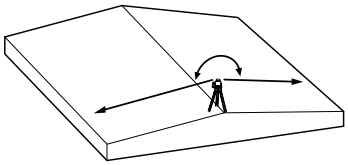
X > 10.00%

Grade swap

The grade in the X and Y axes can be swapped from positive to negative by changing the plus/minus sign in grade entry mode. Refer to 3.4 Grade entry-Grade entry by digit.

A typical application for this feature is road building.

Example: The Rugby 60DG is set up on the crown of the road and one axis is aligned to the centreline. In order to make the cross axis grade fall to the right or left hand side, simply change the plus/minus sign on the Leica Geosystems grade screen.

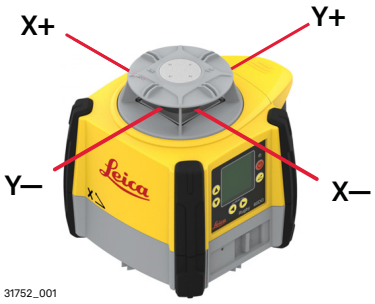


3.5 Axis identification

Axis identification

When entering grade, it is important to know the correct direction in which the grade is being entered.

Refer to the following illustration to identify the correct directions of the axes.



3.6 Conversion of slope into percent of grade

Conversion of slope

Slope: The change in elevation per unit of measure (foot, metre, etc.)

Percent of Grade: The change in elevation per 100 units of measure (feet, metre, etc.)

Calculating percent of grade from slope:

[Slope] x 100 = [Percent of Grade]

Example:

Slope	= 0.0059
Conversion	= 0.0059 x 100
Percent of Grade	= 0.590%

3.7 Alignment of the axes

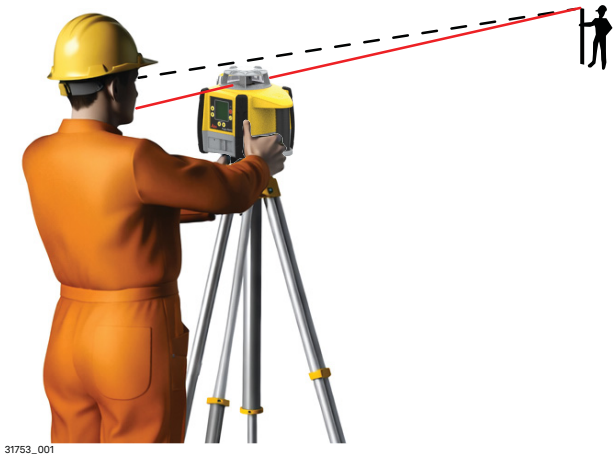
Aligning X- and Y-axis

After the desired grade is correctly set in the display, align the X- and Y-axis to the jobsite.

☞ Ensure that the bubble of the circular level is positioned near the centre of the circle for maximum self-levelling capability.

☞ Ensure that the Rugby 60DG is properly positioned over a control point.

The direction of the X-Axis is seen from the front of the Rugby 60DG, sighting over the top of the Rugby 60DG.



Rotate the Rugby 60DG slightly until the alignment marks are aligned with your second control point.

Once the Rugby 60DG is aligned, you can start working.

3.8 Precise alignment of the axes

Precisely aligning X- and Y-axis

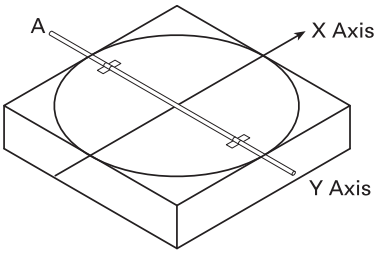
Under most conditions, the raised alignment marks on the top of the Rugby 60DG are adequate for alignment of the axes. For a more precise alignment, you can use the following procedure.

Objective of a precise alignment:

- To establish Point A on the Y-axis as a reference and take an elevation reading.
- To enter grade into the X-axis and then adjust the position of the laser until the original elevation at Point A is again found.

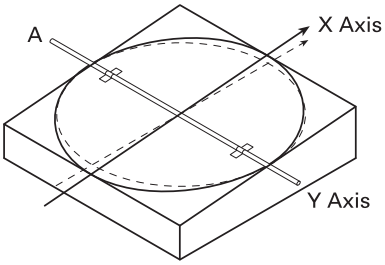
1. With 0.000% grade in both axes, set up the Rugby 60DG directly over a grade stake and roughly align the Y-axis to a second grade stake (Point A).

2. Take an elevation reading at Point A using the receiver and a survey rod.



3. Enter +5.000% grade into the X-axis. When grade is entered into the X-axis, the Y-axis acts like a hinge or fulcrum.

4. With +5.000% in the X-axis, take a second reading at Point A.



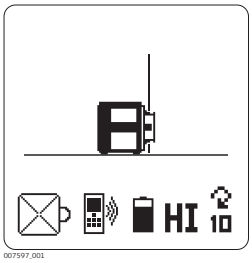
5. Alignment:
   - If the second reading is equal to the first reading, the X-axis is aligned correctly.
   - If the second reading is greater than the first reading, rotate the Rugby 60DG clockwise (to the right) until the two readings are equal.
   - If the second reading is less than the first reading, rotate the Rugby 60DG counter-clockwise (to the left) until the two readings are equal.

☞ An optional sighting scope is available for the Rugby 60DG which improves the axis alignment for second day setups. It is recommended that you first perform the precise alignment procedure, and then adjust the scope to these axes.

3.9 Laydown operation

Vertical plane of laser light

You can use the Rugby 60DG in laying down position to create a vertical plane for layout and alignment jobs.



Rugby 60DG Laying down screen

4 RC60 remote control

4.1 Description of the remote control

The RF Remote Control communicates with the Rugby 60DG via RF (radio frequency) and is used to control the same functions as on the laser.

RC60 remote control



a LCD display
b Power button
c Remote battery LED
d Grade button
e Left and right arrow buttons
f Rugby 60DG LED
g Sleep mode button
h Up and down arrow buttons

Description of the control panel

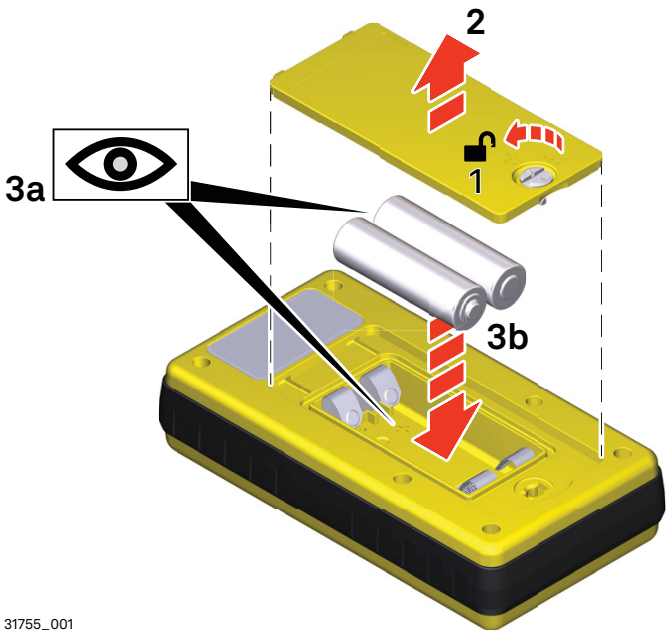
Components	Function
LCD display	Displays all required user information.
Power button	Press to turn on or off the remote control.
Grade button	Press to start grade entry mode.
Up and Down arrow buttons	Press to change the grade displayed. Press both simultaneously to reset the grade value to zero.
Left and Right arrow buttons	Press to display and move cursor for grade entry. Press both simultaneously to enter the Rugby 60DG menu. Press and hold simultaneously for 1.5 seconds to enter the remote control menu.
Sleep mode button	Press to put the Rugby 60DG in sleep mode. • During sleep mode, all functions are disabled. • The LCD display indicates that the Rugby 60DG is in sleep mode. • The Rugby 60DG sleeps for 2 hours*, then shuts down automatically and must be turned on again at the laser. • When in sleep mode, pressing the sleep button wakes the Rugby 60DG and normal operation is resumed.
Rugby 60DG LED	Indicates level status of the Rugby 60DG.
Remote battery LED	Indicates when the batteries for the remote control should be replaced.

* In the remote control menu, you can select the sleep time.

Replacing the batteries

☞ The remote control is powered by 2x AA batteries.

If the remote battery LED flashes, replace the batteries as shown in the picture.



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4.2 Pairing the Rugby 60DG with the RC60 remote control

Pairing step-by-step

The Rugby 60DG and the RC60 remote control include radio devices that allow you to activate the functions on the Rugby 60DG remotely up to 300 m (1000') from the Rugby 60DG.

Before using the RF features, the Rugby 60DG and the remote control must be paired together to be able to communicate with each other.

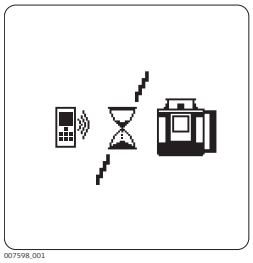
1.	Turn off both the Rugby 60DG and the remote control.
2.	Press and hold the Power button on the Rugby 60DG for 5 seconds to turn on the Rugby 60DG in pairing mode. The Rugby 60DG beeps five times slowly.
3.	Press and hold the Power button on the remote control until pairing is confirmed.
4.	When the pairing is successful: Both the Rugby 60DG and the remote control beep quickly five times and the Status LED flashes green quickly (5 Hz). There is no confirmation on the LCD displays during this process.
5.	When the pairing is **not** successful: Both the Rugby 60DG and the remote control beep slowly three times and the Status LED flashes red (1 Hz).

4.3 Connecting screens for the remote control

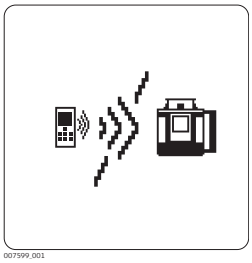
Information screens while connecting

There are three screens on the RC60 remote control which are displayed when connecting to the Rugby 60DG.

Wait screen


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Connecting screen


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The "wait" and "connecting" screens are displayed when the remote control is first turned on and while connecting to the Rugby 60DG.

Lost communication screen



The “lost communication” screen is displayed when the Rugby 60DG and the remote control have lost their communication link.

☞ Ensure that you are within clear sight of the Rugby 60DG and that you have not exceeded the working range.

☞ The RC60 remote control has its own menu where you can change the display brightness, sleep mode hours and remote shut-off time. Refer to 7 RC60 menufor information on the remote control menu.

5 Receiver

5.1 Overview

Description

The Rugby 60DG is primarily sold with the Rod Eye 105B receiver. The Rod Eye 105B receiver enhances the performance of the Rugby 60DG with automatic Beam Catching and monitoring.

5.1.1 Rod Eye 105B, digital RF receiver

The Rod Eye 105B receiver provides you with basic position information by using an arrow display, digital readout plus RF communication to the Rugby 60DG for special features.

Instrument components



a Speaker
b LCD Digital Display
c LED Display
d Power button
e Beam Catch button
f Reception window
g Bandwidth button
h Audio button

Description of the buttons

Button	Function
Power	Press once to turn on the receiver.
	Press 1.5 seconds to turn off the receiver.
Beam Catch	Press to capture the digital reading.
	Press 1.5 seconds to start the Beam Catching function. Refer to 8.3 Beam Catching (grade matching).
	Press 5 seconds to start the Beam Lock function. Refer to 8.4 Beam Lock (grade matching and monitoring).
Bandwidth	Press to change detection bandwidths.
Audio	Press to change the audio output.

5.2 Using the Rod Eye 105B receiver with the Rugby 60DG

Special functions when using Rod Eye 105B receiver

The Rugby 60DG can be used with almost any receiver.

However, when used with the Rod Eye 105B receiver, the following special functions are available:

- Beam Catching - Allows you to match an existing grade. (Refer to 8.3 Beam Catching (grade matching))
- Beam Lock - Monitors the grade position to keep it on grade. (Refer to 8.4 Beam Lock (grade matching and monitoring))

Before using the special functions, the Rugby 60DG and the Rod Eye 105B must be paired together to be able to communicate with each other. (Refer to 5.3 Pairing the Rod Eye 105B with the Rugby60DG)

5.3 Pairing the Rod Eye 105B with the Rugby 60DG

Pairing step-by-step

The Rugby 60DG and the Rod Eye 105B Receiver include radio devices that allow you to activate the functions on the Rugby 60DG remotely up to 100 m (300') from the Rugby 60DG.

Before using the RF features, the Rugby 60DG and the Receiver must be paired together to be able to communicate with each other.

1.	Turn off the Rugby 60DG.
2.	Press and hold the Power Button on the Rugby 60DG for 5 seconds to turn on the Rugby 60DG in pairing mode. The Rugby 60DG beeps five times slowly.
3.	Press and hold the Power Button on the Receiver until pairing is confirmed.
☞	When the pairing is successful: Both the Rugby 60DG and the Receiver beep five times and the LEDs are flashing (green). There is no confirmation on the LCD displays during this process.
☞	When the pairing is **not** successful: The Status LED on the Rugby 60DG flashes (red) quickly five times.

6 Rugby 60DG menu

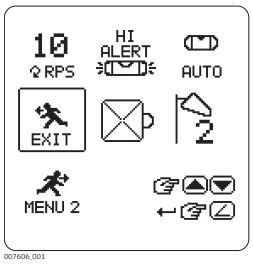
6.1 Access and navigation

Description

The Rugby 60DG has several menu options that allow you to optimise the performance of the Rugby 60DG for an individual application.

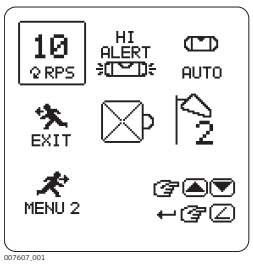
To access the menu of the Rugby 60DG, press the Left and Right arrow buttons simultaneously while the main screen is displayed.

Navigation within the menu:

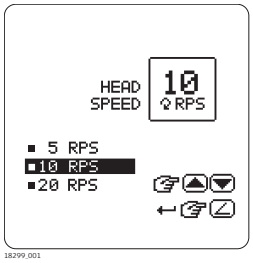


In the bottom right-hand corner of the menu screen, there are displayed user direction buttons to indicate the navigation within the Rugby 60DG menu.

Press the Up and Down arrow buttons to move the cursor and highlight an icon or an option.



A highlighted icon is surrounded by a box.



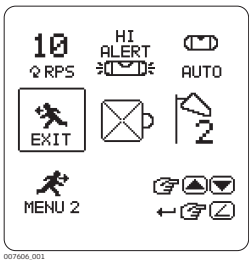
A highlighted option is shaded in black.

Press the Grade button to select a highlighted icon or to enable/disable a highlighted option.

- *If you select an icon, a screen with the options for the selected icon is displayed.*
- *If you select the menu icon (MENU 1, MENU 2, MENU 3), the next menu set is displayed.*
- *If you select the EXIT icon, the system returns to the main screen.*

6.2 Menu set 1

Overview



Menu set 1

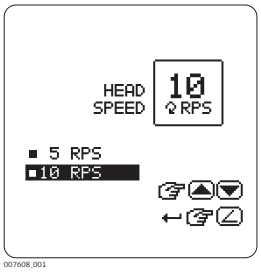
In the Menu Set 1, you can select the following parameters:

- Head speed settings
- H.I.Alert - on/off
- Automatic/manual modes
- Sensitivity settings
- Beam masking

☞ To exit the menu, highlight and select the EXIT icon. OR: Wait for 8 seconds and the menu is exited automatically.

☞ To display the menu set 2, highlight and select the MENU 2 icon.

Head speed settings

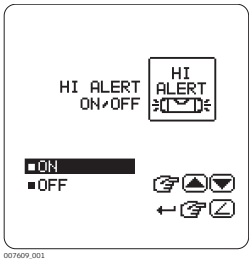


Head speed settings

You can select three head speed settings:

- 5 rps
- 10 rps
- 15 rps

H.I.Alert - on/off



H.I.Alert settings

You can choose to enable or disable the H.I.Alert function:

- On
- Off

When enabled, the H.I.Alert function turns on automatically every time the Rugby 60DG is turned on. The function becomes active 30 seconds after turning on the Rugby 60DG.

How does the H.I.Alert function work?

The Height of Instrument (H.I.) or Elevation Alert function prevents incorrect work caused by movement or settling of the tripod that would cause the laser to level at a lower height.

30 seconds after the Rugby 60DG has levelled and the head of the laser starts rotating, the H.I.Alert function becomes active.



H.I.Alert screen

The H.I.Alert function monitors the movement of the laser; if disturbed, the H.I.Alert screen flashes and the Rugby 60DG beeps rapidly.

To stop the alert, turn the Rugby 60DG off and on again. Check the height of the laser before beginning to work again.

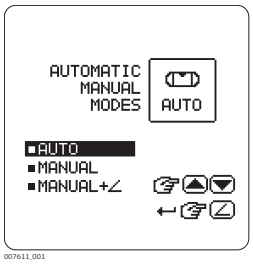
Automatic/Manual mode

You can select from three different modes:

- Automatic mode (default)
- Manual mode
- Manual mode with grade

You can choose to disable the automatic self-levelling mode.

☞ The Rugby 60DG always turns on in automatic mode regardless of the previous selection.



Automatic mode

The Rugby 60DG always turns on in automatic mode and continuously self-levels to maintain grade accuracy.

Manual mode

In manual mode the self-levelling function is turned off. The Manual mode screen is displayed instead of the normal main screen.

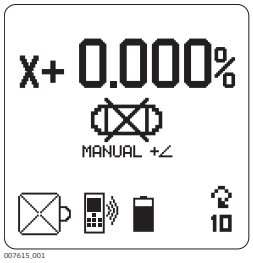
The plane of laser light can be manually sloped using the same buttons as for direct grade entry, but no value for the grade is shown in the display.



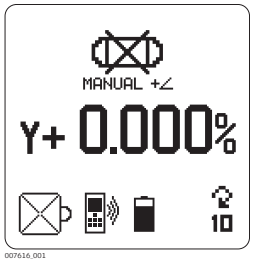
Manual mode with grade

In manual mode with grade the self-levelling function is turned off. The Manual mode with grade screen is displayed instead of the normal main screen. The plane of laser light can be manually sloped using the same buttons as for direct grade entry. The value of the entered grade is displayed in the Manual grade entry screens.

When using this mode, the Rugby 60DG first levels to the selected grade, then returns to manual mode.



Manual mode with grade - X-axis



Manual mode with grade- Y-axis

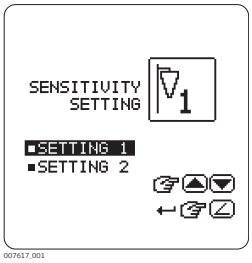


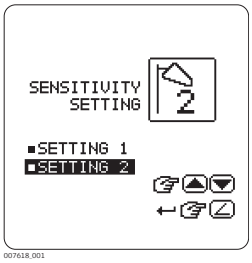
Manual grade entry - X-axis



Manual grade entry - Y-axis

Sensitivity settings





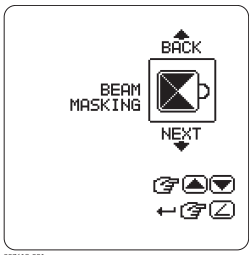
Sensitivity Variable Screens

While levelling, the Rugby 60DG responds to disturbances (wind, vibrations) and stops the head rotation, if necessary. You can choose between two levels of sensitivity:

- Sensitivity Setting 1: For normal performance - wind, vibration and other disturbances are minimal.
- Sensitivity Setting 2: For situations when wind, vibration and other disturbances are more severe.

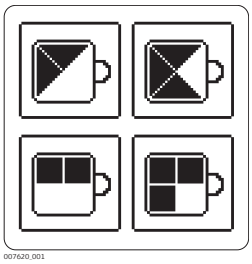
When enabled, the H.I.Alert function turns on automatically every time the Rugby 60DG is turned on. The function becomes active 30 seconds after turning on the Rugby 60DG.

Beam masking



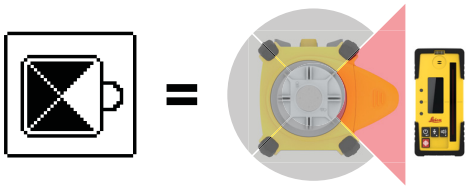
Beam masking Screen

Beam masking allows you to turn off the laser beam on selected sides of the laser to prevent interference with other lasers or receivers that could be working in the same working area.



Possible combinations

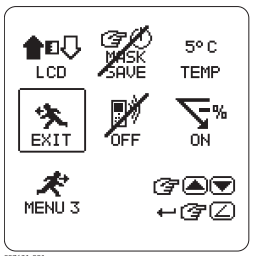
You can choose to block half or three quarters of the rotating laser beam.
Each of the four displayed combinations is available in four different variants. The dark area represents the area where the laser beam is turned off.
Use the Up or Down arrow buttons to choose from the 16 possible combinations.



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6.3 Menu set 2

Overview



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Menu Set 2

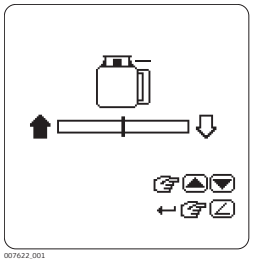
In the Menu Set 2, you can select the following parameters:

- Display brightness
- Beam masking - save at power off
- Temperature sensitivity
- Negative grade - enable/disable
- Radio - enable/disable

☞ To exit the menu, highlight and select the EXIT icon. OR: Wait for 8 seconds and the menu is exited automatically.

☞ To display the Menu Set 3, highlight and select the MENU 3 icon.

Display brightness



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Display brightness screen

With this setting, you can change the display brightness.
Use the Up and Down arrow buttons to adjust the brightness as desired.

Save beam masking at power off



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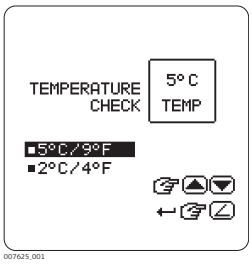
007624_001

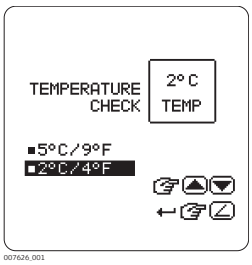
Save beam masking screens

Normally, the beam masking setting is disabled every time you turn off the Rugby 60DG.
If you prefer to save the beam masking settings for usage on the following day, you can enable the saving of the beam masking setting:

- Save: The beam masking settings are saved at power off.
- Do not save: The beam masking settings are disabled at power off.

Temperature sensitivity settings

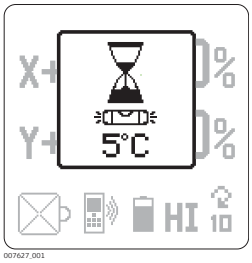


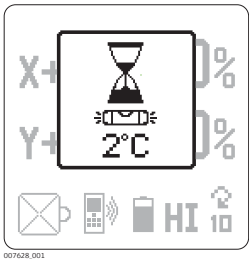


Temperature check settings screens

For each change in temperature of ± 5 °C (± 9 °F) the Rugby 60DG returns to the level position to check if the change in temperature has led to a change of the main levelling system.
For a more sensitive unit, you can change the setting to ± 2 °C (± 4 °F) temperature change.
Available intervals:

- Temperature is checked every 5 °C/9 °F
- Temperature is checked every 2 °C/4 °F



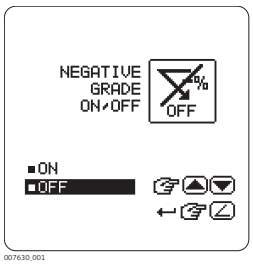


Temperature check wait screens

Relevelling process
When the Rugby 60DG is relevelling, the Temperature check wait screen is displayed. Wait until the process is finished before using the laser again. The Status LED flashes to indicate normal levelling.

Negative grade - enable/disable



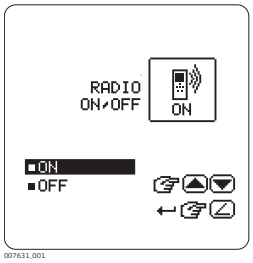


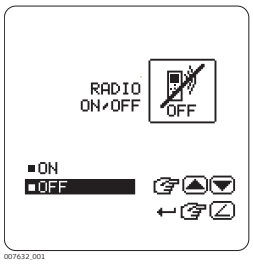
Negative grade screens

If you want to prevent confusion when setting up the laser, you can disable the negative grade function on the Rugby 60DG.

- ON: Negative grade is enabled.
- OFF: Negative grade is disabled.
  When negative grade is disabled, only positive grade can be entered in the direction of the arrow-shaped alignment marks on the top of the Rugby 60DG.

Radio - enable/disable





Radio screens

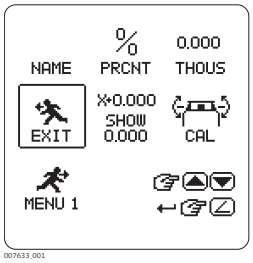
To be able to communicate with the RC60 remote control and the receiver, the radio on the Rugby 60DG must be enabled. The radio is automatically enabled when the units are paired together.

- ON: Radio is enabled.
- OFF: Radio is disabled.

☞ If you do not use the remote control or the receiver, it is recommend to disable radio in order to save battery life.

6.4 Menu set 3

Overview



Menu Set 3

In the Menu Set 3, you can select the following parameters:

- Customer name entry
- Display - percent/per mil
- Display - thousandths/hundredths
- Show grade settings on power up
- Calibration alert - enable/disable

☞ To exit the menu, highlight and select the EXIT icon. OR: Wait for 8 seconds and the menu is exited automatically.

☞ To display the Menu Set 1, highlight and select the MENU 1 icon.

Customer name settings

The Customer name settings allow you to enter the name of the customer, to enable/disable the customer name screen when turning on the Rugby 60DG, and to protect the name entry with a password.

Customer name entry



Customer name entry screen

When entering the Customer Name settings the first time, you are taken directly to the Customer Name entry screen. On this screen, you can enter 6 lines of text with up to 20 characters per line.

It is recommended to determine the desired text before changing or entering the information:

_____

_____

_____

_____

_____

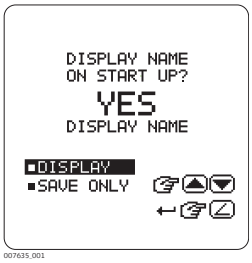
_____

To save the entered information, press and hold the Grade button for 1.5 seconds.

Enable/disable the display name on start-up

After saving the name entry, the display name on start-up screen is displayed. You can choose between two options:

- Display (YES): The customer name screen is displayed each time the laser is turned on.
- Save only (NO): The information entered in the customer name screen is stored in the laser, but is only visible when the customer name entry screen is accessed.





Display name on start-up screens

Protect customer name entry with a password

After selecting the display on start-up setting, you can choose to enable/disable the password protection of the customer name entry screen:

- YES: Password protection is enabled. Enter a four-digit password. The password is required each time you access the customer name entry screen.
- NO: Password protection is disabled.



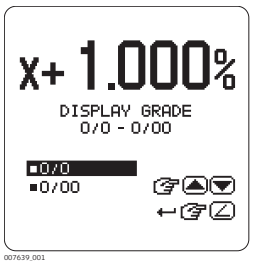


New password screens

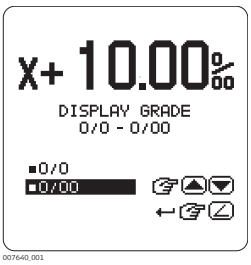
Display - percent/per mil

You can choose to display the grade in percent of grade or per mil:

- 1.000% = 1 metre rise per 100 metres
- 1.00‰ = 1 metre rise per 1000 metres

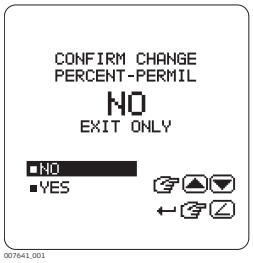


Display percent



Display per mil

Standard usage is percent of grade.
You are asked to confirm the selected option to prevent unwanted changes and possible errors due to the shift of the decimal point.



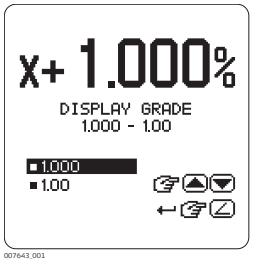


Per mil - confirmation Screens

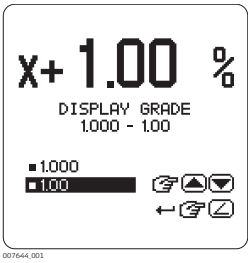
Display - thousandths or hundredths

You can choose to display percent of grade in thousandths or hundredths:

- 1.000 - Standard usage is to display thousandths or three digits after the decimal point.
- 1.00 - If you choose to display hundredths, only two digits are displayed after the decimal point.



Display thousandths

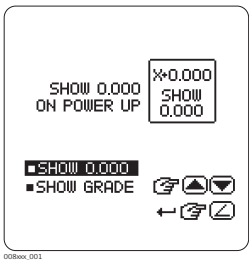


Display hundredths

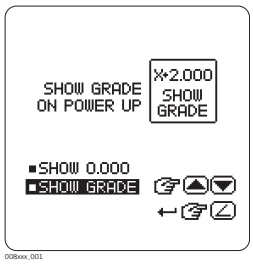
Show grade settings on power up

Normally, the grade value is reset to 0.000% every time you turn on the Rugby 60DG.
If you prefer to display the previous grade settings when turning on the Rugby 60DG, you can enable the option **Show Grade**.

- Show 0.000: The grade settings are reset to 0.000% on power up (default).
- Show Grade: The previous grade settings are displayed on power up.



Show 0.000%



Show Grade

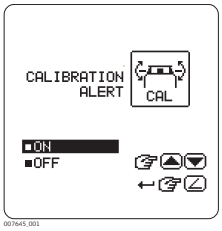
Note: When the option **Show 0.000%** is selected and you want to restore the last set grade(s), press and hold the Grade button for 1.5 seconds.

Calibration alert activation

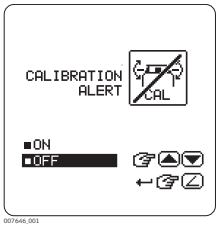
Enabling/disabling the calibration alert function

You can choose to enable/disable a calibration alert function based on hours of use:

- ON: Calibration alert is enabled
- OFF: Calibration alert is disabled



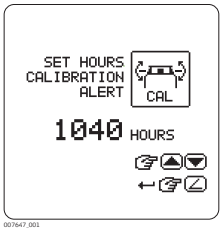
Enable calibration alert screen



Disable calibration alert screen

Setting the hours for calibration alert

If you enabled the calibration alert function, the “Set Calibration Alert Hours” screen is displayed. The default setting is 1.040 hours, which corresponds to approximately 6 months, based on a 40-hour working week.



Set calibration alert hours screen

Set the number of hours you would like to work before receiving a calibration alert. The hours can be set in increments of 40 hours.

Display of calibration alert on start-up screen

If you enabled the calibration alert function, the calibration alert hours are displayed on the start-up screen after turning on the Rugby 60DG:



Calibration alert hours on start-up screen

- LAST CAL: The number of hours since the last calibration.
- NEXT CAL: The number of hours remaining until the next calibration is planned.



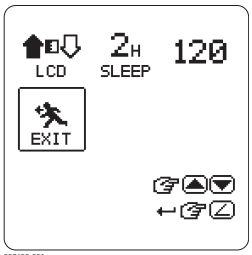
Calibration alert flashing screen

When the number of planned hours is reached, the words “CALIBRATION ALERT” are displayed for 8 seconds.

After calibrating the Rugby 60DG, the calibration alert hours are automatically reset. Changing or disabling the calibration alert is only possible by accessing the menu option “Calibration alert activation”.

7 RC60 menu

Overview



Remote control menu screen

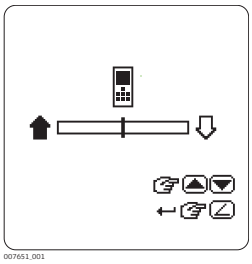
The RC60 remote control has its own menu where you can change the following parameters:

- Display brightness
- Sleep mode hours
- Remote shut-off time

To access the remote control menu, press and hold the Left and Right arrow buttons on the remote control for 1.5 seconds.

For navigation within the remote control menu, use the same buttons as for navigation within the Rugby 60DG menu. Refer to 6.1 Access and navigation.

Display brightness



Remote control display brightness

You can change the display brightness on this screen.
Use the Up and Down arrow buttons to adjust the brightness as desired.

Sleep mode hours

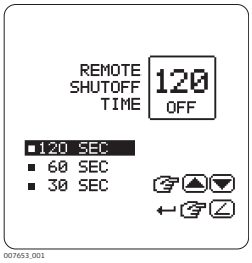


Sleep mode hours

You can determine how long the Rugby 60DG stays in sleep mode before turning off completely:

- 2 hours
- 4 hours
- 8 hours
- 16 hours

Remote shut-off time



Shut-off time

You can determine a shut-off time for the remote control:

- 30 seconds
- 60 seconds
- 120 seconds

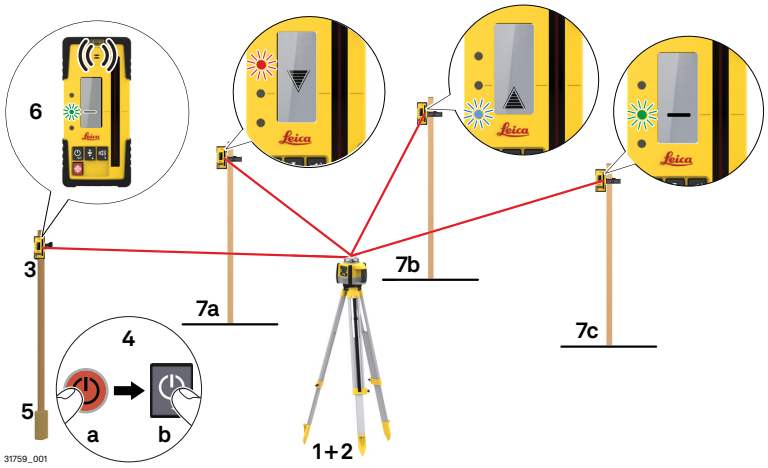
If the remote control is not used during this time, it shuts off automatically.

8 Applications

8.1 Checking grades

Checking grades step-by-step

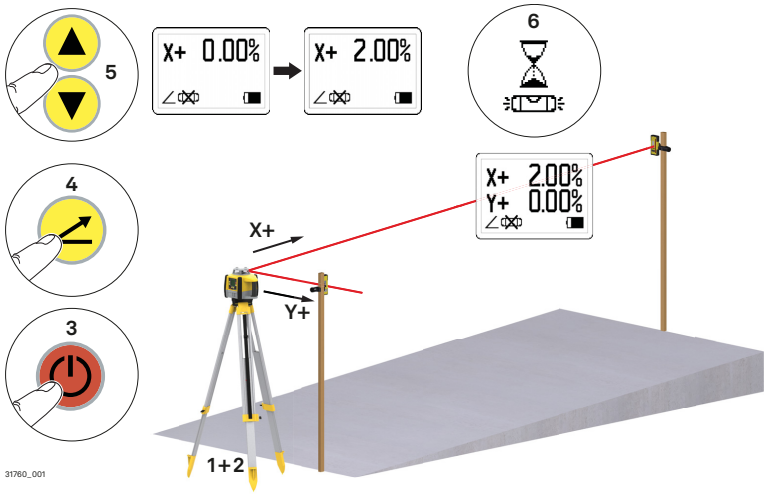
Application shown using the Rod Eye 105B receiver.



1.	Set up the Rugby 60DG on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Attach the receiver to a rod.
4.	Turn on the Rugby 60DG and the receiver.
5.	Set the base of the rod on a known point for the finished grade.
6.	Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: • the centre bar, • the green flashing LED, • a solid audio tone.
7.	Set the rod with the attached receiver on top of the excavation or concrete pour to check for correct elevation.
8.	Variances can be read in precise measurements with the digital receiver. • 7a: Position is too high. • 7b: Position is too low. • 7c: Position is on grade.

8.2 Entering grades

Entering grades step-by-step

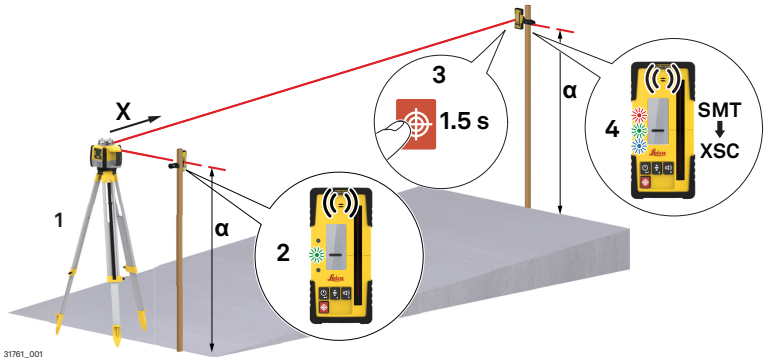


1.	Set up the Rugby 60DG on a tripod.
2.	Set up the tripod at the base of the slope with the X-axis pointing in the direction of the slope.
3.	Turn on the Rugby 60DG.
4.	Press the Grade button.
5.	Press the Up or Down button to enter grade for the X-axis (single slope). Press the Grade button to enter grade for the Y-axis. Press the Grade button again to exit grade entry mode.
6.	Once grade is entered, the Rugby 60DG will begin to adjust to grade. Do not disturb the Rugby 60DG during this process.
☞	To restore previous grade, press and hold the Grade button for 1.5 seconds.

8.3 Beam Catching (grade matching)

Beam Catching using the Rod Eye 105B step-by-step

Using the Beam Catching feature you can match an existing grade. The Rugby 60DG moves to the new grade position, displays the grade found and begins self-levelling to maintain the grade over time. Maximum range is 100 m (300').



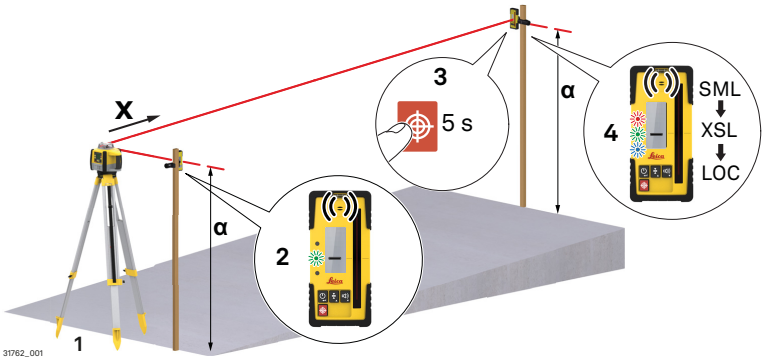
1.	The Beam Catching process can only be run on the X-axis in horizontal mode.
2.	Set up the Rugby 60DG at the base of a slope with no grade dialled into the Rugby 60DG and with the X-axis pointing in the direction of the slope.
3.	Adjust the height of the receiver on the rod at the base of the slope until the on-grade (centreline) position is indicated on the receiver by: • the centre bar, • the green flashing LED, • a solid audio tone, • the digital display.
4.	Move the rod with the receiver to the top of the slope. To start the Beam Catching process, press the Beam Catch button for 1.5 seconds. • The Rugby 60DG searches for the receiver until the on-grade position is found. The receiver shows **SMT**, then **XSC** while catching the beam on the X-axis. • Once the on-grade position is found, the receiver flashes all three LEDs simultaneously one time and the receiver returns to normal operation.

5. After this signal, the receiver can be moved and used as normal. The grade for the sloped axis is displayed on the LCD display and the Rugby 60DG now self-levels to this new slope.

8.4 Beam Lock (grade matching and monitoring)

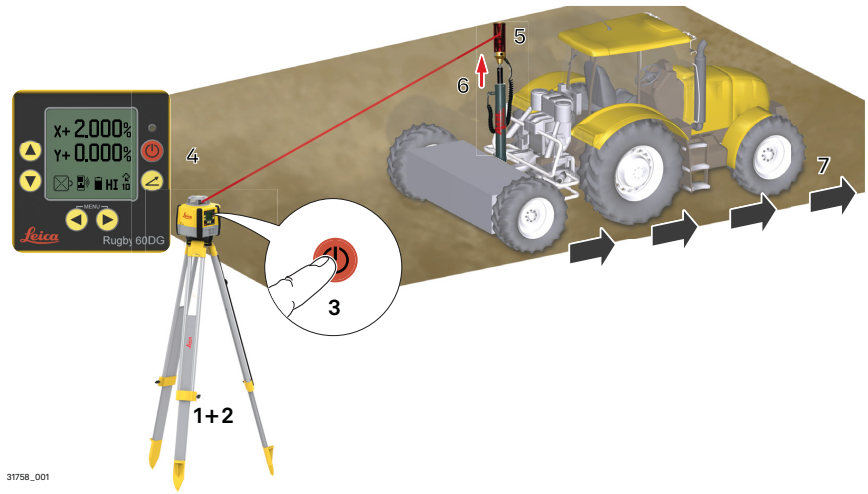
Beam Lock using the Rod Eye 105B step-by-step

Using the Beam Lock feature, you can match an existing grade and monitor the laser beam. The Rugby 60DG moves to the new grade position, displays the grade found and begins self-levelling to maintain the grade over time. The Rod Eye 105B must remain in place to monitor any movements of the rotating beam. Thus, an accurate grade setup is maintained. Maximum range is 100 m (300').



1. The Beam Lock process can only be run on the X-axis in horizontal mode.
2. Ensure that the grade value is set to zero.
   Set up the Rugby 60DG at the base of a slope with the X-axis pointing in the direction of the slope.
3. At the base of the slope, adjust the height of the Rod Eye 105B receiver on the rod until the on-grade (centreline) position is indicated on the receiver by:
   - the centre bar,
   - the green flashing LED,
   - a solid audio tone,
   - the digital display.
4. Move the rod with the receiver to the top of the slope. To start the Beam Lock process, press the Beam Catch button for 5 seconds.
   - The Rugby 60DG searches for the receiver until the on-grade position is found. The receiver shows **SML**, then **XSL** while catching and locking the beam on the X-axis.
   - Once the on-grade position is found, the receiver flashes all three LEDs simultaneously one time.
   - The display shows **LOC** while the receiver is in lock mode.
5. After this signal, the receiver must remain in place to monitor any movements of the rotating beam. The grade for the sloped axis is displayed on the LCD display of the Rugby 60DG.
6. To turn off the Beam Lock mode on the receiver, hold the Power button for 1.5 seconds.
7. To lock and monitor the rotating beam of an existing grade, mount the receiver in the plane of the laser before starting the Beam Lock process.

Agriculture levelling step-by-step



1.	Set up the Rugby 60DG on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Turn on the Rugby 60DG.
4.	Enter the required grade on the Rugby 60DG. Refer to 3.4 Grade entry.
5.	Attach the receiver on the mast that is mounted on the machine.
6.	Raise the mast until receiver is on grade with the reference line. ☞ The laser beam of the Rugby 60DG acts as a constant grade reference.
7.	Level the ground according to the grade reference.

9 Batteries

Description

The Rugby 60DG can be purchased with alkaline batteries or a rechargeable Li-Ion battery pack.

The following information is appropriate only to the model you have purchased.

9.1 Operating principles

First-time use/ charging batteries

- The battery must be charged before using it the first time, because it is delivered with an energy content as low as possible or might be in sleep mode.
- The permissible temperature range for charging is from 0 °C to +40 °C/ +32 °F to +104 °F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10 °C to +20 °C/+50 °F to +68 °F if possible
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery once the temperature is too high
- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make a discharge/charge cycle
- For Li-Ion batteries, a single discharge/charge cycle is sufficient. We recommend carrying out the process when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

Operation/discharging

- The batteries can be operated from –20 °C to +55 °C/–4 °F to +131 °F
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery

9.2 Battery for Rugby 60DG

Charging the Li-Ion battery pack step-by-step

The rechargeable Li-Ion battery pack on the Rugby 60DG can be charged without removing the battery pack from the laser.



1.	Slide the locking mechanism on the battery compartment to the centre position to expose the charge jack.
2.	Plug the AC connector into the appropriate AC power source.
3.	Connect the charger plug into the charge jack on the Rugby 60DG battery pack.
4.	The small LED next to the charge jack flashes indicating that the Rugby 60DG is charging. The LED is on solid when the battery pack is fully charged.
5.	When the battery pack is fully charged, disconnect the charger plug from the charge jack.
6.	Slide the locking mechanism to the left position to prevent dirt from getting into the charging jack.

☞ The battery pack reaches a full charge in approximately 5 hours if completely empty. A one-hour charge should allow the Rugby 60DG to run for a full 8 hours.

Changing the Li-Ion battery pack step-by-step

With the rechargeable Li-Ion battery pack the battery indicator on the Rugby 60DG LCD display shows when the battery pack is low and needs to be charged. The charge indicator LED on the Li-Ion battery pack indicates when the pack is being charged (flashing slowly) or fully charged (on, not flashing).



1.	The batteries are inserted in the front of the laser.
2.	The rechargeable battery pack can be recharged without being removed from the laser. Refer to Charging the Li-Ion battery pack step-by-step for further information.
3.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
4.	Remove the batteries from the battery compartment and/or insert the batteries into the battery compartment.
5.	Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.

Changing the alkaline batteries step-by-step

With alkaline batteries the battery indicator on the Rugby 60DG LCD display flashes when the batteries are low and need to be replaced. If no battery icon is shown, the batteries are okay.



Step	Description
☞	The batteries are inserted in the front of the laser.
1.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
2.	Remove the batteries from the battery compartment or insert the batteries into the battery compartment ensuring that the contacts are facing in the right direction.
	☞ The correct polarity is displayed on the battery holder.

Step	Description
3.	Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.

10 Accuracy adjustment

About

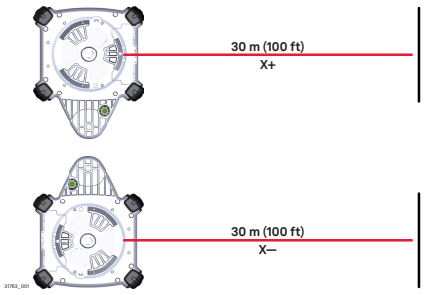
- It is the responsibility of the user to follow operating instructions and to periodically check the accuracy of the laser and work as it progresses.
- The Rugby 60DG is adjusted to the defined accuracy specification at the factory. It is recommended to check the laser for accuracy upon receipt and periodically thereafter to ensure accuracy is maintained. If the laser requires adjustment, contact your nearest authorised service centre or adjust the laser using the procedures described in this chapter.
- Only enter the accuracy adjustment mode when you plan to change the accuracy. Accuracy adjustments should only be performed by a qualified individual that understands basic adjustment principles.
- It is recommended to perform this procedure with two people on a relatively flat surface.

10.1 Checking the level accuracy

Checking the level accuracy

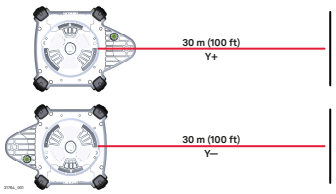
☞ The Rugby 60DG is within its accuracy specification if the four marks are within ± 1.5 mm (± 1/16") from the centre.

1. Place the Rugby 60DG on a flat, level surface or tripod approximately 30 m (100 ft) from a wall.



2. Align the first axis so that it is square to a wall. Allow the Rugby 60DG to self-level completely (approximately 1 minute after the Rugby 60DG begins to rotate).
3. Mark the position of the beam.
4. Rotate the laser 180° and allow it to self-level.
5. Mark the opposite side of the first axis.
6. Align the second axis of the Rugby 60DG by rotating it 90° so that this axis is square to the wall. Allow the Rugby 60DG to self-level completely.

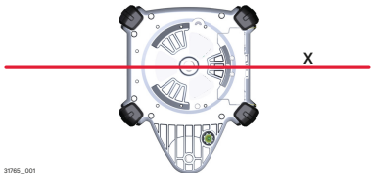
Lorem ipsum



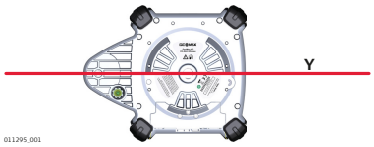
7. Mark the position of the beam.
8. Rotate the laser 180° and allow it to self-level.
9. Mark the opposite side of the second axis.

10.2 Adjusting the self-levelling accuracy

Description



In Adjustment Mode the X-axis LED indicates changes to the X-axis.



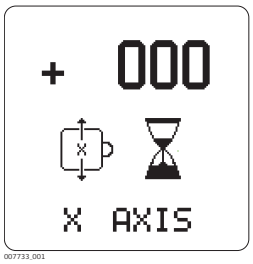
The Y-axis LED indicates changes to the Y-axis.

Entering calibration mode step-by-step

1.	Turn off the power.
2.	Put the Rugby 60DG in an upright position.
3.	Press and hold both the Up and Down arrow buttons.
4.	Press the Power button. The X-axis calibration screen appears. The Rugby 60DG is now in calibration mode.
☞	In calibration mode, the LED does not blink and the laser head continues to rotate. An hour-glass indicates that the Rugby 60DG is levelling.

Calibrating the X-axis step-by-step

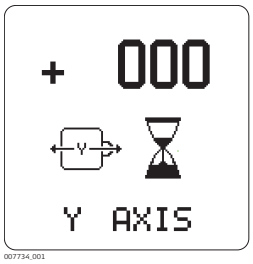
When entering Calibration mode, the X-axis calibration screen appears:



1.	When the hour glass has disappeared, indicating that the Rugby 60DG has levelled, check both sides of the X-axis.
2.	Press the Up and Down arrow buttons to bring the plane of laser light to the specified level position.
☞	Each step represents approximately 2 arc seconds of change. Therefore, 5 steps equal approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Grade button to accept the adjusted position and to switch to the Y-axis calibration screen.

Calibrating the Y-axis step-by-step

After calibration of the X-axis, the Y-axis calibration screen appears:



1.	When the hour glass has disappeared, indicating that the Rugby 60DG has levelled, check both sides of the Y-axis.

2.	Press the Up and Down arrow buttons to bring the plane of laser light to the specified level position.
☞	Each step represents approximately 2 arc seconds of change. Therefore, 5 steps equal approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Grade button to accept the adjusted position and to switch to the X-axis calibration screen.
4.	Press and hold the Grade button for 3 seconds to accept the adjusted positions, save and store the calibration settings and return to the Main user screen.

Exiting calibration mode

Press and hold the Grade button for 3 seconds to save and exit Calibration mode.

☞ Pressing the Power button at any time while in Calibration mode will exit the mode without saving changes.

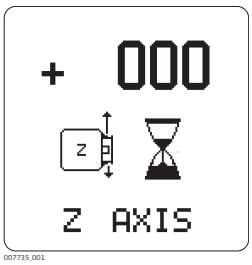
10.3 Adjusting the vertical accuracy

Entering calibration mode for the Z-axis step-by-step

1.	Turn off the power.
2.	Put the Rugby 60DG in laydown position.
3.	With power off, press and hold both the Up and Down arrow buttons.
4.	Press the Power button. The active axis is the Z-axis.
☞	In Calibration mode, the LED does not blink and the laser head continues to rotate. An hour-glass indicates that the Rugby 60DG is levelling.

Calibrating the Z-axis step-by-step

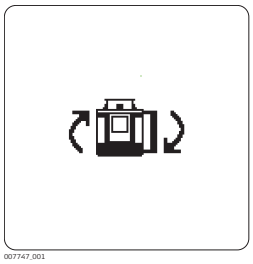
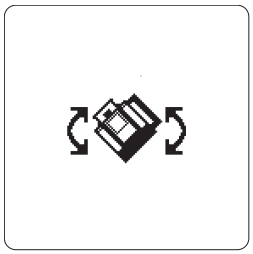
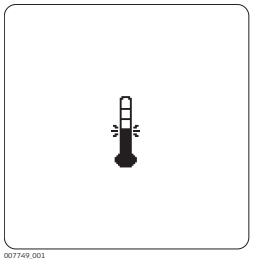
When entering calibration mode for the Z-axis, the Z-axis calibration screen appears:

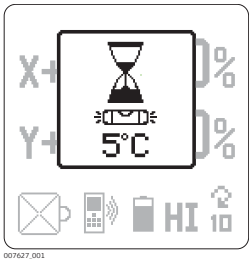
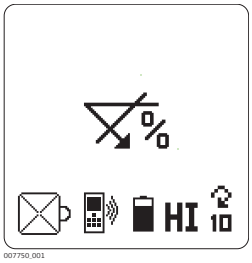
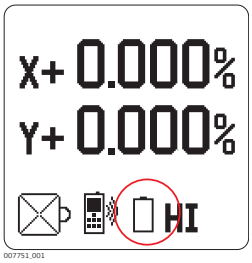
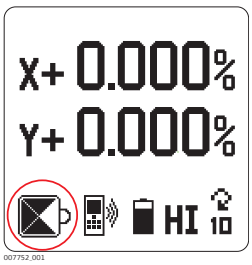
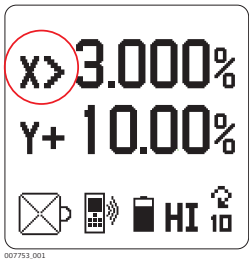


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1.	Press the Up and Down arrow buttons to increment the vertical position of the laser beam.
2.	Continue to press the Left and Right arrow buttons and monitor the beam until the Rugby 60DG is within its specified range.
3.	Press and hold the Grade button for 3 seconds to accept the adjusted position, to save and store the calibration settings and to return to the main user screen.

Alerts and message screens

Alert	Symptom	Possible causes and solutions
	Low Battery indication on the display.	The batteries are low. Recharge the Li-Ion battery pack. Refer to 9 Batteries.
	Elevation (H.I.) Alert The Elevation (H.I.) Alert screen is shown and the audio beeps. (Level position)	The Rugby 60DG has been bumped or tripod was moved. Turn off Rugby 60DG to stop alert, check the height of the laser before beginning to work again. Allow Rugby 60DG to relevel and check the height of the laser. After 2 minutes in the alert condition, the unit will shut off automatically.
	Servo Limit Alert The Servo Limit Alert screen is shown.	The Rugby 60DG is tipped too far to reach a level position. Relevel the Rugby 60DG within the 6 degree self-levelling range. After 2 minutes in the alert condition, the unit will shut off automatically.
	Tilt Alert The Tilt Alert screen is shown.	The Rugby 60DG is tipped more than 45° from level. After 2 minutes in the alert condition, the unit will shut off automatically.
	Temperature Alert The Temperature Alert screen is shown.	The Rugby 60DG is in an environment where it cannot operate without damaging the laser diode, for example being exposed to the heat from direct sunlight. Shade the Rugby 60DG from the sun. After 2 minutes in the alert condition, the unit will shut off automatically.

Alert	Symptom	Possible causes and solutions
	Temperature Check The Temperature Check Alert screen is shown.	The Rugby 60DG has detected a change in temperature of 5°C and is checking the level position. ☞ Wait until procedure is complete. Refer to Temperature sensitivity settings for changing the setting between 5°C and 2°C.
	Negative grade entry is not possible.	The negative grade function is disabled. Only positive grade can be entered in the Rugby 60DG. To enter negative grade, enable the negative grade function. Refer to Negative grade - enable/ disable.
	The “empty battery” icon flashes.	The Rugby 60DG has reached a low battery condition and changes the head speed to 7rps. If the receiver detects the Rugby 60DG rotating at 7 rps, it displays a small flashing Rugby 60DG. ☞ Check the battery of the Rugby 60DG.
	The beam is not emitting from all sides of the laser.	Beam masking is activated for two or more sides of the laser. To de-activate or change beam masking, refer to Beam masking.
	It is not possible to enter grade greater than 10.00% or 3.000%.	The Rugby 60DG allows for up to 10% grade entry in both axes simultaneously. If the grade entry for one axis is greater than 10%, the cross axis is limited to 3%.

Alert	Symptom	Possible causes and solutions
	The Rugby 60DG is not communicating with the remote control.	The Rugby 60DG has lost the communication link to the remote control. ☞ Ensure that you are within clear sight of the Rugby 60DG and that you have not exceeded the 100 m (300') working range.

Troubleshooting

Problem	Possible Causes	Suggested Solutions
The Rugby 60DG does not turn on.	The batteries are low or dead.	Check the batteries and change or charge the batteries if necessary. If the problem continues, return the Rugby 60DG to an authorised service centre for service.
The distance of the laser is reduced.	Dirt is reducing the laser output.	Clean the windows of the Rugby 60DG and the receiver. If the problem continues, return the Rugby 60DG to an authorised service centre for service.
The laser receiver is not working properly.	The Rugby 60DG is not rotating. It may be levelling or in H.I.Alert.	Check for proper operation of the Rugby 60DG. ☞ Refer to the receiver manual for more information.
	The receiver is out of usable range.	Move closer to the Rugby 60DG.
	The batteries of the receiver are low.	Check the low battery symbol on the receiver display. Change the receiver batteries.
The RC60 remote control is not working properly.	The remote control is out of usable range.	For normal operation, the remote control works up to 300 m (1,000').
	The batteries of the remote are low.	Check the Remote Battery LED on the control panel. Change the remote control batteries.

Problem	Possible Causes	Suggested Solutions
The display is too dark or too light.	The setting of the display brightness is unsuitable.	The brightness for both the Rugby 60DG and the remote control can be reset in the menu of the respective device. Refer to Display brightness(Rugby 60DG) or to Display brightness(Remote control).
The grade is shown in percent(%) or per mil (‰).	The wrong setting has been selected.	Choose the desired setting in the option menu. (Display - percent/per mil)
The grade resets to zero each time the laser is turned on.	The wrong setting has been selected.	Choose the desired setting in the option menu. (Show grade settings on power up)
The laser stops too often to relevel.	The sensitivity setting may be set to the “fine” setting (Setting 1).	Choose the Sensitivity Setting 2 in the option menu. (Sensitivity settings)
	The Tripod may be unstable.	Check your tripod for stability. Tighten all screws. Use sand bags on the legs if necessary.
	The wind is causing the Rugby 60DG to move too much.	Shelter the Rugby 60DG from the wind. Press the tripod legs more firmly into the ground.

12 Care and transport

12.1 Transport

Transport in the field

When transporting the equipment in the field, always make sure that you
- either carry the product in its original 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 container and secure it.

Shipping

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

Shipping, transport of batteries

When transporting or shipping batteries, the person responsible for 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

Exposing the product to high mechanical forces, for example through frequent transport or rough handling, or storing the product for a long time may cause deviations and a decrease in the measurement accuracy. Periodically carry out test measurements and perform the field adjustments indicated in the User Manual before using the product.

12.2 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.

Li-Ion and alkaline batteries

For Li-Ion and alkaline batteries
- Refer to 13 Technical data for information about storage temperature range
- Remove batteries from the product and the charger before storing
- After storage recharge batteries before using
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use

For Li-Ion batteries
- A storage temperature range of 0 °C to +30 °C / +32 °F to +86 °F in a dry environment is recommended to minimize self-discharging of the battery
- At the recommended storage temperature range, batteries containing a 40% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged

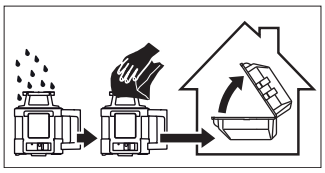
12.3 Cleaning and drying

Product and accessories

- Blow dust off lenses and prisms.
- 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. Remove the battery cover and dry the battery compartment. Do not repack until everything is completely dry. Always close the transport container when using in the field.



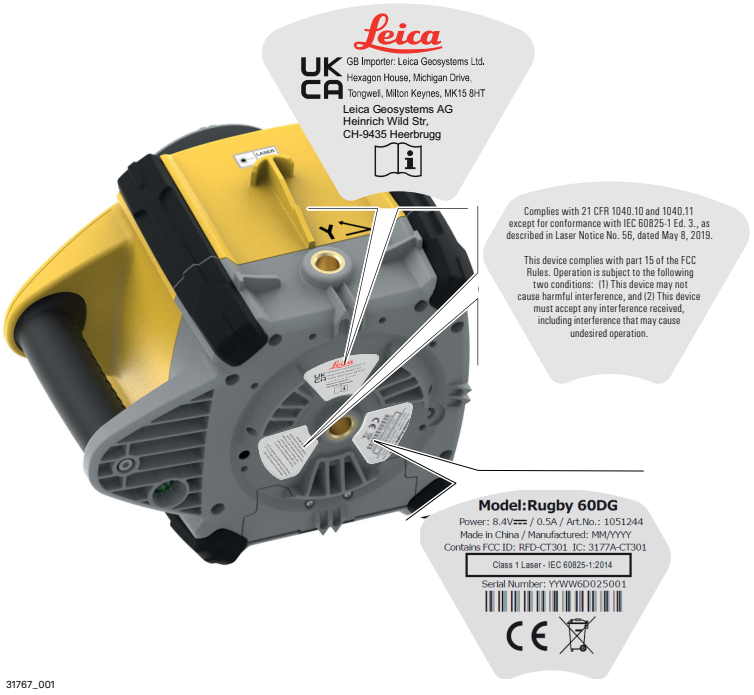
Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

13 Technical data

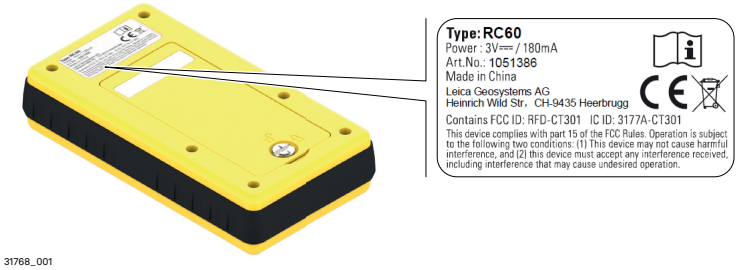
13.1 Conformity to national regulations

Labelling Rugby 60DG



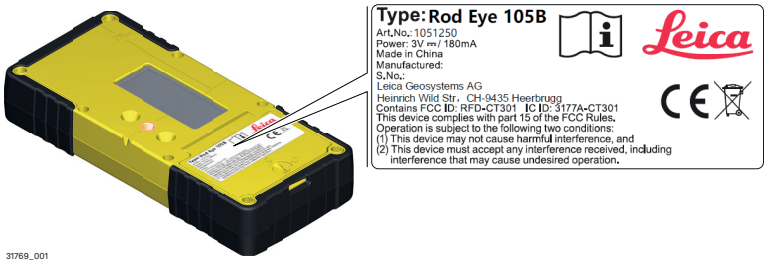
Labelling remote

RC60:



Labelling receiver

Rod Eye 105B:



Antenna

Rugby 60DG:	Chip antenna
RC60 remote control:	Chip antenna

Frequency band

2400 - 2483.5 MHz

Output power

< 100 mW (e. i. r. p.)

USA

Contains FCC ID: RFD-CT301
15

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, it may cause harmful interference to radio communications.

However, there is no guarantee that interference does 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.

Canada

CAN ICES-003(A)/NMB-003(A)
Contains IC: 3177A-CT301

Canada Compliance Statement
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference
2. This device must accept any interference, including interference that may cause undesired operation of the device

Canada Déclaration de Conformité
L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement du dispositif

Others

The conformity for countries with other national regulations has to be approved prior to use and operation.

13.2 Dangerous goods regulations

Dangerous goods regulations

Many products of Leica Geosystems are powered by Lithium batteries.

Lithium batteries can be dangerous under certain conditions and can pose a safety hazard. In certain conditions, Lithium batteries can overheat and ignite.

☞ When carrying or shipping your Leica product with Lithium batteries onboard a commercial aircraft, you must do so in accordance with the **IATA Dangerous Goods Regulations**.

☞ There are guidelines on **How to carry** and **How to ship** products with Lithium batteries. Before any transportation of a Leica product, we ask you to consult the guidelines on the web page (IATA Lithium Batteries) to ensure that you are in accordance with the IATA Dangerous Goods Regulations and that the Leica products can be transported correctly.

☞ Damaged or defective batteries are prohibited from being carried or transported onboard any aircraft. Therefore, ensure that the condition of any battery is safe for transportation.

13.3 General technical data of the product

Operating range

Operating range (diameter):

Rugby 60DG:	900m/3000ft

Self-levelling accuracy

Type	Value
Self-levelling accuracy[1)]	±1.5 mm at 30 m (±1/16" at 100 ft)

Self-levelling range

Type	Value
Self-levelling range	±5°

Head speed

Type	Value
Head speed	5, 10, 15 rps

Laser dimensions



Grade capability

± 10% in both axes simultaneously, 15% in one axis with up to 3% in the cross axis

Weight

Rugby 60DG weight with battery:	3.4 kg/7.4 lbs.

Internal battery

Type	Operating times* at 20°C
Lithium-Ion (Li-Ion Pack)	40 h
Alkaline (four D-cells)	60 h

*Operating times are dependent upon environmental conditions.

☞ Charging the Li-Ion battery pack takes a maximum of five hours.

☞ Use only high quality alkaline batteries to achieve operating time.

[1)] Self-levelling accuracy is defined at 25 °C (77 °F).

Environmental specifications

Temperature

Type	Operating temperature	Storage temperature
Rugby 60DG	−20 to +50 °C −4 to +122 °F	−30 to +70 °C −22 to +158 °F

Protection against water, dust and sand

Type	IP class
Rugby 60DG	IP67 (IEC 60529) Dust tight

Pollution degree

Type	Pollution degree
Rugby 60DG	2

Humidity

Type	Protection
All instruments	Max 95% non-condensing.

Altitude

Type	Range
Rugby 60DG	0-2000 m

Sound level

Type	Value
Rugby 60DG	< 70 db(A)

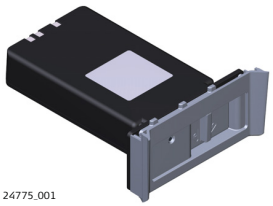
Lithium-Ion charger



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Type	Value
Input voltage	100 V AC-240 V AC, 50 Hz-60 Hz
Output voltage	12 V DC
Output current	3.0 A
Polarity	Shaft: negative, Tip: positive

Lithium-Ion battery pack



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Type	Value
Input voltage	12 V DC
Input current	2.5 A

Type	Value
Charge time	5 hours (maximum) at 20 °C

13.3.1 RC60 remote control

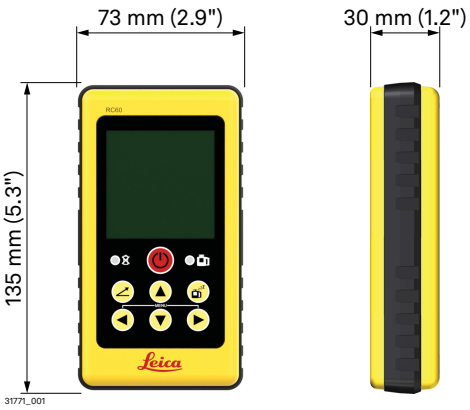
Operating range

Type	Value
Operating range (diameter)	300 m / 1000 ft

Batteries

Type	Value
Batteries	2 × 1.5 V AA
Battery life, typical usage	70 hours

Remote control dimensions



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