

# Leica Rugby 820

## User Manual



Version 2.0  
English

- when it has to be **right**

**Leica**  
Geosystems

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

## Validity of this manual

This manual applies to the Rugby 820 lasers.

## Available documentation

| Name                  | Description/Format                                                                                                                                                                                   |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Rugby 820 Quick Guide | Provides an overview of the product. Intended as a quick reference guide.                                                                                                                            | ✓                                                                                   | ✓                                                                                   |
| Rugby 820 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 820 documentation/software:

- the Leica Rugby CD
- <https://myworld.leica-geosystems.com>

myWorld@Leica Geosystems (<https://myworld.leica-geosystems.com>) offers a wide range of services, information and training material.

With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

| Service            | Description                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| myProducts         | Add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.                                                                                                                                                               |
| myService          | View the service history of your products in Leica Geosystems Service Centres and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centres view the current service status and the expected end date of service.                                                                                                                                    |
| mySupport          | Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.                                                                                                                                                                     |
| myTraining         | Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.                                                                                                                            |
| myTrusted Services | Offers increased productivity while at the same time providing maximum security. <ul style="list-style-type: none"> <li>• myExchange<br/>With myExchange you can exchange any files/objects from your computer to any of your Leica Exchange Contacts.</li> <li>• mySecurity<br/>If your instrument is ever stolen, a locking mechanism is available to ensure that the instrument is disabled and can no longer be used.</li> </ul> |

# Table of Contents

| In this manual | Chapter                                                      | Page      |
|----------------|--------------------------------------------------------------|-----------|
| <b>1</b>       | <b>Safety Directions</b>                                     | <b>6</b>  |
| 1.1            | General                                                      | 6         |
| 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                                         | 10        |
| 1.6.1          | General                                                      | 10        |
| 1.6.2          | Rugby 820                                                    | 10        |
| 1.7            | Electromagnetic Compatibility EMC                            | 11        |
| 1.8            | FCC Statement, Applicable in U.S.                            | 12        |
| 1.9            | ICES-003 Statement, Applicable in Canada                     | 13        |
| <b>2</b>       | <b>Description of the System</b>                             | <b>14</b> |
| 2.1            | System Components                                            | 14        |
| 2.2            | Rugby Laser Components                                       | 15        |
| 2.3            | Case Components                                              | 15        |
| 2.4            | Setup                                                        | 16        |
| <b>3</b>       | <b>Operation</b>                                             | <b>17</b> |
| 3.1            | Buttons                                                      | 17        |
| 3.2            | LED Indicators                                               | 18        |
| 3.3            | Turning the Rugby on and off                                 | 18        |
| 3.4            | Automatic Mode                                               | 19        |
| 3.5            | Manual Mode                                                  | 19        |
| 3.6            | Elevation Alert (H.I.) Function                              | 20        |
| <b>4</b>       | <b>RC800 Remote Control and Semi-Automatic Grade</b>         | <b>21</b> |
| 4.1            | RC800 Remote Control                                         | 21        |
| 4.1.1          | Description of the Remote Control                            | 21        |
| 4.1.2          | Pairing the Rugby with the RC800 Remote Control              | 22        |
| 4.1.3          | Connecting Screen for the Remote Control                     | 22        |
| 4.2            | Operation                                                    | 23        |
| 4.2.1          | Start Up Screens                                             | 23        |
| 4.2.2          | Grade Entry                                                  | 24        |
| 4.2.3          | Elevation (H.I.) Alert, Bump Alert and Smart Slope Functions | 25        |
| 4.2.4          | Rugby Menu Options                                           | 27        |
| 4.2.5          | RC800 Menu                                                   | 29        |
| <b>5</b>       | <b>Receivers</b>                                             | <b>30</b> |
| 5.1            | Rod Eye 160, Digital Receiver                                | 30        |
| 5.2            | Rod Eye 180, Digital RF Receiver (used with the Rugby 820)   | 31        |
| 5.3            | Menu                                                         | 32        |
| 5.4            | Pairing the Rod Eye 180 with the Rugby 820                   | 32        |

|           |                                                                  |           |
|-----------|------------------------------------------------------------------|-----------|
| <b>6</b>  | <b>Applications</b>                                              | <b>33</b> |
| 6.1       | Setting Forms                                                    | 33        |
| 6.2       | Checking Grades                                                  | 34        |
| 6.3       | Manual Grades                                                    | 35        |
| 6.4       | Applications - Rugby 820 and the Rod Eye 180 Digital RF receiver | 36        |
| 6.4.1     | Smart Target (Automatic Slope Catching)                          | 36        |
| 6.4.2     | Smart Target Lock (Slope Lock/Monitoring)                        | 37        |
| 6.4.3     | Dual Receiver Setups                                             | 38        |
| 6.5       | Rugby and the RC800 Remote Control                               | 39        |
| 6.5.1     | Entering Grades                                                  | 39        |
| <b>7</b>  | <b>Batteries</b>                                                 | <b>41</b> |
| 7.1       | Operating Principles                                             | 41        |
| 7.2       | Battery for Rugby                                                | 42        |
| <b>8</b>  | <b>Accuracy Adjustment</b>                                       | <b>45</b> |
| 8.1       | Checking the Level Accuracy                                      | 45        |
| 8.2       | Adjusting the Level Accuracy                                     | 46        |
| <b>9</b>  | <b>Automatic Field Calibration</b>                               | <b>48</b> |
| <b>10</b> | <b>Troubleshooting</b>                                           | <b>51</b> |
| 10.1      | Rugby 820                                                        | 51        |
| 10.2      | RC800 Remote Control                                             | 53        |
| <b>11</b> | <b>Care and Transport</b>                                        | <b>55</b> |
| 11.1      | Transport                                                        | 55        |
| 11.2      | Storage                                                          | 55        |
| 11.3      | Cleaning and Drying                                              | 56        |
| <b>12</b> | <b>Technical Data</b>                                            | <b>57</b> |
| 12.1      | Conformity to National Regulations                               | 57        |
| 12.1.1    | Rugby 820                                                        | 57        |
| 12.1.2    | Dangerous Goods Regulations                                      | 57        |
| 12.2      | General Technical Data of the Laser                              | 58        |
| 12.3      | RC800 Remote Control                                             | 59        |
| <b>13</b> | <b>Warranty under PROTECT by Leica Geosystems</b>                | <b>60</b> |
| <b>14</b> | <b>Accessories</b>                                               | <b>61</b> |
|           | <b>Index</b>                                                     | <b>62</b> |

# 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 herein.

**DANGER, WARNING, CAUTION** and **NOTICE** are standardized 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 table below 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                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.                                                      |
|  <b>WARNING</b> | Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.                                |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.                                 |
| <b>NOTICE</b>                                                                                      | 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.                  |

## 1.2

## Definition of Use

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Intended use</b>                  | <ul style="list-style-type: none"><li>• The product casts a horizontal laser plane or a laser beam for the purpose of alignment.</li><li>• The laser beam can be detected by means of a laser detector.</li><li>• Remote control of product.</li><li>• Data communication with external appliances.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Reasonably foreseeable misuse</b> | <ul style="list-style-type: none"><li>• Use of the product without instruction.</li><li>• Use outside of the intended use and limits.</li><li>• Disabling safety systems.</li><li>• Removal of hazard notices.</li><li>• Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.</li><li>• Modification or conversion of the product.</li><li>• Use after misappropriation.</li><li>• Use of products with obvious damages or defects.</li><li>• Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.</li><li>• Inadequate safeguards at the working site.</li><li>• Deliberate dazzling of third parties.</li><li>• Controlling of machines, moving objects or similar monitoring application without additional control and safety installations.</li></ul> |

## 1.3

## Limits of Use

|                                                                                                   |                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Environment</b>                                                                                | Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.                                                         |
|  <b>DANGER</b> | Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product. |

## 1.4

## Responsibilities

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Manufacturer of the product</b>        | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Person responsible for the product</b> | <p>The person responsible for the product has the following duties:</p> <ul style="list-style-type: none"><li>• To understand the safety instructions on the product and the instructions in the user manual.</li><li>• To ensure that it is used in accordance with the instructions.</li><li>• To be familiar with local regulations relating to safety and accident prevention.</li><li>• To inform Leica Geosystems immediately if the product and the application becomes unsafe.</li><li>• To ensure that the national laws, regulations and conditions for the operation of e.g. radio transmitters or lasers are respected.</li></ul> |

**CAUTION**

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

**Precautions:**

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use as well as before and after important measurements.

**DANGER**

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**

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**

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

**Precautions:**

Do not use the product in a thunderstorm.

**WARNING**

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites and at industrial installations.

**Precautions:**

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety, accident prevention and road traffic.

**CAUTION**

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people 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**

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

**Precautions:**

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

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





## WARNING

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

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

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

### Precautions:

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



## WARNING

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

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

### Precautions:



The product must not be disposed with household waste.

Dispose of the product appropriately in accordance with the national regulations in force in your country.

Always prevent access to the product by unauthorised personnel.

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



## WARNING

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



## WARNING

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

### Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.



## WARNING

If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized 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 objects.

## 1.6

### 1.6.1

## Laser Classification

### 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 (2004-02). 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 (2004-02), 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 (2004-02).

### 1.6.2

### Rugby 820

#### General

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

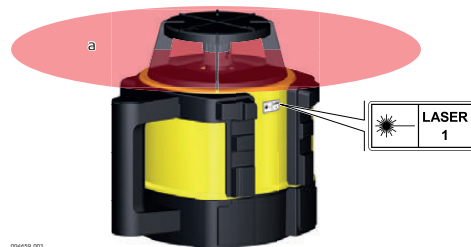
The laser product described in this section is classified as laser class 1 in accordance with:

- 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.

| Description                | Value           |
|----------------------------|-----------------|
| Maximum peak radiant power | 0.6 mW / 2.2 mW |
| Pulse duration (effective) | 500 ms / 1.1 ms |
| Pulse repetition frequency | 1 Hz / 10 Hz    |
| Beam divergence            | 0.2 mrad        |
| Wavelength                 | 635 nm          |

#### Labelling



a) Laser beam

**Description**

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

**WARNING**

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

**CAUTION**

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

**Precautions:**

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

**CAUTION**

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

**Precautions:**

Check the plausibility of results obtained under these conditions.

**CAUTION**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

**Precautions:**

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

**Radios or Digital Cellular Phones****WARNING**

Use of product with radio or digital cellular phone devices:

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

**Precautions:**

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment 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 to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.



The greyed paragraph below is only applicable for products without radio.



## WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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



## WARNING

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

## Labelling Rugby 820



004660\_002

## Labelling Rod Eye

### Rod Eye 160:



004661\_001

**Type: RE160**  
Power : 3V<sup>nom</sup> / 60mA  
Art.No.: 785492  
Made in China

**Swiss Technology**  
by **Leica Geosystems**  
CH-9435 Heerbrugg

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.

CE, FCC, and other regulatory marks.

### Rod Eye 180



004662\_002

**Type: RE180A**  
Power : 3V<sup>nom</sup> / 100mA  
Art.No.: 832396  
Made in China  
Contains FCC ID: RFD-CT100 IC ID: 3177A-CT100

**Swiss Technology**  
by **Leica Geosystems**  
CH-9435 Heerbrugg

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.

CE, FCC, and other regulatory marks.

## Labelling RC800

### RC800



007818\_002

**Type: RC800A**  
Power : 3V<sup>nom</sup> / 100mA  
Art.No.: 840706  
Made in China  
Leica Geosystems AG  
CH-9435 Heerbrugg  
Contains FCC ID: RFD-CT300 IC ID: 3177A-CT300

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.

CE, FCC, and other regulatory marks.

## 1.9

## ICES-003 Statement, Applicable in Canada



### WARNING

This Class (B) digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe (B) est conforme à la norme NMB-003 du Canada.

## 2

## Description of the System

### 2.1

### System Components

#### General description

The Rugby 820 is a laser tool for general construction and levelling applications such as

- Setting forms
- Checking grades
- Controlling depths for excavations

If set up within the self-levelling range, the Rugby automatically levels to create an accurate horizontal plane of laser light.

Once the Rugby has levelled, the head will start rotating and the Rugby is ready for use.

30 seconds after the Rugby has completed the levelling, the H.I. Alert system becomes active and protects the Rugby against changes in elevation caused by movement of the tripod to ensure accurate work.

#### Available system components



The delivered components depend on the package ordered.

## 2.2

## Rugby Laser Components

---

### Rugby laser components



004606\_001

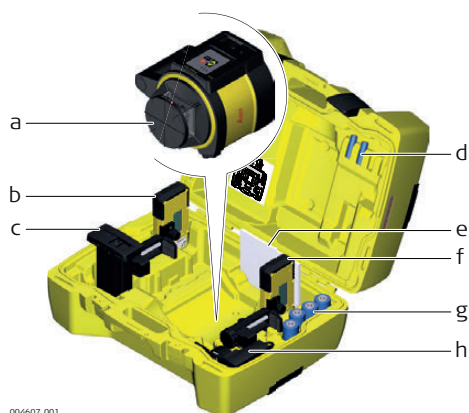
- a) Carry Handle
- b) LED Indicators
- c) Buttons
- d) Battery compartment
- e) Charge jack (for Li-Ion battery pack)

## 2.3

## Case Components

---

### Case components



004607\_001

- a) Rugby laser
- b) Rod eye receiver mounted on the bracket
- c) Li-Ion battery pack or Alkaline battery pack
- d) 2x AA-cell battery
- e) User Manual/CD
- f) Second receiver (can be purchased separately)
- g) 4 x D-cell battery (for alkaline versions only)
- h) Charger (for Li-Ion versions only)

**Location**

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

**Setting up on a Tripod**

004608.001

| Step | Description                                                                         |
|------|-------------------------------------------------------------------------------------|
| 1.   | Set up the tripod.                                                                  |
| 2.   | Place the Rugby on the tripod.                                                      |
| 3.   | Tighten the screw on the underside of the tripod to secure the Rugby on the tripod. |

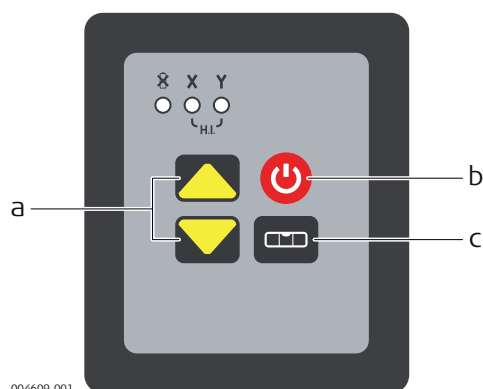
- Attach the Rugby securely to a tripod or laser trailer, or mount on a stable level surface.
- Always check the tripod or laser trailer before attaching the Rugby. Make sure all screws, bolts and nuts are tight.
- If a tripod has chains, they should be slightly loose to allow for thermal expansion during the day.
- Secure the tripod on extremely windy days.



## 3 Operation

### 3.1 Buttons

#### Buttons



- a) Up and Down Arrow buttons
- b) Power button
- c) Automatic/Manual Mode button

#### Description of the Buttons

| Button                    | Function                                                                                                                                                                                                                                                                   |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Up and Down Arrow         | Press to enter a slope for an axis in Manual Mode.                                                                                                                                                                                                                         |
| Power                     | Press to turn on or off the Rugby.                                                                                                                                                                                                                                         |
| Automatic/<br>Manual Mode | Press once to change the X-axis to Manual Mode with Y-axis self-levelling.                                                                                                                                                                                                 |
|                           | Press again to change the Y-axis to Manual Mode with X-axis self-levelling.                                                                                                                                                                                                |
|                           | Press again to change both axes to Manual Mode with no self-levelling.                                                                                                                                                                                                     |
|                           | Press again to change back to Full Automatic Mode.<br> Note the changes in the LED indicators in the Manual Modes. The red LED indicates that the corresponding axis is in Manual Mode. |

## 3.2

## LED Indicators

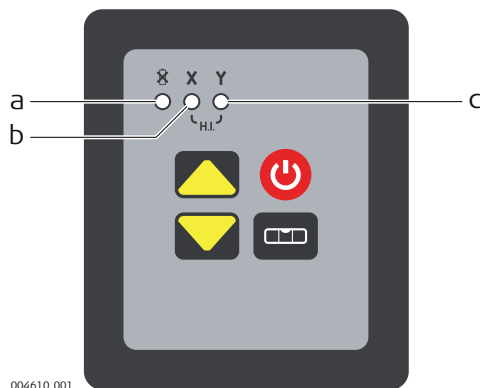
### Main Functions

#### Description

The LED Indicators have three main functions:

- To indicate the level status of the axes.
- To indicate the battery status.
- To indicate an H.I. Alert condition.

#### Diagram of the LED Indicators



- a) Low Battery Indicator LED
- b) X-axis Indicator LED
- c) Y-axis Indicator LED

### Description of the LEDs

| IF the                               | is/are            | THEN                                                    |
|--------------------------------------|-------------------|---------------------------------------------------------|
| Low Battery Indicator LED (Li-Ion)   | off               | the battery is okay.                                    |
|                                      | flashing slowly   | the battery has $\leq 10\%$ (4 h) power remaining.      |
|                                      | flashing quickly  | the battery has $\leq 5\%$ (2 h) power remaining.       |
|                                      | red               | the battery cannot power the Rugby. Charge the battery. |
| Low Battery Indicator LED (alkaline) | off               | the battery is okay.                                    |
|                                      | flashing slowly   | the battery is getting low.                             |
|                                      | flashing rapidly  | the battery needs to be changed.                        |
| X-axis and Y-axis Indicator LEDs     | green             | the axis is level.                                      |
|                                      | flashing green    | the axis is levelling.                                  |
|                                      | red               | the axis is in Manual Mode.                             |
|                                      | both flashing red | an H.I. Alert is indicated.                             |

## 3.3

## Turning the Rugby on and off

### Turning on and off

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

#### After turning on:

- If set up within the  $6^\circ$  self-levelling range, the Rugby automatically levels to create an accurate horizontal plane of laser light.
- Once levelled, the head starts rotating and Rugby is ready for use.
- After 30 seconds of completing the levelling, the H.I. Alert system becomes active to protect the laser against changes in elevation caused by movement or settling of the tripod.
- The self-levelling system and H.I. Alert function continues to monitor the position of the laser beam to ensure consistent and accurate work.

### 3.4

### Automatic Mode

#### Description of the Automatic Mode

The Rugby always starts up in Automatic Mode. In Automatic Mode the Rugby automatically levels if set up within the 6° self-levelling range.

### 3.5

### Manual Mode

#### Description of the Manual Mode

After start-up the Manual Mode can be activated. In Manual Mode the self-levelling will be deactivated. The following options are available:

- Change the X-axis to Manual Mode
- Change the Y-axis to Manual Mode
- Change to Full Manual Mode

☞ After turning the Rugby off and on again, the Rugby is in Automatic Mode.

#### Changing the X-axis to Manual Mode

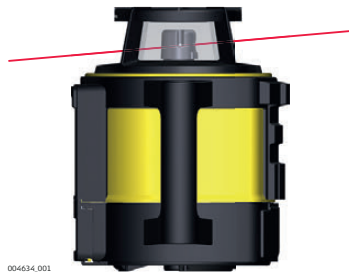
After startup, press the Automatic/Manual Mode Button once to change the X-axis to Manual Mode.

☞ The X-axis and Y-axis are marked on the top of the Rugby.

- The X-axis does not self-level and a slope can be entered in this axis using the Up and Down Arrow buttons on the Rugby.
- The X-axis LED is red.
- The Y-axis continues to self-level and the Y-axis LED flashes green until level.



When the X-axis is in Manual Mode, the X-axis can be sloped upwards or downwards as illustrated.



004634\_001

#### Changing the Y-axis to Manual Mode

Press the Automatic/Manual Mode button again to change the Y-axis to Manual Mode.

☞ The X-axis and Y-axis are marked on the top of the Rugby.

- The Y-axis does not self-level and a slope can be entered in this axis using the Up and Down Arrow buttons on the Rugby.
- The Y-axis LED is red.
- The X-axis continues to self-level and the X-axis LED flashes green until level.



When the Y-axis is in Manual Mode, the Y-axis can be sloped upwards or downwards as illustrated.



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## Changing to Full Manual Mode

Press the Automatic/Manual Mode button again to change to Full Manual Mode.



The X and Y axes are marked on the top of the Rugby.

- Both the X-axis and Y-axis do not self-level and a slope can be entered in the X-axis using the Up and Down Arrow buttons on the Rugby.
- The X-axis LED is red.
- The Y-axis LED is red.



When both the X-axis and Y-axis are in Manual Mode, the X-axis can be sloped using the Up and Down Arrow buttons.



004636\_001

## 3.6

### Elevation Alert (H.I.) Function

#### Description of the Elevation Alert function

- The Elevation Alert or Height of Instrument (H.I.) function prevents incorrect work caused by movement or settling of the tripod that would cause the laser to level at a lower height.
- The Elevation Alert function becomes active and monitors the movement of the laser 30 second after the Rugby has completely levelled and the head of the laser starts rotating.
- The Elevation Alert monitors the laser. If disturbed, both the X-axis LED and Y-axis LED flash and the Rugby beeps rapidly.
- To stop the alert turn Rugby off and on again. Check the height of the laser before beginning to work again.



The Elevation Alert function turns on automatically every time the Rugby is turned on.

#### Disable or enable the Elevation Alert function

The Elevation Alert function can be disabled or enabled by pressing the following button combination:

- With the Rugby turned on, press and hold the Up and Down Arrow buttons.
- Press the Automatic/Manual Mode button.



The Rugby beeps once to indicate the change.

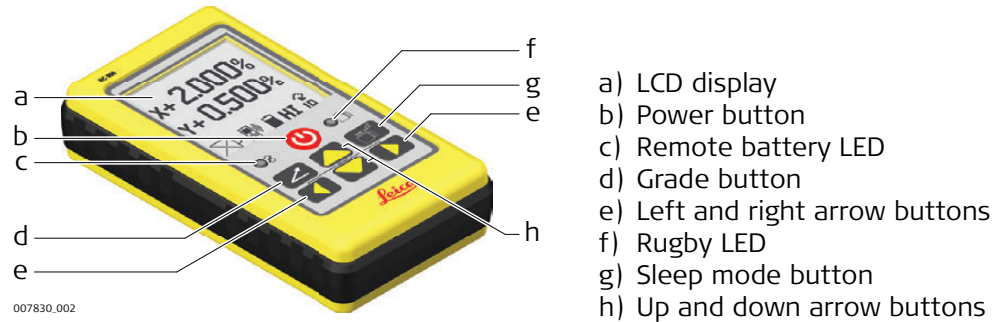
## 4 RC800 Remote Control and Semi-Automatic Grade

### 4.1 RC800 Remote Control

#### 4.1.1 Description of the Remote Control

The RF Remote Control communicates with the Rugby via RF (radio frequency). When the Rugby is used together with the RC800 remote (type 800A), the Rugby will operate as an semi-automatic grade laser, allowing the user to dial in a desired grade value.

#### RC400 Remote Control



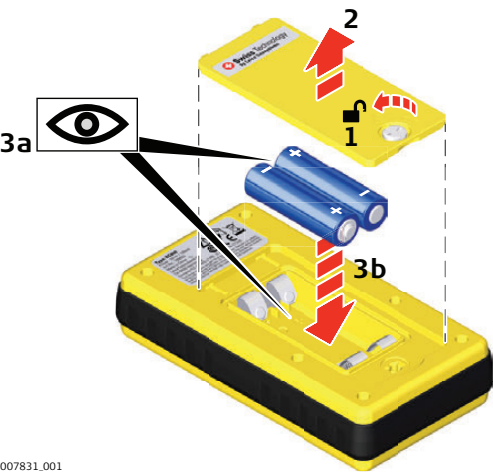
#### Description of the Control Panel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.<br>Press both simultaneously to reset the grade value to zero.                                                                                                                                                                                                                                                                                                                                   |
| Left and Right Arrow Buttons | Press both simultaneously to enter the Rugby menu.<br>Press and hold simultaneously for 1.5 seconds to enter the Remote Control menu.                                                                                                                                                                                                                                                                                                 |
| Sleep Mode Button            | Press to put the Rugby in sleep mode. <ul style="list-style-type: none"><li>• During Sleep Mode, all functions are disabled.</li><li>• The LCD display indicates that the Rugby is in Sleep Mode.</li><li>• The Rugby sleeps for 2 hours*, then shuts down automatically and must be turned on again at the laser.</li><li>• When in Sleep Mode, pressing the sleep button wakes the Rugby and normal operation is resumed.</li></ul> |
| Rugby LED                    | Indicates level status of the Rugby.                                                                                                                                                                                                                                                                                                                                                                                                  |
| 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.



007831.001

4.1.2 Pairing the Rugby with the RC800 Remote Control

**Pairing step-by-step** The Rugby and the RC800 Remote Control include radio devices that allow you to activate the functions on the Rugby remotely up to 100 m (330') from the Rugby. Before using the RF features, the Rugby and the Remote Control must be paired together to be able to communicate with each other.

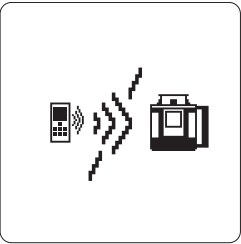
| Step                                                                                | Description                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                                                                                  | Turn off both the Rugby and the Remote Control.                                                                                                                                                                     |
| 2.                                                                                  | Press and hold the Power Button on the Rugby for 5 seconds to turn on the Rugby in pairing mode. The Rugby beeps five times slowly.                                                                                 |
| 3.                                                                                  | Press and hold the Power Button on the Remote Control until pairing is confirmed.                                                                                                                                   |
|  | When the pairing is successful:<br>Both the Rugby 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. |
|  | When the pairing is <b>not</b> successful:<br>Both the Rugby and the Remote Control beep slowly three times and the Status LED flashes red (1 Hz).                                                                  |

4.1.3 Connecting Screen for the Remote Control

**Information screen while connecting**

**Connecting Screen**

The "connecting" screen is displayed when the Remote Control is first turned on and while connecting to the Rugby.



007599.001

## 4.2

### 4.2.1

## Operation

### Start Up Screens

#### Start up screen



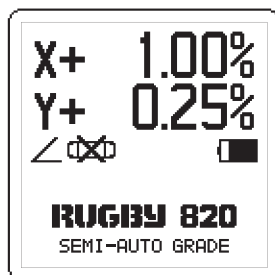
011107.001

Start up screen - RC800

When the Rugby is turned on, the Leica Start up screen is shown displaying the following information:

- Serial number (Rugby)
- Software revision level (RC800)

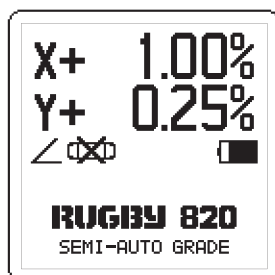
#### Main user screen



011108.001

The Main user screens show the grade input.

#### Grade mode screen



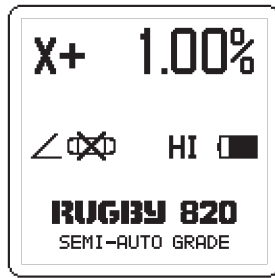
011109.001

Enter your desired grade in Grade mode. The Rugby will check the level position and then adjust the plane of laser light to the grade input.

In Grade mode, the Rugby does not self-level, but is set to detect bumps and temperature changes.

A small icon in the bottom left of the screen indicates that the axis with grade is not self-levelling.

## Entering grade



X-axis grade entry



Y-axis grade entry

The Rugby always starts up with no grade input.

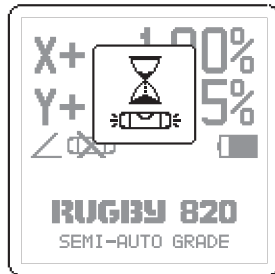
To enter grade, do the following:

- 1) Press the Grade button once to enter Grade mode.
- 2) Press the Up and Down arrow buttons to enter a grade for the X-axis.
- 3) Press the Grade button a second time to switch to the Y-axis.
- 4) Press the Up and Down arrow buttons to enter a grade for the Y-axis.
- 5) Press the Grade button again to return to the Main user screen.

The Rugby will begin the grade setting process.

-  The smallest grade increment is 0.05% up to 3.00% grade and 0.10% for grade greater than 3.00%.
-  When entering grade the displays change as shown.
-  To restore the last set grade(s), press and hold the Grade button for 1.5 seconds.
-  If after eight seconds no button is pressed, the Rugby will accept the grade entered and will begin the grade setting process.

## Grade setting process



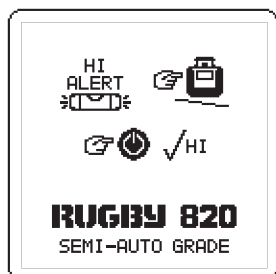
Levelling to grade screen

After grade entry for one or both axes, the Rugby waits for 8 seconds of no movement or button presses before beginning the process. The Rugby then displays the Levelling to grade screen and automatically self-levels in the horizontal plane, followed by readjusting the servo mechanism to the desired grade value.

After completion, the Rugby activates the Slope/Bump Alert and Temperature Alert functions (if enabled).

-  During this process, do not touch or disturb the Rugby.



**Elevation (H.I.)  
Alert**

Elevation (H.I.) Alert screen

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

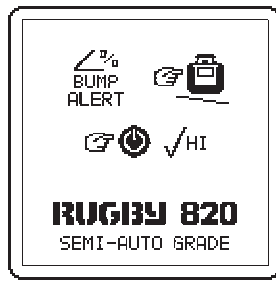
The Elevation (H.I.) Alert function becomes active and monitors the movement of the Rugby 30 seconds after it has completely levelled and the head starts rotating.

If the Rugby gets disturbed, the Elevation (H.I.) Alert screen is displayed and the Rugby beeps rapidly.

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

-  The Elevation (H.I.) Alert functions in Level mode (0.00%) and in Grade mode when one of the axes remains at 0.00%.
  -  The Elevation (H.I.) Alert function turns on automatically every time the Rugby is turned on. It can be enabled/disabled in the Option Menu (enabled by default).
-

## Bump Alert



Bump Alert screen

The Bump Alert function prevents incorrect work caused by movement or settling of the tripod that occurs when the Rugby is used for grade.

The Bump Alert function becomes active and monitors the movement of the Rugby when it has completely levelled and the head starts rotating.

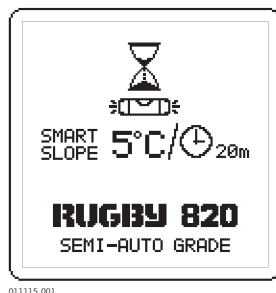
If the Rugby gets disturbed, the Bump Alert screen is displayed and the Rugby beeps rapidly.

To stop the alert, do one of the following:

- If the height has not changed, press the Grade button for 1.5 seconds to stop the alert and continue working. The Rugby will check level and return to desired grade.
- If the height has changed, turn the Rugby off and on again, check the height of the laser and reenter the grade.

- ☞ If one axis is still set to Level mode (0.00%), the Elevation (H.I.) Alert function is also active for this axis.
- ☞ The Bump Alert function turns on automatically every time grade is entered in the Rugby. It can be enabled/disabled in the Option Menu (enabled by default).
- ☞ The Bump Alert function can be set to FINE or COARSE in the Option Menu (FINE by default).

## Smart Slope



Smart Slope screen: COARSE

If the Rugby detects a change in ambient temperature, the grade mechanism will return to level position, check level and return to the grade set.

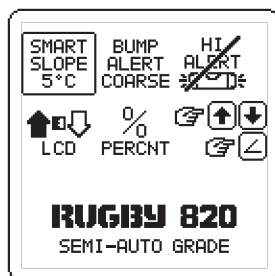
During this, the Rugby cannot be used and the Smart Slope screen is displayed.

There are two settings for the Smart Slope function:

- FINE: 2°C temperature change / 10 minutes
- COARSE: 5°C temperature change / 20 minutes

- ☞ The Smart Slope setting can be changed in the Option Menu (COARSE by default).

## Option Menu



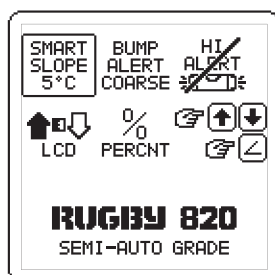
011116.001

To access the menu of the Rugby, press the left and right arrow button on the RC800 simultaneously while the main screen is displayed.

There are five options available:

- Smart Slope: FINE/COARSE/OFF
- Bump Alert: FINE/COARSE/OFF
- H.I. Alert: ON/OFF at start up
- Contrast
- Percent/Per mil

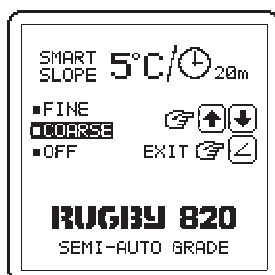
## Selecting an option



011117.001

- 1) Press the Up arrow or Down arrow button to highlight the option to change.
- 2) Press the Grade button to enter the selected option screen.

## Changing an option



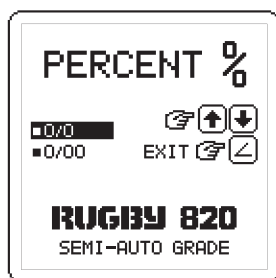
011118.001

- 1) Press the Up arrow or Down arrow button to highlight the desired option.
- 2) Press the Grade button to confirm the setting and return to the Option Menu.

## Percent/Per mil



Do not change this option unless you are sure you want to work with Per mil values (Percent by default).

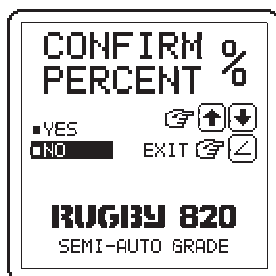


011119.001

Percent/Per mil option

Changing from Percent to Per mil moves the decimal point one place to the right:

- Percent: 1 m per 100 m
- Per mil: 1 m per 1,000 m (1 mm per 1 m)

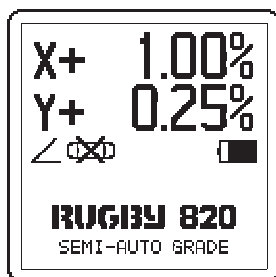


011120.001

Confirm Percent



If changing from Percent to Per mil, confirmation for the change is necessary.

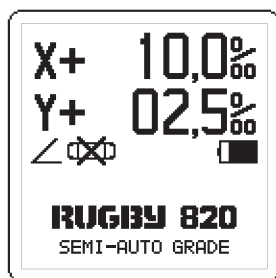


011121.001

Percent



The Percent and Per mil screens to the left are equal.



011122.001

Per mil

## Overview



Remote Control Menu Screen

The RC800 Remote Control has its own menu where you can change the following parameters:

- Display Brightness
- Sleep Mode Hours
- Remote Shut-Off Time

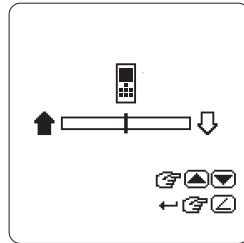


To access the Remote Control menu, press and hold the Left and Right Arrow Buttons on the remote control for 1.5 seconds.



For navigation within the Remote Control menu, use the same buttons as for navigation within the Rugby menu. (Refer to "3.1 Buttons")

## 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

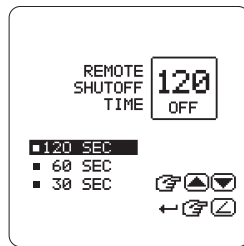


Sleep Mode Hours

You can determine how long the Rugby 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

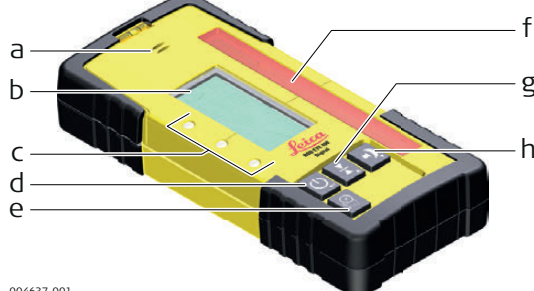
If the remote control is not used during this time, it shuts off automatically.

**Description**

The Rugby 820 is sold with the Rod Eye 160 Digital Receiver.

The Rod Eye 180 Digital Receiver can also be purchased and enhances the performance of the Rugby 820 laser with automatic slope catching and monitoring. The following information is appropriate only to the model you have purchased.

Additional information on the Digital Receivers can be found in the individual user manuals also located on this CD.

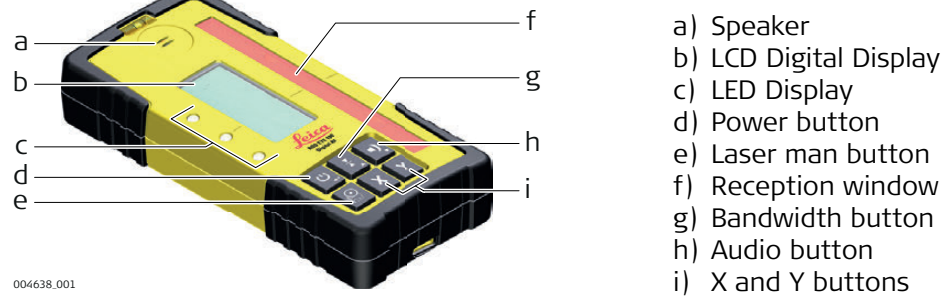
**5.1****Rod Eye 160, Digital Receiver****Instrument components**

004637.001

- a) Speaker
- b) LCD Digital Display
- c) LED Display
- d) Power button
- e) Laser man 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. |
| Laser man | Press to capture the digital reading.       |
| Bandwidth | Press to change detection bandwidths.       |
| Audio     | Press to change the audio output.           |

**Instrument components****Description of the Buttons**

| Button    | Function                                                                                       |
|-----------|------------------------------------------------------------------------------------------------|
| Power     | Press once to turn on the receiver.                                                            |
|           | Press 1.5 seconds to turn off the receiver.                                                    |
| Laser man | Press to capture the digital reading.                                                          |
|           | Press 1.5 seconds to start the Smart Target (automatic slope catching) function on the X-axis. |
| Bandwidth | Press to change detection bandwidths.                                                          |
| Audio     | Press to change the audio output.                                                              |
| X and Y   | Press to select alternate or second axis for slope catching and slope monitoring.              |

**Menu access and navigation**

To access the menu of the Rod Eye 160/Rod Eye 180 Digital Receivers, press the Bandwidth button and Audio button simultaneously.

- Use the Bandwidth button and Audio button to change parameters.
- Use the Power button to scroll through the menu.

**Menu**

| Menu | Function                                                                                                                                                                      | Indication                                                                                                                      |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| UNT  | Changes the unit of measure for the digital readout.                                                                                                                          | Units - mm/cm/in/ft<br> Active unit flashes. |
| LED  | Changes the brightness of the LED indicators.                                                                                                                                 | LEDs - High/Low/Off                                                                                                             |
| DRO  | Turns on or off the digital readout.                                                                                                                                          | Green LED is on: digital readout is on.                                                                                         |
|      |                                                                                                                                                                               | Red LED is on: digital readout is off.                                                                                          |
|      |                                                                                                                                                                               |  DRO flashes.                                |
| BAT  | Turns on or off the Laser low battery indication on the receiver.                                                                                                             | Green LED is on: Laser low battery icon function is active.                                                                     |
|      |                                                                                                                                                                               | Red LED is on: Laser low battery icon function is not active.                                                                   |
|      |                                                                                                                                                                               |  Rugby icon flashes.                         |
| MEM  | Turns on or off the position memory function.                                                                                                                                 | Green LED is on: function is on.                                                                                                |
|      |                                                                                                                                                                               | Red LED is on: function is off.                                                                                                 |
|      |                                                                                                                                                                               |  Full down arrow flashes.                    |
| RPS  | Measures the head speed of the laser.<br> Hold in rotating beam to measure the head speed. | Measured head speed is displayed.                                                                                               |

**Pairing the Rod Eye 180 with the Rugby 820****Pairing step-by-step**

The Rugby 820 and the Rod Eye 180 include radio devices that allow the user to automatically match an existing grade.

When purchased together, the Rugby 820 and Rod Eye 180 have been paired together at the factory. If purchasing a second receiver, the Rugby 820 and the Rod Eye 180 must first be paired together to be able to communicate with each other.

| Step                                                                                | Description                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                                                                                  | Turn off the Rugby 820 and the Rod Eye 180.                                                                                                                                                                                                                         |
| 2.                                                                                  | Press and hold the Power button on the Rugby 820 for 5 seconds to turn on the Rugby 820 in pairing mode. The Rugby 820 beeps five times.                                                                                                                            |
| 3.                                                                                  | Press and hold the Power button on the Rod Eye 180 for 5 seconds.                                                                                                                                                                                                   |
|  | The X-axis Indicator LED and the Y-axis Indicator LED flash green and the Rugby 820 beeps five times quickly when the pairing was successful. The X-axis Indicator LED and the Y-axis Indicator LED flash red five times quickly if the pairing was not successful. |



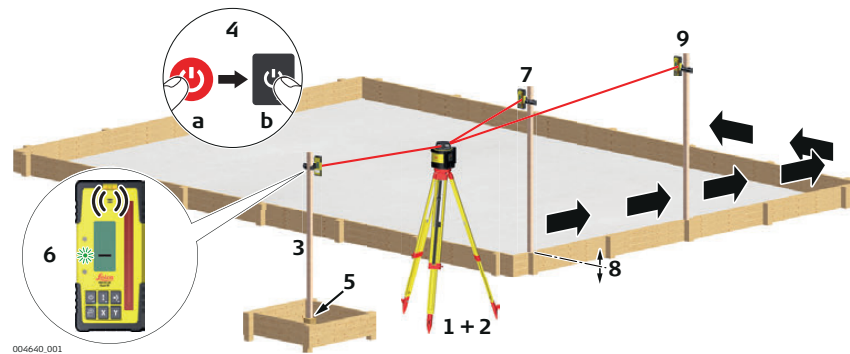
## 6

## Applications

### 6.1

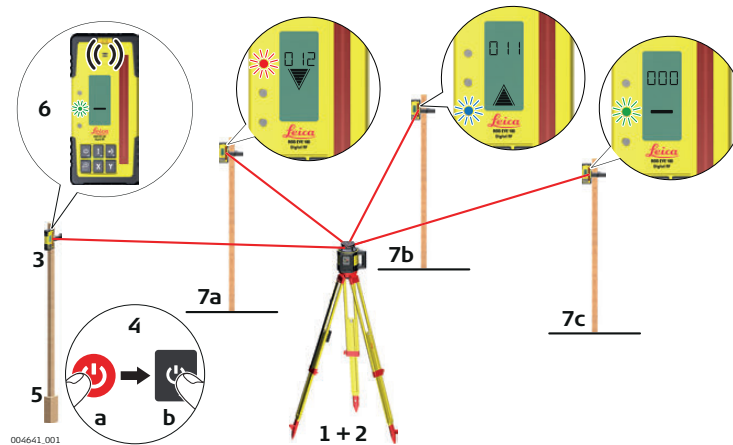
### Setting Forms

#### Setting Forms step-by-step



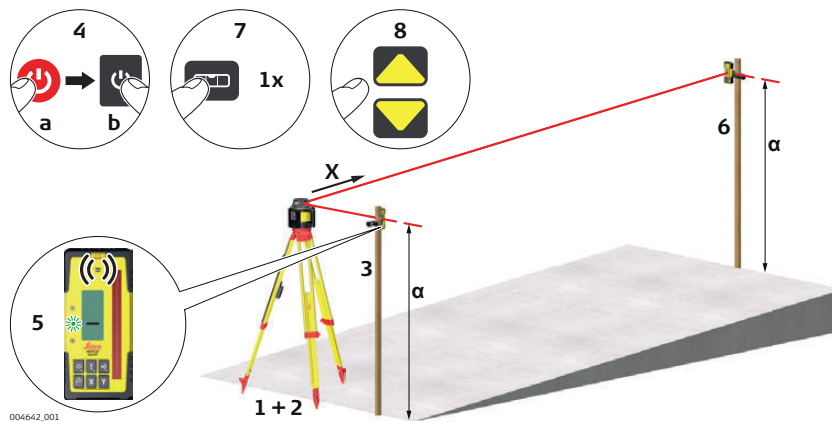
| Step | Description                                                                                                                                                                                                                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby 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 and the receiver.                                                                                                                                                                                                                                                  |
| 5.   | Set the base of the rod on a known point for the finished height of forms.                                                                                                                                                                                                           |
| 6.   | Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: <ul style="list-style-type: none"><li>• the centre bar</li><li>• the green flashing LED</li><li>• a solid audio tone</li><li>• the digital display</li></ul> |
| 7.   | Set the rod with the attached receiver on top of the form.                                                                                                                                                                                                                           |
| 8.   | Adjust the height of the form until the on-grade position is again indicated.                                                                                                                                                                                                        |
| 9.   | Continue to additional positions until the forms are levelled to the rotating plane of the Rugby.                                                                                                                                                                                    |

### Checking Grades step-by-step



| Step | Description                                                                                                                                                                                                                                                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby 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 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: <ul style="list-style-type: none"> <li>the centre bar</li> <li>the green flashing LED</li> <li>a solid audio tone</li> <li>the digital display</li> </ul> |
| 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. <ul style="list-style-type: none"> <li>7a: Position is too high.</li> <li>7b: Position is too low.</li> <li>7c: Position is on grade.</li> </ul>                                                         |

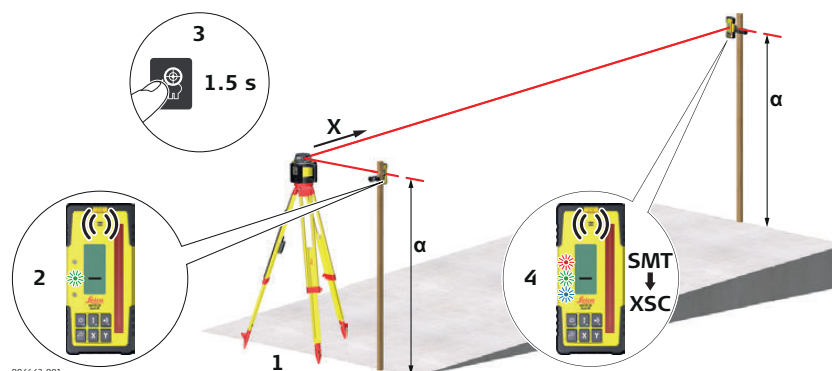
## Manual Grading step-by-step



| Step | Description                                                                                                                                                                                                                                                                                                                    |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby on a tripod.                                                                                                                                                                                                                                                                                                  |
| 2.   | Set up the tripod at the base of a slope with the x-axis pointing in the direction of the slope.                                                                                                                                                                                                                               |
| 3.   | Attach the receiver to a rod.                                                                                                                                                                                                                                                                                                  |
| 4.   | Turn on the Rugby and the receiver.                                                                                                                                                                                                                                                                                            |
| 5.   | At the base of the slope, adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: <ul style="list-style-type: none"> <li>• the centre bar</li> <li>• the green flashing LED</li> <li>• a solid audio tone</li> <li>• the digital display</li> </ul>            |
| 6.   | Move the rod and the attached receiver to the top of the slope.                                                                                                                                                                                                                                                                |
| 7.   | Change the X-axis to Manual Mode by pressing the Automatic/Manual Mode button once on the Rugby.                                                                                                                                                                                                                               |
| 8.   | Use the Up and Down Arrow buttons on the Rugby to move the laser beam up and down until the on-grade (centre-line) position is indicated on the receiver by: <ul style="list-style-type: none"> <li>• the centre bar</li> <li>• the green flashing LED</li> <li>• a solid audio tone</li> <li>• the digital display</li> </ul> |

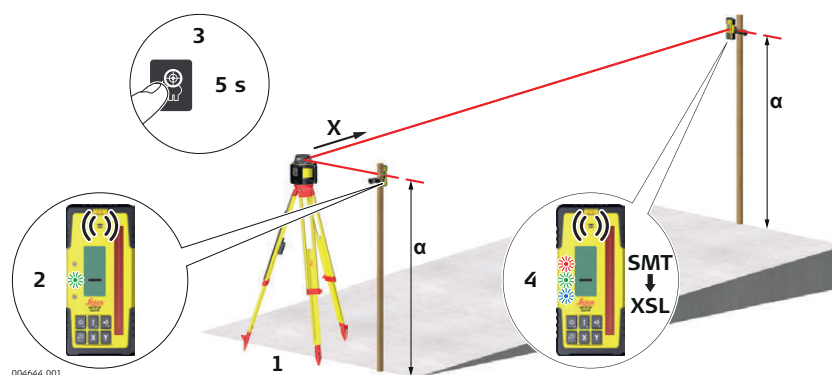
**Description**

The Rugby 820 and the Rod Eye 180, Digital Receiver RF, contain radio devices which allow for special features when used together.

**6.4.1****Smart Target (Automatic Slope Catching)****Smart Targeting using the Rugby 820, step-by-step**

| Step | Description                                                                                                                                                                                                                                                                                                 |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby 820 at the base of a slope with the X-axis pointing in the direction of the slope.                                                                                                                                                                                                         |
| 2.   | At the base of the slope, adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: <ul style="list-style-type: none"> <li>the centre bar</li> <li>the green flashing LED</li> <li>a solid audio tone</li> <li>the digital display</li> </ul> |
| 3.   | Move to the top of the slope and press the laser man button for 1.5 seconds to start the smart targeting process. The receiver shows <b>SMT</b> , then <b>XSC</b> for X-axis slope catching.                                                                                                                |
| 4.   | The Rugby 820 searches for the receiver until the on-grade position is found. Once the on-grade position, the receiver will flash 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 sloped axis is in Manual mode and should be checked from time to time to ensure the Rugby 820 has not moved.                                                                                                                            |

### Smart Target Lock using the Rugby 820, step-by-step



| Step | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby 820 at the base of a slope with the X-axis pointing in the direction of the slope.                                                                                                                                                                                                                                                                                                                                                                       |
| 2.   | At the base of the slope, adjust the height of the Rod Eye 180 Digital Receiver RF on the rod until the on-grade (centre-line) position is indicated on the receiver by: <ul style="list-style-type: none"> <li>the centre bar</li> <li>the green flashing LED</li> <li>a solid audio tone</li> <li>the digital display</li> </ul>                                                                                                                                        |
| 3.   | Move to the top of the slope and press the laser man button for 5 seconds to start the smart target and lock process. The receiver will show <b>SMT</b> , then <b>XSL</b> during the X-axis slope lock process.                                                                                                                                                                                                                                                           |
| 4.   | The Rugby 820 searches for the receiver until the on-grade position is found. Once the on-grade position is found, the receiver will flash all three LEDs simultaneously one time and the receiver returns to normal operation. The display will show <b>LOC</b> while the receiver is in lock mode.<br> To turn off lock mode on the receiver, hold the power button for 1.5 seconds. |

### Dual Receiver setups using the Rugby 820

It is possible to use the Smart Targeting feature of the Rod Eye 180 Digital RF Receiver to catch and monitor both axes of the laser. To do this, perform the actions above for the first axis, and then repeat the actions for the second axis using a second receiver.

-  To use the Smart Target feature to slope catch and monitor both axes, it is necessary to have two receivers.
-  Once the lock and monitoring process is started, the receivers must remain in place.

Individual axis can be selected for the Smart Targeting procedure by first pressing the X or Y button on the receiver keypad and the laser man button.

| Action                                                                           | Buttons                                                                                                                                                                            |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| To slope catch the X-axis: Press <b>X</b> plus Laser Man for 1.5 seconds         | 1x  +  1.5 s |
| To slope catch and lock the X-axis: Press <b>X</b> plus Laser Man for 5 seconds. | 1x  +  5 s   |
| To slope catch the Y axis: Press <b>Y</b> plus Laser Man for 1.5 seconds.        | 1x  +  1.5 s |
| To slope catch and lock the Y-axis: Press <b>Y</b> plus Laser Man for 5 seconds. | 1x  +  5 s   |

## 6.5

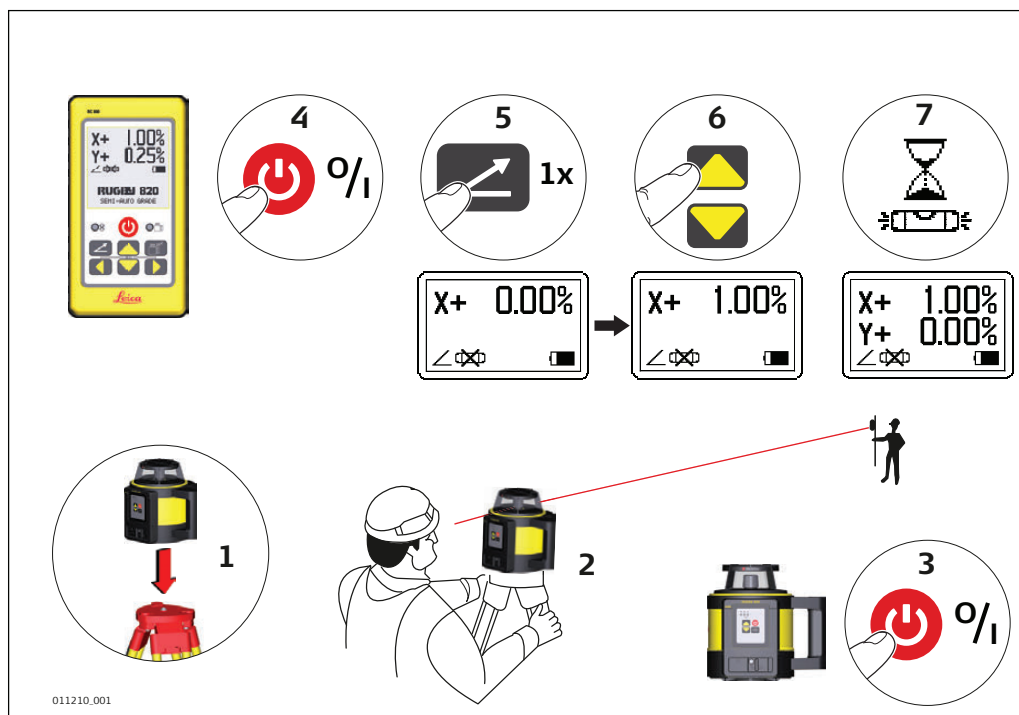
### 6.5.1

## Rugby and the RC800 Remote Control

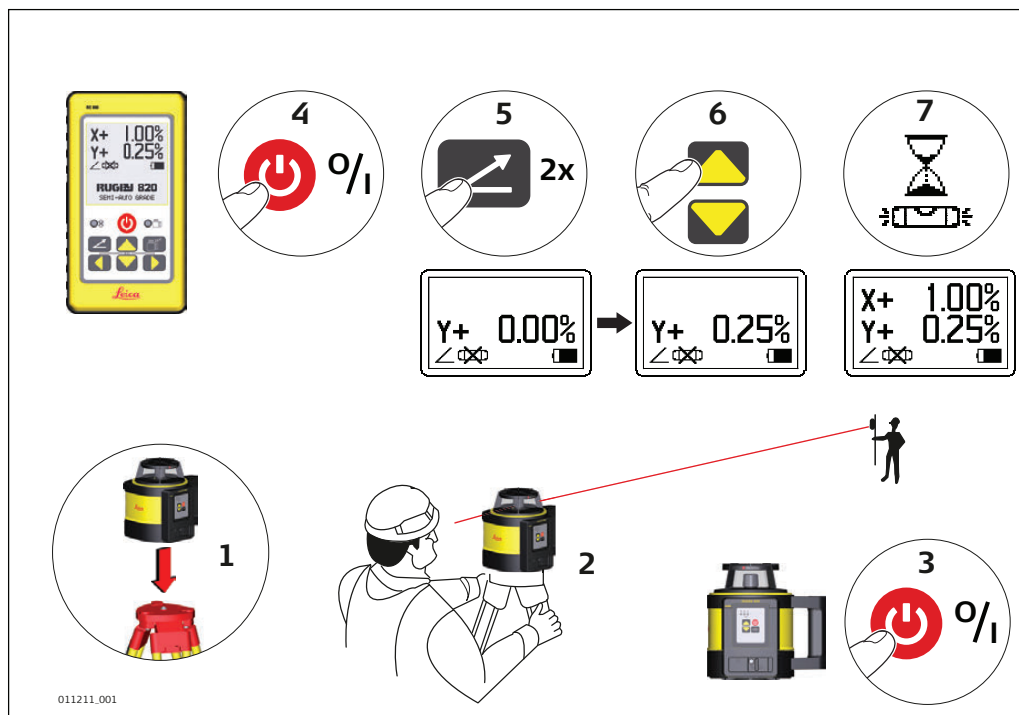
### Entering Grades

#### Entering Grades step-by-step

#### X-axis



#### Y-axis



| Step | Description                                                                                                                                                                                                                                                           |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Set up the Rugby 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.                                                                                                                                                                                                                                                    |
| 4.   | Turn on the RC800 to change the Rugby to semi-automatic grade mode.                                                                                                                                                                                                   |
| 5.   | Press the Grade button.                                                                                                                                                                                                                                               |
| 6.   | Press the Up or Down button to enter grade for the x-axis (single slope). <ul style="list-style-type: none"> <li>• For dual-grade, press the Grade button to enter grade for the y-axis.</li> <li>• Press the Grade button again to exit grade entry mode.</li> </ul> |
| 7.   | Once grade is entered, the Rugby will begin to adjust to grade. Do not disturb the Rugby during this process.                                                                                                                                                         |



To restore previous grade, press and hold the Grade button for 1.5 seconds.



**Description**

The Rugby 820 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.

**7.1****Operating Principles****First-time Use /  
Charging Batteries**

- The battery must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 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 if 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 only one charge/discharge cycle.
- For Li-Ion batteries, a single discharging and charging 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.

7.2

Battery for Rugby

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

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



| Step | Description                                                                                                                                      |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Slide the locking mechanism on the battery compartment to the very left 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 battery pack.                                                                         |
| 4.   | The small LED next to the charge jack flashes indicating that the Rugby 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 centre 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 to run for a full eight hours.

## Changing the Li-Ion batteries step-by-step

The Low Battery Indicator LED on the Rugby flashes when the batteries are low and need to be charged.

The charge indicator LED on the Lithium-Ion battery pack indicates when the pack is being charged (flashing slowly) or fully charged (on, not flashing).



004655\_001

| Step | Description                                                                                                                                                            |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | The batteries are inserted in the front of the laser.                                                                                                                  |
|      | 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. |
| 1.   | Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.                                                     |
| 2.   | To remove the batteries:<br>Remove the batteries from the battery compartment.<br>To insert the batteries:<br>Insert the batteries into the battery compartment.       |
| 3.   | Close the cover of the battery compartment and slide the locking mechanism to the left centre position until it locks into position.                                   |

Changing the alkaline batteries step-by-step

The Low Battery Indicator LED on the Rugby flashes when the batteries are low and need to be replaced.



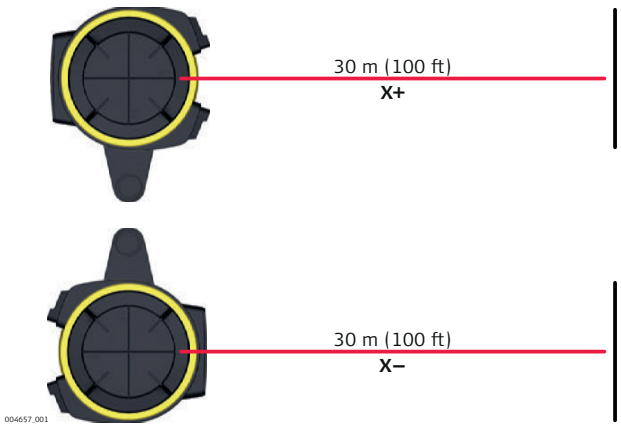
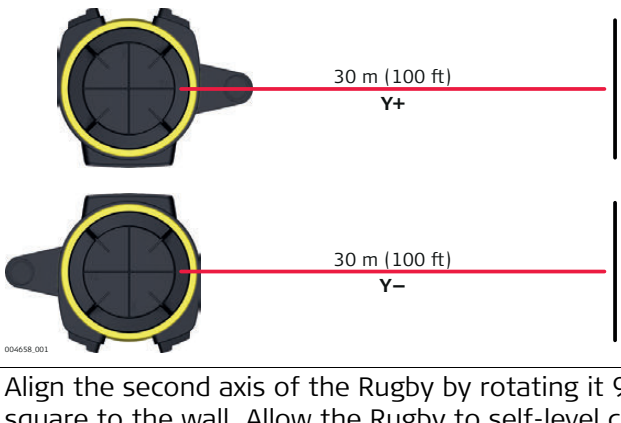
004673\_001

| 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.   | To remove the batteries:<br>Remove the batteries from the battery compartment.<br><br>To insert the batteries:<br>Insert the batteries into the battery compartment, ensuring that the contacts are facing in the right direction.<br>The correct polarity is displayed on the battery holder. |
| 3.   | Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.                                                                                                                                                                           |

**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 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.

**8.1****Checking the Level Accuracy****Checking the level accuracy step-by-step**

| Step | Description                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Place the Rugby on a flat, level surface or tripod approximately 30 m (100 ft) from a wall.                                                                                                                                                                                                                                                                                                                                                 |
|      |  <p>The diagram shows two views of the Rugby laser level. In the top view, a red laser beam is projected horizontally to a vertical wall, labeled '30 m (100 ft) X+'. In the bottom view, a red laser beam is projected horizontally to a vertical wall, labeled '30 m (100 ft) X-'. The Rugby device is shown with its yellow ring and black body.</p>  |
| 2.   | Align the first axis so that it is square to a wall. Allow the Rugby to self-level completely (approximately 1 minute after the Rugby 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.                                                                                                                                                                                                                                                                                                                                                                                                   |
|      |  <p>The diagram shows two views of the Rugby laser level. In the top view, a red laser beam is projected horizontally to a vertical wall, labeled '30 m (100 ft) Y+'. In the bottom view, a red laser beam is projected horizontally to a vertical wall, labeled '30 m (100 ft) Y-'. The Rugby device is shown with its yellow ring and black body.</p> |
| 6.   | Align the second axis of the Rugby by rotating it 90° so that this axis is square to the wall. Allow the Rugby to self-level completely.                                                                                                                                                                                                                                                                                                    |
| 7.   | Mark the position of the beam.                                                                                                                                                                                                                                                                                                                                                                                                              |

| Step | Description                                       |
|------|---------------------------------------------------|
| 8.   | Rotate the laser 180° and allow it to self-level. |
| 9.   | Mark the opposite side of the second axis.        |



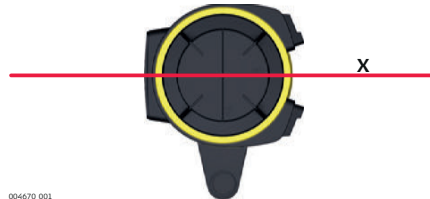
The Rugby is within its accuracy specification if the four marks are within  $\pm 1.5$  mm ( $\pm 1/16$ ") from the centre.

## 8.2

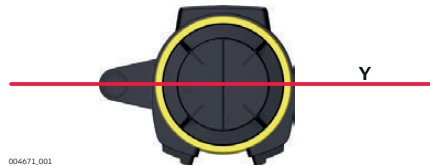
### Adjusting the Level Accuracy

#### 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 adjustment mode step-by-step

| Step | Description                                            |
|------|--------------------------------------------------------|
| 1.   | Turn off the power.                                    |
| 2.   | Press and hold both the Up and Down Arrow buttons.     |
| 3.   | Press the Power button. The active axis is the X-axis. |

The following sequence of LED behaviour occurs:

- The X-axis and the Y-axis LEDs flash alternately three times.
- The X-axis LED flashes three times, then flashes slowly until level. When the Rugby is level, the X-axis LED is on, but does not flash.
- The Y-axis LED is off.

#### Adjusting the X-axis step-by-step

| Step | Description                                                                                                                                                                                                                                                                                                   |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Press the Up and Down Arrow buttons to increment the laser beam up and down. Each increment is indicated by a flash of the X-axis LED and a beep from the audio indicator.                                                                                                                                    |
| 2.   | Continue to press the Up and Down Arrow buttons and monitor the spot until the Rugby is within its specified range.<br> Five steps are equal to 10 arc seconds of change, or approximately 1.5 mm at 30 m (1/16" at 100'). |
| 3.   | Press the Automatic/Manual Mode button to switch to the Y-axis.                                                                                                                                                                                                                                               |

The following sequence of LED behaviour occurs:

- The X-axis and the Y-axis LEDs flash alternately three times.
- The Y-axis LED flashes three times, then flashes slowly until level. When the Rugby is level, the Y-axis LED is on, but does not flash.
- The X-axis LED is off.

### Adjusting the Y-axis step-by-step

| Step | Description                                                                                                                                                                                                                                                                                                 |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Press the Up and Down Arrow buttons to increment the laser beam up and down. Each increment is indicated by a flash of the Y-axis LED and a beep from the audio indicator.                                                                                                                                  |
| 2.   | Continue to press the Up and Down Arrow buttons and monitor the spot until the Rugby is within its specified range.<br> Five steps are equal to 10 arc seconds of change, or approximately 1.5 mm at 30 m (1/16" at 100'). |
| 3.   | Press the Automatic/Manual Mode button to switch back to the X-axis if desired.                                                                                                                                                                                                                             |

### Exiting adjustment mode step-by-step

Press and hold the Automatic/Manual Mode button for 3 seconds to save and exit Adjustment Mode.  
The X-axis LED and Y-axis LED flash alternately three times, then the Rugby shuts off.



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

**About**

This procedure is unique to the Rugby lasers and uses the digital readout of the Rod Eye 180 receiver to measure, then adjust the plane of each axis. This procedure is an alternative to the traditional method described in "8 Accuracy Adjustment".

**Description**

Objective: To rotate the laser to all four axes, then allow the receiver to adjust the beam automatically.

**Setup**

| Step | Description                                                                                                                           |
|------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Pair the receiver to the laser (if not already done). Refer to "5.4 Pairing the Rod Eye 180 with the Rugby 820" for more information. |
| 2.   | Mount the laser on a flat, level surface or tripod.                                                                                   |
| 3.   | Turn on the laser and align the X-axis toward the receiver position.                                                                  |
| 4.   | Mount the receiver to a fixed position (e.g., a stationary grade rod) approximately 30 meters (100 ft) from the laser.                |
| 5.   | Turn on the receiver and position the height of the receiver near or at the on-grade position. It is not necessary to be exact.       |
| 6.   | Turn off the receiver.                                                                                                                |
| 7.   | Turn on the receiver in <b>CAL</b> mode by pressing both the power and Laser man button for five seconds.                             |
| 8.   | The display will show <b>CAL</b> .<br>              |
| 9.   | Return to the laser and note the colour and activity of the X and Y LEDs.                                                             |



- With each rotation it may take up to 10 seconds for the calibration process to identify the axis being checked, i.e. before the LED starts to blink red.
- Each step of the process is very exact and may take 1 minute to complete before the LED turns to green.
- It is important to note the colour and blink sequence to know the status of each axis in the process.
- It is not necessary to follow the steps in the exact order, but different rotation sequences will result in different LED indications.
- Increasing the distance beyond 30 meters (100 ft) between the laser and receiver will not increase the accuracy of the calibration process.

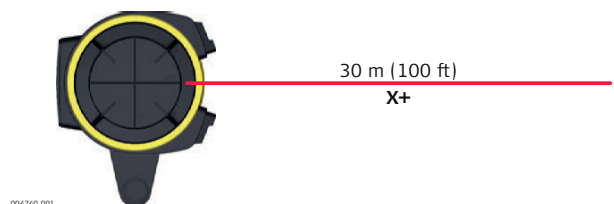


## Calibrating step-by-step

The following table defines and displays the LED indications that will be seen during each step of the field calibration process.

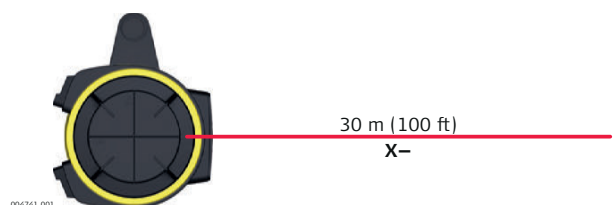
| X-axis LED | Y-axis LED | X                                                                                 | Y                                                                                 | X-axis status      | Y-axis status      | Actions                                            |
|------------|------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------|--------------------|----------------------------------------------------|
| Red on     | Red on     |  |  | X-axis not aligned | Y-axis not aligned | Rotate laser until the X-axis LED is flashing red. |

### Step 1 - Rotate and align the first side of the X-axis (X+)



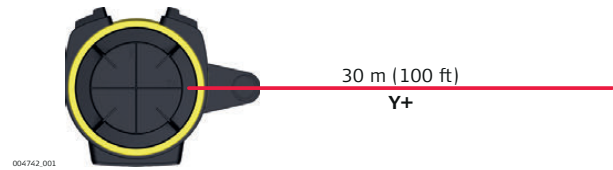
| X-axis LED     | Y-axis LED | X                                                                                 | Y                                                                                 | X-axis status           | Y-axis status      | Actions                                                       |
|----------------|------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------|--------------------|---------------------------------------------------------------|
| Flashing red   | Off        |  |  | X-axis is levelling     | Off                | Wait until the first side of the X-axis is measured.          |
| Flashing green | Red on     |  |  | X-axis is half complete | Y-axis not aligned | Rotate laser 180° until the X-axis LED is again flashing red. |

### Step 2 - Rotate 180° and align to the opposite side of the X-axis (X-)



| X-axis LED   | Y-axis LED | X                                                                                   | Y                                                                                   | X-axis status       | Y-axis status      | Actions                                                |
|--------------|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------|--------------------|--------------------------------------------------------|
| Flashing red | Off        |  |  | X-axis is levelling | Off                | Wait until the reverse of the X-axis is measured.      |
| Green on     | Red on     |  |  | X-axis is complete  | Y-axis not aligned | Rotate laser 90° until the Y-axis LED is flashing red. |

### Step 3 - Rotate 90° and align to the first side of the Y-axis (Y+)



| X-axis LED | Y-axis LED     | X | Y | X-axis status      | Y-axis status           | Actions                                                       |
|------------|----------------|---|---|--------------------|-------------------------|---------------------------------------------------------------|
| Off        | Flashing red   | ○ | ☀ | Off                | Y-axis is leveling      | Wait until the first side of the Y-axis is measured.          |
| Green on   | Flashing green | ● | ☀ | X-axis is complete | Y-axis is half complete | Rotate laser 180° until the X-axis LED is again flashing red. |

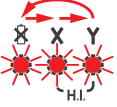
### Step 4 - Rotate 180° and align to the opposite side of the Y-axis (Y-)



| X-axis LED | Y-axis LED   | X | Y | X-axis status      | Y-axis status      | Actions                                           |
|------------|--------------|---|---|--------------------|--------------------|---------------------------------------------------|
| Off        | Flashing red | ○ | ☀ | Off                | Y-axis is leveling | Wait until the reverse of the Y-axis is measured. |
| Green on   | Green on     | ● | ● | X-axis is complete | Y-axis is complete | Done.                                             |

If the calibration process was successful, the X and Y LEDs will flash alternately three times, the beeper will sound and the Rugby will then turn off.  
 If the Rugby does not complete the procedure as noted above, the procedure has failed and must be repeated.

## Alerts

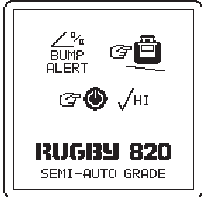
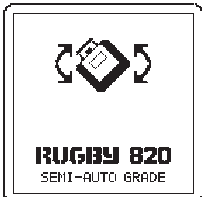
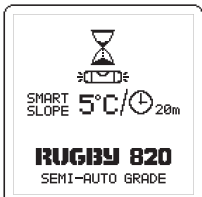
| Alert                                                                               | Symptom                                                              | Possible causes and solutions                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Low Battery LED flashes red, or is on but not flashing.              | The batteries are low. Replace the alkaline batteries or recharge the Li-Ion battery pack. Refer to "Main Functions".                                                                                                                                                                       |
|    | Elevation (H.I.) Alert<br>The LEDs flash quickly with an audio beep. | The Rugby has been bumped or tripod was moved. Turn off Rugby to stop alert check the height of the laser before beginning to work again. Allow Rugby to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically.        |
|    | Servo Limit Alert<br>All LEDs flash sequentially.                    | The Rugby is tipped too far to reach a level position. Re-level the Rugby within the 6 degree self-levelling range. This alert will also be displayed any time the unit is tipped more than 45° from level. After two minutes in the alert condition, the unit will shut off automatically. |
|  | Temperature Alert<br>All LEDs are on but not flashing.               | The Rugby is in an environment where it cannot operate without causing damage to the laser diode. This could be a result of heat from direct sunlight. Shade the Rugby from the sun. After two minutes in the alert condition, the unit will shut off automatically.                        |

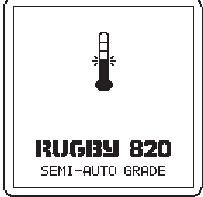
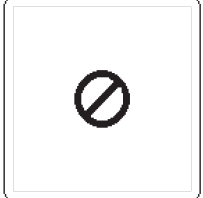
## Troubleshooting

| Problem                                       | Possible Cause(s)            | Suggested Solutions                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Rugby is working, but not self-levelling. | The Rugby is in Manual Mode. | The Rugby must be in Automatic Mode to self-level. Set the Rugby to Automatic Mode by pressing the Automatic/Manual Mode button. <ul style="list-style-type: none"> <li>- In Automatic Mode the X-axis LED and the Y-axis LED flash green while levelling.</li> <li>- In Manual Mode the X-axis LED and/or the Y-axis LED are red.</li> </ul> |

| Problem                                                                                                                                                         | Possible Cause(s)                                                                           | Suggested Solutions                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rugby 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 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 and the receiver. If the problem continues, return the Rugby to an authorised service centre for service.                                                                                                                                                                                          |
| The laser receiver is not working properly.                                                                                                                     | The Rugby is not rotating. It may be levelling or in Elevation Alert.                       | Check for proper operation of the Rugby.<br> Refer to the receiver manual for more information.                                                                                                                                                |
|                                                                                                                                                                 | The receiver is out of usable range.                                                        | Move closer to the Rugby.                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                                                 | The batteries of the receiver are low.                                                      | Change the receiver batteries.                                                                                                                                                                                                                                                                                                    |
| The Smart Target feature is not working.                                                                                                                        | The Rugby 820 and the receiver have not been paired and cannot communicate with each other. | Pair the Rugby 820 and the receiver. Refer to "5.4 Pairing the Rod Eye 180 with the Rugby 820" for more information.<br>Only the Rugby 820 contains a radio device and can be paired to the Rod Eye 180.                                                                                                                          |
| Elevation Alert function is not working.                                                                                                                        | The Elevation Alert function is disabled.                                                   | The Elevation Alert function is enabled or disabled by pressing the following button combination:<br>With Rugby turned on and rotating, press and hold the Up and Down Arrow buttons. Then press the Automatic/Manual Mode button to enable or disable the Elevation Alert function. The Rugby beeps once to indicate the change. |
| The Rugby does not switch to Manual Mode. The Rugby beeps three times when the Auto-automatic/Manual Mode button is pressed and does not change to Manual Mode. | The Manual Mode is disabled.                                                                | The Manual Mode can be enabled or disabled by pressing the following button combination:<br>With the Rugby turned off, press and hold both the Auto-automatic/Manual Mode button and the Power button for 5 seconds. The Rugby will beep five times, then give a longer beep at the end to indicate the change.                   |

## Alerts

| Alert                                                                               | Symptom                                                                                                       | Possible causes and solutions                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Low Battery indication on the display.                                                                        | The batteries are low. Replace the alkaline batteries or recharge the Li-Ion battery pack. Refer to "7 Batteries".                                                                                                                                                                    |
|    | Elevation (H.I.) Alert<br>The Elevation (H.I.) Alert screen is shown and the audio beeps.<br>(Level position) | The Rugby has been bumped or tripod was moved. Turn off Rugby to stop alert, check the height of the laser before beginning to work again. Allow Rugby to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically. |
|    | Bump Alert<br>The Bump Alert screen is shown and the audio beeps.<br>(Grade position)                         | The Rugby has been bumped or tripod was moved. Turn off Rugby to stop alert, check the height of the laser before beginning to work again. Allow Rugby to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically. |
|  | Servo Limit Alert<br>The Servo Limit Alert screen is shown.                                                   | The Rugby is tipped too far to reach a level position. Re-level the Rugby within the 6 degree self-levelling range. After two minutes in the alert condition, the unit will shut off automatically.                                                                                   |
|  | Tilt Alert<br>The Tilt Alert screen is shown.                                                                 | The Rugby is tipped more than 45° from level. After two minutes in the alert condition, the unit will shut off automatically.                                                                                                                                                         |
|  | Smart Slope Alert<br>The Smart Slope Alert screen is shown.                                                   | The Rugby is checking the level position before returning to grade. Refer to "Smart Slope".                                                                                                                                                                                           |

| Alert                                                                             | Symptom                                                     | Possible causes and solutions                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Temperature Alert<br>The Temperature Alert screen is shown. | The Rugby is in an environment where it cannot operate without causing damage to the laser diode. This could be a result of heat from direct sunlight. Shade the Rugby from the sun.<br>After two minutes in the alert condition, the unit will shut off automatically. |
|  | Function not allowed                                        | The Rugby is in Smart target, Smart lock or Calibration mode. The remote cannot be used.                                                                                                                                                                                |

## Troubleshooting

| Problem                                         | Possible Cause(s)                                           | Suggested Solutions                                                                                                                                   |
|-------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Rugby is working, but not self-levelling.   | The Rugby is in Grade Mode.                                 | The Rugby will self-level only when 0.00% is shown in the display.<br>In Grade mode, the Rugby self-levels at 0.00%, then adjusts to the grade input. |
| Elevation (H.I.) Alert function is not working. | The Elevation (H.I.) Alert function is disabled.            | The Elevation (H.I.) Alert function can be enabled or disabled in the Option Menu.                                                                    |
| The Bump Alert feature activates too often.     | The Bump Alert setting is too sensitive.                    | Change the Bump Alert setting from FINE to COARSE in the Option Menu.                                                                                 |
| The Smart Slope feature activates too often.    | The Smart Slope setting is too sensitive.                   | Change the Smart Slope setting from FINE to COARSE in the Option Menu.                                                                                |
| The display is too dark/light.                  | Contrast setting needs readjustment to lighting conditions. | Adjust the contrast setting in the Option Menu.                                                                                                       |
| The grade shows in Percent (%) or Per mil (‰).  | Wrong setting chosen.                                       | Choose the desired setting in the Option Menu.                                                                                                        |

## 11

## Care and Transport

### 11.1

### Transport

|                                         |                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transport in the field</b>           | <p>When transporting the equipment in the field, always make sure that you</p> <ul style="list-style-type: none"><li>• either carry the product in its original transport container,</li><li>• or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.</li></ul> |
| <b>Transport in a road vehicle</b>      | <p>Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container, original packaging or equivalent and secure it.</p>                                                                                                     |
| <b>Shipping</b>                         | <p>When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.</p>                                                                                       |
| <b>Shipping, transport of batteries</b> | <p>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.</p>                            |
| <b>Field adjustment</b>                 | <p>Periodically carry out test measurements and perform the field adjustments indicated in the User Manual, particularly after the product has been dropped, stored for long periods or transported.</p>                                                                                                       |

### 11.2

### Storage

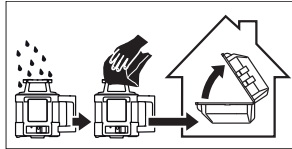
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>                       | <p>Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "12 Technical Data" for information about temperature limits.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Field adjustment</b>              | <p>After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Li-Ion and alkaline batteries</b> | <p><b>For Li-Ion and alkaline batteries</b></p> <ul style="list-style-type: none"><li>• Refer to "Technical Data" for information about storage temperature range.</li><li>• Remove batteries from the product and the charger before storing.</li><li>• After storage recharge batteries before using.</li><li>• Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.</li></ul> <p><b>For Li-Ion batteries</b></p> <ul style="list-style-type: none"><li>• 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.</li><li>• At the recommended storage temperature range, batteries containing a 30% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.</li></ul> |

**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 can 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.

---



## 12

## Technical Data

### 12.1

### Conformity to National Regulations

#### 12.1.1

#### Rugby 820

##### Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product Rugby 820 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EU Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

##### Frequency band

2400 - 2483.5 MHz

##### Output power

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

##### Antenna

Rugby 820:

Chip antenna

Rod Eye 180, Digital RF Receiver:

Chip antenna

RC800 remote control:

Chip antenna

#### 12.1.2

#### Dangerous Goods Regulations

##### Dangerous Goods Regulations

The 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.**



Leica Geosystems has developed **Guidelines** on "How to carry Leica products" and "How to ship Leica products" with Lithium batteries. Before any transportation of a Leica product, we ask you to consult these guidelines on our web page (<http://www.leica-geosystems.com/dgr>) to ensure that you are in accordance with the IATA Dangerous Goods Regulations and that the Leica products can be transported correctly.



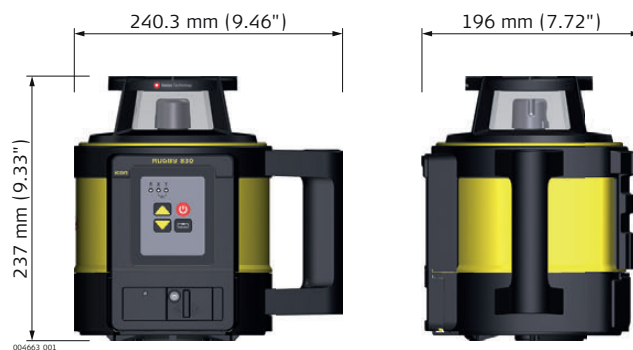
Damaged or defective batteries are prohibited from being carried or transported onboard any aircraft. Therefore, ensure that the condition of any battery is safe for transportation.

## 12.2

## General Technical Data of the Laser

|                                |                                                                        |                            |
|--------------------------------|------------------------------------------------------------------------|----------------------------|
| <b>Operating range</b>         | Operating range (diameter):                                            |                            |
|                                | Rugby 820:                                                             | 1100 m/3600 ft             |
| <b>Self-levelling accuracy</b> | Self-levelling accuracy: $\pm 1.5$ mm at 30 m ( $\pm 1/16"$ at 100 ft) |                            |
|                                | Self-levelling accuracy is defined at 25°C (77°F)                      |                            |
| <b>Self-levelling range</b>    | Self-levelling range:                                                  | $\pm 6^\circ$              |
| <b>Rotation speed</b>          | Rotation speed:                                                        | 10 rps                     |
| <b>Radio functions</b>         | <b>Model</b>                                                           | <b>Radio function</b>      |
|                                | Rugby 820                                                              | slope catching, slope lock |

### Laser Dimensions



|                         |                                |                                 |
|-------------------------|--------------------------------|---------------------------------|
| <b>Weight</b>           | Rugby 820 weight with battery: |                                 |
|                         | 3 kg/6.6 lbs.                  |                                 |
| <b>Internal battery</b> | <b>Type</b>                    | <b>Operating times* at 20°C</b> |
|                         | Lithium-Ion (Li-Ion Pack)      | 50 h                            |
|                         | Alkaline (four D-cells)        | 40 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.

Environmental specifications

|                                                  |                                     |
|--------------------------------------------------|-------------------------------------|
| Temperature                                      |                                     |
| Operating temperature                            | Storage temperature                 |
| -20°C to +50°C<br>(-4°F to +122°F)               | -40°C to +70°C<br>(-40°F to +158°F) |
| Protection against water, dust and sand          |                                     |
| Protection                                       |                                     |
| IPX8 (IEC 60529) / MIL-STD-810G                  |                                     |
| Dust tight                                       |                                     |
| Protected against continuous immersion in water. |                                     |

|                                      |                 |                                |
|--------------------------------------|-----------------|--------------------------------|
| <b>A100 Lithium-Ion charger</b>      | Type:           | Li-Ion battery charger         |
|                                      | Input voltage:  | 100 V AC-240 V AC, 50 Hz-60 Hz |
| <b>A800 Lithium-Ion battery pack</b> | Output voltage: | 12 V DC                        |
|                                      | Output current: | 3.0 A                          |
|                                      | Polarity:       | Shaft: negative, Tip: positive |
| <b>A800 Lithium-Ion battery pack</b> | Type:           | Li-Ion battery pack            |
|                                      | Input voltage:  | 12 V DC                        |
|                                      | Input current:  | 2.5 A                          |
|                                      | Charge time:    | 5 hours (maximum) at 20°C      |

12.3

RC800 Remote Control

|                                       |                              |                |
|---------------------------------------|------------------------------|----------------|
| <b>Operating range with Rugby 820</b> | Operating range (radius):    | 100 m / 330 ft |
|                                       |                              |                |
| <b>Batteries</b>                      | Batteries: Alkaline          | Two AA-cells   |
|                                       | Battery life (typical usage) | 70 hours       |

Remote Control dimensions



**Description****Lifetime Manufacturer's Warranty**

Warranty coverage for the entire usage time of the product under PROTECT according to Leica Geosystems International Limited Warranty and PROTECT General Terms & Conditions set out under [www.leica-geosystems.com/protect](http://www.leica-geosystems.com/protect). Free charge repair or replacement of all products or any parts under PROTECT that suffer defects as a result of faults in materials or manufacturing.

**5 Years No Costs**

Additional services should the product under PROTECT become defective and require servicing under normal conditions of use, as described in the user manual, at no additional charge.

To receive the "5 years no cost" period, the product must be registered at <http://myworld.leica-geosystems.com> within 8 weeks of the purchase date. If the product is not registered, a "Two years no cost" period applies.

**Description****Two Year Knockdown Warranty**

In addition to the lifetime manufacturer's warranty and the "No Cost" period for additional services, the internal self-levelling system of the product under PROTECT is covered. Should any accident or knockdown occur within two years of the purchase date, all repairs to the internal self-levelling assembly will be covered under PROTECT General Terms & Conditions.

### Accessories for power supply

#### A100 - Li-Ion Charger (790417)

The A100 Li-Ion charger comes complete with four separate AC adaptors.

#### A130 - 12 Volt Battery Cable (790418)

The A130 12 volt battery cable connects the Rugby to a standard 12 volt automotive battery as a backup for the unit's battery. It is only usable with the rechargeable battery pack. Length: 4 metres/13 feet.

#### A140 - Car Adapter Cable (797750)

The A140 car adapter cable connects the Rugby to a standard automotive accessory jack as a backup for the unit's battery or to charge in a vehicle. It is only usable with a rechargeable battery pack. Length: 2 metres/6.5 feet.

#### A150 - Alkaline Battery Pack (790419)

The A150 alkaline battery pack is included as part of the standard alkaline package. It can also be purchased separately to be used as a backup for rechargeable models. Batteries required: Four D-cell type alkaline.

#### A170 - Solar Panel Kit (807479)

The A170 solar panel kit runs and charges the Rugby. It is usable only with a rechargeable battery pack. The A170 solar panel comes complete with its own storage bag that can be attached directly to the Rugby carrying case.

#### A800 - Li-Ion Battery Pack (790416)

The A800 Li-Ion battery pack is included as part of the standard rechargeable package. It can also be purchased separately as an upgrade to the alkaline battery pack. It is necessary to also purchase the A100, Li-Ion battery charger to complete the Li-Ion battery solution.



|                                   |    |                                 |    |
|-----------------------------------|----|---------------------------------|----|
| <b>A</b>                          |    | <b>F</b>                        |    |
| Accessories .....                 | 61 | FCC Statement .....             | 12 |
| Accuracy                          |    | Frequency Band                  |    |
| Self-levelling .....              | 58 | Rugby .....                     | 57 |
| Accuracy Adjustment .....         | 45 | <b>I</b>                        |    |
| Adjust                            |    | Indicators, LED                 |    |
| Level Accuracy .....              | 46 | Level status .....              | 18 |
| Antenna                           |    | Instrument                      |    |
| Technical Data .....              | 57 | Technical Data .....            | 58 |
| Applications                      |    | Turn on and off .....           | 18 |
| Checking Grades .....             | 34 | Intended use .....              | 7  |
| Entering Grades .....             | 39 | <b>L</b>                        |    |
| Manual Grades .....               | 35 | Laser                           |    |
| Setting Forms .....               | 33 | Classification .....            | 10 |
| Smart Target .....                | 36 | Dimensions .....                | 58 |
| Smart Target Lock .....           | 37 | Laser Classification            |    |
| Automatic Field Calibration ..... | 48 | Rugby .....                     | 10 |
| Automatic Mode .....              | 19 | LED Indicators .....            | 18 |
| <b>B</b>                          |    | Level Accuracy                  |    |
| Batteries                         |    | Adjust .....                    | 46 |
| Operation, Discharging .....      | 41 | Check .....                     | 45 |
| Battery                           |    | Li-Ion battery .....            | 59 |
| Change alkaline batteries .....   | 44 | Storage .....                   | 55 |
| Change Li-Ion battery pack .....  | 43 | <b>M</b>                        |    |
| Charge .....                      | 42 | Manual mode .....               | 19 |
| Technical data .....              | 58 | Menu                            |    |
| Battery Charger                   |    | Remote Control .....            | 29 |
| Technical data .....              | 59 | Rod Eye .....                   | 32 |
| Battery Pack                      |    | <b>O</b>                        |    |
| Technical data .....              | 59 | Operating range .....           | 58 |
| Buttons .....                     | 17 | Output Power                    |    |
| <b>D</b>                          |    | Rugby .....                     | 57 |
| Dangerous Goods Regulations ..... | 57 | <b>P</b>                        |    |
| Definition of Use .....           | 7  | Pairing                         |    |
| Description of the system .....   | 14 | Remote Control with Rugby ..... | 22 |
| Digital Receiver .....            | 30 | Rod Eye 180 .....               | 32 |
| Dimensions                        |    | <b>R</b>                        |    |
| Of laser .....                    | 58 | Range                           |    |
| Of Remote Control .....           | 59 | Self-levelling .....            | 58 |
| Documentation .....               | 2  | Receiver                        |    |
| Dual Receiver Setups .....        | 38 | Pairing .....                   | 32 |
| <b>E</b>                          |    | Remote Control                  |    |
| Elevation alert .....             | 20 | Dimensions .....                | 59 |
| Environmental specifications      |    | Responsibilities .....          | 7  |
| Laser .....                       | 58 | Menu .....                      | 32 |
| Rod Eye                           |    |                                 |    |

|                             |    |
|-----------------------------|----|
| Rod Eye 160                 |    |
| Buttons .....               | 30 |
| Instrument components ..... | 30 |
| Rod Eye 180                 |    |
| Buttons .....               | 31 |
| Instrument components ..... | 31 |
| Rotation speed .....        | 58 |

## **S**

|                               |    |
|-------------------------------|----|
| Safety Directions .....       | 6  |
| Setup                         |    |
| Dual Receivers .....          | 38 |
| Instrument on tripod .....    | 16 |
| Specifications, environmental |    |
| Instrument .....              | 58 |

## **T**

|                       |        |
|-----------------------|--------|
| Temperature           |        |
| Laser                 |        |
| Operating .....       | 58     |
| Storage .....         | 58     |
| Troubleshooting ..... | 51, 54 |

## **W**

|                  |    |
|------------------|----|
| Weight           |    |
| Instrument ..... | 58 |

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- when it has to be **right**

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Geosystems