

DG211

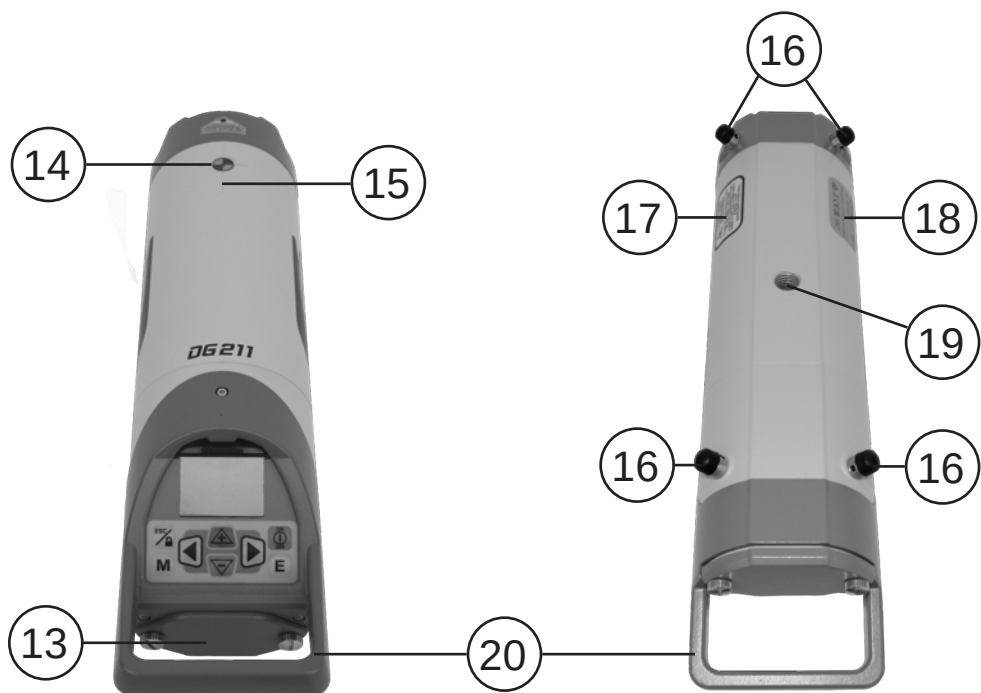
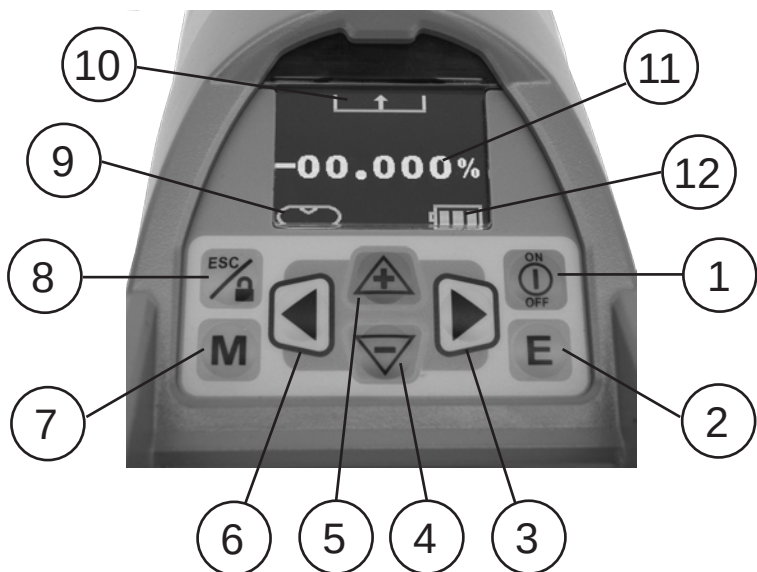


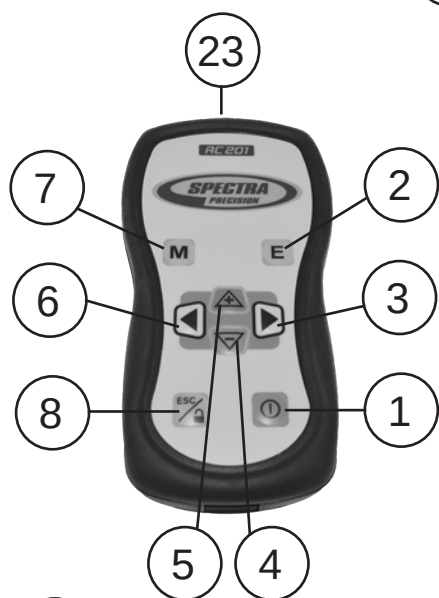
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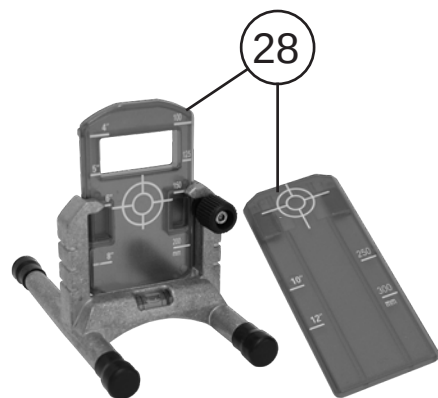
DG211

User Guide
Bedienungsanleitung
Manuel de l'utilisateur
Guida per l'uso





RC201



946

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1 Introduction

Thank you for choosing a Spectra Precision pipe laser. The pipe laser is an easy-to-use tool that provides underground contractors line, elevation, and grade control for installing storm, sanitary, or other gravity-flow pipe. This system can also be used for tunneling, boring, pipe alignment, or any other application requiring line, elevation, and grade control.

The pipe laser projects a highly visible laser beam in a direction at a predetermined (grade) for the alignment of gravity-flow pipe. The laser light is intercepted by a target. To align the pipe, you need to position it so that the pipe laser's beam is centered at the target's bullseye.

2 Safety Instructions

For hazard-less and safe operation, read all the user guide instructions.

- Use of this product by people other than those trained on this product may result in exposure to hazardous laser light.
- The users of this product ensure they have read and understand the user guide.
- Do not remove warning labels from the unit.
- The DG211 is class 3A/3R laser (<5mW; 600 – 680nm) IEC 60825-1:2014. A Class 2 version is also available.



- Never look into the laser beam or direct it to the eyes of other people.
- Always operate the unit in a way that prevents the beam from getting into people's eyes.
- If initial service is required which results in the removal of the outer protective cover, removal must only be performed by factory-trained personnel.
- Do not use the product in aggressive or explosive environment.
- Ensure that product is not damaged so that any unsafe usage is prevented.
- Before starting your work, always check the leveling accuracy of the product. See chapter 4.1.
- Spectra Precision is not responsible for any inaccuracy that is caused by not reading the user guide and by any misuse of the product.
- The user of the product is responsible to check the results for accuracy.
- Never put a wet laser or wet accessories in the carrying case for storage.

- Caution:** Use of other than the described user and calibration tools or other procedures may result in exposure to hazardous laser light.
- Caution:** Using the laser differently than described in the user guide may result in unsafe operation.
- Note:** Any local or national laws and regulations for the use of machines or products described in this document must be followed.
- Note:** Reflections from some surfaces like windows or flat metal surfaces can lead to wrong receiver readings.
- Note:** After storage or transportation, let the product acclimate to the ambient temperature before use of high accurate measurements.
- Note:** Do not expose the unit to extreme temperatures or extreme temperature changes (do not leave in vehicles).
- Warning:** Li-Ion batteries or alkaline batteries shipped with the product may contain small amounts of harmful substances.
Do not open the battery, dispose of in fire or short circuit; it may ignite, explode, leak or get hot causing personal injury.
Dispose of batteries in accordance with all applicable federal, state and local regulations.
Keep the batteries away from children, If swallowed, do not induce vomiting. Seek medical attention immediately.
Charge only with specified chargers according to device manufacturer's instructions.
Be sure to charge the battery before using it for the first time and after not using it for an extended length of time.
Do not open the rechargeable batteries cage.

3 Product

3.1 General Description

The laser ships with a rechargeable Li-Ion battery pack. Alkaline batteries can be used as a backup to power the laser at the job site. When alkaline batteries are used, the plus and minus symbols in the battery pocket indicate how to install the batteries into the product.

The rechargeable Li-Ion battery pack avoids mis-insertion by design.

Note: Charging the rechargeable Li-Ion battery pack beyond the temperature mentioned in the technical specification (chapter 8.1) may lead to decreased battery life or undercharged batteries.

3.2 Product Components

DG211 Laser and RC201 Remote Control

1	Power Button	Press DG211 for one second to turn on the Laser; press and hold for one second to turn off the laser
2	E – Button	Enter button; confirms the grade entry
3	Arrow Button Right	Moves beam or cursor to the right
4	Minus Button	Decreases grade value or moves beam down
5	Plus Button	Increases grade value or moves beam up
6	Arrow Button Left	Moves beam or cursor to the left
7	M – Button	Changes to grade enter mode or manual mode
8	ESC/Lock Button	
9	Roll Vial	Shows roll position of the product housing
10	Laser Beam Position	Symbol shows the position of the laser beam
11	Grade Display	Shows the current grade value
12	Battery Symbol	Shows the amount of battery charge
13	Laser Battery Door with Thumbscrews	Opens the battery compartment to remove or replace the batteries
14	Line-Axis Pivot Marker and LED	Point where the alignment directions starts; when powering the laser on, the LED is on for 15 minutes before it switches off automatically
15	Axis Alignment Markers	Markers help to align the product
16	Legs	Legs; different sets available
17	Laser Safety Label	Shows laser warning information
18	Serial Number Label	
19	Tripod Mounts 5/8x11	Mount to tripod
20	Handle	Product carrying handle
21	Beam Exit Windows	Exit of the laser beam
22	Grade Axis Pivot Marker	Point where the grade starts
23	RC201 Infrared Diodes	Emitting of IR light
24	RC201 Battery Door	Open to insert or replace batteries
25	Li-Ion Battery Pack and Battery Door with Thumbscrews	
26	Alkaline Spacer with Battery Door	
27	CH11 Charger	
28	946 Target Set	

3.3 Installing the Batteries

Open the battery door using the turning knobs.

Rechargeable: Insert the rechargeable battery pack. It is designed to only be inserted one way and prevents mis-insertion.

Note: DO NOT REMOVE RECHARGEABLE BATTERIES FROM THEIR CAGE AND INSTALL ALKALINE BATTERIES. SEVERE DAMAGE TO THE UNIT WILL RESULT IF CHARGING IS ATTEMPTED.

The Li-Ion battery pack is charged outside the unit.

When needed replace Li-Ion battery pack with alkaline batteries using the alkaline spacer.

Alkaline: Four C-cell alkaline batteries can be used as a backup.

Insert four C-cell alkaline batteries into the housing according to the symbols within the battery compartment and on the alkaline spacer.

Close the battery door.

3.4 Battery Status Indication

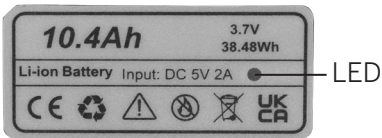
The approximate charge of the batteries is shown in the LCD (12). The remaining battery lifetime is depending on the battery brand, the temperature, the job site conditions (wind, vibrations, etc.) as well as age of the batteries and amount of recharge cycles.

-  battery good; no need to charge.
-  battery low; user can still use the product.
-  battery empty; charge battery to avoid abnormal product behavior.

3.5 Recharging the Batteries

For charging the Li-Ion battery pack (25), connect the charger (27) with the Li-Ion battery pack using the USB charging cable. It takes approximately 6 hours to charge the Li-Ion battery pack.

Charging Indicator LED: Off - Not Charging
Blinking - Charging
On - Charging Complete

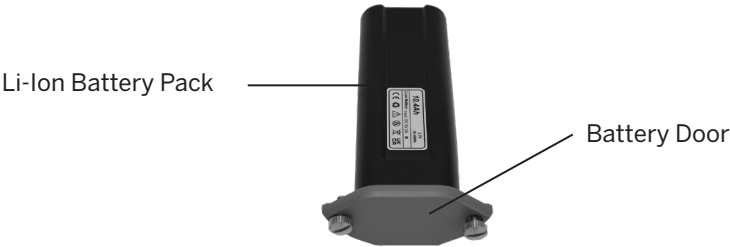


When the charger is unplugged, the LED will remain on for approximately one minute.

Note: See chapter 8.1 for the temperature range for charging the Li-Ion battery pack.

3.6 Battery Door

To remove the battery door from the alkaline spacer or from the Li-Ion battery pack, hold either the alkaline spacer or the Li-Ion battery pack and turn the battery door 90° counterclockwise.



To mount the battery door to the Li-Ion pack or the alkaline spacer, do the same steps as mentioned above turning the battery door 90° clockwise.

3.7 Laser Setup

Position the laser at the manhole invert or on bottom of the trench at the desired elevation.

It is required to position the laser within its self-leveling range; see chapter 8.1.

When the laser is not positioned within the self-leveling range, the laser beam will

drive towards the maximum position and the symbol  or  will blink, indicating to lower or raise the handle to achieve the self-leveling range.

For the correct cross axis position, the LCD window shows the correct position with the roll vial symbol (9). For correct grade the symbol has to be in the center position

. If the symbol is in the left  or right  position the laser accuracy will be affected.

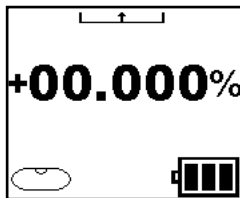
3.8 Turn On/Off Laser

Press the power button (1) on the laser for one second to turn on the laser. The display turns on and the self-leveling will start at once with the last saved grade value. The line axis LED (14) powers on for 15 minutes.

During self-leveling the laser beam and the % symbol blink. The laser has completed leveling when the laser beam and the % symbol in the LCD display are no longer blinking.

Once leveled the laser constantly monitors the roll position. If the laser has been changed in the position during self-leveling mode, the roll alert will indicate the wrong position with a blinking roll vial symbol. Check the correct laser position and readjust the roll position of the laser before continuing the grade work.

During self-leveling mode, the standard display is shown.



Turn off the laser by pressing the power button (1) on the laser or the remote control for one second.

Note: The power button (1) on the remote control can power the laser off but cannot power the laser on.

3.9 Grade Entry with Digit Select Mode

The DG211 provides a grade range of -20% to +30%.

Note: The self-leveling range of the DG211 is limited to -10% to +25%. Any grade value below -10% or above +25% requires a pre-tilt of the laser. See chapter 3.7 with some guidance how to pre-tilt the laser to overcome this issue.

How to change grade value using Digit Select Mode:

Press and release M button (7) quickly to enter into the grade entry mode. The cursor blinks at the very left position. Press either plus button (5) or minus button (4) to change the grade value from plus to minus and vice versa.

Move the blinking cursor using the left arrow button (6) or right arrow button (3) to the left or right. Press plus button (5) to increase the value on the cursor position or press minus button (4) to decrease the value on the cursor position.

Press and hold plus button (5) and minus button (4) simultaneously will zero the grade value.

Pressing the E button (2) submits the grade value. Pressing the M button (7) or ESC/ Lock button (8) leaves the grade entry menu without any change.

3.10 Grade Entry with Step & Go Mode

The DG211 provides a grade range from -20% to +30%.

Note: The self-leveling range of the DG211 is limited from -10% to +25%. Any grade value below -10% or above +25% requires a pre-tilt of the laser. See chapter 3.7 with some guidance how to pre-tilt the laser to overcome this issue.

How to change grade value to work with DG211 using Step & Go mode:

Press and hold plus button (5) or minus button (4) for more than two seconds will change the grade value starting from the very last digit and will run over to the very left position. A short interruption of the button press will change the same digit. A long interruption of the button press will start the change from the very last position again. Press and hold plus button (5) and minus button (4) simultaneously will zero the grade value.

After releasing the buttons the product will start to level at the released grade value.

3.11 Laser Alignment

Using arrow button left (6) the laser beam can be aligned to the left. Using the arrow button right (3) the laser beam can be aligned to the right. The position of the laser is shown via the laser alignment symbols, see pic below.

3.12 Center Laser

Pressing the arrow button left (6) and arrow button right (3) simultaneously centers the alignment of the laser beam indicated by the centering laser symbol.

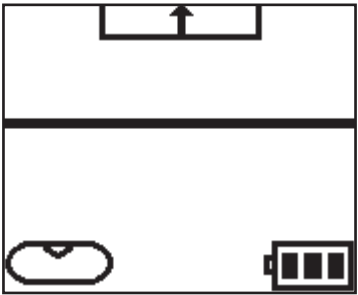


The center position of the laser is shown via the laser alignment symbols; see pic below.



3.13 Manual Mode

Press and hold M button for five seconds to enter the manual mode. In manual mode the product is no longer in self-leveling mode. The laser beam can be moved using the arrow button left (6) and the arrow button right (3) as well as the plus button (5) or the minus button (4).



Note: During manual mode the roll alert is not active. See 3.15 for roll alert.

3.14 Lock Keypad

To avoid any unwanted button presses, there is a way to lock the keypad. Press and hold the ESC/Lock button (8) and the arrow button left or right (6,3) within one second to lock the arrow button left and right. The locked left/right button is shown with a symbol in the LCD display; see pic below. Press the same button sequence to revert it. Press the ESC/Lock button (8) and the plus button or the minus button (5,4) within one second to lock the plus and minus buttons. The locked plus and minus button is shown with a symbol in the LCD display, see pic below. Press the same button sequence to revert it.



3.15 Roll Alert

When the laser is in self-leveling mode, a roll alert activates when the stable set up of the laser has been disturbed by vibrations or other impact to the laser. When the laser is in self-leveling mode the symbol of the roll vial (9) and the laser light is blinking for roll alert. When the laser is in stand-by mode only the symbol of the roll vial (9) is blinking.

When the roll alert is activated, check the laser position and set up the laser so the roll vial symbol (9) no longer blinks.

Note: The roll alert is not active during manual mode.

3.16 Standby Mode

Standby mode is used to save battery life when the laser is not needed. During Standby mode the laser beam is off and the LCD is off. Only the battery symbol is displayed to show the unit is still on. Also the start grade LED (11) is blinking and the vial symbol is displayed during standby mode (LED 1 second on and 4 seconds off).

Press and hold ESC/Lock button (8) for three seconds to change laser into the standby mode. When in standby mode, press and hold ESC/Lock button (8) for three seconds to change back into self leveling mode.

Note: After four hours in standby mode, the product shuts off completely.

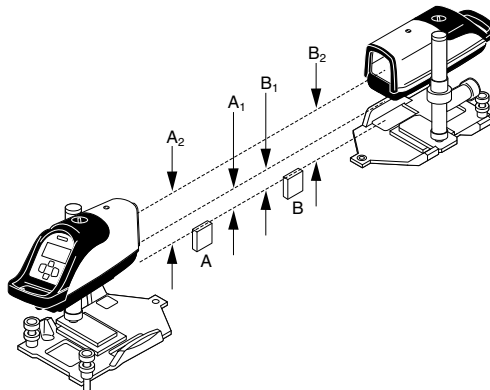
Note: Roll alert is active during standby mode

Note: In case of roll alert during standby mode, the roll vial (9) blinks

Note: Activation of the roll alert will end the standby mode.

4 Check Calibration

4.1 Check Level Accuracy



Checking the calibration of your pipe laser is simple with an engineer's rule and your pipe laser.

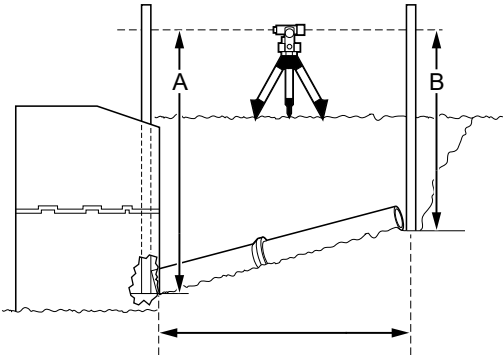
1. Select a level road, parking lot or field whose rise is not more than 4 inches in 100 feet (10 cm/30 m).
2. Choose two points A and B, 100 feet (30 m) apart. The points must be found, so mark them well.
3. Set up the pipe laser just behind point A so that it passes over points A and B and rough level.
4. Turn on the pipe laser and let it warm up for about 10 minutes.
5. Set the grade counter to 0.000%.
6. Ensure the laser beam passes over points A and B. Allow the pipe laser to self-level.
7. Accurately measure the elevation to the center of the beam at point A and record the elevation as A1 in a table like the one shown below.
8. Accurately measure the elevation to the center of the beam at point B and record the elevation as B1.
9. Move the pipe laser behind point B and aim the laser beam so that it passes over points A and B. Allow the pipe laser to self-level.
10. Accurately measure the elevation to the center of the beam at point B and record the elevation as B2.
11. Accurately measure the elevation to the center of the beam at point A and record the elevation as A2.
12. Subtract the A1 and B1 elevation readings from A2 and B2 elevation readings.

Note: Your laser is in calibration if the difference between $A2 - A1$ equals $B2 - B1$.

Note: If the error is greater than $1/8$ in (3 mm) in the set up described above (100 ft / 30 m distance between point A and B), return the pipe laser to an authorized Spectra Precision service center.

	Point A	Point B
Second Reading	A2	B2
First Reading	A1	B1
Difference	$A2 - A1$	$B2 - B1$
Error in 100 feet (30 m)	$((A2-A1)-(B2-B1))/2$	

4.2 Check Grade Accuracy



After the first 25 – 50 feet (8 – 15 m) of pipe has been laid, it is recommended that you make a grade check to insure that the setup is correct, and that the system is properly operating.

The illustration shows a method for checking grade.

1. Using a laser, transit, or automatic level and a grade rod, take a reading at the beginning of the pipe “A”.
2. Using the same instruments, obtain a level reading at the end of the pipe “B”.
3. The difference between the readings equals the rise over the run.
4. In terms of % of grade, rise divided by the run times 100 equals the percent of grade.

Note: The user of this equipment is expected to follow all operating instructions and make periodic checks on the proper grade, elevation, and line of the pipe as it is being laid. Spectra Precision or its representatives assume no responsibility for improperly laid pipe.

Example:

	Feet / Tenths	Metric
Rod Reading at A	15.74 feet	4,801 m
Rod Reading at B	12.289 feet	3,749 m
Rise or Difference (A-B)	3.451 feet	1,052 m
Distance from A to B	145 feet	44,196 m
Rise divided by Run	0.0238	0,0238
Rise divided by Run times 100 = Laser setting	2.38%	2,38%
Rise according to engineering plan	2.38% x 145 feet = 3.452 feet	2.38% x 44,196 m = 1,052 m

The pipe is laid correctly when the rod reading “A” minus rod reading “B” equals the rise according to the engineering plans.

5 Cleaning and Maintenance

Dirt and water on the glass parts of the laser will influence beam quality and operating range considerably. Clean with cotton swabs.

Remove dirt on the housing with a lint-free, warm, wet and smooth cloth. Do not use harsh cleaners or solvents.

Allow the unit to air dry after cleaning it.

Note: Never put a wet unit into the carrying case for storage.

6 Protecting the Environment

The unit, accessories and packaging ought to be recycled.

Note: Do not throw used batteries into the garbage, water or fire. Remove them from service in compliance with local environmental requirements

7 Warranty

Spectra Precision LLC warrants the DG211 to be free of defects in material and workmanship for a period of three years. Spectra Precision LLC or its authorized service center will repair or replace, at its option, any defective part, or the entire product, for which notice has been given during the warranty period. If required, travel and per diem expenses to and from the place where repairs are made will be charged to the customer at the prevailing rates. Customer should send the product to the nearest authorized service center for warranty repairs or exchange, freight prepaid. Any evidence of negligent, abnormal use, accident, or any attempt to repair the product by other than factory-authorized personnel using Spectra Precision LLC certified or recommended parts, automatically voids the warranty. Special precautions have been taken to ensure the calibration of the laser; however, calibration is not covered by this warranty. Maintenance of the calibration is the responsibility of the user.

The foregoing states the entire liability of Spectra Precision LLC regarding the purchase and use of its equipment. Spectra Precision LLC will not be held responsible for any consequential loss or damage of any kind. This warranty is in lieu of all other warranties, except as set forth above, including any implied warranty merchantability of fitness for a particular purpose, are hereby disclaimed. This warranty is in lieu of all other warranties, expressed or implied.

8 Technical Specification

8.1 Technical Specification Laser DG211

Accuracy, Level ¹	± 1.5 mm / 30 m; 1/16" @ 100 ft.
Accuracy, Grade ¹	± 9 mm / 30 m; 1/4" @ 70 ft.
Accuracy, Grade, Temperature	± 0.6 mm / 30 m per °Celsius ± 3/128" @ 100 ft.; per 1.8°Fahrenheit
Operational Area ^{1,2}	Up to 150 m / 500 feet
Laser Type	600 – 680 nm
Laser Class	3A/3R OR 2
Grade Range	-20% to 30%
Self-Leveling Range	-10% to 25%
Battery Life Li-Ion pack ^{1,2}	36 hrs
Li-Ion pack charging time	< 6 hrs
Li-Ion pack charging temperature	0°C to 45°C / 32°F to 113°F
Alkaline batteries back up	4 x C-Cells
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Dust and Waterproof	IP68
Weight	2868 g / 6.3 lbs (incl. Li-Ion pack)
Product length	372 mm / 14.65 in
Diameter	96 mm / 3.78 in

8.2 Technical Specification Remote Control RC201

IR operating range (front, through pipe) ^{1,2}	150m
IR operating range (back) ^{1,2}	10m
Power source	2 x 1.5 V AA alkaline batteries
Weight	153 g / 0.34 lbs w/o batteries
Dimensions	148 x 79 x 33 mm / 5.83 x 3.11 x 1.3 in

¹ @ 21°C, 70°F

² Under optimal atmospheric circumstances

9 CE Declaration of Conformity

We

Spectra Precision LLC, declare under our sole responsibility that the DG211, a pipe laser, including remote control RC201 and charger, to which this declaration relates, is in conformity with the following directives:

2014/30/EU Electromagnetic Compatibility (EMC)

2014/35/EU Low Voltage Directive (LVD)

2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Relevant harmonized standards:

EN 60825-1:2014 Safety of laser products -Part1 1: Equipment classification and requirements

EN IEC 62368-1:2020 + A11:2020 Audio/video, information and communication technology equipment - Part 1: Safety requirements

EN61000-6-3:2007 + A1:2011 Electromagnetic compatibility - Part 6-3 Generic standards - Emission standard for residential, commercial and light-industrial environments

EN IEC 61000-6-2:2019 Electromagnetic compatibility - Part 6-2 Generic Standards - Immunity standard for industrial environments

The managing director

10 UKCA Declaration of Conformity

We declare under our sole responsibility that the DG211 and RC201 comply with all applicable provisions of the regulations listed below and are in conformity with the following standards.

EN 60825-1:2014

EN IEC 62368-1:2020 + A11:2020

EN61000-6-3:2007 + A1:2011

EN IEC 61000-6-2:2019

11 Service and Customer Advice

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