Spectra Precision LL300S



User Guide



LL300S

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Introduction

Thank you for choosing one of the Spectra Precision Lasers from the family of precision lasers.
The LL300S laser is an easy-to-use tool that offers accurate horizontal laser reference up to 1300 ft (400 m) away using a receiver.

For Your Safety

For hazardless 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.
- Do not remove warning labels from the unit.
- The LL300S is a class 2 laser (<3.4mW) IEC 60825-1:2014)
- **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.



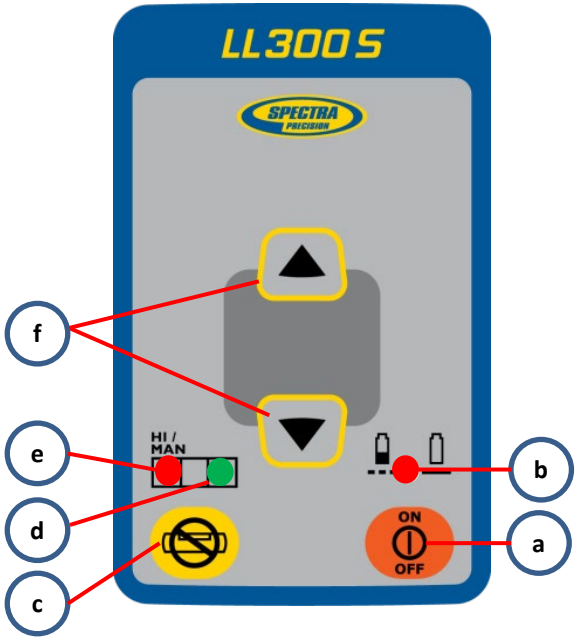
Caution: Use of other than the described user and calibration tools or other procedures may result in exposure to hazardous laser light.

Caution: Using different than described at the LL300S user guide, may result in unsafe operation.

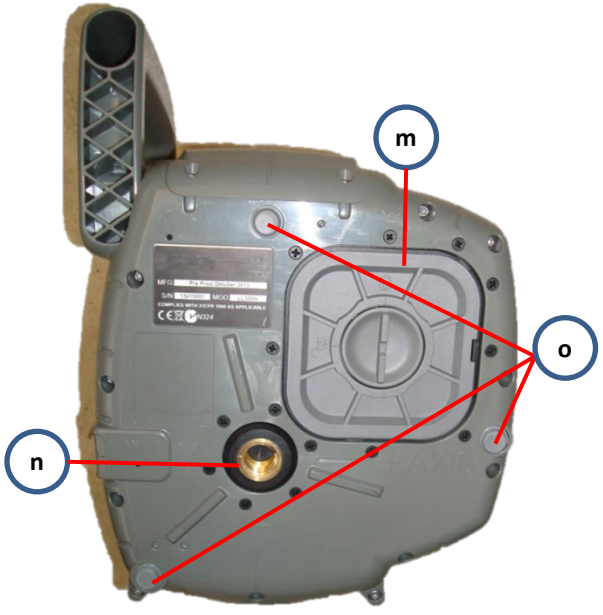
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LL300S - Components









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Components

a Power Button
b Battery LED
c Manual/Standby Button
d Leveling LED
e HI/Manual LED
f Up and Down Arrow Buttons
g Rotor
h Sunshade
i Sighting Guides
j Axes-Alignment-Marks
k Recharge Jack
l Handle
m Battery door
n 5/8x 11 Tripod Mounts
o Rubber feet

How to Use the Laser System

Powering the Laser

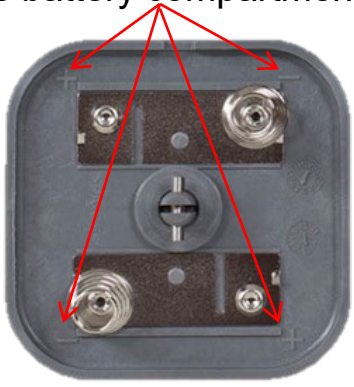
Batteries

WARNING
Ni-MH batteries may contain small amounts of harmful substances.
Be sure to charge the battery before using it for the first time, and after not using it for an extended length of time.
Charge only with specified chargers according to device manufacturer‘s instructions.
Do not open the battery, dispose of in fire or short circuit; it may ignite, explode, leak or get hot causing personal injury.
Dispose in accordance with all applicable federal, state, and local regulations.
Keep the battery away from children. If swallowed, do not induce vomiting. Seek medical attention immediately.

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Powering the LL300S

1 – LL300S uses alkaline batteries or a rechargeable NiMH battery pack which is keyed to prevent mis-insertion.
2 – The rechargeable battery pack can be charged inside of the unit
3 – Alkaline batteries can be used as a backup
4 – Plus and minus symbols at the battery door indicate how to put the alkalines into the battery compartment











Installing Batteries

Remove the battery door by turning the center screw 90° counterclockwise. Insert batteries (or a rechargeable battery pack) into the housing so that the **negative poles are on the bigger battery spiral springs**.

DO NOT REMOVE RECHARGEABLE BATTERIES FROM THEIR HOLDER AND INSTALL ALKALINE BATTERIES, SEVERE DAMAGE TO UNIT WILL RESULT IF CHARGING IS ATTEMPTED.

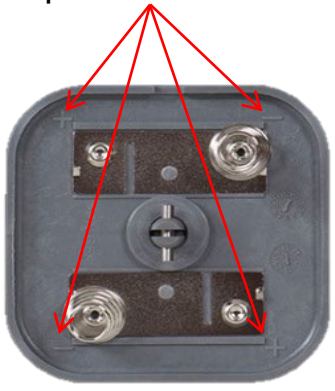
Install the battery door and tighten it by turning the center screw 90° clockwise.

A mechanical switch prevents alkaline batteries from being charged. Only the original rechargeable battery pack allows charging within the unit. Any other rechargeable batteries have to be charged externally.

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Recharging the Batteries

Note: The battery LED shows the approximate charge of the batteries.
The LED will flash when battery voltage is between 3.8 and 4.0 volts.
The LED will be on continuously when battery voltage is less than 3.8 volts.
The charger requires approx. 13 hours to charge empty rechargeable batteries.
For charging, connect the plug of the charger to the recharge jack of the unit.
New or long-time out-of-use rechargeable batteries reach their best performance after being charged and recharged five times. For Indoor applications the charger can be used as a power supply for the GL.
Alkaline batteries can be used as a backup. Insert 4 D-cell batteries noting the plus (+) and minus (-) diagrams at the battery door.



The batteries should only be charged when the laser is between 50° F and 104° F (10°C to 40°C). Charging at a higher temperature may damage the batteries. Charging at a lower temperature may increase the charge time and decrease the charge capacity, resulting in loss of performance and shortened life expectancy.

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Laser Setup

Position the laser horizontally (tripod mount and rubber feet downward!) on a stable platform, wall mount or tripod at the desired elevation.
The laser recognizes automatically whether it is used horizontally or vertically when switched on.
Note: When set up vertically, the unit switches always automatically into manual mode.

Turning On/Off the laser

Press the power button to turn On the laser.
The LEDs (**b, d** and **e**) are turned on for 3 seconds. Self-leveling will start at once. The unit is leveled when the leveling LED (**d**) is no longer flashing (once every second). The rotor will not spin until the unit is leveled. For the first five minutes after the laser self-levels, the LED lights solid then flashes every four seconds to let you know the laser is still level and the HI alert has been activated.
To turn Off the laser, press and hold the power button again.

If the laser is positioned beyond its self-leveling range of ±8%, the manual and leveling indicators flash simultaneously and a warning sound is emitted. Reposition the laser within its self-leveling range.
Once leveled, the unit constantly monitors its level condition. The height change (HI) alert is activated 5 minutes after self-leveling was performed. The green LED (**d**) flashes every 4 seconds and HI appears at the right corner of the optional remote control's display.

Level errors > 30 mm/10 m put the unit into alert mode because they are generally caused by a disturbance that could lead to inaccurate measurements. When entering into alert mode, the rotation stops, the laser beam turns off, a warning sound is heard and the HI/MAN LED (**e**) flashes 2 x per second. Turn the unit off and then on again. To ensure your former elevation, now you have to check or arrange the exact height.

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Standard Features

Manual mode

In horizontal mode pressing the **Manual** button on the laser or remote control once changes the laser from automatic self-leveling mode to Manual mode. Manual mode is indicated by the flashing (once every second) red LED **e**.

In Manual mode (horizontal), the Y-axis can be sloped by pressing the Up- and Down-Arrow-buttons on the laser or remote control. Additionally, the X-axis can be sloped by pressing the Left- and Right-Arrow-buttons on the remote control.

To resume automatic self-leveling mode, press the manual button twice.

In vertical mode, the laser is always in MANUAL mode. Pressing the up and down arrow buttons adjust the slope of the laser beam. The left and right arrow buttons at the remote control can be used to align the laser beam to the right/left side.

To resume automatic self-leveling mode, press the manual button again.

Y-Single Slope Mode

The **Manual** button on the laser and remote control toggles the unit to Manual, the Y-axis Single Slope Mode, then Automatic Mode. To activate the Y-axis single slope mode, press the **Manual** button at the laser or remote control twice. This is indicated by the simultaneously flashing red **e** and green **d** LEDs (once every second).

In Y-axis single slope mode, the Y-axis can be sloped by pressing the Up- and Down-Arrow-buttons on the laser or remote control, while the X-axis remains in automatic self leveling mode (e.g. when setting up sloped ceilings or drive ways).

To resume automatic self-leveling mode from Y-axis single slope mode, press the manual button again.

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Mask Mode

Mask Mode – allows you to electronically turn off the laser beam (electronic shutters) in up to 3 lighthouse windows to prevent interference with other receivers on the jobsite. Mask Mode can be selected as a standard feature as well as using the menu.

To activate the mask mode on the + or -Y-axis, press the **up** or **down** arrow button at the laser or remote control, then within <1 second press and release the **Manual** button.

Press the **right** or **left** arrow button at the **RC402N** in sequence with the **Manual** button to activate/deactivate the mask mode for the + or – X axis.

The RC402N display indicates which side of the laser the beam has been electronically turned off.

Note: The unit always powers up with the mask mode deactivated (default).

Activating/Deactivating Standby mode

Press and hold the **Manual** button at the laser or remote control for 3 seconds activates the Standby mode.

The self-leveling and rotation will be stopped and the beam will be turned off while the HI alert is still active.

The HI/MAN LED at the laser flashes red every 5 seconds while the RC402N display shows Standby.

To deactivate Standby mode and restore full operation of the laser, press and hold the **Manual** button at the laser or remote control again for 3 seconds.



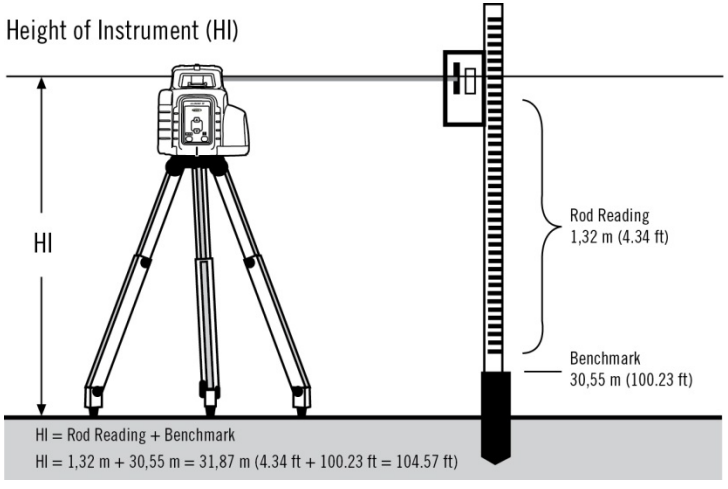
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Determining the Height of Instrument (HI)

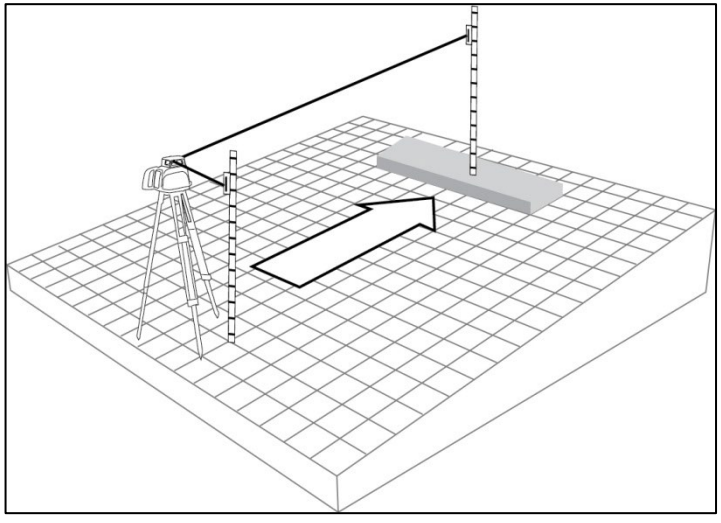
The height of instrument (HI) is the elevation of the laser's beam.
The HI is determined by adding the grade-rod reading to a benchmark or known elevation.
Set up the laser and place the grade rod on a job-site benchmark (BM) or known elevation.
Slide the receiver up/down the grade rod until it shows an on-grade reading.
Add the grade-rod reading to the benchmark to determine the height of instrument.
Example:
Benchmark = 30.55 m (100.23 ft)
Rod reading = +1.32 m (+4.34 ft)
Height of instrument = 31.87 m (104.57 ft)
Use this HI as a reference for all other elevations.



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Using the Y-Axis Single Slope Mode

1. Set up the laser and align it to the desired slope hub using the sighting guides on the sunshade.
2. Check the laser beam elevation close to the laser.
3. To activate the Y-axis single slope mode, press the manual mode button twice. The red and green LED flashes simultaneously (once a second).
4. Set the grade rod with the receiver attached to it on the desired slope/elevation hub.
   NOTE: DO NOT change the receiver position at the rod
5. Press the up and down arrow buttons until you get an on-grade reading on the receiver
6. Check the elevations along the direction of the slope



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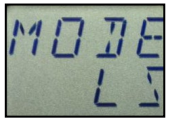
Using the optional HL760 receiver
To pair the HL760 receiver with the transmitter

Make sure the transmitter is turned off.

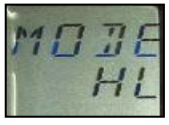
First, turn on the receiver, then press and hold the Scroll up (A) and Scroll down (B) buttons for two seconds.

After two seconds, the display shows MENU first, then RDIO

Press and release the Enter button (C) – display shows the current radio mode.

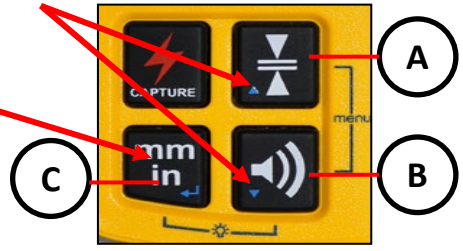


or

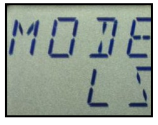


or





If not already set to **LS**, press Units **(C)** button (current mode flashes) and then press Deadband **(A)** or Audio button **(B)** until **LS** is displayed.



Press Units **(C)** button again to enter selection.
Press and release the Audio **(A)** button – display shows **PAIR**.
Press the Units **(C)** button again – the display shows **PAIR** and a rotating bar.
Then press and hold the **Manual** button and turn on the transmitter (Battery LED flashes fast).



After completing PAIR, **OK** will be displayed.



The LL300S pairs now automatically with the new receiver and turns back to the standard function.
Press and release the HL760 Power button two times to exit the menu at the receiver.
A laser symbol and an antenna is lit to confirm the receiver is ready for communication with the laser.



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Special Features using the optional RC402N

RC402N Features and Functions

The remote control mirrors the basic functionality of the LL300S keypad and offers additional features.

M-Button : Quickly press and release **starts the MENU entry** and can be used to return to the previous menu position

E-Button: Quickly press and release starts the selected mode

Manual Button: Quickly press and release activates/deactivates the manual mode/ single slope mode

Up/Down Arrow Buttons

Left/Right Arrow Buttons

ON/OFF button - press for 1 second to turn on the unit; press and hold for 2 seconds to turn off the unit

RC402N Battery- Status-LED (red)



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Powering the RC402N

1. Open the battery door using a coin or similar pry device to release the battery door tab on the RC402N. RC402N will be shipped with alkaline batteries Rechargeable batteries can be used optional but need to be charged externally
2. Insert two AA batteries noting the plus (+) and minus (-) diagrams inside the battery housing.
3. Close the battery door. Push down until it “clicks” into the locked position.



Turning On/Off the Radio Remote Control

The radio remote control is a hand-held device that allows you to send operational commands to the laser from a remote location.

Press the power button to turn on the radio remote control.

Note: When the remote control is initially turned on, the standard display (model number and software version) appear for the first 3 seconds, then the RC402N LCD shows the actual laser function.



Display at RC402N
LL300S – horizontal setup



Display at RC402N
LL300S - vertical setup

With every button press, the LCD backlight is activated and turns off automatically if no button is pressed for 8 seconds.

To turn off the radio remote control, press and hold the power button for 2 seconds.

If the RC402N is outside of the operating range or not paired with the transmitter, the LCD shows the model number and software version.



Note: 5 minutes after the last button press, the remote control turns off automatically.

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Pairing the remote control with the transmitter

First, make sure the transmitter and the remote control are turned off. Then press and hold the **Manual** button and turn on the transmitter. During the next 4 seconds repeat the same steps on the remote control.

The Laser beeps and the remote's display show Pairing OK for one second and then the same function as the laser is actually working to indicate the transmitter has been matched with the remote control.



RC402N Menu Functions

Press and release **M button** at the Standard Display to enter the MENU.
The actual available function will be marked in arrow brackets **>> <<**.
A down arrow at the the right site indicates that the user can scroll down through the menu using the **down** arrow button.
After going to the next menu row, an up/down arrow at the the right site indicates that the user can scroll up/down through the menu using the **Up/Down** arrows buttons.
Pressing and releasing button **M** changes the unit always back to the standard or previous display.
Press and release the **Up/Down** buttons until the desired function at the selected menu row is marked.
Press and release button **E** to open the submenu OR start the selected function.

Menu functions for the LL300S

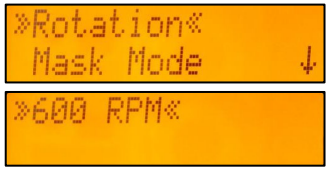






Rotation

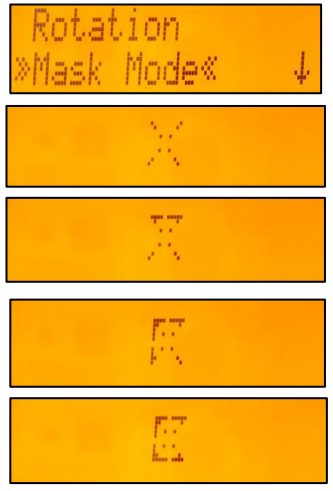
Press and release the **M** button at the Standard Display and select **>>Rotation<<**.
Press and release button **E** to display the actual rotation speed.



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Mask mode

Press and release the **M** button at the Standard Display and select **>>Mask Mode<<**.
Depending on which side the beam should be turned off, the required side can be selected. Press and release the **E** button, the mask symbol occurs**.**
For selecting the side, press and release one of the arrow button.
When all areas have been set, press button **E** to store the mask sector selection until the unit will be turned off.
Note: The unit always powers up with the mask mode deactivated (default).



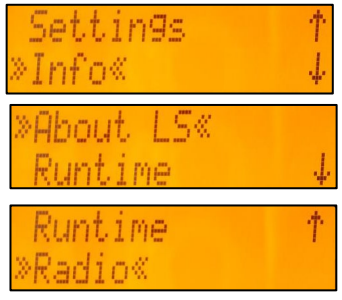
Setting Menu

Please see the Setting Menu details at the following pages.



Info

Press and release the **M** button at the Standard Display and select **>>Info<<**.
Up and **Down** Buttons can be used to toggle between **About LS, Runtime** and **Radio**
Press and release button **E** to confirm the selection.
The laser information (software version, serial number.), the runtime and the radio channel of the laser will be displayed.





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Service

Press and release the **M** button at the Standard Display and select **>>Service<<**.

Buttons **Up/Down** can be used to toggle between **Calibration X** and **Calibration Y**.







Press and release button **E** to confirm the selection.

The calibration at the selected axis starts the field calibration procedure.





Setting Menu

Press and release the **M** button at the Standard Display and select **>>Settings<<**.



Press and release button **E** to open the Setting Menu; select the desired function then press button **E** to open the selected submenu function OR start the selected function.

HI-alert Selection

Select **HI Alert** and press and release button **E** to open the HI Alert submenu.



The desired HI-alert: **5 min**.(Default), **30 seconds** and **HI-Off**) can be selected using the **Up/Down** buttons.







Press and release button **E** to confirm the selected HI-alert.

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Sensitivity Selection



Select **>>Sensitivity<<** and press and release button **E** to open the Sensitivity menu.

The desired Sensitivity: **Low**, **Middle** (Default) and **High**) can be selected using the **Up/Down** buttons.



Press and release button **E** to confirm the selected Sensitivity.

Select Language



Select **>>Language<<** and press and release button **E** to open the Language menu.

Use **Up/Down** buttons to select the required local language (EN, DE, IT, FR, ES, PT, NL, DA, NO, SV, FI, PL, TR, CZ).



Press and release button **E** to store the selected Language; unit falls back to the standard menu.



Radio Channel

Select **>>Radio Channel<<** <u>at the laser</u> and press and release button **E** to open the Radio Channel menu.

The desired Radio Channel: 0 to 5 can be selected using the **Up/Down** buttons.



Press and release button **E** to confirm the selected Radio Channel.

After changing the Radio channel, **the RC and HL needs to be paired again**.

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Optional ST805 Signal Transporter

Once paired with the laser, the ST805 will re-broadcast the radio signal, typically doubling the range of the RC402N / RC1402 remote control.
The ST805 also allows extending the radio range of an HL760 or CR700 receiver.

Pairing with the LL300S

First, make sure the Laser and ST805 are switched off.
Start with the laser. Turn the laser on by pressing and holding the manual button first and then the power button. Keep the buttons pressed until all three LEDs blink. The laser is now in pairing mode for about six seconds, which is indicated by the laser's battery LED flashing twice a second.
During these six seconds, turn on the ST805.
If pairing was successful, the ST805 status LED will flash shortly three times.
Then the ST805 status LED starts flashing once per second until all laser information has been synchronized. When the process is complete, the ST805 status LED changes to solid on.
The ST805 Blue LED flashes short once per two seconds.

Battery LED



Solid green when ST805 is on and batteries are ok.
Blinking red when battery voltage is low.
Solid red when battery voltage is low and ST805 turns off automatically after five minutes.

Status LED



Off – Not paired with laser.
Flashing – laser paired but not available.
Solid – radio connection OK.

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Troubleshooting

Any error message at the RC402N can be deleted with a short press of button **E**. The table shows the related description and possible solutions.
The next service center should be contacted if a different error message as shown at the table will be displayed.

Error codes	Description	Solution
21	Temporary EEprom problem	Press the E button to deletet the error message
120	HI alert - Unit Height changed	Check laser beam elevation
160	X or Y level sensor defect	Contact service center

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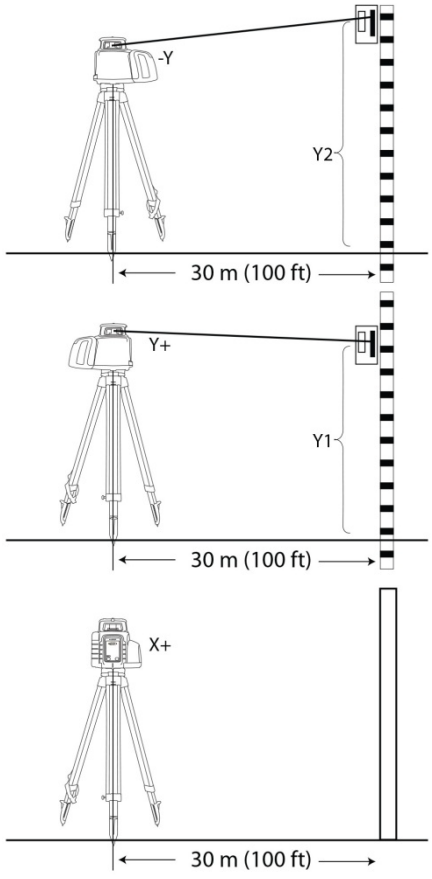
CALIBRATION

Checking Calibration of the Y- and X-Axes

1. Set up the laser 30 m (100 ft) from a wall and allow it to level.
2. Allow the unit to warm up for 20 minutes.
3. Set the grade to 0.000% in both axes.
4. Raise/lower the receiver until you get an on-grade reading for the +Y axis. Using the on-grade marking notch as a reference, make a mark on the wall.

Note: For increased precision, use the fine-sensitivity setting (1.5 mm/ 1/16 in.) on the receiver.

5. Rotate the laser 180° (-Y axis toward the wall) and allow the laser to re-level.
6. Raise/lower the receiver until you get an on-grade reading for the –Y/axis. Using the on-grade marking notch as a reference, make a mark on the wall.
7. Measure the difference between the two marks. If they differ more than 3 mm at 30 m (1/8 inch at 100 feet), the laser needs calibrating.
8. After checking the Y-axis, rotate the laser 90°. Repeat the above starting with the + X axis facing the wall.



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PROTECTING THE UNIT

Do not expose the unit to extreme temperatures or temperature changes (do not leave inside the car).
The unit is very robust and can resist damage if dropped even from tripod height. Before continuing your work, always check the leveling accuracy. See **Checking Calibration** section.
The laser is water proof and can be used indoors and outdoors.

CLEANING AND MAINTENANCE

Dirt and water on the glass parts of laser or prism 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 cleansers or solvents.
Allow the unit to air dry after cleaning it.

PROTECTING THE ENVIRONMENT

The unit, accessories and packaging ought to be recycled.
This manual is made of non-chlorine recycling paper.
All plastic parts are marked for recycling according to material type.



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

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Warranty

Spectra Precision LLC warrants the LL300S to be free of defects in material and workmanship for a period of five 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. Customers should send the product to Spectra Precision LLC or 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.

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TECHNICAL DATA

Laser

Leveling accuracy [1,3]:	± 1.5 mm/30 m, 1/16“ @ 100 ft, 10 arc seconds
Rotation speed:	600 min^{-1}
Operational area [1,2]:	appr. 400 m (1300 feet) radius with detector
Laser type:	red diode laser 650 nm
Laser class:	Class 2, <3.4 mW
Self-leveling range [4]:	appr. ± 5° (+/-9%)
Leveling indicators:	LED flashes
Radio range (HL760):	up to 100 m (330 ft)
Power source:	10000mAh NiMH battery pack
Battery life[1]:	47 hours NiMH; 60 hours alkaline
Operating temp.:	-20°C to 50°C (-4°F to 122°F)
Storage temp.:	-20°C to 70°C (-4°F to 158°F)
Tripod attachments:	5/8 x 11 horizontally and vertically
Dust and Water proof:	IP66
Weight:	3.1 kg (6.8 lbs)
Low voltage indication:	LED battery indicator
Low voltage disconnection:	unit shuts off

1) at 21° Celsius
2) under optimal atmospheric circumstances
3) along the axis
4) pre-tilt above 9%

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TECHNICAL DATA

Remote Control RC402N

Radio operating range[1]:	up to 100 m (330 ft)
Leveling indicators:	LCD indications flash
Power source:	2 x 1.5V AA alkaline batteries
Battery life[1]:	130 hours
Dust and Water proof:	IP66
Weight (incl. Batteries):	0.26 kg (0.57 lbs)

DECLARATION OF CONFORMITY

We,
Spectra Precision (Kaiserslautern) GmbH
Declare under our sole responsibility that the products
LL300S and optional **RC402N**
To which this declaration relates is in conformity with the following standards:
EN300 440-2 V1.1.1:2004, EN301 489-03 V1.4.1:2002, EN301 489-01 V1.4.1:2002, EN50371:2002
following the provisions of directive **R&TTE 1999/5/EC**
The managing director

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Electro-Magnetic Compatibility

Compliance statement (part 15.19) 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. Warning (part 15.21) Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This in particular is applicable for the antenna which has been delivered with the LL300S and RC402N Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for succesful communication.

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Spectra Precision LL300S

User Guide

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