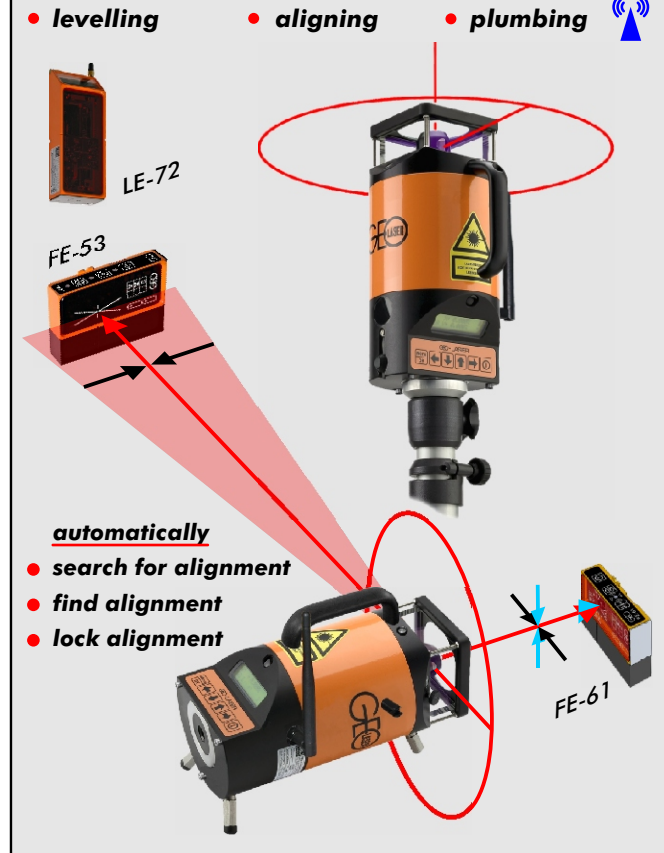


Operating Instructions

Rotary Laser RL-87L



Congratulations on your new GEO laser

This operating instructions contain enclosed in addition to information on how to use the laser **important safety information**.

Please note: First read the safety instructions on the supplement page **1 - 3** and then the operating instructions carefully before using the laser.

1. Description

1.1 RL-87L

The automatic rotary laser RL-87L is an all-round laser for horizontal and vertical use capable of electronic self-levelling over three axes. Equipped with a beam split prism in the rotor head, it can also be used as a square or plumb laser. It emits a stationary or rotating laser beam, which turns into a light plane. It is additionally equipped with manual rotor setting, plumb-down function, aligning function and box levels for horizontal and vertical mounting each.

1.2 Robust Light Metal Housing

Plastic-coated, swept and filled with nitrogen, 100 % watertight.

1.3 Laser Warning Sign

Laser class 2, < 1 mW

1.4 Keyboard

Clear layout. Big, user-friendly, self-explanatory keys.

1.5 Charging Socket

Behind the dust guard cap.

1.6 Box level

Aid for horizontal set-up.

1.7 Antenna Lock

1.8 Bulging Ground Area, niro St.

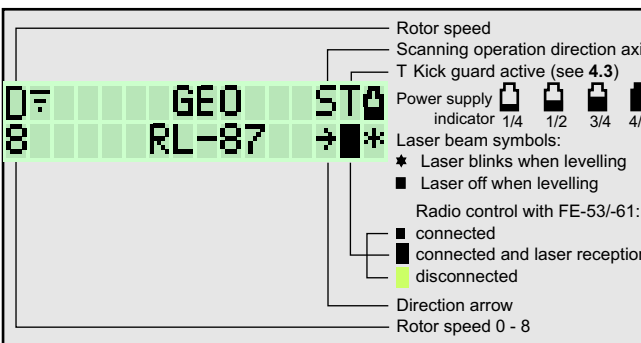
Central fastening thread 5/8".

1.9 Battery Box

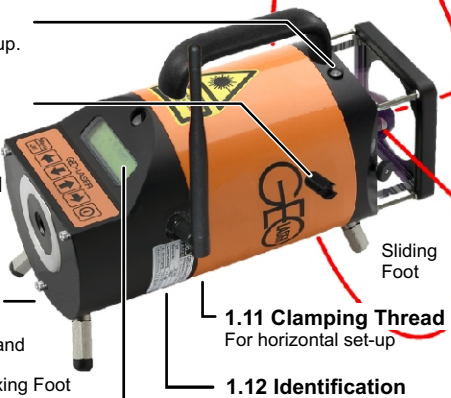
Watertight with Li Ion rechargeable battery and safety valve.

1.10 LCD Display

Clearly legible, illuminated display for on/off, company data, device data, rotor speed, rotor scanning function, duty type and battery level.



Horizontal Set-Up



Vertical Set-Up



1.13 Rotor Head

Rotor speed adjustable from 0 - 800 rpm.

1.14 Box Level

For plumb-down function.

1.15 Box level

Aid for vertical set-up.

1.16 Manual Rotor Setting with rotation

Pressed in: rotor motor cut out
Extracted: rotor motor cut in again
By turning: setting of the desired position

1.17 Handle

For easy handling, safe transport and simple set-up.

1.18 Antenna Radio Remote Control

2. Buttons

1 = 2.1 ON/OFF Button

The device is switched on by pressing this button. The device and company data are then shown, followed by the LCD main level (see 1.10). The device is then levelled automatically. After the levelling phase the laser beam and laser beam symbol stop blinking. If this does not happen, the device must be moved into the levelling range by tilting it forwards. The display illumination switches off after approx. 30 seconds automatically. The illumination is switched on again by pressing the ON/OFF button shortly. To switch off the device, press the ON/OFF button until "Auf Wiedersehen !" appears.

Menu OK = 2.2 Selection - Adjustment - Acknowledgement

By pushing the menu/OK button, one after the other the rotor speed **D**, the rotor scanning operation **T** and the scanning operation **S** are selected (see 2.9). For identification the position cleared blinks and can be adjusted by the arrow up/down buttons as per the following description. If the adjustment does not take place within approx. 20 seconds, the clearing is cancelled.

Down Arrow or **Up Arrow** = 2.3 Setting of Rotor Speed

When **D** is blinking, the rotor speed changes by 100 rpm when pushing briefly the arrow button.
Setting range: 0 - 800 rpm

Down Arrow + **Up Arrow** = 2.4 Zero Setting of Rotor Speed

When **D** is blinking, the rotor speed is set to zero.

Down Arrow or **Up Arrow** = 2.5 Rotor Scanning Operation

When **T** is blinking, the rotor head is vibrated for clear visibility of laser line. At the LCD display additional symbols for modification of rotor scanning operation are indicated. They can be selected by the arrow left/right buttons and changed by the arrow up/down buttons. That means:

T = Adjust laser line length from point (0) to approx. 1/4 turning (10)

Left Arrow = Turn laser line to the left or the right.

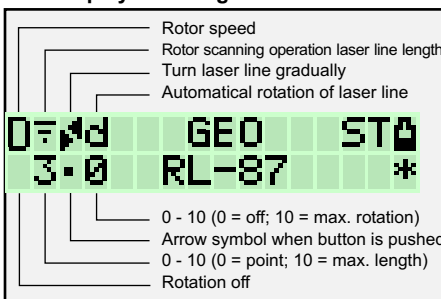
d = Laser line is standing (0) or rotating by 360°.

1 = slowly to 10 = max. rotating speed

Finish adjustments by pressing briefly the ON/OFF button. If the selection does not take place within approx. 20 seconds, the clearing is cancelled and the activation mark is indicated under the scanning symbol.

Leave scanning operation: When **D** is blinking, press the arrow up/down button.

LCD Display scanning level



Left Arrow or **Right Arrow** = 2.6 Direction Setting (horizontal set-up)

Push the corresponding button for electromotive fine/coarse adjustment of the laser beam in direction. Pushing longer changes the direction with increasing speed.

When end position is reached, the laser beam blinks slowly. The setting must then be moved back within 2.5 minutes. If this is not done, the laser is switched off automatically.

2.7 Quick Setting

In addition to the respective arrow button also press the ON/OFF button.

Menu OK = 2.8 Locking the Direction Axis

Press the Menu/OK button three times. **S** (scanning mode) blinks. Scanning mode can then be started to lock the direction axis fully automatically by pressing the arrow up button. This means, the laser light plane is motor driven until it hits the FE-53 and is locked by it with utmost precision.

Note: Prerequisite for this is radio communication with the FE-53, recognisable by the symbol on the LCD display (1.10).

3. Power Supply

7.4 V DC internal lithium ion rechargeable battery or 12 V DC external rechargeable battery via connection cable 0117.02.

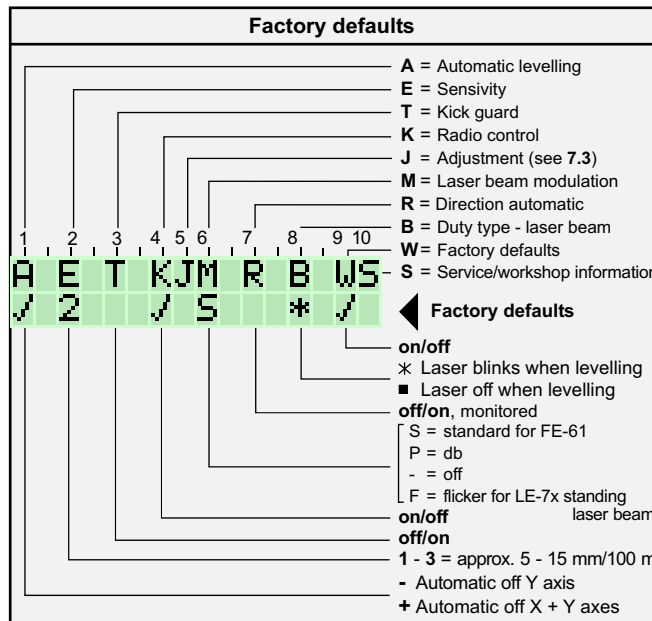
3.1 Battery Charging

- Carry out charging only with the power and charging unit, type NE-80 or a 12 V DC external rechargeable battery via connection cable 0117.02.
- Keep charger dry and only use in rooms.
- For charging take the laser out of the transport case.
- Permissible charging temperature 0° C to + 40° C, as best + 10° C to + 25° C.
- After approx. 5 hours the charging time is finished. The display turns off or the battery symbol shows a full battery.
- Low ambient temperatures reduce the running time, high temperatures reduce the battery life.
- Damaged batteries must be disposed.

4. Device Settings

Menu OK Select Menu Level

Keep the button pressed until the adjustment menu is shown.



Changing the Factory Defaults

Left Arrow or **Right Arrow** = Select Letter
The selected letter begins to blink.

Down Arrow or **Up Arrow** = Change Settings

1 = Back to Operating Display

4.1 Automatic Levelling Cut-Out

Green Checkmark = Automatic levelling switched on (factory defaults)

Green Square = Automatic levelling cut out for the Y axis.
On the display **Y-A OFF** is indicated.

Green Plus = Automatic self-levelling cut out for both axes.
On the display **X-A OFF + Y-A OFF** is indicated.

When the automatic is cut out, the laser can be positioned just as you like it. For electromotive fine/coarse adjustment of the laser beam, push the respective arrow buttons. Longer pushing changes the direction with increasing speed.

4.2 Sensitivity Setting Wind/Vibration

The self-levelling function corrects even the smallest deviation.

Additionally the laser beam and the laser beam symbol at the operating mode display blink when the limit values of step 1 to 3 are exceeded, i. e. by influence of wind and/or vibration.

- 1 = 0.005 % no effect
- 2 = 0.010 % weak effect (factory defaults)
- 3 = 0.015 % strong effect

4.3 Kick Guard (Automatic Laser Beam Cut-Out)

Green Checkmark = Kick guard switched on. It is only active after 30 sec. Then a **T** appears in front of the battery symbol at the operating mode display. This means the laser is switched off automatically as a precautionary measure in the event of a jerky movement (bump). The **T** then begins to blink. The laser must be switched on again and the positioning checked and corrected if necessary.

Green Square = Factory defaults: Kick guard switched off.

4.4 Radio Control On/Off

Is required for the operation with the locking receiver FE-53.

Green Square = off (energy-saving mode)

Green Checkmark = on (factory defaults)

4.5 Automatic Adjustment of Horizontal Light Plane

(see 7.3)

4.6 Laser Beam Modulation Mode

S = Standard modulation for FE-61 (factory defaults)

P = db

Green Square = Modulation off

F = Flickering for LE-7x stationary beam

4.7 Direction Automatic Monitoring

When using the locking receiver FE-53 the automatic locking can be monitored. The laser beam switches off when the laser or radio contact is interrupted for more than 3 min.

It can be switched on again by briefly pressing the laser ON button.

Green Square = off (factory defaults)

Green Checkmark = on

4.8 Operating Mode Laser Beam

Star = Laser beam and laser beam symbol blink at the operating mode display when levelling (factory defaults).

Green Square = Laser beam is off when levelling. However the symbol blinks at the operating mode display.

4.9 Factory defaults

Green Checkmark = All set to factory defaults.

4.10 Service/Workshop Notice

First off all a phone no. for service/help appears. Then authorized personnel can put in a numerical code to come to the adjustment mode.

5. Locking Automatic

The light plane can be fixed in the Y-axis in connection with the locking receiver FE-53 (see 13.) and the plumb beam in the Y- and X-axes with the FE-61 (see 14.).

6. Radio Control

- The serial numbers of the laser, FE-53/-61 and FB-10 must correspond with each other.
- Simultaneous operation of FE-53/-61 and FB-10 is not possible.

7. Adjustment

7.1. Checking the Adjustment

Set-up the laser upright and mark laser beam in the height of the required measuring distance. Turn laser device on the tripod by 180°, mark once again. If the adjustment is perfect, the first mark does not deviate from the second one. Turn device by 90°, repeat this process.

7.2. Adjustment

The laser can be adjusted in the field without having to open the device. For safety reasons, however, adjustment should only be carried out by authorized personnel. See the special adjustment instructions in this regard.

7.3 Automatic Adjustment

This comfortable possibility to adjust the horizontal light plane and the vertical plumb axis increases the security and the accuracy.

7.3.1 Requirements

Laser receiver LE-71 or LE-72 firmware version from 0.41. The laser must have the MAC address of the receiver.

7.3.2 Preparation

Mount laser with the bubble level exactly horizontal, switch on the laser and have it rotated by 800 rpm.

Mount the laser at approx. middle of the laser beam height in the Y2 axis.

The recommended distance laser <-> receiver is the maximum of the distance to be measured but must not be less than 10 m and more than 50 m.

Switch on receiver.

Measuring mode: continuous measuring with bluetooth.

7.3.3 Adjustment

- 1 x **Menu OK** until the menu is shown
- 4 x **Right Arrow** until "J" blinks
- 1 x **Up Arrow** and wait until "Y2 -> LE-7x -> OK" blinks, then
- 1 x **Menu OK** and wait until "Y4 -> LE-7x -> OK" blinks, then
- Left Arrow** -> Y4 = turn laser by 180°, then
- 1 x **Menu OK** and wait until "X3 -> LE-7x -> OK" blinks, then
- Left Arrow** -> X3 = turn laser by 90°, then
- 1 x **Menu OK** and wait until the operating mode display is shown again. The adjustment is finished now.

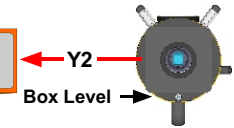
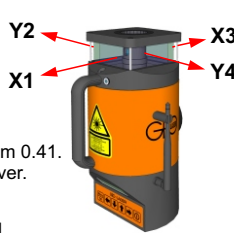
Please note: It is absolutely necessary to check the correctness of the adjustment. If the deviations are too big, the adjustment process must be repeated.

7.3.4 Input of the MAC Address

- Write down the MAC address of the LE-7x. To find it, go to **Settings > Bluetooth MAC/ID** in the LE-7x menu.
- Press Menu/OK button until the second menu plane is shown. Choose "J" by the right arrow button and enter with the arrow up button. Start the input of the MAC address by pressing the ON button. Enter the LE-7x Mac-Address. Use left/right arrow to select the digit and change it with the arrow up and down buttons. Save all by Menu/OK button.

7.3.5 Error Messages

- | | |
|------------------------------------|-------------------------------------------------------------------|
| "Bluetooth is not active -> ABORT" | error if bluetooth was switched off |
| "ERROR:WRONG MODE" | automatic is not switched on in both axes, i. e. device is lying. |
| "ZEROADJ. ABORT !" | abortion by ON button |
| "DATA-IO-ERROR !" | receiver type not compatible |



8. Troubleshooting

1. No laser beam - check battery charge.
2. Low range - clean laser beam exit window.
3. Laser beam blinks slowly - move device into the levelling range by tilting forwards.
4. Laser beam and banking arrows blink slowly - reset laser from the limitation. If the errors of points 3 and 4 are not corrected within 2.5 minutes, the device is switched off automatically.
5. Laser switched off automatically (kick guard or direction automatic monitoring) - Switch on laser beam by pressing the ON button shortly.
6. Rotor does not rotate: Manual rotor setting: extract knob by turning it (see 1.16).

9. Maintenance

The laser requires no special maintenance. Keep the electrical connections clean. Do not clean with water spray. Clean glass parts with a soft, clean cloth. Store dry. Always transport the laser in its original case.

10. Technical Specifications RL-87L

Laser class: 2
Output power plumb and rotating beam: < 1 mW each
Laser type: diode, visible red, 635 nm
Beam diameter: at laser 13 mm
Range depending on circumstances: to 200 m, Ø 400 m

Automatic function: horizontal and vertical
Automatic function can be switched off: yes, either one or both axes
Rotor speed: adjustable: 0, 100, 200, 300, 600, 800 rpm
Self-levelling range: ± 5 %
Direction setting: ± 5 %
Permissible deviation: ± 5 mm/100 m

Automatic locking of laser light plane: to 200 m via locking receiver FE-53
Automatic locking of plumb beam: to 100 m via locking receiver FE-61

Operating time with 7.4 V DC Li Ion recharg. battery: to 28 hours
External power supply: 11 to 14 V DC with cable 0117.02
Low battery cut-out: yes

Watertight: to 3.5 m
Temperature range: - 10° C to + 50° C
Weight: 3.4 kg
Adjustment: possible in the field without having to open the device

Guarantee: 24 months
CE: certified

Frequency range: 2.4 Ghz ISM Band
Transmission power: < 100 mW (EIRP)

Conformity with national regulations:
GEO-Feinmechanik GmbH herewith declares that the devices RL-87L, FE-53, FE-61 and FB-10 conform to the fundamental requirements and other relevant regulations of directive 1999/5/EG.

The declaration of conformity can be found at the following address:
<http://www.geo-laser.de>. In countries with national regulations that are not covered by European directives the operator must himself check the provisions and permits for use.

The permit for use is only valid for use with antenna of up to 3 dBi.

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11. Standard Delivery Package

No.	Order No.	Type	Description
1	0001.675	RL-87L	Rotary Laser
2	0037.18	NE-80	Power supply/Battery charger
3	0077.36		Transport case
1- 3	0001.675.1		RL-87L with standard delivery package



12. Optional Accessories

No.	Order No.	Type	Description
1	1035.27	Storm	Laser receiver with digital data display
2	0009.39.1	LE-72	Laser receiver with digital data display
3	0009.36.1	FE-53	Locking receiver for laser light plane
4	0009.70.1	FE-61	Locking receiver for plumb beam
5	0026.07	FB-10	Two-way radio remote control
6	0117.02		12 V DC Li Ion connection cable
7	0061.01.2	BW-80	Base plate/Wall mount
8	0122.01.1	ST-05	Facade mounting system



No.	Order No.	Type	Description
-	0085.03	LM5	Laser Messfix S, 5 m
-	1001.03	TN21	Flexi rod 2.6 m
-	8040.01		Floor support for flexi rod TN21
-	1005.12	TNL5	Telescopic levelling rod, 5 m
-	1021.09	FS-23	Al tripod, min. 1.05 m, max. 1.70 m
-	1021.21	FS-30L	Al crank tripod, min. 0.95 m, max. 2.85 m
-	0059.06.1	ST-10	Al crank tripod, min. 0.55 m, max. 0.94 m
-	0059.01.1	ST-20	Al crank tripod, min. 0.93 m, max. 1.99 m
-	0059.11.1	ST-30	Al crank tripod, min. 1.18 m, max. 3.00 m

13. Locking and Measuring Receiver FE-53

Functions

13.1 Laser Receiver

The laser receiver type FE-53 receives a rotating laser or diode laser beam and indicates its position to the light plane by way of two resp. three LEDs and various signal tones. Accuracy approx. ± 1 resp. ± 0,1 mm.

13.2 Locking Receiver for the Y-axis (Direction)

The rotating laser beam is received by the locking receiver FE-53 and then automatically directed to the position fixed before. Deviations are detected and corrected immediately. Accuracy to ± 1mm/100 m.

13.3 Receiver Description

Robust Metal Housing

Plastic-coated, watertight.
M5 mounting thread at the back of the housing.

Meas. Receiver ± 0.1 mm

Meas. Receiver ± 1 mm

LED + quick tone sequence

LED + steady tone = middle

LED + slow tone sequence

Locking Receiver

LED + Tone alternating = middle

Operating Mode Display

Locking Receiver:

LED blinks = Radio control dial-up

LED off = Radio control connected

LED on = Radio control failure

Meas. Receiver:

LED blinks = device switched on

LED off = device switched off

Power Indicator:

LED blinks slowly = device switched on

LED blinks quickly = battery almost empty

LED off = device switched off

Battery Compartment Lid

To open in direction of arrow. Make sure the polarity is correct when installing the new battery.

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