

FL 300HV-G EasyGRADE

USER MANUAL



Dear customer,

Thank you for your confidence in us having purchased a **geo-FENNEL** instrument.
This manual will help you to operate the instrument appropriately.

Please read the manual carefully - particularly the safety instructions. A proper use only guarantees a longtime and reliable operation.

geo-FENNEL
Precision by tradition.

Contents

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A

SUPPLIED WITH

- Single axis grade laser horizontal with vertical function
FL 300HV-G EasyGRADE
- Receiver with clamp
- Remote control
- Rechargeable battery (Li-Ion)
- Intelligent battery charger
- Battery case for alkaline batteries
- Floor mount (integrated)
- Carrying case
- User manual



FL 300HV-G EasyGRADE with receiver FR 45
 FL 300HV-G EasyGRADE with receiver FR-DIST 30
 FL 300HV-G EasyGRADE with receiver FR 77-MM

Art. no. 214045
 Art. no. 214050
 Art. no. 214077

FEATURES

- Single axis grade laser horizontal with vertical function

GENERAL

- TILT function
- VWS function (Vibration-Wind-Security)
- 90° beam to zenith
- Dust / water protection IP 66

HORIZONTAL

- Self-levelling
- Numerical grade setting in X-axis between 0,1% and 6,9% in 0,1% steps
- Manual grade setting in Y axis with the remote control

VERTICAL

- Self-levelling
- Axis direction in Y-axis with remote control

Technical Data

Self-levelling	horizontal / vertical
Self-levelling range	± 5°
Laser class	2
Accuracy	
· horizontal	± 0,75 mm / 10 m
· vertical	± 1,0 mm / 10 m
Working range with receiver Ø	
· FR 45	1.200 m
· FR 77-MM	600 m
· FR-DIST 30	600 m
Slope setting / axis direction	
HORIZONTAL	
· Grade setting in X-Axis	+ 0,1 to 6,9% (at 0,1% step)
· Y axis self-levelled - or - manual grade setting	± 5° (± 9 %)
VERTICAL	
· Vertical axis direction	± 5°
· 2nd axis self-levelled	
Remote control range	IR 100 m
Rotating speed	800 rpm
Power supply / operating time	40h (Li-Ion)
Temperature range	-10°C - +50°C
Dust / water protection	IP 66

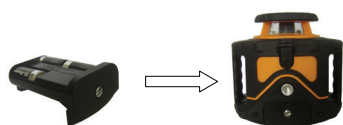
B POWER SUPPLY

Both the standard Li-Ion battery pack and alkaline batteries can be used.

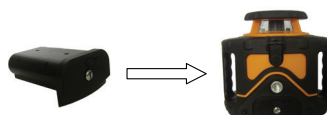
- 1) Insert alkaline batteries into the alkaline battery box (ensure correct polarity) and fix the battery box into the instrument.

OR

- 2) Fix the rechargeable battery box into the instrument.



Box for alkaline batteries



Rechargeable battery box

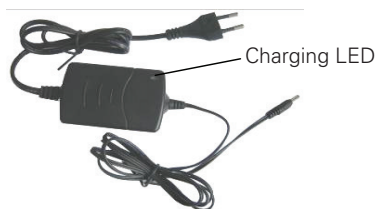
CHARGING THE BATTERY

Connect the charger with the charging plug of the instrument and the power source. If the charging LED is red the battery is being charged; if the LED is green the battery is fully charged.

ATTENTION

The rechargeable battery can be charged if it is in the instrument or if it is outside.

Battery status indication: If the ON/OFF LED (2) flashes the battery has to be recharged.



KEYPAD AND FUNCTIONS

C

1. Laser emitting window
2. Rotating head
3. Receiving window remote control
4. Handle
5. Vial for vertical application
6. Adjustment thumb screw for vertical application
7. Keypad
8. Support for vertical use
9. 5/8" thread hole vertical
10. Battery compartment lock
11. Battery compartment cover
12. 5/8" thread hole horizontal



OPERATION

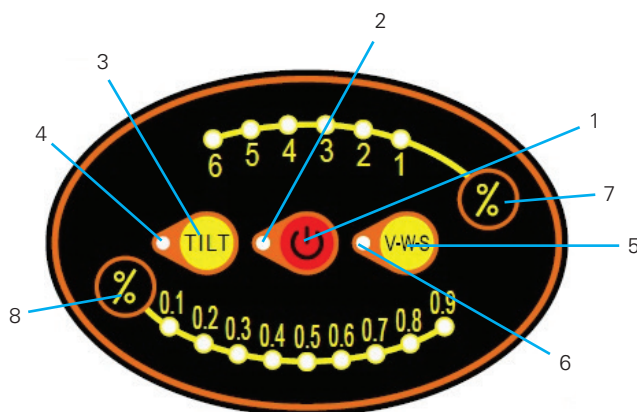
D

Set-up the laser on a flat and even surface or mount onto a tripod.

Press the ON/OFF button **(1)** to power on the laser.

After POWER ON the laser automatically self-levels. The laser beam and the TILT LED **(4)** flash indicating that the automatic self-levelling procedure is activated. This self-levelling procedure may take up to 90 sec. When completed the TILT LED **(4)** is illuminated. The laser starts rotating at 800 rpm. If the TILT LED **(4)** continues to flash and the alarm beep sounds the laser was most likely set up outside of its self-levelling range of $\pm 5^\circ$. Re-position the instrument on more even surface.

OPERATION - INSTRUMENT KEYPAD



ON / OFF BUTTON (1)

Press this button to power on and off the unit. If the red LED (2) lights the instrument is powered on. After powering on the instrument the self-levelling procedure starts automatically. Thereafter, the laser will rotate with 800 rpm.

If in normal use the LED (2) flashes the battery has to be recharged.

HORIZONTAL SLOPE SETTING IN X-AXIS (7 + 8)

Press the upper % button (7) to set the grade from 1% to 6%
 Press the lower % button (8) to set the grade from 0,1% to 0,9%

Any value between 0,1% and 6,9% can be set in 0,1% steps

Both %-rows can be set individually or together.

The lasers acceptance of the %-value is stepless.

The chosen grade setting is indicated by the respective LED.

2nd axis (Y)

- Self-levelled

or

- Manual grade setting with the remote control (description see page 28)



TILT FUNCTION (3)

After POWER ON the laser automatically activates the TILT function. The TILT LED (4) is flashing during the activation procedure. When it is completed (after 90 sec. approx.) the LED is illuminated. If the laser is disturbed rotation stops and the laser beam and TILT LED (4) will flash. The laser will **not** re-level automatically.

To quit the TILT function press button (3).

If the laser is disturbed (i. e. due to a positional change of the tripod) it will automatically self-level (within the self-levelling range of 5°); a height offset can occur. This will be avoided by using the TILT function. The use of this function ensures that the laser is shut off even within the self-levelling range if the laser is disturbed. Power on the unit and wait until the self-levelling procedure is completed.

VIBRATION-WIND-SECURITY FUNCTION (V-W-S) (5)

Press button (5) to activate the V-W-S function. The V-W-S LED (6) is illuminated and the TILT LED (4) starts flashing. When the V-W-S LED (6) and the TILT LED (4) are both illuminated the V-W-S function is activated. The V-W-S function automatically activates the TILT function. This function allows continuous operation during periods of vibration and wind. If a significant movement occurs the laser stops rotating and the TILT LED (4) and the laser beam start flashing. Press the V-W-S button (5) to quit. Press the V-W-S button (5) once again for re-activation.

OPERATION WITH THE REMOTE CONTROL



HORIZONTAL USE

In order to set a second gradient (i. e. paving works) also the Y axis can be tilted manually. The operation is made with the buttons **(12) / (13)** of the remote control.

If the Y axis has been tilted manually the LED **(2)** of the laser will light green permanently. To quit these slope functions power off the laser first and then power on again.

VERTICAL USE

- Unfold the datum point on the integrated floor mount and set up the laser in its vertical (lay-down) position.
- The laser automatically self-levels in this position.
- Set the circular bubble as accurately as possible by using the two thumb screws. This ensures that the instrument is set within its self-levelling range and the rotating beam is centered over its datum point.

VERTICAL AXIS DIRECTION IN Y-AXIS WITH REMOTE CONTROL (12 + 13)

The direction of the Y-axis can be set manually up to 5°, the second axis remains self-levelled. In vertical direction a slope setting is not possible.

The axis direction is to be set with the buttons **(12) / (13)** of the remote control. If the Y axis has been shifted the LED **(2)** of the laser will light green permanently.

To quit the axis direction function bring the laser in a horizontal position and power off the laser first and then power on again.

When the self-levelling procedure is completed the TILT function is automatically active, the V-W-S function can be activated.

ON / OFF REMOTE CONTROL FUNCTION (9)

With this button the remote control can be powered off - but not the instrument. Press the ON/OFF button of the remote; the instrument will be in standby function. The ON/OFF LED of the laser flashes. The values set will remain.

If the batteries of the remote are empty each key pressure will cause a permanent sound.

LED REMOTE CONTROL (10)

This LED flashes if any button is used and a beep sounds.

TILT FUNCTION (11)

See top of page 27.

With the remote control only the Y axis can be set.

RECEIVER FR 45

E

FEATURES

1. Vial (2)
2. Display
3. Reference indicator
4. Receiving window
5. ON / OFF switch
6. Loudspeaker
7. Battery compartment (back side)
8. Sound on / off
9. Accuracy coarse / normal / fine
10. Light on / off
11. Magnets (2)
12. 1/4"-thread for clamp (back side)



SUPPLIED WITH

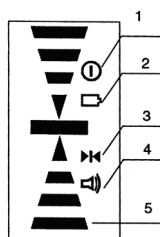
Receiver FR 45, battery, clamp, user manual

Technical Data

Indication	Front display
Accuracy coarse	$\pm 10 \text{ mm}$
Accuracy normal	$\pm 4 \text{ mm}$
Accuracy fine	$\pm 2 \text{ mm}$
Tones	3
Operating time	400h
Power supply	1 x 9V

SYMBOLS


1. Power ON / OFF
2. Battery status indicator
3. Detection indicator
4. Sound ON / OFF
5. Detected position indicator




ACCURACY COARSE / NORMAL / FINE

The FR 45 is equipped with three precision modes. They can be chosen by pressing button (9):

Accuracy coarse ± 10 mm
Symbol on display: without symbol

Accuracy normal ± 4 mm
Symbol on display: 

Accuracy fine ± 2 mm
Symbol on display: 

INSTALLATION OF THE BATTERIES

- Open the battery compartment cover (7).
- Insert 1 x 9 V AA battery according to the installation symbol (ensure correct polarity!). Close the cover.
- In order to save battery power the receiver will automatically turn off if it has not received laser scanning signal for 5 minutes.

USE OF RECEIVER

Press the button (5) to switch the unit on.

Move the receiver up and down **carefully** to detect the laser beam.

A Move the receiver down
Acoustic signal : ultra-short requent beep

B Move the receiver up
Acoustic signal: short requent beep

C On level
Acoustic signal: continuous beep

A+B: The closer the distance to „on level“ (C) is,
the shorter the arrows become.

CLAMP FOR LEVELLING STAFF

If required the FR 45 can be attached to laser poles or any other equipment by means of the clamp supplied with.

RECEIVER FR 77-MM

SUPPLIED WITH

- Laser receiver FR 77-MM
- 4 x AA alkaline batteries
- Clamp for levelling rod
- Special mount
- User manual

Technical Data

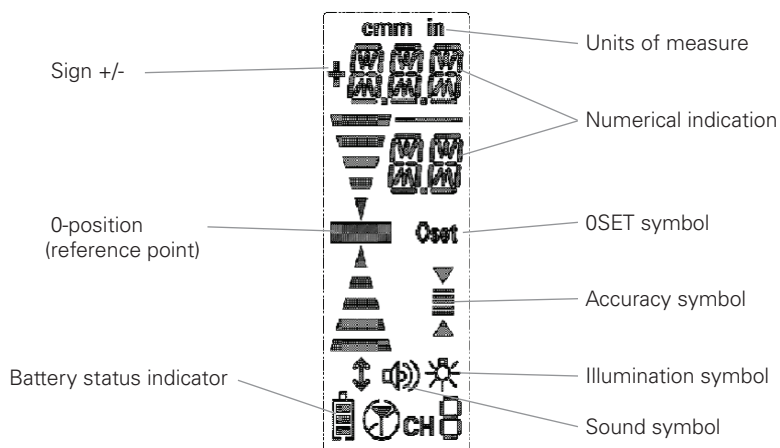
3 accuracy settings	$\pm 2 \text{ mm} / \pm 5 \text{ mm} / \pm 9 \text{ mm}$
mm-indication accuracy	$\pm 1 \text{ mm}$
Length of the receiving window	125 mm
Length of the receiving area for mm-indication	100 mm
Offset range (OSET) / from reference point	$\pm 20 \text{ mm}$
Measuring units	mm, cm, in, in-fraction
Signal tones	3
LCD display	front, rear
LED height indicators	front, side, rear
Power supply / Operating times	Alkaline / 110 h
Temperature range	-10°C to +50°C
Display illumination	yes
Magnets	top, side
Bubble vials	top, side
Dust / water protection	IP 67
Dimensions	170 x 77 x 32 mm
Weight	0,5 kg

FEATURES

- Extra long receiving window
- mm-indication of height difference between the laser plane and the reference point
- The segments of the display increase / decrease proportionally
- The „0“ position can be changed (Offset)
- Display illumination (front and rear)
- Robust clamp
- Special mount for diverse connections, e. g. scaffolding

FEATURES





ON/OFF button

Power ON/OFF the receiver



Accuracy button

Select accuracy setting



UNITS button

Select units of measure



Sound/illumination button

Sound and/or illumination ON/OFF



0SET button

Set a relative ZERO position

POWER SUPPLY

INSERT / REPLACE BATTERIES

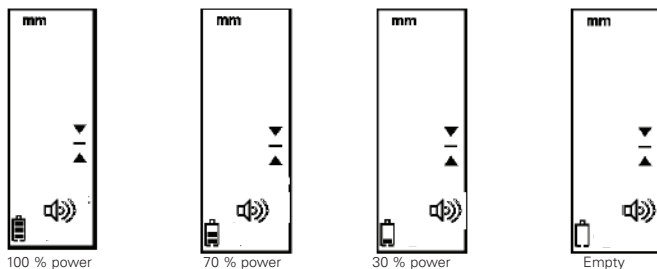
Open the battery compartment cover on the rear of the receiver and insert 4 x AA alkaline batteries. Refer to the battery compartment diagram to ensure correct polarity. Close the battery compartment cover.

Always remove the batteries if the receiver will not be used for a long period of time to avoid leakage.



BATTERY STATUS INDICATOR

The FR 77-MM front LCD display has four power status symbols. The receiver will automatically power off when the batteries are empty.



AUTOMATIC POWER-OFF

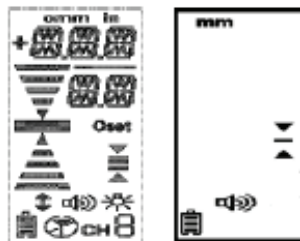
If the receiver does not receive a laser beam or is not operated for 10 minutes it will automatically power off.

OPERATION

POWER ON

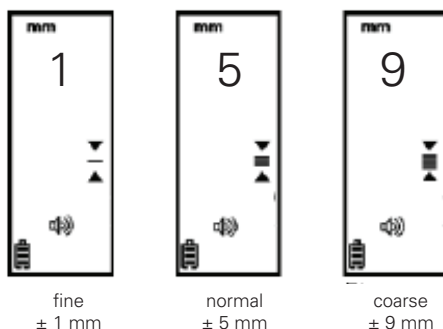
Press the ON/OFF button once to power on the receiver. The LCD display will initialise taking about 0.5 seconds when all the display symbols are illuminated (see diagram, left).

The receiver is now ready for use (see diagram, right).



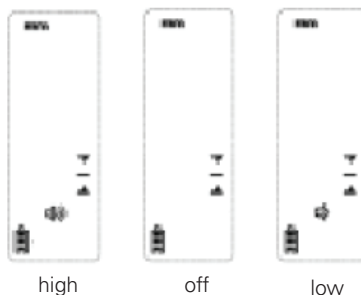
SELECT ACCURACY SETTING

Power on the unit and select the receiving accuracy fine, normal or coarse by pressing the „accuracy button“. The default accuracy setting following Power is „Fine“.



SWITCH ON /OFF THE SOUND

Power on the receiver and press the button „Sound/illumination“ to select the sound and volume required. The symbols in the LCD display show the status of the sound and volume.



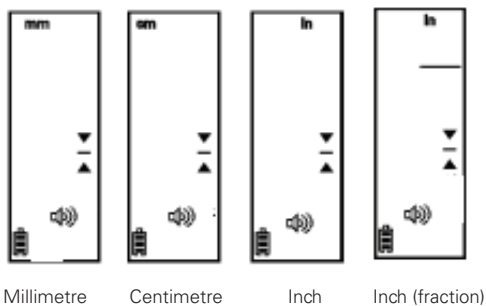
SWITCH ON/OFF THE DISPLAY ILLUMINATION

Power on the receiver and keep the button „Sound/illumination“ pressed until the illumination is on.



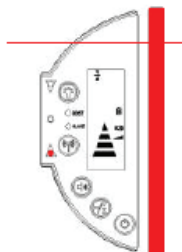
SELECT THE UNITS

Power on the receiver and press the „UNITS“ button successively until the required unit symbol appears in the display.



RECEIVE A LASER BEAM

Power on the receiver and make all required settings (i. e. accuracy fine, sound high).
Carefully move the receiver up and down to detect the laser beam.



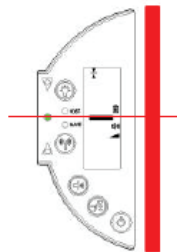
Indication 1

The laser beam is high
„arrow“ is illuminated.
Acoustic signal:
Slow beep.
->Move the receiver up.



Indication 2

The laser beam is low
„arrow“ is illuminated.
Acoustic signal:
Fast beep.
->Move the receiver down.



Indication 3

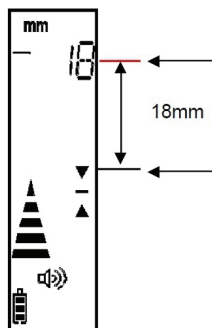
The LED „0-position“
bar is illuminated.
Acoustic signal:
Continuous beep.
-> On level.

PLEASE NOTE:

If the distance between the rotating laser and the receiver is less than 1 m erroneous measurements may occur.

MM INDICATION

If the reference level of the receiver is e. g. 18 mm below the laser beam this height difference will be displayed by an exact numerical value (see the left diagram).



The laser beam is exactly on-level.

further examples



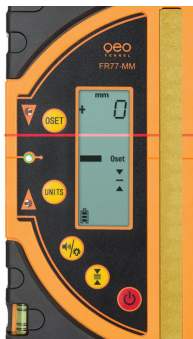
The laser beam is 19 mm above the reference point (move the receiver up).



The laser beam is 35 mm below the reference point (move the receiver down).

RELATIVE 0-POSITION (REFERENCE POINT)

Within the range of ± 20 mm of the standard reference point (0-position) a relative 0-position can be set. Press the „0SET“ button when the laser beam hits the receiving window (the „0SET“ symbol will flash on the display). This current position of the laser beam is now set as the relative 0-position on the receiver. Press the „0SET“ button to return to the default mode.



APPLICATION

Connect the clamp to the receiver for use with a laser pole, levelling staff or similar accessory. For optimum accuracy always level the bubble vials on the receiver before taking measurements.

SPECIAL MOUNT

To increase the versatility and scope of the receiver a special mount is provided (see illustrations).



F SAFETY NOTES

SPECIFIC REASONS FOR ERRONEOUS MEASURING RESULTS

Measurements through glass or plastic windows; dirty laser emitting windows; after the instrument has been dropped or hit. Please check the accuracy.

Large fluctuation of temperature: If the instrument will be used in cold areas after it has been stored in warm areas (or the other way round) please wait some minutes before carrying out measurements.

CARE AND CLEANING

Handle measuring instruments with care. Clean with soft cloth only after any use. If necessary damp the cloth with some water. If the instrument is wet clean and dry it carefully. Pack it up only if it is perfectly dry. Transport in original container / case only.

ELECTROMAGNETIC ACCEPTABILITY (EMC)

It cannot be completely excluded that this instrument will disturb other instruments (e.g. navigation systems); will be disturbed by other instruments (e.g. intensive electromagnetic radiation nearby industrial facilities or radio transmitters).

CE-Conformity

The instrument has the CE mark according to EN 61010-1:2001 + corrig. 1+2.

WARRANTY

This product is warranted by the manufacturer to the original purchaser to be free from defects in material and workmanship under normal use for a period of two (2) years from the date of purchase. During the warranty period, and upon proof of purchase, the product will be repaired or replaced (with the same or similar model at manufacturers option), without charge for either parts or labour. In case of a defect please contact the dealer where you originally purchased this product. The warranty will not apply to this product if it has been misused, abused or altered. Without limiting the foregoing, leakage of the battery, bending or dropping the unit are presumed to be defects resulting from misuse or abuse.

EXCEPTIONS FROM RESPONSIBILITY

1. The user of this product is expected to follow the instructions given in the user manual. Although all instruments left our warehouse in perfect condition and adjustment the user is expected to carry out periodic checks of the product's accuracy and general performance.
2. The manufacturer, or its representatives, assumes no responsibility of results of a faulty or intentional usage or misuse including any direct, indirect, consequential damage, and loss of profits.
3. The manufacturer, or its representatives, assumes no responsibility for consequential damage, and loss of profits by any disaster (earthquake, storm, flood etc.), fire, accident, or an act of a third party and/or a usage in other than usual conditions.
4. The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits due to a change of data, loss of data and interruption of business etc., caused by using the product or an unusable product.
5. The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage other than explained in the user manual.
6. The manufacturer, or its representatives, assumes no responsibility for damage caused by wrong movement or action due to connecting with other products.

INTENDED USE OF INSTRUMENT

The instrument emits a visible laser beam in order to carry out the following measuring tasks (depending on the instrument): Setting up heights, horizontal and vertical planes, right angles.

SAFETY INSTRUCTIONS

- Follow up the instructions given in the user manual.
- Do not stare into the beam. The laser beam can lead to eye injury. A direct look into the beam (even from greater distance) can cause damage to your eyes.
- Do not aim the laser beam at persons or animals.
- The laser plane should be set up above the eye level of persons.
- Use the instrument for measuring jobs only.
- Do not open the instrument housing. Repairs should be carried out by authorized workshops only. Please contact your local dealer.
- Do not remove warning labels or safety instructions.
- Keep the instrument away from children.
- Do not use the instrument in explosive environment.
- The user manual must always be kept with the instrument.

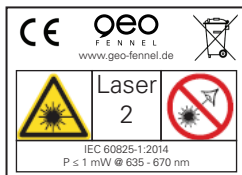
LASER CLASSIFICATION

The instrument is a laser class 2 laser product according to DIN IEC 60825-1:2014.

It is allowed to use the unit without further safety precautions.

The eye protection is normally secured by aversion responses and the blink reflex.

The laser instrument is marked with class 2 warning labels.



Please note:

If you return instruments for repair / for adjustment to us please disconnect batteries or rechargeable batteries from the instrument - this is for safety reasons!

Thank you.

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**Technische Änderungen vorbehalten.
All instruments subject to technical changes.
Sous réserve de modifications techniques.**



12/2019

Precision by tradition.

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F E N N E L