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1. Features and functions

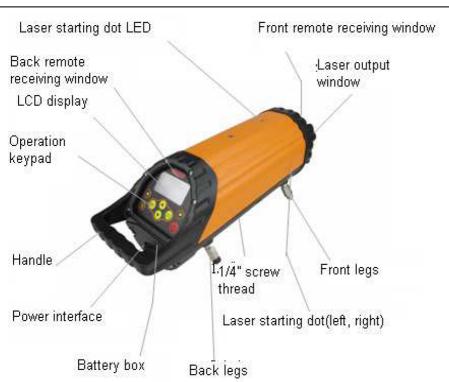
650S pipe laser could send self-leveling laser dot to provide precise horizontal and grade reference for tunnel excavating, pipe laying layout and calibration with convenient operation and wide usage.

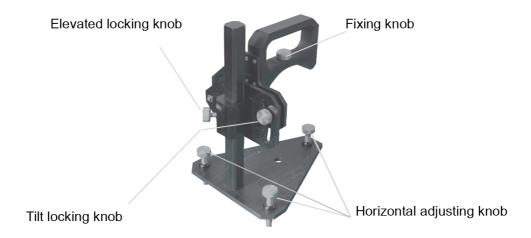
- leph Electronic leveling, laser flash and OLED display when beyond the range
- large range grade set
- Laser dot on-grade function
- ※ Vibration function
- ※ Remote operation function
- Many accessories could enlarge the use range.
- ※ Filled with nitrogen to full seal, complete waterproof and dustproof.

2. User safety

- Laser output sign is located near the output window
- Do not stare into laser beam directly
- ◆ Do not disassemble the instrument or attempt to perform any internal servicing. Repairs and servicing could be performed only by authorized service centers
- The instrument complies with the safety classification standards of laser radiation

3. Nomenclature





Adjustable bracket



Target



Support legs

4. Operation keypad

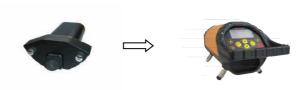
4.1 Battery mount

a) Mount 4*D alkaline batteries into the battery box according to the polarity indication shown in the battery box, and then mount the battery box to the instrument.



Alkaline battery box mount

b) Mount the rechargeable battery box to the instrument directly.



Rechargeable battery mount

4.2 Charge the rechargeable battery

Plug the charger into the charging hole to charge the rechargeable battery box. When charging, the indication light is red, and when finished charging, the indication light turns from red to green.



Charger



Charge to the rechargeable battery box directly



Mount the rechargeable battery box on the instrument and charge it

Note:

- a) Please charge the rechargeable battery when the battery is empty (the power supply LED flash mean the battery is already empty). That could extend the battery service life.
- b) Please charge to the rechargeable battery every two or three month after the releasing date.

4.3 Placement of the instrument

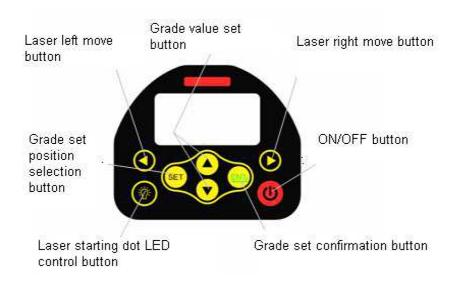
Place the instrument on the platform directly, and place it inside the pipe laser with different diameter(standard legs could fit for the pipes of diameter 150mm, 200mm, 250mm, 300mm, 400mm, 500mm).

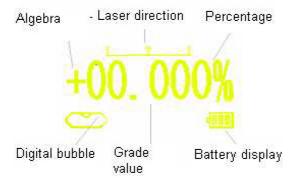


Fix the instrument on LS355 adjustable bracket with the screws on the top, loose the elevated locking knob to adjust the height of instrument, loose the tilt locking knob to adjust the tilt angle of instrument.



4.4. Instrument operation keypad





4.5 ON/OFF button

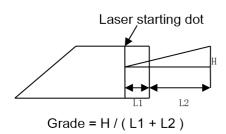


- a) Press ON/OFF button, the instrument is on, and make self-leveling.
- n) Instrument will display the last set grade value.

4.6 Laser starting dot LED control button



Press this button under ON status, green LED is on, and it is for indicating the laser starting position, the grade calculation is related to it.



4.7 Laser left/right move button

4.7.1 Laser dot on-grade function



- Press buttons simultaneously and loose after one seconds, the laser dot will make automatic centering.
- The symbol on LCD will flash during centering operations. b)
- After centering, LCD will display _____ symbol.

4.7.2 Laser dot scanning function

- Press laser left move button to make the laser move leftwards, press right move button to make the laser move rightwards, single press for move slowly, continuous press to move quickly.
- When the laser is moving, LCD will display the symbol to show the laser dot position.
- Symbol flash means the laser dot is at the left limit position.
- Symbol means the laser dot is at the leftward
- Symbol means the laser dot is centering.
- Symbol means the laser dot is at the rightward
- Symbol flash means the laser dot is at the right limit position

4.8 Grade set position selection button



Press this button in turns, the grade value will display from "+00.000%" to "+" and the user could choose the required symbol and digit.

4.9 Grade value set button





- When entering the grade set mode, set the grade value with grade set button, press \land button, if the symbol is selected, the symbol will change to "+", if the digit is selected, then the digit will increase, the max is "9", press button 🔻 , if the symbol is selected, the symbol will change to "-", if the digit is selected, the digit will deduct, the min is "0", and hold this button could set the digit quickly.
- Hold on A simultaneously to set the grade value as 0.

4.10 Grade set confirmation button



After finished the grade value set, press grade set confirmation button to confirm, and the instrument will emit the laser with the set grade value, when the instrument is leveling, the grade value symbol flash, after leveling is finished, it stop flashing.

4.11 Front and back out of range alarming

when the laser is placed to over inclined (front and back) or the grade is beyond the self-leveling range, the laser will alarm (laser beam flash, the symbol on LCD flash), Then the user need to reset the laser to make it in the self-leveling range, please see the below pictures:

- When LCD display 👃 🔼 symbol, it's necessary to make the handle lower until it don't display this symbol.
- When LCD display symbol, it's necessary to make the handle higher, until it don't display this symbol.

Note:

When the instrument is out of range alarming status, the user could still set grade value

4.12 Left and right tilt out of range alarming

LCD has bubble symbol which is used to indicate the laser incline status. When is laser is place over inclined, the accuracy will be bad. Please adjust the legs to make the bubble symbol centered.

Symbol flash means the instrument left height exceed allowed range, and may influence the instrument accuracy.

Symbol means the instrument is placed horizontally, under this situation, the instrument accuracy is highest, and the user could operate under this situation.

Symbol flash means the instrument right height exceed allowed range, and may influence the instrument

4.13 Battery volume status indication

Power on, instrument check the battery capacity automatically and show the power status on the LCD display by a power symbol.

Means enough battery, no need to charge

Means low voltage, the user could still use

Means very low voltage, and need to charge to instrument otherwise it will work abnormally.

4.14 Remote function

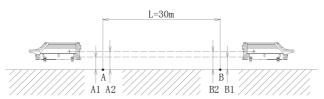
- a) Instrument come with remote, the keypad function of the remote is same as the instrument (except 🥨).
- b) Press the On/Off key on the remote when instrument in on, it will enter the sleep mode. Then instrument save the current data and stop working.
- c) Laser beam is off in the sleep mode, laser dot start mark LED flash slowly. When press on the remote again, it will wake the instrument. If the instrument is not waked within 30 mins, it will power off automatically.
- d) Remote range: front end (laser output window) 80m, back end (handle) 10m.

4.15 Instrument status comparison sheet

Instrument status	Laser	LCD symbol
Have leveled	Not flash	Grade % symbol not flash
is leveling	Quick flash	Grade % symbol flash
Front and back out of range	Slow flash	Display front and back out of range symbol
Left and right tilt out of range	ON	Display left and right tilt out of range symbol
Left and right scanning out of range	ON	Display left and right scanning out of range symbol
Sleep	OFF	Display no symbol.

5. Self-check and calibration

5.1 Accuracy self-check



- a) Choose a flat road, parking lot or clear ground.
- b) Choose two dots which is 30m distance (A and B), the distance could not be very exact, but must mark A and B.
- c) Place the instrument behind A dot, power on the instrument, warm-up for 10 mins.
- d) Set the grade value as 00.000%.
- e) Make the laser line pass through A, B two dots, make the instrument self-leveling.
- f) Measure the laser line center at the height value between A dot and B dot, and record as A1 and B1.
- g) Make the instrument place behind B dot, make the laser line pass through A, B two dots, make the instrument self-leveling.
- h) Measure the laser line center at the height value between A dot and B dot, and record as A2 and B2.
- i) Calculate A2-A1, B2-B1 (note: the difference value should be with "+" or "-").
 - If | (A2-A1) (B2-B1) |≤3mm, means the instrument accuracy is exact.
 - If A2-A1 > B2-B1, means the laser line is higher, it is necessary to adjust the laser line to be horizontal.

If A2-A1<B2-B1, means the laser line is lower, it is necessary to adjust the laser line to be horizontal.

5.2 Accuracy calibration

- a) Hold on and loose button on instrument, when LCD display "CALBRATE...", loose and enter accuracy calibration mode, press on the remote control to adjust the laser line, if the laser is higher, press , if the laser is lower, press , and then press on the remote control to finish calibrating.
- b) Make accuracy self-check again until | (A2-A1) (B2-B1) |≤3mm;
- c) When | (A2-A1) (B2-B1) |>6mm, the instrument accuracy is out of accuracy, and need to contact distributor for servicing.

6. Applications



7. Specifications

Items	Parameter	
Laser wavelength	635nm	
Laser class	ClassIII	
Output range	600m	
Grade range	-20%~+30%	
Horizontal accuracy	±0.05mm/m	
Grade accuracy	±0.15mm/m	
Leveling range	±5°	
Left & right scanning	±4°	
Temperature range	-20°C∼+50°C	
IP class	IP68	
Power	4*D alkaline battery or rechargeable battery pack	
Size	Ф132mm×380mm	
Weight	6Kg	

8. Maintenance

- The instrument should be carefully operated and properly preserved, and any violent shock or falling will possibly result in the damage of instrument.
- * Do not attempt to disassemble the instrument, and the unprofessional disassembly will result in the damage of instrument.
- Keep the cleanness of instrument, especially the laser output window, and remove dust by the gentle operation of soft clean cloth.
- * Take the batteries out when the instrument is not in use for a long time, and keep the instrument in the carrying case when it is unused.