

Operating Manual

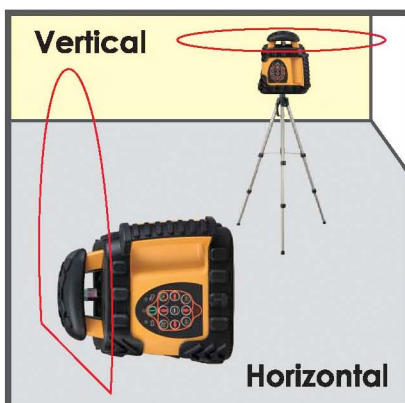


Suzhou Fukuda Laser Precision Instrument Co.,Ltd

1.Functions

This instrument is equipped with the semiconductor diode with wavelength of 635nm, which the laser beam has supreme visibility. And the laser head of instrument will rotate freely to form a laser-scanning surface. Emitting direction of rotary laser-beam illustrated as follows:

Upright-setting



Horizontal-setting



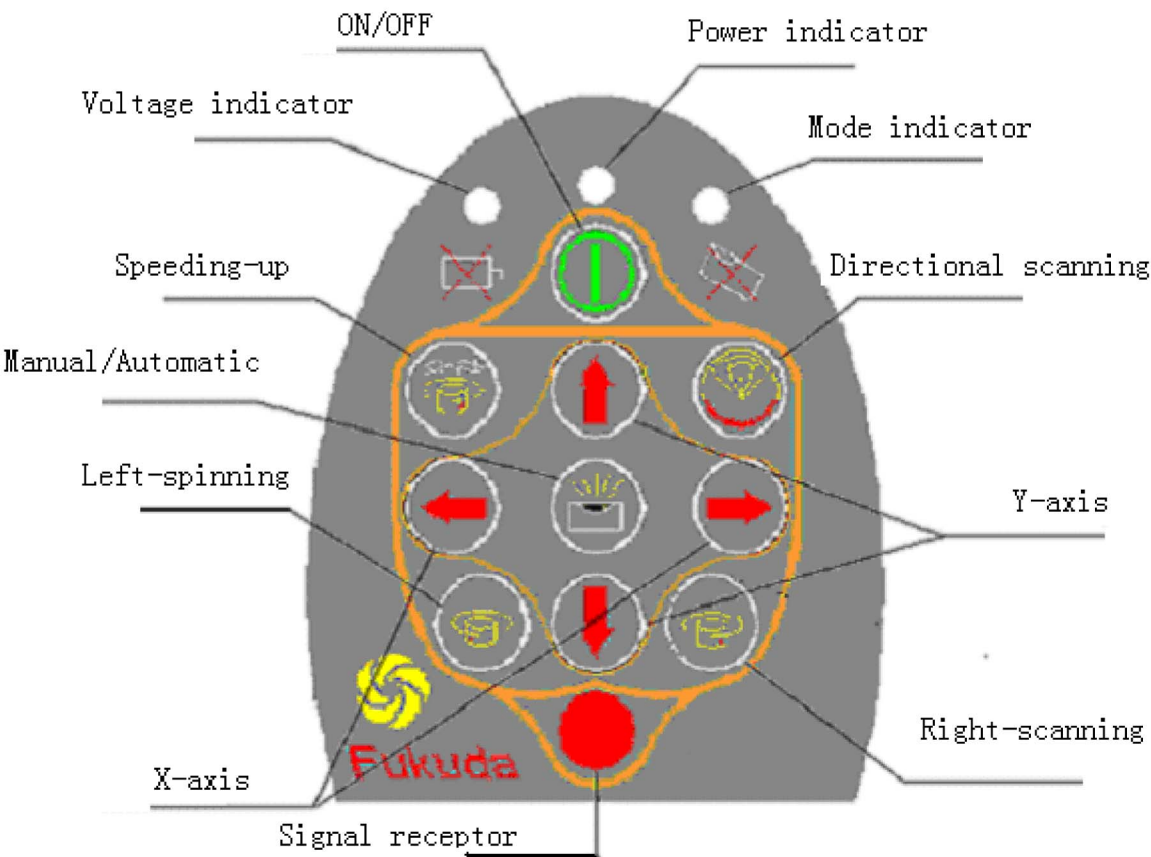
When the instrument is set upright, it will emit laser-beam to form a horizontal scanning surface and a plumb line automatically. When set horizontally, it will form a plumb scanning surface and a vertical line.

2. Introductions
2.1Main body



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2.2Panel



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2.3 Utilities of Panel

- (1) Voltage indicator: When it lights, the rechargeable batteries of instrument need to be charged or the batteries (2# dry battery) to be renewed.
- (2) Power indicator: When it lights, the instrument is starting up. Otherwise it is closing down.
- (3) Mode indicator: When it lights, the instrument is leveling manually. When it winks, it stays in alarm. (The slope of the instrument is out of range).
- (4) ON/OFF: Controlling the state of power.
- (5) Speeding-up: Circling knob. Speed of scanning includes 5-knots: 0-60-120-300-6000 r.p.m
- (6) Directional scanning: Circling knob. Angle of scanning includes 5 levels: 0-10° -45° -90° -180°
- (7) Manual/Automatic: Controlling the mode of leveling.
- (8) Left-spinning: Making the laser head step-move counter-clockwise, when the laser head is power off or it is scanning directionally.
- (9) Right-spinning: Making the laser head step-move clockwise, when the laser head is power off or it is scanning directionally.
- (10) X-axis: Adjusting the slope of X-axis, when the instrument stays in manual mode.
- (11) Y-axis: Adjusting the slope of Y-axis, when the instrument stays in manual mode.

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3. Directions:

3.1 Battery Installment

Rechargeable batteries or 5# dry batteries are all available for this instrument.

- (1) Take down the cover of battery case at the bottom of the instrument.
- (2) Put the batteries into the case according to the right electrode.
- (3) Lay the cover on the box, and then tighten all the screws.

3.2 Instrument Placement

3.2.1 Horizontal scanning

Lay the instrument on the tripod or stable flat surface, or even hang it on the wall. Set upright the instrument, and keep the slope of instrument within the range from -5° to $+5^{\circ}$.

3.2.2 Vertical scanning

Lay the instrument on the flat surface, and keep the slope of instrument within the range from -5° to $+5^{\circ}$.

3.3 Operations

3.3.1 Power

Press the Key ON/OFF to bring automatic leveling into function when the power indicator lights. When voltage indicator lights, it shows the voltage of the batteries is insufficient. Then the rechargeable batteries need to be charged or the 5# dry batteries to be renewed.

Press the Key ON/OFF again to close down the instrument when power indicator goes out.

3.3.2 Leveling

Press the Key ON/OFF to bring automatic leveling into function when the laser beam begins to wink. After automatic leveling, the laser head will rotate right at the speed of 600r.p.m.

If the instrument is placed improperly, or the slope of instrument exceeds the range from -5° to $+5^{\circ}$, when mode indicator and the laser beam will wink at the same time. Then place the instrument properly.

Notice: The instrument will close down automatically after five minutes alarm.

3.3.3 Spinning

(1) Continuous spinning

Press the Key Speeding-up to control the spinning speed of the laser head. If press the key repeatedly, the spinning speed of the laser head will continuously change as follows: 0-60-120-300-600-0 r.p.m.

(2) Stepping spinning

Locate the Key Speeding-up at 0 r.p.m, the laser head will stop spinning. And press the Key Right-spinning, the laser head will step-move clockwise. Then if press the Key

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Left-spinning, the laser head will step-move counter-clockwise.

3.3.4 Directional scanning

(1) Press the Key Directional scanning; the laser head will scan directionally. If press the key repeatedly, the angle of scanning of laser head will continuously change as follows: 0° -10° 45° -90° 180° -0° .

(2) Press the Key Left-spinning or the Key Right-spinning to change the direction of scanning.

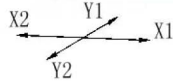
3.3.5 Slope Adjustment



When the instrument is set upright to do horizontal scanning, the slope of X-axis and Y-axis can be adjusted.

Press the Key Manual/Automatic when mode indicator lights, the instrument enters the mode of manual leveling.

(1) Slope of X-axis



a. Aim the X1-beam to the direction of the slope required to adjust, as depicted below:



b. Press the Key  or  to move the laser beam up or down.

(2) Slope of Y-axis

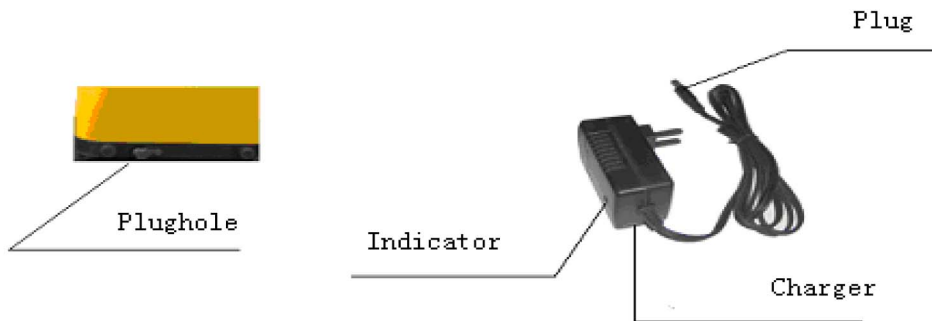
a. Aim the Y1-beam to the direction of the slope required to adjust.

b. Press the Key  or  to move the laser beam up or down.

Notices: Press the Key Manual/Automatic again when mode indicator goes out, the instrument will enter mode of automatic leveling.

4. Power

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When the voltage indicator lights, the batteries need to be charged immediately. Connecting the charger with AC, insert the plug of charger into the plughole at the bottom of the instrument (As depicted above).

If the indicator of charger lights, it shows the batteries are being charged.

If the indicator light of the charger winks, it shows the course of recharging has ended.

Notices:

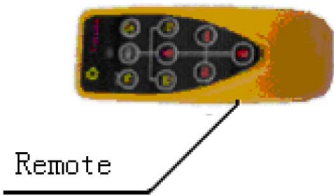
(1) Using the standard rechargeable batteries of the instrument, recharging will be finished within 7 hours.

- (2) Power required for the charger: Frequency: 50-60HZ; Voltage: 85-265V.
- (3) Charging and using of the instrument can progress simultaneously.
- (4) If keeping the instrument in storage (or Leave the instrument unused for a long time), the batteries (dry battery or rechargeable battery) needs to be taken out.
- (5) Brand-new rechargeable batteries or long-time unused rechargeable batteries need to be recharged and discharged three times to attain the capacity required.

5. Remote

The remote of the instrument adopts the infrared technique.

Aim the aperture of infrared ray to the instrument (as depicted below) to bring remote controlling into function (Available distance: indoor: 30M;outdoor: 20M). The telecontrolling panel includes 9 keys; the indicator on the device will wink to show the operating signal has been sent out once pressing any key.



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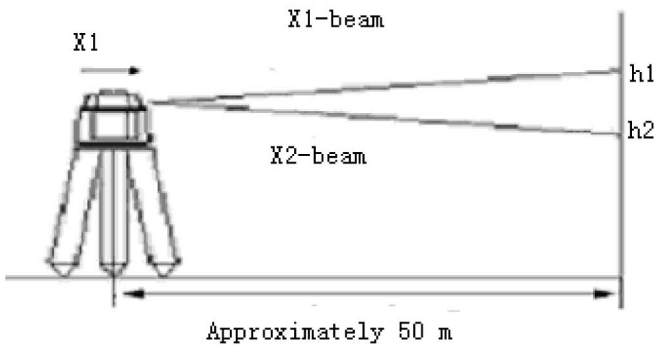
Functions fulfilled by the remote as follows:

- (1) Spinning: Operating method referring to 3.3.3
- (2) Directional scanning: Operating method referring to 3.3.4
- (3) Slope adjustment: Operating method referring to 3.3.5

6.Accuracey Checking

6.1 Horizontal-surface Checking

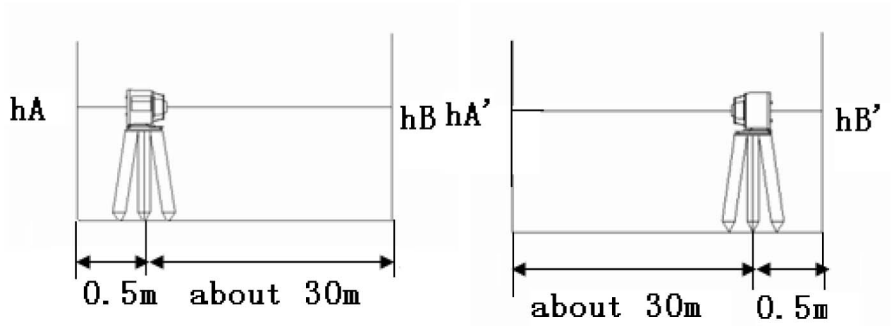
- (1) Place the instrument at the point of 50m in front of wall (or set a scaleplate at the point of 50m away from the instrument), and then adjust the level of the base approximately to aim the X1 to the wall (or scaleplate), as depicted below:



- (2) After switching on the power, use the laser detector measuring the h1 of X1-beam on the wall or scaleplate.
- (3) Loose the screw of the tripod ,and then turn around the instrument 180° to measure the h2 of X2-beam on the wall or scale- plate.
- D-value between h1 and h2 ought to be less than 10mm.
- (4) Check the Y-beam in the same way.

6.2 Horizontal-line Checking

- (1) Place the instrument between two walls with the distance of 30m (or two scaleplates with the distance of 30m).



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- (2) Place the instrument according to horizontal setting and then adjust the instrument.
- (3)Switch on the power, and then measure the middle point of the laser beam on the wall (or scaleplate): hA, hB and hA' , hB' .
- (4) $\triangle 1=hA-hA'$, $\triangle 2=hB-hB'$
- D-value between $\triangle 1$ and $\triangle 2$ ought to be less than 6mm.

7. Specifications

Leveling Accuracy	Horizontal: $\pm 20''$ Vertical: $\pm 20''$
Leveling Range	$\pm 5^{\circ}$
Measuring Range	Diameter:500m(Using the laser detector)
Spinning Speed	0、60、120、300、600 r.p.m
Directional-Scanning Angle	0°、10 °、45 °、90 °、180 °
Slope-adjusting Range	$\pm 5^{\circ}$ (Bi-directional)
Light Source	Laser Diode, wavelength: 635nm
Down Point Diode	Accuracy: $\pm 1\text{mm}/1.5\text{m}$
Remote controlling Distance	Approximately 20m
Working Temperature	-20℃-- +50℃ (-4°F-- +122°F)

Power Supply	DC 4.8-6V (4 section of NI-MH batteries or 4 section of 2# dry batteries)
Hours in continuous use	Approximately 20 hours
Water-proof	IP 64
Dimension	135 (L) × 135 (W) × 170 (H) mm
Weight	1.8kg