

Self-leveling Laser Marker (4V1HXL)



Congratulations on your choice of this  **DaveBell**TM Self-leveling Laser Marker. For the purpose of long-term use of this instrument, we suggest you to read this instruction manual carefully before using it.

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1. Features and Functions

A new generation multi-functional self-leveling laser marker, which can separately or simultaneously project one horizontal laser lines, four vertical laser lines for self-leveling and one plumb-down laser-point. Furthermore, the vertical laser lines will intersect on the ceiling to form the plumb-up reference point. Its extensive functions bring great convenience to set accurate horizontal, vertical and plumb references for indoor lay out and calibration. This kind of product is featured by easy manipulation and wide applications.

Features:

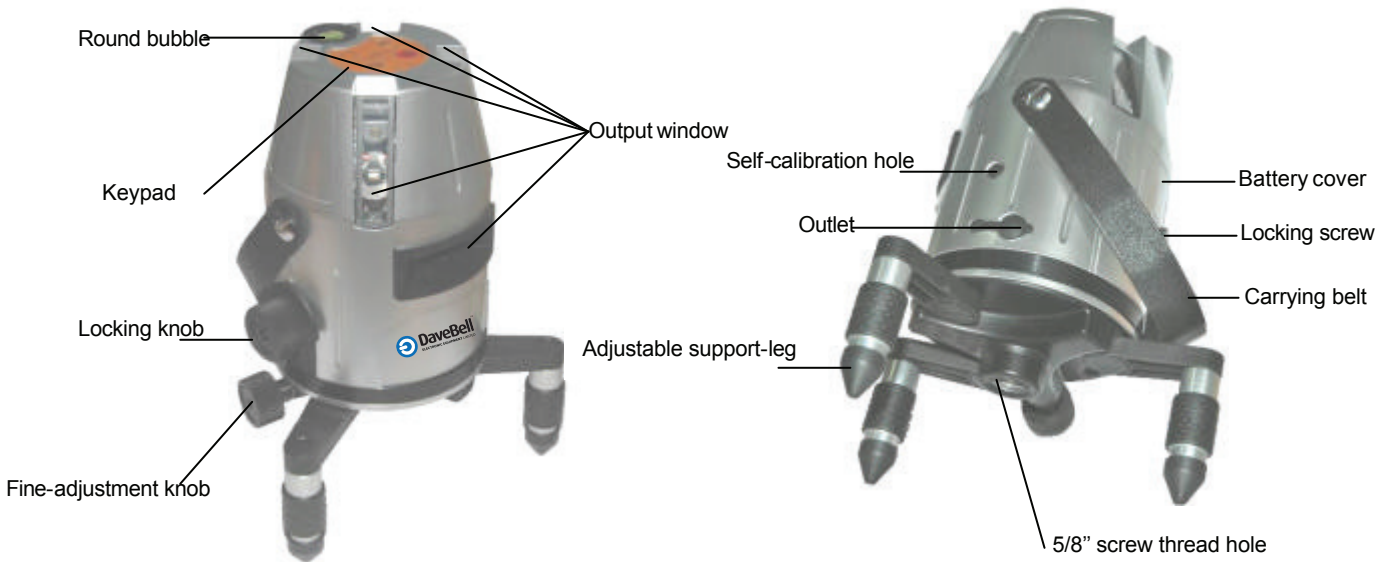
- Able to project five laser lines and one laser point
- Self-leveling, with laser flashing and buzzer indication if beyond range
- Able to supply one cross line in horizontal direction, four vertical laser lines in four directions, and one plumb beeline formed by the cross laser line on ceiling and the plumb-down point
- Able to turn the base by 360°freely, to be controlled by the fine-adjustment knob
- Retractable support-leg is available for making high adjustment.
- Top round bubble vial used for instrument leveling, with bubble illumination convenient for the bubble observation
- 5/8" screw thread on the center of bottom

2. User Safety

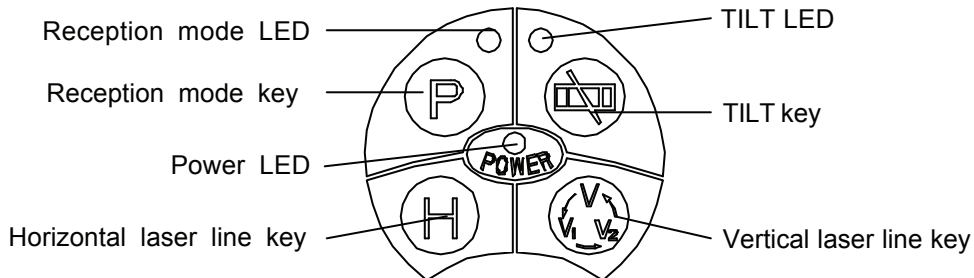
- Laser output sign is located near the output window.
- Do not stare into laser beam directly.
- Do not disassemble the instrument or attempt to perform any internal servicing. Repairs and servicing could be performed only by authorized service centers.
- The instrument complies with the safety classification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



3. Nomenclature



4. Operation Instruction



Power LED light: means power on
 extinguish: means power off
 flashing: means low battery

Reception mode LED:

light: means the reception mode is on
 extinguish: means the reception mode is off

TILT LED:

light: means power on
 extinguish: means power off



4.1 Power on/off



“LOCK” status, turn according to the arrow direction to unlock the unit



“UNLOCK” status, turn according to the arrow direction to lock the unit

Set the locking knob to “UNLOCK” position, the bubble illumination will be lighted and the power LED on the keypad will light.

Set the locking knob to “LOCK” position, the bubble illumination will extinguish and the power LED on the keypad will extinguish.

After power on, if laser line flashing and buzzer indication, it means the unit is beyond the selfleveling range. Please re-level the instrument.


4.2 Reception mode :

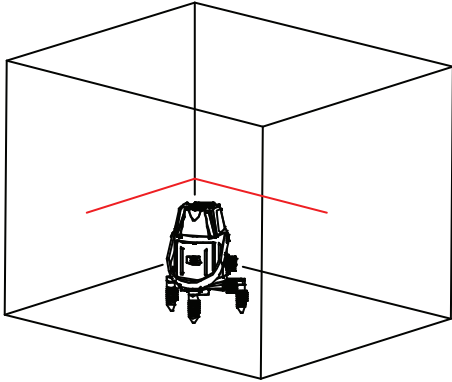
Switch on the reception mode, the reception mode LED will light and the laser line will become dim, which means that now the laser line could be received by the receiver.


Switch off the reception mode, the reception mode will extinguish and now it is impossible to receive the laser line with the receiver.

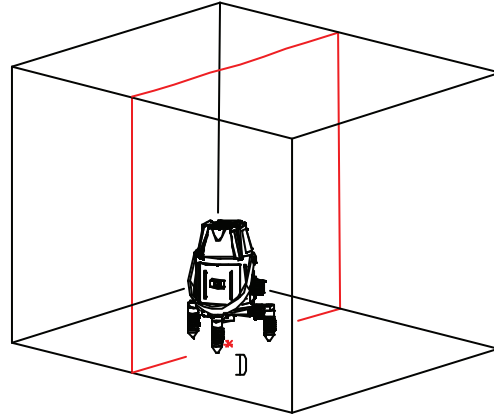
The reception mode can only active when the laser line is emitting. If no laser line is emitting, Press reception mode key will have no response.


4.3 Output form of the laser line

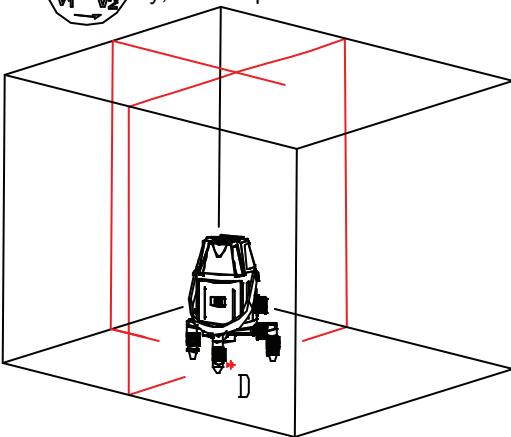
Press  key, the output form is shown as below:




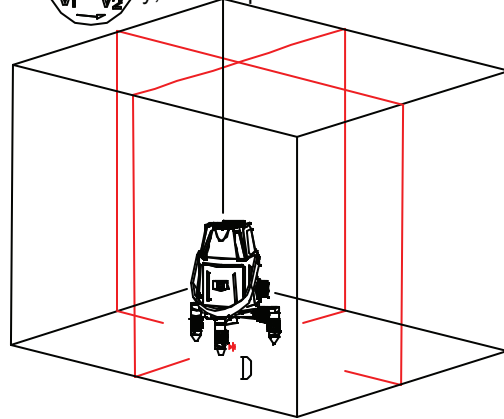
Press  key, the output form is shown as below:



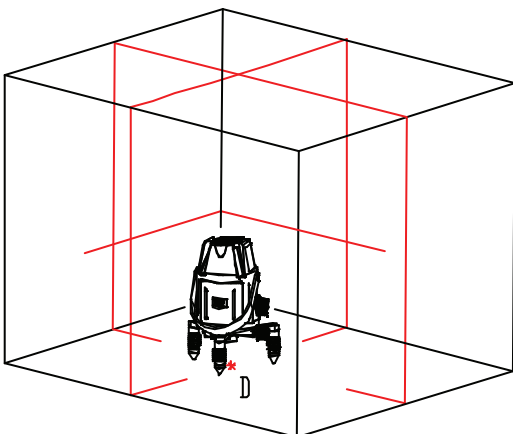
Press  key, the output form is shown as below:



Press  key, the output form is shown as below:



All the laser lines are output as below:



4.4 TILT function

When the unit in “LOCK” status, press TILT key to enter TILT mode. The power LED and bubble illumination will light and TILT LED will flash. The usage of H, V keys and modulation function is same as above description.

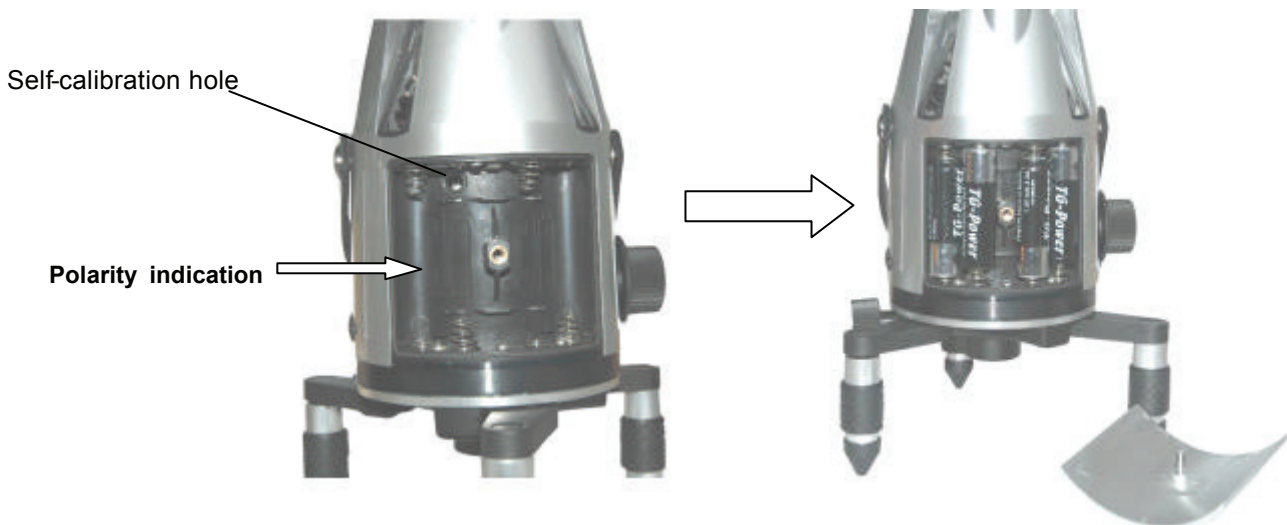
Press TILT key again, the TILT LED will extinguish. The power LED and bubble illumination will be off and the unit is power off.

Note: when the unit is in “UNLOCK” status, it is impossible to enter TILT mode. Press TILT key will have no response. When the unit is working in TILT mode, unlock the unit, the unit will exit TILT mode (TILT LED extinguish) and enter self-leveling working status.

5. Instrument usage

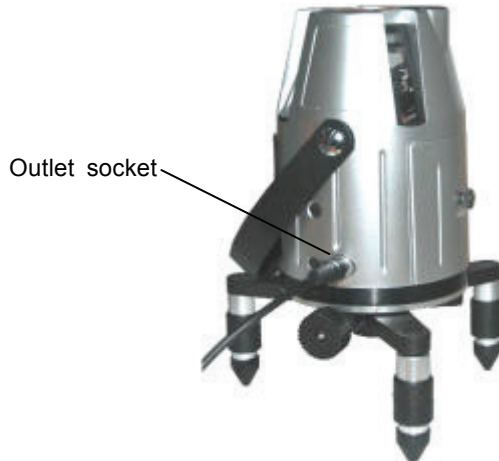
5.1 Usage for Alkaline Batteries

Loosen the locking screw, put 4 x AA alkaline batteries into the battery case according to the polarity indication shown in the battery case



5.2 Adapter usage

Connect the instrument with the adapter through the outlet socket on the battery case.



Connect the instrument with the adapter (DC-6V)

After connecting the instrument with adapter, the instrument will disconnect with the power of alkaline battery automatically, and also the alkaline battery will not be charged in this way.

5.3 Adjusting the adjustable support legs

While using the instrument, it is necessary to adjust the three adjustable support-legs to make the round bubble centered. If the instrument is so tilted as to exceed the self-leveling range, the laser line will flash. Here we should adjust the adjustable support-legs to make the round bubble centered.



5.4 Instrument rotating horizontally and fine adjustment



turn the unit 360 °



Fine adjustment

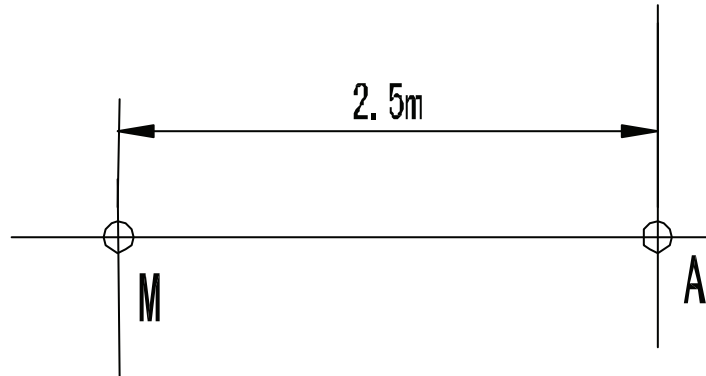
5.5 Connecting with the tripod



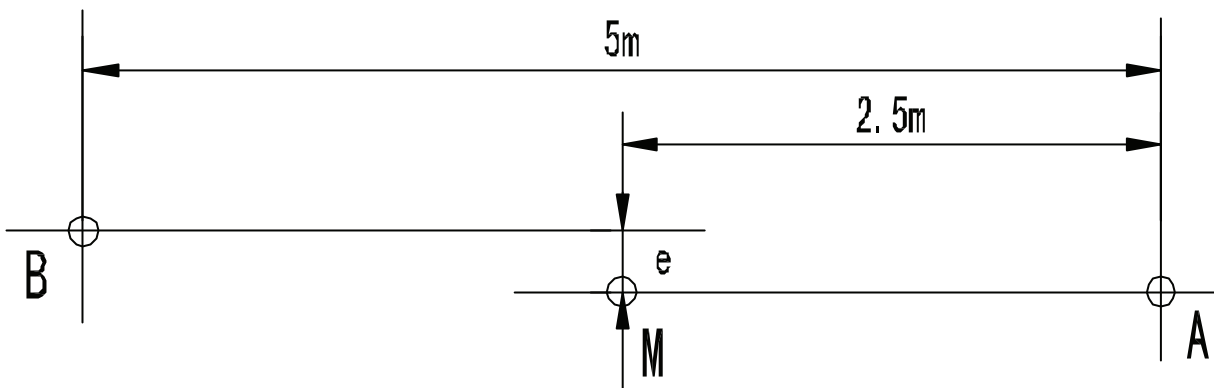
6. Self-check and Calibration

6.1 Horizontal Line Accuracy Self-check (horizontal)

1. Find a smooth wall, set up the unit at 5 meters away from the wall and leveling the vial.
2. Set the instrument on the tripod or support pole, and orient it at the wall.
3. Press the keys H, V1 to project laser lines H, V1, take the cross on the wall as point A.
4. Make out point A and point M on the horizontal line (the distance between the two points is about 2.5m)



5. Turn the unit to move the cross to point B which is 5m away from point A.

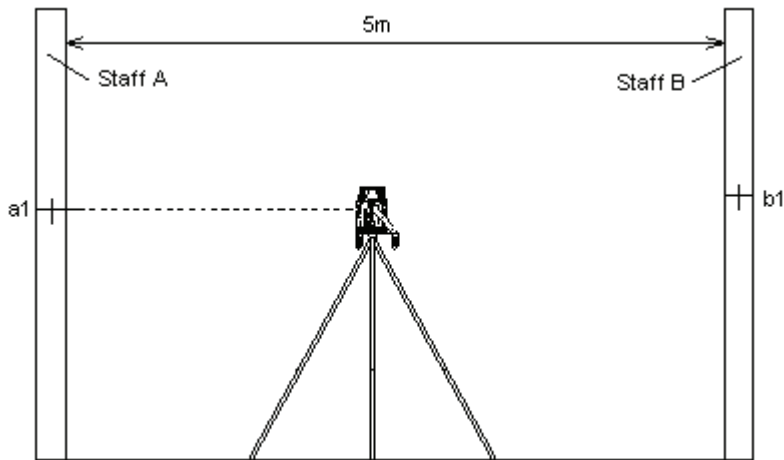


6. Measure the distance e between point M and the laser line

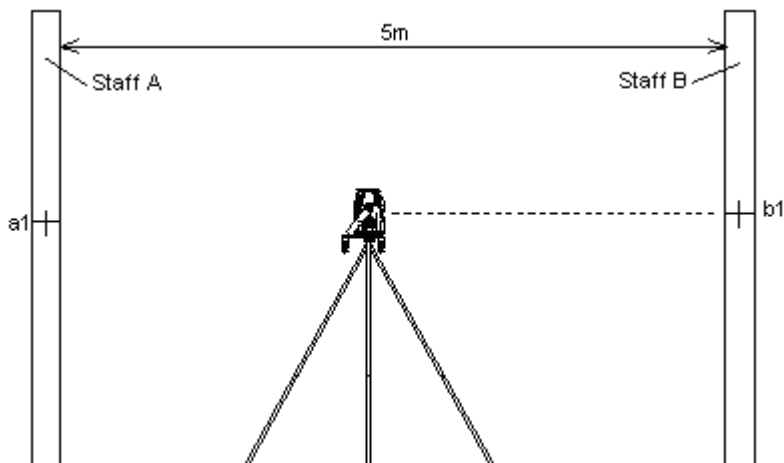
7. If $e > 1\text{mm}$, the unit accuracy is beyond tolerance. Please send it to dealer for maintenance.

6.2 Self-check of horizontal accuracy (vertical)

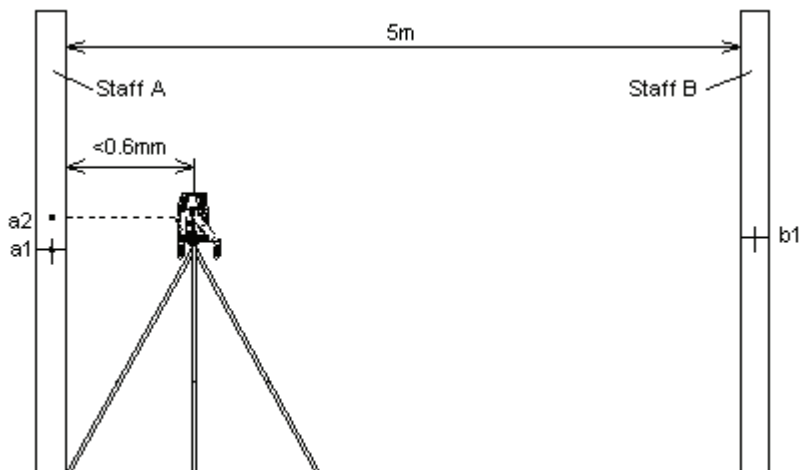
1. Setup two survey-staff which is 5 meters away from each other (or two parallel-wall which is more than 5m away from each other).
2. Set the instrument on the tripod or support pole, then place the unit at the center between the two survey-staff and leveling the vial.
3. Press the keys H, V to project laser lines H, V, have their cross located on staff A and note down the value of a_1



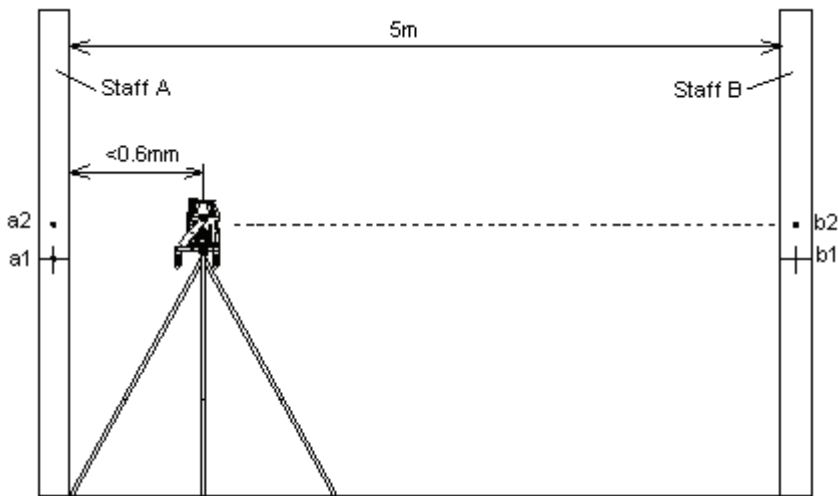
4. Turn the unit 180°, have the cross located on staff B and note down the value of b1.



5. Move the tripod to change the distance between the unit and staff A to 0.6m, have the cross located on staff A and note down the value of a2.



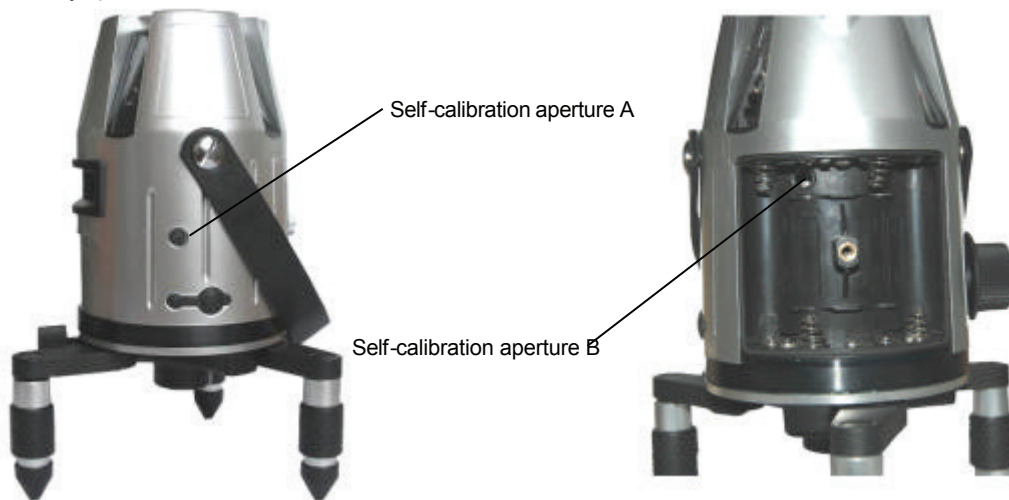
6. Turn the unit 180°, have the cross located on staff B and note down the value of b2.



7. Calculate: $(a1-a2)-(b1-b2)=e$. If the absolute value of e exceeds 1mm, the unit accuracy is beyond tolerance. Please send it to dealer for maintenance.

6.3 Self-Calibration Adjustment (repaired by the dealer)

As shown in following pictures, there are two self-calibration apertures on the instrument. The self-calibration aperture on place A could be used for horizontal adjustment (error checked by “6.1 Horizontal Line Accuracy Self-check”), while the aperture on place B used for vertical adjustment (error checked by “6.2 Self-check of horizontal accuracy”)



Note when calibrating:

- 1) Use a hexagonal spanner with a subtense of 2mm.
- 2) The calibrations at place A and B may influence each other sometimes. That is to say, when making fine-adjustment in horizontal direction, the calibration in vertical direction may change. In the same way, when making fine-adjustment in vertical direction, the calibration in horizontal direction may change. So, when doing the fine-adjustment, the calibration on place A and B should be adjusted again and again.
- 3) The self-calibration screw should not be adjusted more than 4 cycles (clockwise or anticlockwise). If that doesn't work, the instrument needs a further service by opening the housing.

8. Technical Specifications

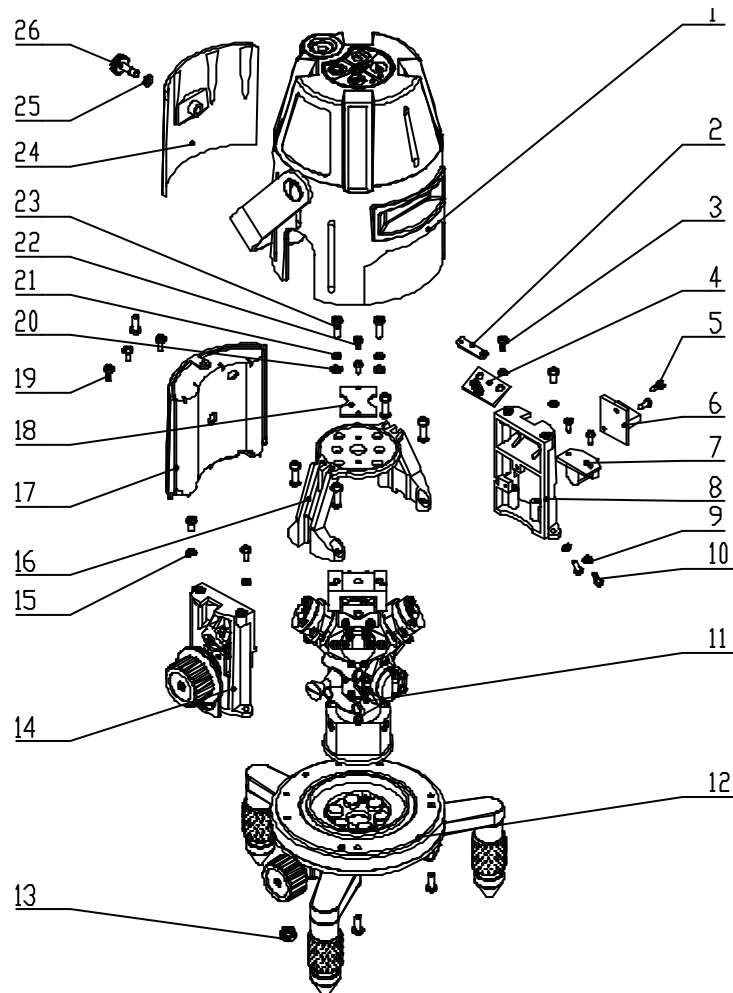
1. Accuracy: $\pm 1.5\text{mm}/10\text{m}$ ($\pm 1^\circ$, the bubble in the top vial is within the range of scale)
2. Self-leveling range: $\pm 3^\circ$ (The emitting laser beam will flash if beyond range)
3. Laser diode: Class II 635nm : horizontal line and vertical line
Class II 650nm : plumb-down point
4. Sector angle: 120°
5. Working temperature: $-10^\circ\text{C} \sim +45^\circ\text{C}$
6. Power supply: 4*AA alkaline batteries/ DC 6v
7. Battery life: about 8 h (all of the laser lines are emitting)
8. Low Voltage Indication: Power indicator lamp twinkle
9. Size: $\Phi 100 \times 190\text{mm}$ (all the support-legs open: $\Phi 160\text{mm}$)
10. Weight: 0.9Kg

9. Maintenance

- Avoid being wet with water and rain.
- The instrument should be carefully operated and properly preserved, and any violent shock or falling will possibly result in the damage of instrument.
- Before moving or transporting the instrument, please keep it in the locked situation to avoid depressing the accuracy.
- 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.

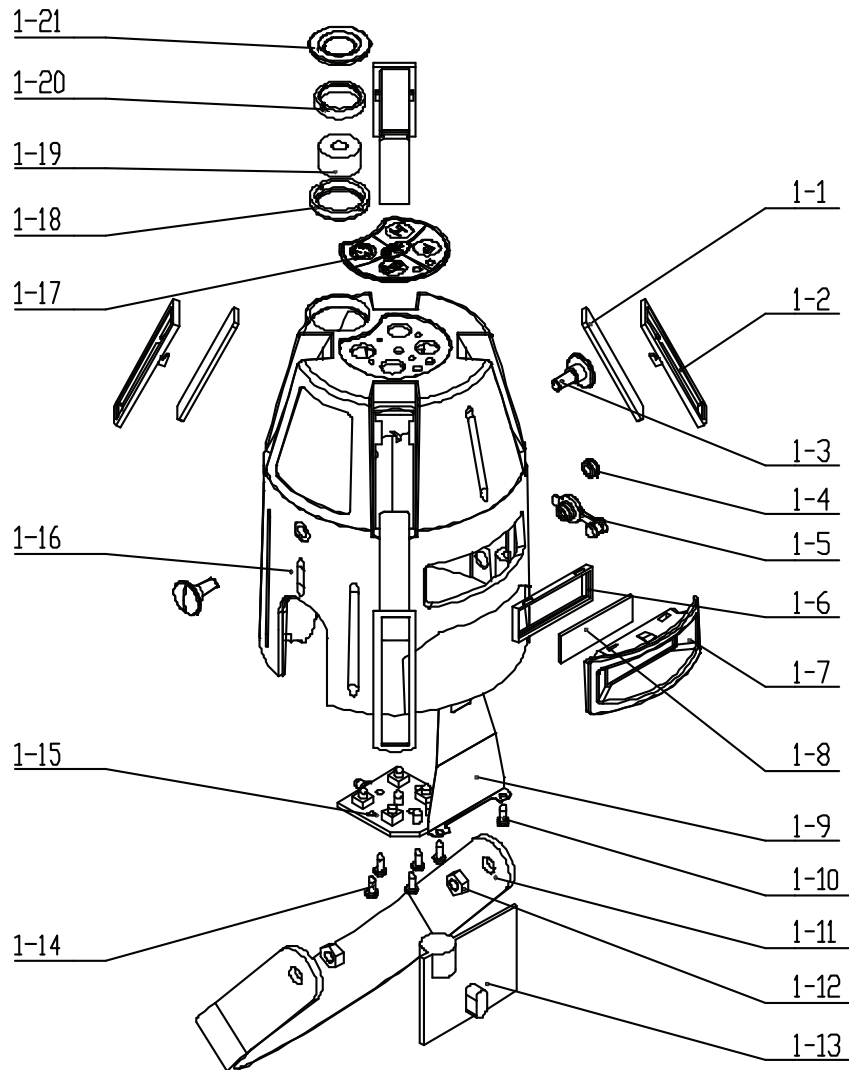


Self-leveling Laser Marker (Exploded View) (4V1HXL)

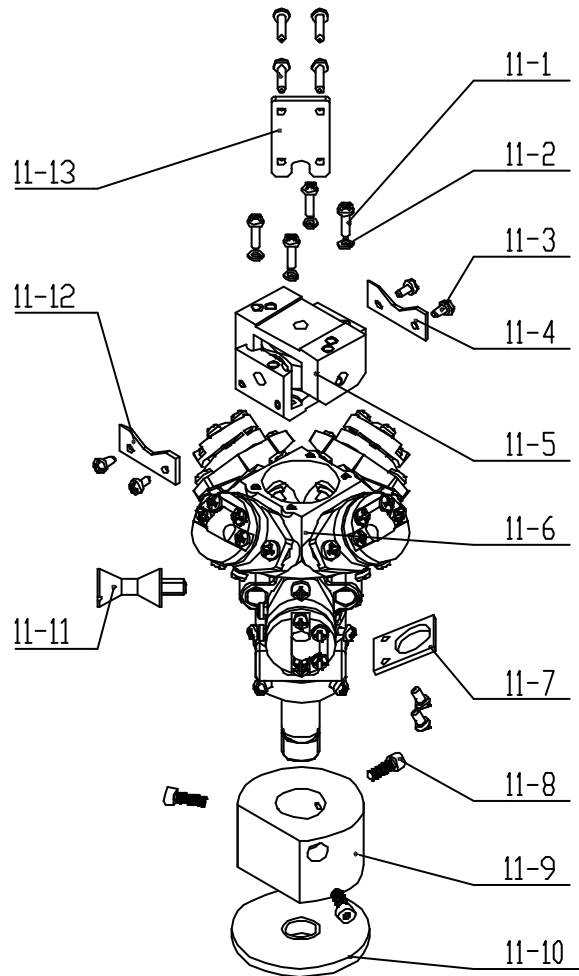


- | | |
|---|---|
| 1. Housing part | 14. Locking bracket part |
| 2. Fixing plate | 15. F3 elastic gasket (8pcs) |
| 3. Crosshead plate screw M3×8 (11pcs) | 16. Bracket |
| 4. 4# alarming shaft circuit board part | 17. Battery box part |
| 5. Crosshead plate tapping screw ST2.2×6.5 (4pcs) | 18. 7# connecting circuit board |
| 6. 6# connecting circuit board part | 19. Crosshead plate screw M2.5×6 (3pcs) |
| 7. 3# connecting circuit board part | 20. F3 flat pad (2pcs) |
| 8. Bracket | 21. F3 saddle elastic gasket (2pcs) |
| 9. F2 flat pad (2pcs) | 22. Crosshead plate screw M2×5 (2pcs) |
| 10. Crosshead plate screw M2×8 (2pcs) | 23. Crosshead plate screw M3×10 (2pcs) |
| 11. Core part | 24. Battery cover |
| 12. Bottom part | 25. Rubber pad |
| 13. Stopple | 26. Locking screw |





- | | |
|--|--|
| 1-1. Vertical window glass (4pcs) | 1-12. M4 nut (2pcs) |
| 1-2. Vertical window frame (4pcs) | 1-13. 2# main circuit board part |
| 1-3. Belt screw (2pcs) | 1-14. Crosshead plate tapping screw ST2.2X4.5 (4pcs) |
| 1-4. Block cover | 1-15. 1# operating circuit board part |
| 1-5. Sealing stopper | 1-16. Housing |
| 1-6. Horizontal window frame press plate | 1-17. Keypad |
| 1-7. Horizontal window frame | 1-18. Bubble seat |
| 1-8. Horizontal window glass | 1-19. Round bubble |
| 1-9. Press plate | 1-20. Adjusting seat |
| 1-10. Crosshead plate tapping screw ST2.2X6.5 (2pcs) | 1-21. Cover plate |
| 1-11. Belt | |



11-1. Crosshead plate screw M2×8 (8pcs)

11-2. F2 elastic gasket (4pcs)

11-3. Crosshead plate screw M2×4 (6pcs)

11-4. 9# connecting circuit board

11-5. Gimbal part

11-6. Base part

11-7. 5# alarm loop circuit board

11-8. Inner hexagonal column-head screw
M2.5×8 (3pcs)

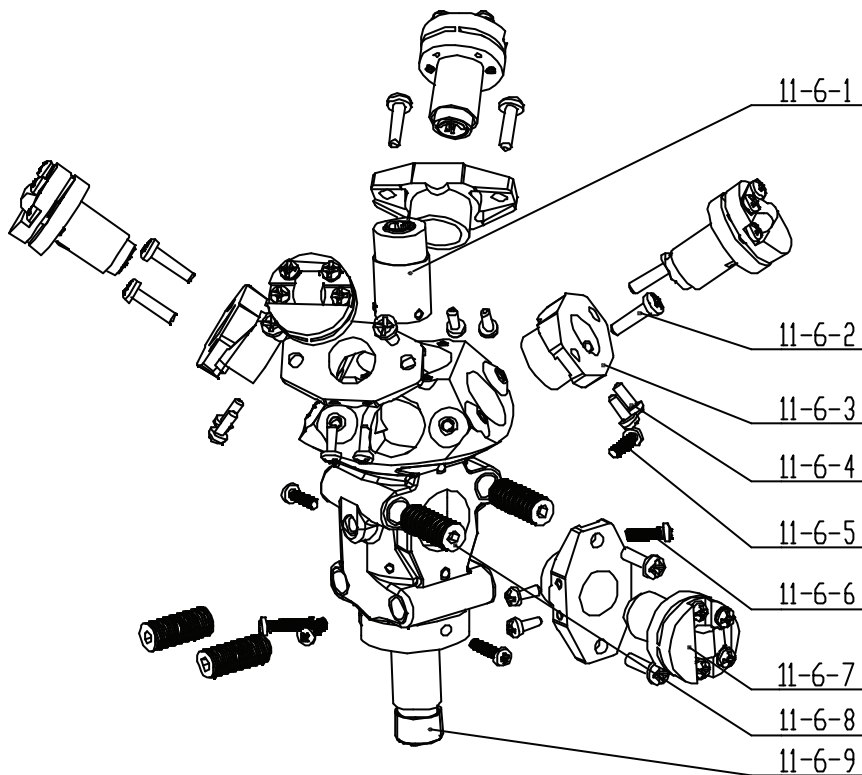
11-9. Pendulum

11-10. Pendulum seat

11-11. Locking wimble

11-12. 8# connecting circuit board

11-13. Weight piece (if necessary)



11-6-1. Plumb-down laser module

11-6-2. Crosshead plate screw M2.5× 10
(10pcs)

11-6-3. Adjusting seat (5pcs)

11-6-4. Special screw 2 (10pcs)

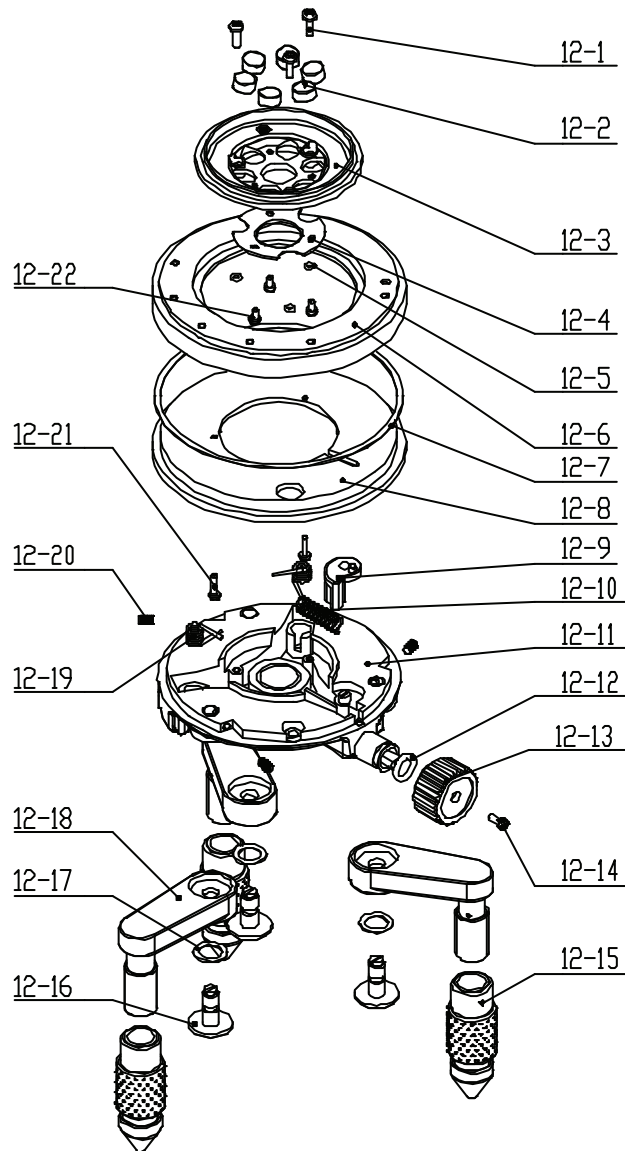
11-6-5. Crosshead plate screw M2× 10 (3pcs)

11-6-6. Crosshead plate screw M2× 8 (3pcs)

11-6-7. Inner hexagonal notched tighten screw
M6× 16 (4pcs)

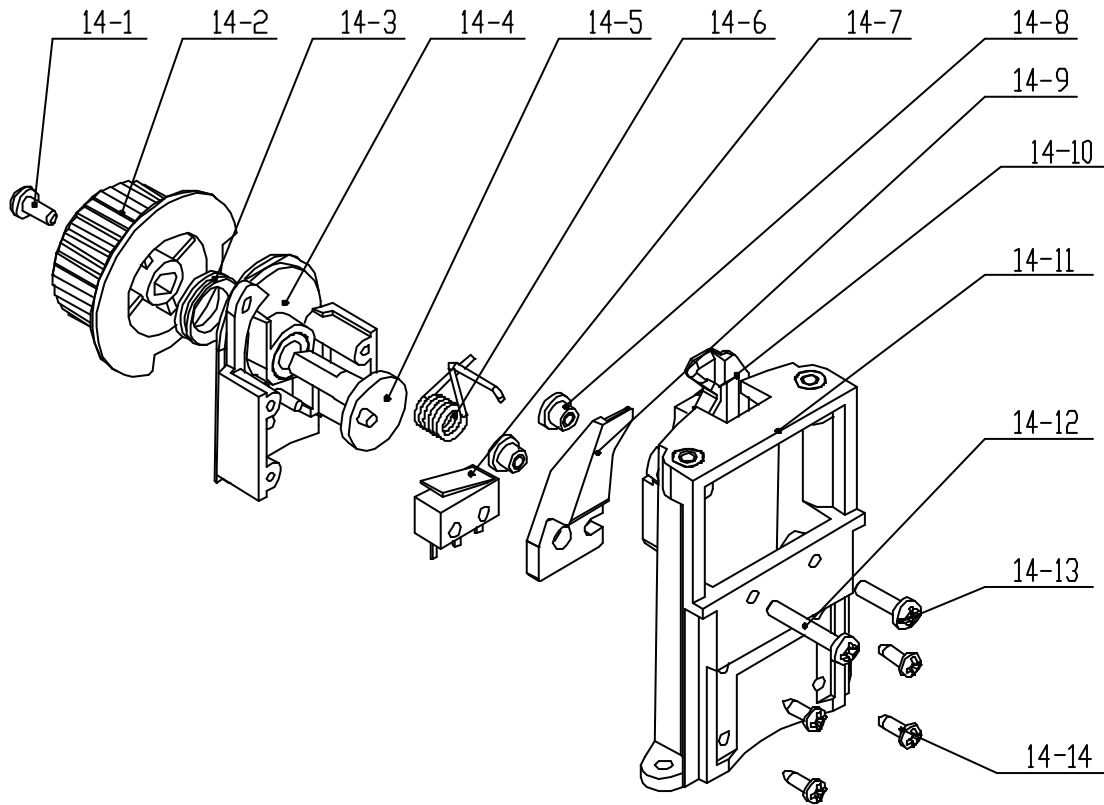
11-6-8. Laser module (5pcs)

11-6-9. Base



- | | |
|---|--|
| 12-1. Crosshead plate screw M2.5×8 (3pcs) | 12-13. Fine-adjustment knob |
| 12-2. Strong magnet F8×5 (6pcs) | 12-14. Crosshead plate screw M2×6 |
| 12-3. Mounting seat | 12-15. Feet cover part (3pcs) |
| 12-4. Magnet seat | 12-16. Locking screw bolt (3pcs) |
| 12-5. F2.5 saddle elastic gasket (3pcs) | 12-17. F 8 saddle elastic gasket (3pcs) |
| 12-6. Bottom plate | 12-18. Support leg part (3pcs) |
| 12-7. Sliding spacer | 12-19. Torsion spring 2 (2pcs) |
| 12-8. Slipper | 12-20. Inner hexagonal notched tighten screw M3×4 (3pcs) |
| 12-9. Shifting block | 12-21. Crosshead plate screw M2×8 (2pcs) |
| 12-10. Compression spring | 12-22. Crosshead plate screw M2×3 (3pcs) |
| 12-11. Bottom part | |
| 12-12. O shape loop | |





- 14-1. Crosshead plate screw M2×8
- 14-2. Locking knob
- 14-3. Sealing ring
- 14-4. Locking marking plate
- 14-5. Crank shaft
- 14-6. Torsion spring
- 14-7. Jiggle switch
- 14-8. Shifting block axis (2pcs)

- 14-9. Shifting block
- 14-10. Locking block
- 14-11. Locking bracket
- 14-12. Crosshead plate screw M2.5× 16
- 14-13. Crosshead plate screw M2.5× 10
- 14-14. Crosshead plate tapping screw ST2.2× 9.5 (4pcs)