
PLUMMET LASER MLP1

Operation Manual



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**Laser radiation!
Do not stare
into beam !**

Caution:

In order to prevent the laser from damaging your eyes, do not observe the laser source directly.

1. Features

With the characteristics of strong direction and the energy concentration of the laser, the MLP1 Laser plumb developed three sets of semiconductor lasers on the optical plumbing basis. One of the Lasers emits from the plumbing telescope. The structure makes the lasers axis and sight axis to be coaxial, concentric and co-focus. When the telescope focus' the target, and a small red laser spot can be found; the other laser emits a horizontal laser beam, to afford the horizontal reference. Another laser emits from the plumbing part, which focus' the point directly and quickly.

MLP1, adopts the integrated body design, with compact structure and stable performance. It can be used to survey tiny horizontal areas and the difference of the vertical alignment, to carry out the point transference, and measure the vertical outline of object. MLP1 is also widely used in building construction, industrial installation, engineering supervision, and deformation observation, such as high-rise buildings, elevators, mines, water towers, chimneys, large-scale equipment installation, aircraft manufacturing, shipbuilding and the other projects.

2. Specification

Telescope

Available aperture	36 mm
Magnification	24 X
Field of View	1°30'
Shortest Focusing Distance	2 m

Upper Laser

Accuracy	1/45000
Available Laser Distance (Day)	150 m
Available Laser Distance (Night)	500 m
Laser Spot at 40m Distance	3mm
Wave Length	635nm
Laser Level	Class II

Laser plummet

Accuracy	0.5mm/1m
Wave Length	635nm
Laser Level	Class II

Horizontal Laser

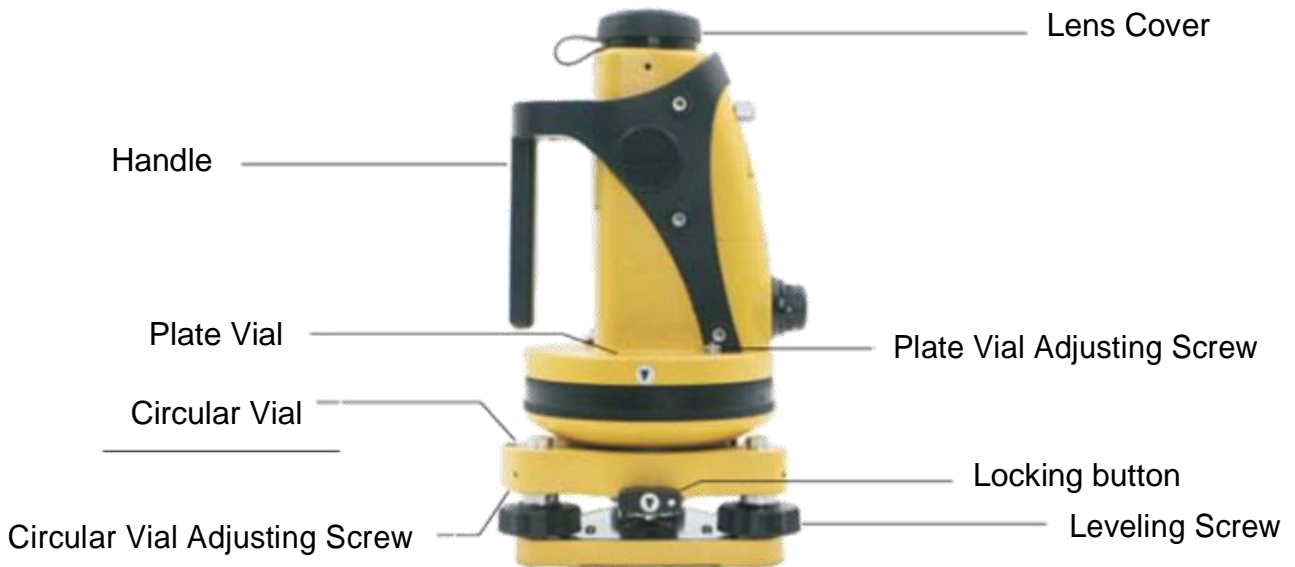
Accuracy	1mm/10m
Wave Length	635nm
Laser Level	Class II

Others

Plate Vial Accuracy	20"/2mm
Deviation Between Collimation and Plumb Axis	$\leq 2''$
Deviation Between Vertical Laser and Focusing Axis	$\leq 5''$
Working Temperature	-10°C--+50°C
Power	3V
Weight	2.7KG

3. Appearance

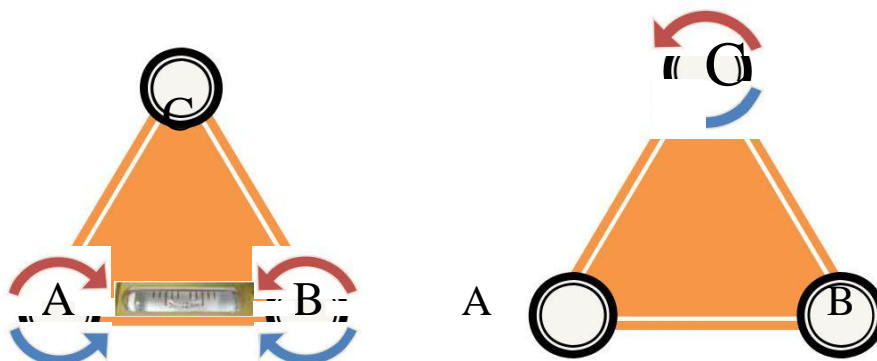




4. Operation

4.1 Leveling and Centering the Instrument

- 1) Set the instrument on the testing points, lock the screws to make it stable.
- 2) Adjust the height of the tripod to ensure the observation.
- 3) Turn the leveling screw A and B in the opposite direction, move the bubble to the line which is the perpendicular to A-B line. Turn the leveling screw C, move the bubble to the center of the circular vial. (Shown as pictures)



4) Switch on the laser, loosen the lock button, then move the instrument to make the laser point focus to the reference point

5) Rotate the instrument, make the plate vial parallel with the line of screws A and B, then make the bubble be on the centre by turning screws A and B. Rotate the instrument to make the plate vial to be perpendicular with A-B line. Turn screw C to centre the bubble.

Repeat the above steps until the bubble is correctly centered in all directions.

6) Repeat step 5 to level the instrument and ensure laser plummet is focused. The laser plummet can be powered off to save energy after adjustment.

4.2 Plummet Aligning Measurement

1) Aim at the target

a. Set grid-target on the target

b. Rotate the eyepiece until the cross-hair is clear. Turn the centering hand-wheel to make the grid-target clearly in your view field.

c. After the equipment is levelled, rotate the disk in 15, this makes 0° focus of the index line on the instrument, record the first result. Rotate the unit 180° and record the second results. Take averages of these two in order to improve accuracy. You can measure several times to increase the accuracy

2) Plummet aligning measurement

Press laser emitting switch and focus the laser spot on the grid-target. Record the data in spot centre as a result. Rotate the observing reading, this will also increase the accuracy.

4.3 Contour Measurement in Vertical Direction

Put the tripod near the determined target, then set the instrument and level it.

1) Optical method

A. Adjust the eyepiece until the cross-hair is clear.

B. Put the laser target close to the determined spot in one side, rotate the focusing hand-wheel to clear the laser target on the cross-hair of reticle, then record data.

C. Move the laser target constantly with a vertical upward interval, repeat step B. The contour of determined target in its vertical direction can be measured.

2) Laser method

A. Adjust the eyepiece until the cross-hair is clear.

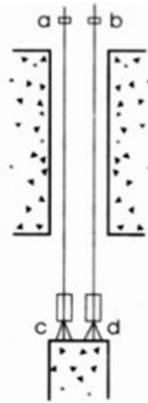
B. Put the laser target close to determine in one side, rotate the focusing

hand-wheel to focus the laser spot, and record the center reading.

C. Move the laser target constantly with a vertical upward interval, with step B. The contour of determined in vertical direction can be measured.

4.4 Vertical Transmission (Shaft Orientation Survey)

In project surveying or mine surveying, MLP1 will achieve the vertical transmission from a reference edge to underground tunnel. Shown as the picture, Line A&B are reference.



- a. Set the laser target at the endpoint a of Line A&B
- b. Put the tripod under the laser target, set and level the instrument. Adjust eyepiece until the cross-hair is clear.
- c. Rotate focusing hand-wheel to make the target clearly in the view field. Move the instrument, the cross-hair of reticle is to overlap to the centre of the laser target. Plate vial is centered.
- d. The plummet focus to point c
- e. Set the laser target at the other endpoint d of Line A&B, so Line C&D is the reference bearing which share the same azimuth with Line A&B.

4.5 Leveling Measurement

Level the instrument as Step 4.1, switch on the horizontal laser and the laser plummet. Rotate the instrument to have a horizontal direction, the laser spot will provide a horizontal reference plane in 360°.

5. Battery

MLP1 uses two alkaline batteries, it can work 2-3 hours continuously. Batteries should be replaced if the laser decreases obviously. Please open the cover, remove the batteries and replace with new ones. Please pay attention to the positive and negative pole.

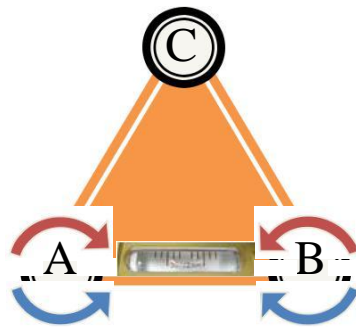
6. Inspection and Adjustment

The instrument has passed strict pre-inspection in the factory. Please check and adjust it after long-term transportation or usage. Please follow the below steps:

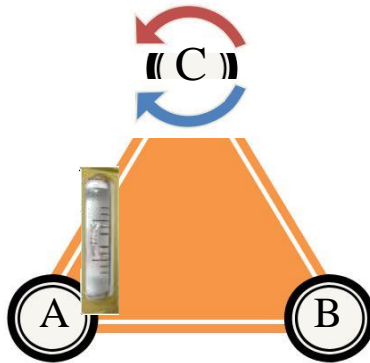
6.1 Plate Vial

Inspection:

- 1) Put the instrument on a stable base, such as tripod or collimator, and tighten it.
- 2) Roughly level the instrument, and make plate vial parallel with screws A and B, adjust the screws to make the plate bubble be in the centre. (Shown as picture below)



- 3) Rotate the instrument 180°, observe the movement of the bubble, if the plate bubble is not centered, please adjust it again. (Shown as picture below)



Adjustment :

- 1) Put the instrument on a stable base and tighten it.
- 2) Roughly level the instrument
- 3) Rotate the instrument and make plate vial parallel with two leveling screws A&B, adjust the screws to center the bubble.
- 4) Rotate the instrument 90°, turn the screw C and center the bubble.
- 5) Rotate the instrument 90° again, use adjusting pin to bring it half way back to the center after the bubble is steady.
- 6) Repeat steps 3, 4, and 5 until the bubble remains in center in any direction.

6.2 Circular Bubble

Inspection:

- 1) Put the instrument on a stable base and tighten it.
- 2) Level the instrument precisely with the plate vial.
- 3) Observe whether the bubble of circle plate is centered; if not, the instrument needs to be adjusted.

Adjustment:

- 1) Put the instrument on a stable base and tighten it.
- 2) Level the instrument precisely with the plate vial.
- 3) Adjust the two adjusting screws under circular bubble to center the bubble.

NOTE: Tighten them symmetrically when adjusting two screws with the correction pin.

6.3 Superposition of Collimation Axis and Vertical Axis

Inspection:

Put a piece of paper with grids and cross' upon the instrument in 40m, make the cross hair of instrument precisely coincide with the cross' of grids paper, Turn it 180°, if the offset difference is over 1 mm, the instrument needs adjustment.

Adjustment:

Take off the cover; adjust the left, right, up and down adjusting screws to make the cross hair-centre of the instrument, move half of the offset value toward cross center of grids paper. Repeat inspection and adjustment until the offset difference is within 1 mm in all direction, then install the cover.

6.4 Superposition of Laser Axis and Collimation Axis

Inspection:

Put a piece of paper with cross' forward to the instrument in 40m. Adjust the focus of the eyepiece to observe the cross, then rotate the handwheel to focus the paper. Makes the centre of the cross match with the centre of the cross hair, switch on the laser power. The offset value should be within 1mm, if not, the instrument needs adjustment.

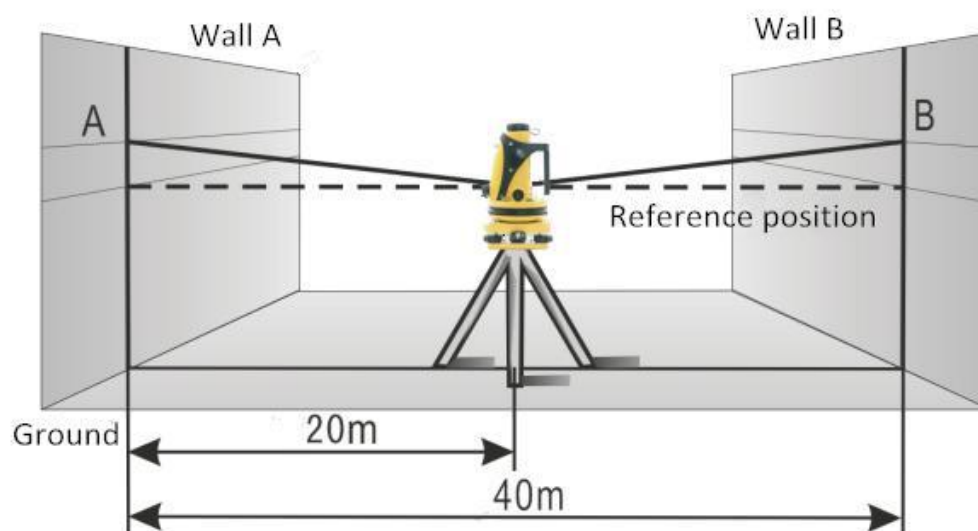
Adjustment:

Take off the laser cover; adjust the left, right, up and down laser adjusting screws to make the center of laser spot coincide precisely with the center of cross, and then install the laser cover and battery cover.

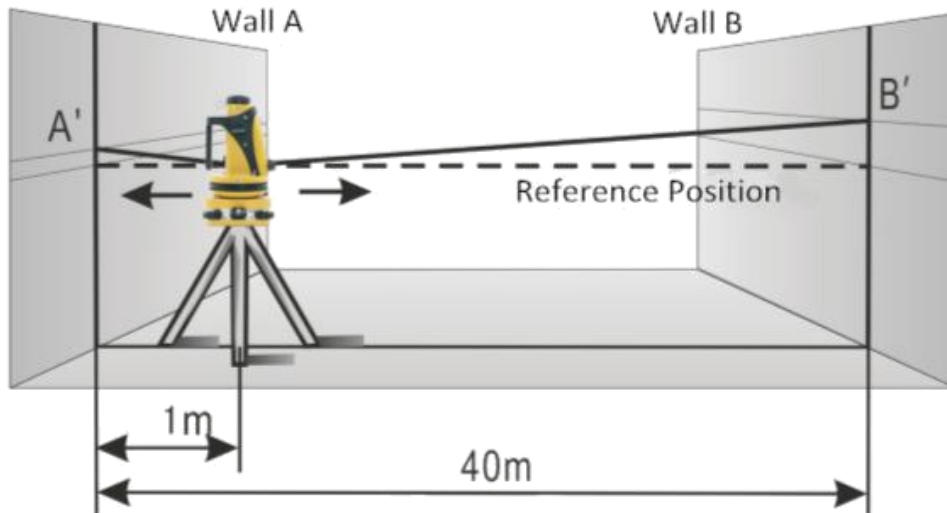
6.5 Horizontal Laser

Inspection:

After the adjustment of 6.1 Plate Vial, set the instrument between Wall A&B in 40m. Level the instrument and switch on the horizontal laser and laser plummet, rotate it and record the position of laser beams on both sides of the wall, named point A and B.



Move the instrument to the position which is away from Wall A about 1m, level the instrument again, rotate it in horizontal and record the position of laser beams on both sides of wall, named point A' and B'.



Calculate the distance between (A-A') and (B-B'), if $|(A-A')-(B-B')|$ is less than 8mm, the laser position is correct.

Adjustment

If $|(A-A')-(B-B')|$ is more than 8mm, adjust the horizontal adjusting screw. It must dispense after adjustment.

NOTE: These steps of inspection and adjustment is just as a reference to users;
Please send the instrument to service centre if possible.

7. Maintenance

Please pay attention to the below steps, in order to use and store the instrument correctly, keep the accuracy and extend the durability.

- 1) Please take out the instrument carefully, do not pull the laser cover and telescope forcibly;
- 2) Please rotate the instrument with two hands when surveying, do not pull too hard on the handle.
- 3) If the optical glasses is dusty, please brush it lightly.
If there is moisture or an oil stain, please wipe it softly with lens wiping paper or flannelette.
- 4) Please power it on 1-2 hours later after carrying the instrument from outdoor to the indoor or indoor to outdoor in winter.
- 5) Remove the batteries if the instrument will not be used for a long time, and

store it in the carrying case with desiccant. The instrument should be placed in a dry, clean, well-ventilated environment.

8. Configuration

1. MLP1 plumb aligner	×1
2. Operation manual	×1
3. Target(optional)	×1
4. Correction pin	×1

5. Dryer	×1
6. Certificate	×1
7. Battery(AA)	×2
8. Objective lens cover	×1
9. Safety goggles (Optional)	×1