

PLUMB ALIGNER ML-401

Operation Manual



GUANGDONG KOLIDA INSTRUMENT CO. LTD



Menu

1. Features and Usage.....	4
2. Technical Specification	5
3. Nomenclature.....	6
4. Operation	7
4.1 Leveling and Centering the Instrument	7
5. Battery Replacement.....	8
6. Check and Adjustment	9
6.1 Plate Vial	9
6.2 Circle Plate	10
6.3 Superposition of collimation and Vertical Axis	11
6.4 Superposition of Laser axis and collimation axis..	11
7. Maintenance.....	12
8. Standard Configuration	13



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

Caution:

There is laser source in the telescope, in order to prevent the laser from damaging your eyes, do not observe the laser source directly with eyes.

1. Features and Usage

As the advantages of highly-direction and energy concentration of laser, ML401 Laser plumb aligner is developed with two sets of semiconductor laser based on optical plumbing series. Laser emits from plumbing telescope. Structure of equipment ensures coaxiality, concentricity and confocality of laser axis and sight axis. when the telescope is sighting to the target, a small red laser spot can be found on the target; another laser emits from down plumbing part, which is used to collimate datum mark directly.

ML401, owing to its integrated body design, has compact structure and stable performance. It can be used to survey tiny horizontal difference of vertical alignment to carry out the point transference, and to measure the vertical contour of object. ML401 is 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 other projects.

2. Technical Specification

Telescope

Available aperture	30 mm
Zoom multiple	25 X
Field of View	1° 30'
Minimum visual range	0.5 m

Laser plummet

Minimum visual range	0.5 m
Accuracy	≤1mm

Laser emitting unit

Laser Level	635 nm
Power	3 V

Available laser distance

Day	≥150 m
Night	≤500 m

Laser Spot Size

Spot diameter 40 m away	≤2 mm
Spot diameter 100 m away	≤5 mm
Working Temperature	-25°C ~ 45°C

Other

Standard deviation for one observation set	1/45000
Plate vial accuracy	20" /2mm

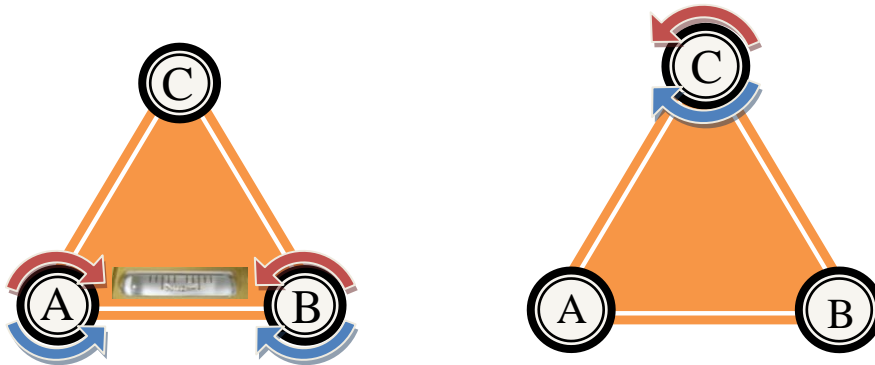
3. Nomenclature



4. Operation

4.1 Leveling and Centering the Instrument

- 1) Set the tripod legs on three testing points, attach the instrument on the tripod and position it on the centre limit point, tighten the tripod screw to make the instrument stable.
- 2) Adjust the height of tripod to make the eyepiece roughly parallel with the observation height.
- 3) Turn the leveling screw A and B to move the bubble onto the line which perpendicular to A-B line, Turn the leveling screw C to move the bubble to the center of the circular vial. (Shown as pictures below)



- 4) Power on the instrument, press the switch button for the first time to switch on the up-sight laser, and then press again to switch on the down-central laser, loose the tripod central screw to slide the instrument until the laser plummet is right over datum mark.
- 5) Rotate the instrument and place the plate vial parallel with the line of leveling screw A and B, and then bring the bubble to the center of the plate vial by turning the leveling screws A and B, Rotate the instrument to make plate vial to be perpendicular with A-B line. Turn the leveling screw C to center the bubble in the middle of plate vial.
Rotate the instrument and repeat the steps above, check whether the bubble is correctly centered in all directions.
- 6) Repeat step 5 to level the instrument and insure laser plummet is centered onto datum mark. After leveling and centering the instrument, please switch off the laser plummet to save power.

4.2 Plummet aligning measurement

- 1) Aim at target
 - a. Set grid-target on observed point
 - b. Adjust eyepiece until cross hair of equipment is clear in view field. Turn Focusing Handwheel to make the grid-target clear in view field.
 - c. After equipment is leveled well, observe and record the result. Rotate for 180° , observe and record second results. Take average of these two results as final observing result in order to improve accuracy. You can observe more times for higher accuracy.
- 2) Plummet aligning measurement

Press laser emitting switch and adjust focus to make the laser spot as clear and small point on grid-target. Record the data of spot center as result. Rotating 180° observing for more accurate is highly recommended.

5. Battery Replacement

ML401 uses two alkaline batteries; two new alkaline batteries can be continuously used for 2-3 hours. User should replace the batteries when the laser intensity decreases obviously. Unclose the battery cover toward the direction of objective lens, remove the batteries and replace with new ones. The direction of positive and negative charges should be paid attention extremely. Install the batteries according to the “+” and “-” marks, then close the cover in the end.

6. Inspection and Adjustment

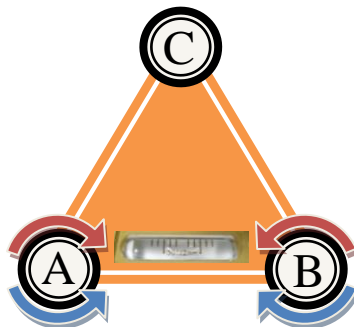
The instrument has been checked and adjusted strictly before leaving the factory; however, after being transported and used for a long time, the instrument should be checked and adjusted periodically.

To avoid the previous adjustment is affected by the later adjustment, please check and adjust the instrument in the following sequence.

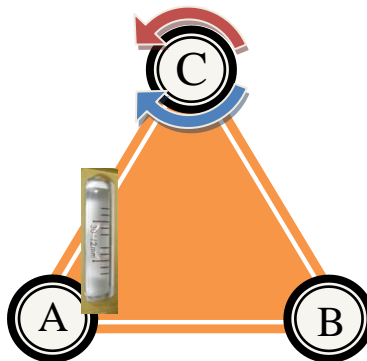
6.1 Plate Vial

Inspection:

- 1) Place the instrument on a stable base, such as tripod or collimator, and then tighten the instrument.
- 2) Roughly level the instrument, and make plate vial parallel with line connecting with two leveling screws A and B, adjust two leveling screws A and B to make the plate bubble centered. (Shown as picture below)



- 3) Rotate the instrument to make plate vial to be perpendicular with A-B line. Turn the leveling screw C to center the bubble in the middle of plate vial.
- 4) Rotate the instrument for 180°, observe the movement of bubble, if the plate bubble is not centered, the instrument must be adjusted. (Shown as picture below)



Adjustment:

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

6.2 Circular bubble**Inspection:**

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

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

6.3 Superposition of collimation axis and Vertical Axis

Inspection:

Put a piece of paper with grids and cross about 40 meters upon the instrument, make the cross hair of instrument precisely coincides with the cross of grids paper, Turn it for 180°, if the offset difference is over 1 mm, That means the instrument needs to be adjusted.

Adjustment:

Take off the cover; adjust the left, right, up and down adjusting screws to make the crosshair-center of 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, and then put on the cover in the end.

6.4 Superposition of Laser axis and collimation axis

Inspection:

Put a piece of graph paper with cross about 40 meters upon the instrument; adjust the focus of the eyepiece to observe the cross and graph paper clearly, move the graph paper to make the center of the cross match together with the center of cross hair, switch on the laser power, the offset value between spot centre and the centre of cross hair should be within 1mm; otherwise, the instrument needs to be adjusted.

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 restore the laser cover and battery cover.

NOTE: The inspection and adjustment above can be used as a reference by user; it is the best way to send the instrument to maintenance department or factory for inspection and adjustment.

7. Maintenance

In order to use and store the instrument correctly, insure the accuracy and extend the durability, please note the following items:

- 1) Take out the instrument carefully, do not pull the laser cover and telescope forcibly;
- 2) While observing, rotate the instrument body with two hands, do not pull the handle forcibly.
- 3) When the exposed optical glasses is dusty, use soft brush to clean it gently; when there is water or oil stain, use lens wiping paper or charpie to wipe it softly.
- 4) While there is large temperature difference indoor and outdoor in winter, Please power it on 1-2 hours later after carrying the instrument from outdoor to the indoor or indoor to out door,
- 5) Remove the batteries if the instrument has not been used for a long time, and store it in the carrying case; put some dryer in it; and the instrument should be placed in dry, clean, well-ventilated environment

8. Standard Configuration

1. ML401 plumb aligner	x1
2. Operation manual	x1
3. Target(optional)	x1
4. Correction pin	x1
5. Dryer	x1
6. Certificate	x1
7. Battery(AA)	x2
8. Objective lens cover	x1
9. Safety goggles (Optional)	x1