

Self-leveling Vibration Isolation Optical Table

Product Manual

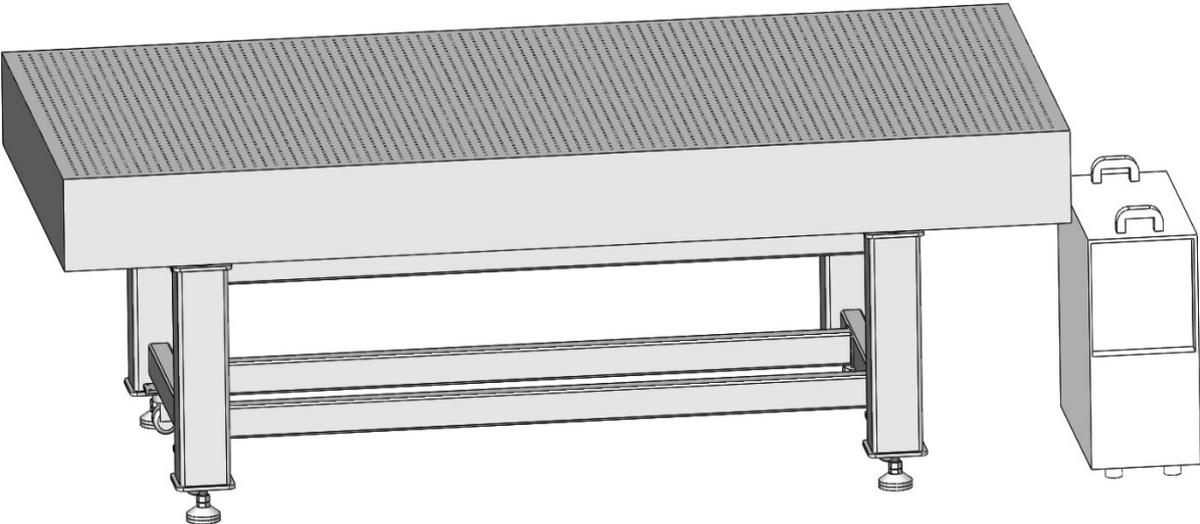


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I. Introduction

This Manual includes all necessary information related to the installation and setting of sensitive vibration isolation system. In order to ensure the operator safety and protect the equipment, please read this Manual carefully before using the equipment, and pay attention to the Safety Introduction and cautions in the Chapter II.

II. Safety Introduction

Must:

- 1) Ensure laying the Platform stably before use.
- 2) In case of using any electrical device, ensure realizing good grounding, having necessary ventilation equipment, and taking other safety measures to assure the operator safety.
- 3) When lifting or moving components, keep correct gesture, and do not transport overweight components separately. Each operator shall not transport weight more than 25kg. Please use appropriate tools to assist in transporting
- 4) When transporting the optical table, please ensure that no other objects are placed on the tabletop.
- 5) Be especially careful when transporting the system on the slope.
- 6) Ensure all components are safe and reliable before use.

Must not:

- 1) Enter the position where you cannot move, such as wall corner and door frame or other positions where you cannot seek shelter in case of danger.
- 2) Stay below the system when moving the system.
- 3) The operator transports weight more than 25kg separately.
- 4) Use the live device to drag the system.
- 5) Use the accessories which are not provided by our Company without obtaining confirmation from the technicians of our Company.

III. Product Introduction

3.1 Product Overview

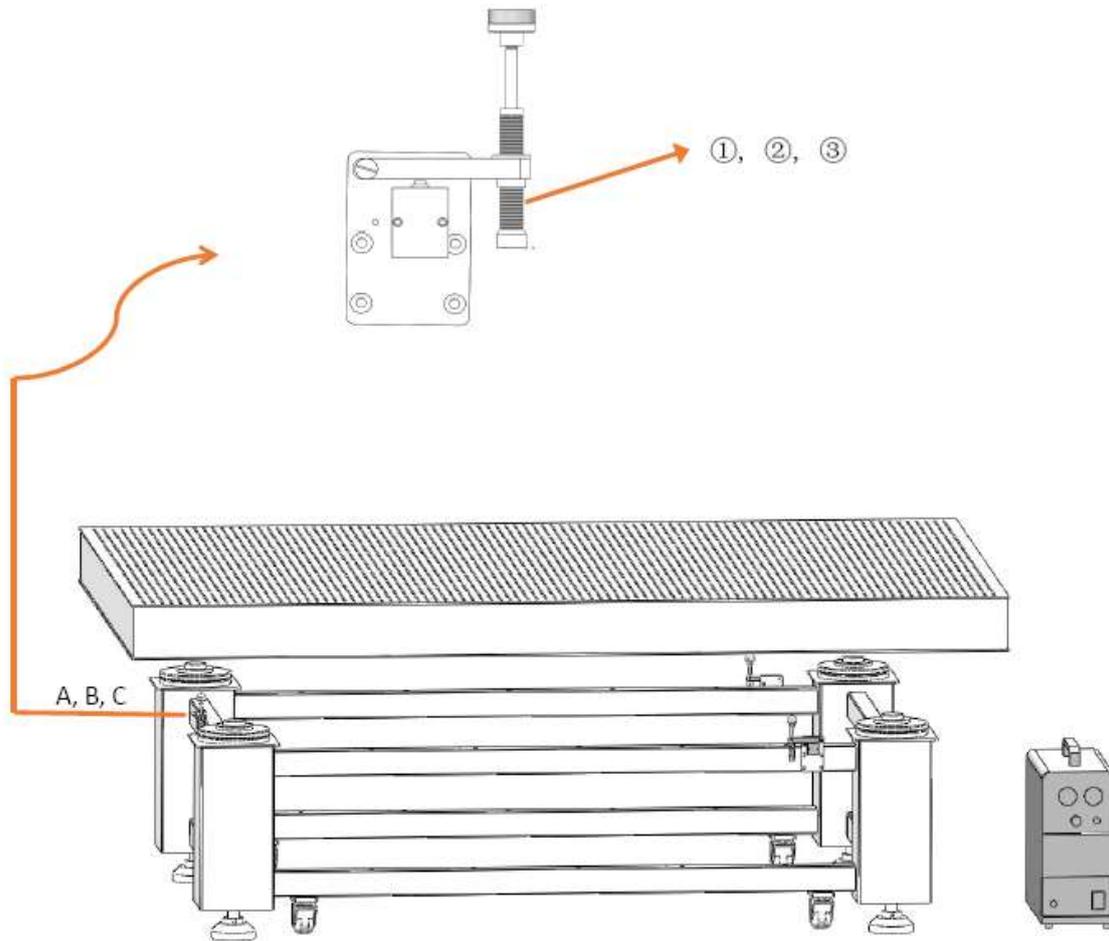
The Self-leveling Vibration Isolation Optical Table is developed by our Company by absorbing the international advanced concepts and technologies for R&D of mechanical processing and vibration isolation system, and combining the domestic current situation of vibration isolation optical table. The tabletop is placed on the pneumatic isolation system, so it can keep horizontal automatically during the use. The pneumatic isolation supports use high-quality airbag. The air chamber is a two-layer structure. Three precision horizontal regulators are sensitive, and have short response time. Moreover, the support frame is a whole structure with casters. There is a mechanism to adjust the stand height below the support legs, which can adjust the height conveniently and flexibly. The pneumatic isolation system can eliminate horizontal and vertical vibration effectively, and ensure that the precision experimental system or instrument is not affected by building vibration noises, environmental vibration noises, working equipment vibration noise, personnel vibration noise, etc. when working.

3.2 Main Characteristics

- The whole frame is stable and reliable.
- The surface is precisely ground to remove rough machining marks completely, so the surface is smooth and has high precision.
- The tabletop is high magnetic conductivity stainless steel with strong corrosion resistance.
- The tabletop is a 3-layer sandwich honeycomb structure with good vibration isolation performance. The side plates of the tabletop are black aluminum-plastic plates, and the four corners are wrapped with stainless steel, which is simple and beautiful.
- The support frame is equipped with casters for easy movement and adjustment.

- The humanistic design concepts are adopted, so it is applicable for teaching and scientific research.

3.3 Stereoscopic Overview Diagram



3.4 Vibration Isolation System

This equipment adopts the membrane damping vibration isolation system. The membrane damping vibration isolation system is mainly composed of airbag, air chamber, high-damping pinhole and auxiliary mechanical structure. When the external vibration noises of the ground, environment, etc. or the vibration noises of the tabletop equipment during operation are transmitted to the membrane damping vibration isolation system, the deformation of the airbag such as extrusion, stretching, translation, rotation and shearing is caused, and the air flows back and forth between the airbag and the air chamber through the high-damping pinhole

vibration absorber, thus eliminates the vibration effectively. On the other hand, the texture deformation and extrusion of the whole air cushion structure will also play certain damping role.

In order to eliminate the vibration impact, beside adopting the cushion type damping system, the multi-grade composite materials are also adopted at the joints of ground and support legs to further play the role of damping and vibration reduction.

3.5 Self-leveling System

In the active pneumatic isolation support system, the regulators A, B, C and regulating rods ①②③ interact, and make the tabletop always keep horizontal state through the changeover air valve. The regulators are fixed at the lower surface of the tabletop. If the tabletop is forced to press against a vibration isolator due to interference or load increase, the regulating rods will be lowered, and a precision three-way air valve will be opened at the same time to make air enter the pneumatic supports, and the tabletop will return to the horizontal state automatically; if the load decreases and the tabletop rises, the valve will be closed, the air pressure in the pneumatic supports will be reduced, and the tabletop will return to the horizontal state automatically.

IV. Installation Preparation and Transport

4.1 Installation Environment

Please examine whether the installation place meets the below requirements:

1. The use environment of this set of equipment is required to be indoor. Due to its large volume and weight, it is inconvenient to move flexibly after installation. Therefore, before installation, please confirm the building structure and bearing strength of the installation place, whether the installation area is sufficient, and whether the installation position is suitable for use and maintenance regulating after installation.

2. Examine the ground flatness and inclination of the installation place, and make the ground undulation not exceed 2mm/m² and the inclination not exceed 0.2°.
3. The air source of this set of equipment is an electric-driven air compressor. Before installation, please examine whether the power supply voltage, frequency and support power apply to the working needs of air compressor.
4. The normal working environment temperature of this set of equipment is 10~35°C, and it shall be ventilated, dust-proof, moisture-proof, and oil waste gas proof. There shall be no high temperature and explosive and flammable articles around the equipment, and there shall be no strong vibration source around and near the equipment.

4.2 Equipment Transport

When transporting the equipment to the installation site, please pay attention to the below cautions:

1. When selecting manual transport, please ensure meeting the safety transport standards of the located country or located place. It is suggested to select the professionals for transport. If there are no corresponding safety transport standards, we suggest:
 - a) When a single piece is transported by a single person, the transport weight shall not exceed 25kg;
 - b) When a single piece is transported by more than a single person, the average load of a single person shall not exceed 20kg, and there shall be a specially assigned person to be responsible for commanding and coordinating;
 - c) When a single piece has the weight of not exceeding 25kg but the volume inapplicable for a single person to transport, multiple people are also required to assist in transport;
 - d) During manual transport, please handle with care, avoid fatigue

operation, and strictly ensure personal safety.

2. The weight and volume of the tabletop and legs are very large, so it is suggested to transport by selecting mechanical way. In case of condition limitation, the manual transport can be selected prudently, and the provisions of the above Article 1 shall be followed. During the transport, the collision and strong vibration shall be avoided.

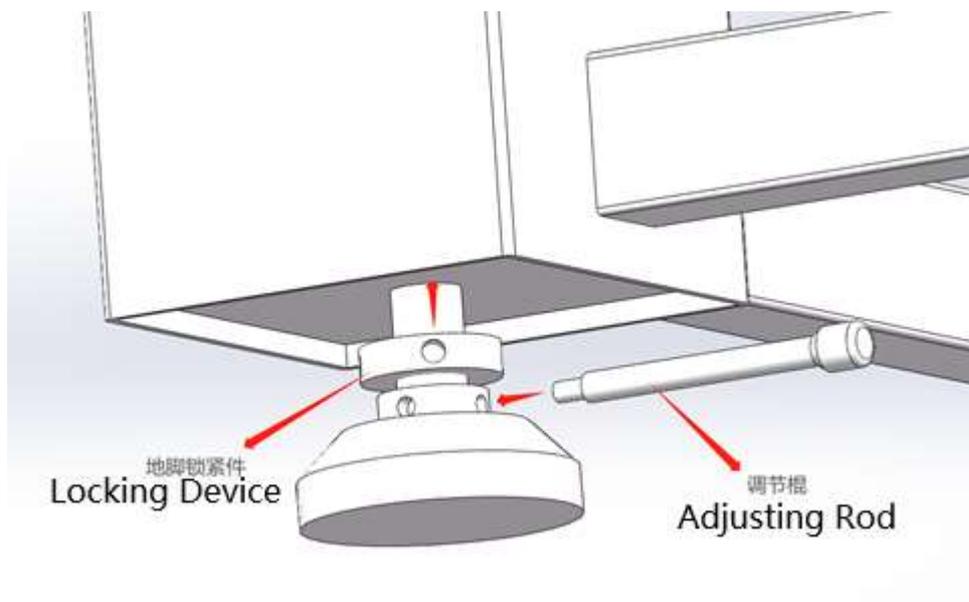
3. During the transport of air compressor, the inclination and inversion shall be prevented; and the collision and vibration shall be strictly forbidden to avoid damaging the equipment.

V. Installation Steps

1. Put the support frame at the required place.

2. Wipe clean the rubber surface where the legs contacting the lower surface of the tabletop by use of a low-fiber soft cloth. Then put the tabletop on the support legs, and lay it in the middle from the left to right.

3. Regulate the feet at the bottom of the support legs to make the castors separate from the ground, then put the level ruler on the tabletop, regulate the four feet, observe the level ruler, and make the tabletop stay in the horizontal state without inflation.

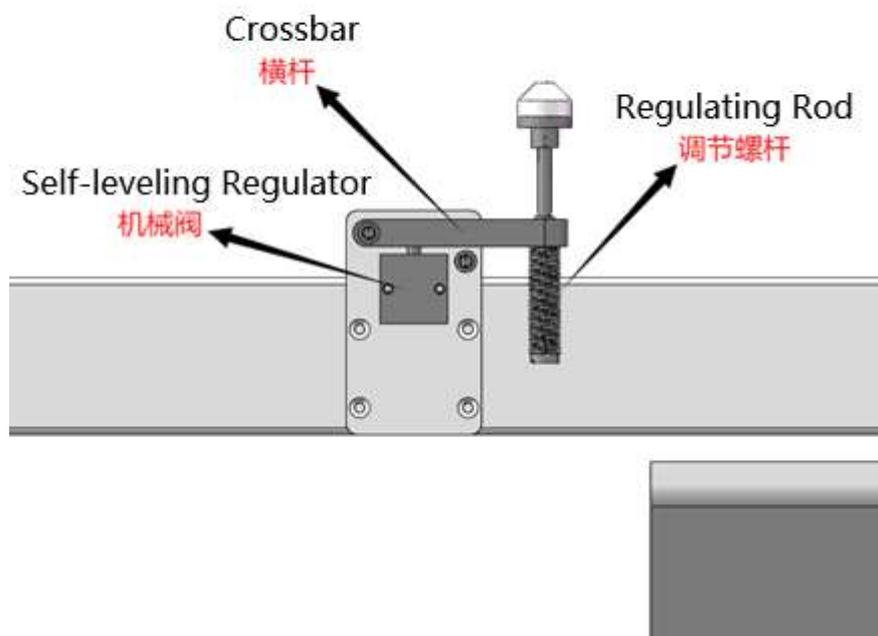


Support foot adjustment method: Rotate the adjusting rod clockwise, and the support foot will fall. Rotate the adjusting rod counterclockwise, and the support foot will rise.

Optical table leveling method: When the support leg is not inflated (adjust the bottom four feet to the ground until the caster is about 2cm off the ground), place a bubble level in the center of the tabletop and observe whether the bubble is in the center. If there is deviation, it means that the leg of the side in the deviation direction is high. It needs to adjust the foot on the side opposite to the deviation direction of the bubble level clockwise until the bubble is in the center position. Then turn the locking device of the foot counterclockwise until the locking device is tightly attached to the top.

4. Use the attached hose to connect the air valve and air compressor. Inflate the support legs and level the optical table with the three regulating rods.

VI. Commissioning Steps



1. Regulate the regulating rods ①, ②, ③ of the self-leveling regulators A, B, C to make them contact the lower surface of the tabletop, and screw the nuts of regulating rods to the lowest positions. Please note not to regulate the regulating rods too low to prevent crushing the self-horizontal regulators.
2. Turn on the air compressor power supply and inflation switch, and start to inflate slowly. Do not turn the inflation switch excessively to prevent the airbag from bursting or causing other damage due to rapid inflation.
3. During the inflation, please carefully observe whether the air compressor works normally, and whether the tabletop rises slowly. During this process, due to uneven inflation speed, the table legs with quick inflation will have the air valve exhaust, which is a normal phenomenon.
4. When the tabletop rises and the regulating rods contacting the bottom surface of the tabletop fully, the valves of the regulators will close automatically. Stand still for several minutes, and make the air reservoir state of each table leg tend to stabilize.
5. Regulate the nuts of the regulating rods respectively and slowly, and adjust the tabletop to the horizontal state. During the regulating process, there will be a certain delay in the tabletop lifting, so please wait for several minutes after regulation, and continue to regulate after the tabletop state is stable. During the regulating process, it is unnecessary to lift the tabletop too high. The tabletop being 5~15mm away from the outer edge of the table legs is enough to ensure the tabletop working normally and stably. Moreover, due to the uneven ground, the distance from the tabletop to the outer edge of each table leg may be different, which is a normal phenomenon.
6. Carefully examine whether the air circuit has any condition of air

leakage. When necessary, apply a proper amount of soapy water on the inspection position, and observe whether there are bubbles.

VII. Accessories

7.1 Air Compressor





- ① Power plug: three-core plug external power cord (factory equipped)
- ② Pressure gauge for air storage tank: factory preset 0.8Mpa
- ③ Outlet gas adjustment switch: clockwise rotation to increase the air pressure, counterclockwise rotation to reduce the air pressure (no adjustment is required for daily use, factory preset)
- ④ Outlet pressure gauge: display output pressure, recommended air pressure 0.2-0.4Mpa
- ⑤ Air outlet switch: connected with the oil-water separator on the support frame, the status in the figure is closed, and the air outlet is turned on by turning the switch 90° counterclockwise.

⑥ Water drain switch: the status in the figure is off, turn the switch 90° counterclockwise to open the drain (Note: when the air compressor is not used, please release the water in time to ensure the purity of the air, and the factory is equipped with $\varnothing 8\text{mm}$ water drain hose.)

⑦ Power switch

1. The air compressor is installed with an automatic air pressure switch. During the normal working, when the pressure of the air storage tank reaches 0.8Mpa (preset when leaving the factory), the electric contact of the pressure regulator is separated, and the motor will stop working automatically. When the air pressure in the air storage tank drops to a certain value (0.2~0.4MPa), the air pressure switch restarts, and the motor restarts. If it is necessary to regulate the air pressure switch, please open the casing beside the exhaust valve after powering off, and then turn the regulating screws according to the instructions on the label of the pressure switch.

Warning: It is strictly forbidden to regulate the air pressure switch under live conditions.

2. Turn on the drain valve to drain the water every half a month or one month.

3. During the use of the air compressor, please follow the relevant codes for safe use of electricity.

4. During the running of the air compressor, please do not touch the high-temperature components to avoid burn.

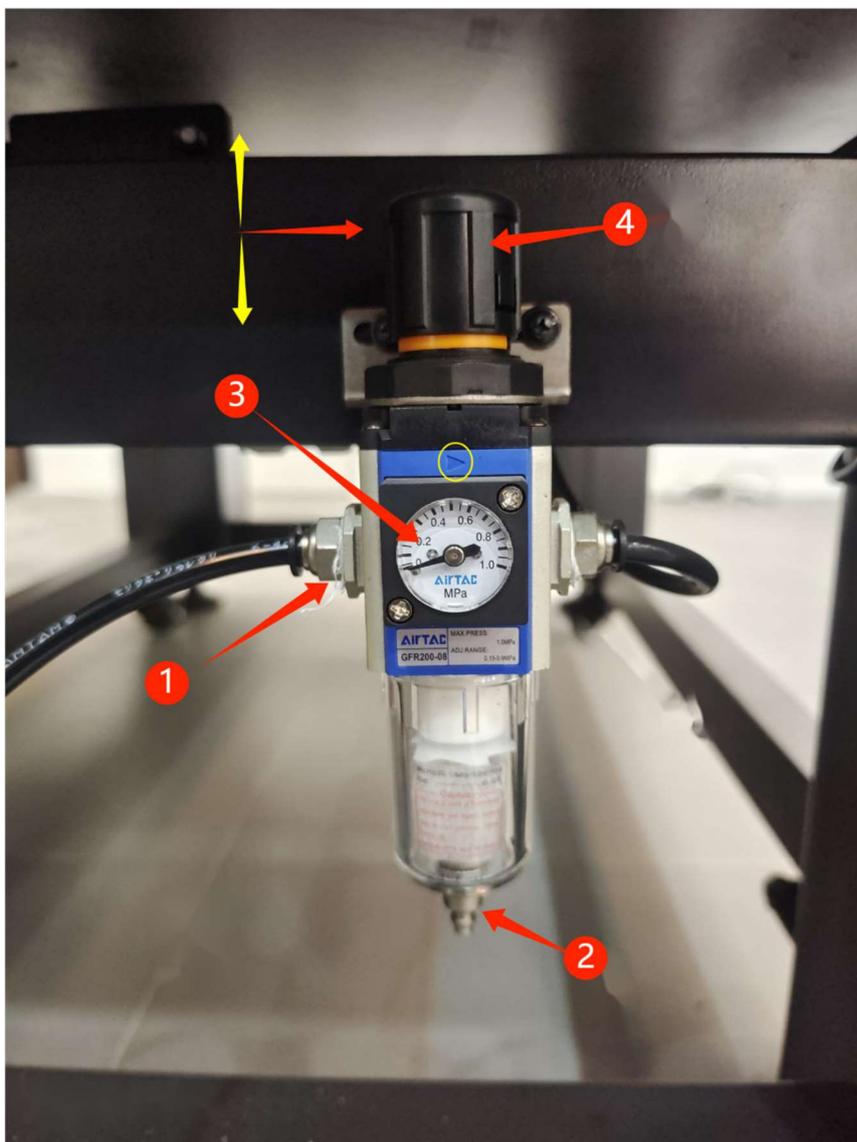
5. In case of no use of the air compressor for a long time, please cut off the power supply and empty the compressed air in the air storage tank, so as to prevent any accident.

6. During the daily transport or maintenance and repair, please empty the compressed air in the air storage tank.

7. When there is a deformation of the air storage tank, excessive air pressure or too high temperature in the air storage tank, failure of the safety valve or pressure gauge, fire, or other emergencies, please cut off the power supply of the air compressor immediately, and empty the compressed air in the air storage tank.

Warning: Must not repair or fasten the pressurized part of the air storage tank when there is pressure in the air storage tank.

7.2 Oil-water Separator



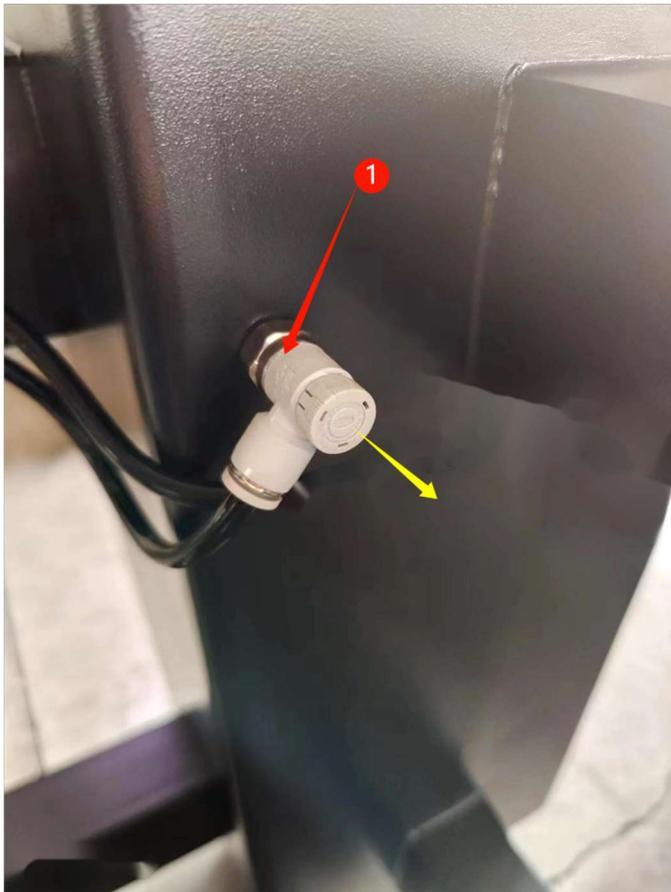
- ① Air source input port: connected to the air compressor outlet.
- ② Gas relief nozzle: Due to the differential pressure effect between the

air compressor and the air bag, when the pressure in the air compressor tank is less than 0.2Mpa, the pressure relief nozzle will start to release gas until the tank pressure reaches 0.2Mpa or more, which is a normal phenomenon. (Noise will be generated during pressure relief. During pressure relief, you can press the pressure relief nozzle by hand for about 15s, until the air pressure of the gas storage tank recovers to more than 0.2Mpa.)

③ Air pressure gauge: used to show the pressure of the internal air bag of the supports (recommended pressure 0.2 ~ 0.4Mpa)

④ Pressure regulator: turn clockwise to increase the pressure, turn counterclockwise to reduce the pressure (unplug the cap on the top of the regulator when adjusting, and press the cap after adjusting.)

7.3 Air Damper Valve



① Damping valve: used to precisely adjust the pressure inside the leg

chamber.

Note: A damping valve is installed on each leg at the factory, which has been adjusted to the best condition at the factory. Do not adjust the damping valve unless in special circumstances.

Adjustment method: Unplug the top cover of the damping valve, turn clockwise to reduce the air pressure, turn counterclockwise to increase the air pressure. After adjustment, press the top lid to lock.

VIII. Daily Use and Cautions

8.1 Use and Maintenance of Tabletop and Support Legs

1. Do not use beyond the load-bearing upper limit of the system. When not supporting the tabletop, the load-bearing upper limit of the four support legs system is 1,000Kg, and the load-bearing upper limit of the six support legs system is 1,500Kg.
2. In order to ensure the stability of the center of gravity when the tabletop is working, please do not put the objects with too high center of gravity or too large volume on the tabletop. Meanwhile, in order to ensure the normal working of the self-leveling system, when putting objects, the center of gravity shall be slightly inclined to the side of the table leg installed with the self-leveling valve (the side of B and C table legs).
3. When putting any object, please handle with care, and try best to avoid the relative friction which will damage the working tabletop and reduce the use precision.
4. Please do not sit or stand on the tabletop.
5. Since the 25×25 M6 screw holes are uniformly distributed on the tabletop, please do not put the granular or rod objects with a size less than 5.5mm on the surface to avoid falling in the inside of the tabletop and affecting use.
6. After the installation and commissioning of the optical table are

completed, unless necessary, please do not adjust the hand knob regulating device on the self-leveling valve freely during use.

7. During use, it is strictly forbidden to bump, push and pull, press and lift the tabletop, so as to avoid causing accidents and destroying the self-leveling structure.

8. Please do not clean this product by use of acidic liquid, so as to avoid damaging the surface quality of this product. Do not rinse this product with water to avoid rust.

9. In case of no use for a long time, please discharge the air in the vibration isolation supports, so as to avoid creep of the vibration isolation airbag.

8.2 Use Environment

1. This equipment can only be used indoor.

2. The normal working environment temperature of the equipment is 10~35°C, and it shall be dust-proof, moisture-proof, and oil waste gas proof. There shall be no high temperature and explosive and flammable articles around the equipment, and there shall be no strong vibration source near the equipment.

3. Please ensure good ventilation.