

**(s) Table**

**Active Pneumatic  
Vibration Isolation Table**

Installation and Maintenance

**SUPERTECH**

## **Specifications of the Vibration Isolation Table**

Size of the top plate: depends on the actual order. The smallest size is 98 x 66 cm

Height of the top plate from the floor (small tables): 78 cm (adjustable +/- 2 cm)

Height of the top plate from the floor (big tables): 78 cm + extra height. There is an addition to the height because of the higher thickness of the big (greater than 1 m<sup>2</sup>) top plates. This addition depends on the size of the top plate.

Vibration attenuators: 2nd order linear phase pneumatic filters built into the cylinders

Corner frequency of the high-cut isolators: 10 Hz

Membrane material in the cylinders: fine and durable silicone rubber

Weight of the legs: 130 kg

There are two models of top plates. The actual one depends on the order.

The first version of the top plate is a steel-polymer honeycomb structure. It is covered by stainless steel surface with special magnetic feature. There are strong metric M6 holes on the top plate in a raster pattern of 100 x 100 mm. You can use either magnetic base, or screws to fix any objects on the top plate.

The second version of the top plate is an Impala granite model. Fixing holes in diameter of 12 mm, or metric M6 holes can be ordered to the granite top plates. The place of these holes can be specified in the order, but the number of the holes are limited in 4 pieces.

Weight of the top plate: 85 kg for the 98 x 66 cm model. Other values can be calculated according to the rate of the surface.

Maximum mass load of the legs: 4 kN, including the top plate

Gas supply: any kind of non-toxic, not flammable, not aggressive gas (e.g. Nitrogen, compressed air)

Pressure of the gas supply: from 1 to 2.2 Bar

The absolute pressure limit of the gas supply: 2.5 Bar

## **The parts of the Vibration Isolation Table**

The Table has got four legs, and a top plate. The legs are assembled together with strong horizontal beams. In every legs there is a pneumatic working cylinder on the top of the leg. These working cylinders form a virtual surface, on which the top plate is floating. The actual height of the pistons in the working cylinders are controlled by pneumatic control systems built on the valve assemblies. Physically the Table has got four legs, but logically it is a table with three legs. This feature gives an excellent stability for the Table. This trick is realized on that way that the two legs on the front have got their own control systems each. But the two legs on the rear side of the Table are internally connected parallel and controlled by only one control system. This arrangement forms a virtual middle-position leg between the two rear legs. If you want to move the table, it is practical to remove the top plate, because it is very heavy. The leg system should be moved in one unit. The legs must not be disassembled, and the working cylinders must not be removed from the legs. Before removing the top plate, the gas supply should be switched off and its tube should be disconnected from the table. There are only two tasks necessary to do before removing the top plate: 1) switch the gas supply off, and disconnect its tube 2) new disposable fixing tapes should be installed (see the text later and Figure 3.). The fixing tapes should be installed during the transportation periods only. Never apply a gas supply, if the fixing tapes are installed, because it will blow the silicone membranes of the working cylinders immediately.

There is a very popular and comfortable accessory of our Tables: the Quiet Air Compressor. This compressor requires no adjustment or maintenance, but it can work for decades. The working actions of the compressor make no pneumatic or mechanical disturbances for the table. There is only one data should be noticed: the starting pulse of electric current of the Quiet Air Compressor is 12 A. You can find detailed description of the Quiet Air Compressor later in this manual.

## **Protection rules**

There are a few general rules to protect the table. Never open the tube of the gas supply between the air filter and the table. The filter must be connected always. If you want to disconnect the gas supply, you can do it at the input connector of the air filter. The fixing tapes of the height sensing levers (see the text later and Figure 3.) should be installed during the transportation periods only. Never apply a gas supply, if the fixing tapes are installed, because it will blow the silicone membranes of the working cylinders immediately. Never disconnect any internal pneumatic connectors, because it will result a continuous loss of the gas supply. The working cylinders must not be disassembled, and they must not be pulled out from the legs. The working cylinders are calibrated by the factory and connected to their appropriate places internally. You should never disassemble or open the screws of the valve assembly in any case. All the screws are fine calibrated and fixed on the valve assembly. They must be held in their original position always, except the height adjustment spring (see Figure 3.) With the height sensing springs of the valve assemblies (see the description later) you CAN NOT adjust the horizontal error of the top plate. The

horizontal error is determined by the leg system. You can find the description how to adjust the leg system correctly later in this booklet.

## **Unpacking and first time installation**

First you should remove all the packing materials and packing assemblies. Free the leg system, the top plate, the Quiet Air Compressor, and the base discs independently. In this phase the fixing tapes of the height sensing levers should be installed (as this is the transport position fixed by the factory). Put the leg system to its final place and refine its position. After positioning the adjustment of the horizontal position of the legs is necessary (see the next paragraph for this topic). After adjusting the legs you can put the top plate on the legs, and you should cut and remove the fixing tapes of the levers. Now you can apply the gas supply. The starting position of the height sensing springs are calibrated by the factory and no other adjustment is necessary. If you should refine it, please see the appropriate paragraph below. Finally you should check the vertical position of the pistons in the working cylinders. If any more adjustments is necessary (it can happen, because the vertical position of the cylinders depend on the position of the top plate in comparison with the legs), please see the description later and the explanation of Figure 5.

## **Positioning and adjustment of the legs**

See Figure 1. Put the base discs under each legs between the floor and the height adjusting screws. The height adjusting screws are very strong screws with 2 inches in diameter. There are turning holes drilled through the height adjusting screws. You can turn them with an appropriate rod tool put through the adjusting screw. Never turn the height adjusting screws with hand, because the thread is sharp and it can cause a serious injury of your fingers. Put a spirit-level on the lower horizontal beams on the top sides of the beams. You can position the leg system in a fine horizontal position with the height adjusting screws. It is an iterative procedure. You should put the spirit-lever on the front-to-back beams on both sides, and the rear beam, too. During the measurements you can fine adjust the horizontal position of the complete leg system. With the height sensing springs of the valve assemblies (see the description later) you CAN NOT adjust the horizontal error of the top plate. This adjustment can be carried out only in this phase with the height adjusting screws. Finally when you find the horizontal position of the leg system perfect according to the spirit-level, you should check the turning torque of the four height adjustment screws. The torques should be approximately equal to each other. This is the only checking method to test the really stable position of the legs on the floor, because if the torques are equal, than the mass forces on the four legs are equal, and the leg system can not tip over.

## **The parts of the Working Cylinder**

See Figure 2. In the figure you can see all the key elements of the Working Cylinder. After the installation, and periodically during the lifetime of the Table the position of these parts should be checked. The actual position of the piston shown in Figure 2. is a wrong position. It is shown in a too high position (see later the explanation of Figure 4.). The reason, why it is shown in an inadequate position is that the silicone membrane can be seen in this position of the piston only. The working position of the piston is determined by the height sensing spring (which can be seen in Figure 3.).

## **The parts of the Valve Assembly**

See Figure 3. The Valve Assembly is a quite difficult part of the Table. The reason, why it is realized on a base plate independently from the leg is, that there are many parts on the Valve Assembly, which are fixed in the factory and must not be modified under any circumstances. If there is any trouble with the control system, the complete Valve Assembly can be changed with the two fixing screws. It is a very easy repairing procedure. After changing the valve assembly, only the adjustment of the height sensing spring is necessary. There is a precise protection mechanism of the valve is realized on the valve assembly. The valve is a very sensitive part. The role of the security bumper is to protect the valve against the huge force appearing in that cases, when no gas supply is applied and the height sensing lever is pressed down by the mass force of the top plate. The height sensing spring is a special construction. Under normal working circumstances (when the table is working) it works as a solid stick, because the spring is quite strong compared to the working force of the lever. When the gas supply is switched off, the height sensing spring is shortened by the huge mass load of the top plate. The actual position of the piston of the working cylinder is determined by the adjustment of the height sensing spring. Always be careful about the disposable fixing tapes. They should be installed during the transportation periods only. Never apply a gas supply, if the fixing tapes are installed, because it will blow the silicone membranes of the working cylinders.

## **Adjustment of the optimal position of the piston**

See Figure 4. The total vertical moving distance of the piston in the cylinder is approximately 20 mm. The task of the height sensing spring is to determine the optimal position of the piston. That is the best case, when the piston is located on the halfway of its total movement. It would be quite difficult to measure this position, but there is a more simple method. It is drawn in Figure 4. In the optimal position the top surface of the piston, and the top surface of the working cylinder form a common surface (see the middle drawing of the figure).

## **Vertical adjustment of the piston**

See Figure 5. Before carrying out these adjustments, the optimal position of the piston should be adjusted as described in the previous paragraph. When the optimal position is perfect, you should check the vertical position of each pistons. When there is no gas supply (after installation or repositioning of the top plate) the holding mats find an undefined position on the bottom surface of the top plate. When the table is working, you can see, if the vertical position is good or not. If it is not good, the top surface of the piston, and the top surface of the working cylinder are different surfaces with an angle between them. However the height of the piston is good, this relation of the surfaces is not perfect. This situation can be seen on the upper drawing in Figure 5. The good vertical position can be seen on the lower drawing. If you want to modify the vertical position of the piston (with moving the holding mat horizontally on the bottom surface of the top plate), you should lift the top plate. It is quite heavy, be careful. You should minimize the angle shown on the upper drawing. If you try to modify, move the holding mat with small distances. One millimeter movement of the holding mat on the bottom surface of the top plate results approximately two degrees in the angle difference of the surfaces (between the piston and the working cylinder).

## **Quiet Air Compressor**

There is a very popular and comfortable accessory of our Active Vibration Isolation Tables: the Quiet Air Compressor. This compressor requires no adjustment or maintenance, but it can work for decades. The Quiet Air Compressor has got its internal pressure regulator circuit optimized to supply our Vibration Isolation Tables. The working actions of the compressor make no pneumatic or mechanical disturbances for the table. If there are no externally forced mechanical transients on the top plate of the Active Vibration Isolation Table, the compressor starts itself a few times a workday. A usual Active Vibration Isolation Table has got such a level of air leakage what starts the Quiet Air Compressor one, or two times a day. If the Quiet Air Compressor starts itself more than five times a day, please call the repair service.

## **Specifications of the Quiet Air Compressor**

High pressure by default (switch off): 2.5 Bar

Low pressure by default (switch on): 1.5 Bar

Other pressure range also can be specified in the order

Internal air buffer: 3 liter

Supply voltage: 230 VAC (unfortunately 115 VAC version can not be manufactured)

Current consumption in the working periods: 1.6 A

Starting current (as maximum): 8 A

## **Important notes about the Quiet Air Compressor**

Quiet Air Compressor is not a dangerous equipment, but you should inspect it. If you recognize, that your Quiet Air Compressor works continuously, please stop it immediately, and do not switch it on again! In such a case please call the repair service immediately! The total worktime of the motor built into the Quiet Air Compressor is 1000 hours. In normal case (when the motor starts a few times a day for a minute) the estimated lifetime of the Quiet Air Compressor is approximately 30 years. But if the motor works continuously, the 1000 hours means 41 days only! After spending the lifetime of the motor the Quiet Air Compressor can even catch fire! If the motor stops, but the voltage is applied (it is the situation when a fault appears), the current of the motor is increased dramatically, resulting a very high temperature. There is an internal thermal protector fuse, what normally breaks the current in such a case. But this fuse can also become faulty in worst case, resulting a fire in your lab, and the building!

The Quiet Air Compressor must not be tilted, because the internal lubricant oil would flow out on the tube connectors.

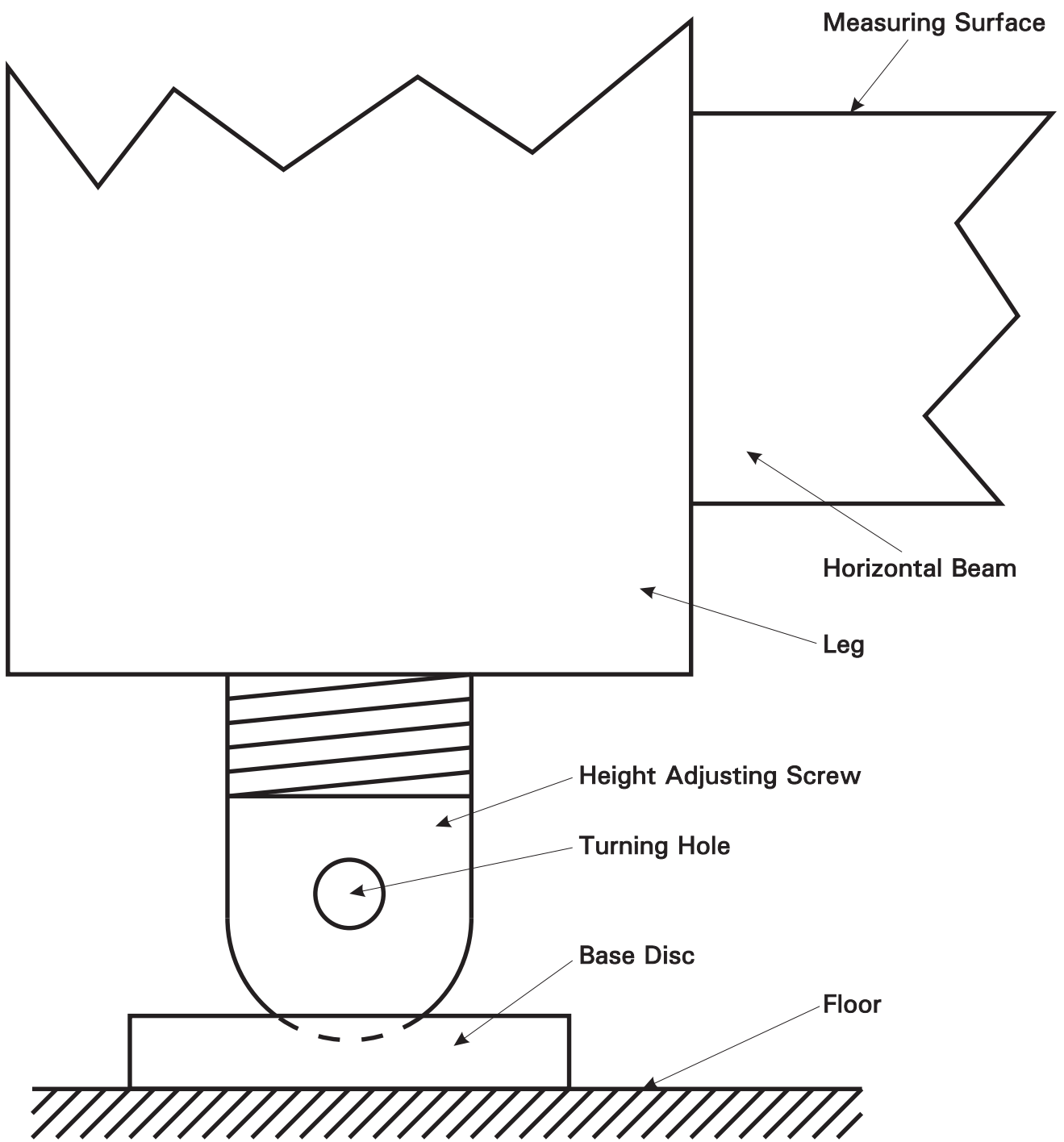
The starting current of the Quiet Air Compressor is approximately 12 A. It is decreased to the nominal 1.6 A in a few seconds after starting the motor, but it is necessary to connect the Quiet Air Compressor into a wall plug capable to provide 12 A of current.

## **"Optical" pattern, and "optical" breadboards**

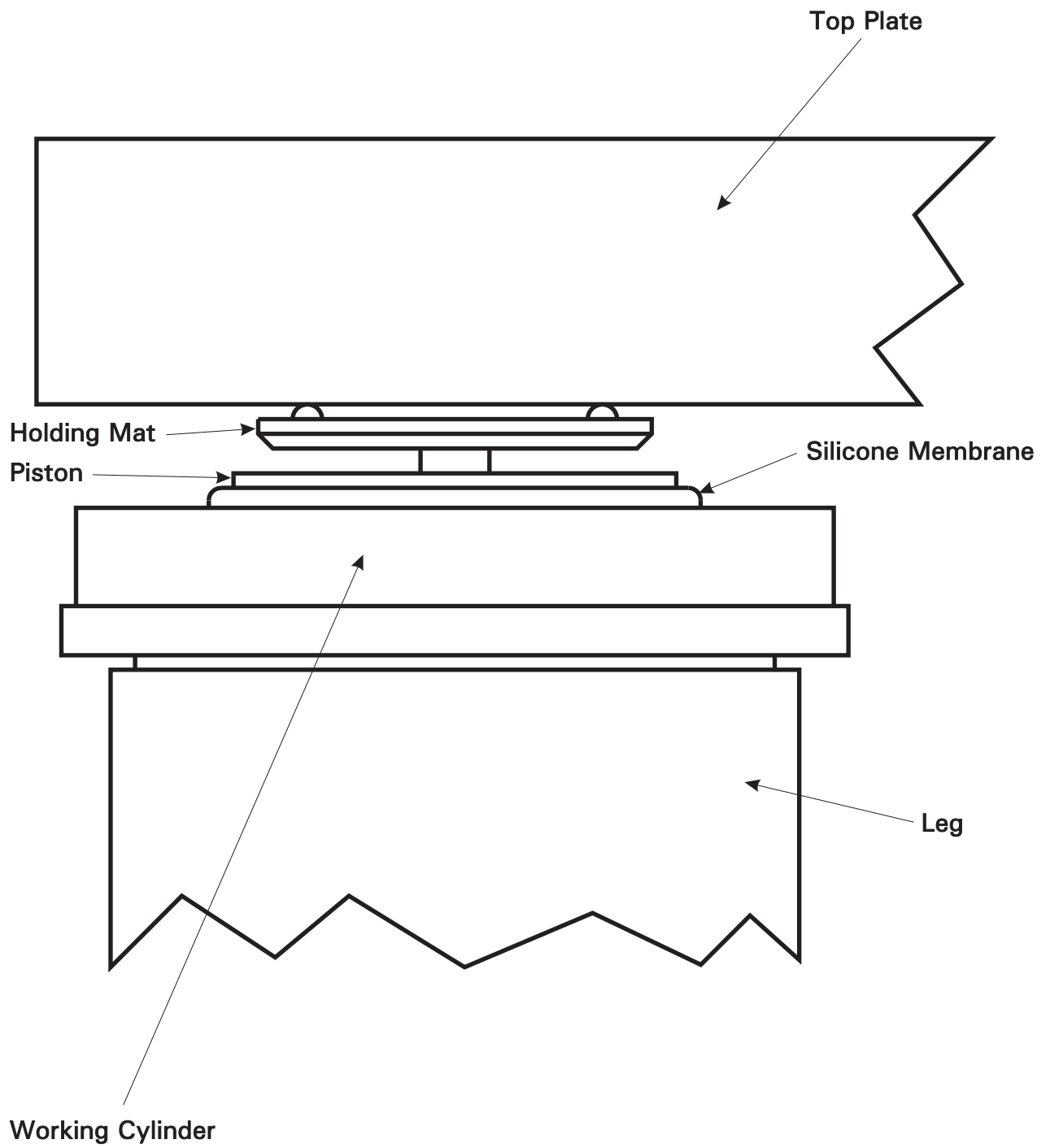
"Optical" pattern means: there are M6 threaded holes in 25x 25 mm pattern on the top plate. It is an optional feature of the steel-honeycomb top plates. It is useful, if many small optical elements (such as lenses, mirrors, lasers, etc.) should be positioned strongly, and precisely. The "Optical" pattern can be drilled in our workshop during the manufacturing process of the steel-polymer honeycomb structured top plates.

"Optical" breadboard means: an additional thin plate containing M6 threaded holes in 25x 25 mm pattern. This "optical" breadboard should be placed on the top plate of the Vibration Isolation Tables. It is covered by stainless steel surface with special magnetic feature.

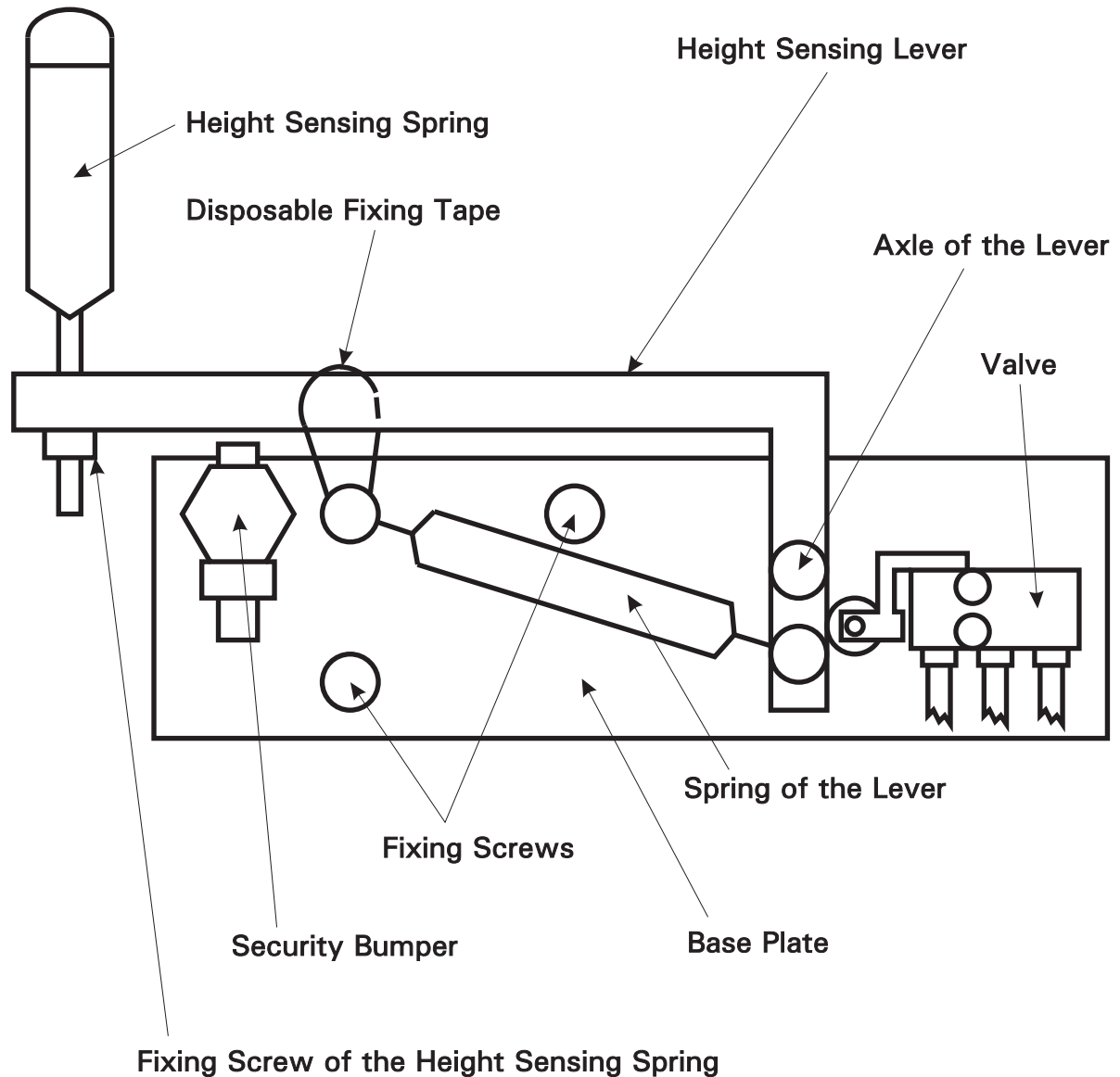




**Figure 1. Horizontal positioning of the legs**



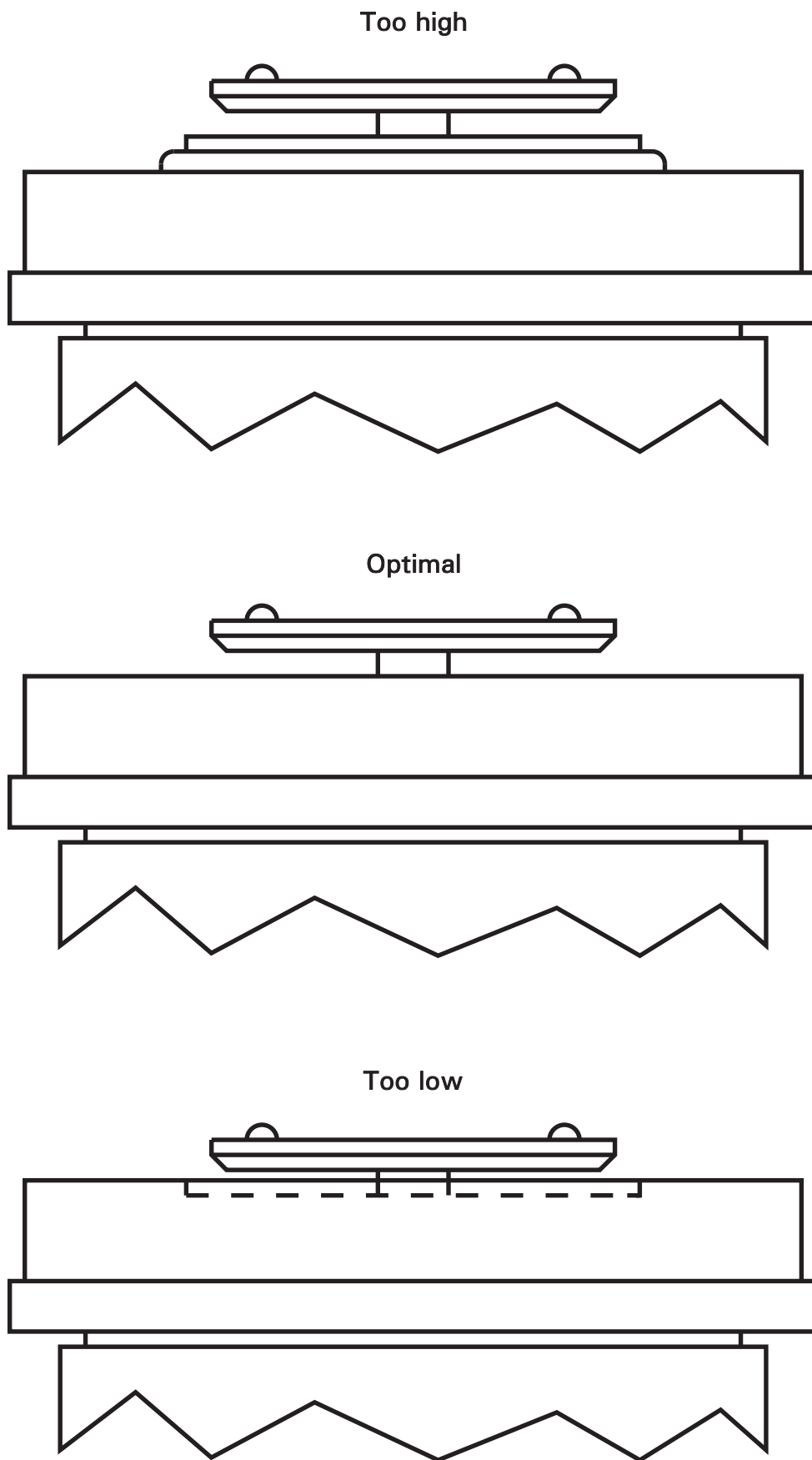
**Figure 2. Parts of the Working Cylinder**



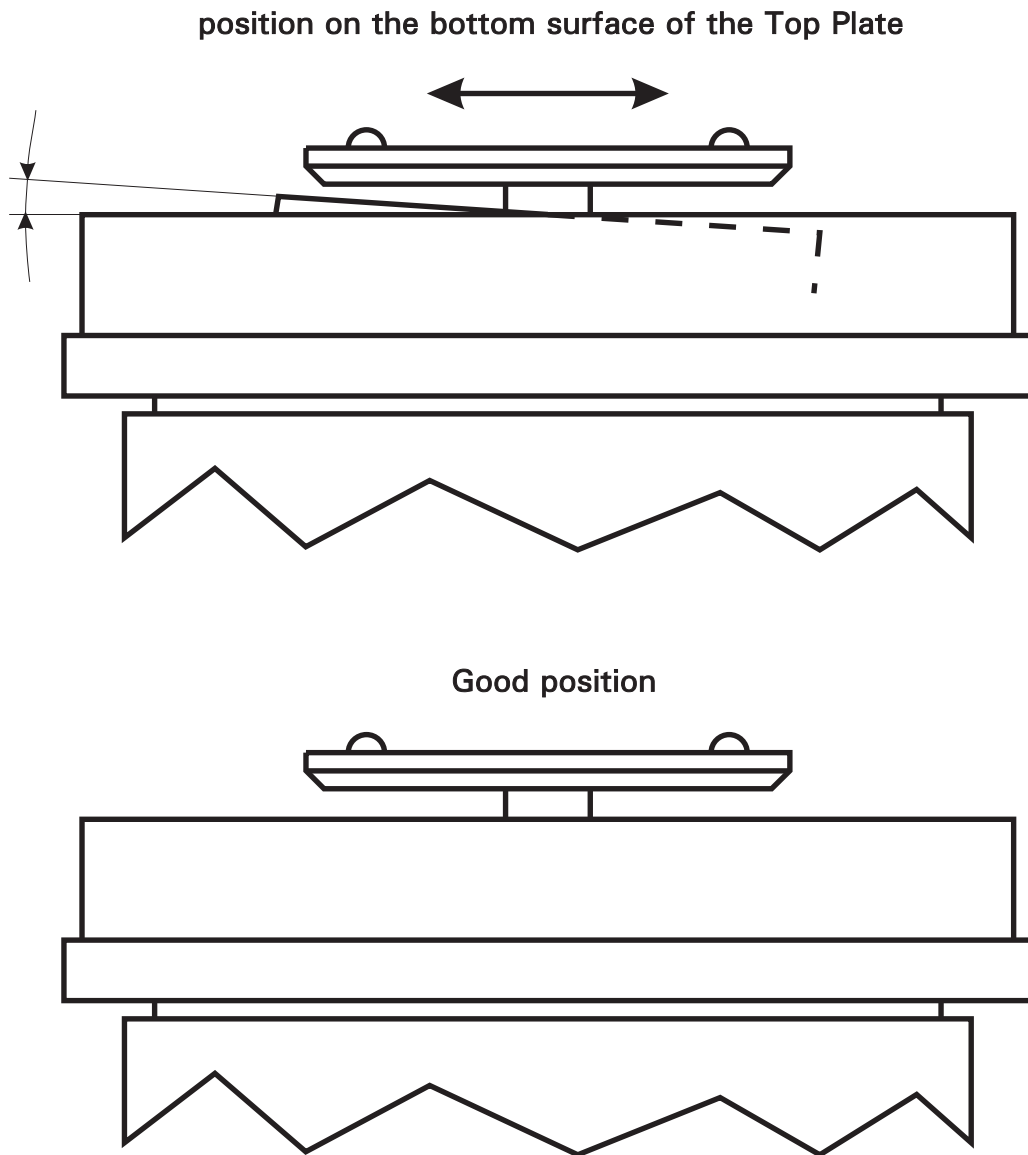
If there is any adjustment seems to be necessary, only the Fixing Screw of the Height Sensing Spring should be opened, and the Height Sensing Spring should be turned into another position. After making the modification the Fixing Screw should be closed again.

Modification of any other parts of this Valve Assembly is prohibited, because serious damage of the Silicone Membrane and/or the Valve can happen.

**Figure 3. Parts of the Valve Assembly**



**Figure 4. Adjusting the height of the Piston in the Working Cylinder**



**Figure 5. Vertical position of the Piston in the Working Cylinder**

# Attenuation of (s)Table vibration isolation table manufactured by SUPERTECH Ltd.

