

STable (©)

Active Pneumatic
Vibration Isolation Table

User Manual

SUPERTECH Instruments

Technical Specifications of the STable (©) Active Pneumatic Vibration Isolation Tables

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

Flatness error: +/- 0.25 mm per meter as maximum anywhere on the top plate

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

Working pressure ranges of the gas supply:

2.0 to 2.2 Bar for the "small" tables

5.0 to 7.0 Bar for the "big" tables

The absolute pressure limits of the gas supply:

2.5 Bar for the "small" tables

7.5 Bar for the "big" tables

Weight of the leg system: approximately 120 kg

Color of the leg system: RAL 5019

Weight of the top plate: depends on the size, 160 kg / m²

Rigidity of the top plate: the deformation of a 180 x 149 cm top plate, if 2 kN concentrated force load is applied to its middle point: 12 microns (0.47 mil). We carried out the same measurement on a SmartTable UT top plate, too. The rigidity of STable (©) top plate was two times better.

Deformation of the top plate for temperature change: the deformation of a 180 x 149 cm top plate, measured in the middle, if mass load was not modified, but we increased the temperature with 10 Centigrade: 8 microns (0.3 mil). We carried out the same measurement on a SmartTable UT top plate, too. The self deformation of STable (©) top plate for temperature change was nearly three times better (smaller).

The unit weight (the weight referring to the same size) of STable (©) top plates is approximately two times bigger compared to SmartTable UT top plates. But we will keep manufacturing of welded steel structure top plates, because we focus on the better performance instead of the lighter weight.

Top plate is a welded steel honeycomb structure by default. It is covered by dull stainless steel surface, but with special magnetic capability (which allows fixing magnetic stands). There are metric M6 holes drilled on the top plate in 100 x 100 mm pattern by default. If you do not need this default hole pattern on the top plate, in other words you need a top plate without holes, you should specify it in the order.

There is an orderable option: "Optical" hole pattern, what means M6 threaded holes in 25 x 25 mm pattern on the top plate. Other, custom-specified hole arrangements, or special shaped, even big holes (e.g. for bottom or base port) can be ordered, as well.

You can order any size of table. Custom size of table does not mean harder price, only longer manufacturing time is necessary (because they are not on stock as the frequently sold models). The smallest available size is 98 x 66 cm.

Active Pneumatic Vibration Isolation Tables (small size)

In our terminology "small" size means, if the top plate is smaller than 1 m².

Thickness of the top plate: 105 mm

Height of the top surface of the top plate from the floor (small tables): 82 cm (adjustable +/- 2 cm)

For a "small" table, optionally, you can order Impala granite top plate. This is a very resistant and smart material, but it is a very difficult procedure to make holes on the surface of the granite plate. However we accept requirements for a few holes. The specification of the fixing holes on the granite plate should be discussed before placing the order.

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

Active Pneumatic Vibration Isolation Tables (big size)

In our terminology "big" size means, if the top plate is bigger than 1 m².

Thickness of the top plate: 165 to 345 mm (depending on the size)

Height of the top surface of the top plate from the floor (big tables): 90 cm + size-dependent-extra-height. There is a size-dependent addition to the height because of the bigger thickness of the "big" top plates. This addition of height depends on the size of the top plate. For a given size of table please ask us for the actual height.

Maximum mass load of the legs: 8 kN, including the top plate.

The parts of the STable (©) Vibration Isolation Table

The Table has got four legs, and a top plate. The legs are assembled together with strong horizontal joint beams. In every leg 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.

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 simple, but very important security rules to protect the Table. It is indispensable to keep them!

Never open the tube of the gas supply between the air filter and the Table. The air filter must be connected always. It protects continuously the pneumatic system of the Table against dirt and dust. If you want to disconnect the gas supply from the Table, you should do it at the input connector of the air filter.

The disposable fixing tapes or rubber rings on the height sensing levers (see the text later and Figure 3.) should be installed during the transportation periods only! These disposable fixing tapes or rubber rings are used to fix the height sensing levers to their security bumpers. Never apply a gas supply to the Table, if the fixing tapes or rubber rings are put onto the height sensing levers, because if the height sensing levers can not move, it will blow up 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 and fault in the Quiet Air Compressor.

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 assembled into their appropriate places internally.

You should never disassemble or open any screws of the valve assembly in any case. All positions of the screws are fine calibrated and fixed on the valve assembly by the factory. They must be kept in their original position always, except the height sensing springs (see Figure 3.). Height sensing springs are the only parts which can be adjusted by the user.

With the height sensing springs of the valve assemblies (see the description later) you CAN NOT adjust the horizontal level error of the top plate. The horizontal level error is determined by the leg system. You can find the description how to adjust the horizontal level of the leg system correctly later in this User Manual.

If you want to move the Table, it is practical to remove the top plate from the leg system, because the top plate is very heavy and it is easier to move it independently.

The leg system should be moved as one unit. The legs must not be disassembled and the working cylinders must not be removed from the legs.

Before removing the top plate from the leg system, the gas supply should be switched off and its tube should be disconnected from the Table (at the input connector of the air filter).

There are only two tasks necessary to do before removing the top plate from the leg system:

- 1) Switch the gas supply off, and disconnect its tube.
- 2) New disposable fixing tapes or rubber rings should be installed (see the text later and Figure 3.) to fix the height sensing levers to their security bumpers. The fixing tapes or rubber rings should be installed during the transportation periods only! Never apply a gas supply to the Table, if the fixing tapes or rubber rings are put onto the height sensing levers, because if the height sensing levers can not move, it will blow up the silicone membranes of the working cylinders immediately!

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, the armrest, the armrest screws and the table-leg chocks (holding mats) independently. In this phase the disposable fixing tapes or rubber rings should be left on the height sensing levers to fix them to their security bumpers (as this is the transport position set by the factory). Put the leg system to its final place and refine its position. After final positioning the adjustment of the horizontal level 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 must remove the disposable fixing tapes or rubber rings from the height sensing levers. Now you can connect and apply the gas supply. The starting position of the height sensing springs are calibrated by the factory and usually no other adjustment is necessary. However if you would like to refine it, please see the appropriate

paragraph below. Finally you should check the vertical position of the pistons in the working cylinders. The vertical position of the pistons depends on the current position of the top plate compared to the leg system. If any more adjustments are necessary, please see the description later and the explanation of Figure 5.

Positioning and adjustment of the legs

See Figure 1. Put the table-leg chocks (holding mats) under each leg 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 turning holes of the height adjusting screws. 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 joint beams on the top sides of the beams. You can position the leg system in a fine horizontal level 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 level 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 level error of the top plate. The adjustment of the horizontal level can be carried out only in this phase with the height adjusting screws. This is a delicate feature of STable (©) Active Pneumatic Vibration Isolation Tables, because the legs of other manufacturers are more simplified. The pneumatic control system deals with keeping the optimal position of the pistons in the working cylinders (to understand the aim and function of the pneumatic control system see Figure 2. and Figure 4. and their explanations). Finally when you find the horizontal level position of the leg system perfect according to the spirit-level, you should check the out-turning (clockwise turning from top looking) torque of the four height adjusting screws. The four out-turning torques should be approximately equal to each other. This is a fancy trick, how to measure forces by measuring torques. This is the only verification method to test the really stable position of the legs on the floor, because if the four out-turning torques are equal, than the mass forces on the four legs are equal and the leg system will not waggle.

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. Figure 2. shows the piston in a slightly wrong position. The piston is shown in a bit too high position (see later the explanation of Figure 4.). The reason, why the piston is shown in an inadequate position in Figure 2. is that the silicone membrane can be seen in this (too high) 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 assembled on a removable base plate independently from the leg, that there are many parts on the Valve Assembly, which are fixed, fine adjusted and calibrated in the factory. They 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 proper adjustment of the height sensing spring is necessary. There is a precise protection mechanism of the valve 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 height sensing lever. When the gas supply is switched off, the height sensing lever is pushed onto the security bumper and the height sensing spring is shortened by the huge mass load of the top plate. The actual position of the piston in the working cylinder is determined by the adjustment of the height sensing spring. Always take care of the disposable fixing tapes or rubber rings. They should be installed during the transportation periods only! Never apply a gas supply, if the disposable fixing tapes or rubber rings are installed, because if the height sensing levers can not move, it will blow up the silicone membranes of the working cylinders immediately!

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 angle adjustment of the piston

See Figure 5. Before carrying out these adjustments, the optimal positions of the pistons should be adjusted as described in the previous paragraph. When the optimal positions of the pistons are perfect, you should check the vertical angle positions of each piston. 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 angle position is good or not. If it is not good, the top surface of the piston, and the top surface of the

respective working cylinder form different surfaces with an angle between them. However the height of the piston is good, this parallel relation of the surfaces is not perfect. This situation can be seen on the upper drawing in Figure 5. The good vertical angle position can be seen on the lower drawing in Figure 5. If you want to modify the vertical angle position of the piston (with moving the holding mat horizontally on the bottom surface of the top plate), you should lift the top plate a little bit. It is quite heavy, be careful! You should minimize the angle shown on the upper drawing in Figure 5. 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 respective working cylinder).

Quiet Air Compressor

There is a very popular and comfortable accessory of STable (©) 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 STable (©) Active Vibration Isolation Table, the compressor starts itself a few times a workday. A usual STable (©) 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 consult the repair service for help.

Specifications of the Quiet Air Compressor

Default pressure range for the "small" tables:

- Low (switch on) pressure: 2.0 Bar
- High (switch off) pressure: 2.5 Bar

Default pressure range for the "big" tables:

- Low (switch on) pressure: 5.0 Bar
- High (switch off) pressure: 7.0 Bar

The default pressure ranges are optimized for STable (©) Active Vibration Isolation Tables manufactured by Supertech Instruments. Other pressure range can also be specified in the order, because we manufacture Quiet Air Compressors for any user defined specification.

Volume of the internal air buffer tank: 3 dm³

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

Current consumption in the working periods: 1.6 A

Peak current in the starting periods (approximately 2 seconds): 12 A

Weight: 20 kg

Important notes about the Quiet Air Compressor

Quiet Air Compressor is not 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 work time 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 STable (©) Vibration Isolation Tables. It is covered by stainless steel surface with special magnetic feature.

Attenuation diagram of the STable (©) Vibration Isolation Table

At the end of this booklet enclosed please find the attenuation diagram of the STable (©) Vibration Isolation Tables manufactured by Supertech Instruments. This attenuation diagram is downloadable from our website, too. In the diagram the relative attenuation is shown as a function of the frequency. During the measurements a vertical excitation was applied at the floor standing the Table on. The spectral characteristic of the excitation was a white noise. The measurements were carried out in the time domain, and then they were transformed off-line to the frequency domain.

Warranty

We give you full warranty service, including rest parts for the period of 3 years by default. Longer warranty periods can also be defined and agreed (the actual conditions should be discussed before placing the order). Usually and basically we repair the faulty equipments in our workshop. The expense of the shipment should be covered by our customers.

The warranty does not cover the faults made by the user.

If the installation was not carried out on a workmanlike manner, the warranty ceases. We provide many resources to help you to install the product correctly: user manual, installation manual, repair manual, free helpdesk on the phone and in email. With this background the workmanlike installation is easy. However if you are not sure you can do it, you can involve our product specialist.

Since the STable (©) Vibration Isolation Tables and Quiet Air Compressors are heavyweight equipments, they would be expensive to transport. In case of a fault there are two possible alternate solutions:

1) The product specialist of Supertech Instruments travels from the Factory to the location of the Table, and repairs on site. In this case the expense of the repair task (spare parts, and the labour costs) is paid by Supertech Instruments, but the traveling costs (to there, and back, too), and the accommodation expenses (if necessary, if the distance is far) are paid by the customer. In such cases Supertech Instruments counts the real pure travel costs (without applying any profit on it), because to support the perfect repairing is our interest, too.

2) Supertech Instruments provides all the necessary spare parts and background support (technical documentation, email, phone and videophone consultation, etc.) for the repair action. The customer provides a qualified and practiced professional who repairs on site. This way the travel costs (mentioned in the previous paragraph) can be spared by the customer. In such cases the customer should choose the appropriate specialist, and the customer has all the responsibilities for the professional quality of the chosen specialist. The first action what the local specialist must do is to read and

follow every step of the Fault Locating Checklist issued by Supertech Instruments. After completing the steps of the Fault Locating Checklist the local specialist has to consult (on the phone, via email or videophone) the product specialist of Supertech Instruments and must follow his instructions. This way the local specialist can efficiently repair by the full support of the product specialist.

Further information sources

Technical hotline via email (all of them work):

office@superte.ch

office@supertechinstruments.co.uk

office@super-tech.eu

International technical hotline on the phone: + 36 20 9234 386

For further technical information please visit our websites. Supertech Instruments continuously uses several websites with the same content. Please use that one, which is the easiest for you to remember:

www.superte.ch

www.supertechinstruments.co.uk

www.supertech-instruments.co.uk

www.supertech-instruments.com

www.super-tech.eu

Specifically for the STable (©) Vibration Isolation Tables you can find four more websites with the same content, too:

www.optical-table.com

www.airtable.eu

www.opticaltable.eu

www.vibrationisolation.eu

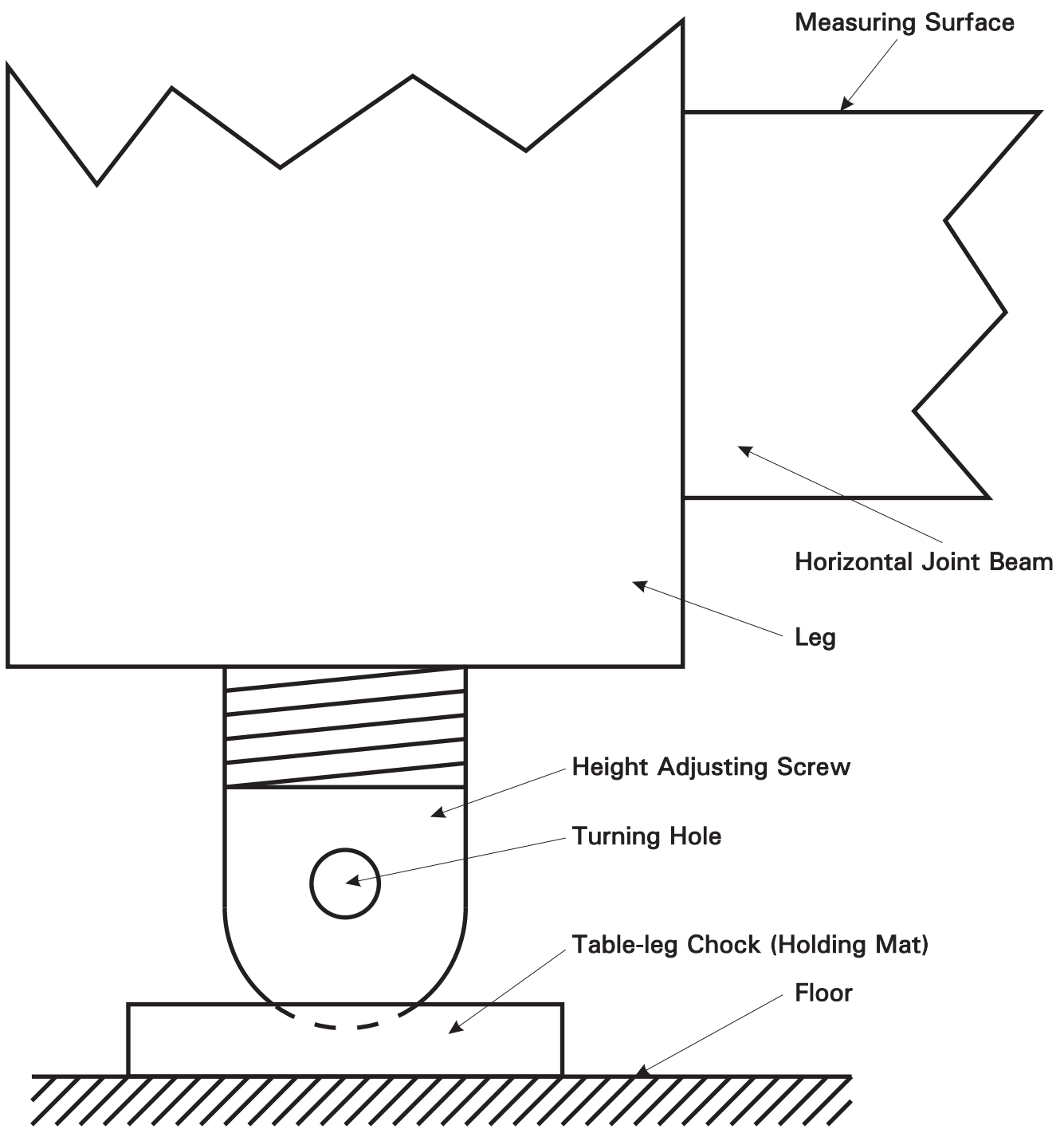


Figure 1. Horizontal level positioning of the leg system

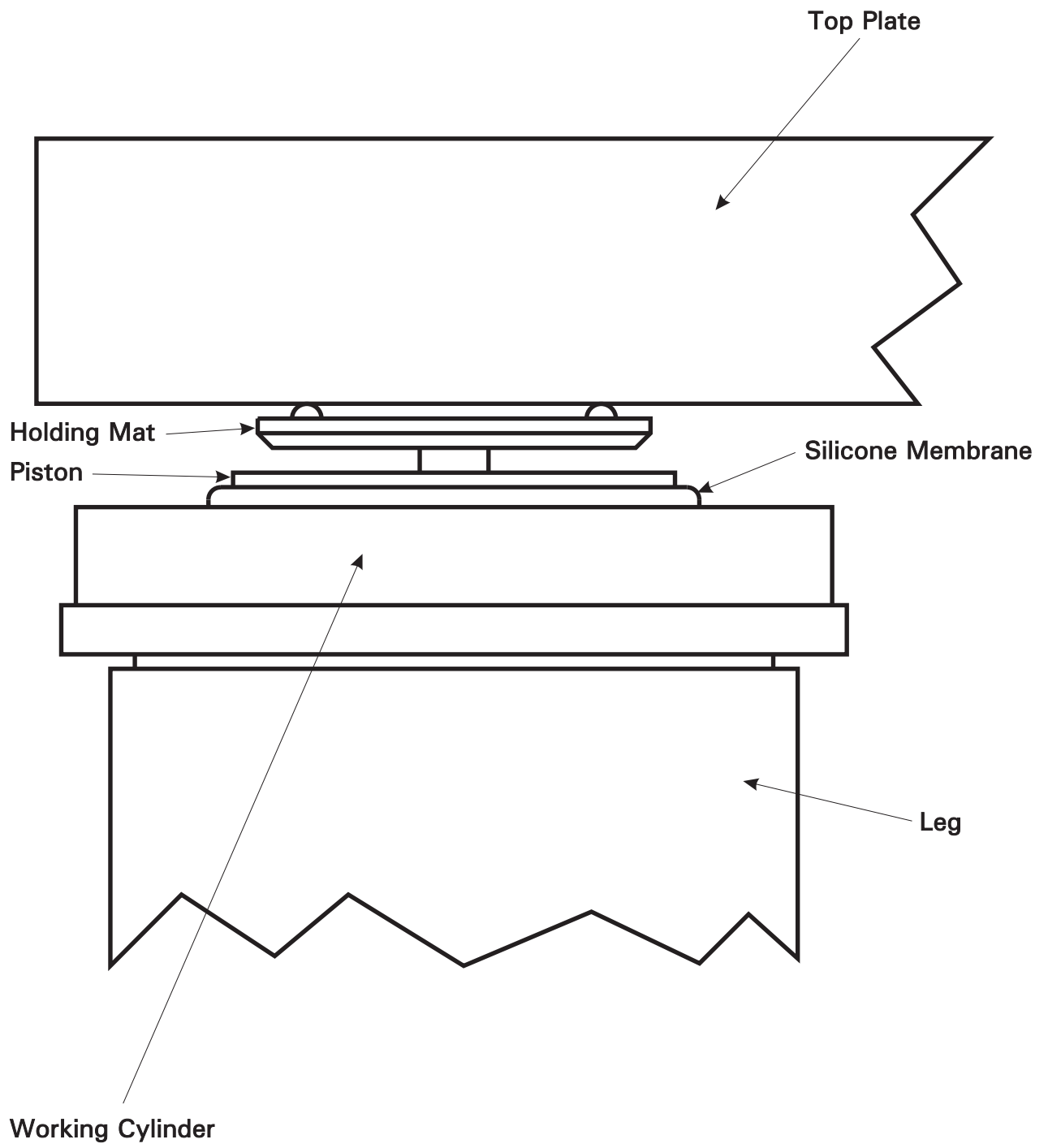
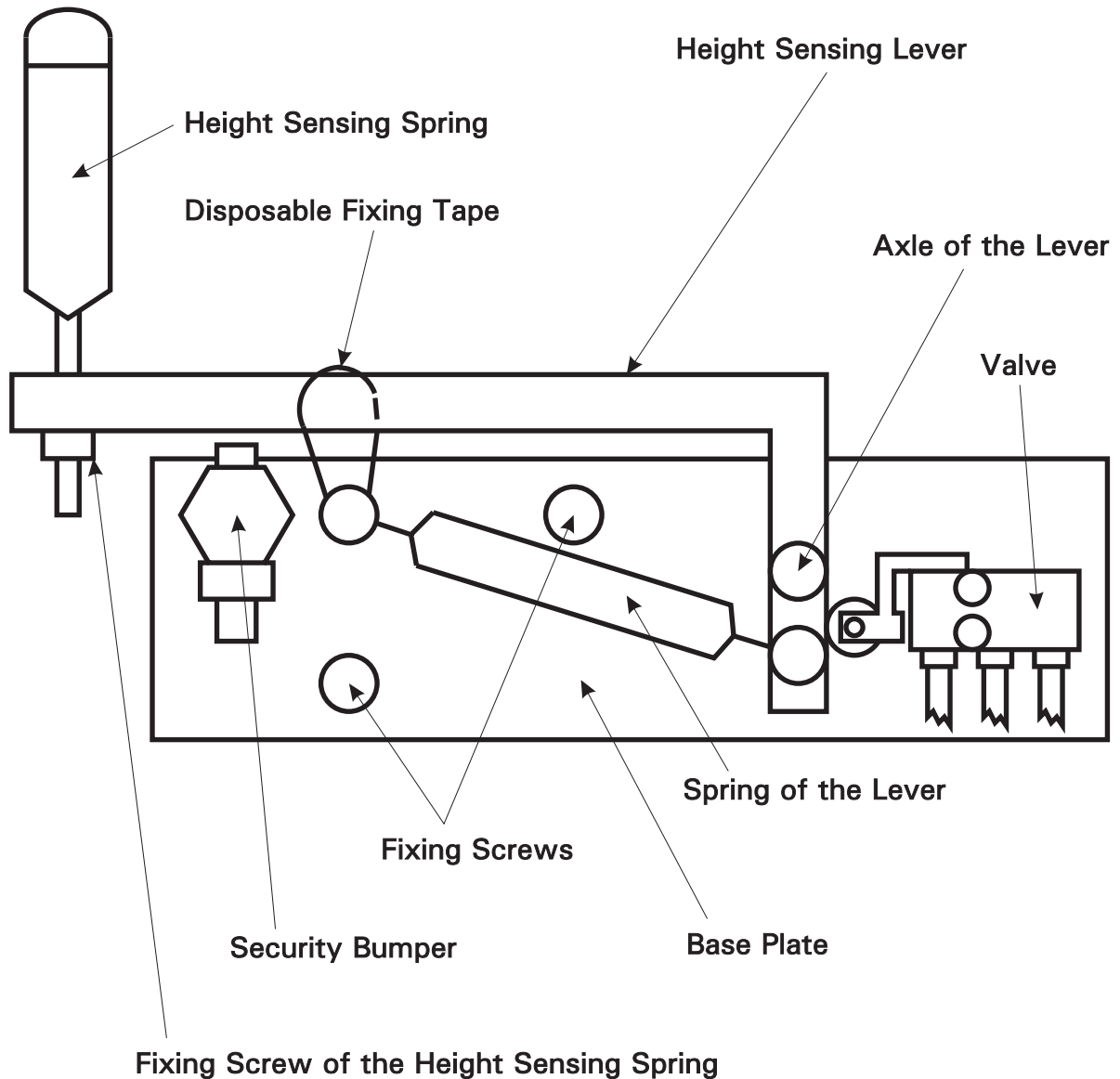


Figure 2. Parts of the Working Cylinder



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

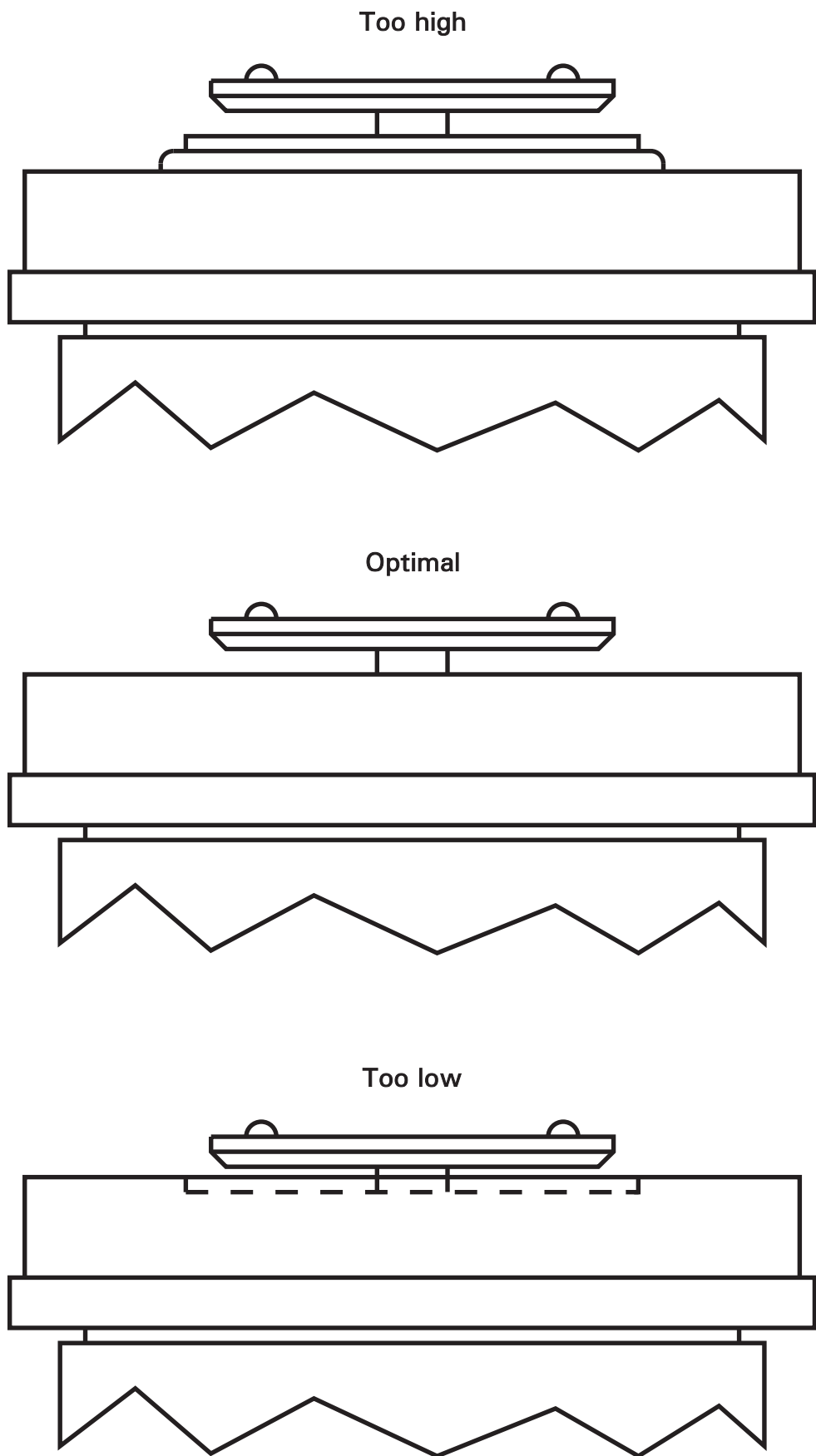


Figure 4. Adjusting the height of the Piston in the Working Cylinder

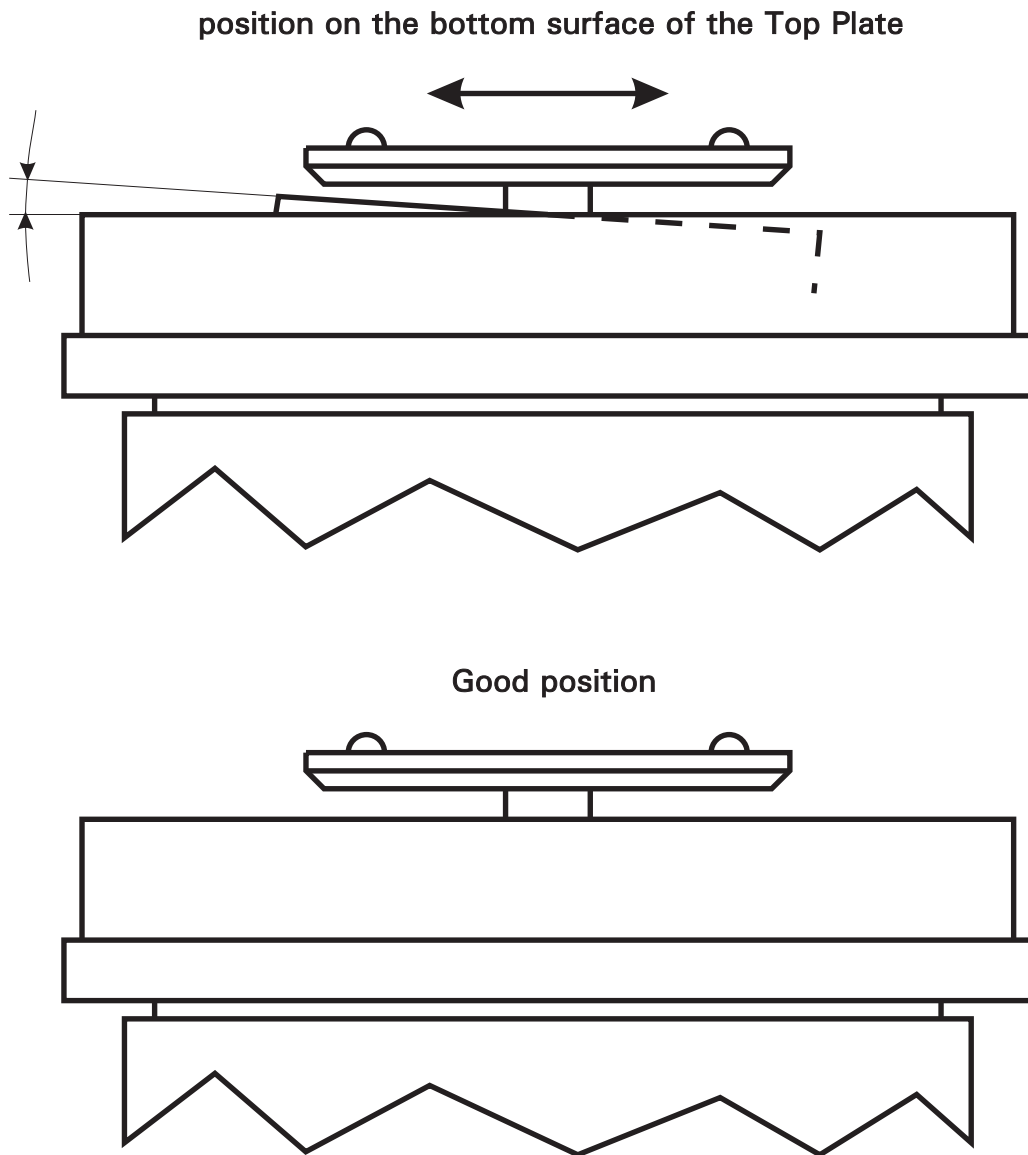


Figure 5. Vertical angle position of the Piston in the Working Cylinder

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

