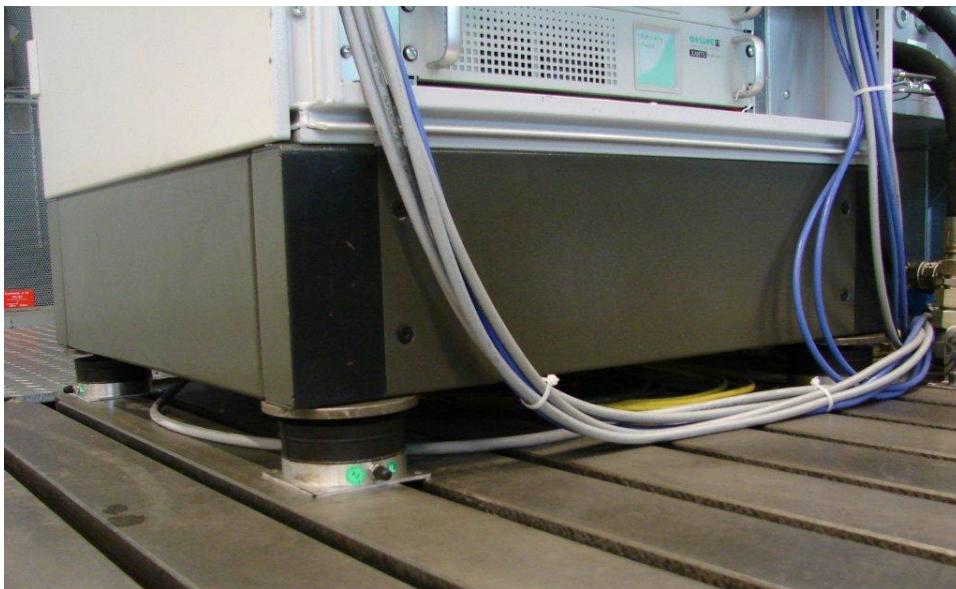


Operating manual PLM air spring system Precision levelling mount system



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1. Key information

1.1 Safety precautions

Read through this manual carefully before installing and using the air spring system for the first time.

If you have any questions or if something does not make sense to you, do not use the air spring system; contact ACE Stoßdämpfer GmbH instead.

Tel. +49 (0)2173-9226-20

Failure to follow this instruction manual may result in burst PLM air spring elements or physical injury due to crushing.

National statutory provisions take precedence over this manual.

ACE shall not be held liable for installation faults or any resulting damage if you should choose to install the air spring system yourself.



1.2 Explanation of symbols



Safety and warning notice



Warning: Danger of crushing



Warning: Danger of bursting

1.3 Service address

ACE Stoßdämpfer GmbH
Albert-Einstein-Straße 15
40764 Langenfeld
Germany

T +49 (0)2173-9226-20

info@ace-int.eu
www.ace-ace.de

1.4 Key information



- Strictly observe statutory and operational accident and safety regulations.
- Immediately cut the compressed air supply to the control box and main line by closing the shut-off valve if parts of the air spring system such as the compressed air hoses or air springs are damaged. After that, completely vent the air spring system.
- Do not start the PLM air spring elements without load.
- Do not exceed the maximum load according to Table B.
- Do not exceed the maximum pressure according to table B. Check the pressure using a pressure gauge.
- Never repair the PLM air spring system while pressurised. Always completely vent the air spring system.
- Only move or alter the load after completely venting the individual PLM air spring elements.
- Make sure that the machine base is level.
- Vent the entire air system before removing system components.
- Protect the air springs and compressed air lines from dirt and damage during PLM air spring system installation and operation. Dust, swarf and similar may cause the control valves to malfunction.
- Always have qualified personnel commission, service and repair the PLM air spring system. Send defective air springs, control valves and similar to ACE Stoßdämpfer GmbH for inspection after consultation.
- The sole intended purpose of ACE PLM air spring systems is to provide active and passive vibration isolation of machines and devices. The user shall be liable for any damage due to improper operation or use.

2. System description

The sole intended purpose of ACE PLM air spring systems with control valves is to provide active and passive vibration isolation of machines and devices. The air spring system responds immediately to any changes in load or shifts in the centre of gravity of the machine or foundation, and automatically controls the level of the machine or foundation by pressurisation or depressurisation without impacting the effectiveness of vibration isolation.

3. INSTALLATION

Check the consignment for completeness before you start installation (cf. Appendix, air spring system parts list).

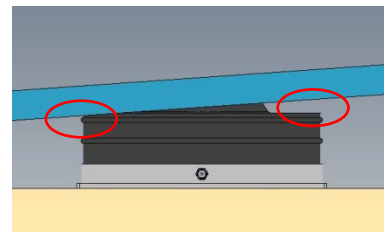
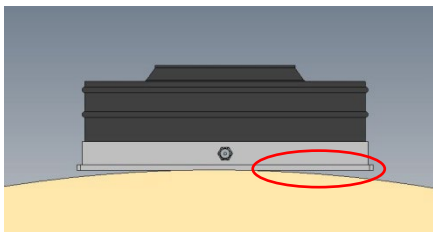
The operator is responsible for ensuring that the maximum operating pressure (max rated pressure) is not exceeded.

Only use individual air spring elements within the system.

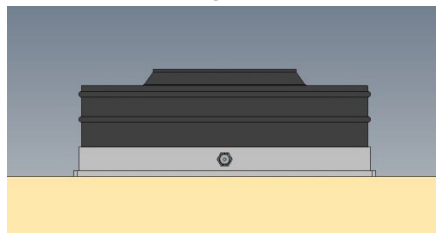
Check that the installation to be carried out agrees with the tubing plan (see Appendix) before installing the tubing. Connect the tubing between the control valves and PLM air springs according to the marking on the control valve. The "A" connection leads to the PLM air spring and the "P" connection to the inlet pressure supply.

1. Make sure that the contact surfaces have a flatness of ± 1 mm before pressurising the PLM air spring elements.

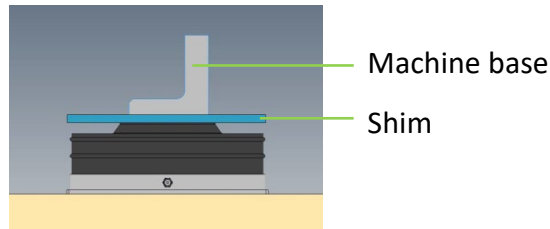
WRONG



OK



2. Position the PLM air spring element under the system to be isolated and secure it against slipping or shifting with the aid of the thread on the top of the PLM.
3. Make sure that the machine base to be isolated covers the entire surface of the PLM air spring element; a shim with minimum diameter "D" (Table A) between the machine base and PLM air spring element would be suitable.



4. Use the four holes in the base plate to help you attach the PLM air spring elements. Tighten the screws up to the specified torque.

3.1 Control valve installation

3.1.1 Air quality

Precision valves manufactured by ACE Stoßdämpfer GmbH are maintenance-free as long as air quality is maintained as specified. This means that the air supply components play a decisive role in the reliability and durability of the air spring system.

Failure to comply with air quality specifications will immediately void any guarantee, and no liability shall be entertained for direct or consequential damages.

The air supply must reach the following quality rating for the air spring system depending on the type of valve:

Based on DIN ISO 8573-1:2010 at p=1 bar, t=20°C
Maximum particle size at 5 µm for valves of type:

**PALV1-1, PALV1-1-H,
PALV1-2, PALV1-2-H,
PALV1-3, PALV1-3-H,
PALV1-4, PALV1-4-H,
PALV20-1,
PALV5-1, PALV5-1-H
PALV5-2, PALV5-2-H
PALV5-5, PALV5-6**

ISO 8573-1:2010 [3:3:0]

Maximum total oil content: 0.003 mg/m³

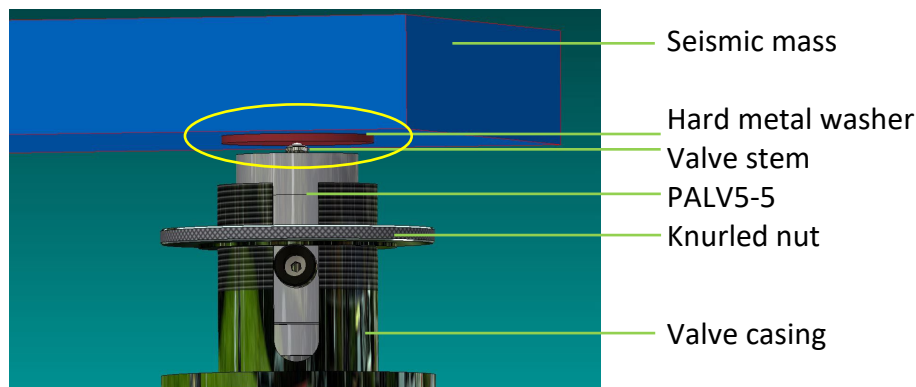
Refer to the parts list in the Appendix for the valve type names used in your air spring system.

Different requirements apply when using ACE air spring systems in or under climate chambers. Ask ACE Stoßdämpfer GmbH about these individual project-specific specifications.

3.1.2 Control valve installation

The valve stem position mechanically controls the PALV5-5. Air is fed or discharged into the PLM system depending on valve stem deflection.

The valve stem deflects via the underside of the seismic mass. The valve stem requires a hardened metal washer as stem seat. These hard metal washers are included with the system; position and secure them centrally above the valve stem using the power strip.



The valve may malfunction without a hard metal washer fitted. This may result in complete failure.



3.1.3 Control valve adjustment

Take the following steps after installing the air springs under the mounted mass:

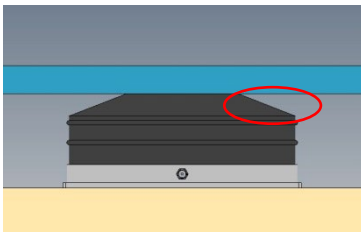
1. Make sure that the PLM is positioned at the same height as the control valve.
2. Position the control valve under the mass to be mounted with the plunger fully recessed in the valve housing.
3. Slowly open the compressed air supply upstream from the filter pressure regulator.
4. Observe the system's reaction. Make sure that it does not fill with air.
5. Gradually turn the pressure control knob clockwise until the mass gently begins to rise.
6. Increase the pressure to the air springs in 0.5 bar increments until the springs deflect to the required height. See value "X" in Section 5.1.
7. Now increase the operating pressure up to 1 bar in 0.5 bar increments. The spring deflection will not change.
8. Now turn the knurled nut on the valve housing clockwise until the PLM extends to around 5 mm (1 turn = 1.5 mm stroke).
9. From this position, fine-tune the horizontal alignment using a spirit level.
Result => final working height

10. After exact alignment, extend mobile masses and workpieces or tools into their outermost positions. Gradually increase the pressure by 0.5 bar back to working height (see step 9) if the air springs in a control loop should go into solid compression due to a shift in centre of gravity or increase in mass. After that, increase the operating pressure by 0.5 bar to 1 bar (see step 7).

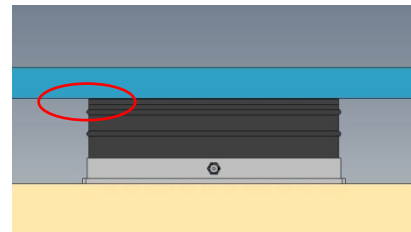
3.2 Adjustment

1. Set the working height within the given tolerances by letting air in or out of the individual air spring elements.
Adjustment range for PLM1 and PLM3: ± 3 mm
Adjustment range for PLM6 – PLM192: ± 6 mm
2. Check the total height for each individual air spring element against Table B. Repeat Step 1 to correct if necessary.

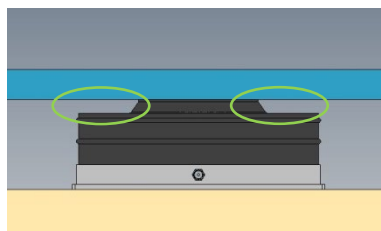
On exceeding the setting range



On undercutting the setting range



Perfect working conditions



4. Deinstallation

4.1 Safety

- Observe the respective SOPs and work procedures applicable.
- Use the protective equipment required for your particular activity.
- Always observe all local accident prevention regulations.
- Do not dismantle the air spring system until you have shut it down.
- The equipment must be shut down before working on the air spring system or any individual air spring.

1. Release all the air from each individual PLM air spring element.
2. You may then shift, move or change the load.

4.2 Storage

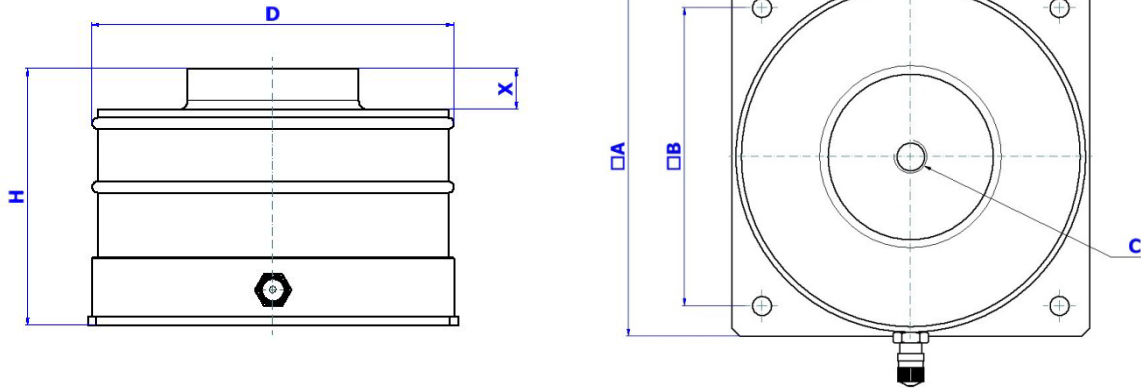
We recommend a damp cloth and neutral detergent for cleaning.
Do not use cleaners or solvents containing sand, chlorides or acids.
Seal the fittings and tubes using suitable plugs.

4.3 Disposal

Observe local regulations.

Contact your local authorities for information on environmentally sound disposal in your country if you wish to dispose of this product.

5. Technical specifications



5.1 Dimensions

Table A	□A in mm	□B in mm	C selectable, metric	C selectable, inches	Diameter D in mm	H in mm (working height)	Setting range in mm
PLM1	76.2	60.3	M10	3/8-16	74	62.5	±3
PLM3	106.4	88.9	M12	1/2-13	106	63.5	±3
PLM6	130.2	108	M12	1/2-13	127	89	±6
PLM12	174.7	152.5	M12	1/2-13	171	89	±6
PLM24	254	216	M16	5/8-11	246	89	±6
PLM48	343	304.9	M16	5/8-11	339.8	89	±6
PLM96	470	406	M24	1-14	468	89	±6
PLM192	610	508	M24	1-14	604	89	±6

5.2 Operating conditions

Table B	Max. load		Max. pressure	
	kg	lb	bar	psi
PLM1	45	99	6	87
PLM3	150	330	6	87
PLM6	250	551	6	87
PLM12	550	1,212	6	87
PLM24	1,100	2,425	6	87
PLM48	2,200	4,850	6	87
PLM96	4,400	9,700	6	87
PLM192	8,800	19,400	6	87



WHEN PERFORMANCE MATTERS

ACE Stoßdämpfer GmbH
Albert-Einstein-Straße 15
40764 Langenfeld
Germany

T +49 (0)2173-9226-20

info@ace-int.eu
www.ace-ace.de