

MECHANICAL LEVEL CONTROL SYSTEMS

EFFICIENT LEVEL CONTROL SYSTEMS FOR AIR SPRING INSULATORS COMBINED WITH THE HIGHEST LEVELLING CONSTANCY.



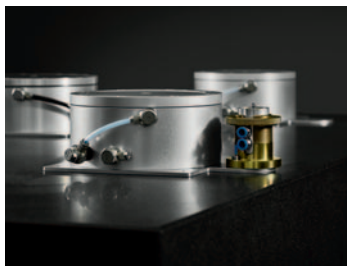
All information on our mechanical level control systems can also be found on our website.

Mechanical-pneumatic level control systems from Bilz are an essential component for the optimum functioning of a vibration insulation system using the FAEBI[®] and FAEBI[®]-HD rubber air springs or BiAir[®] membrane air springs.

They prevent impermissible deflection of the insulators or inclination of the machine caused by load changes on a machine or an air spring-mounted machine or system.

NOTES

- Supplied as a complete set which includes the 3 control valves and all necessary hose lines and connectors for 4 air springs. All components are also available individually as spare parts.
- On the LCV variant the air flow can be reduced using the throttle valve should the control system tend to overshoot. The PVM variant can also be fitted with a throttle valve as an option.
- In addition to the standard solutions listed here we also hold special versions with regard to material, flow, accuracy and restoring force.



Level control system (PVM version)



Level control system (Variante PVM)



Level control system
(PVM version with ducted exhaust air)



FUNCTION OF THE VALVES

The level is continuously sensed by means of a plunger. The position of the plunger is directly applied to the slide valve. The air spring supplied with compressed air via the valve is pressurised or vented according to the position of the valve slide. The target level is adjusted by turning the knurled adjustment ring. The height and level of the machine is adjusted using three valves.

FUNCTION OF THE MECHANICAL-PNEUMATIC LEVEL CONTROL SYSTEMS

The valves are used to adjust and automatically regulate the air pressure inside the insulators according to the respective load by means of rapid ventilation and venting. This enables the highest degree of stability and effective insulation even with changes in the centre of gravity.

DESIGN

A level control system consists of at least three mechanical-pneumatic valves and three air springs (Fig. 1). If more insulators are required due to reasons of design or load, the system must still be operated in three controlled groups (Fig. 2), as otherwise it is statically overdetermined. This is achieved by using multiple insulators in parallel as a group (Fig. 2). Optionally, an additionally available maintenance unit for compressed air preparation can be connected upstream of the control valves.

Fig. 1

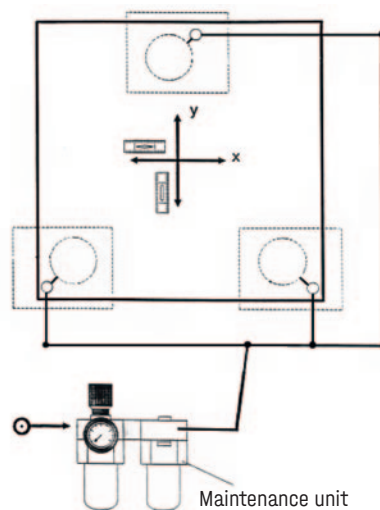
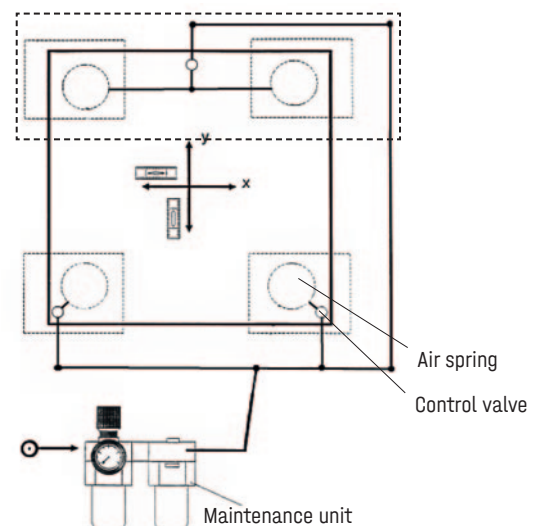


Fig. 2



MECHANICAL-PNEUMATIC LEVEL CONTROL SYSTEMS (MPN)

Proportional valves to prevent tilting as a result of load changes. The level is continuously sensed by means of a plunger. The position of the plunger is directly applied to the valve and the air spring is pressurised or vented respectively. The target level is adjusted by turning the knurled adjustment ring and is maintained with an accuracy of $\pm 1/10\text{mm}$ (MPN-LCV), or $\pm 1/100\text{mm}$ (MPN-PVM). Three control valves are used, which can be connected to an additionally available maintenance unit for compressed air preparation. This limits the system pressure to max. 6 bar, removes any condensate and cleans the compressed air of solid particles (rust and dust).

MPN-LCV



Standard solutions

MPN-LCV for FAEBI® and FAEBI®-HD rubber air springs:

Item no. 61-0103

Standard version of the LCV with stainless steel washer.

MPN-LCV for BiAir® membrane air springs:

Item no. 61-0012

Standard version of the LCV with stainless steel washer.

MPN-LCV-short-Pad-A for BiAir® membrane air springs:

Item no. 61-0054

Shortened version of the LCV with plunger insulation pad.

- Extremely robust galvanised proportional valve
- The reset accuracy is $\pm 1/10\text{mm}$
- The air flow can be reduced using the throttle valve should the control system tend to overshoot.
- Compressed air quality must be in accordance with ISO 8573-1:2010 in order to operate the air elements: Air class 3.4.3
- Supplied as a complete set which includes the 3 control valves and all necessary hose lines and connectors for 4 air springs.
- All components are also available individually as spare parts.
- In addition to the standard solutions listed here we also hold special versions with regard to material, flow, accuracy and restoring force.

MPN-PVM



MPN-PVM for BiAir® membrane air springs:

Item no. 61-0010

Standard version of the PVM with hard metal washer.

MPN-PVM-short-Pad-A for BiAir® membrane air springs:

Item no. 61-0058

Shortened version of the PVM with plunger insulation pad.

- High-precision proportional valve
- The reset accuracy is $\pm 1/100\text{mm}$
- Compressed air quality must be in accordance with ISO 8573-1:2010 in order to operate the air elements: Air class 2.4.2, below 15 °C: Air class 2.3.2
- Supplied as a complete set which includes the 3 control valves and all necessary hose lines and connectors for 4 air springs. All components are also available individually as spare parts.
- Available as an option: Throttle valve for reducing the air volume flow should the control system tend to overshoot.
- In addition to the standard solutions listed here we also hold special versions with regard to material, flow, accuracy and restoring force.

ACCESSORIES

Our accessories complement the requirements of our mechanical-pneumatic level control systems.

MAINTENANCE UNITS



Version with filter (up to 5 µm) for MPN-LCV.

WFD-M:
Item no. 61-0140



Version with additional fine filter (up to 1 µm) for MPN-PVM.

WFD-M-PVM:
Item no. 61-0048



Version with additional ultrafine filter (up to 0.01 µm) for polluted, oily air.

WFD-M-PVM oil filter:
Item no. 61-0049

ANTI-TRAPPING PROTECTION



Anti-trapping protection incl. compatible hard metal disc, per valve:

Item no. 50-0276

BELLOWS



For LCV valve:
Item no. 66-0001

For PVM valve:
Item no. 78-0038

WITH PRESSURE REGULATOR AND FILTER

The air maintenance units are used to set the optimum system pressure and prepare the compressed air for the air spring system. The integrated compressed air preparation system traps incidental condensate and cleans the compressed air of particles such as rust and dust. This ensures the required compressed air quality (for MPN-LCV air class 3.4.3, for MPN-PVM air class 2.4.2 or 2.3.2) according to ISO 8573-1:2010.

The anti-trapping protection can be used to reduce the risk of crushing in the area of the valve or sensor plungers.

The anti-trapping protection can be attached to the special carbide washer supplied and consequently can also be retrofitted to existing systems. It can be removed without damage for maintenance work.

To protect the valves in contaminated environments.

ELECTRONIC LEVEL CONTROL SYSTEMS

ELECTRONIC-PNEUMATIC LEVEL CONTROL SYSTEMS FOR COMBINATION WITH BIAIR® MEMBRANE AIR SPRINGS, FOR OPTIMISED POSITIONING ACCURACY AND REDUCTION OF DEFLECTION



All information about our electronic level control systems can also be found on our website.

NOTES

- Electronic pneumatic level control systems are suitable for combination with BiAir® membrane air springs.
- The use of an intelligent standard algorithm and electronic valves with flow rates of up to 1000 l/min allow significantly reduced deflections and settling times compared to mechanical-pneumatic level control systems.
- The Bilz electronic pneumatic level control systems are ideally suited for use with high-precision machines, highly dynamic and vibration-sensitive measuring machines as well as testing and production machines.

ELECTRONIC PNEUMATIC POSITION CONTROL EPPC™



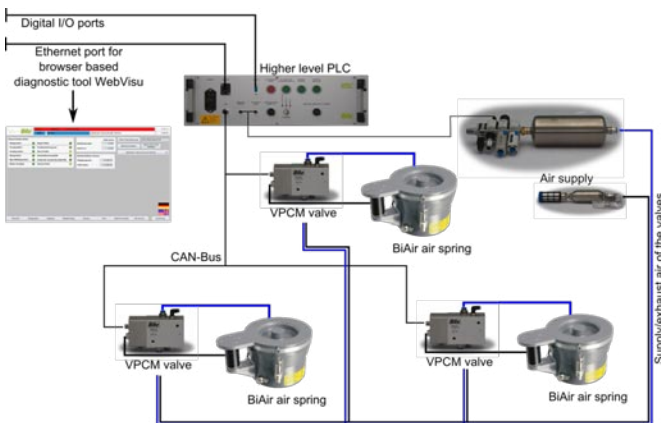
Description

- The Electronic Pneumatic Position Control EPPC™ offers optimum vibration insulation and levelling for highly dynamic and vibration-sensitive machines and instruments.
- The EPPC™ can be combined with three or six BiAir® membrane air spring control groups to control up to six degrees of freedom. Bilz offer a wide range of different size air springs for system design.

The powerful electronics, consisting of a 14bit AD converter and 16bit signal processor, are integrated into the pressure control valves and thus ensure almost noise-free control. Losses (pressure drops) within the hose connections are minimised by directly connecting the pressure control valves to the respective air springs. The use of CAN bus technology means that the control unit can be installed up to 20 m away. The EPPC™ is consequently suitable for use in sensitive environments such as clean rooms or laboratories.

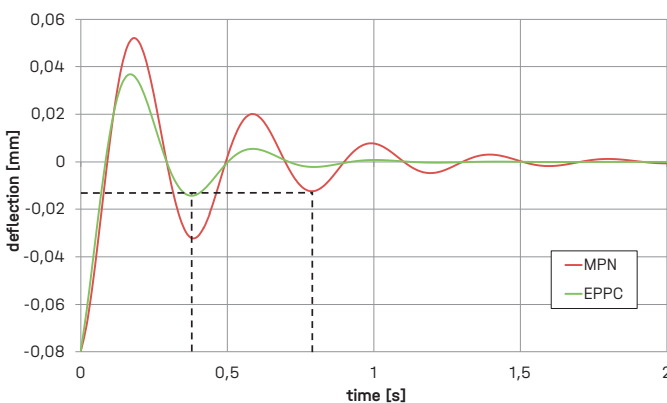


SYSTEM INSTALLATION



Information about graphic

Theoretical vibration curve of a mechanical-pneumatic level control system (MPN) compared to the EPPC™. At a deflection of $-80 \mu\text{m}$, the MPN reaches a stable position within $\pm 15 \mu\text{m}$ after approx. 0.75 seconds. With the EPPC™, the deflection time is reduced by approx. 45 % to 0.4 seconds.



Properties

- Optimum positional accuracy ($\pm 10 \mu\text{m}$).
- Individually adjustable system parameters (such as insulation).
- Short deflection and settling times in response to load changes.
- One high-performance servo valve and one displacement sensor per degree of freedom.
- Optimised connecting system using CAN bus technology.
- Intelligent browser-based user interface for setting, diagnostics and monitoring, connection via Ethernet, remote maintenance possible.
- Operator status display (e.g. ready, working position, motion complete, error).
- Digital I/O interfaces for external control and monitoring.
- Noise-free control due to high-resolution signal processing and servo-valve technology.
- Robust and proven air spring technology, can be combined with Bilz BiAir® membrane air springs.
- No disturbing heat generation, magnetic field fluctuations or high power consumption as in electromagnetic actuators.

TECHNICAL DATA OVERVIEW

Typical system load*	800 kg - 120.000 kg
Vertical natural frequencies*	1.2 - 2.5 Hz
Horizontal natural frequencies*	2,2 - 2,8 Hz
Type of control	Servo-pneumatic
Clean room suitable	yes
Communication interfaces	Ethernet, Digital I/O

SENSOR RESOLUTION:

Displacement measuring system	0,76 μm
Pressure sensor	0,36 mbar
Sampling rate sensor signal	1 kHz (after oversampling)

*Customised modifications possible