

Forced Dynamization

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1 Forced Dynamization: Switching Frequency Min....

The specification “Forced dynamization: switching frequency min...” is a recommendation for valves in non-safety related applications based on our technical experience. When the moving parts of a valve are at standstill in a particular switching position (off or on) this may lead to a temporary change in the tribological¹ system, and manifests itself in a change in the switching behavior of the valve. A noticeable increase in the switching time (or the switching pressure) is to be expected during the first switching operations.

The change in the switching behavior can have different possible causes, such as the stick-slip phenomenon, adhesion of lubricants, the setting behavior of the seals, etc.

The following factors can have a negative influence on the switching behavior after standstill (the list is not exhaustive, at the upper and lower end of the values of the stated product specifications):

- Low pilot air pressure
- Lubricated air
- Extremely low or extremely high ambient temperatures
- Extremely low or extremely high temperature of medium
- Low and high relative humidity
- Dirty environments

Where these factors are present or the switching frequency (value of the forced dynamization) is not reached, the switching time (or switching pressure) should be regularly checked. In practice, the simplest method to check the switching time or pressure is a functional test when starting up the machine or by monitoring the positioning time of the cylinder with limit switches. In general, the switching behavior will recover after several switching operations.

¹ Tribology is the study of science and engineering of interacting surfaces in relative motion. It includes the study and application of the principles of friction, lubrication and wear.

The impact of the above-mentioned effects can be reduced when the operating conditions in the application are adjusted to: pilot air pressure ≥ 6 bar, ambient temperature 23°C , temperature of pressurized air 23°C , air quality according to the technical data sheet of the valve, pressure dew point $>7^{\circ}\text{C}$, unlubricated pressurized air.

Valves used in safety-related applications

For valves which are used in safety-related applications, the specification of the forced dynamization is a prerequisite for their intended use in order to recognize static failures² through dynamic tests³.

If in safety-related applications the switching frequency (value of the forced dynamization) is not reached, e.g. during storage / transport of a machine or plant closure, the switching behavior of the valve must be checked before use, e.g. by a functional test when starting up the machine or by monitoring the positioning time of the cylinder with limit switches.

² Static failures are failures that may occur when the valve is not operated and can only be detected by switching the valve (a dynamic test).

³ A dynamic test is a functional test in which the valve is switched from the current switching state into a different switching state and its function is checked by direct monitoring (piston position detection) or indirect monitoring (e.g. pressure sensor, limit switch on the cylinder).

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