

Installation, Commissioning and Maintenance of Servo and High-response Control Valves

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1/4

1. General

Before commissioning servo valves, the guidelines stated within the following data sheets have to be taken into account:

- Relevant catalogue sheet
- The German standard DIN 24346
- ISO standard ISO 4413

Note:

Each servo valve is subjected to functional tests prior to delivery. This functional test is documented in test reports, which can be ordered when a valve is purchased.

Commissioning must be carried out by specialist personnel using the relevant calibration equipment.

Depending on the size and the requirements of an installation, the customer's operating personnel may carry out the commissioning (provided that they have a sufficient experience with hydraulics or have completed a corresponding training course).

2. Flushing of the system

The system must be flushed without the servo valves being fitted. Instead of the servo valves use either flushing plates or, if the system allows, directional valves of the same size (Spool symbol G or H), thus, allowing also the service lines and the actuator to be flushed. With an external pilot oil supply make sure that this line is also flushed.

In order to obtain the required minimum cleanliness the hydraulic system must be flushed for a sufficiently long time.

The oil volume in the system should be flushed through the filter at least 150 to 300 times. As a rough guide, the flushing time may be calculated as follows:

$$t = \frac{V}{q_V} \times 2,5 \text{ to } 5$$

With:

t = flushing time in hours

V = tank capacity in litres

q_V = pump flow in l/min

A decisive factor for the flushing time is the degree of contamination of the hydraulic fluid according to paragraph 6.2., which can only be determined by continuous monitoring by means of a particle counter.

When changing over to special fluids, which are **not** compatible or cannot be mixed with the hydraulic fluids used so far, the required flushing time may be considerably longer.

During the flushing procedure, check all the filters at short intervals and, if required, replace the filter elements.

3. Rules for correct installation

3.1 Cleanliness

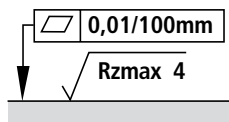
- When installing or removing valves, take care that the immediate area is clean.
- The tank must be fitted with a filler breather to prevent external contamination from entering the tank and to permit the fluid level to vary according to system requirements. For servo systems a pore size of 5 µm is recommended.
- Piping and reservoir must be cleaned of dirt, scale, swarf, etc. before being installed into the system.
- Hot-bent or welded pipes must then be pickled, flushed and oiled.
- Use only lint-free cloth or special paper for cleaning.

3.2 Valve assembly

When assembling the valve care is to be taken, to ensure that the valve and subplate mounting surfaces are dry and free of oil. If it is not possible to carry out the assembly without oil being present then the fixing screws must be tightened manually, not with the aid of power tools. If there are more than four fixing screws then care should be taken to ensure that the centre screws are tightened first.

By adhering to these procedures it is ensured that the seal rings correctly seal against the valve connection surface.

- 3.3 Sealing materials such as hemp, putty or sealing tape are not permissible.
- 3.4 Hoses, especially for the connection to the actuator, should be avoided wherever possible.
- 3.5 The connecting lines to the actuator should be kept as short as possible. We recommend that the servo valve is mounted directly onto the actuator. The required finish of the mounting face is as follows:



- 3.6 Pipes should be seamless precision pipes to DIN 2391/C in order to ensure the required pressure resistance.
- 3.7 Before installing the valve, compare the nameplate of the valve with the ordering data.
- 3.8 Install the servo valves after completion of the flushing procedure and observe strictest cleanliness.
- Remove the protective cover from the servo valve only immediately prior to the installation of the valve and keep it safe for possible maintenance work (paragraph 7.3) in the future.
- 3.9 Tighten the fixing screws to the torque specified in the data sheet.
- 3.10 All hydraulic functions must first be tested at low pressures under controlled conditions.
- To facilitate commissioning and trouble-shooting, battery or mains powered control units are available for the servo valves.

4. Installation position

A horizontal position is preferred, but the possible spool position in relation to the type of feedback being used must be taken into account.

If the servo valve is mounted directly onto an actuator, a position in which the valve spool is in parallel to the actuator's direction of acceleration should be avoided.

5. Electrical connection

For the electrical connection, please refer to the relevant data sheet. The servo valve can be operated in parallel or series circuits. For reasons of operational safety and to reduce the coil inductivity we recommend that a parallel circuit is used.

Special types of electrical insulation require special measures to be taken to ensure the safe operation of the system.

6. Commissioning

6.1 Hydraulic fluid

The preferred fluid is mineral oil to DIN 51524. Other hydraulic fluids on enquiry. In order to protect the hydraulic fluid the manufacturer's recommendations concerning maximum temperatures should be observed. In order to obtain constant response characteristics from the system, it is recommended that the fluid temperature should be held constant ($\pm 5^\circ\text{C}$).

6.2 Filtration

- Install a filter with high pressure differential without bypass, if possible with a clogging indicator, immediately before the servo valve (possibly a sandwich plate filter).
- Permissible maximum degree of contamination of the hydraulic fluid for internally pilot operated valves: class 18/16/13 - cleanliness class to ISO 4406 (c).
- For externally pilot operated valves, the permissible maximum degree of contamination in the "X"-line is: class 18/16/13 - cleanliness class to ISO 4406 (c); in the "P"-line: class 20/18/15 - cleanliness class to ISO 4406 (c).
- When changing the filter observe absolute cleanliness:
 - Contamination on the inlet side reduces the service life of the filter elements.
 - Contamination on the outlet side of the filter will be flushed into the system and eventually cause the system to completely break down.

- 6.3 As part of the final inspection in the factory, the hydraulic zero point of every valve is adjusted. However, in order to obtain an optimum control quality for the specific application, it may be necessary to re-adjust the hydraulic zero point either on the valve or in the closed loop control electronics.

7. Maintenance

- 7.1 If the tank volume is topped up by more than 10 % or if an oil change is carried out, the system must again be flushed according to paragraph 2.
- 7.2 Contamination in the flapper jet system is caused by insufficient system filtration of the hydraulic fluid.

Without special knowledge of servo valves, servicing is limited to changing the protective filter inside the valve and to re-adjusting the valve zero point.

7.3 Return of valves for repair

When returning a defective servo valve, it is necessary to fix a clean protective plate (see paragraph 3.7) to the base of the valve. Careful packaging is advisable in order to prevent any damage during transportation.

7.4 Storage

When storing servo valves for periods longer than 6 months, they should be filled with a clean preservative oil.

Storage rooms must meet the following requirements: dry, dust-free, low humidity, free of corrosive materials and vapours, and no wide temperature fluctuations.

Notes
