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TECHNICAL INFORMATION
GEAR FLOW DIVIDERS

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Technical information Gear flow dividers

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1. General

The installation, commissioning and maintenance of hydraulic systems or their components may be carried out only by suitably qualified personnel and in strict observance of all the relevant safety regulations.

Gear flow dividers are used in hydraulics to drive motors or cylinders synchronously with one another. They consist of two or more modular gear elements (sections) mechanically connected by a shaft. This arrangement allows the gears in all sections to rotate always at the same speed as one another.

Similar to a gear pump, gear flow dividers have a constant geometric volume. Each rotation of the shaft delivers the same volume to each connected consumer. The result is that they run synchronously. A gear flow divider can rotate in either direction, and is therefore capable of dividing or combining the volumetric flow.

However, high accuracy is achieved only if some basic preconditions are observed. These include the correct design for the specific application, taking into account division error and compliance with the permissible pressure differences between the individual sections.

2. Safety instructions

The maximum loads (pressures, forces, temperatures) given in the product documentation must not be exceeded.

3. Technical information

3.1. Design

In order to ensure a gear flow divider operates as effectively as possible, the speed of rotation should be in the range of approximately 1800-2000 rpm. The manufacturer's information for the specific gear flow divider must be taken into account. The maximum pressure difference between the individual sections must not exceed 30 bar, otherwise this could greatly increase division error. In the event of larger pressure differences being present in the system, precharging valves should be used to increase the pressure at the outlets connected to consumers working at lower pressures.

The pipelines to the consumers should each be about the same length. Otherwise negative effects on the division accuracy arise from different compression volumes.

In the case of a design in combination with cylinders, the transmission ratio of the cylinders must be taken into account. If necessary, the oil flow for retracting the cylinder must be restricted. The pressure transmission of the cylinder must be considered in order to avoid the pressures being too high at the gear flow divider.

3.2. Installation

The cross sections of the connecting pipe and hose lines must be appropriately dimensioned and clean. Dirt (dust, metal burrs, rubber particles etc.) inside the gear flow divider adversely affects its operation. 10-20 µm filtration must be provided. The recommended viscosity is 20-40 cSt, the optimum fluid temperature is between +30 °C and +60 °C. An unsuitable fluid not only causes malfunctions, it also reduces the service life of the components.

The use of external leak oil lines is preferred and improves flow division performance. The leak oil lines must be led directly to the tank and must not be under pressure. Gear flow dividers with anticavitation valves must be positioned lower than the level of the oil in the hydraulic tank.

The initial running-in should take place not under pressure or load. This also allows for flushing and bleeding of the pipelines. If necessary, the system must be bled again after the consumers have been connected. Gear flow dividers are ready to perform their intended function after approximately 1 hour of running-in. The phase correction valve must be set in accordance with the manufacturer's instructions.

3.3. Technical parameters

Manufacturing tolerances, different pressures in the sections and different pipe line lengths to the consumers result in a gear flow divider having some division error. This equates to approximately 3% for the gear flow divider types supplied by us. Correction of the division error must take place during the extension and retraction of the consumer when all cylinders move to their end positions (end position correction). Otherwise, the division error accumulates with every new stroke.

Gear flow dividers are available in various versions:

- **Gear flow dividers without phase correction valve**

  These types can correct division error only by means of internal leaks. As a rule, this means that they have to remain under pressure for a little while longer in their end positions in order to allow phase correction. The required time for the end position correction to take place depends on the oil temperature and its viscosity.

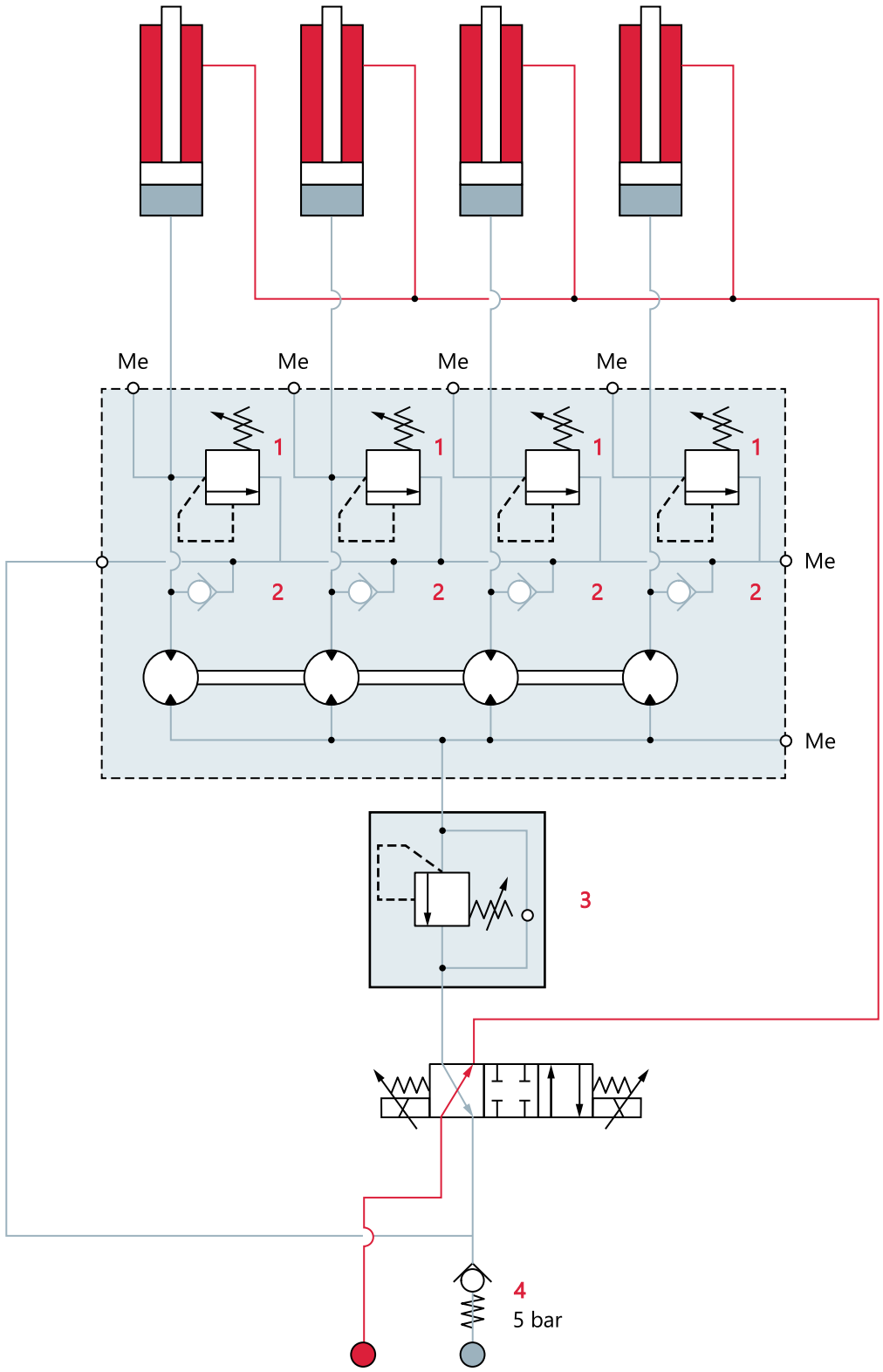
- **Gear flow dividers with central phase correction valve**

  These types are fitted with a correction valve in the form of a pressure relief valve, which allows all the sections to be rephased. Individual sections are separated from one another by non-return valves. With these types of gear flow dividers, phase correction takes place by means of the correction valve only at an end position when oil flows from the inlet to the outlet side. The advantage is that the set equalisation pressure is always exactly the same for all sections.

- **Gear flow dividers with a phase correction valve and an anticavitation valve in each section**

  These types are fitted with a correction valve in each section, which allows the equalisation pressure to be individually set for each section. This design also allows correction in both end positions.

Example of a hydraulic circuit with a 4-section gear flow divider



(1) Phase correction valve in the gear flow divider
(2) Anticavitation valve in the gear flow divider
(3) Precharge valve (pressure sequence valve)
(4) Return line precharge

The return line precharge (4) ensures a shock-free extension of the cylinder. The precharge valve (3) ensures that the cylinder retracts again shock-free. The anticavitation valve (2) prevents cavitation in the piston-head side end position.

4. Disposal information

Hydraulic oil, hydraulic hose lines and hydraulic components may not be thoughtlessly placed in the ordinary refuse; they must be collected and disposed of in accordance with the applicable waste disposal regulations. The national requirements of the respective country and, if appropriate, the information given in the safety data sheets must be observed.