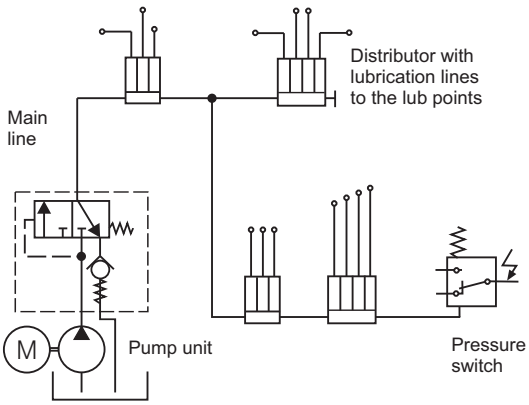
System description

With the single line system, the lubricant (oil or fluid grease) is supplied by intermittent pressure via a main line to the metering elements and from there it is metered out and passed to the lubrication points.

Single line systems can provide several friction points with lubricant. The distribution of the lubricant is carried out at all lub points at the same time.

Arrangement

In principle, a single line system consists of a central lubrication pump and a main line, which can optionally be branched off.



Application

Typical applications for single line systems are machines such as machine tools, printing-presses, paper converting machines, packing machines, textile machines, presses as well as plastic-, wood- or metalworking machinery.

Advantages

- simple arrangement of the system
- easy set-up, easy assembly
- extension or modification of the system as required
- easy maintenance
- economic supply of many lubrication points with only one pump
- exact metering due to a wide range of types

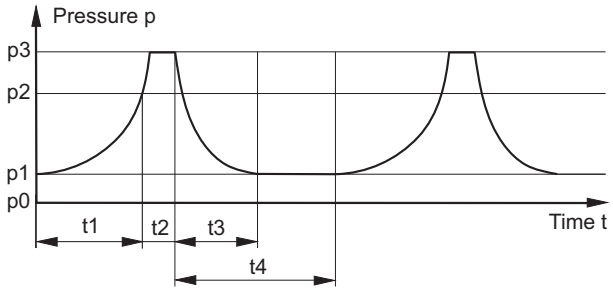
Function

After switching-on the system, the pump builds up the initial pressure p1 in the main line. During pressurization time t1 the metering elements deliver measured amounts of lubricant.

When the necessary system pressure p2 has been reached, the pressure switch indicates the end of the metering process and possibly starts the relubrication time t2.

The pressure rises up to the opening pressure p3 of the pressure limitation valve at the pump. After the relubrication time t2 is the pump switched off and the break time t4 follows.

During the break time t4 the pressure in the main line is within the time t3 relieved by a residual pressure valve in the pump down to original pressure p1.



The residual pressure prevents the main line from running empty during the break time.

When the pressure switch is at the pump, the relubrication time t2 helps to ensure that also at more remotely installed metering elements enough pressure is build up. When the pressure switch is installed at the end of the pressure line (or at the most remote point), the relubrication time is not necessary.

The relief time t3 has to be shorter than break time t4 as the piston do not return into their original position when the pressure is not relieved down to original pressure p1. The consequence would be no or insufficient metering by the metering elements.

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System design

When the components for a single line system are selected, the choice of the pump, the size of the system and the lubricant type are important.

You can choose between manually, hydraulically, pneumatically or electrically driven actuation.

The lubricant metering is differentiated between the dynamic metering system and the static metering system.

At the dynamic system is the delivery piston fitted into the valve drilling. With pressurization is then the delivery piston shifted against a spring and the lubricant which is on the opposite side of the piston is delivered to the lubrication point. The delivery volume of the pump has to be big enough that the shifting speed of the delivery piston is higher than the speed of the lubricant flow to the drilling.

After the lubricant metering, the main line is relieved. The lubricant is then restacked via the annular gap into the metering chamber by the reset of the delivery piston. filled in the chamber. The necessary fast pressurization of the metering valves requires a pump with a high delivery capacity.

Reference values for the installation of a static system

In the static system control and re-stacking of the metering piston is done via the control sleeves. The static system allows a slow pressurization provided the metering is exact. However, when measuring out the effective volume, limit values for the static system have to be observed, too:
For manually, hydraulically and pneumatically operated pumps: Max. 60 % of the pump's delivery rate so that a sufficient reserve for the pressurization is ensured.
Effective volume[1)] for gear pump units: Delivery rate of the pump in 10 sec.Example: Pump output rate 0,4 l/min, effective volume = 66 cm³
Length of the main line from the pump to the most distant metering valve: Max. 50 m.

1) Effective volume = the volume per lubrication cycle used by the metering elements and used as expansion volume of the pipes and tubes.

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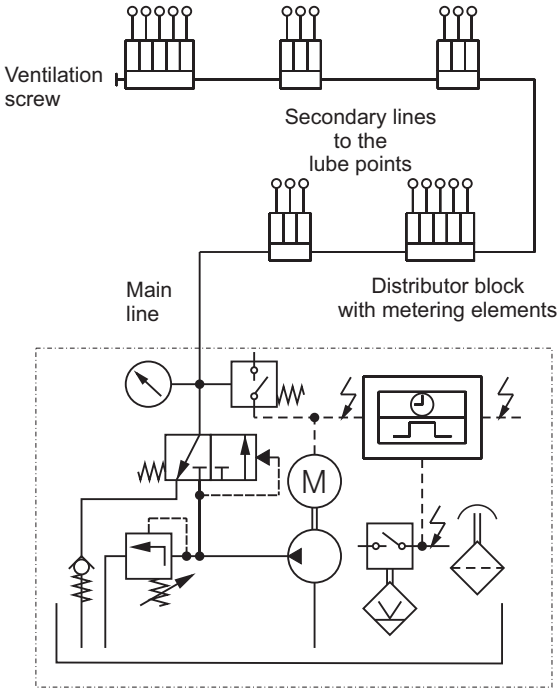
Set-up and installation of single line systems

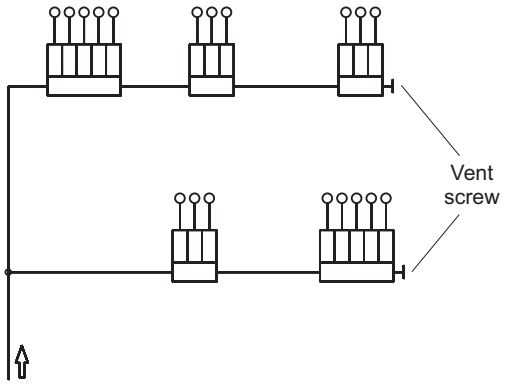
Corresponding to the number and arrange-ment of the lube points and the pump's drive, a scheme is made first.

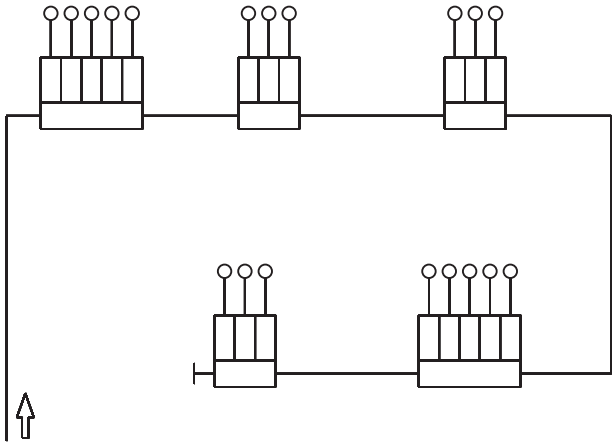
The following example shows a single line unit with integrated control and pressure switch:



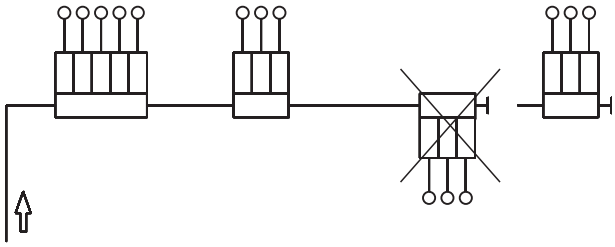
When the metering elements are installed, take care that air which is possibly in the main line, can be ventilated with a screw at the end of the main line, when the system is put into operation.

For secondary lines, you have to provide a vent screw at the end of each branch after the metering elements.





The main line(s) should always be installed rising. When the metering elements are installed as shown above, there is no possibility to bleed the main line completely after start-up.



The outlets of the metering elements at the end of a main line should not be installed sloping or directly downwards, for the case that air gets into the system and the metering elements cannot deliver.

The main line of a single line system has to be laid out in a way that the air can evade towards the ventilation screw. Please never lay out the main line falling from the ventilation screw.

The ventilation screw directly after the last metering element makes it possible that air inclusions can be transported out by this element.

If outlets at the distributor block are locked, a metering element in the last connection before the vent screw has to be provided.

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Calculating the system

Once the system has been installed, the next step is to calculate the necessary output rate of the. The line expansions are subject to the specific materials (see below).

Reference values for the volume con-sumption:

Steel pipe	approx. 0,05 cm³/m
Polyamide pipe 6 x 1	approx. 0,4 cm³/m
Polyamide pipe 6 x 1,2	approx. 0,15 cm³/m
Hoses	approx. 0,1 cm³/m

Example of a system calculation:

Main line:

8 m steel pipe (0,05 cm³/m)

Volume intake: 0,40 cm³

2 m polyamide pipe 6 x 1,2 (0,15 cm³/m)

Volume intake: 0,30 cm³

Metering valves:

10 metering valves with 0,02 cm³/cycle

Total metering volume: 0,20 cm³

12 metering valves with 0,03 cm³/cycle

Total metering volume: 0,36 cm³

Complete consumption of the system per lubrication cycle: 1,26 cm³

Selection of the pump

When choosing a pump, take into consideration:
A manual, hydraulic or pneumatic pump needs an output rate of at least 2,1 cm^3/per piston stroke for the lubrication system (as per above sample), at a permitted volume of 60% of the pump delivery rate.

For gear pump units the necessary delivery rate has to be determined according to the lubrication system.

Static single line system

Effective volume of gear pump units: Delivery rate of the pump in 10 sec. according to example: = 0,008 l/min

Note: This calculation shows that, with all our single line gear pump units pf our program, systems with several hundred metering valves can be operated with the static system.

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