SP/SMT 1 Flow Divider

with and without inline strainer for circulating-oil or hydraulic systems

Introduction

The flow divider splits the supplied flow into two equal induvidual flows or into two individual flows in a specific ratio.

Advantages

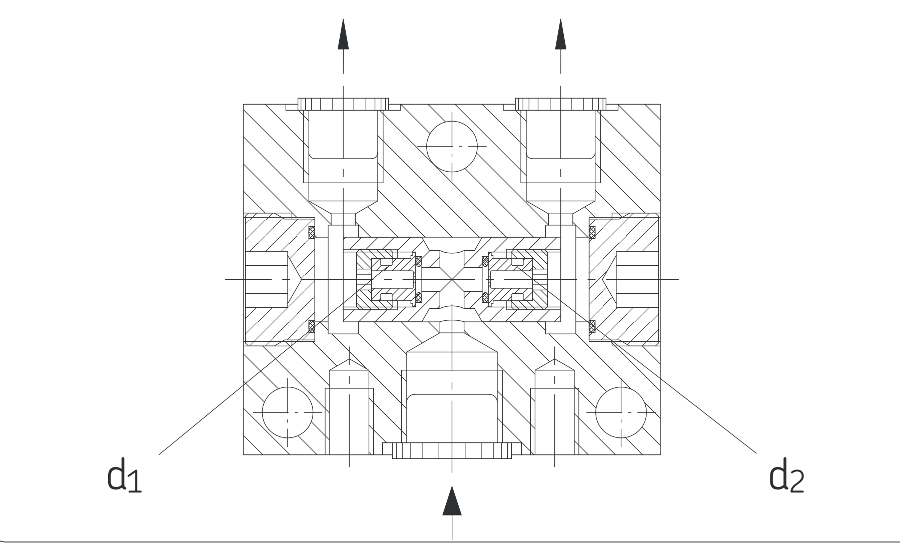
- Compact design, for installation near by the lube point
- Corrosion-resistant, for use in aggressive environments
- Self-regulating, so varying back pressures have negligible impact on dividing accuracy
- Easy flow adjustment by changing nozzles
- Defined dividing ratios
- Can be used with a wide range of viscosities
- Large selection of different flow divider nozzles
- Inexpensive monitoring since the pressure balance also closes the second outlet port if one of the outlets is blocked. An upstream pressure switch or volumetric flow controller thus controls 2 lube points.

Flow divider design

The flow divider is distinguished by its simple and compact design.

Inside the flow divider's housing there is a control piston, also called a pressure balance. It holds the two nozzles d_1 and d_2 (DF and DF´).

Design of the SP/SMT1 flow divider



How they work

Pressure p_o is applied to the two nonadjustable orifices DF and DF´ at the inlet P. (these are the two exchangeable nozzles d_1 and d_2).

The control piston compares the pressures p_1 and $p_{1'}$.

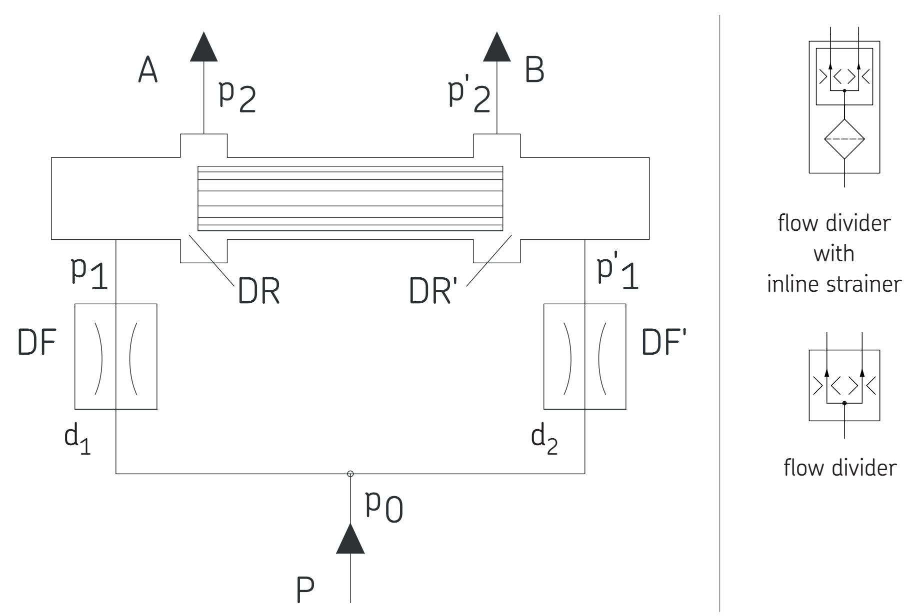
The control piston drifts out of its center position when $p_1 \neq p_{1'}$. Changing the cross sections of the two adjustable orifices DR and DR´, which results in a pressure ratio of $p_1 = p_{1'} = P$.

So there is a constant pressure differential of $p_o - p_1$ at the two non adjustable orifices DF and DF´.

As a result, the two flows in output ports A and B remain constant in the selected ratio, even when $p_2 \neq p_{2'}$.

The flow divider thus compensates for different back pressures.

Functional diagram of the SP/SMT1 flow divider



See important product usage information the on back cover.

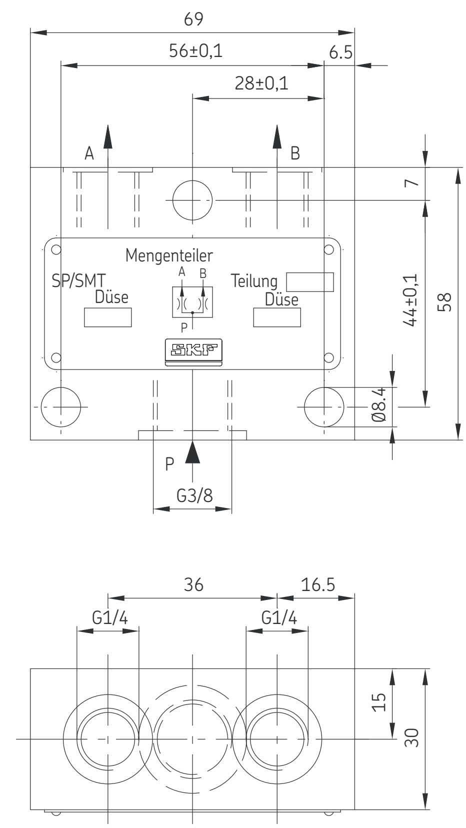
Technical data

Mounting position	any
Ambient temperature	0 to 100 °C
Flow divider weight	0,3 kg
Flow divider weight with inline strainer	0,8 kg
Mesh width of inline strainer	0,3 mm

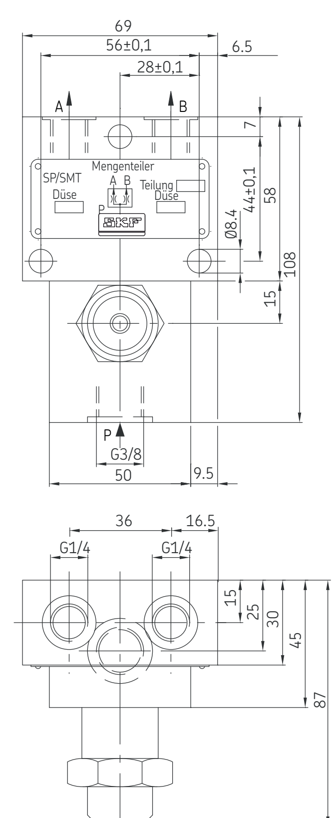
Hydraulics

Operating pressure range	
Input	up to 100 bar
Control pressure loss	2.5 to 6,5 bar
Lubricant temperature range	0 to 100 °C
Lubricant	all mineral and synthetic oils
Operating viscosity	50 to 1300 mm²/s
Volumetric flow Q_0 min.	0.50 l/min
max.	6,00 l/min
Dividing ratios	1:1; 1:1.5; 1:2; 1:2.5;
	1:3; 1:3.5; 1:4
Dividing accuracy	≥ 95%
Housing material	aluminum, anodized

Dimension Dwg of the SP/SMT1 flow divider



Dimension Dwg of the SP/SMT1 flow divider with inline strainer



How to select the right flow divider

A flow divider splits the supplied flow into two equal individual flows or into two individual flows in a specific ratio.

The following specific values must therefore be known to define the right flow divider:

- required flow Q_1 for lube point 1
- required flow Q_2 for lube point 2
- Operating viscosity of the lubricant to be used

Note

Flow dividers generate pressure loss within the lubrication system due to the dividing ratio of the flows and the operating viscosity of the lubricant used.

In order to achieve an optimal lubrication system design, the pressure loss generated by the system should be determined and taken into account when designing the system.

This is illustrated in the following example.

Problem

Two lube points should be supplied with oil. The oil flows should be divided as follows:

- Lube point 1 with Q_1 = 250 cm^3/min
- Lube point 2 with Q_2 = 750 cm^3/min.

The operating viscosity is 650 mm^2/s due to the operating conditions.

Exercise 1

Which nozzle diameters (d_1 for Q_1 and d_2 for Q_2) should be selected? (**required for order codes**)

Solution

The following volumetric flow should be supplied to the flow divider: $\mathbf{Q_1 + Q_2 = Q_0}$ (250 cm^3/min + 750 cm^3/min =**1000 cm^3/min**)

The dividing ratio resulting from the volumetric flows is: $\mathbf{Q_1 : Q_2}$ (250 cm^3/min : 750 cm^3/min) **= 1: 3**

Result 1

The nozzle diameters d_1 and d_2 should be selected using Diagram 1 as follows.

With a required flow of 1000 cm^3/min (curve 1000) and a dividing ratio of 1:3, the nozzle diameters are:

d_1 = 0.9 mm and d_2 = 1.4 mm
(values marked in red).

Exercise 2:

How high is the pressure loss? (**for customer system design**)

Solution

The pressure loss can be determined from diagram 2 and diagram 3. It is approx. 2.8 bar with a total flow of 1000 cm^3/min. and a given dividing ratio of 1:1. (Diagram 2)
This value must be adjusted according to diagram 3, as the dividing ratio in our example is 1:3. The pressure loss is then only 60%, corresponding to a factor of 0.6. The division of the volumetric flows thus results in a pressure loss of:**2.8 bar x 0.6 = 1.68 bar**.

Pressure loss is, however, also influenced by the viscosity of the lubricant used. This second correction is done using diagram 4.

At an operating viscosity of 650 mm^2/s, the reading is 110 %, corresponding to a factor of 1.1

Result 2

After correcting for viscosity, the pressure loss generated by the flow divider is:

1.68 bar x 1.1 = **approx. 1.85 bar**

Diagram 1

Determination of nozzle diameters d_1 and d_2

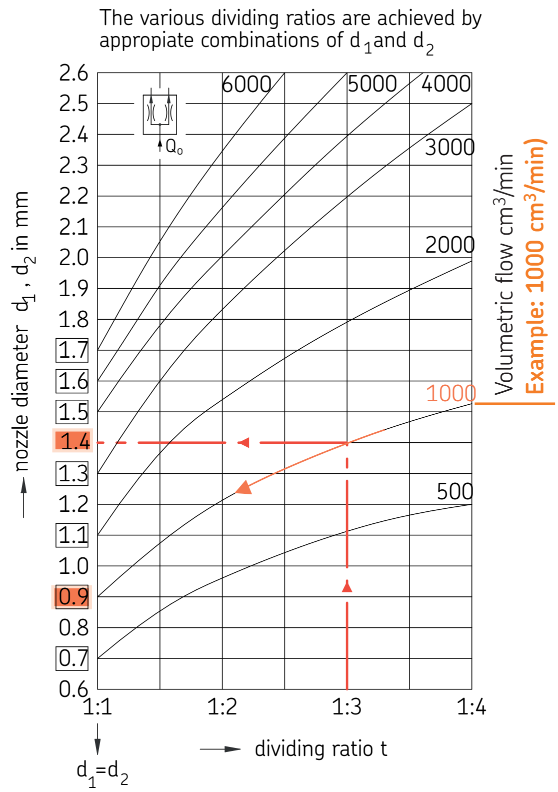


Diagram 3

Determination of pressure loss corrective factor relative to dividing ratio

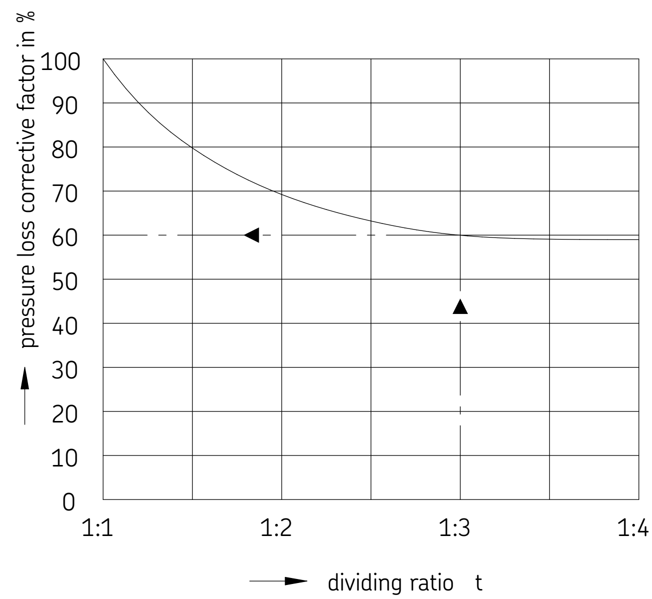


Diagram 2

Determination of pressure loss as a function of flow at a dividing ratio of 1:1

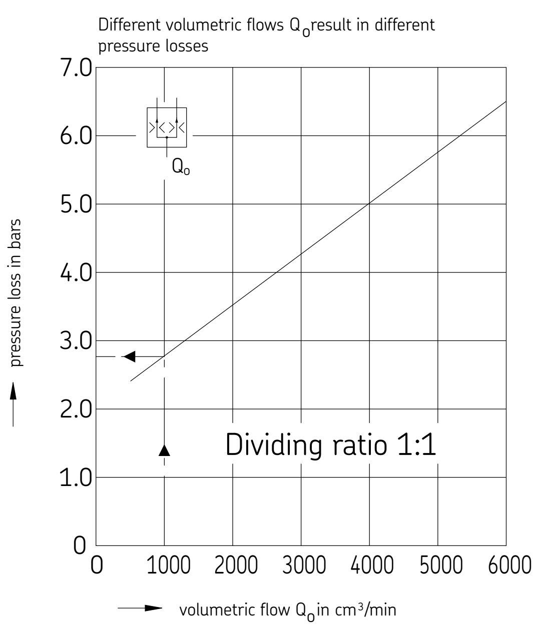
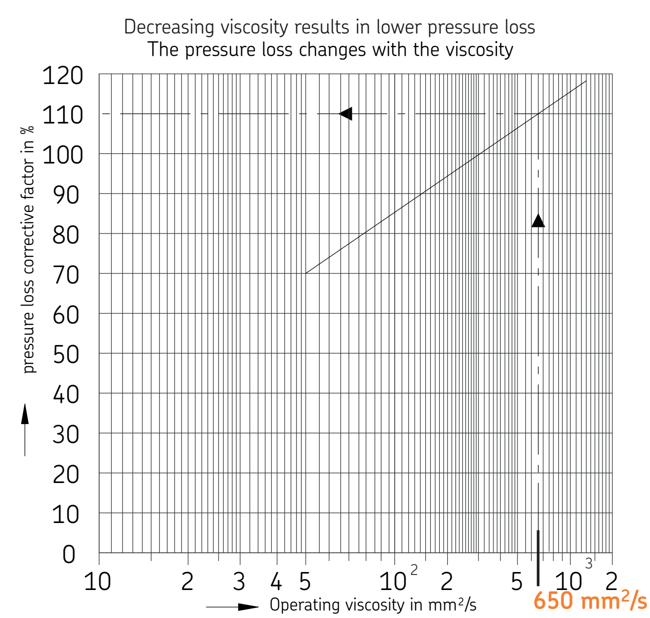


Diagram 4

Determination of corrective factor for pressure loss as a function of viscosity



Explanation of order codes

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SP / SMT1 / 1 / 10 / A... / B...

Assembly
SP

Type
SMT

Version key
1 = standard design
2 = with inline strainer

Flow dividing ratio

10 = 1:1	**20** = 1:2
15 = 1:1.5	**25** = 1:2.5
30 = 1:3	**35** = 1:3.5
40 = 1:4	

Nozzle diameters 1)
d_1
d_2

1) Nozzle diameters d_1 and d_2 need to be determined using diagram 1 on page 5.
These values must be given in three digits on the order code.
The code for the example on page 4 would be:
d_1 (0.9 mm) = 090
and for d_2 (1.4 mm) = 140.

Please note
For a proper function be sure to dismantle and mount the control piston in the correct mounting position (dismantling position = mounting position)!

Note

The composition of the following order example for a flow divider is based on the key data and design specifications on page 4 as well as the associated diagrams on page 5.

Order example

Flow divider, assembly SP (**SP**), type SMT1 (**SMT1**) in standard design (**1**) with a volumetric ratio between nozzle 1 (d_1) and nozzle 2 (d_2) of 1:3 (**30**) with a nozzle diameter for d_1 of 0.9 mm (**A090**) and a nozzle diameter for d_2 of 1.4 mm (**B140**), gives the following order number:

SP/SMT1/**1**/**30**/A**090**/B**140**

Order No. 1-5017-EN
Subject to change without notice! (07/2014)

Important product usage information
All products from SKF may be used only for their intended purpose as described in this brochure and in any instructions. If operating instructions are supplied with the products, they must be read and followed.
Not all lubricants are suitable for use in centralized lubrication systems. SKF does offer an inspection service to test customer supplied lubricant to determine if it can be used in a centralized system. SKF lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1013 mbars) by more than 0.5 bar at their maximum permissible temperature.
Hazardous materials of any kind, especially the materials classified as hazardous by European Community Directive EC 67/548/EEC, Article 2, Par. 2, may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

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