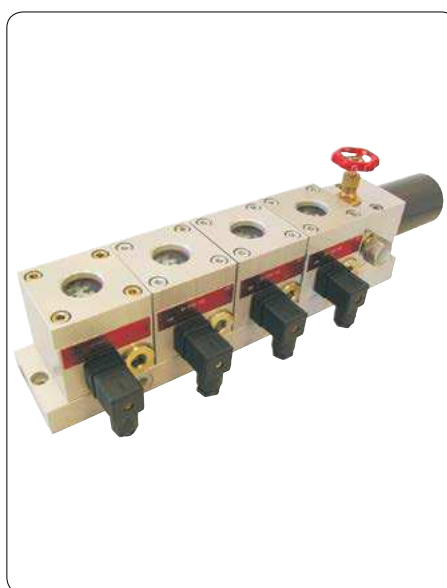


Flow limiter SP/SMB9

for mounting plates



Flow limiters are used in large oil circulating lubrication systems. The task of a flow limiter is to divide up the volumetric flow of the main line into parallel individual volumetric flow quantities and to "limit" these according to requirements, or to keep them constant. The volumetric flow generated is independent of the system pressure and virtually independent of viscosity.

The SP/SMB9 flow limiter was developed specially for mounting plates. The advantage of this design is its simple and compact construction.

Using interchangeable plug-in nozzles, the volumetric flow of the flow limiter can be set stepwise from **0.08 to 8 l/min**. That makes it possible to adjust the volumetric flow rates at a later date.

The SP/SMB9 series comes with a visual/electronic gear wheel-type flow indicator with a specific flow of 12.0 ml per revolution of the gears.

Advantages

- **reliable**
perpetual dispensation of individual volume flows
 - self-adjusting metering, thus identical volume flows despite different back pressures.
 - wide viscosity range, virtually independent of temperature and viscosity, thus stable system conditions
- **easy system design**
The required volume flow and nozzle size are determined during the engineering phase.
- **space-saving installation**
thanks to a common base plate with only one inlet for up to 6 flow limiters.
- **easy start up**
Pre-adjusted volume flows enable short start-up periods.
- **effective monitoring of volume flow with gear wheel-type flow indicator, with Hall sensor**
- **wide range of operation**
- **optional ATEX version**
- **stable and reproducible measurement, no adjustment required.**

Design

The SP/SMB9 flow limiter consists of the following:

- flow limiter housing (with sensor)
- flow limiter regulating assembly (with control piston, plug-in nozzle and pressure spring)
- gear pair
- flow limiter cover (with sight glass, seals, plugs and fastening screws)
- baseplate.

See important product usage information on the back cover.

The housing, gears and cover consist of an anodized aluminum alloy to provide corrosion-resistance and low weight. A round glass disk conforming to DIN 8902 (pressed hard glass) is used for the sight-glass pane. The pane floats in the cover to avoid distortion and premature failure. The housing accommodates a sensor that is actuated by pin magnets embedded in the gear.

Mode of operation

With the SP/SMB9 flow limiter, the total volumetric flow Q is divided up into individual flow lines Q_i by the parallel layout of the volume limiter on the mounting plate. The system pressure, being the input pressure p_1 , is thus maintained for all flow limiters.

Every flow limiter has a control piston with a plug-in nozzle as a differential pressure regulator.

The differential pressure ($p_1 - p_2$) at the interchangeable plug-in nozzle D_1 in the control piston is based on a balance of forces.

$$p_1 \cdot A = p_2 \cdot A + F \quad \text{resp.} \quad p_{1/2} = p_1 - p_2 = \frac{F}{A} = \text{constant}$$

It follows that:

The difference in pressure in front of and behind variable nozzle D_2 is held constant by a balance in pressure. The condition for this function is that the system pressure p_1 is always greater than the sum of the pressure drops in and after each flow limiter.

$$p_1 > p_{1/2} + p_3$$

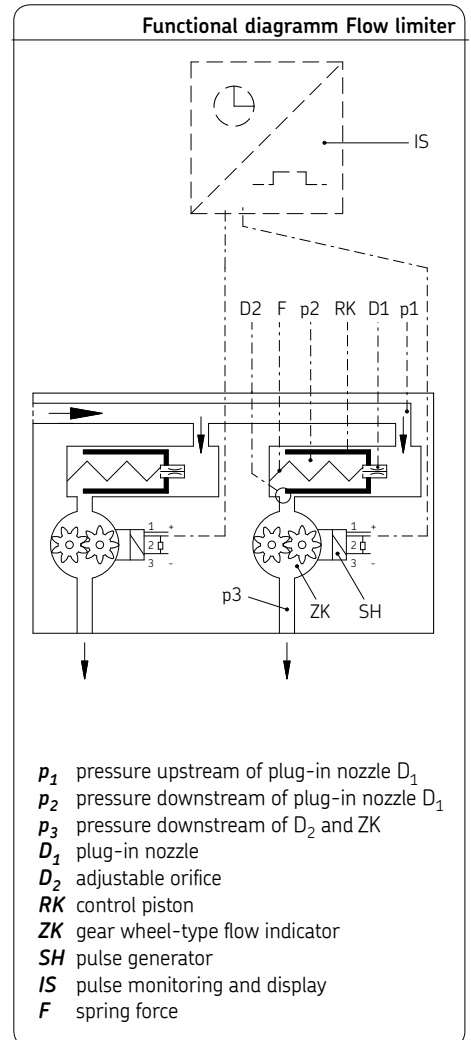
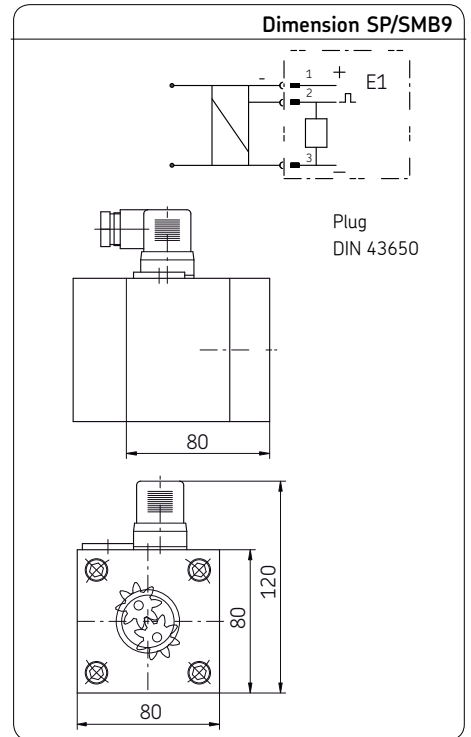
For this reason, the pump volume flow should exceed all individual flow quantities by approx. 15 %, i.e.,

$$Q = 1.15 \cdot (\sum Q_i).$$

The downstream gear wheel-type flow indicator uses a dynamic pulse generator (24 V DC) to emit a continuous sequence of pulses proportional to the volumetric flow. The proportionality factor K_1 is derived from the swallowing capacity of one revolution of the gear pair ($K_1 = 12.0 \text{ ml/pulse}$).

The sequence of pulses can be displayed and monitored by pulse-monitoring equipment, group monitoring units or a central evaluation station.

Selection of nozzle, cf. page 5..



Technical Data

General information

Type 2-way flow limiter valve with volumetric flow control
 Application for Mounting plates
 Fitting position any (make sure the filter is mounted in vertical position)
 Ambient temperature range 0 bis + 70 °C
 Material AlCuPb F38, neutrally anodized
 Weight 1.4 kg

Hydraulics

Nominal volumetric flow stepwise from 0.09 bis 8.18 l/min (see also related tables page 5)
 Working pressure p_1 6 bis 50 bars

Required differential pressure between input pressure p_1 and output pressure p_3 ≥ 6 bars
 Lubricant mineral oils, synthetic oils and ecofriendly oils
 Lubricant temperature range 0 bis + 90 °C¹⁾
 Operating viscosity 20 bis 600 mm²/s

Gear wheel-type flow indicator

Sensor Hall sensor
 Power 24 V DC \pm 10%
 Max. switched current 20 mA
 Connection plug DIN 43 650
 Type of enclosure IP 65
 Proportionality factor 12.0 ml/Impuls

1) Only when ambient temperature < 60 °C

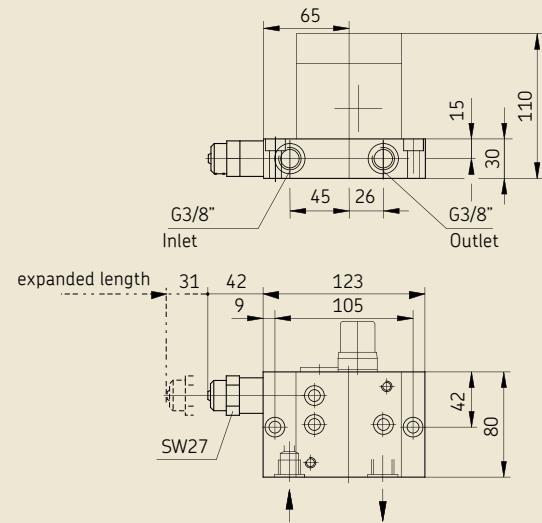
Mounting plate for a flow limiter with interchangeable strainer

Material AlCuMgPb F38, neutrally anodized
 Mesh spacing interchangeable strainer 0.1 mm
 Weight 0.8 kg

Mounting plate with interchangeable strainer

Description	Order no.
Mounting plate for a flow limiter with interchangeable strainer	24-0714-318

Mounting plate for 1 flow limiter with interchangeable strainer



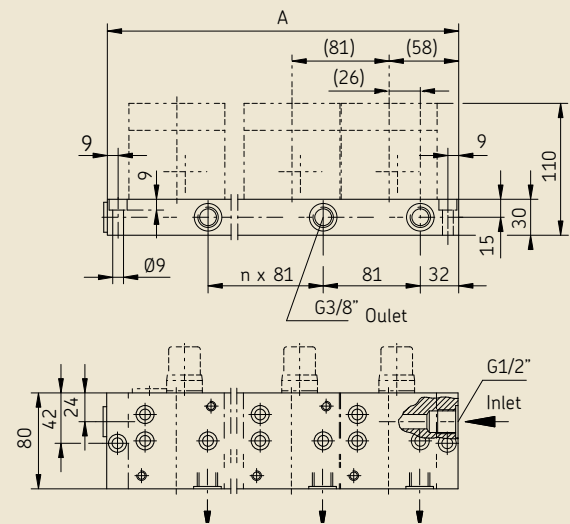
Mounting plate for 1 to 6 flow limiters

Material AlCuMgPb F38, neutrally anodized
 Weight see table

Mounting plates without oil filter

Number flow limiter[n]	Dim. A [mm]	Weight [kg/part]	Order no.
1	116	0.75	24-0714-3171
2	197	1.28	24-0714-3172
3	278	1.80	24-0714-3173
4	359	2.33	24-0714-3174
5	440	2.85	24-0714-3175
6	521	3.38	24-0714-3176

Mounting plate for 1 to 6 flow limiters



Mounting plate for 1 to 6 flow limiters with extension for oil filter mounting

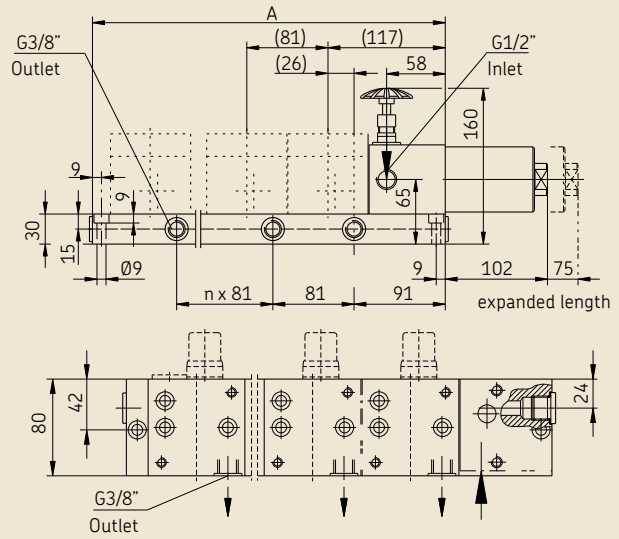
Material AlCuMgPb F38, neutrally anodized
 Weight see table

Mounting plate with extension for oil filter mounting ¹⁾

Number of flow limiters	Dim. A [mm]	Weight ²⁾ [kg/part]	Order no. ¹⁾
1	175	1,0	24-0714-3181
2	256	1,5	24-0714-3182
3	337	2,0	24-0714-3183
4	418	2,5	24-0714-3184
5	499	3,0	24-0714-3185
6	580	3,5	24-0714-3186

1) Without oil filter, must ordered separately.
 2) without filter

Mounting plate with mounted oil filter



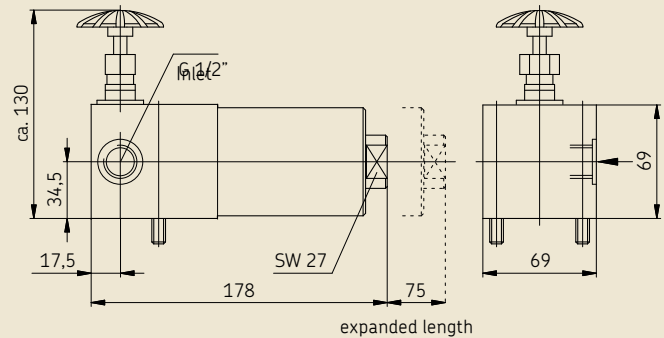
Oil filter with shut-off valve

Material AlCuMgPb F38, neutrally anodized
 Cloth V4A
 Mesh spacing interchangeable straine 0.1 mm
 Weight 0.8 kg

Oil filter with shut-off valve

Description	Order no.
Oil filter with shut-off valve	24-0651-3041

Oil filter with shut-off valve



Dummy element for spare outlets

Material AlCuMgPb F38, neutrally anodized
 Model with mounting screws M8x30 and sealing rings
 Weight 0.8 kg

Dummy element

Description	Order no.
Dummy element	24-0711-2405
Screw plug G 3/8" ¹⁾	95-0038-0908

1) order 1 screw plug for a dummy element!

Dummy element for spare outlets

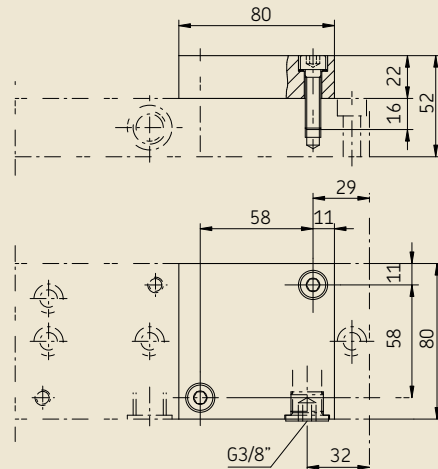


Table: Plug-in nozzles

				<i>Plug-in nozzles SP/SMB9</i>			
<i>Nominal volumetric ¹⁾</i> <i>[l/min]</i>	<i>Index nozzle</i>	<i>Nozzle</i> <i>[Ø mm]</i>	<i>Spare Part complete Plug in nozzle D₁</i>	<i>Nominal volumetric</i> <i>[l/min]</i>	<i>Index nozzle</i>	<i>Nozzle</i> <i>[Ø mm]</i>	<i>Spare Part complete Plug in nozzle D₁</i>
0.081	050	0.50	24-0455-2574	1.67	150	1.50	24-0455-2594
0.115	055	0.55	24-0455-2575	1.79	155	1.55	24-0455-2595
0.150	060	0.60	24-0455-2576	1.92	160	1.60	24-0455-2596
0.207	065	0.65	24-0455-2577	2.07	165	1.65	24-0455-2597
0.252	070	0.70	24-0455-2578	2.21	170	1.70	24-0455-2598
0.290	075	0.75	24-0455-2579	2.36	175	1.75	24-0455-2599
0.345	080	0.80	24-0455-2580	2.52	180	1.80	24-0455-2600
0.411	085	0.85	24-0455-2581	2.67	185	1.85	24-0455-2601
0.468	090	0.90	24-0455-2582	2.80	190	1.90	24-0455-2602
0.559	095	0.95	24-0455-2583	2.98	195	1.95	24-0455-2603
0.650	100	1.00	24-0455-2584	3.16	200	2.00	24-0455-2604
0.730	105	1.05	24-0455-2585	3.30	205	2.05	24-0455-2605
0.794	110	1.10	24-0455-2586	3.43	210	2.10	24-0455-2606
0.884	115	1.15	24-0455-2587	3.58	215	2.15	24-0455-2607
0.978	120	1.20	24-0455-2588	3.79	220	2.20	24-0455-2608
1.087	125	1.25	24-0455-2589	3.98	225	2.25	24-0455-2609
1.177	130	1.30	24-0455-2590	4.18	230	2.30	24-0455-2610
1.303	135	1.35	24-0455-2591	4.37	235	2.35	24-0455-2611
1.425	140	1.40	24-0455-2592	4.57	240	2.40	24-0455-2612
1.558	145	1.45	24-0455-2593	4.80	245	2.45	24-0455-2613
				5.00	250	2.50	24-0455-2614
				5.19	255	2.55	24-0455-2615
				5.37	260	2.60	24-0455-2616
				5.55	265	2.65	24-0455-2617
				5.77	270	2.70	24-0455-2618
				5.99	275	2.75	24-0455-2619
				6.22	280	2.80	24-0455-2620
				6.49	285	2.85	24-0455-2621
				6.74	290	2.90	24-0455-2622
				6.95	295	2.95	24-0455-2623
				7.15	300	3.00	24-0455-2624
				7.31	305	3.05	24-0455-2625
				7.48	310	3.10	24-0455-2626
				7.72	315	3.15	24-0455-2627
				7.98	320	3.20	24-0455-2628

1) at a service viscosity of 300 mm²/s and 20 bar differential pressure

Note!

The table values given above up to a nozzle diameter of 1.45 are based on a differential pressure of 20 bar and viscosity of 300 mm²/s. Other differential pressures or viscosities result in slightly different delivery rates. These can be determined precisely using the charts for delivery rates and correction factors for the pressure.

The table values given above for nozzle diameters of 1.5 and above are valid without correction over the entire viscosity range from 150 to 600 mm²/s and differential pressures of 20 to 150 bar.

See leaflet 1-3028-EN

Accessories/Replacement parts

	<i>Order No.</i>
Group monitoring unit	84-8011-0380
Group monitoring unit with electrical monitoring	84-8011-0390
Flow limiter	
SP/SMB9 without nozzle, without electrical monitoring ..	24-1883-3012
SP/SMB9 without nozzle, with electrical monitoring	24-1883-3010
Gasket set for SP/SMB9	24-0404-2340
Socket	179-990-033

	<i>Order No.</i>
General	
Interchangeable strainer	24-1874-2104
Gasket set for Interchangeable strainer	24-0404-2117
Oil filter with shut-off valve	
Filter insert	24-0651-2200
Gasket set for filter insert	24-0404-2293
Interchangeable strainer	24-2104-2009
Gear wheel-type flow indikator	
Sight glass (with flange, seal and shims)	24-0758-2113

Key to order codes



Order example

Flow limiter design SP/SMB and size 9 (SP/SMB9) equipped with nozzle (2), with electrical volumetric flow check (E1), nozzle size Ø 1.80 mm with a volume flow of 2.52 l/min (180) results in the following:

Type designation: **SP/SMB9/2E1/180**
 as well as
 Order no.: **24-2709-1180**

Note

The flow limiter type SP/SMB9 is optionally available in ATEX designs:

-  Zone 1
-  Zone 21

with the following characteristics:

- Body design with ground clamp
- Typeplate extended
- Operates only while using a disconnecter unit
- Can be ordered with ATEX certificate

Additional ATEX versions available on demand after consultation with SKF Lubrication Systems Germany GmbH.

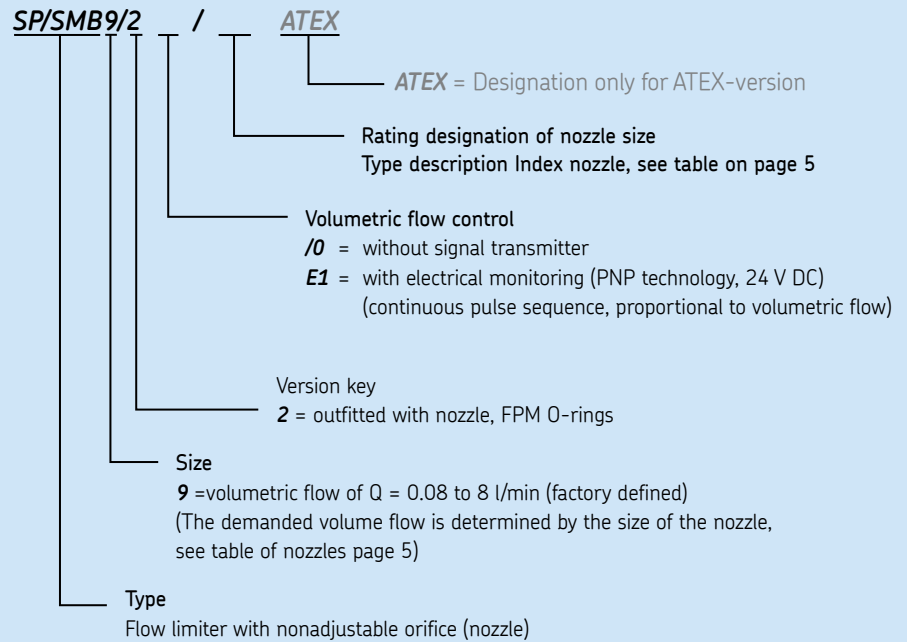
Type designation:

SP/SMB9/2 .. /

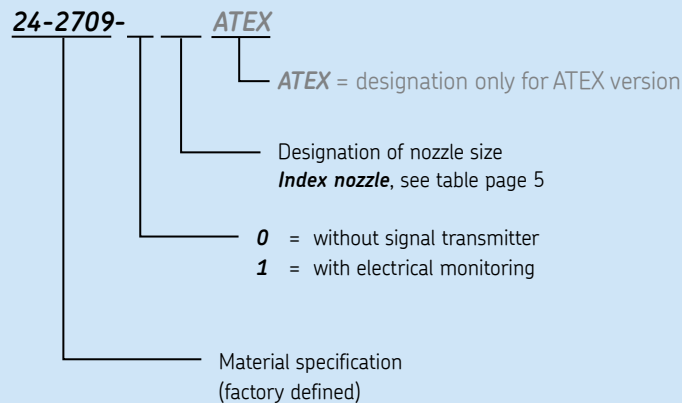
Order number:

24-2709-

Configuration of type designation for flow limiter SP/SMB9



Configuration of order no. for flow limiter SP/SMB9



Example of a circulating-oil lubrication system

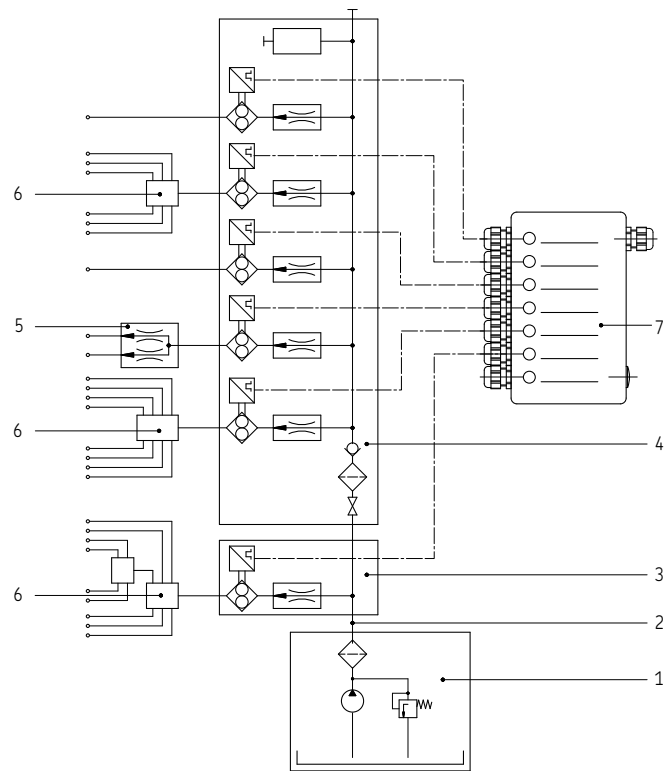
The pump (1) feeds the lubricant into the main line (2). From there the lubricant makes its way directly through the flow limiter (3) (and downstream progressive feeders (6)) as well as through the flow limiters (4) (including the downstream flow divider (5) and progressive feeders (6)) to the lube points. The electrical pulse generator built into the respective flow limiters (3) (4) checks the volumetric flow. Group monitoring units evaluate the incoming pulses (7).

Replacing plug-in nozzles

- Interrupt oil feed to flow limiter above shutoff valve (at oil filter, if required).
- ☞ Control piston held under spring pressure!
- **Slowly screw out** stop screw (hexagonal head, WAF 12) together with washer.
- ☞ **WARNING**
Burning oil hazard.
Failure to slowly remove screw could result in burns.

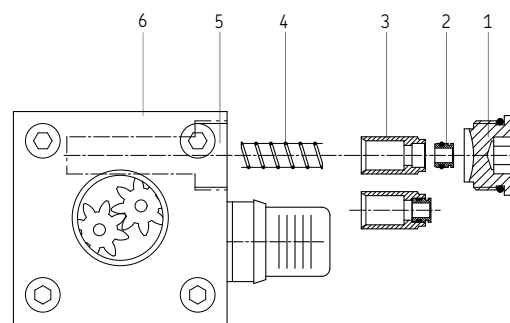
- Remove control piston and pressure spring.
- Remove plug-in nozzle from control piston.
- ☞ A roughly $\varnothing 6$ mm rod (never use a pointed object like, for instance, a scriber) can be used to help press it out.
- Press new plug-in nozzle and washer into the control piston all the way to the stop.
- Insert the pressure spring in the borehole.
- Insert new plug-in nozzle into the borehole over the pressure spring without skewing.
- Check to make sure the control piston moves easily by pressing it against the pressure spring. Skewing leads to malfunctions.
- Screw in stop screw with washer.
- Open the shutoff valve

Example of a circulating-oil lubrication system



- | | |
|---|--------------------------------|
| 1 Pump | 5 Flow divider |
| 2 Main line | 6 Progressive feeders |
| 3 Flow limiter with 1 outlet | 7 Group pulse-monitoring units |
| 4 Flow limiter with 5 outlets, link element and oil filter with shutoff valve | |

Replacing plug-in nozzles on flow limiter SP/SMB



- | |
|------------------------------|
| 1 Stop screw with washer |
| 2 Plug-in nozzle with washer |
| 3 Control piston |
| 4 Pressure spring |
| 5 Basic plate |
| 6 Flow limiter housing |

Note

With altered nozzle-cross-section, the nozzle-statements are to be altered accordingly on the Typ plate sign.

Order No. 1-3002-EN

Subject to change without notice! (11/2018)

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.

Additional brochures

1-3027-EN	Overview brochure - Flow limiter			
1-3001-EN	Flow limiter SP/SMB3	6	until 38 l/min	signal transmitter and proximity switch
1-3001-EN	Flow limiter SP/SMB6	25	until 132 l/min	signal transmitter and proximity switch
1-3028-EN	Flow limiter SP/SMB8	0.08	to 8 l/min	Sensor and piston detector
1-3003-EN	Flow limiter SP/SMB10	0.21	to 8.15 l/min	Gear wheel-type flow indicator
1-3004-EN	Flow limiter SP/SMB13	6	to 38 l/min	Gear wheel-type flow indicator
1-3005-EN	Flow limiter SP/SMB14	25	to 132 l/min	Gear wheel-type flow indicator
1-1730-EN	Electrical plug-in connections			

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