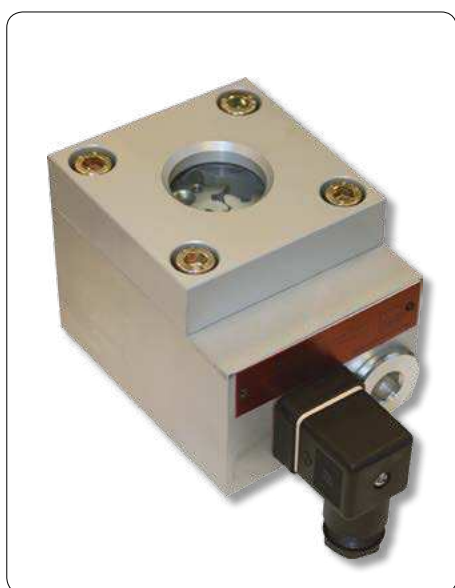


Flow limiter SP/SMB10

Dual flow series



Flow limiters are used in circulating-oil 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 produced does not depend on the system pressure and is nearly independent of viscosity. It is also possible to switch from the rated volumetric flow of the SP/SMB10 to a reduced starting flow (1:4) to prevent cold bearings from overflowing. The SP/SMB 10 flow limiter was developed specially for baseplates. 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 **0.21 to 8.15 l/min**. That makes it possible to adjust the volumetric flow rates at a later date. The SP/SMB10 series comes with a visual/electric gear wheel-type flow indicator that has a proportional factor of 12 ml per revolution.

Advantages

- **reliable**
 - Parallel distribution of individual flow quantities
 - self-regulating metering with pressure balancing valve, thus constant volumetric flows even for different back pressures.
 - wide viscosity spectrum, nearly independent of viscosity and temperature and thus stable system conditions
 - possibility of a reduced starting flow
- **easy system planning**

The required volumetric flow (the required flow limiter nozzle) has to be determined already during the project planning phase.
- **simple start-up**

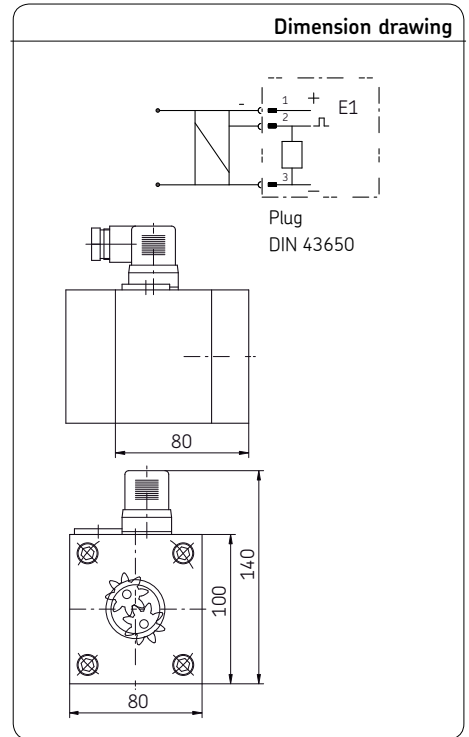
Preset volumetric flows allow short start-up times.
- **effective volumetric flow control by means of gear wheel-type flow indicator with Hall-Sensor**
- **broad range of applications**
- **optional ATEX version**

Design

The SP/SMB 10 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.

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 (temperature stable 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/SMB 10 flow limiter, the total volumetric flow Q is divided up into individual flows Q_i , by the parallel layout of the volume limiter on the baseplate. The system pressure, being the input pressure p_1 , is thus equal 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 nozzles D_1/D_2 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 the variable nozzles is held constant by a control piston RK.

For this function, the system pressure p_1 must always be greater than the sum of the pressure drops in and downstream of each flow limiter.

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

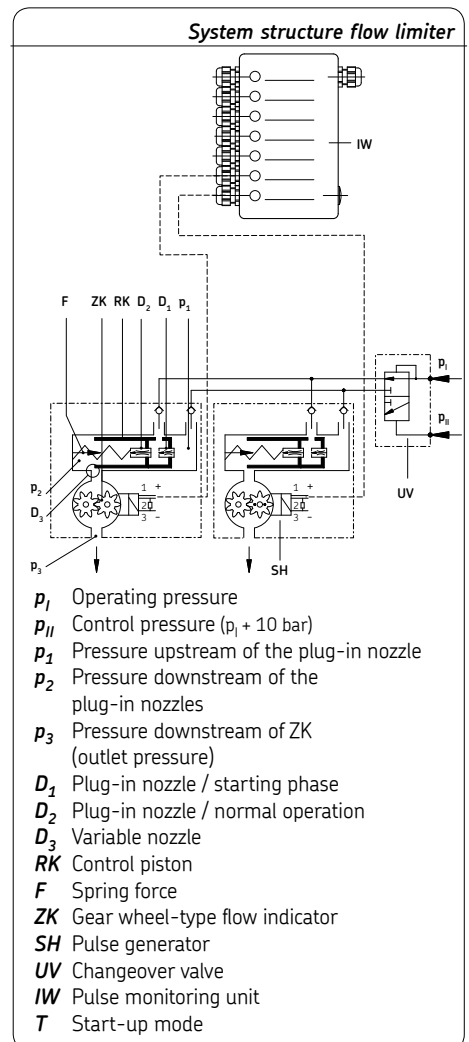
For this reason, the pump's volumetric flow should exceed all the individual flow quantities by approx. 15 %, i.e.,

$$Q = 1,15 \cdot (\sum Q_i).$$

The downstream gear wheel-type flow indicator uses a dynamic pulse generator (24 VDC) 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 ($K_1 = 12 \text{ ml/pulse}$).

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

Due to the very short throttle length of the plug-in nozzle D_1/D_2 , the control performance in the indicated viscosity range is almost independent of temperature and viscosity.



See important product usage information on the back cover.

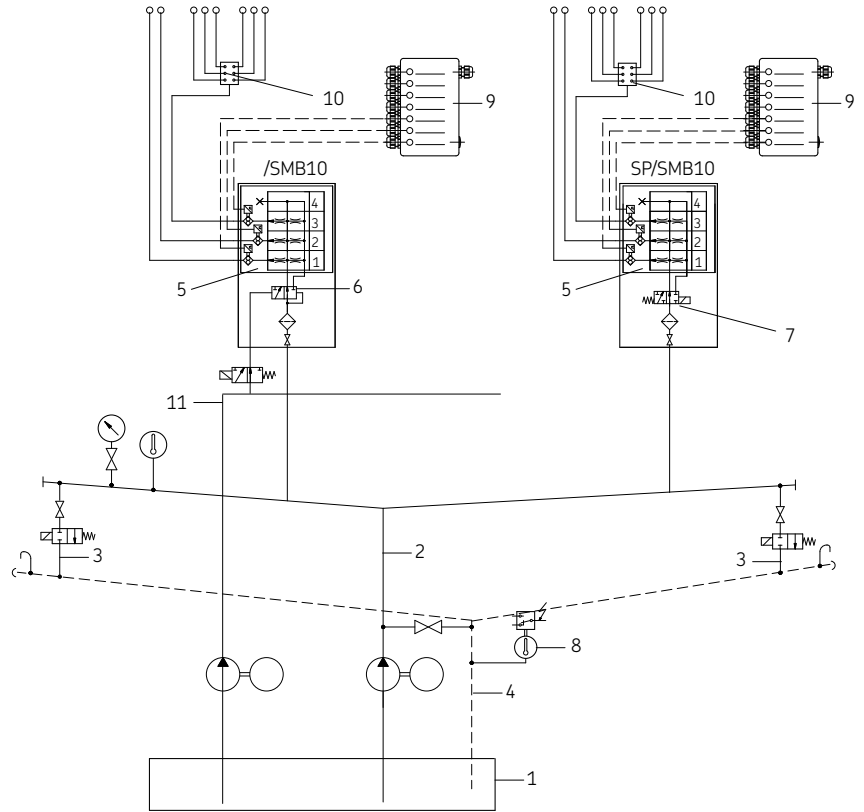
Example of a circulating-oil lubrication system

Before lubrication begins, the lubricant is heated in the oil supply unit (1). When the start-up temperature is reached, the oil is released to the pressure line (2). The lubricant now flows back to the oil supply unit (1) via the pressure line (2), enabled warm-up lines (3) and return line (4). (The flow limiters (5) are not monitored in this period of time.) The flow limiters (5) are switched to when the specified return lubricant temperature is reached. The hydraulic (6) and/or electrical changeover valve (7) at the flow limiters (5) actuates start-up plug-in nozzle D_1 . This nozzle reduces the rated volumetric flow to a lower starting flow of 1:4. At the same time, the electrical monitoring of the flow limiters is activated.

A temperature transmitter (8) on the return line (4) determines the returning lubricant's temperature. When the specified lubricant temperature is reached, the hydraulic (6) and/or electrical changeover valve (7) switches to normal-operation nozzle D_2 . The nozzle adjusts to the full-rated volumetric flow. Lubrication points that do not require a reduction in the starting volume ratio (to 1:4 of the nominal volumetric flow) are fed with the full nominal volumetric flow. This is done by the appropriate selection of the plug-in nozzles (without a starting reduction ratio of 1:1 - see plug-in nozzle table on pages 8 and 9). Group pulse monitoring units (9) are used for evaluation of the signals arriving from the flow limiters (5).

Progressive feeders (10) can be additionally installed downstream of the flow limiters (5).

Example of a circulating-oil lubrication system



- | | |
|------------------------------|-------------------------------|
| 1 Oil supply unit | 7 Electrical changeover valve |
| 2 Pressure line | 8 Temperature transmitter |
| 3 Warm-up line | 9 Group monitoring units |
| 4 Return line | 10 Progressive feeders |
| 5 Flow limiter | 11 Control pressure line |
| 6 Hydraulic changeover valve | |

Flow limiter, reversible, for baseplates

Technical Data

General information

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

Hydraulic

Nominal volumetric flow stepwise from 0.21 to 8.15 l/min (see
tables on page 8 and 9)
Working pressure p_1 7 to 50 bars
Control pressure p_{II} for hydraulic ... working pressure plus 10 bar
changeover valve

Required differential pressure
between inlet p_1 and outlet p_3 ... ≥ 7 bar

Lubricant mineral oils, synthetic oils and
ecofriendly oils
Lubricant temperature range 0 to +90 °C ¹⁾
Operating viscosity 20 to 600 mm²/s

Gear wheel-type flow indicator

Sensor Hall-Sensor
System voltage 24 V DC \pm 10%
Max. switched current max. 20 mA
Connection plug, DIN 43 650
Protection class IP 65
Proportionality factor 12.0 ml/pulse

1) Only when ambient temperature < +60 °C

Baseplate for 1 to 6 flow limiters, hydraulic changeover valve

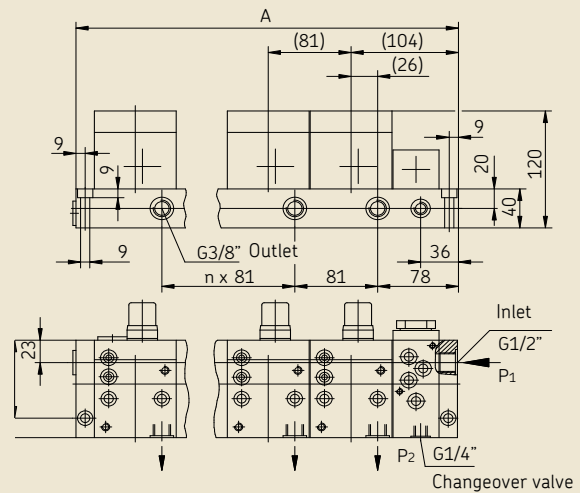
Material AlCuMgPb F38, neutrally anodized
Weight see table

Baseplates only

Number of flow limiters [n]	Dim. A [mm]	Weight [kg/each]	Order number
1	162	2.00	24-0714-3231
2	243	2.43	24-0714-3232
4	405	4.25	24-0714-3234
6	567	5.75	24-0714-3236

Note: please order the hydraulic changeover valve separately

Baseplate for 1 to 6 flow limiters and hydraulic changeover valve



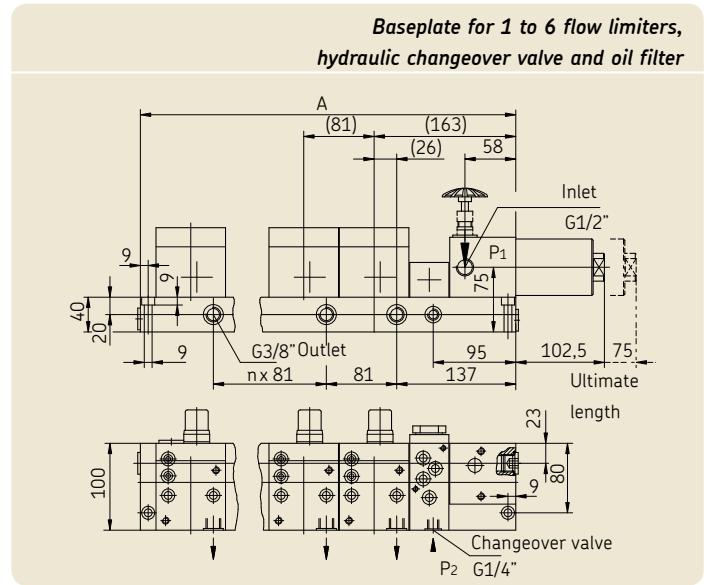
Baseplate for 1 to 6 flow limiters, hydraulic changeover valve and oil filter

Material AlCuMgPb F38, neutrally anodized
 Weight see table

Baseplates only

Number of flow limiters [n]	Dim. A [mm]	Weight [kg/each]	Order number
1	221	2.25	24-0714-3241
2	302	3.00	24-0714-3242
4	464	4.50	24-0714-3244
6	626	6.00	24-0714-3246

Note: please order the hydraulic changeover valve and oil filter separately



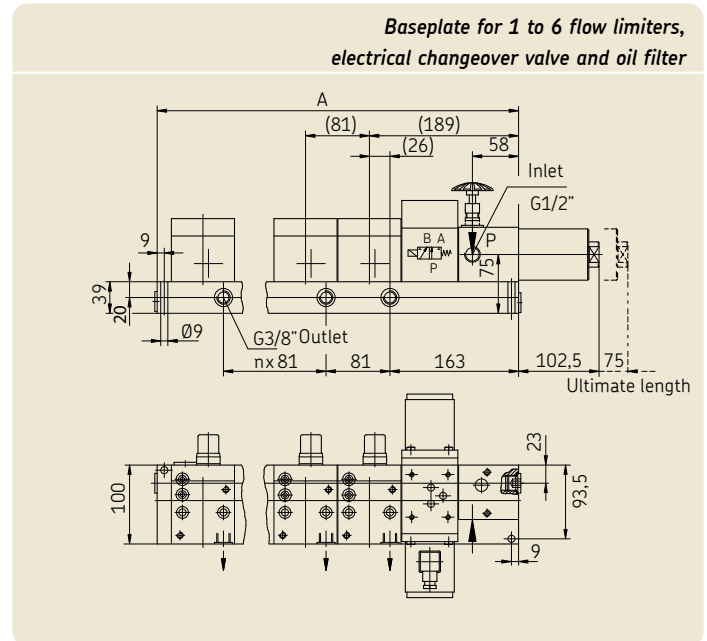
Baseplate for 1 to 6 flow limiters, electrical changeover valve and oil filter

Material AlCuMgPb F38, neutrally anodized
 Weight see table

Baseplates only

Number of flow limiters [n]	Dim. A [mm]	Weight [kg/each]	Order number
1	247	2.5	24-0714-3261
2	328	3.2	24-0714-3262
3	409	4.0	24-0714-3263
4	490	4.8	24-0714-3264
5	571	5.6	24-0714-3265
6	652	6.4	24-0714-3266
Dummy plate			24-0714-3164

Note: please order the electrical changeover valve and oil filter separately

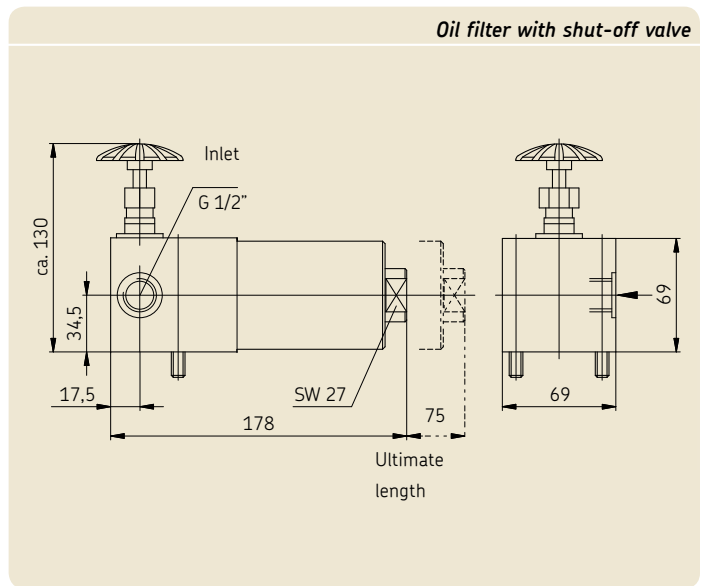


Oil filter with shut-off valve

Material AlCuMgPb F38, neutrally anodized
 Cloth V4A
 Mesh spacing filter elements 0.1 mm
 Weight 2.3 kg

Oil filter with shut-off valve

Description	Order number
Oil filter with shut-off valve for baseplate attachment	24-0651-3041

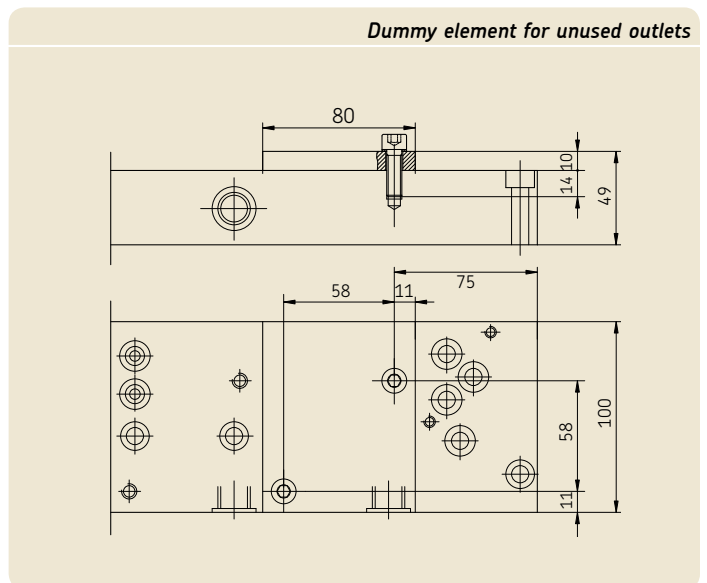


Dummy element for an unused baseplate outlet

Material AlCuPb F38, neutrally anodized
 Delivery with connection screws
 M8×30 and sealing rings
 Weight 0.8 kg/each

Dummy element

Description	Order number
Dummy element	24-0711-2406

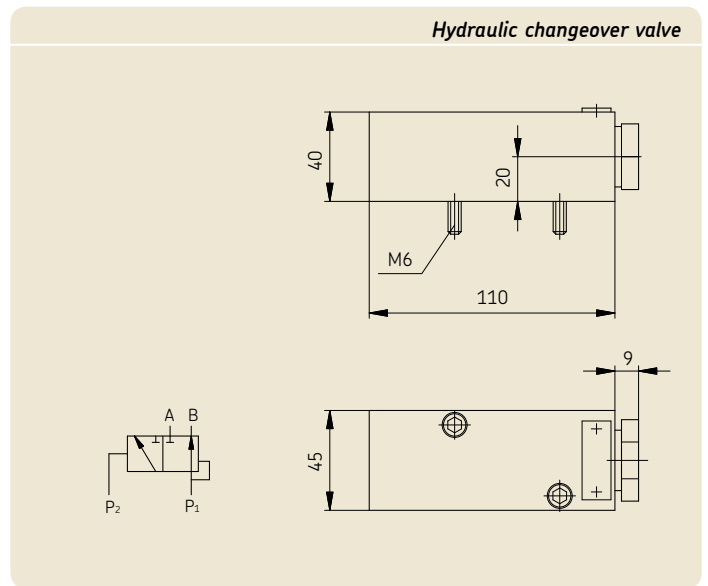


Hydraulic changeover valve

Type.....hydraulic 3/2-way valve
 MaterialAlCuMgPb F38, neutrally anodized
 Weight 0.42 kg

Hydraulic changeover valve

Description	Order number
Hydraulic changeover valve	24-1883-2093

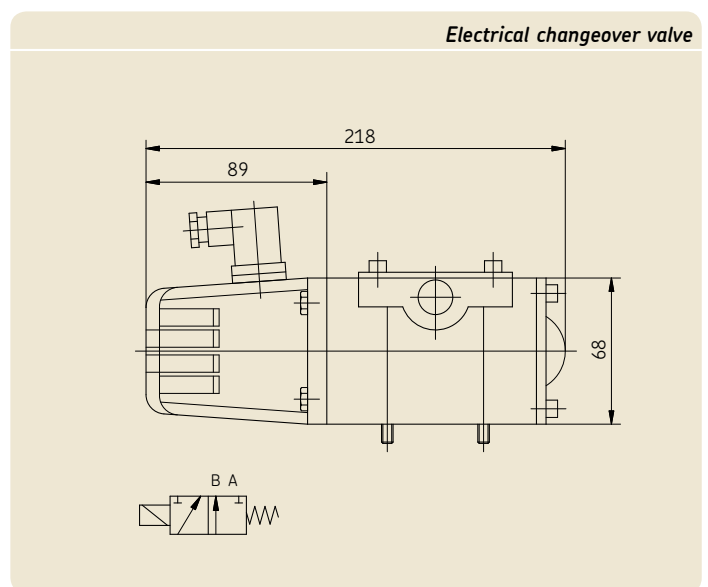


Electrical changeover valve

Type.....electrical 4/2-way valve
 Rated voltage 240 V AC, 50 Hz or 24 V DC
 Weight 6.5 kg

Electrical changeover valve

Description	Order number
Electrical changeover valve 230 V AC	24-1254-2487
Electrical changeover valve 24 V DC	24-1254-2486



Plug-in nozzle table for flow limiters with a starting/operating volumetric flow ratio of 1:4

<i>Plug-in nozzle table SP/SMB10</i>					
Nominal volumetric flow ¹⁾ 1:4 [l/min]	Nozzle index D₁-D₂	Nozzle D ₁ -D ₂ [Ø mm]	Order index	Spare part compl. plug-in nozzles	
				D ₁ Order no.	D ₂ Order no.
0.21 : 0.85	050-100	0.50-1.00	003	24-0455-2574	24-0455-2584
0.26 : 1.02	055-110	0.55-1.10	004	24-0455-2575	24-0455-2586
0.30 : 1.22	060-120	0.60-1.20	005	24-0455-2576	24-0455-2588
0.36 : 1.43	065-130	0.65-1.30	006	24-0455-2577	24-0455-2590
0.41 : 1.66	070-140	0.70-1.40	007	24-0455-2578	24-0455-2592
0.48 : 1.91	075-150	0.75-1.50	008	24-0455-2579	24-0455-2594
0.54 : 2.17	080-160	0.80-1.60	009	24-0455-2580	24-0455-2596
0.61 : 2.45	085-170	0.85-1.70	010	24-0455-2581	24-0455-2598
0.69 : 2.75	090-180	0.90-1.80	011	24-0455-2582	24-0455-2600
0.76 : 3.06	095-190	0.95-1.90	012	24-0455-2583	24-0455-2602
0.85 : 3.39	100-200	1.00-2.00	013	24-0455-2584	24-0455-2604
0.93 : 3.74	105-210	1.05-2.10	014	24-0455-2585	24-0455-2606
1.02 : 4.10	110-220	1.10-2.20	015	24-0455-2586	24-0455-2608
1.12 : 4.49	115-230	1.15-2.30	016	24-0455-2587	24-0455-2610
1.22 : 4.88	120-240	1.20-2.40	017	24-0455-2588	24-0455-2612
1.32 : 5.30	125-250	1.25-2.50	018	24-0455-2589	24-0455-2614
1.43 : 5.73	130-260	1.30-2.60	019	24-0455-2590	24-0455-2616
1.55 : 6.18	135-270	1.35-2.70	020	24-0455-2591	24-0455-2618
1.66 : 6.65	140-280	1.40-2.80	021	24-0455-2592	24-0455-2620
1.78 : 7.13	145-290	1.45-2.90	022	24-0455-2593	24-0455-2622
1.91 : 7.63	150-300	1.50-3.00	023	24-0455-2594	24-0455-2624
2.04 : 8.14	155-310	1.55-3.10	024	24-0455-2595	24-0455-2626

¹⁾ at a working viscosity of 300 mm²/s

Plug-in nozzle table for flow limiters without a starting reduction ratio of 1:1

Plug-in nozzle table SP/SMB10									
Nominal volumetric flow ¹⁾ [l/min]	Nozzle index D_1-D_2	Nozzle D_1-D_2 [Ø mm]	Order index	Spare part compl. Plug-in nozzle D_2 Order no.	Nominal volume volumetric flow ¹⁾ [l/min]	Nozzle index D_1-D_2	Nozzle D_1-D_2 [Ø mm]	Order index	Spare part compl. Plug-in nozzle D_2 Order number
0.21	550-050	5.5-0.50	050	24-0455-2574	2.90	550-185	5.5-1.85	185	24-0455-2601
0.26	550-055	5.5-0.55	055	24-0455-2575	3.06	550-190	5.5-1.90	190	24-0455-2602
0.30	550-060	5.5-0.60	060	24-0455-2576	3.22	550-195	5.5-1.95	195	24-0455-2603
0.36	550-065	5.5-0.65	065	24-0455-2577	3.39	550-200	5.5-2.00	200	24-0455-2604
0.41	550-070	5.5-0.70	070	24-0455-2578	3.56	550-205	5.5-2.05	205	24-0455-2605
0.48	550-075	5.5-0.75	075	24-0455-2579	3.74	550-210	5.5-2.10	210	24-0455-2606
0.54	550-080	5.5-0.80	080	24-0455-2580	3.92	550-215	5.5-2.15	215	24-0455-2607
0.61	550-085	5.5-0.85	085	24-0455-2581	4.10	550-220	5.5-2.20	220	24-0455-2608
0.69	550-090	5.5-0.90	090	24-0455-2582	4.29	550-225	5.5-2.25	225	24-0455-2609
0.76	550-095	5.5-0.95	095	24-0455-2583	4.49	550-230	5.5-2.30	230	24-0455-2610
0.85	550-100	5.5-1.00	100	24-0455-2584	4.68	550-235	5.5-2.35	235	24-0455-2611
0.93	550-105	5.5-1.05	105	24-0455-2585	4.88	550-240	5.5-2.40	240	24-0455-2612
1.02	550-110	5.5-1.10	110	24-0455-2586	5.09	550-245	5.5-2.45	245	24-0455-2613
1.12	550-115	5.5-1.15	115	24-0455-2587	5.30	550-250	5.5-2.50	250	24-0455-2614
1.22	550-120	5.5-1.20	120	24-0455-2588	5.51	550-255	5.5-2.55	255	24-0455-2615
1.32	550-125	5.5-1.25	125	24-0455-2589	5.73	550-260	5.5-2.60	260	24-0455-2616
1.43	550-130	5.5-1.30	130	24-0455-2590	5.96	550-265	5.5-2.65	265	24-0455-2617
1.55	550-135	5.5-1.35	135	24-0455-2591	6.18	550-270	5.5-2.70	270	24-0455-2618
1.66	550-140	5.5-1.40	140	24-0455-2592	6.41	550-275	5.5-2.75	275	24-0455-2619
1.78	550-145	5.5-1.45	145	24-0455-2593	6.65	550-280	5.5-2.80	280	24-0455-2620
1.91	550-150	5.5-1.50	150	24-0455-2594	6.89	550-285	5.5-2.85	285	24-0455-2621
2.04	550-155	5.5-1.55	155	24-0455-2595	7.13	550-290	5.5-2.90	290	24-0455-2622
2.17	550-160	5.5-1.60	160	24-0455-2596	7.38	550-295	5.5-2.95	295	24-0455-2623
2.31	550-165	5.5-1.65	165	24-0455-2597	7.63	550-300	5.5-3.00	300	24-0455-2624
2.45	550-170	5.5-1.70	170	24-0455-2598	7.89	550-305	5.5-3.05	305	24-0455-2625
2.60	550-175	5.5-1.75	175	24-0455-2599	8.15	550-310	5.5-3.10	310	24-0455-2626
2.75	550-180	5.5-1.80	180	24-0455-2600					

1) at a working viscosity of 300 mm²/s

Spare part plug-in nozzle D_1

Description
plug-in nozzle D_1 compl.
Ø 5.5 mm, nozzle index 550

Order number.
24-0455-2629

Note!

For two identical volumetric flows, nozzle D_1 could be omitted.
To avoid misunderstandings, the largest possible nozzle
(Ø 5.5 mm) will be plugged in as nozzle D_1 .
In both switch positions, nozzle D_2 affects both volumetric flows.

Key to order codes

Order example

Flow limiter, type SP/SMB and size 10, equipped with nozzle (2), with optical/electrical monitoring (gear wheel-type flow indicator) with Hall-Sensor (E1) with a starting/operating volumetric flow ratio (1:4) of 0.85 : 3.39 l/min with a nozzle index of 100-200 and the order index 013 results in the following type designation:

SP/SMB10/2E1/100-200

and

Order number: 24-2710-1013

Note

The following flow limiters, type SP/SMB10, are available in ATEX design:

-  Zone 1
-  Zone 21

possible design features:

- housing design with ground terminal
- rating plate, extended
- can be used only in connection with a circuit breaker device
- can be ordered with ATEX certificate

Restrictions regarding temperature and explosion class must be observed.

Further details can be obtained from SKF Lubrication Systems Germany GmbH.

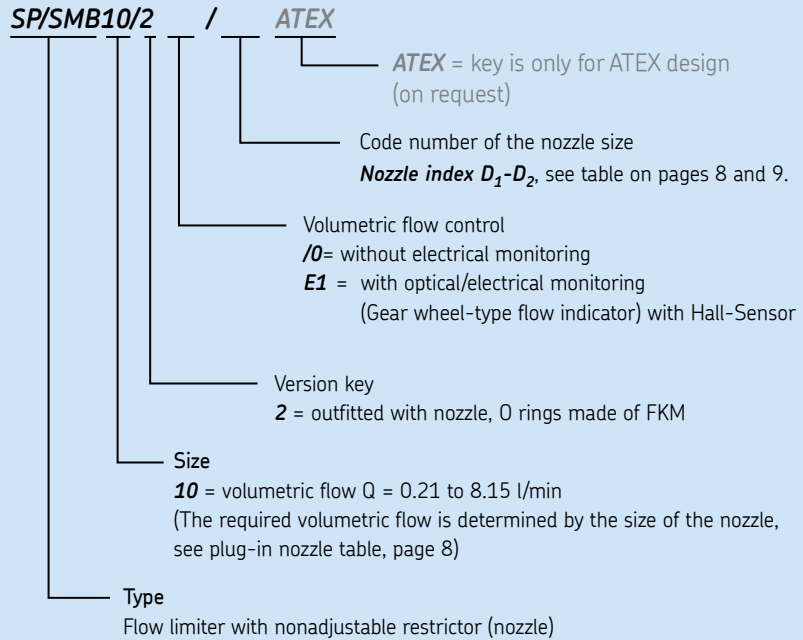
Type designation:

SP/SMB10/2 .. /

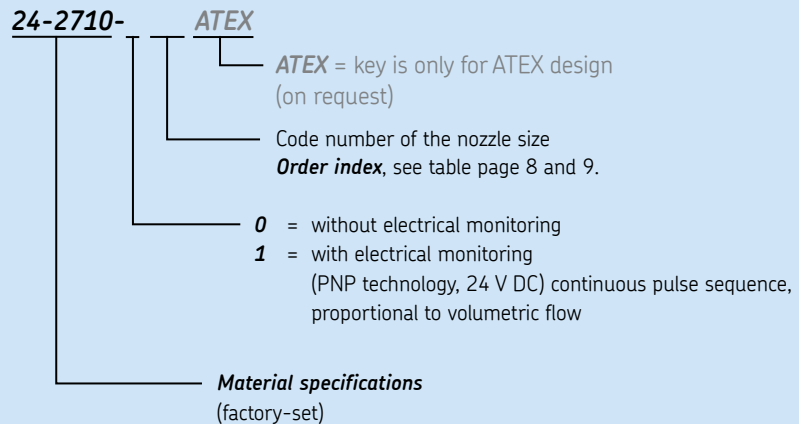
Order number:

24-2710-

Configuration of the type designation



Structure of the Order number



Note!

For ordering a flow limiter SP/SMB10, the customer must generate a type designation as well as a Order no. This must be adjusted in accordance with the desired flow limiter design.

The key to the order codes illustrates the structure of the type designation and the order number. For the required nozzle and Order index, see plug-in nozzle table on pages 8 and 9.

Replacing plug-in nozzles

- Interrupt oil feed to flow limiter using the shutoff valve (at oil filter, if required).
- ☞ Control piston (5) held under spring pressure!
- Slowly screw out stop screw (1) (hexagon socket WAF 12) together with washer.

☞ **WARNING**

Burning oil hazard.

Failure to slowly remove screw could result in burns.

- Remove control piston with plug-in nozzles (4/5) (D₁/D₂) and pressure spring.
- ☞ **Attention!**
When reinstalling the plug-in nozzles, make sure they are not mixed up!
Consult the rated volumetric-flow table on pages 8-9 for the selection of plug-in nozzles.

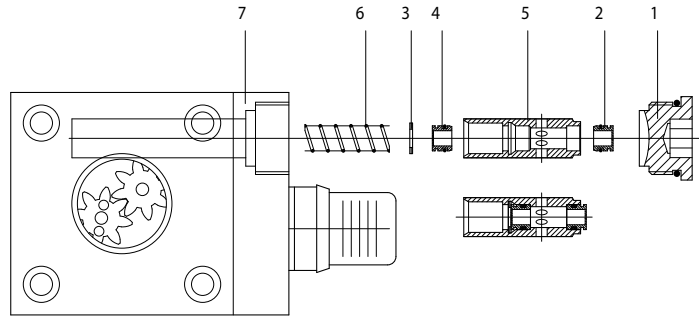
Dismantling/installation of plug-in nozzle D₁

- Remove plug-in nozzle D₁ (2) (with washer) from the control piston.

Dismantling/installation of plug-in nozzle D₂

- Loosen and remove retaining ring (3) from the control piston (5).
- Remove plug-in nozzle D₂ (4) (with washer) from the control piston.
- ☞ **A roughly ø 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 D₂ (4) and washer firmly into the control piston (5), all the way to the stop with the nozzle opening pointing upward (nozzle type legible).
- Insert retaining ring (3) in the control piston (5).
- Press new plug-in nozzle D₁ (2) and washer firmly into the control piston (5), all the way to the stop with the nozzle opening pointing upward (nozzle type legible).
- Insert pressure spring (6) in the borehole.
- Insert control piston with new plug-in nozzle(s) in the borehole over the pressure spring without skewing.
- Check to make sure the control piston (5) moves easily by pressing it against the pressure spring(6). Skewing leads to malfunctions.
- Screw in stop screw (1) with washer.
- Open the shutoff valve.

Changing the plug-in nozzle



- | | |
|--|------------------------|
| 1 Stop screw with washer | 5 Control piston |
| 2 Plug-in nozzle D ₁ (startup 1:4) with washer | 6 Pressure spring |
| 3 Retaining ring 10x1 | 7 Flow limiter housing |
| 4 Plug-in nozzle D ₂ (normal operation 1:1) with washer | |

Note!

In the case of a change in the nozzle size, the nozzle specifications on the rating plate must be changed accordingly.

Accessories/spare parts

Accessories

Designation	Order number
Group monitoring unit	84-8011-0380
Group monitoring unit with connection socket for hand-held display unit	84-8011-0390

Replacement parts

Designation	Order number
Flow limiter	
SP/SMB10 without nozzle, with electrical monitoring	24-1883-3020
Gasket set for SP/SMB 10	24-0404-2341
Oil filter with shut-off valve	
Filter insert	24-0651-2200
Gasket set for filter	24-0404-2293
Shut-off valve	24-2104-2009
Hydraulic changeover valve	
Gasket set	24-0404-2281
Gear wheel-type flow indicator	
Sight glass (with flange, seals and shims)	24-0758-2113

Order No. 1-3003-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.

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	0.09	to 8.18 l/min	Sensor and piston detector
1-3002-EN	Flow limiter SP/SMB9	0.09	to 8.18 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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