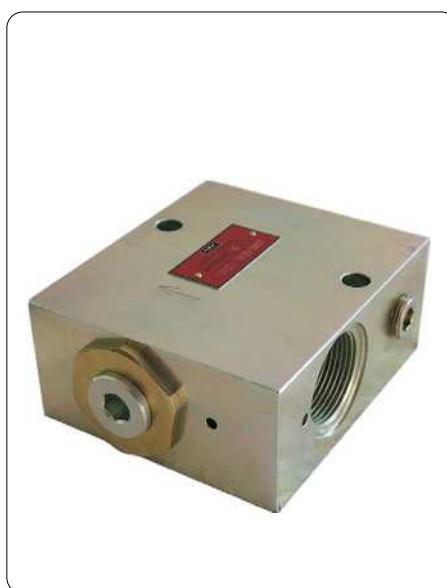


Flow limiter SP/SMB3

Flow limiter SP/SMB6

for circulating-oil lubrication systems



Flow limiters are used in large 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 generated is independent of the system pressure and virtually independent of viscosity.

When exchangeable plug-in nozzles are used, it is possible to adjust the volumetric flow of the flow limiter as follows:

SP/SMB3 in steps from 6.0 to 38.0 l/min

SP/SMB6 in steps from 25.0 to 90 l/min

This enables a subsequent adjustment of the volumetric flow.

The volumetric flow can either be monitored by a sensor or a piston detector (also retrofittable). A fault signal is emitted when the volumetric flow drops to approx. 85 % of the rated flow.

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 the system conditions are stable
- **easy system design**
The demanded volume flow and flow limiter nozzle respectively, are determined during projection.
- **easy startup**
Pre-adjusted volume flows enabling short start up periods.
- **effective monitoring of the volume flow**
signal transmitter or piston detector react to deviations of the volume flow from approx. 15%.
- **wide range of operation, up to 200 bar**
- **optional ATEX version or integrated gear indicator for volume flow**

Flow limiter SP/SMB3 and Flow limiter SP/SMB6

The SP/SMB3 and the SP/SMB6 flow limiter comes with two throttles installed in series (D_1 , D_2). Throttle D_1 is an interchangeable plug-in nozzle which, as a nonadjustable orifice, determines the rated volumetric flow. Nonadjustable orifice D_1 is available with different nozzle cross sections (see tables on pages 8 and 10).

Throttle D_2 , on the other hand, is an adjustable orifice that has a variable nozzle cross section depending on the position of control piston RK. Displacement of the control piston RK against the spring force (F) automatically changes the flow resistance of throttle D_2 in such a way that the differential pressure at nonadjustable orifice D_1 remains constant, and thus the volumetric flow as well.

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

The result is:

the difference in pressure upstream and downstream of the variable nozzle is held constant by adjustable orifice D_2 (pressure balance).

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.

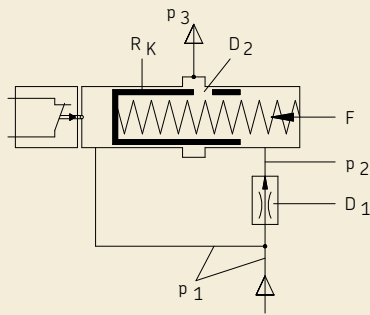
$$p_1 > p_{1/2} + p_3$$

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

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

Due to the very short throttle length of the plug-in nozzle D_1 , the control characteristic is virtually independent of viscosity and temperature within the specified viscosity range.

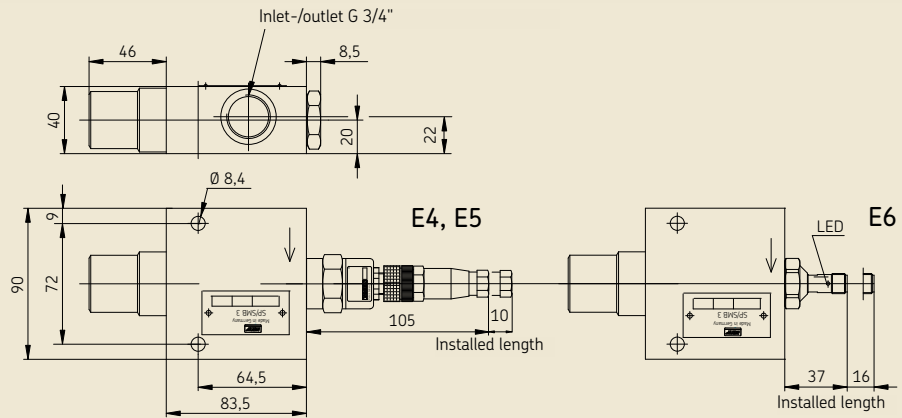
Functional diagram Flow limiter



- p_1 pressure upstream of plug-in nozzle D_1
- p_2 pressure downstream of plug-in nozzle D_1
- D_1 nonadjustable orifice (plug-in nozzle)
- D_2 adjustable orifice
- RK control piston
- F spring force
- p_3 pressure downstream of plug-in nozzle D_2 (pressure outlet)
- A cross-sectional area of control piston

Flow limiter SP/SMB3

Dimension SP/SMB3

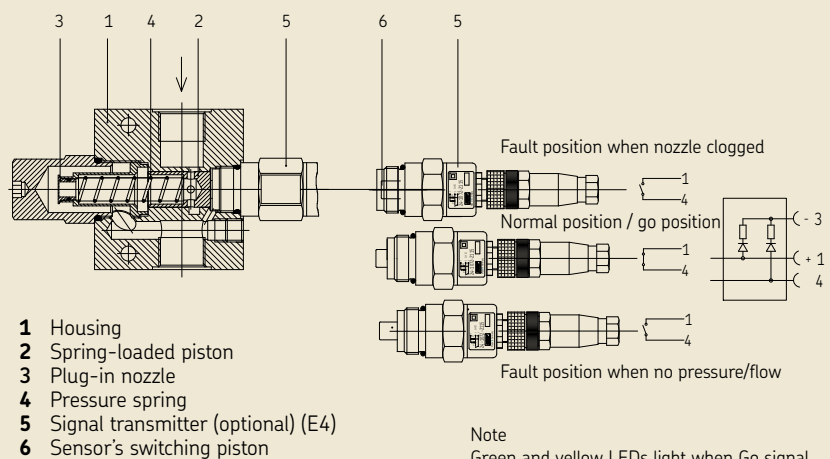


Design Flow limiter SP/SMB3

with signal transmitter version E4



SP/SMB3 with sensor version E4, 24 V

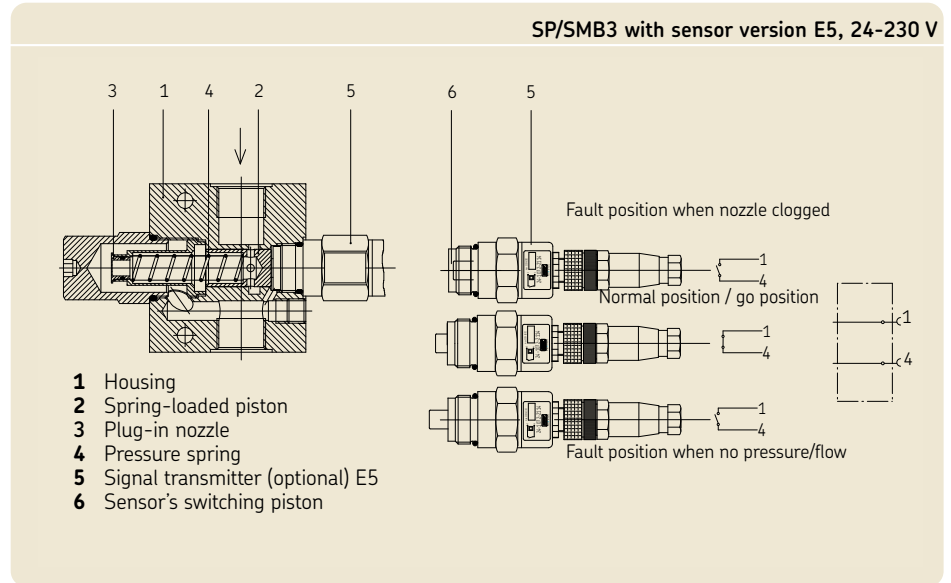


- 1 Housing
- 2 Spring-loaded piston
- 3 Plug-in nozzle
- 4 Pressure spring
- 5 Signal transmitter (optional) (E4)
- 6 Sensor's switching piston

Note
Green and yellow LEDs light when Go signal received, when yellow LED goes out => fault signal.

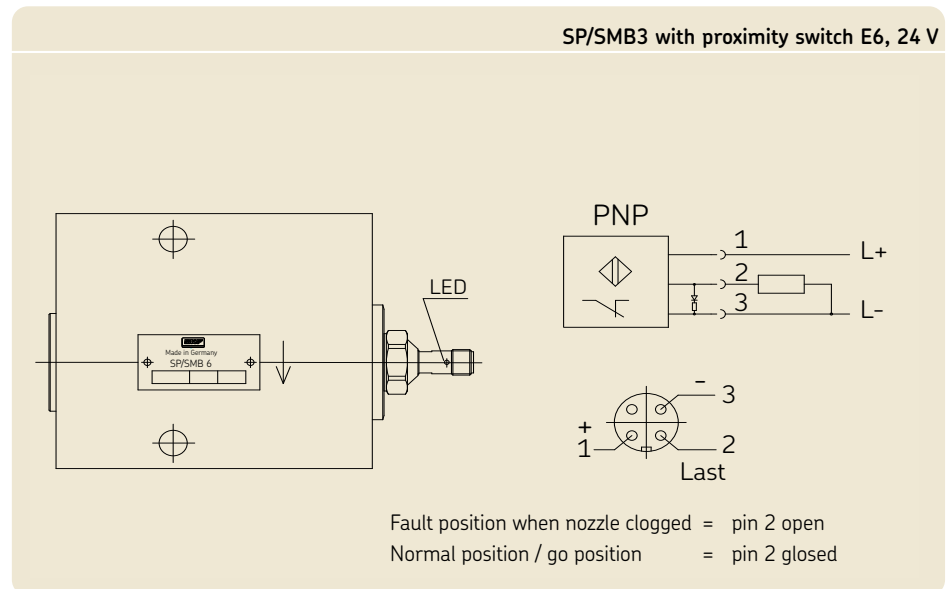
Design Flow limiter SP/SMB3

with signal transmitter version E5



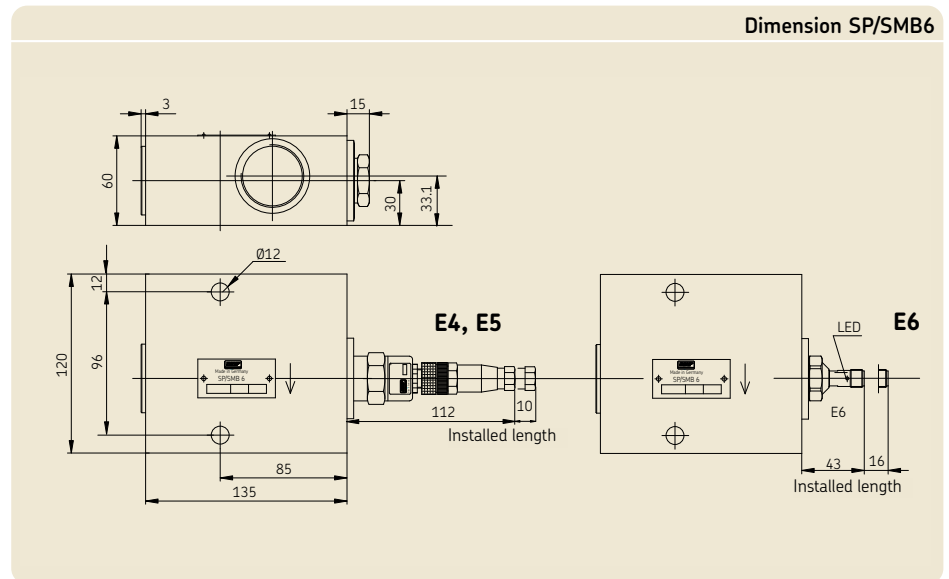
Design Flow limiter SP/SMB3

with proximity switch E6



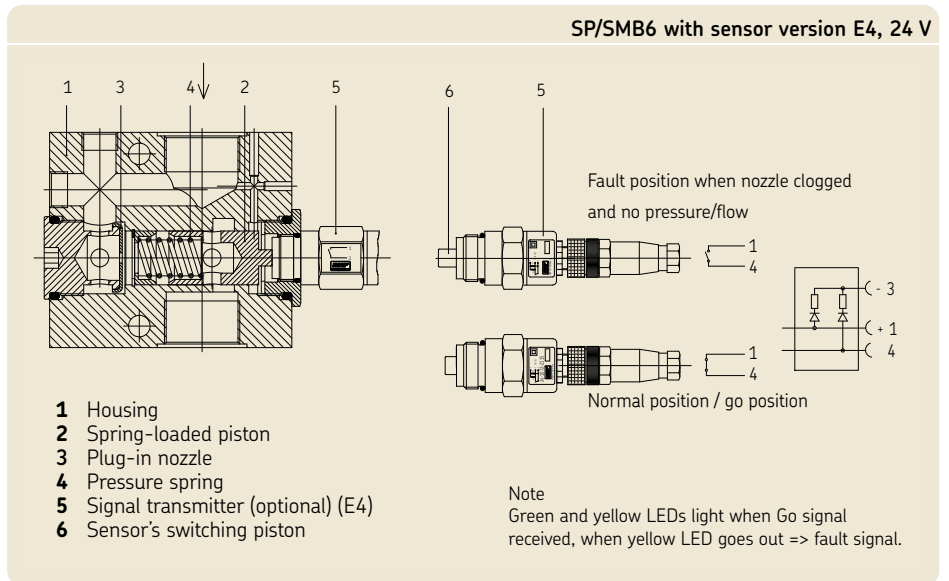
See important product usage information on the back cover.

Flow limiter SP/SMB6



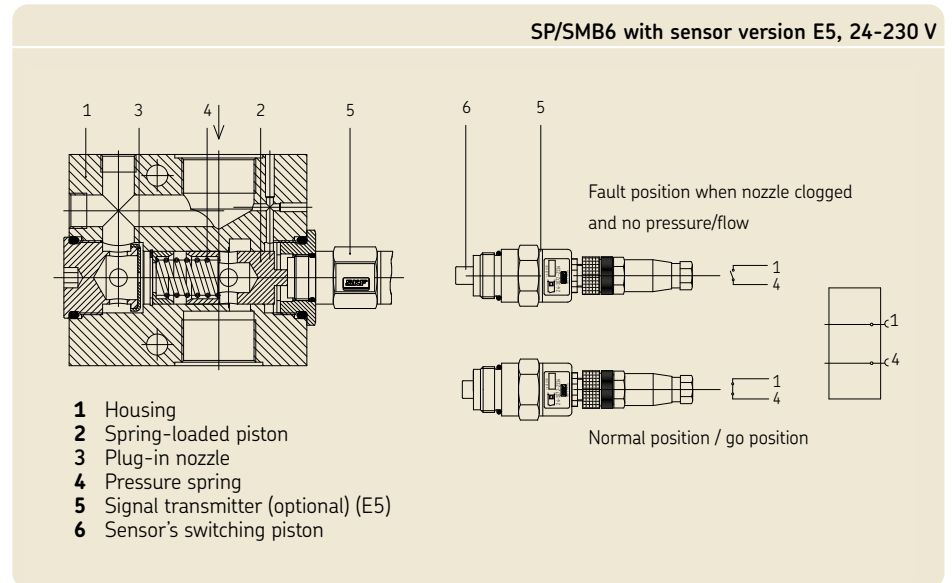
Design Flow limiter SP/SMB6

with signal transmitter version E4



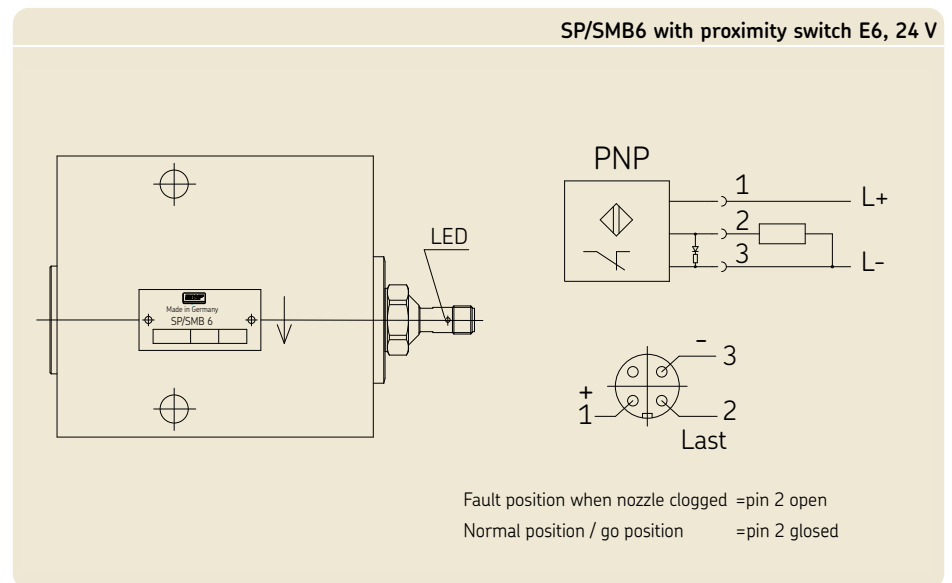
Design Flow limiter SP/SMB6

with signal transmitter version E5



Design flow limiter SP/SMB6

with proximity switch E6



Technical Data

SP/SMB3, SP/SMB6

General information

Mounting position . . . any (Preferably vertical)

Ambient temperature and Lubricant temperature range 0 to + 100 °C

Material Gray cast iron surface zinc coated

Weight
 SP/SMB3 2.6 kg
 SP/SMB6 5.8 kg

Hydraulics

Nominal volumetric flow (also see related tables on pages 8/10)

SP/SMB 3 ... stepwise from 6.0 to 38 l/min
 SP/SMB 6 ... stepwise from 25 to 90 l/min

Working pressure p_1
 without adaptations 5 to 200 bars
 E4/E5 with signal transmitter 5 to 85 bars
 E6 with proximity switch 5 to 200 bars

Required differential pressure between input pressure p_1 and output pressure $p_3 \geq 5$ bar

Lubricant mineral oils, synthetic oils and ecological oils


Operating viscosity 20 to 600 mm²/s

Signal transmitter E4 / E5

Type magnetic switch
 Switching element/contact type magnetic/reed contact
 Ambient and lubricant temperature range . . 0 to + 90 °C
 Material/Casing AlCuMgPb F38, neutrally anodized, Connector polyamide
 Weight 0.2 kg

Normal version

ATEX Version ¹⁾

Switching voltage 24 V bis 230 V AC/DC ²⁾	30 V DC
Switched current max. 2A ³⁾	max. 100 mA
Switching capacity max. 40 W	
Function NC (normally closed)	NC (normally closed)
Type of protection. IP 65 ³⁾	 II 3 cII CT6
Connection	
E4 plug straight, 4 pol, 24 V DC, with a green and yellow LED, M12x1	
E5 plug straight, 24-230 V AC/DC without LED, M12x1	E5 plug straight, 4 pol, without LED, M12x1
Connection linesscrewed	screwed
Cross section for connection	
E4 max. 3x0.75 mm ²	
E5 max. 2x0.75 mm ²	E5 max. 2x0.75 mm ²

Proximity switch E6

Type inductive PNP (normally closed)
 Operating voltage. 12 to 36 V DC
 Current rating. 100 mA
 Operating temperature . . -25 °C to +80 °C
 Short circuit protection included
 Type of enclosure (DIN 40 050) IP 67 ⁴⁾

Accessories/ Replacement parts

SP/SMB3, SP/SMB6

Designation

Order number

Flow limiter SP/SMB3	
without nozzle, without signal transmitter	24-1883-2081
Gasket set for SP/SMB3.....	24-0404-2119
Flow limiter SP/SMB6	
without nozzle, without signal transmitter	24-0712-6050
Gasket set for SP/SMB6.....	24-0404-2155
Signal transmitter, Version E4	
signal transmitter without coupler socket	24-1072-2113
signal transmitter with coupler socket with LED`s (24 V DC)	24-1072-2115
coupler socket with LED`s (24 V DC)	24-1882-2151
Signal transmitter, Version E5	
signal transmitter without coupler socket	24-1072-2113
signal transmitter with coupler socket without LED`s (230 V AC/DC)	24-1072-2114
coupler socket without LED`s	24-1882-2121
Proximity switch E6	
Proximity switch	24-1884-2282
Sockets straight, 4-poles, M 12x1	179-990-371
Sockets angled, 4-poles, M 12x1	179-990-372
Sockets straight, 4-poles, M 12x1 with orange cable 5 m	179-990-600
Sockets angled, 4-poles, M 12x1 with orange cable 5 m	179-990-601
Monitoring unit	
Group monitoring unit	84-8011-0369

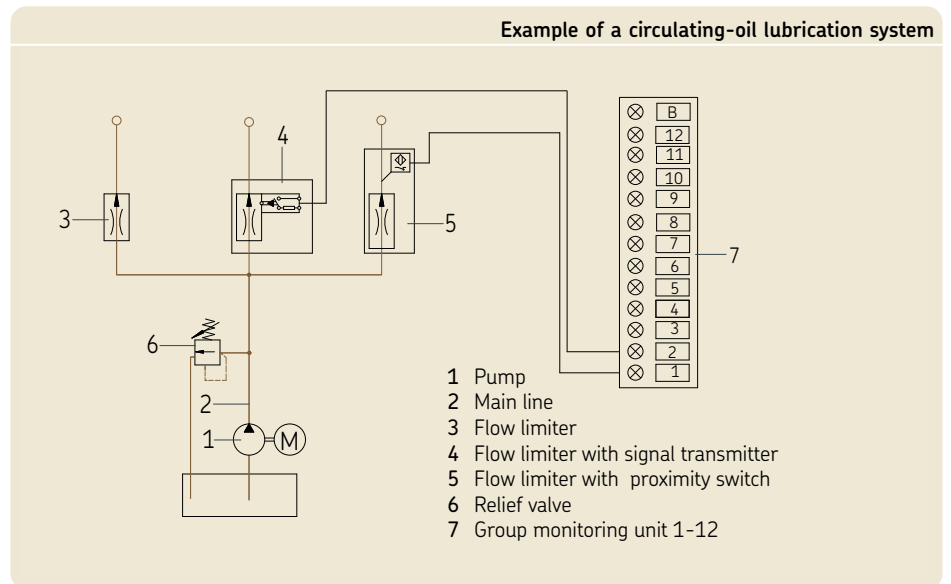
1) The ATEX signal transmitter is identical to the basic version E5. The electric connection values of the ATEX signal transmitter have to be considered. The signal transmitter must only be used in combination with the disconnecter unit.
 2) Sufficient spark protection required.
 3) Pay attention to maximum switching capacity.
 4) Please order coupler socket separately; see accessories

Example of a circulating-oil lubrication system

The pump (1) feeds the lubricant into the main line (2). The lubricant makes its way directly to the lube points from the flow limiters mounted in parallel (3-5).

The pump's volumetric flow has to be at least 15 % greater than the total nominal volumetric flow rates of all the connected flow limiters. Limitation of the system pressure is taken care of by the relief valve (6) built into the main line.

The sensors (or piston detectors) screwed into the flow limiters (3-5) monitor the volumetric flow. Group monitoring setups (7) evaluate the incoming signals.



Replacing plug-in nozzles

- Shut off the oil feed to the flow limiter (1)

WARNING:

☞ Burning oil hazard!

Failure to shut off oil feed could result in burns.

- SP/SMB3** Loosen and remove the screw plug (2) with the help of a hexagon socket screw key (SW 8)
- SP/SMB6** Loosen and remove the screw plug (2) with the help of a hexagon socket screw key (WAF 10) press out carefully the plug-in nozzle (4)

☞ A brass fitting wedge (but not hard object like, for instance, a screwdriver) should be used to help press the plug-in nozzle (out of the nozzle holder with the SP/SMB 3 or out of the screw plug with the SP/SMB 6).

- SP/SMB3** Place fitting wedge between nozzle holder (3) and plug-in nozzle (4) and carefully press the old plug-in nozzle (4) with Sealing (5) out
- SP/SMB6** Place a fitting wedge between the screw plug (2) and nozzle (4), carefully press the old plug-in nozzle (4) out

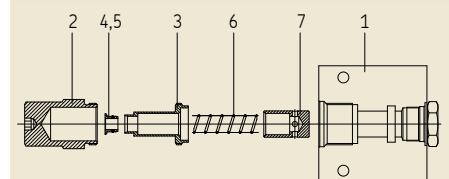
- SP/SMB3** Install new plug-in nozzle (4) and Sealing (5) on the bore of the nozzle holder (3)

☞ A brass fitting mandrel (∅ 10 mm) (but not case a hard object) should be used to help press the plug-in nozzle into the nozzle holder.

- SP/SMB3** Use a brass fitting mandrel to press the new plug-in nozzle (4) and Sealing (5) into the bore of the nozzle holder (3) without skewing
- SP/SMB6** press on new nozzle (4) onto the screw plug (2) on a plane surface. Do not tilt!

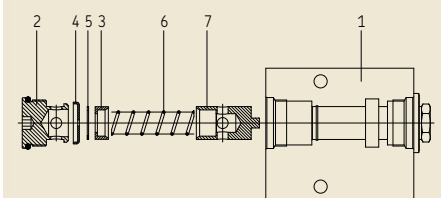
- Place the screw plug (2) in the flow limiter's threads and tighten with a hexagon socket screw key
- Open the oil feed to the flow limiter

Replacement of plug-in nozzles SP/SMB3



- Flow limiter
- Screw plug
- Nozzle holder
- Plug-in nozzle
- Sealing
- Ground plate
- Stop screw

Replacement of plug-in nozzles SP/SMB6



- Flow limiter
- Screw plug
- Nozzle holder
- Plug-in nozzle
- Sealing
- Ground plate
- Stop screw

Table: Plug-in nozzles

SP/SMB3

Table: Plug-in nozzles SP/SMB3

Nominal volumetric flow ¹⁾ [l/min]	type nozzle	index nozzle	nozzle-Ø [Ø mm]	Spare Part complete Plug in nozzle D ₁ Order number
6.00	250	250	2,50	24-0455-2370
6.50	260	260	2,60	24-0455-2371
6.75	270	270	2,70	24-0455-2372
7.00	280	280	2,80	24-0455-2373
7.50	290	290	2,90	24-0455-2374
8.00	300	300	3,00	24-0455-2375
8.75	310	310	3,10	24-0455-2376
9.25	320	320	3,20	24-0455-2377
9.75	330	330	3,30	24-0455-2378
10.50	340	340	3,40	24-0455-2379
11.00	350	350	3,50	24-0455-2380
11,50	360	360	3,60	24-0455-2381
12.00	370	370	3,70	24-0455-2382
12.75	380	380	3,80	24-0455-2383
13.50	390	390	3,90	24-0455-2384
14.00	400	400	4,00	24-0455-2385
14.75	410	410	4,10	24-0455-2386
15.50	420	420	4,20	24-0455-2387
16.00	430	430	4,30	24-0455-2388
16.75	440	440	4,40	24-0455-2389
17.50	450	450	4,50	24-0455-2390
18,00	460	460	4,60	24-0455-2391
18.75	470	470	4,70	24-0455-2392
19.50	480	480	4,80	24-0455-2393
20.25	490	490	4,90	24-0455-2394
21.00	500	500	5,00	24-0455-2395
21.75	510	510	5,10	24-0455-2396
22.50	520	520	5,20	24-0455-2397
23.25	530	530	5,30	24-0455-2398
24.00	540	540	5,40	24-0455-2399
25.00	550	550	5,50	24-0455-2400
26.50	570	570	5,70	24-0455-2402
28.00	580	580	5,80	24-0455-2403
30.00	600	600	6,00	24-0455-2405
34.00	650	650	6,50	24-0455-2411
38.00	690	690	6,90	24-0455-2412

1) at a service viscosity of 300 mm²/s.**Note!**

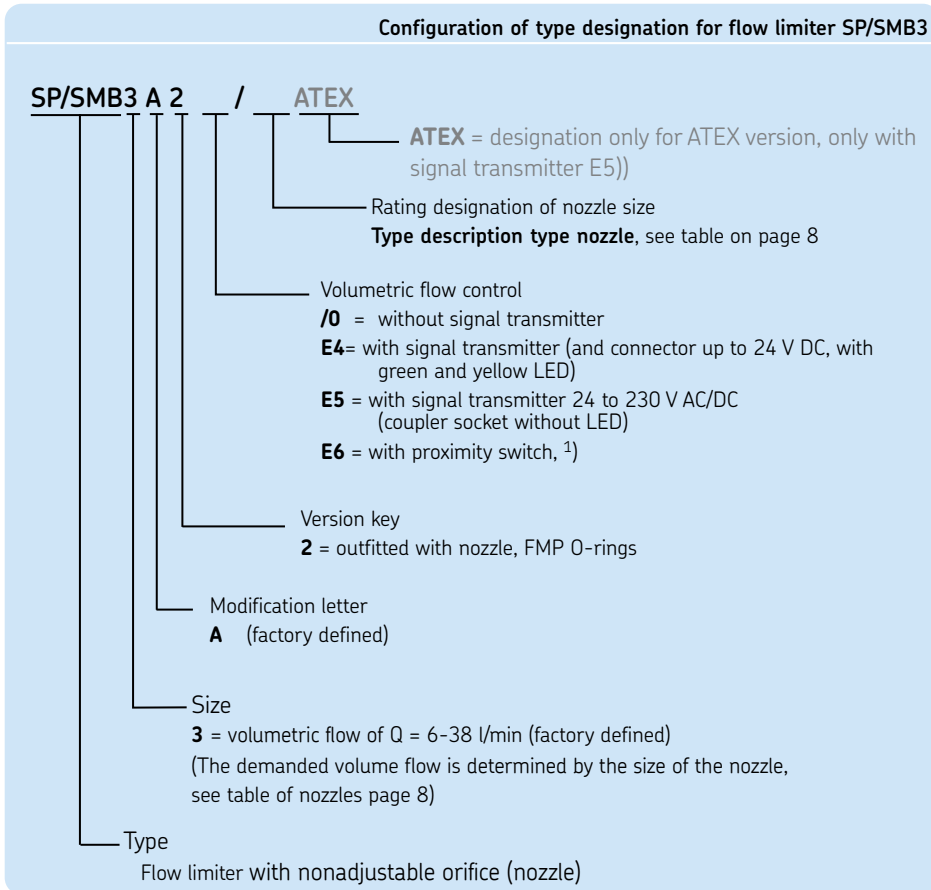
To order a flow limiter SP/SMB3, the customer has to create both a type designation and an order number. The latter has to be adjusted according to the flow limiter version.

The order designation on page 9 shows how to create type designation and order number.

The necessary nozzle type (for type designation) as well as nozzle index (for order no.) can be taken from the table of plug-in nozzles SP/SMB3 on page 10.

Key to order codes

SP/SMB3



Order example

Flow limiter design SP/SMB and size 3 (SP/SMB3) with modification letter (A), equipped with nozzle (2), with 2 point signal transmitter, version 24-230 V AC/DC (E5) and a nozzle diameter of 5.0 mm with a volume flow of 21 l/min (500) results in the following:

Type designation: **SP/SMB3A2E5/500**
as well as order no.: **24-2703-8500**

Note

The flow limiter type SP/SMB3 is optionally available in ATEX designs:

Zone 1

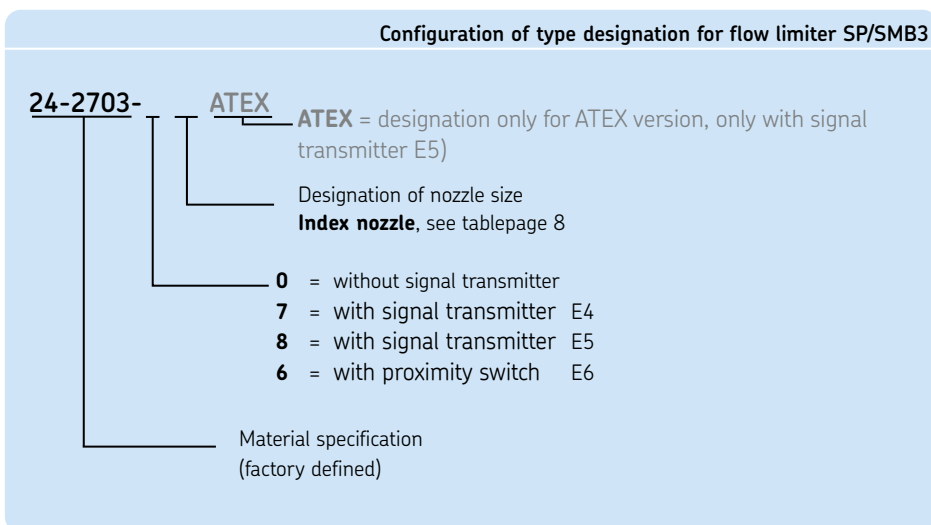
Zone 21

with following characteristics:

- Body design with grounding clamp
- Type plate extended
- Operate 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.

¹⁾ Please order line socket separately, see accessories on page 6



Type designation:

SP/SMB3A2..... /

Order number:

24-2703-..

Table: Plug-in nozzles

SP/SMB6

Table: Plug-in nozzles SP/SMB6

Nominal- volumetric flow ¹⁾ [l/min]	type nozzle	index nozzle	nozzle-Ø [Ø mm]	Spare Part complete Plug in nozzle D ₁ Order number
25	570	570	5.70	44-0455-2357
30	630	630	6.30	44-0455-2360
35	680	680	6.80	44-0455-2363
40	730	730	7.30	44-0455-2365
45	780	780	7.80	44-0455-2367
50	820	820	8.20	44-0455-2369
55	870	870	8.70	44-0455-2371
60	910	910	9.10	44-0455-2373
65	960	960	9.60	44-0455-2374
70	000	000	10.00	44-0455-2375
75	040	040	10.40	44-0455-2376
80	080	080	10.80	44-0455-2377
90	170	170	11.70	44-0455-2378

1) at a service viscosity of 300 mm²/s.

Note!

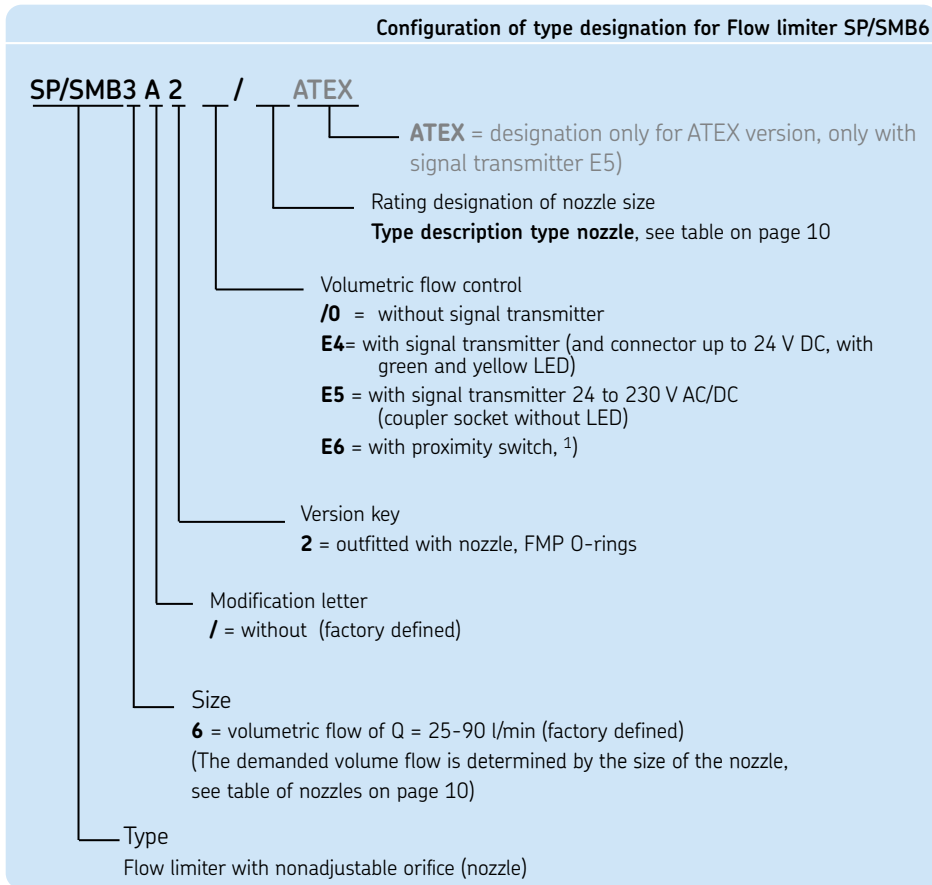
To order a flow limiter SP/SMB6, the customer has to create both a type designation and an order number. The latter has to be adjusted according to the flow limiter version.

The order designation on page 11 shows how to create type designation and order number.

The necessary nozzle type (for type designation) as well as nozzle index (for order no.) can be taken from the table of plug-in nozzles SP/SMB6.

Key to order codes

SP/SMB6



Order example

Flow limiter design SP/SMB and size 6 (SP/SMB6) without modification letter, equipped with nozzle (2) and signal transmitter with switching voltage 24 V to 230 V AC/DC (E5) and a nozzle diameter of 10.8 mm with a volume flow of 80 l/min (0570) results in the following:

Type designation: **SP/SMB6/2E5/1080**
as well as order no.: **24-2706-55080**

Note

The flow limiter type SP/SMB6 is optionally available in ATEX designs:

⊠ Zone 1

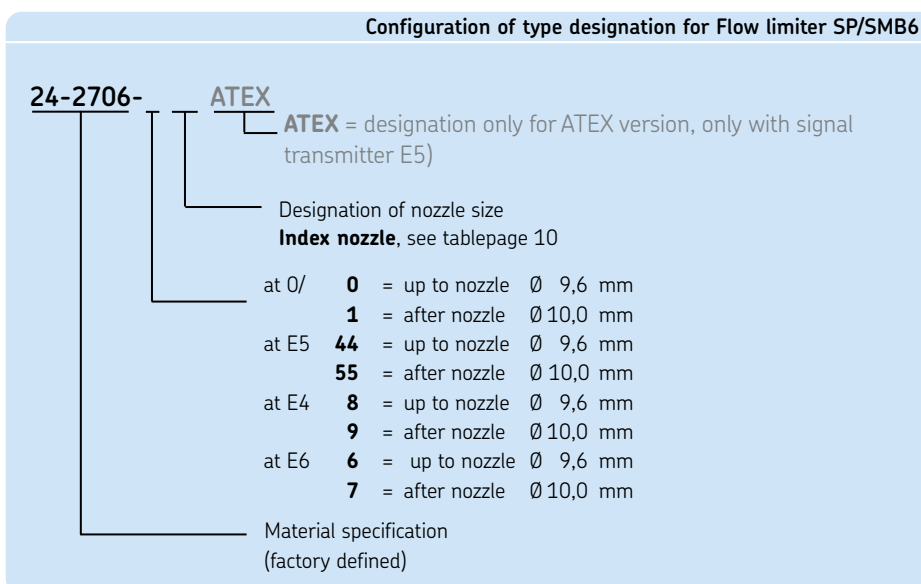
⊠ Zone 21

with following characteristics:

- Body design with grounding clamp
- Type plate extended
- Operate only while using a disconnecter unit
- Includes available ATEX certificate

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

¹⁾ Please order line socket separately, see accessories on page 6



Type designation:

SP(SMB6/2...../.....

Order no.:

24-2706-.....

Order No. 1-3001-EN

Subject to change without notice! (10/2021)

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.

Brochure note

1-3027-EN	Overview brochure - Flow limiter			
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	
1-3003-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 90 l/min	Gear wheel-type flow indicator	
1-1730-EN	Electrical plug-in connections			

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