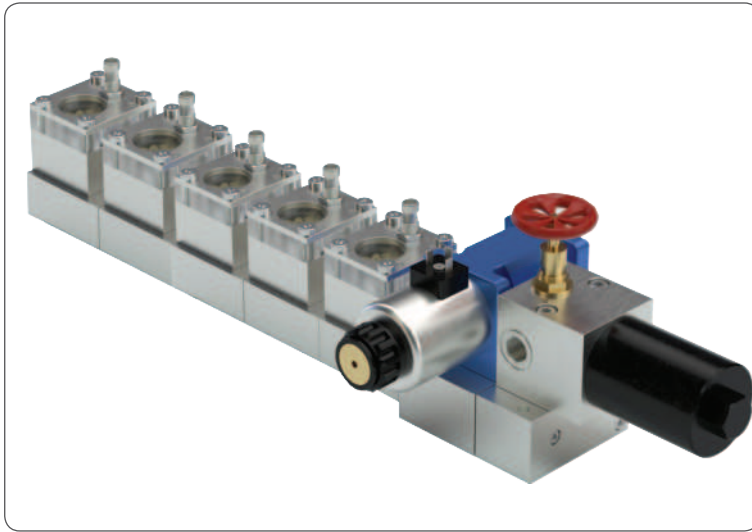


# Flow limiters of series SMBM-X und SMBM-V

Assembly instructions  
acc. to Machinery Directive 2006/42/EC

EN



Version 01 2020  
951-170-238-EN



## EC Declaration of Incorporation acc. to Machinery Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer, SKF Lubrication Systems GmbH, Hockenheim Plant, 2. Industriestr. 4, DE - 68766 Hockenheim, hereby declares the conformity of the partly completed machinery

Designation: Flow limiter  
 Type: **SMBM-...**  
 Item number: 5788-... without baseplate  
 6788-... Assembly with baseplate

Year of manufacture: See type plate

with the essential protection requirements of Machinery Directive 2006/42/EC at the time of placing on the market.

1.1.2 · 1.1.3 · 1.3.2 · 1.3.4 · 1.5.1 · 1.5.6 · 1.5.8 · 1.5.9 · 1.6.1 · 1.7.1 · 1.7.3 · 1.7.4

The special technical documentation described in Annex VII, Part B of this Directive has been compiled.

We undertake to transmit, in response to a reasoned request by the national authorities, the special documents for this partly completed machine.

The Head of Technical Standards is the authorized representative for the technical documentation. See the manufacturer information for the address.

Furthermore, the following Directives and (harmonized) standards were applied in the applicable areas:

2011/65/EU                      RoHS II  
 2014/30/EU                      Electromagnetic Compatibility | Industry

Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
DIN EN ISO 12100	2011	DIN EN 60947-5-1	2010	DIN EN 61000-6-2	2006	DIN EN 61000-6-4	2011
DIN EN 809	2012	DIN EN 61131-2	2008	Correction	2011	DIN EN 60947-5-1	2010
DIN EN 60204-1	2007	Correction	2009	DIN EN 61000-6-3	2011		
Correction	2010	DIN EN 60034-1	2015	Correction	2012		
DIN EN 50581	2013	DIN EN 61000-6-1	2007				

The partly completed machinery must not be put into service until it has been established that the machinery into which it is to be incorporated is in compliance with the provisions of the Machinery Directive 2006/42/EC and all other applicable Directives.

Hockenheim, 8/18/2020

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951-170-238-EN

Version 01

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## Masthead

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### Training

SKF conducts detailed training in order to enable the maximum safety and efficiency.

SKF recommends taking advantage of this training. For information, contact the relevant SKF service address.

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### Warranty

The instructions do not contain any information on the warranty. This can be found in our General Terms and Conditions.

### Disclaimer of liability

The manufacturer shall not be held liable for damage resulting from:

- Improper usage, assembly, operation, configuration, maintenance, repair, or accidents
- Improper reaction to malfunctions
- Unauthorized modifications to the product
- Intentional or gross negligence
- Use of non-original SKF spare parts

The maximum liability for loss or damage resulting from the use of our products is limited to the purchase price. Liability for indirect damage of any kind is excluded.

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## Explanation of symbols and signs

	General warning		Risk of electrical shock		Risk of slipping		Hot surfaces
	Being drawn into machinery		Crushing hazard		Pressure injection		Suspended load
	Electrostatic sensitive components		Potentially explosive atmosphere				
	Wear personal protective gear (goggles)		Wear personal protective gear (face mask)		Wear personal protective gear (gloves)		Wear personal protective gear (protective clothing)
	Wear personal protective gear (protective footwear)		Unlock the product		General notes		Unauthorized persons must be kept away
	CE marking		Disposal, recycling		Disposal of waste electrical and electronic equipment		

	Warning level	Consequence	Probability	Symbol	Meaning
	<b>DANGER</b>	Death, serious injury	Immediate	•	Chronological instructions
	<b>WARNING</b>	Death, serious injury	Possible	○	Bullet list items
	<b>CAUTION</b>	Minor injury	Possible		Indicates the requirements that must be met for the actions described in the following
	<b>IMPORTANT NOTE</b>	Property damage	Possible		



Abbreviations and conversion factors

re:	regarding	°C	degrees Celsius	°F	degrees Fahrenheit
approx.	approximately	K	Kelvin	oz.	ounce
i.e.	that is	N	Newton	fl. oz.	Fluid ounce
etc.	et cetera	h	hour	in.	inch
poss.	possibly	s	second	psi	pound per square inch
if necessary	if necessary	d	day	sq.in.	square inch
usually	usually	Nm	Newton meter	cu. in.	cubic inch
incl.	including	ml	milliliter	mph	miles per hour
min.	minimum	ml/d	milliliters per day	RPM	Revolutions per minute
max.	maximum	ccm	cubic centimeter	gal.	gallon
Min.	minute	mm	millimeter	lb.	kilopond
etc.	et cetera	l	liter	hp	horsepower
e.g.	for example	db (A)	sound pressure level	kp	kilopound
kW	kilowatt	>	greater than	fpsec	feet per second
U	voltage	<	less than	Conversion factors	
R	Resistance	±	plus minus	Length	1 mm = 0.03937 in.
I	current intensity	∅	diameter	Area	1 cm <sup>2</sup> = 0.155 sq.in.
V	volt	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
W	watt	RH	relative humidity		1 l = 2.11416 pints (US)
AC	alternating current	≈	approximately	Ground	1 kg = 2.205 lbs
DC	direct current	=	equal to		1 g = 0.03527 oz.
A	ampere	%	percent	Density	1 kg/cm <sup>3</sup> = 8.3454 lb./gal(US)
Ah	ampere hour	‰	per mil (thousandth)		1 kg/cm <sup>3</sup> = 0.03613 lb./cu.in.
Hz	Frequency (Hertz)	≥	greater or equal	Force	1 N = 0.10197 kp
NC	normally closed contact	≤	less or equal	Pressure	1 bar = 14.5 psi
NO	Make-contact (normally open)	mm <sup>2</sup>	square millimeter	Temperature	°C = (°F-32) x 5/9
		rpm	Revolutions per minute	Power	1 kW = 1.34109 hp
				Acceleration	1 m/s <sup>2</sup> = 3.28084 ft./s <sup>2</sup>
				Speed	1 m/s = 3.28084 fpsec.
					1 m/s = 2.23694 mph

# 1. Safety instructions

## 1.1 General safety instructions

- The operator must ensure that the instructions are read by all persons tasked with working on the product or who supervise or instruct such persons. The operator must also ensure that the staff fully understands the content of the instructions. Putting the products into operation or operating them without having read the instructions is prohibited.
- Retain the instructions for further use.
- The products described here were manufactured in accordance with current state-of-the-art technology. Risks may, however, arise from non-compliant usage and may result in personal injury or damage to material assets.
- Any malfunctions which may affect safety must be remedied immediately. In addition to these instructions, the statutory regulations for accident prevention and environmental protection must be observed.

## 1.2 General behavior when handling the product

- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- Unauthorized persons must be kept away.
- Wear personal protective gear.
- All safety regulations and in-house instructions relevant to the particular activity must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Guards and safety devices must not be removed, modified, nor disabled during operation and must be checked for proper function and completeness at regular intervals.

- If protective and safety mechanisms must be removed, they must be reinstalled immediately following conclusion of work and then inspected for proper function.
- Any malfunctions that occur must be resolved according to responsibility. The supervisor must be notified immediately in case of malfunctions outside one's individual scope of responsibility.
- Never use any part of the centralized lubrication system as a stand or step or for climbing.

### 1.3 Intended use

Feed lubricants only in compliance with the specifications, technical data, and limits presented in this manual.

The data and values listed in the "Technical data" chapter must be observed.

Usage is permitted exclusively in the context of commercial or business activity by professional users.

### 1.4 Foreseeable misuse

Any usage of the product other than as specified in this manual is strictly prohibited. Particularly prohibited are:

- Use outside the specified operating temperature range
- Use of non-specified equipment
- Use without a pressure relief valve

- Use in areas with aggressive, corrosive substances (e.g., high ozone loads)
- Use in areas with damaging radiation (e.g., ionizing radiation)
- Use to feed, forward, or store hazardous substances and mixtures as defined in Annex I Part 2-5 of the CLP Regulation (EC 1272/2008) that are marked with hazard pictograms GHS01-GHS06 and GHS08.
- Use to feed / forward / store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature
- Use in an explosion protection zone.

### 1.5 Painting plastic components

The painting of all plastic components and seals of the products described here is prohibited.

Completely remove or mask affected components before painting the main machine.

### 1.6 Modifications to the product

Unauthorized modifications and changes can have an unpredictable effect on safety. Unauthorized modifications and changes are therefore prohibited.

### 1.7 Prohibition of certain activities

The following activities must be performed only by employees of the manufacturer or

authorized persons due to possibly undetectable sources of error or due to statutory requirements:

- Repairs, modifications to the attachments, e.g. sensors, etc.
- Repairs, modifications to the monitoring equipment
- Replacement, modifications to the nozzle and the pressure balance of the throttle bushing

### 1.8 Inspections prior to delivery

The following tests were performed prior to delivery:

- Safety and functional tests
- For electrically operated products: Electrical tests according to DIN EN 60204-1:2007, VDE 0113-1:2007

### 1.9 Referenced documents

In addition to this manual, the following documents must be observed by the respective target group:

- Operational instructions, approval rules
- The safety data sheet of the lubricant used

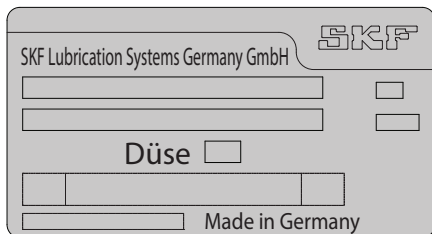
If applicable:

- Project planning documents
- Instructions from suppliers of purchased parts
- Instructions for other components for setting up the centralized lubrication system
- Other relevant documents for integration of the product into the main machine, system

### 1.10 Notes on the type plate

The rating plate provides important data such as the type designation, order number, etc.

To avoid loss of this data in case the type plate becomes illegible, these characteristics should be entered in the manual.



Part No. \_\_\_\_\_

Designation \_\_\_\_\_

Serial number \_\_\_\_\_

### 1.11 Note on CE marking

The CE marking is based on the requirements of the applied Directives:

- 2014/30/EU  
Electromagnetic compatibility
- 2011/65/EU  
(RoHS II) Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

#### Note on Low-Voltage Directive 2014/35/EU

The protection objectives of the Low-Voltage Directive 2014/35/EU are met in accordance with Annex I, No. 1.5.1 of Machinery Directive 2006/42/EC.

#### Note on Pressure Equipment Directive 2014/68/EU

Due to its performance characteristics, the product does not reach the limit values defined in Article 4, Paragraph 1, Subparagraph (a) item (i) and is, pursuant to Article 4, Paragraph 3, excluded from the scope of Pressure Equipment Directive 2014/68/EU.

## 1.12 Persons authorized to use the product

### 1.12.1 Operator

A person competent due to training, knowledge, and experience to execute the functions and activities associated with normal operation. This also includes the avoidance of possible hazards that may arise during operation.

### 1.12.2 Qualified mechanic

A person with appropriate technical training, knowledge, and experience who can recognize and avoid the hazards that may occur during transport, assembly, first start-up, operation, maintenance, repair, and dismantling.

### 1.12.3 Qualified electrician

A person with appropriate technical training, knowledge, and experience who can recognize and avoid hazards that may result from electricity.

### 1.13 Instruction of outside fitters

Before commencing work, the operator must inform outside fitters of the operational safety regulations, applicable accident prevention regulations, and the functions of the main machine and its protective devices.

### 1.14 Provision of personal protective gear

The operator must provide personal protective gear appropriate for the location and intended application.

## 1.15 Operation

The following must be observed during first start-up and operation:

- All information within this manual and all information within the referenced documents
- All laws and regulations that the operator must observe

### 1.16 Emergency shutdown

Shut down the product in an emergency by:

- Switching off the main machine in which the product is integrated
- If necessary, pressing the on/off switch on the main machine

### 1.17 Transport, assembly, maintenance, malfunction, repair, shutdown, disposal

- Prior to the start of this work, all relevant persons must be notified of it. Precautionary operational measures, work instructions must be observed.
- Transport only with suitable transport and lifting gear on suitable paths.
- Maintenance and repair work can be subject to restrictions at low or high temperatures (e.g., altered flow properties of the lubricant). Maintenance and repair work should therefore preferably be performed at room temperature.
- Prior to performing work, the product and the machine in which the product will be integrated must be de-energized, depressurized, and secured against unauthorized activation.
- Take appropriate measures to ensure that moving, detached parts are immobilized during the work and that no limbs can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold. Other units of the machine, the vehicle must not be damaged or impaired in their function by the installation.
- Dry any wet, slippery surfaces or cover appropriately.
- Cover hot or cold surfaces appropriately.
- Work on electrical components may be performed only by qualified electricians. Note possible waiting times for discharge. Work on electrical components may be performed only in a voltage-free state and using tools suitable for electrical work.
- Establish the electrical connection only in accordance with the valid circuit diagram and in observance of the relevant regulations and the local electrical operating conditions.
- Do not touch cables or electrical components with wet or moist hands.
- Drill required holes only on non-critical, non-load-bearing parts. Use existing boreholes. Do not damage lines or cables when drilling.
- Observe any possible wearing spots. Protect components appropriately.

### 1.18 First start-up, daily start-up

- All components used must be designed for:
  - The maximum operating pressure
  - The maximum/minimum ambient temperature
  - The lubricant to be delivered.
- No parts may be subjected to torsion, shearing, or bending.
- Check parts for contamination before use and clean if necessary.
- Adhere to the specified torques. Use a calibrated torque wrench when tightening.
- Avoid mixing up or incorrectly assembling disassembled parts. Label parts.

Ensure that:

- All safety mechanisms are fully present and functional
- All connections are properly connected
- All parts are correctly installed

### 1.19 Cleaning

- There is a fire hazard from the use of flammable cleaning agents. Use only non-flammable cleaning agents that are suitable for the intended purpose.
- Do not use corrosive cleaning agents.
- Do not use steam-jet equipment or high-pressure cleaners. This may damage electrical components. Observe the IP enclosure rating.
- Cleaning work must not be performed on conducting components.
- Mark wet areas accordingly.



## 1.20 Residual risks

Residual risk	Possible in lifecycle	Avoidance / Remedy
Personal injury / property damage due to falling of hoisted parts	A, B, C, G, H, K	Unauthorized persons must be kept away; nobody is allowed to be present below hoisted parts. Lift parts using suitable and tested lifting gear.
Personal injury/property damage due to tilting or falling product due to non-compliance with specified torques	B, C, G	Adhere to the specified torques. Secure the product only to components with a sufficient load-carrying capacity. If no torques are specified, use those specified for the screw size for screws of strength class 8.8.
Personal injury / property damage due to electric shock resulting from power lead damage	B, C, D, E, F, G, H	Inspect power leads for damage prior to initial use and then at regular intervals. Do not install the cable on moving parts or wearing spots. If this cannot be avoided, use anti-kink coils and/or conduits.
Personal injury / property damage due to spilled, leaked lubricant	B, C, D, F, G, H, K	Be careful when filling the reservoir and then connecting or disconnecting the lubricant lines. Use only hydraulic screw unions and lubrication lines suitable for the specified pressure. Do not install lubrication lines on moving parts or wearing spots. If this cannot be avoided, use flexible hose lines or anti-kink coils and/or conduits.
Lifecycles: A = Transport, B = Assembly, C = First start-up, D = Operation, E = Cleaning, F = Maintenance, G = Malfunction, repair, H = Shutdown, K = Disposal		

## 2. Lubricants

### 2.1 General information

Lubricants are used specially for specific applications. To fulfill the task, lubricants must meet various requirements to varying degrees. The most important requirements for lubricants are:

- Reduction in friction and wear
- Corrosion protection
- Noise reduction
- Protection against contamination/ingress of foreign matter
- Cooling (primarily for oils)
- Durability (physical/chemical stability)
- Compatibility with as many materials as possible
- Economic and environmental aspects

#### IMPORTANT NOTE

Safe operation of the flow limiters is ensured only when clean lubricating oil is being supplied. The lubricating oil must be free of air inclusions during its conveyance.

### 2.2 Selection of lubricants

SKF Lubrication Systems considers lubricants to be an element of system design. The selection of a suitable lubricant should reasonably be made during the design of the machine and forms the basis for planning the centralized lubrication system.

The manufacturer/operator of the machine should preferably make the selection with

the supplier of the lubricant on the basis of the requirements profile of the specific task.

If you have no or little experience selecting lubricants for centralized lubrication systems, please contact SKF.

We gladly assist our customers in the selection of suitable components for supplying the selected lubricant and in the planning and design of a centralized lubrication system.

This will spare you potentially costly downtime due to damage to the machine/system and/or damage to the centralized lubrication system.



Only lubricants specified for the product may be used (see "Technical data" chapter). Unsuitable lubricants may lead to failure of the product.



Do not mix lubricants. This can have unpredictable effects on the usability and this function of the centralized lubrication system.



Due to the large number of possible additives, individual lubricants that meet the required specifications according to the manufacturer's data sheet are under some circumstances not suitable for use in centralized lubrication systems (e.g., incompatibility between synthetic lubricants and materials). To avoid this, always use lubricants that have been tested by SKF.

### 2.3 Material compatibility

The lubricants must generally be compatible with the following materials:

- Steel, gray cast iron, brass, copper, aluminum
- NBR, FKM (FPM), ABS, PA, PU

### 2.4 Aging of lubricants

In case of extended machine downtime, check before putting back into operation that the lubricant is still suitable for use in terms of chemical and physical signs of aging. We recommend performing this inspection after one week of machine downtime.

In case of doubt regarding the suitability of the lubricant, replace it before re-commissioning and, if necessary, perform an initial lubrication manually.

It is possible for lubricants to be tested in the company's laboratory for their pumpability in centralized lubrication systems (e.g., "bleeding").

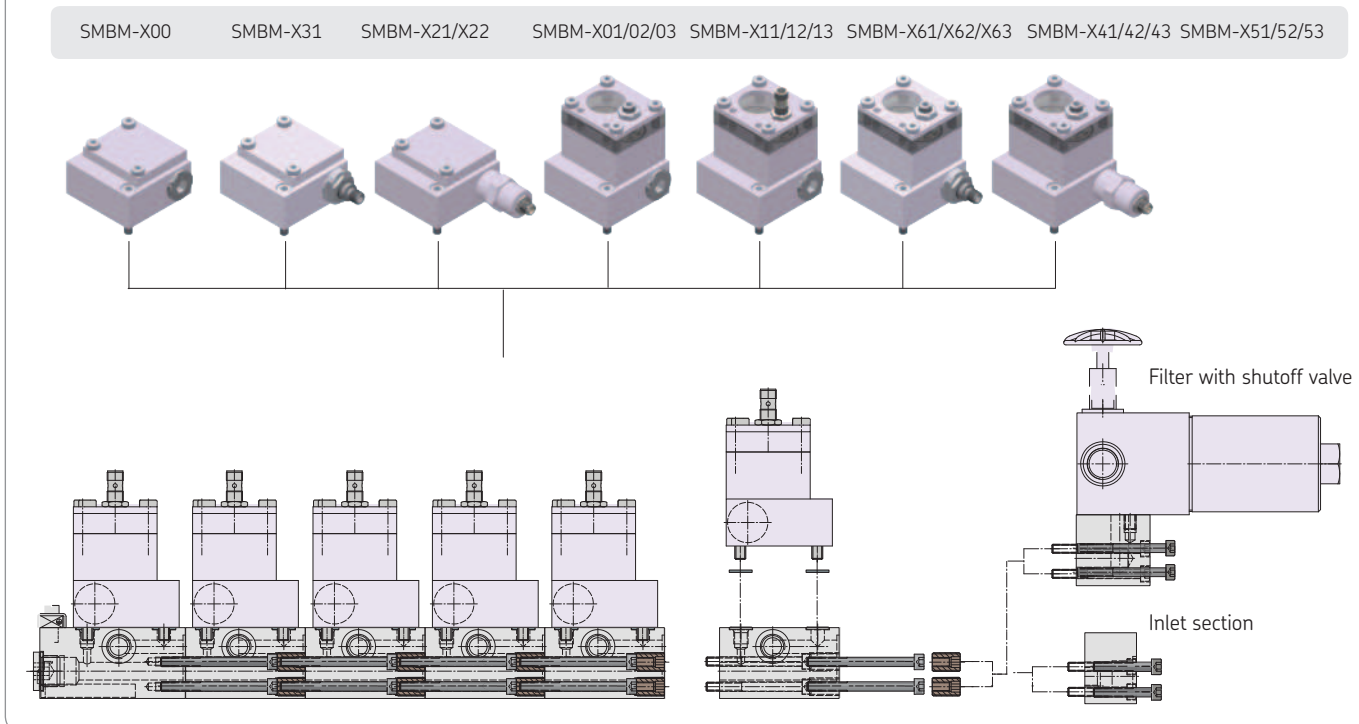
Please contact SKF if you have further questions regarding lubricants.

An overview of the lubricants we have tested is available on request.

### 3. Overview, functional description

#### 3.1 Series SMBM-X (Single Flow) flow limiter versions

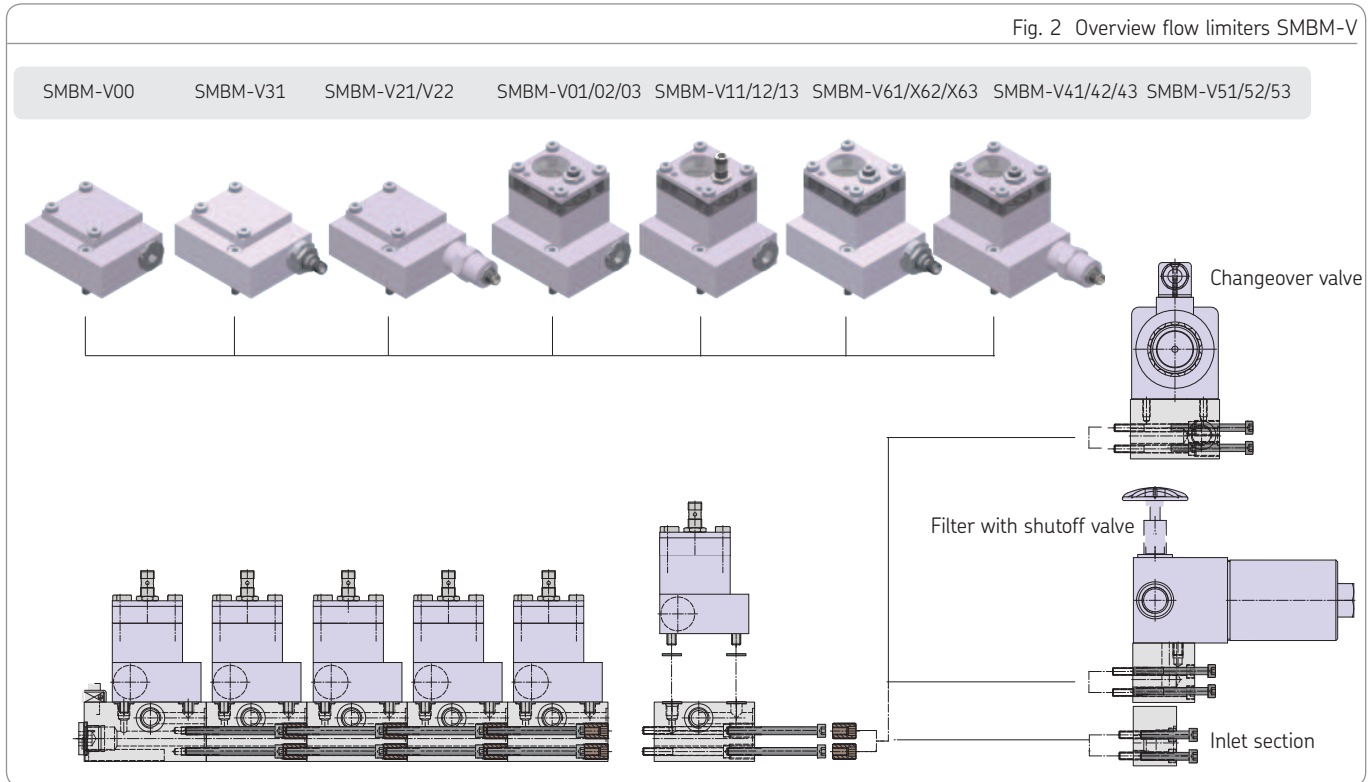
Fig. 1 Overview flow limiters SMBM-X



Flow limiter SMBM-X ..	(Design) ↓
without gear-type flow indicator, without signal transmitter	00
without gear-type flow indicator, with piston detector	31
without gear-type flow indicator, with signal transmitter 24 V DC (with LED)	21
without gear-type flow indicator, with signal transmitter 24 V DC (without LED)	22
with gear-type flow indicator, 333 pulses per liter, without pulse generator, max. plug-in nozzle size 295	01
with gear-type flow indicator, 167 pulses per liter, without pulse generator	02
with gear-type flow indicator, 83 pulses per liter, without pulse generator	03
with gear-type flow indicator, 333 pulses per liter, with pulse generator, max. plug-in nozzle size 295	11
with gear-type flow indicator, 167 pulses per liter, with pulse generator	12
with gear-type flow indicator, 83 pulses per liter, with pulse generator	13
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (with LED)	41
with gear-type flow indicator, 167 pulses per liter, with signal transmitter 24 V DC (with LED)	42
with gear-type flow indicator, 83 pulses per liter, with signal transmitter 24 V DC (with LED)	43
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (without LED)	51
with gear-type flow indicator, 167 pulses per liter and signal transmitter 24 V DC (without LED)	52
with gear-type flow indicator, 83 pulses per liter and signal transmitter 24 V DC (without LED)	53
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and flow indicator (piston detector)	61
with gear-type flow indicator, 167 pulses per liter and flow indicator (piston detector)	62
with gear-type flow indicator, 83 pulses per liter and flow indicator (piston detector)	63
Filter with shutoff valve	

## 3.2 Series SMBM-V (Dual Flow) flow limiter versions

Fig. 2 Overview flow limiters SMBM-V



Flow limiter SMBM SMBM-V ..	(Design) ↓
without gear-type flow indicator, without signal transmitter	00
without gear-type flow indicator, with piston detector	31
without gear-type flow indicator, with signal transmitter 24 V DC (with LED)	21
without gear-type flow indicator, with signal transmitter 24 V DC (without LED)	22
with gear-type flow indicator, 333 pulses per liter, without pulse generator, max. plug-in nozzle size 295	01
with gear-type flow indicator, 167 pulses per liter, without pulse generator	02
with gear-type flow indicator, 83 pulses per liter, without pulse generator	03
with gear-type flow indicator, 333 pulses per liter, with pulse generator, max. plug-in nozzle size 295	11
with gear-type flow indicator, 167 pulses per liter, with pulse generator	12
with gear-type flow indicator, 83 pulses per liter, with pulse generator	13
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (with LED)	41
with gear-type flow indicator, 167 pulses per liter, with signal transmitter 24 V DC (with LED)	42
with gear-type flow indicator, 83 pulses per liter, with signal transmitter 24 V DC (with LED)	43
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (without LED)	51
with gear-type flow indicator, 167 pulses per liter and signal transmitter 24 V DC (without LED)	52
with gear-type flow indicator, 83 pulses per liter and signal transmitter 24 V DC (without LED)	53
with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and piston detector	61
with gear-type flow indicator, 167 pulses per liter and flow indicator and piston detector	62
with gear-type flow indicator, 83 pulses per liter and flow indicator and piston detector	63
Reversing valve	
Filter with shutoff valve	

## 3.3 Type designation of flow limiters of series SMBM-

X	...
V	

Order code	SMB	M	-				
	A	B		C	D	E	F
<i>Order example:</i>	<i>SMB</i>	<i>M</i>	<i>-</i>	<i>V</i>	<i>11</i>	<i>CS</i>	<i>025</i>

<b>A</b>	<b>Assemblies designation</b> Flow limiter
SMB	

<b>B</b>	<b>Type</b>
M	= Modular design

<b>C</b>	<b>Version/switchover option</b>
X	= Single flow rate (one plug-in nozzle $D_1$ )
V	= Starting hydraulic flow (plug-in nozzle $D_1$ ) and operating hydraulic flow (plug-in nozzle $D_2$ )

<b>E</b>	<b>Electrical connection</b>		
XX	= without connection cable		
CA	= Connection cable, 5 m long, with angle plug	XA	= with angle plug, without cable
CS	= Connection cable, 5 m long, with straight plug	XS	= with straight plug, without cable

<b>F</b>	<b>Plug-in nozzle</b>
SMBM-X = $D_1$	= Plug-in nozzle index, to be obtained from Chapter 4.7, page 39
SMBM-V = $D_1/D_2$	= Plug-in nozzle index, to be obtained from Chapter 4.8, page 40

&gt;&gt;&gt;&gt;



D Design key / Volumetric flow control	
00	without gear-type flow indicator, without signal transmitter
31	without gear-type flow indicator, with piston detector
21	without gear-type flow indicator, with signal transmitter 24 V DC (with LED)
22	without gear-type flow indicator, with signal transmitter 24 V DC (without LED)
01	with gear-type flow indicator, 333 pulses per liter, without pulse generator, max. plug-in nozzle size 295
02	with gear-type flow indicator, 167 pulses per liter, without pulse generator
03	with gear-type flow indicator, 83 pulses per liter, without pulse generator
11	with gear-type flow indicator, 333 pulses per liter, with pulse generator, max. plug-in nozzle size 295
12	with gear-type flow indicator, 167 pulses per liter, with pulse generator
13	with gear-type flow indicator, 83 pulses per liter, with pulse generator
41	with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (with LED)
42	with gear-type flow indicator, 167 pulses per liter, with signal transmitter 24 V DC (with LED)
43	with gear-type flow indicator, 83 pulses per liter, with signal transmitter 24 V DC (with LED)
51	with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and signal transmitter 24 V DC (without LED)
52	with gear-type flow indicator, 167 pulses per liter and signal transmitter 24 V DC (without LED)
53	with gear-type flow indicator, 83 pulses per liter and signal transmitter 24 V DC (without LED)
61	with gear-type flow indicator, 333 pulses per liter, max. plug-in nozzle size 295 and piston detector
62	with gear-type flow indicator, 167 pulses per liter and piston detector
63	with gear-type flow indicator, 83 pulses per liter and piston detector

*Order example*

*Flow limiter of Series **SMB**, Modular type (**M**) with starting and operating hydraulic flow control (**V**), with gear wheel-type flow indicator with 333 pulses per liter (pulse/l), with pulse generator, without signal transmitter (**11**), with ... m connection cable with straight plug (**CS**), with a nominal volumetric flow of (**1.92: 7.98**) liters per minute gives the order No.: **SMBM-V11CS 025**.*



### 3.5 Application

Flow limiters are used in circulating-oil lubrication systems. They supply the lubrication points of the connected system with the required oil quantities. These individual oil quantities are independent of fluctuations of operating pressure and, in wide ranges, are also independent of oil viscosity. This makes them the ideal solution for applications with fluctuating oil temperatures, such as may occur, for example, in steel mills or in mining operations. Their self-regulating operating principle makes elaborate pressure regulation unnecessary.

The flow limiter series SMBM is designed for setup on base plates in assemblies of 1 to 6 flow limiter modules. The use of plug-in nozzles makes it possible to set the oil quantity in increments from 0.08 to 8 l/min. (0.17 to 16.9 pts/min).

One pump supplies the main pressure line with oil. The flow limiters directly connected to this main line divide up the total oil quantity into smaller, constant oil quantities. The option exists of installing metering devices or flow dividers downstream of the flow limiters in order to divide up the oil quantity even further into ever-smaller partial flows. The function can be monitored by signal transmitters, piston detectors or gear wheel-type flow indicators which are mounted on the flow limiters and connected to a monitoring unit.

### 3.6 Functional description of a flow limiter of series SMBM

☞ see Figure 4 and Fig. 5

The SMBM flow limiters are single modules for setup on base plates. Functionality for the two series (SMBM-X and SMBM-V) is identical.

The total volumetric flow  $Q_{in}$ , which is supplied to a flow limiter assembly, is divided up into individual volume flows  $Q_{out}$  by the flow limiter modules. For this, the system pressure, designated as inlet pressure  $p_1$  in the presentation, is identical for all flow limiters on the same base plate.

Every flow limiter has a spring-loaded control piston SK with a plug-in nozzle  $D_1$  (SMBM-X) or 2 plug-in nozzles  $D_1/D_2$  (SMBM-V), which act as differential-pressure valves. The nonadjustable restrictor  $D_1$  is available in different nozzle sizes (nozzle table, SMBM-X = see Chapter 4.5, SMBM-V = see Chapter 4.6). The plug-in nozzles ( $D_1$  or  $D_1/D_2$ ) in the control piston which act as nonadjustable restrictors determine the flow rate (Fig. 5), while  $D_3$  represents a

variable nozzle which is formed by the outlet boreholes arranged in a circle in the throttle bushing and by the lower edge of the control piston which partly covers over these boreholes.

The covering of this variable nozzle  $D_3$  is the result of the equilibrium of the pressures  $p_1$  and  $p_2$  and of the spring force  $F$  on the control piston. The influence of viscosity is only slight, due to the relatively short hydraulic length which arises from the geometry of the plug-in nozzles  $D_1$  or  $D_1/D_2$ , respectively. The flow rate is thus determined only by the differential pressure  $p_{1/2}$ , which is constant. This results in the flow rate also being constant.

#### Prerequisites

To ensure impeccable functioning of the flow limiter,  $p_1$  must always be greater than the the differential pressure  $p_{1/2}$  plus the back pressure downstream of the flow limiter.

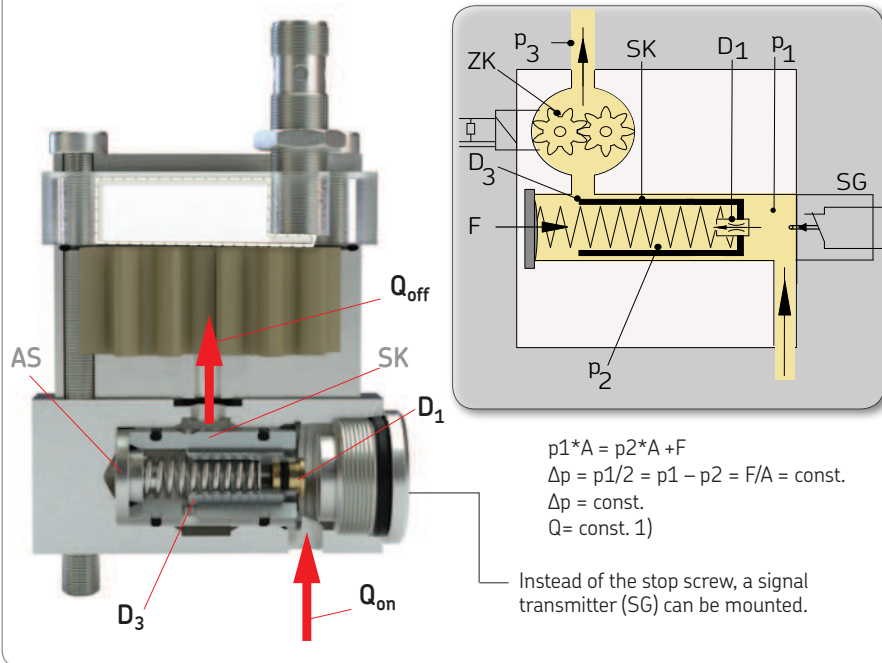
$$p_1 > p_{1/2} + p_3$$

We recommend that a reserve of approximately 15% be provided for the selection of the oil pump.

$$Q_{pump} \geq 1.15 * \Sigma Q_{on}$$

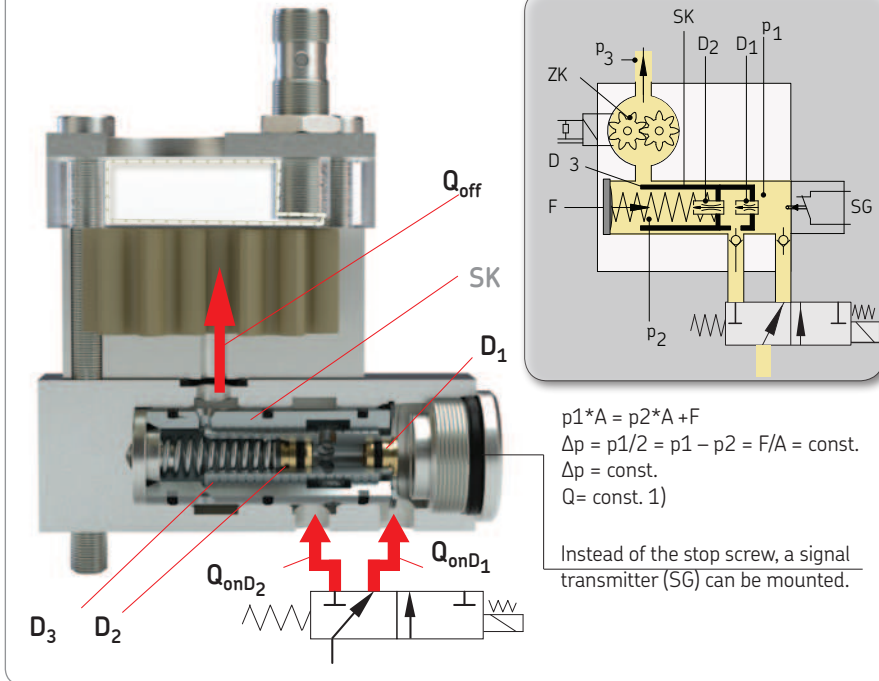
Circulating-oil lubrication systems with flow limiters, which are equipped with downstream metering devices are usually run with a system pressure of 20-25 bar (290-360 psi), while a system pressure of 16 bar (230 psi) is sufficient for systems comprised solely of flow limiters.

Fig. 4 Functional diagram SMBM-X



Item	Legend to Figure 4
D <sub>1</sub>	Nonadjustable restrictor (plug-in nozzle)
D <sub>3</sub>	Variable nozzle, formed by control piston and outlet boreholes aligned in a circle
p <sub>1</sub>	Inlet pressure upstream of D <sub>1</sub>
p <sub>2</sub>	Inner pressure downstream of D <sub>1</sub>
p <sub>3</sub>	Outlet pressure downstream of D <sub>2</sub> (back pressure from the system)
F	Spring tension
SK	Control piston
Q <sub>on</sub>	Inlet volumetric flow
Q <sub>off</sub>	Outlet volumetric flow
SG	Signal transmitter (optional)

Fig. 5 Functional diagram SMBM-V

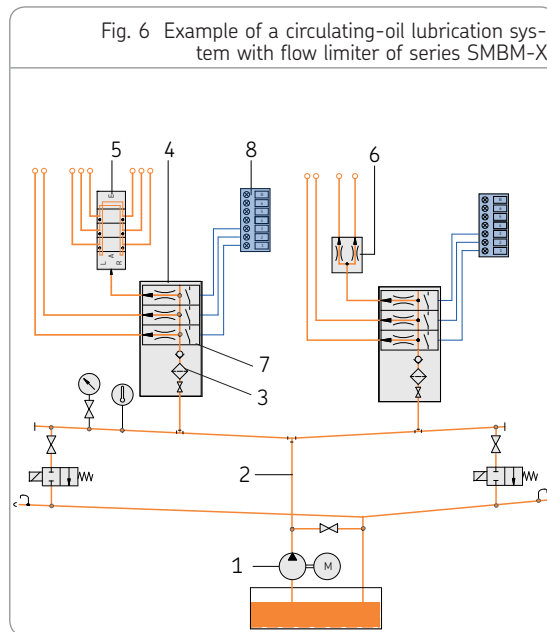


Item	Legend to Figure 5
D <sub>1</sub>	Nonadjustable restrictor (plug-in nozzle), starting state
D <sub>2</sub>	Nonadjustable restrictor (plug-in nozzle), operating state
D <sub>3</sub>	Variable nozzle, formed by control piston and outlet boreholes aligned in a circle
p <sub>1</sub>	Inlet pressure upstream of D <sub>1</sub> /D <sub>2</sub>
p <sub>2</sub>	Inner pressure downstream of D <sub>1</sub> /D <sub>2</sub>
p <sub>3</sub>	Outlet pressure downstream of D <sub>3</sub> (back pressure from the system)
F	Spring tension
A	Cross-sectional area of the control piston
SK	Control piston
Q <sub>on1</sub>	Inlet volume flow, starting state
Q <sub>on2</sub>	Inlet volume flow, operating state
Q <sub>off</sub>	Outlet volumetric flow
SG	Signal transmitter
ZK	Gear-type flow indicator with pulse generator

### 3.7 Example of a circulating-oil lubrication system with flow limiter of series SMBM-X

See Figure 6

Before first start-up of the machine, the lubricant is heated inside the oil supply unit (1). The main delivery line (2) opens when the specified lubricant temperature is reached. The lubricant now flows through warm-up lines (4), which are switched on by valves (3), and through the return line (5) back to the oil supply unit (1). Once the specified lubricant temperature has been reached on the return line to the reservoir, the warm-up lines (4) are closed by the valves (3). The pump (1) now delivers the lubricant to the main pressure line (2). From here it travels through the oil filters (6) to the flow limiters (7) and then via downstream metering devices (8) or flow dividers (9) to the lubrication points as needed. Either signal transmitters (10), piston detectors or gear wheel-type flow indicators with pulse sensors in connection with monitoring devices are used to monitor the individual volumetric flows.



Item	Legend to Figure 6
1	Oil supply unit
2	Main pressure line
3	Changeover valve
4	Warm-up line
5	Return line
6	Oil filter
7	Flow limiter
8	Progressive metering device
9	Flow divider
10	Signal transmitter
11	Monitoring unit

### 3.8 Example of a circulating-oil lubrication system with flow limiters of series SMBM-V

☞ See Figure 7

Series SMBM-V flow limiters provide an optional switchover to a lower volumetric flow to support the heating-up procedures and to avoid bearing overflows with machines that are not yet warm enough for operation.

Before start-up of the machine, the lubricant is heated inside the oil supply unit **(1)**. The main delivery line **(2)** opens when the specified lubricant temperature is reached. The lubricant now flows through connected warm-up lines **(3)** and through the return line **(4)** back to the oil supply unit **(1)**. The warm-up lines are closed once the specified lubricant temperature has been reached **(5)** on the return line to the reservoir. The pump **(1)** now delivers the lubricant to the main pressure line **(2)**. From here it travels through the oil filters **(6)** to the flow limiters **(7)** and then via downstream progressive metering devices **(8)** or flow dividers to the lubrication points as needed.

During this process, the electrical 3/2-way changeover valve **(9)** is first connected in such a way that the plug-in nozzle designed for start-up operation **D<sub>1</sub>** is actuated. This reduces the rated volumetric flow to a lower starting flow of 25%.

Once the target lubricant temperature has been reached on the return line to the reservoir, the electrical 3/2-way changeover valve **(9)** is switched over to the plug-in nozzle **D<sub>2</sub>** designed for the full flow rate. Lubrication points that do not require a reduction in the starting volume ratio (to 25% 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 Chapter 4.6).

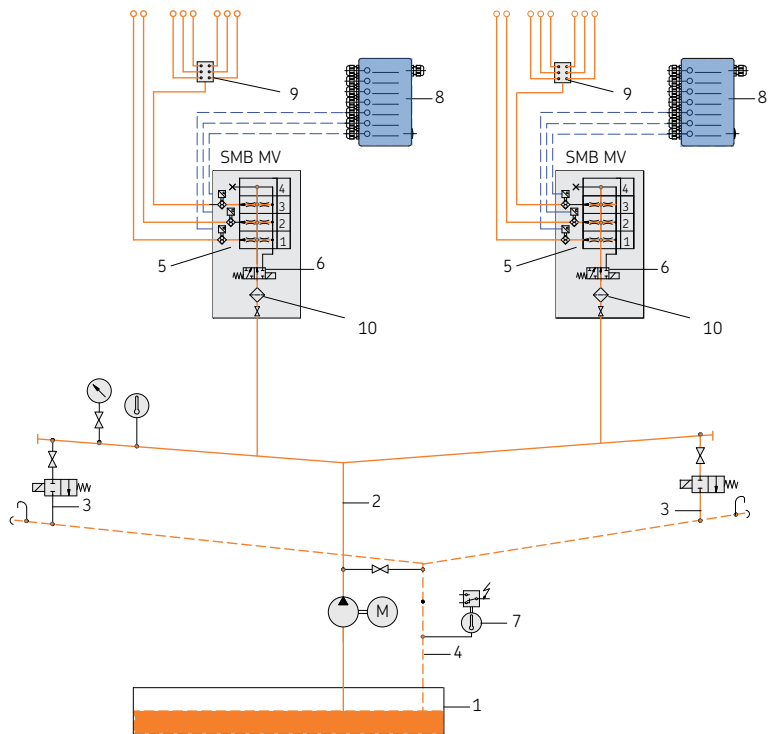
Either signal transmitters **(10)**, piston detectors or gear wheel-type flow indicators with pulse sensors in connection with monitoring devices **(11)** are used to monitor the individual volumetric flows.



It is not permitted to utilize a mixture of SMBM-X and SMBM-V on the same base plate, because otherwise the SMBM-X flow limiter would not be supplied with oil while the valve is positioned for start-up operation!



Fig. 7 Example of a circulating-oil lubrication system with flow meters of series SMBM-V



Item	Legend to Figure 7
1	Oil supply unit
2	Main pressure line
3	Warm-up line
4	Return line
5	Temperature sensor
6	Oil filter with shutoff valve
7	Flow limiter with changeover valve
8	Progressive metering device
9	Electrical changeover valve
10	Signal transmitter
11	Monitoring units

## 4. Technical data

### 4.1 General technical data SMBM

Type	2-way flow limiter valve with fixed required value
Material	EN AW-6061-T651, anodized
Mounting position	any (without filter) / vertical with filter
Flow rate	0.08 to 8.0 l/min; only up to 6.95 l/min for pulse generators with 333 lpl.
Operating pressure (inlet) $P_1$	
- without attachments	5 to 200 bar
- with piston detector (24-1884-2785)	5 to 100 bar
- with gear-type flow indicator	6 to 50 bar
- with signal transmitter (24-1072-2124)	5 to 100 bar
- with electrical changeover valve (24-1254-2486)	5 to 350 bar; with a signal transmitter, the smaller value 5-100 bar applies
System operating pressure	See note 1
Required differential pressure between inlet $p_1$ and outlet $p_3$	≥5 bar without gear wheel-type flow indicator
	≥6 bar with gear wheel-type flow indicator
Pumped medium	mineral oils, synthetic and environmentally friendly oils
Working viscosity <sup>2)</sup>	20 bis 600 mm <sup>2</sup> /s (With cold-start conditions, a switchover to a lower target volumetric flow is possible (only SMBM-V))
Ambient temperature/surface temperature/ storage temperature range	0 to +70 °C
Lubricant temperature range	0- to 90 °C at ambient temperature <60 °C
Measuring range/proportional factor	333 pulses per liter (3.0 ml/pulse)
	167 pulses per liter (6.0 ml/pulse)
	83 pulses per liter (12.0 ml/pulse)
Total weight, modular structure with 1 to 6 flow limiters (attach- ments, monitoring - see Chapter 4.2 to Chapter 4.7)	SMBM-X- see Chapter 6.3.9, page 52
	SMBM-V- see Chapter 6.4.10, page 59

## Note:

1) We recommend a system operating pressure of 16 bar for the operation of systems comprised solely of flow limiters and of 22 bar when downstream progressive metering devices are used. Doing so ensures that brief pressure fluctuations or a loss of pressure caused by the use of excessively cold oil during start-up will not affect the preset volumetric flow.

2) We recommend using high-conductivity lubricants (if possible, >1000 pS/m at 20°C) to minimize the electrostatic charge of the lubricants.

## 4.2 Piston detector 24-1884-2785

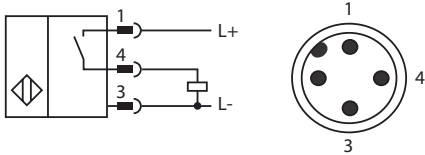
Switching voltage (U)	10-30 V DC	Switched current (I)	max. 100 mA
Function	Inductive, NC contact, contact between pin 2 and pin 3 closed during operation	Switching functions	See Chapter 6.5
Polarity reversal protection	Yes	Enclosure rating	IP 67
Ambient temperature	0-80 °C (32-176 °F)		
Lubricant temperature	0-80 °C (32-176 °F)		
Max. working pressure	100 bar (1450 psi)		
Material	Stainless steel	Weight	0.05 kg
Thread	M26x1.5	Cable socket connection	M12x1
Connection	Accessory cable socket (straight, without cable), Order No. 179-990-371 For other cable sockets- see Chapter 15.2	Conductor cross-section	max. 3 x 0.75 mm <sup>2</sup>

Circuit state display	LED, yellow		
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### 4.3 Signal transmitter 24-1072-2124, without cable box

Switching voltage (U)	max. 24 V DC
Switched current (I)	max. 2A
Switching capacity (P)	Max. 40 W
Function	NC contact, contact between pin 1 and pin 4 closed during operation, see Chapter 6.7 for switching functions
Functionality	Magnetic switch, Reed contact
Ambient temperature	0-70 °C (32-158 °F)
Lubricant temperature	0-70 °C (32-158 °F)
Max. working pressure	85 bar (1233 psi)
Material	Housing: EN AW-6061-T651, anodized, Plug: polyamide
Thread / enclosure rating	M26x1.5 / IP65
Conductor cross-section	max. 2 x 0.75 mm <sup>2</sup>
Plug thread	M12x1, PG7 fitting

## 4.4 Pulse generator 2340-0000030 for gear-type flow indicator

General technical data																	
Switch function	PNP (NO)	Output type	Inductive, 3-wire	Ambient temperature	-40 ... 70°C (-40 ... 158°F)												
Sensing distance $S_n$	4 mm	Installation	flush mountable	Lubricant temperature	-40 ... 70°C (-40 ... 158°F)												
Secured sensing distance $S_a$	0 ... 3.24 mm			Enclosure rating	IP67												
Housing material	Brass, nickel-plated	Face	PBT	Polarity reversal protection	polarity reversal protection												
Key data																	
Operating voltage $U_B$	10...30 V DC	Switching frequency $f$	0 ... 500 Hz	Operating current $I_L$	0 ... 150 mA												
Hysteresis $H$	typ. 5%	Short-circuit protection	intermittent	Residual current $I_r$	0 ... 0.5 mA, typ. 0.1 $\mu$ A												
Voltage drop $U_d$	$\leq 3$ V	Thread	M12x1	Weight	0.03 kg												
Circuit state display	LED, yellow	Plug connector	M12x1, 4-pin														
			For other cable sockets- see Chapter 15.2	Standardization	EN 60947-5-2007												
					IEC 60947-5-2007												
Wiring diagram	 <p>Wire colors according to EN 60947-5-2</p> <table border="1"> <tbody> <tr> <td>1</td> <td>BN</td> <td>(Brown)</td> </tr> <tr> <td>2</td> <td>WH</td> <td>(White)</td> </tr> <tr> <td>3</td> <td>BU</td> <td>(Blue)</td> </tr> <tr> <td>4</td> <td>BK</td> <td>(Black)</td> </tr> </tbody> </table>					1	BN	(Brown)	2	WH	(White)	3	BU	(Blue)	4	BK	(Black)
1	BN	(Brown)															
2	WH	(White)															
3	BU	(Blue)															
4	BK	(Black)															

## 4.5 Electrical changeover valve 24-1254-2486 for separation of starting and main oil flow

Type	3/2 directional solenoid valve	Voltage	24 V DC $\pm$ 10%
Type	3WE 10 B5X/EG24N9K4	Rated output	40 W
Medium temperature range	-20 to +70°C	ON-time	S1, Duty type acc. to VDE 0580
Ambient temperature range	up to 50°C	Enclosure rating	IP 65
Max. operating pressure connection A, B, P	210 bar	Insulation class	F
Max. operating pressure connection T	210 bar	Plug	DIN 24-340-A, Order No. 24-1882-2029
Max. volumetric flow	150 l/min	Medium viscosity	2.8 to 500 mm <sup>2</sup> /s
Weight	3.9 kg		
Wiring diagram			

## 4.6 Oil filter 24-0651-3041

Type	Metal grid filter	Mounting position	Vertical, with filter cartridge downwards
Medium temperature range	0 to 70°C	Ambient temperature range	0 to 70°C
Material, filter flange	EN AW-6061-T651, anodized	Material, filter body	Cast iron
Material Filter element	Stainless steel	Material shutoff valve	Brass
Pipe thread	G1/2 BSPP	Filter mesh size	0.1 mm
Weight	2.2 kg		

## 4.7 Plug-in nozzle table SMBM-X

Nominal volumetric flow <sup>1)</sup> [l/min]	Pints/Minute [pts/min]	Nozzle index	Spare part, complete plug-in nozzle D <sub>1</sub>	Nominal volumetric flow <sup>1)</sup> [l/min]	Pints/Minute [pts/min]	Nozzle index	Spare part, complete plug-in nozzle D <sub>1</sub>
0.08	0.17	050	24-0455-2574	2.67	5.64	185	24-0455-2601
0.12	0.25	055	24-0455-2375	2.80	5.92	190	24-0455-2602
0.15	0.32	060	24-0455-2576	2.98	6.30	195	24-0455-2603
0.20	0.42	065	24-0455-2577	3.16	6.68	200	24-0455-2604
0.25	0.53	070	24-0455-2578	3.30	6.97	205	24-0455-2605
0.29	0.61	075	24-0455-2579	3.43	7.25	210	24-0455-2606
0.35	0.74	080	24-0455-2580	3.58	7.57	215	24-0455-2607
0.41	0.87	085	24-0455-2581	3.79	8.01	220	24-0455-2608
0.47	0.99	090	24-0455-2582	3.98	8.22	225	24-0455-2609
0.56	1.18	095	24-0455-2583	4.18	8.83	230	24-0455-2610
0.65	1.37	100	24-0455-2584	4.37	9.24	235	24-0455-2611
0.73	1.54	105	24-0455-2585	4.57	9.66	240	24-0455-2612
0.79	1.67	110	24-0455-2586	4.80	10.14	245	24-0455-2613
0.88	1.86	115	24-0455-2587	5.00	10.57	250	24-0455-2614
0.98	2.07	120	24-0455-2588	5.19	10.97	255	24-0455-2615
1.09	2.30	125	24-0455-2589	5.37	11.35	260	24-0455-2616
1.18	2.49	130	24-0455-2590	5.55	11.73	265	24-0455-2617
1.30	2.75	135	24-0455-2591	5.77	12.19	270	24-0455-2618
1.43	3.02	140	24-0455-2592	5.99	12.66	275	24-0455-2619
1.56	3.30	145	24-0455-2593	6.22	13.15	280	24-0455-2620
1.67	3.53	150	24-0455-2594	6.49	13.72	285	24-0455-2621
				6.74	14.24	290	24-0455-2622
1.79	3.87	155	24-0455-2595	6.95	14.69	295	24-0455-2623
1.92	4.06	160	24-0455-2596	7.17	15.15	300	24-0455-2624
2.07	4.37	165	24-0455-2597	7.31	15.45	305	24-0455-2625
2.21	4.67	170	24-0455-2598	7.48	15.81	310	24-0455-2626
2.36	4.99	175	24-0455-2599	7.72	16.32	315	24-0455-2627
2.52	5.33	180	24-0455-2600	7.98	16.86	320	24-0455-2627

## 4.8 Plug-in nozzle table SMBM-V

Nominal volumetric flow <sup>1)</sup> [l/min]	Pints/Minute [pts/min]	Nozzle index	Spare part, complete plug-in nozzle D <sub>1</sub>	Spare part, complete plug-in nozzle D <sub>2</sub>
0.08 : 0.65	0.17 : 1.37	003	24-0455-2574	24-0455-2584
0.12 : 0.79	0.25 : 1.67	004	24-0455-2575	24-0455-2586
0.15 : 0.98	0.32 : 2.07	005	24-0455-2576	24-0455-2588
0.20 : 1.18	0.42 : 2.49	006	24-0455-2577	24-0455-2590
0.25 : 1.43	0.83 : 3.02	007	24-0455-2578	24-0455-2592
0.29 : 1.67	0.61 : 3.53	008	24-0455-2579	24-0455-2594
0.35 : 1.92	0.74 : 4.06	009	24-0455-2580	24-0455-2596
0.41 : 2.21	0.87 : 4.67	010	24-0455-2581	24-0455-2598
0.47 : 2.52	0.99 : 5.33	011	24-0455-2582	24-0455-2600
0.56 : 2.80	1.18 : 5.92	012	24-0455-2583	24-0455-2602
0.65 : 3.16	1.37 : 6.68	013	24-0455-2584	24-0455-2604
0.73 : 3.43	1.54 : 7.25	014	24-0455-2585	24-0455-2606
0.79 : 3.79	1.67 : 8.01	015	24-0455-2586	24-0455-2608
0.88 : 4.37	1.86 : 9.24	016	24-0455-2587	24-0455-2610
0.98 : 4.57	2.07 : 9.66	017	24-0455-2588	24-0455-2612
1.09 : 5.00	2.30 : 10.57	018	24-0455-2589	24-0455-2614
1.18 : 5.37	2.49 : 11.35	019	24-0455-2590	24-0455-2616
1.30 : 5.77	2.75 : 12.19	020	24-0455-2591	24-0455-2618
1.43 : 6.22	3.02 : 13.15	021	24-0455-2592	24-0455-2620
1.56 : 6.74	3.30 : 13.24	022	24-0455-2593	24-0455-2622
1.67 : 7.17	3.53 : 15.15	023	24-0455-2594	24-0455-2624
1.79 : 7.48	3.87 : 15.81	024	24-0455-2595	24-0455-2626
1.92 : 7.98	4.06 : 16.86	025	24-0455-2596	24-0455-2628

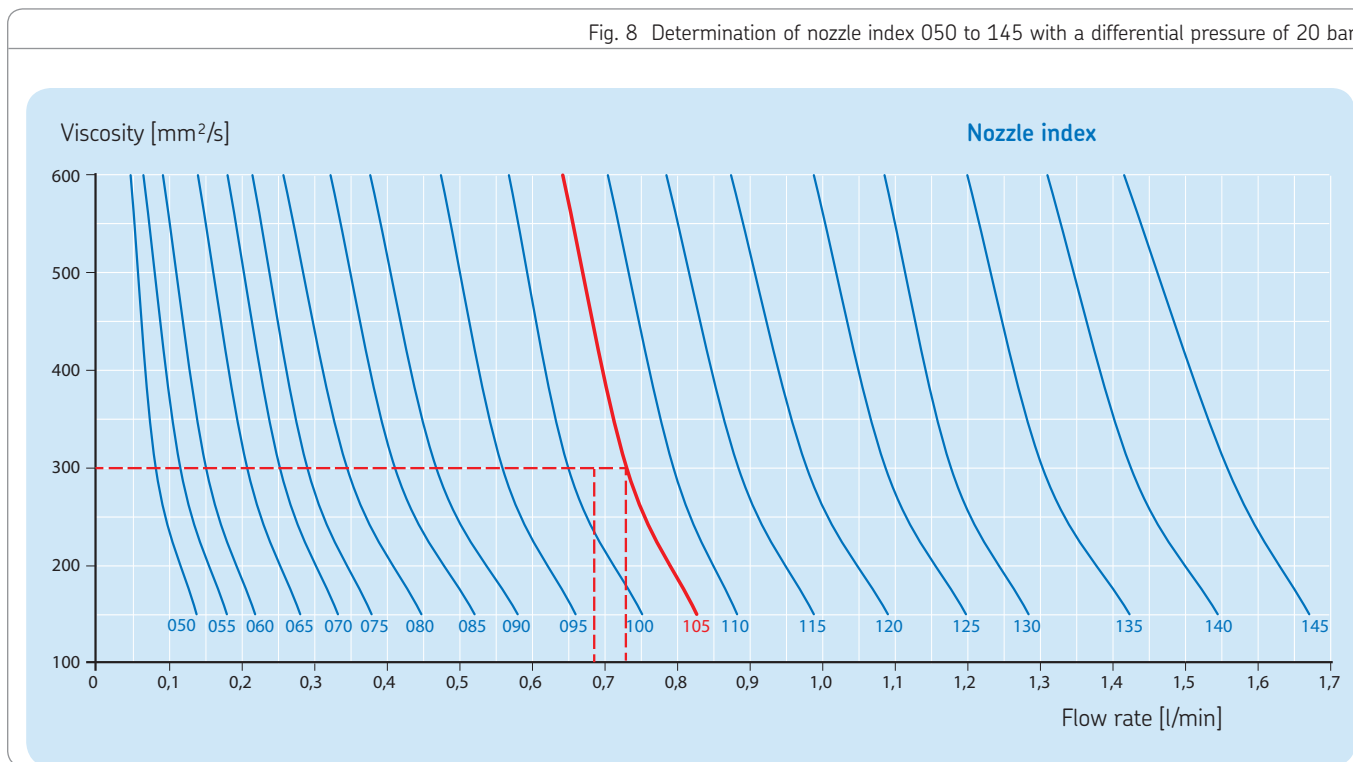
- 1) The nominal volumetric flows specified in the table are in reference to a working viscosity of 300 mm<sup>2</sup>/s at an oil temperature of 20°C. They are approximate values and may need to be modified in accordance with different viscosities. See Chapter 4.9.



## 4.9 Calculation of the resulting oil volumetric flow

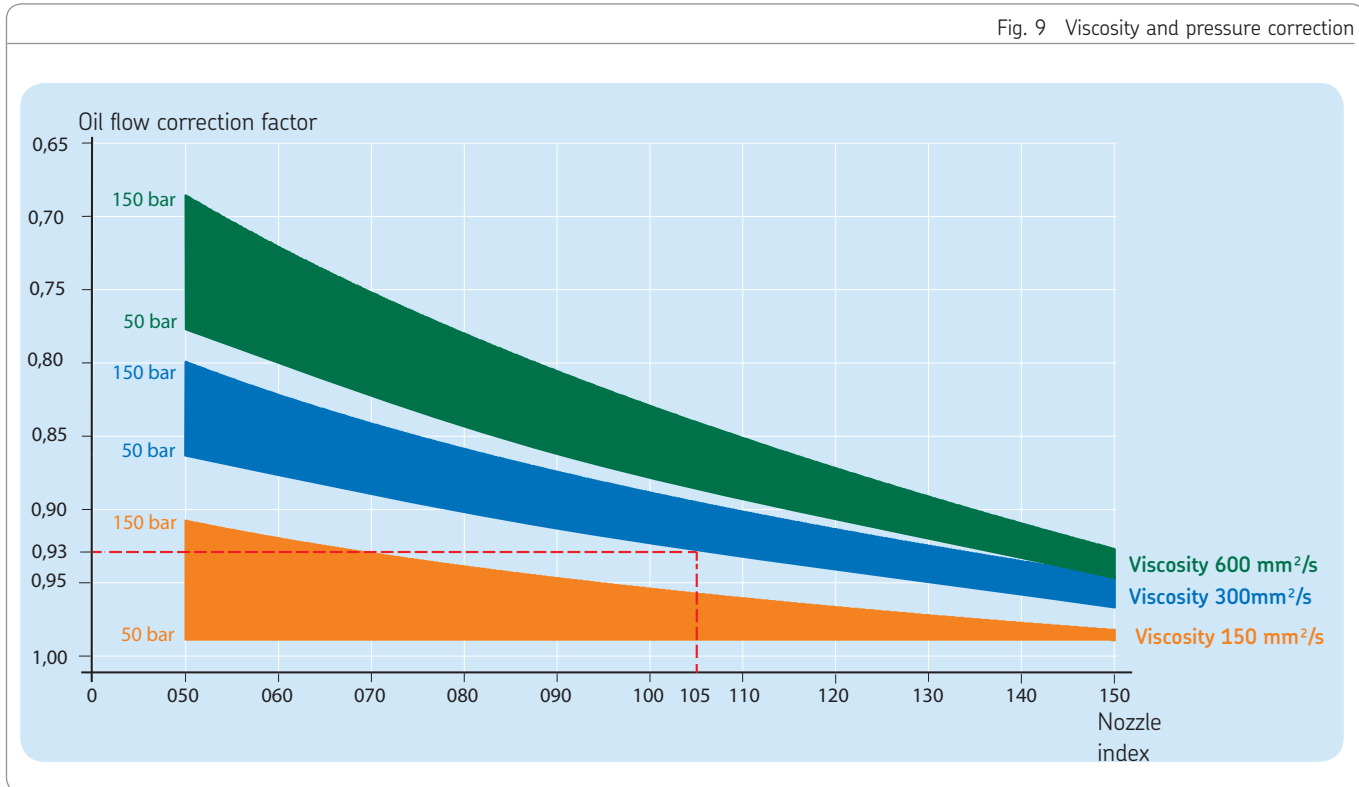
## 4.9.1 Diagram for determination of the nozzle index

Fig. 8 Determination of nozzle index 050 to 145 with a differential pressure of 20 bar



## 4.9.2 Diagram for determination of the correction factor for the volumetric flow of the oil

Fig. 9 Viscosity and pressure correction



### 4.9.3 Example

Given:

$Q = 0.69 \text{ l/min}$  (1.46 pts/min)

Operating viscosity =  $300 \text{ mm}^2/\text{s}$

Pressure differential  $\Delta p = 50 \text{ bar}$  ((e.g., system pressure 90 bar, back pressure 40 bar)

#### 1 Preselection of the Nozzle index

- See Chart Figure 6

Consult the diagram to obtain the intersection between the desired flow rate ( $0.69 \text{ l/min}$ ) and working viscosity ( $300 \text{ mm}^2/\text{s}$ ).

The closest curve defines the Nozzle index (105). The nominal flow rate for this nozzle with loss of nominal pressure ( $\Delta p = 20 \text{ bar}$ ) is derived from the intersection of the nozzle characteristic curve (105) and the working viscosity ( $300 \text{ mm}^2/\text{s}$ ). In this example, it is  $0.73 \text{ l/min}$ .

(1.54 pts / min).

#### 2 Determination of the correction

- See Chart Figure 7

Factor and calculation of the actual flow rate.

The correction factors for a viscosity of  $300 \text{ mm}^2/\text{s}$  can be obtained from the range marked in blue.

Find the vertical intersection of nozzle index 105 and the lower limit of the range marked in blue, which represents the differential pressure of 50 bar. The correction factor results from the horizontal and vertical intersection. The result is 0.93.

#### 3 Calculation of the resulting oil flow rate.

Multiply the result listed under 1 times the correction factor listed under 2.

$> 0.73 \text{ l/min.} \times 0.93 = \mathbf{0.68 \text{ l/min}}$   
(1.44 pts/min)

## 5. Delivery, returns, storage

### 5.1 Delivery

After receipt of the delivery, it must be inspected for any shipping damage and for completeness on the basis of the shipping documents. Immediately inform the transport carrier of any shipping damage.

The packaging material must be preserved until any discrepancies are resolved. Safe handling must be ensured during on-site transport.

### 5.2 Return shipment

Before return shipment, all contaminated parts must be cleaned and properly packed (i.e., according to the requirements of the recipient country).

The product must be protected from mechanical effects such as impacts. There are no restrictions for land, air, or sea transport.

The following must be marked on the packaging of return shipments:



### 5.3 Storage



Before usage, check products for damage that may have occurred during storage. This applies in particular to parts made of plastic and rubber (due to embrittlement) as well as components pre-filled with lubricant (due to aging).

The following conditions apply to storage:

- The permissible storage temperature range corresponds to the operating temperature range (see "Technical data").
- Dry, low-dust, vibration-free, in closed rooms
- No corrosive, aggressive substances at the storage location (e.g., UV rays, ozone)
- Protected against animals
- In the original product packaging
- Protected from nearby sources of heat or cold
- In case of large temperature fluctuations or high humidity, take appropriate measures (e.g., heating) to prevent the formation of condensation water.

## 6. Assembly



### 6.1 General information



Only qualified technical personnel may install the products specified in the instructions.

The product should, to the extent possible, be protected from humidity and vibration, and should be mounted so that it is easily accessible, allowing all further installation work to be done without difficulty.

During assembly and especially when drilling assembly holes on the system, always pay attention to the following:

- Check the flow limiter for any shipping damages and for completeness.
- The IP safety class must be observed.
- See the connection diagrams below for the measurements and port dimensions.
- No radial or axial active forces may occur at the flow limiter.
- The flow limiter must be installed in a stress-free position.
- Other units must not be damaged by assembly work.
- The product must not be installed within range of moving parts.
- The product must be installed at a sufficiently large distance from sources of heat or cold.
- Maintain safety clearances and comply with statutory regulations for assembly and accident prevention.
- Drill the assembly holes as specified in this chapter.
- Carefully clean screw unions and tubing prior to beginning installation.
- It must be ensured that screw unions, connections, and connection elements are leak-free.
- Ensure cleanliness; components must be installed without contamination.
- Do not use any cleaning wipes containing lint.
- Follow the mounting position requirements in "Technical data" (Chapter 4).

	 <b>CAUTION</b>
<p><b>Slipping hazard</b> Centralized lubrication systems must always be free of leaks. Leaking lubricant is hazardous. It creates a risk of slipping and injury. Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.</p>	

	 <b>WARNING</b>
<p><b>Bursting hazard</b> The lubrication system must be secured with a pressure relief valve, the maximum opening pressure of which is determined by the maximum permissible pressure of the flow limiter design – see Chapter 4, "Technical data".</p>	

## 6.2 Minimum mounting dimensions

To ensure enough space for maintenance work and for any disassembly of the product, ensure that the minimum mounting dimensions (Figs. 10 to 28) are maintained.

### IMPORTANT NOTE

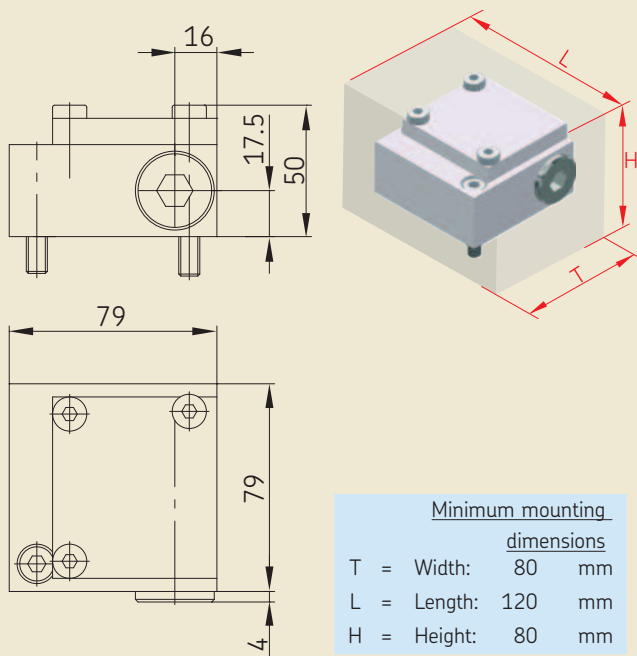
Maintain sufficient space around the pulse generator, signal transmitter or change-over valve.

It must be ensured at the customer site that no damage can occur to the electrical parts or their connection cables. If needed, corresponding protective devices, e.g. against impacts, are to be provided for at the customer site.

6.3 Assembly drawing SMBM-X

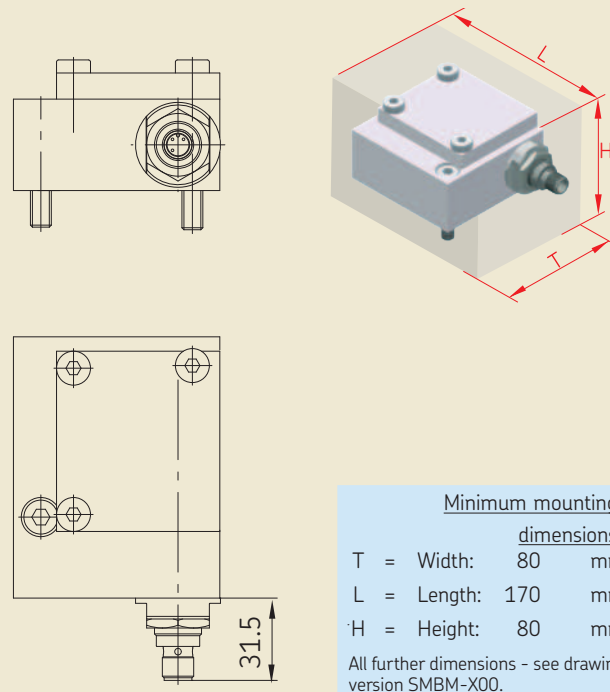
6.3.1 Assembly drawing SMBM-X00 without gear-type flow indicator, without signal transmitter

Fig. 10 Flow limiter SMBM-X00



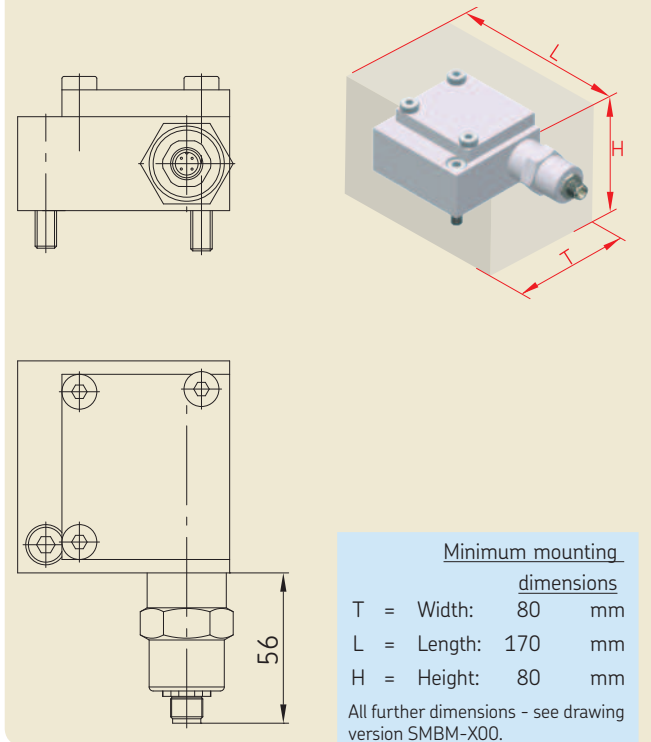
6.3.2 Assembly drawing SMBM-X31 with piston detector

Fig. 11 Flow limiter SMBM-X31



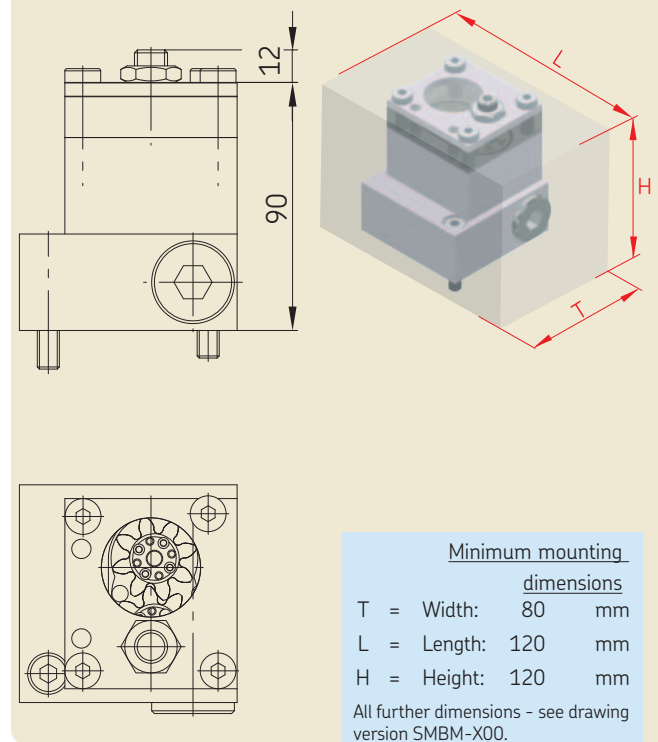
## 6.3.3 Assembly drawing SMBM-X21/X22 with signal transmitter

Fig. 12 Flow limiter SMBM-X21/X22



## 6.3.4 Assembly drawing SMBM-X01/X02/ X03 with gear-type flow indicator

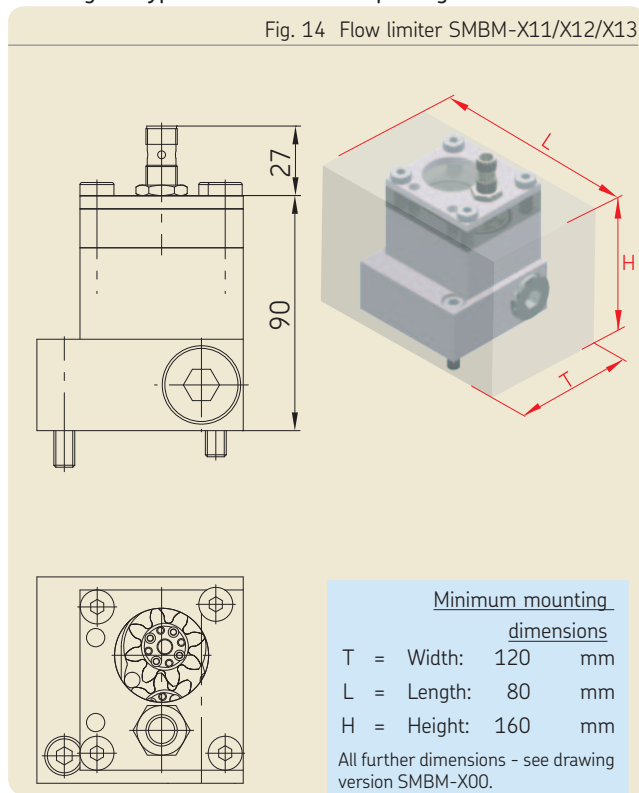
Fig. 13 Flow limiter SMBM-X01/X02/X03





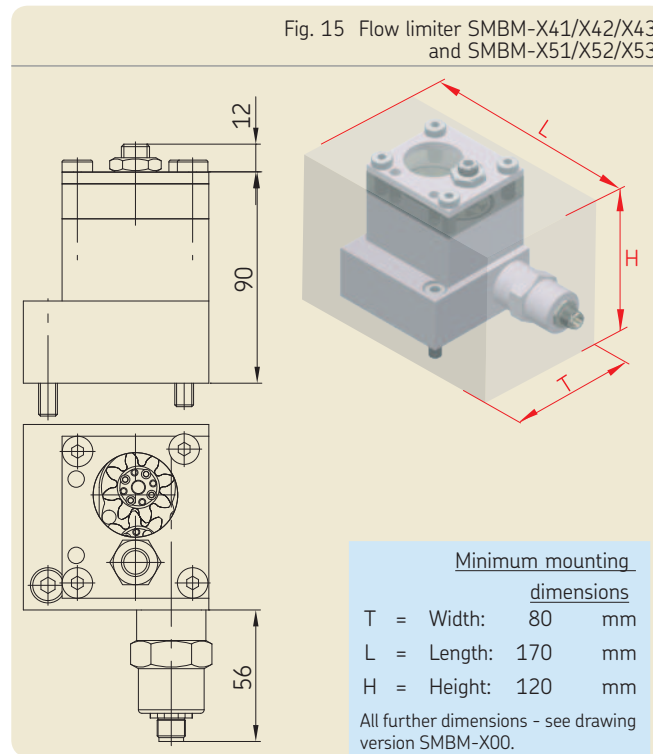
### 6.3.5 Assembly drawing SMBM-X11/X12/X13 with gear-type flow indicator and pulse generator

Fig. 14 Flow limiter SMBM-X11/X12/X13



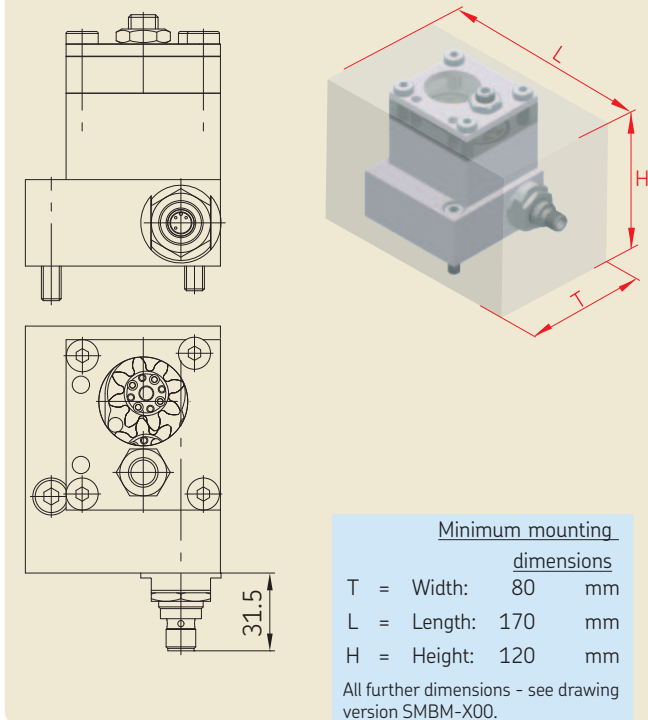
### 6.3.6 Assembly drawing SMBM-X41/X42/X43 SMBM-X51/X52/X53

Flow limiter with gear-type flow indicator and signal transmitter

Fig. 15 Flow limiter SMBM-X41/X42/X43  
and SMBM-X51/X52/X53

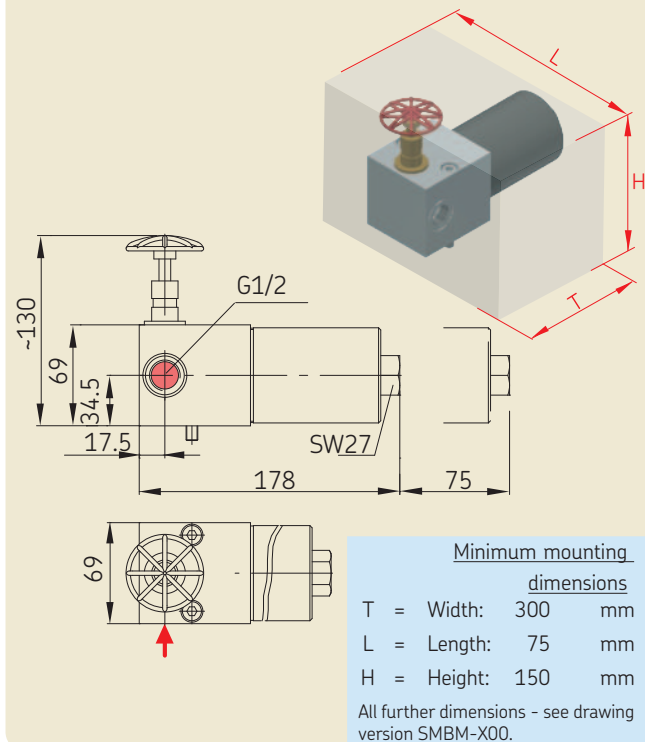
### 6.3.8 Assembly drawing SMBM-X61/X62/X63 Flow limiter with gear-type flow indicator and piston detector

Fig. 16 Flow limiter SMBM-X61/X62/63



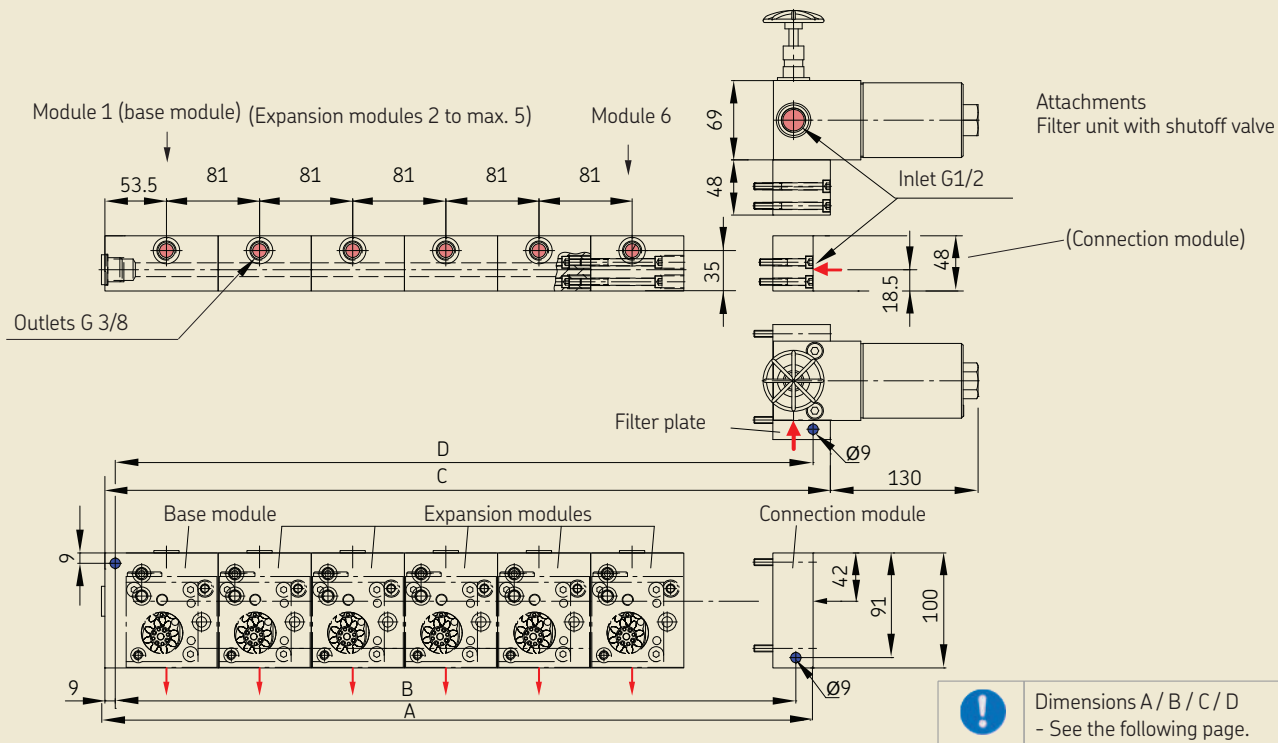
### 6.3.7 Filter unit for flow limiter SMBM-X

Fig. 17 Filter unit for flow limiter SMBM-X



6.3.9 Base plates for flow limiter SMBM-X

Fig. 18 Base plates for flow limiter SMBM-X



Dimension	Attachment dimensions SMBM-X with maximum number of attached modules [mm]						with attachments [mm]
	1 Module	2 Modules	3 Modules	4 Modules	5 Modules	6 Modules	
A	133.5	214.5	295.5	376.5	457.5	538.5	
B [ ±1 ]	109.5	190.5	271.5	352.5	433.5	514.5	
C	148.5	229.5	310.5	391.5	472.5	553.5	Filter and stopcock
D [ ±1 ]	124.5	205.5	286.5	367.5	448.5	529.5	Filter and stopcock

Weight [kg]	1 Module	2 Modules	3 Modules	4 Modules	5 Modules	6 Modules	Note!
Total weight SMBM-X with number of modules =>	2.66	4.75	6.84	8.93	11.02	13.11	The weight specifications refer to complete flow limiter assemblies without monitoring, attachments and screw unions. Weight specifications for monitoring units and attachments, see Chapter 4, Technical data.
Weight for filter with shut-off valve and base plate						2.84	

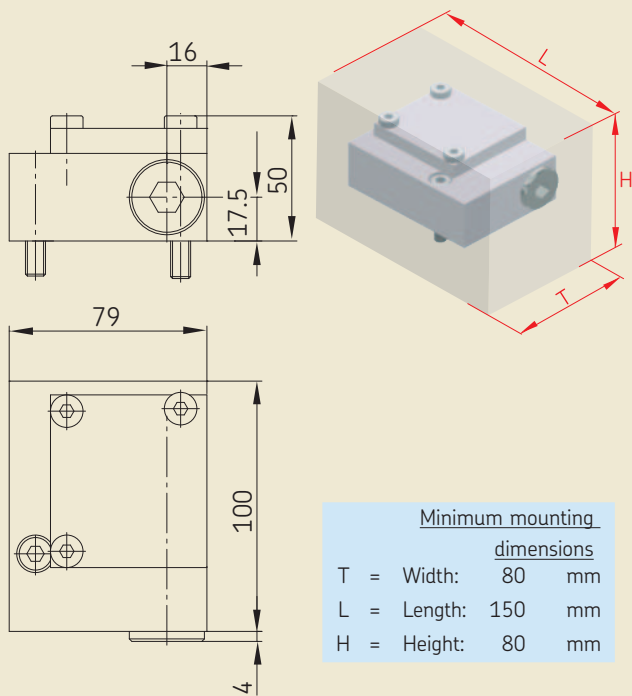
## IMPORTANT NOTE

Flow limiters are often used in application areas in which strong vibrations and jolts can occur. For reasons of safety during assembly (fastening screws M6 (2x)), an overall length of six SMBM modules should therefore not be exceeded.

6.4 Assembly drawing SMBM-V

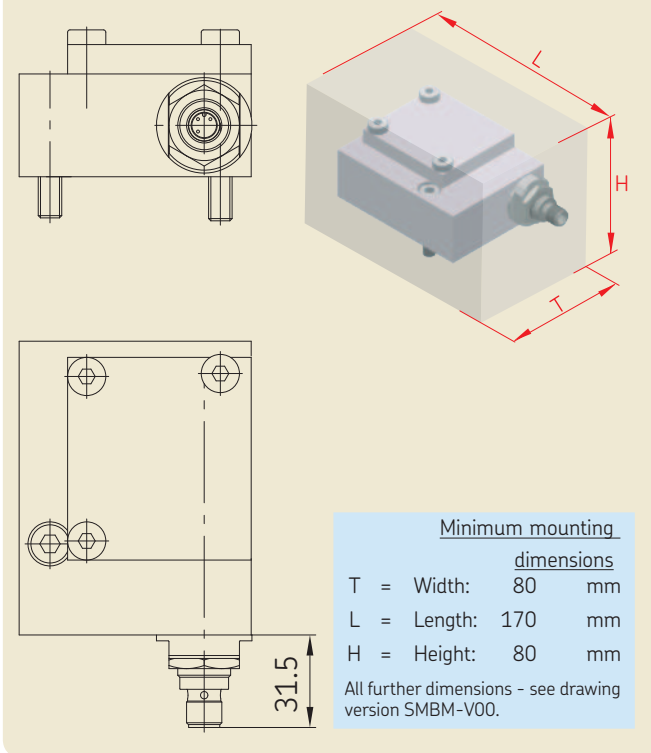
6.4.1 Assembly drawing SMBM-V00 without gear-type flow indicator, without signal transmitter

Fig. 19 Flow limiter SMBM-V00

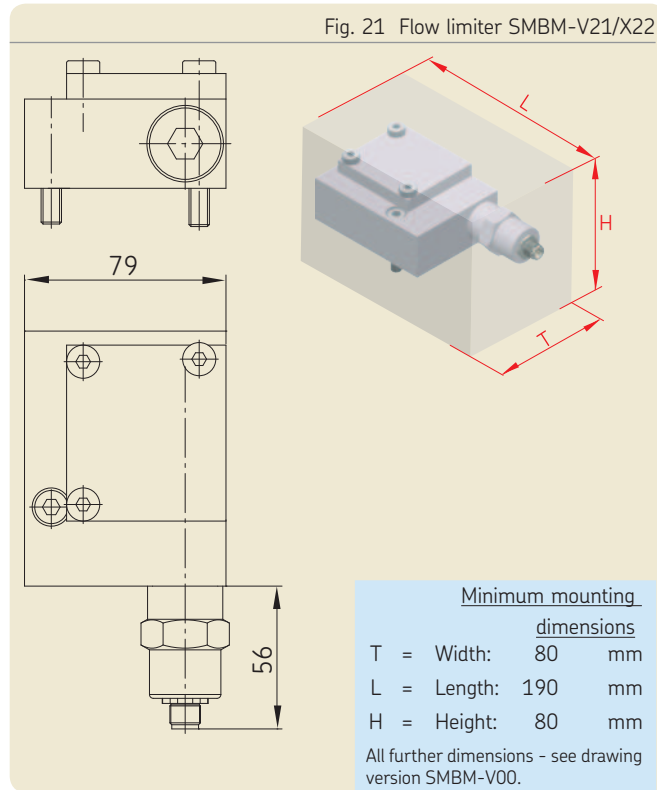


6.4.2 Assembly drawing SMBM-V31 with piston detector

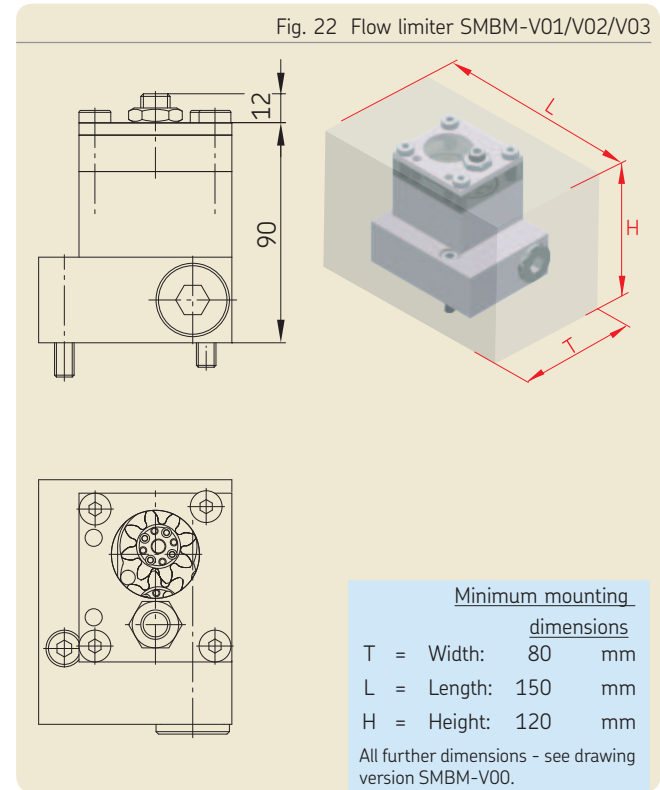
Fig. 20 Flow limiter SMBM-V31



## 6.4.3 Assembly drawing SMBM-V21/X22 with signal transmitter

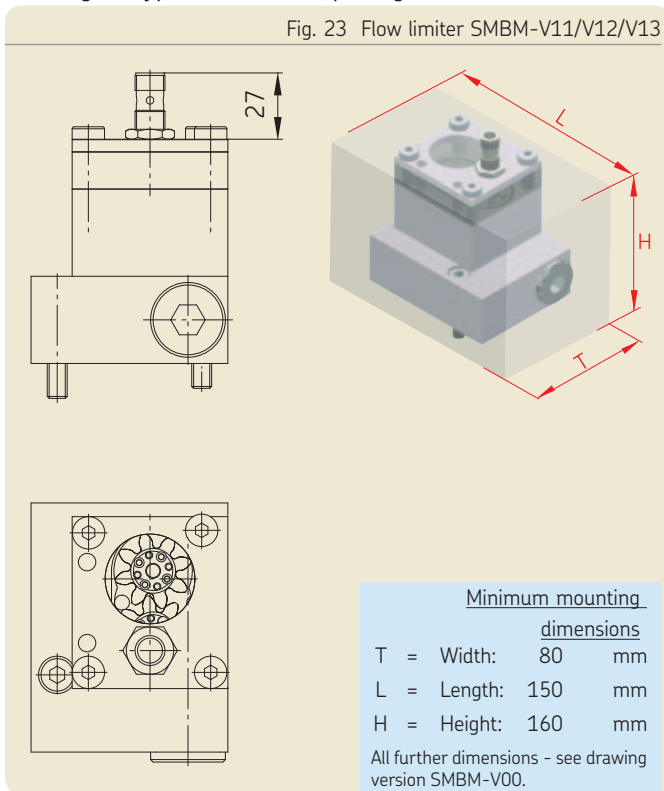


## 6.4.4 Assembly drawing SMBM-V01/V02/V03 with gear-type flow indicator, pulse generator



6.4.5 Assembly drawing SMBM-V11/V12/V13 with gear-type flow indicator, pulse generator

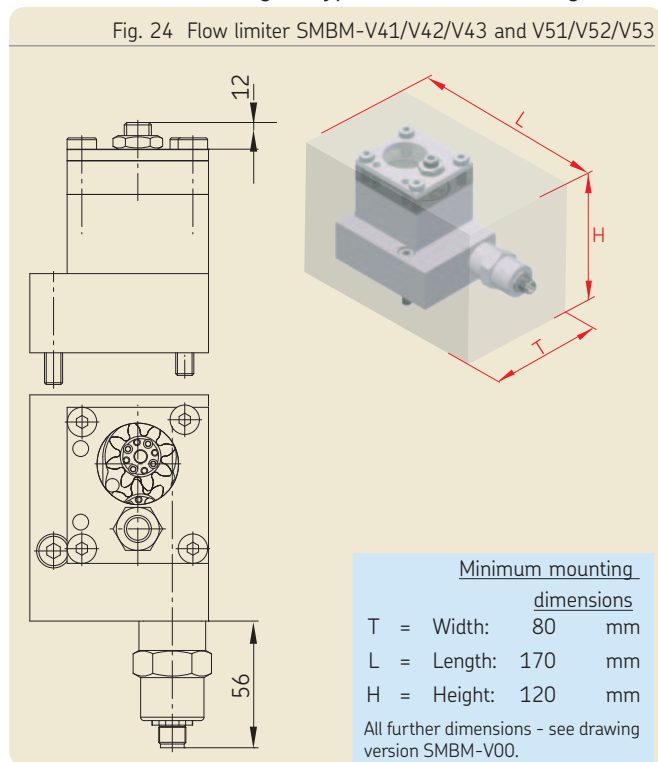
Fig. 23 Flow limiter SMBM-V11/V12/V13



6.4.6 Assembly drawing SMBM-V41/V42/V43 SMBM-V51/V52/V53

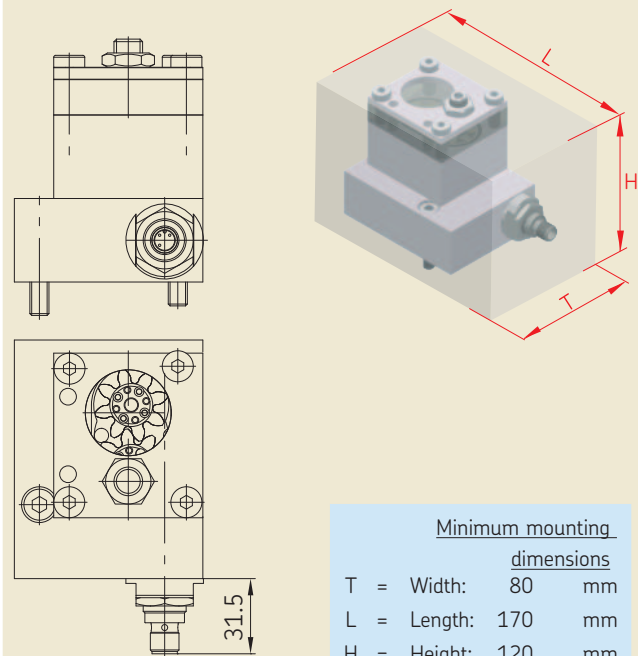
Flow limiter with gear-type flow indicator and signal transmitter

Fig. 24 Flow limiter SMBM-V41/V42/V43 and V51/V52/V53



### 6.4.7 Assembly drawing SMBM-V61/V62/V63 Flow limiter with gear-type flow indicator and piston detector

Fig. 25 Flow limiter SMBM-V61/V62/V63



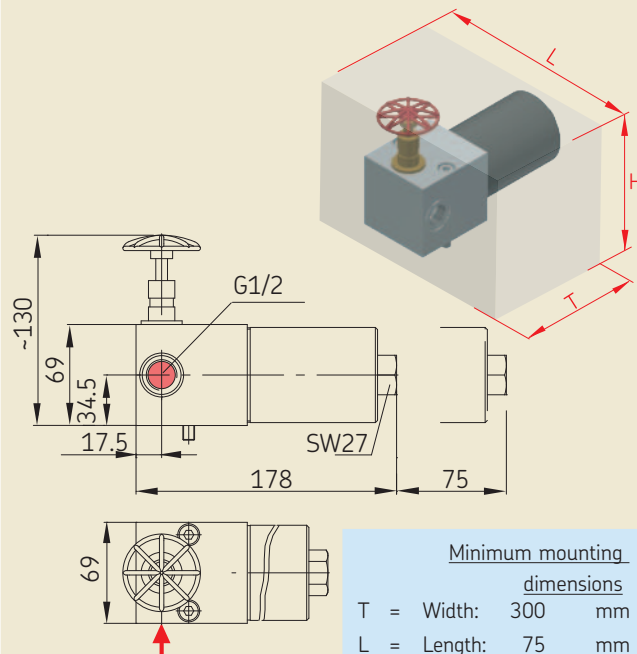
#### Minimum mounting dimensions

T = Width:	80	mm
L = Length:	170	mm
H = Height:	120	mm

All further dimensions - see drawing version SMBM-V00.

### 6.4.8 Filter unit for flow limiter SMBM-V

Fig. 26 Filter unit for flow limiter SMBM-V



#### Minimum mounting dimensions

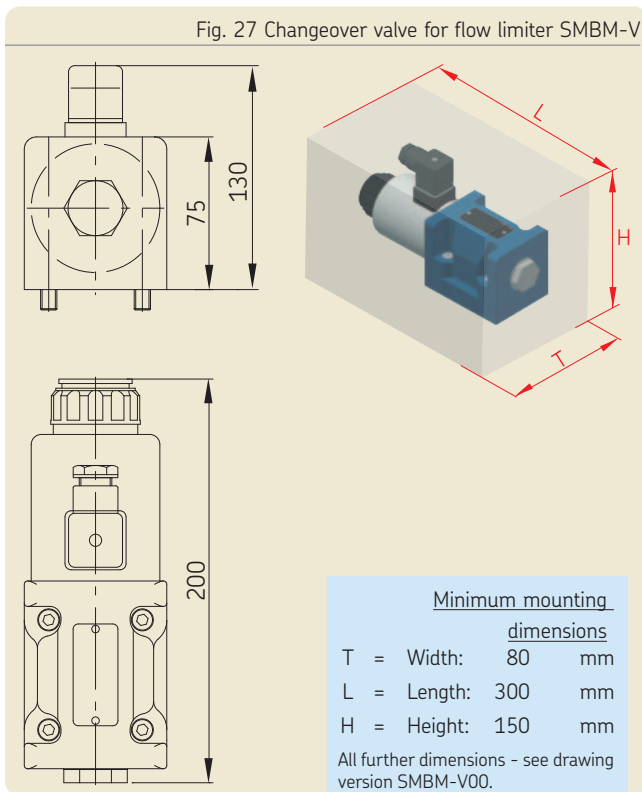
T = Width:	300	mm
L = Length:	75	mm
H = Height:	150	mm

All further dimensions - see drawing version SMBM-V00.



## 6.4.9 Changeover valve for flow limiter SMBM-V

Fig. 27 Changeover valve for flow limiter SMBM-V

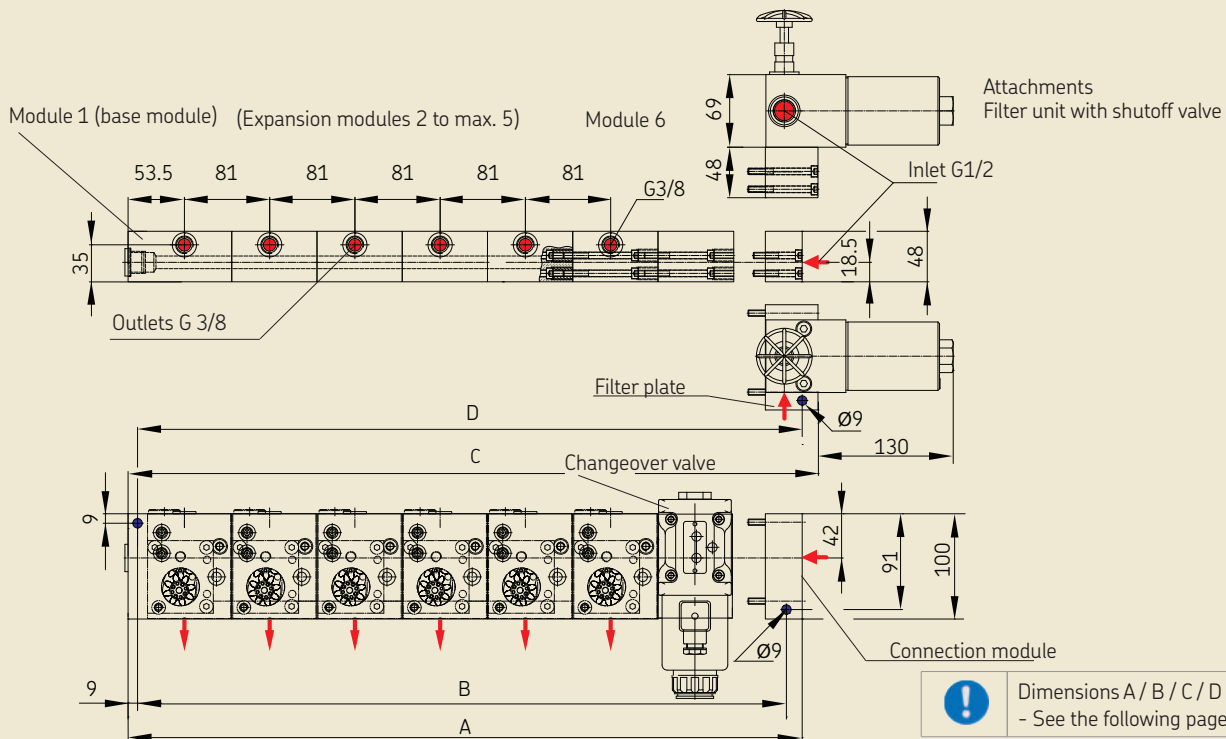
**Assembly information!**

4x screws according to DIN 912-M6X40-8.8 are required for mounting on the base plate.

The screws are to be tightened with a tightening torque of  $6 \pm 1$  Nm.

## 6.4.10 Base plates for flow limiter SMBM-V

Fig. 28 Base plates for flow limiter SMBM-V



Dimension	Attachment dimensions SMBM-V with maximum number of attached modules [mm]						with attachments [mm]
	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	
A	205.5	286.5	367.5	448.5	529.5	610.5	with changeover valve
B [ $\pm 1$ ]	181.5	262.5	342.5	424.5	505.5	586.5	with changeover valve
C	220.5	301.5	382.5	463.5	544.5	625.5	with changeover valve and filter with stopcock
D [ $\pm 1$ ]	196.5	277.5	358.5	439.5	520.5	601.5	with changeover valve and filter with stopcock

Weight [kg]	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Note!
Total weight SMBM-V with number of modules =>	2.82	4.91	7.00	9.09	11.18	13.2	The weight specifications refer to complete flow limiters without monitoring, attachments and screw unions. Weight specifications for monitoring units and attachments, see Chapter 4, Technical data.
Weight for filter with shut-off valve and base plate						2.84	
Weight of base plate for changeover valve with adapter plate						1.61	

## IMPORTANT NOTE

Flow limiters are often used in application areas in which strong vibrations and jolts can occur. For reasons of safety during assembly (fastening screws M6 (2x)), an overall length of six SMBM modules should therefore not be exceeded.

## 6.5 Assembling the flow limiters SMBM

☞ See Figure 29

☞ The mounting surface for the attachment of the flow limiter must be free of dust particles, machining chips, rust, and paint residue. If necessary, clean this surface prior to flanging.

- Set up the flanging surface and the assembly threads according to the attachment dimension (Chapter 6.2.7 / Chapter 6.2.14)
- Clean the flanging surface, maintain parallelism ( $// 1 \text{ mm}$ ) of the flanging surface/flanging bores!

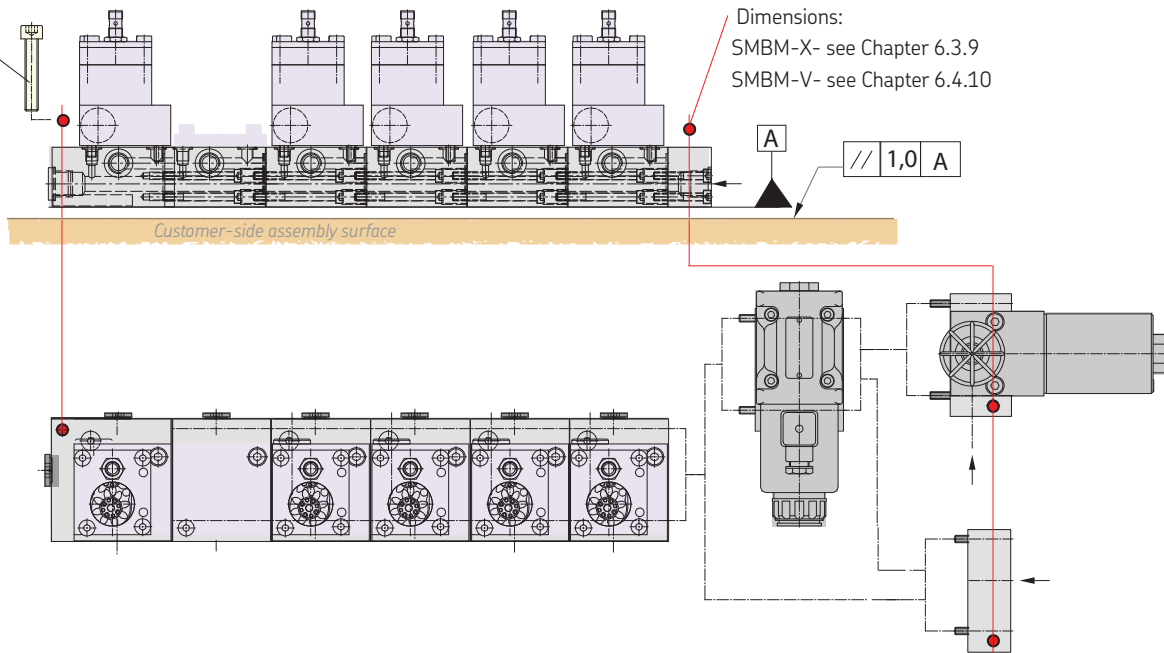
Fastening material provided by customer in corrosion-protected design:

- Washers, 2x acc. to ISO 7090, ID 8 mm, strength class 200-HV
  - Carefully place and align the flow limiter on the flanging surface.
  - Insert hexagon head bolts (2x) in customer-provided assembly holes and tighten them slightly.
  - Align flow limiter, tighten hexagon head screws with following torque:  
M8 =  $15 \pm 1 \text{ Nm}$
  - Remove protective plugs at the inlet and the outlet, if present.
- ☞ Use the torque of the fitting manufacturer for inlet and outlet screw unions
- Attach the inlet and outlet screw unions to the flow limiter and tighten with the torque specified by the manufacturer
  - If present, connect piston detector (see Chapter 6.7) or pulse generator (see Chapter 6.8) or signal transmitter (see Chapter 6.9) or change-over valve (see Chapter 6.10)
- Hexagon head screws, 2x acc. to DIN EN ISO 4017, M8, strength class 8.8

Fig. 29 Assembly of the flow limiters and assembly holes

Mounting screws (2x)  
M8 x ....

Mounting points (2x), assembly bore diameter 9 mm  
Dimensions:  
SMBM-X- see Chapter 6.3.9  
SMBM-V- see Chapter 6.4.10

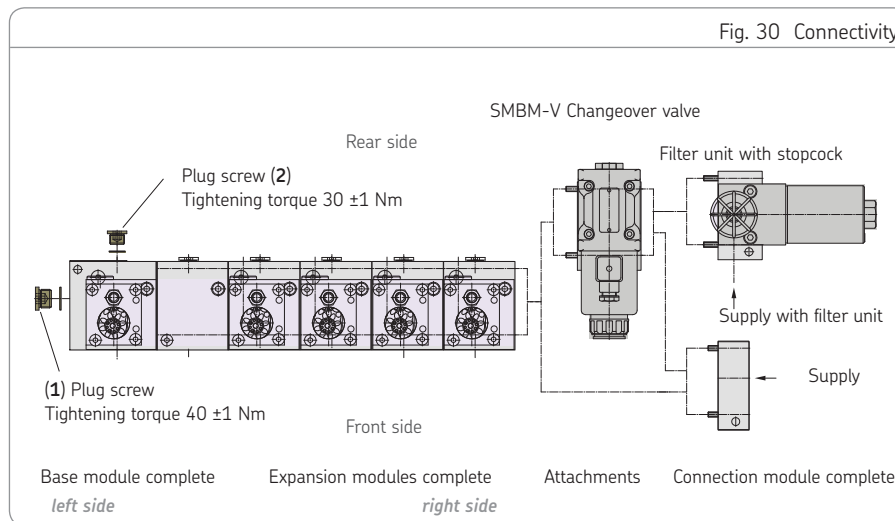


## 6.6 Mechanical connection options SMBM

☞ See Figure 30

The supply for the flow limiters of the SMBM series is located by default on the connection module mounted on the right, with or without changeover valve. In the case of SMBM with filter unit, the connection is located on the filter unit. In the last module (on the left side), the so-called base module, the pass-through inlet bore is closed by a plug screw with a packing ring (1/2"R) **(1)**. A replacement of the supply connection of right to left can be implemented at the customer site with the SMBM-X flow limiter, except when a filter unit is attached. This is not possible with the SMBM-V flow limiter. The plug screw **(1)** is to be tightened afterwards with a torque of  $40 \pm 1$  Nm. The outlet boreholes of the modules are located on the front side of the flow limiter, while on the rear side the boreholes are each closed with one plug screw (3/8"R) **(2)** with packing ring. A switching of sides for the outlet boreholes can be implemented separately for each module. To this end, only

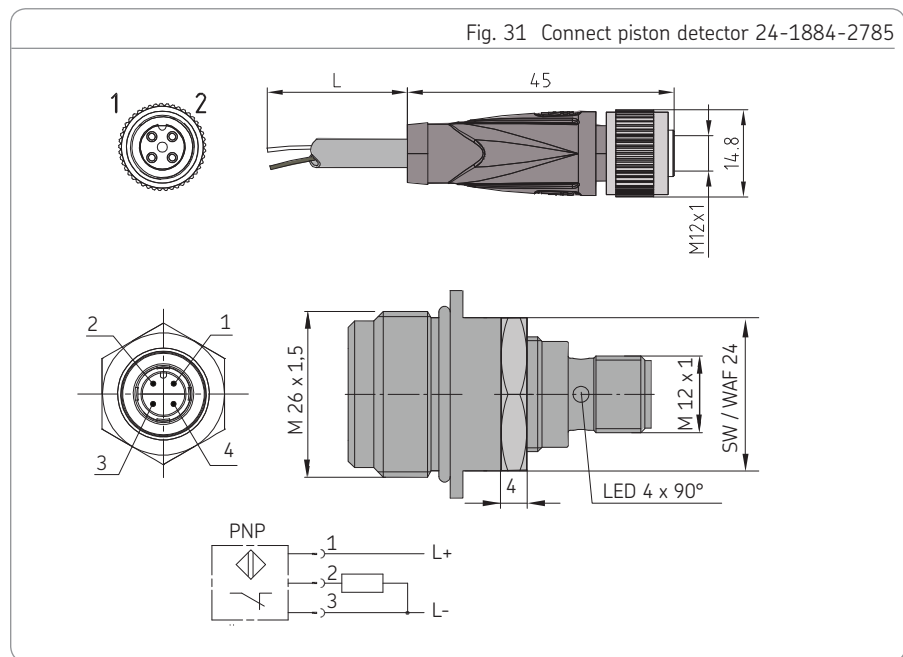
the plug screw **(2)** (with packing ring) is to be switched from the rear side to the front side. The plug screw **(2)** is to be tightened afterwards with a torque of  $30 \pm 1$  Nm.



### 6.7 Electrical connection of piston detector 24-1884-2785

☞ See electrical data of the pressure switch , Chapter 4

- Connect piston detector according to terminal diagram in Figure 31



#### Spare parts/accessories

Designation	Order number
Piston detector	24-1884-2785

#### Cable box (Accessories)

with 5 m cable

Code	Box type	Order number
CS	straight, 3-pin	179-990-381
CA	angled, 3-pin	179-990-382

without cable

Code	Box type	Order number
XS	straight, 4-pin	179-990-371
XA	angled, 4-pin	179-990-372

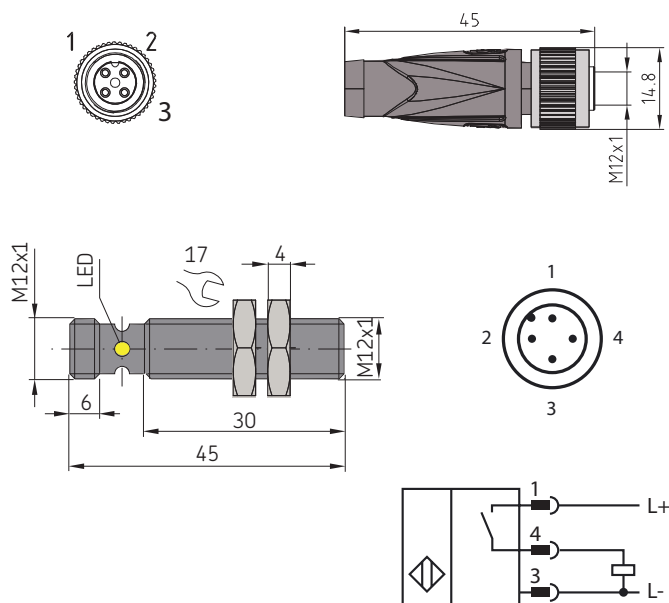
For other options, see Chapter 15.2, "Accessories"

## 6.8 Electrical connection of pulse generator 2340-0000030

☞ See electrical data of the pulse generator , Chapter 4

- Connect pulse generator according to terminal diagram in Figure 32

Fig. 32 Connect inductive pulse generator 2340-0000030



### Spare parts/accessories

Designation	Order number	
Piston detector	2340-0000030	
<b>Cable box (Accessories)</b>		
with 2 m cable		
Code	Box type	Order number
CS	straight, 3-pin	2370-0000053
with 5 m cable		
Code	Box type	Order number
CA	angled, 3-pin	179-990-382

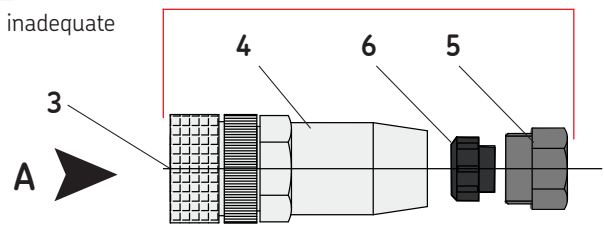
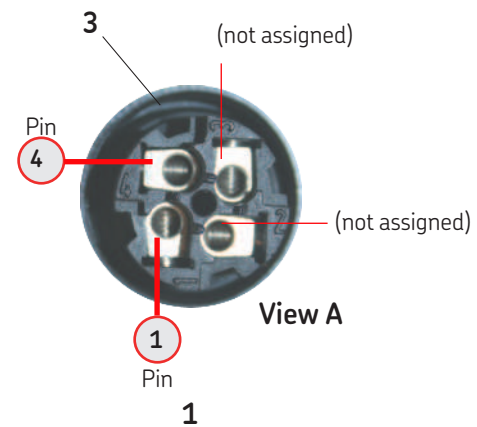
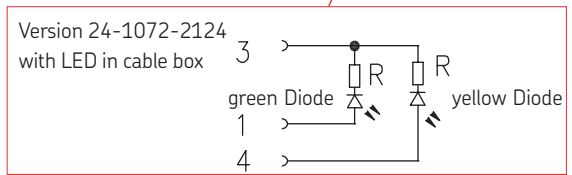
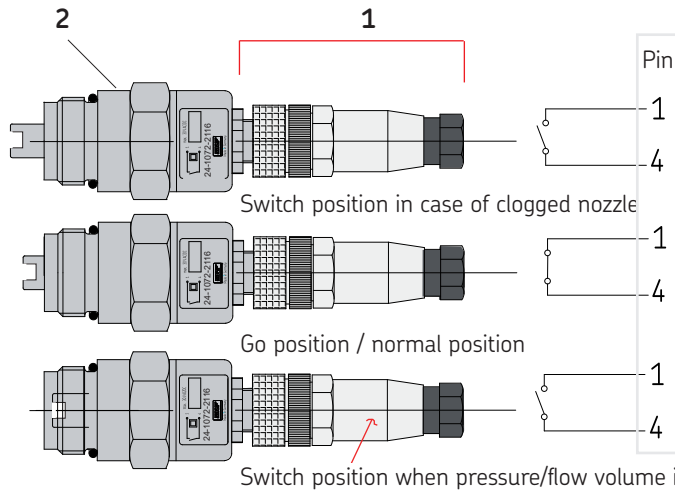


### 6.9 Electrical connection of signal transmitter 24-1072-2124

☞ See Figure 33

- Loosen the entire cable socket (1) from the signal transmitter (2)
- Unscrew the connection socket (3), housing (4) and cable gland (5) with conical ring (6) out of the cable socket (1)
- ☞ Observe the maximum clamping limit for the terminal clamps ("Technical data" chapter)!
- Pull the customer-provided connection cable through the cable gland (5), conical ring (6) and housing (4)
- Connect the flexible cable leads to the cable socket (3) according to the connection diagram (- see Fig. 33, view A, terminals 1 and 4)
- Attach and tighten the connection socket (3) to the housing (4)
- On the housing (4), use a cable gland (5) to tighten the conical ring (6) securely
- Check the screw union for leak-tightness
- ☞ Ensure that the power lead provided by the customer is secured against strain and twisting. Secure the connection cable accordingly if necessary.
- Attach the complete cable socket (1) to the signal transmitter (2) and screw it tightly
- Arrange the power lead from the signal transmitter to the port without any kinks.

Fig. 33 Connection of signal transmitter 24-1072-2123



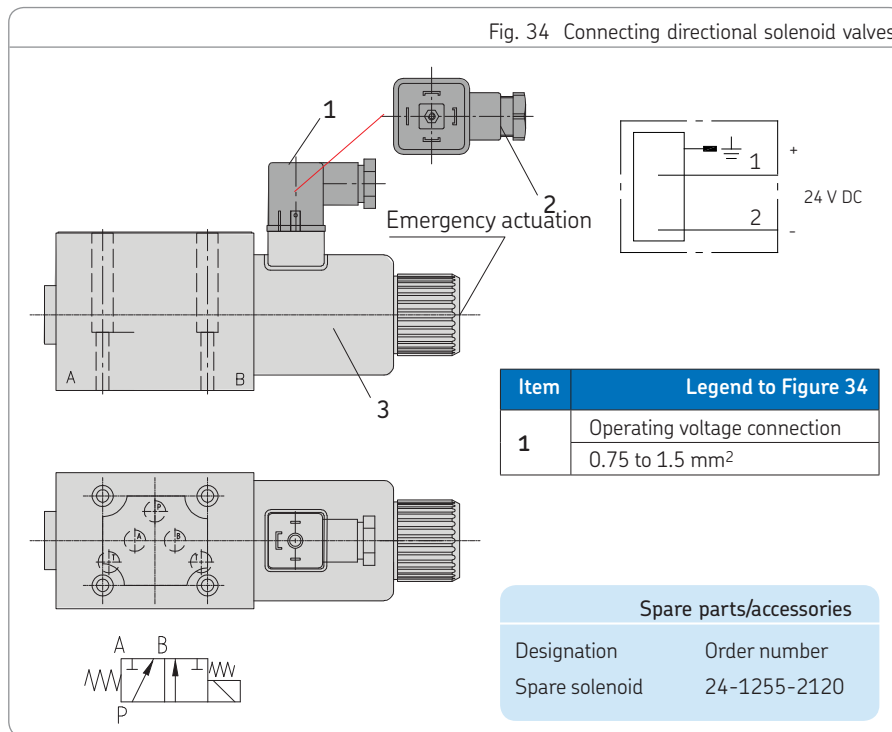
## 6.10 Electrical connection of changeover valve 24-1254-2486

☞ with coupler socket 24-1882-2029 (not included in valve)



☞ see electrical data of the 3/2 changeover valve (directional control valve), Chapter 4.5

☞ see Figure 34

- Loosen the coupler socket (1)
- Loosen the cable gland (2)
- Guide the connection cable through via screwed gland (2)
- Connect directional solenoid valve (3) according to terminal diagram in Figure 34
- Tighten the cable fitting (2)
- Tighten the coupler socket (1)



### 6.11 Lubrication line connection

	 <b>CAUTION</b>
	<b>Risk of slipping</b> Exercise caution when handling lubricants. Immediately bind and remove any leaked lubricants.



Connect the lubricant lines in such a way that no forces are transferred to the product (stress-free connection).

All components of the centralized lubrication system must be designed for:

- The maximum pressure that occurs
- The permissible temperature range
- The delivery rate and the lubricant to be fed



Secure the centralized lubrication system against excessive pressure using an appropriate pressure regulating valve.

Observe the following assembly information for safe and trouble-free operation.

- Use only clean components.
- The flow of lubricant should not be impeded by the mounting of sharp bends, angle valves, flap valves, seals protruding inward, or changes in cross-section (large to small). Unavoidable changes in the cross-section in lubrication lines must have smooth transitions.

## 7. First start-up

To ensure safety and functionality, the person specified by the operator is required to perform the following inspections. Any detected deficiencies must be remedied prior to initial start-up. The correction of deficiencies must be done exclusively by a specialist competent and authorized to do so.

### 7.1 Inspections before first start-up

Mark the following with: YES or NO	Series SMBM	
	Yes	No
Product variant		
If present, electrical connection of the pressure switch (piston detector) 24-1884-2785 is executed correctly		
If present, electrical connection of the pulse generator 2340-00000030 is executed correctly		
If present, electrical connection of the signal transmitter 24-1072-2124 is executed correctly		
If present, electrical connection of the 3/2 changeover valve 24-1254-2486 is executed correctly		
The performance characteristics for the aforementioned connections match the specifications in "Technical data"		
Mechanical connection established correctly		
All components such as lubrication lines are correctly mounted		
No apparent damage, contamination, or corrosion		
Any dismantled protective and monitoring equipment (of the main machine) is fully reinstalled and functional		

### 7.2 Inspections during first start-up

No unusual noises, vibrations		
No undesired discharge of lubricant at connections		
No impurities in the lubricant		
Lubricant is fed without bubbles		
The bearings/friction points requiring lubrication receive the planned amount of lubricant		

## 8. Operation

SKF products operate largely automatically.

The activities required during normal operation are limited primarily to cleaning of the exterior of the product if contaminated.

### IMPORTANT NOTE

Safe operation of the flow limiters is ensured only when clean lubricating oil is being supplied. The lubricating oil must be free of air inclusions during its conveyance.

#### 8.1 Temporary shutdown

Temporary shutdown is performed by disconnecting the hydraulic supply line.

#### 8.2 Permanent shutdown and disposal

For permanent shutdown, follow the regulations for the disposal of lubricants and parts contaminated with lubricants.

#### 8.3 Disposing of dismantled parts



Dispose of or recycle electrical components in accordance with WEEE Directive 2002/96/EC.



Plastic or metallic parts can be disposed of as industrial waste.



## 9. Cleaning

 <b>WARNING</b>
 <p><b>Electric shock</b>          Perform cleaning work only on products that have been de-energized and depressurized. Do not touch cables or electrical components with wet or moist hands. Use steam-jet equipment or high-pressure cleaners only in accordance with the IP enclosure rating of the components. Otherwise, electrical components may be damaged.          Cleaning, required personal protective gear, cleaning agents, and equipment are in accordance with the current operating rules of the operator.</p>

### 9.3 Interior cleaning

The interior normally does not need to be cleaned.

The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled.

Please contact SKF Customer Service.

### 9.1 Cleaning agents

Only cleaning agents compatible with the materials can be used for cleaning (see Section 2.3 for materials).



Always completely remove residue of the cleaning agent on the product and rinse with clear water. This prevents the formation of alkaline deposits.

### 9.2 Exterior cleaning

- Mark and secure wet areas
- Unauthorized persons must be kept away
- Thoroughly clean all external surfaces with a moist cloth



The flow limiters must be kept closed without fail during cleaning.

### 9.4 Cleaning of the pulse generator

If the active sensor surface becomes contaminated, it must be cleaned with a cloth.

## 10. Maintenance

### 10.1 Maintenance for flow limiters

Careful and regular maintenance is required in order to detect and remedy possibly malfunctions in time. The specific intervals must always be determined by the operator according to the operating conditions and the local conditions and regularly reviewed and adapted where necessary.

In particular with maintenance and repair work, the following safety measures must be implemented at a minimum:

- Prevent access by unauthorized persons
- Mark and secure the work area
- Depressurize flow limiters
- Cover any live parts in the surrounding area.

### 10.2 Maintenance schedule

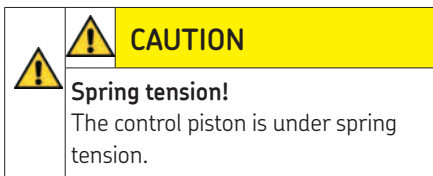
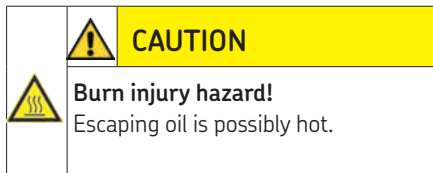
Maintenance table, Table 1 of 2	Maintenance intervals <sup>1)</sup> [Months]		Checklist	
	Interval	Change	YES	NO
Activity to be performed	Interval	Change	YES	NO
Mechanical connection established correctly	Annually	Customer specification	<input type="checkbox"/>	<input type="checkbox"/>
If present, electrical connection of the piston detector 24-1884-2785 is executed correctly			<input type="checkbox"/>	<input type="checkbox"/>
If present, electrical connection of the pulse generator 2340-00000030 is executed correctly	Annually		<input type="checkbox"/>	<input type="checkbox"/>
If present, electrical connection of the signal transmitter 24-1072-2124 is executed correctly	Annually		<input type="checkbox"/>	<input type="checkbox"/>
If present, electrical connection of the 3/2 changeover valve 24-1254-2486 is executed correctly	Annually		<input type="checkbox"/>	<input type="checkbox"/>
The performance characteristics for the aforementioned connections match the specifications in "Technical data"	Annually		<input type="checkbox"/>	<input type="checkbox"/>
All components such as lubrication lines are correctly mounted	Annually		<input type="checkbox"/>	<input type="checkbox"/>
No apparent damage, contamination, or corrosion	Annually		<input type="checkbox"/>	<input type="checkbox"/>



Maintenance table, Table 2 of 2	Maintenance intervals <sup>1)</sup> [Months]		Checklist	
	Intervals	Change	YES	NO
Activity to be performed				
Any dismantled protective or monitoring equipment is fully reinstalled and functional			<input type="checkbox"/>	<input type="checkbox"/>
No unusual noises, vibrations, moisture accumulation, odors present	Annually		<input type="checkbox"/>	<input type="checkbox"/>
No undesired discharge of lubricant at connections	Annually		<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is fed without bubbles			<input type="checkbox"/>	<input type="checkbox"/>
The bearings and friction points requiring lubrication receive the planned lubricant volume. If this is not the case, then the plug-in nozzle is to be cleaned/replaced - see Chapter 10.3	Customer specification		<input type="checkbox"/>	<input type="checkbox"/>

*1) The maintenance intervals depend greatly on the degree of cleanliness and contamination of the lubricant used, they are therefore only reference values. The determination of the intervals is the responsibility of the operator, based on existing conditions.*

### 10.3 Changing the plug-in nozzle SMBM



#### 10.3.1 Changing the plug-in nozzle SMBM-X

☞ See Figure 35

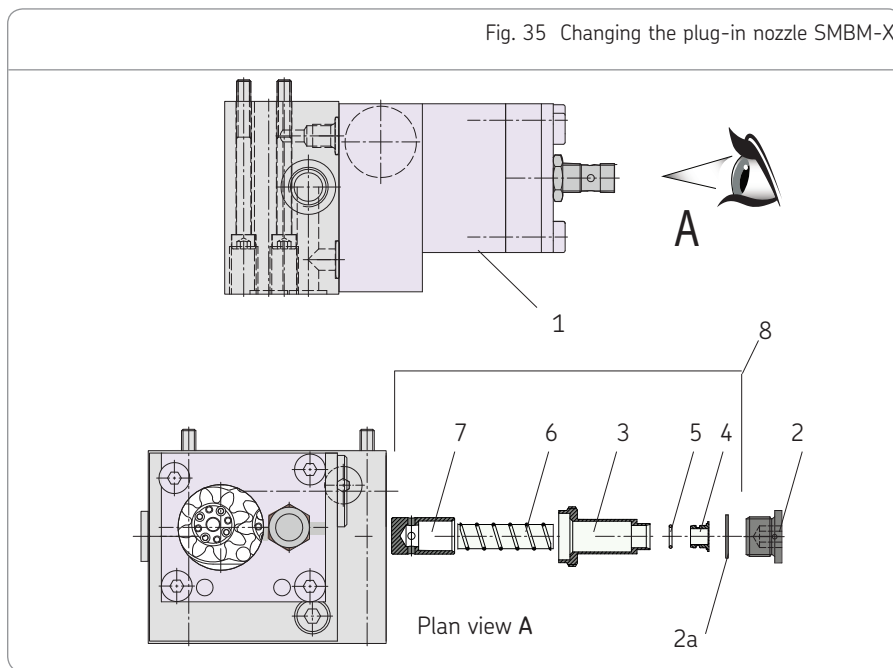
- Interrupt oil feed to flow limiter **(1)**
  - Loosen the plug screw **(2)** using a hexagon socket screw key (WAF 8) and remove it together with the packing ring **(2a)**
  - Remove the complete control piston rod **(8)** from the flow limiter housing **(1)**
- ☞ A brass fitting wedge (never use a hard object such as a screwdriver) should be used to subsequently help press the plug-in nozzle out of the control piston.
- Place the fitting wedge between control piston **(3)** and plug-in nozzle **(4)** and carefully press out the old plug-in nozzle **(4)** with the packing ring **(5)**



For plug-in nozzle selection, see Chapter 4.7

- ☞ A brass fitting mandrel ( $\varnothing$  10 mm) (never use a hard object such as a screwdriver) should be used to subsequently help press the plug-in nozzle into the control piston.
- Use the fitting mandrel to press the new plug-in nozzle **(4)** and packing ring **(5)** into the bore of the control piston **(3)** without skewing
  - Place plug screw **(2)** with the new packing ring **(2a)** on the flow limiter thread and tighten with hexagon socket screw key
  - Tightening torque  $30 \pm 1$  Nm
  - Open oil feed to flow limiter

Fig. 35 Changing the plug-in nozzle SMBM-X



Item	Legend to Figure 35
1	Flow limiter housing
2	Plug screw
2a	Packing ring plug screw
3	Control piston
4	Interchangeable plug-in nozzle
5	Packing ring for plug-in nozzle
6	Spring
7	Stop screw
8	Control piston rod

**Note!**

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

### 10.3.2 Changing the plug-in nozzle SMBM-V

☞ See Figure 36

- Interrupt oil feed to flow limiter

☞ The control piston (5) is under spring tension!

- Slowly unscrew the stop screw (1) (hexagon socket screw WAF 12) together with the packing ring.

☞ **Burn injury hazard!**

Escaping oil is possibly hot!

- Remove control piston with plug-in nozzles (4/5) ( $D_1/D_2$ ) and pressure spring.

☞ **Warning!**

When reinstalling the plug-in nozzles make sure they are not mixed up!



For plug-in nozzle selection, see Chapter 4.8

#### Dismantling of plug-in nozzle $D_1$

- Remove plug-in nozzle  $D_1$  (2) (with packing ring) from the control piston.

#### Dismantling/installation of plug-in nozzle $D_2$

- Loosen and remove retaining ring (3) from the control piston (5).

- Remove plug-in nozzle  $D_2$  (4) (with packing ring) from the 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  $D_2$  (4) and packing ring 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).

#### Installation of plug-in nozzle $D_1$

Press new plug-in nozzle  $D_1$  (2) and packing ring 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.

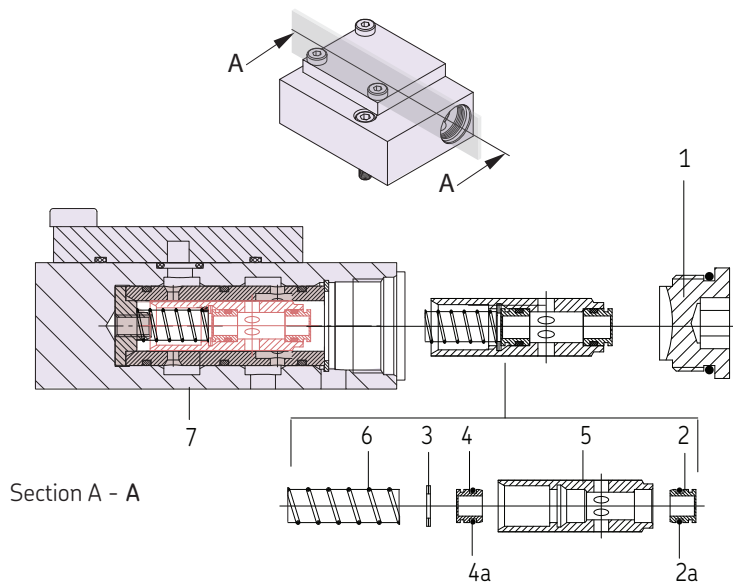
- Insert control piston with new plug-in nozzle(s) in the borehole over the pressure spring without skewing.

- 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 new packing ring.

- Open the shutoff valve.

Fig. 36 Changing the plug-in nozzle SMBM-V

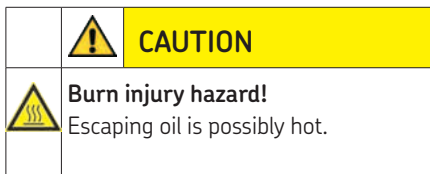


Item	Legend to Figure 36
1	Stop screw with packing ring
2	Plug-in nozzle D <sub>1</sub> (startup 1:4) packing ring
2a	Packing ring Plug-in nozzle D <sub>1</sub>
3	Retaining ring 10x1
4	Plug-in nozzle D <sub>2</sub> (operation 1:1)
4a	Packing ring for plug-in nozzle D <sub>2</sub>
5	Control piston
6	Pressure spring
7	Flow limiter housing

**Note!**

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

### 10.4 New mounting or replacement of a flow limiter module while retaining the base plate module



- Interrupt oil feed to flow limiter
- If necessary, clean the flow limiter to remove any external impurities
- If necessary, detach the electrical quick-coupling connectors at the module to be replaced and place them aside
- **Ensure that the oil contained in the lubrication system has cooled down!**

#### 10.4.1 New mounting with existing dummy module or replacement of an SMBM-X module

☞ See Figure 37

<i>Required parts:</i>			
Item	Designation	Quantity	Part number
11	SMBM-X -Modul/ SMBM-V -Module	1	see order code
9	Hexagon socket screw M8 x 40 mm	1	DIN912-M8x40-8.8
8	Hexagon socket screw M8 x 100 mm	1	2010-00000007
6	Packing ring (O-ring)	2	WVN532-12x2
4	Plug screw	1	2030-00000002
<i>Installed parts:</i>			
2	Complete dummy module	1	24-0711-2406

- Loosen and remove the two hexagon socket screws (M8, WAF 13) **(1)**
  - Carefully detach the dummy module **(2)** from the base plate module **(3)** and set it to one side along with the two screws **(1)** and mounted packing rings **(6)**
  - If necessary, clean the flanging area of the base plate module with a suitable (lint-free!) cleaning cloth
- ☞ In the event that only one already mounted SMBM-X module is to be replaced by a new SMBM-X module, the subsequent assembly steps can be skipped. One can then proceed with the mounting point "SMBM-X module replacement". Otherwise:

For initial installation of an SMBM-X module:

- Screw the plug screw (4) into the borehole (5) and tighten it securely (conical thread)
- Place a new O-ring (650) (6) in the groove of the borehole (7)
- Carefully place the SMBM-X module (10) on the flanging area of the base plate module (3)
- At the SMBM-X module, put hexagon socket screw (8) (M8 x 100, WAF 6) in place and tighten it slightly
- Also put the opposite-side hexagon socket screw (9) (M8 x 40, WAF 6) in place and tighten it slightly as well
- Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm

SMBM-X module replacement:

- Place a new O-ring (6) in the groove of the borehole (7)
- Carefully place the SMBM-X module (10) on the flanging area of the base plate module (3)
- At the SMBM-X module, put the hexagon socket screw (8) (M8 x 100, WAF 6) in place and tighten it slightly
- Also put the opposite-side hexagon socket screw (9) (M8 x 40, WAF 6) in place and tighten it slightly as well
- Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm
- If necessary, clean the flow limiter to remove any external impurities
- Open oil feed to flow limiter

### 10.4.2 New mounting with existing dummy module or replacement of an SMBM-V module

☞ see Fig. 37

Required parts:			
Item	Designation	Quantity	Part number
11	SMBM-V Module	1	see order code
10	Check valve	2	24-2104-2049
9	Hexagon socket screw M8 x40 mm	1	DIN912-M8x40-8.8
8	Hexagon socket screw M8 x 100 mm	1	2010-00000007
6	O-ring	3	WVN532-12x2
Installed parts:			
1	Hexagon socket screws	2	
2	Dummy module SMBM	1	

- Loosen and remove the two hexagon socket screws (M8, WAF 6) **(1)**
- Carefully detach the dummy module **(2)** from the base plate module **(3)** and set it to one side along with the two screws **(1)** and mounted packing rings **(6)**
- If necessary, clean the flanging area of the base plate module with a suitable (lint-free!) cleaning cloth

☞ In the event that only one already mounted SMBM-V module is to be replaced by a new SMBM-V module, the subsequent assembly steps can be skipped. One can then proceed with the mounting point "SMBM-V module replacement". Otherwise:

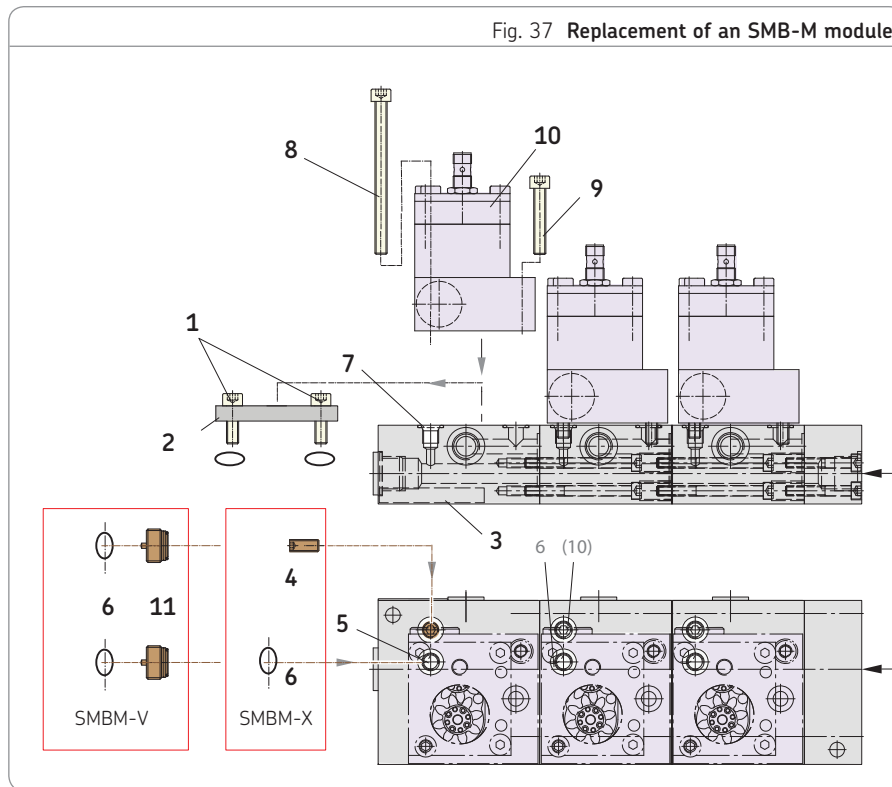
For initial installation of an SMBM-V module:

- Using the special tool for that purpose (Part No. 2350-00000078, Chapter "Spare parts"), screw check valves **(11)** (2x) into borehole **(5)** and borehole **(7)** with a tightening torque of  $8_{-1}$  Nm
- Place new packing rings **(6)** in the groove of the boreholes **(5)** and **(7)**
- Carefully place the SMBM-V module **(10)** on the flanging area of the base plate module **(3)**
- At the SMBM-V module, place the hexagon socket screw **(8)** (M8 x 100, WAF 6) in place and tighten it slightly
- Also place the opposite-side hexagon socket screw **(9)** (M8 x 40, WAF 6) in place and tighten it slightly as well
- Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm



SMBM-V module replacement:

- Place new packing rings (6) in the groove of the boreholes (5) and (7)
- Carefully place the SMBM-V module (10) on the flanging area of the base plate module (3)
- At the SMBM-V module, put the hexagon socket screw (8) (M8 x 100, WAF 6) in place and tighten it slightly
- Also put the opposite-side hexagon socket screw (9) (M8 x 40, WAF 6) in place and tighten it slightly as well
- Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm
- If necessary, clean the flow limiter to remove any external impurities
- Open oil feed to flow limiter



### 10.4.3 Expansion of an existing flow limiter assembly to include an SMBM module

☞ See Figures 37 and 38



- Interrupt oil feed to flow limiter
- Depressurize flow limiter
- If necessary, clean the flow limiter to remove any external impurities
- If necessary, detach the electrical quick-coupling connectors and place them aside
- Place an oil pan under the flow limiter
- **Ensure that the oil contained in the lubrication system has cooled down!**

☞ *See Figure 38 below*

- Loosen and remove the fastening screws (**1a/1b**) of the flow limiter assembly (**2**)
- Loosen and remove the plug screw (**3**) and allow the oil still remaining in the flow limiter system to drain off in controlled fashion.
- Loosen and remove the two hexagon socket screws:
  - with connection module (**4**) M6x40-8.8 (WAF 6) (**5**)
  - with filter unit (**6**) M6x60-8.8 (WAF 5) (**7**)
- Carefully separate the connection module (**4**) or the filter unit (**6**) from the rest of the flow limiter

*Only with flow limiter with changeover valve (7) (SMBM-V):*

- Unscrew the spacer screw (**8**) (2x) with a hex key (WAF 6) and place it aside
- Unscrew cylinder screws (**9**) (2x) with a hex key and place them aside as well

*General further procedure:*

☞ As a rule, an expansion of an existing flow limiter assembly proceeds with the flanging of the new expansion module at the previous first module, as seen from the inlet. Existing pipework need not be altered for that reason. If not present, then a new assembly hole for the fastening screw (**1b**) must be fitted by the customer.

- Insert cylinder screws **(9)** (2x) into the two boreholes of the new expansion module **(10)**
- Lightly grease the required O-rings **(11)** (2x or 3x, depending on the number needed) and insert them into the grooves on the expansion module **(10)**
- Place the new expansion module **(10)** up against the module which has previously been mounted, and tighten the two cylinder screws **(9)** (WAF...) slightly
- Align the new expansion module **(10)**
- Tighten the two cylinder screws **(9)** by turns with a torque of  $12 \pm 1$  Nm
- Use a hex key (WAF 6) to rotate new spacer screws **(8)** (2x) into the new expansion module **(10)**
- Tighten the two spacer screws **(8)** evenly by turns with a torque of  $25 \pm 1$  Nm

For initial installation of an SMBM-X module:

☞ **See Figure 37**

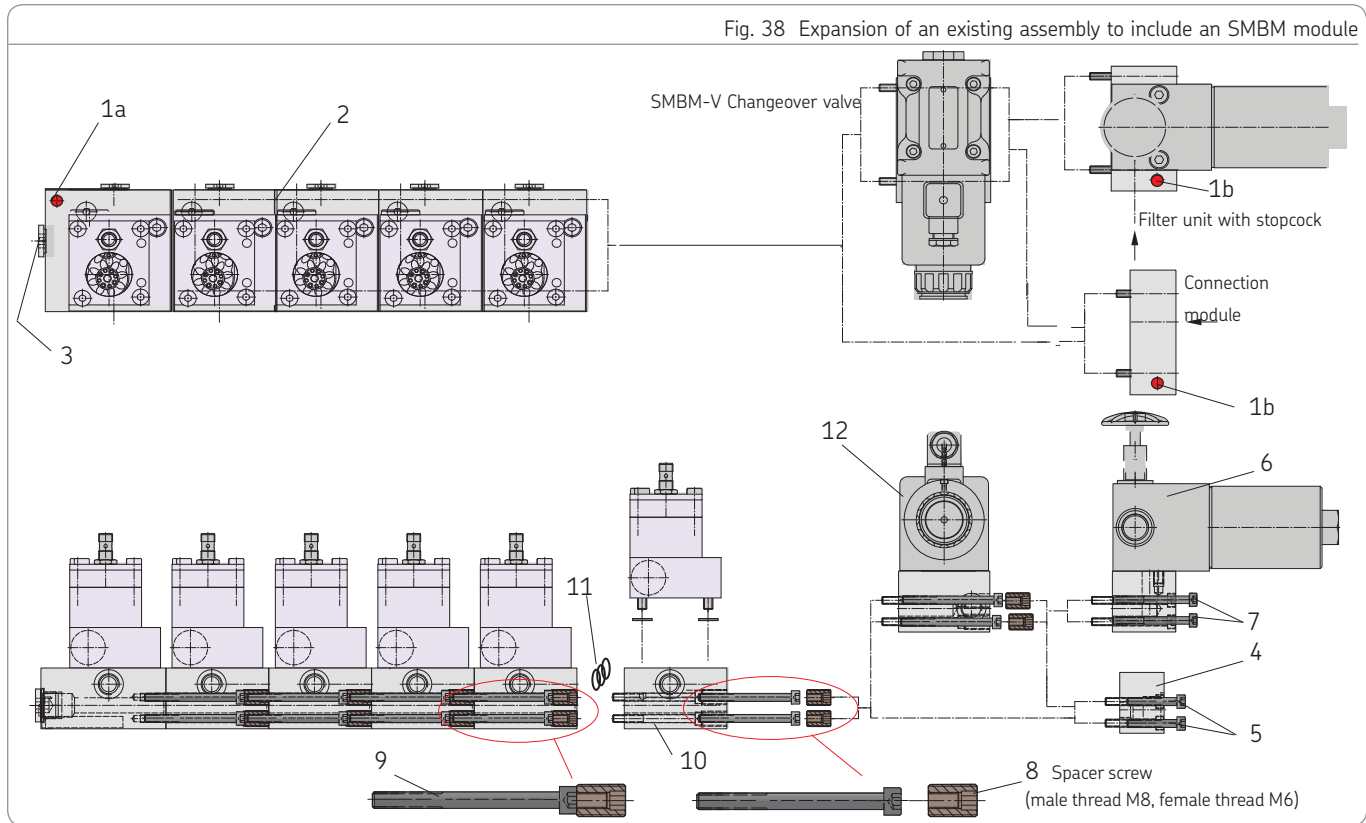
- Screw the plug screw **(4)** into the borehole **(5)** and tighten it with a tightening torque of  $15 \pm 1$  Nm
- Place a new O-ring **(6)** in the groove of the borehole **(7)**
- Carefully place the SMBM-X module on the flanging area of the base plate module **(3)**
- At the SMBM-X module, put the hexagon socket screw **(8)** (M8 x 100, WAF 6) in place and tighten it slightly
- Also put the opposite-side hexagon socket screw **(9)** (M8 x 40, WAF 6) in place and tighten it slightly as well
- Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm

For initial installation of an SMBM-V module:

- Using the special tool for that purpose (Part No. 2350-00000078, Chapter "Spare parts"), screw check valves **(10)** (2x) into borehole **(5)** and borehole **(7)**
- Place new packing rings **(6)** in the groove of the boreholes **(5)** and **(7)**
- Carefully place the SMBM-V module on the flanging area of the base plate module **(3)**
- At the SMBM-V module, put the hexagon socket screw **(8)** (M8 x 100, WAF 6) in place and tighten it slightly



- Also put the opposite-side hexagon socket screw **(9)** (M8 x 40, WAF 8) in place and tighten it slightly as well
  - Tighten the two screws evenly crosswise with a torque of  $15 \pm 1$  Nm
- ☞ **See Figure 38 below**
- Only with flow limiter with changeover valve **(11)** (SMBM-V):*
- Insert cylinder screws **(9)** (2x) into the two boreholes of the changeover valve **(11)** and the changeover valve base plate
  - Complete changeover valve **(11)** at new expansion module (put in place, tighten the two cylinder screws **(9)** slightly)
  - Align the changeover valve **(11)**
- Tighten the two cylinder screws **(9)** by turns with a torque of  $12 \pm 1$  Nm
  - Use a hex key (WAF 6) to rotate spacer screws **(8)** (2x) into the changeover valve **(11)**
  - Tighten the two spacer screws **(8)** evenly by turns with a torque of  $25 \pm 1$  Nm
- General further procedure
- Insert hexagon socket screws **(5 or 7)** into the two boreholes of the connection module **(4)** or of the filter unit **(6)**
  - Align the connection module **(4)** or the filter unit **(6)**
  - Tighten the two cylinder screws **(5 or 7)** by turns with a torque of  $12 \pm 1$  Nm
- Place the fastening screws **(1a/1b)** at the flow limiter assembly **(2)** and tighten them with a tightening torque of  $15 \pm 1$  Nm
  - Open oil feed to flow limiter
  - Perform a leak test
  - Remove the drip pan
  - If necessary, connect electrical quick-disconnect couplings



Fig. 38 Expansion of an existing assembly to include an SMBM module



## 11. Malfunctions, causes, and remedies

The following table provides an overview of possible malfunctions and their causes. Contact the SKF Service department if you cannot remedy the malfunction.

		<b>WARNING</b>
	<b>System pressure</b>	The described component is pressurized during operation. Depressurize the component before starting maintenance work.

		<b>WARNING</b>
	<b>Burn injury hazard!</b>	Escaping oil is possibly hot.

### 11.1 Malfunctions at the flow limiter







Malfunction	Cause	Remedy
No pulse signal (LED flashing) while gear wheels of the gear wheel-type flow indicator are rotating  -Pulse generator 2340-00000030	o Cable socket is not installed correctly, cable is not correctly connected at the customer site	<ul style="list-style-type: none"> <li>• Remount the cable socket and tighten the mounting screw</li> <li>• Check connection cable for correct assembly and connection</li> </ul>
	o Pulse generator is defective	<ul style="list-style-type: none"> <li>• Replace pulse generator, see Chapter "Repair"</li> </ul>
	o Clearance between pulse generator and cover is too large (thread engagement insufficient)	<ul style="list-style-type: none"> <li>• Unscrew the pulse generator out of the cover then carefully screw it back in by hand up to the stop cover</li> </ul>
No monitoring signal  from signal transmitter 24-1072-2124	o Cable socket is not installed correctly	<ul style="list-style-type: none"> <li>• Remount the cable socket and tighten the mounting screw</li> </ul>
	o Pigtails in the cable socket are not connected or are connected incorrectly	<ul style="list-style-type: none"> <li>• Check the pigtails and connect if necessary</li> </ul>
	o Customer did not/did not correctly connect pigtails	<ul style="list-style-type: none"> <li>• Check/reconnect the customer's connection of the pigtails</li> </ul>
	o Signal transmitter defective	<ul style="list-style-type: none"> <li>• Replace signal transmitter</li> </ul>

Malfunction	Cause	Remedy
Gear wheels are not rotating, no oil in the gear chamber	<ul style="list-style-type: none"> <li>Flow limiter mounted on the base plate with 180° rotation</li> </ul>	<ul style="list-style-type: none"> <li>Depressurize the system, loosen the fastening screws of the flow limiter, rotate the flow limiter by 180°, observe correct seating of the O-rings, retighten the fastening screws (see Chapter "Repair").</li> </ul>
Oil escaping at the flow limiter.	<ul style="list-style-type: none"> <li>Screw connections not sufficiently tightened</li> </ul>	<ul style="list-style-type: none"> <li>Retighten screw connections (see Chapter "Repair").</li> </ul> <p><b>Caution!</b> Before the cover screws of the gear chamber are retightened, the pulse generator mounted there is to be unscrewed and then reinserted again correctly once the retightening of the cover screws has been completed. See Chapter 12.2. Repair.</p>

### 11.2 System malfunctions with effects on the flow limiter

Malfunction	Cause	Remedy
Flow rate too low	<ul style="list-style-type: none"> <li>System pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>Check system pressure</li> </ul>
	<ul style="list-style-type: none"> <li>Plug-in nozzle size too small</li> </ul>	<ul style="list-style-type: none"> <li>Check the selection of the plug-in nozzle against the selection table and insert the correct nozzle</li> </ul>
	<ul style="list-style-type: none"> <li>Gear wheels are sticking, ingress of foreign objects into the gear chamber</li> </ul>	<ul style="list-style-type: none"> <li>Depressurize the system, open the gear chamber, clean the gear wheels and reinsert them (observe arrangement and alignment). Close the gear chamber and screw it shut.</li> </ul>
	<ul style="list-style-type: none"> <li>Cold oil, viscosity &gt; 600 cSt.</li> </ul>	<ul style="list-style-type: none"> <li>Bring oil up to operating temperature. The viscosity should be &lt; 600 cSt.</li> </ul>
Flow rate too high	<ul style="list-style-type: none"> <li>Plug-in nozzle size too large</li> </ul>	<ul style="list-style-type: none"> <li>Check the selection of the plug-in nozzle against the selection table and insert the correct nozzle</li> </ul>

## 12. Repairs

 <b>WARNING</b>	
	<b>Risk of injury</b>
	At a minimum, the following safety measures must be taken before any repairs:
	○ Unauthorized persons must be kept away
	○ Mark and secure the work area
	○ Depressurize the product
	○ Unlock the product and prevent it from being restarted
	○ Check to ensure the absence of voltage
	○ Ground and short-circuit the product
	○ Cover any live parts in the surrounding area



### 12.1 Replacement of signal transmitter 24-1072-2124

☞ See Figure 39

- Depressurize the signal transmitter (1)

#### At the defective signal transmitter:

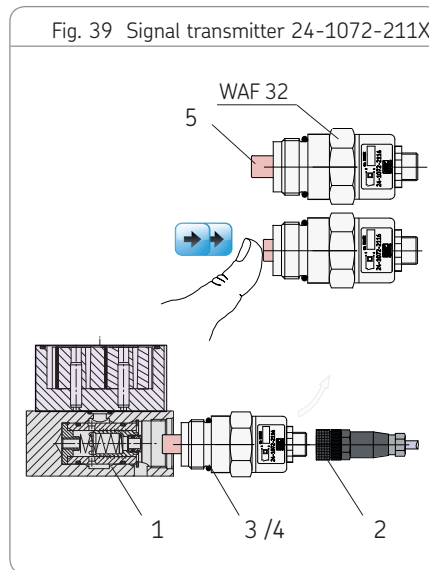
- Unscrew the cable socket (2) from the signal transmitter (3)
- Attach box wrench (WAF 32) to the signal transmitter, detach the signal transmitter
- Remove the signal transmitter (3) with O-ring (4)

#### At the new signal transmitter:

- Use a finger to press the operating piston (5) into the signal transmitter housing in order to check that it is running smoothly

- At the signal transmitter (3), check the O-ring (4) for correct seating
- Attach the signal transmitter (3) at the flow limiter (1) and screw it in by hand
- Tighten the signal transmitter with box wrench (WAF 32)  
**Torque:** 15 ±1Nm
- Screw the cable socket (2) onto the signal transmitter (3)

☞ Ensure that the cable of the cable socket is secured against strain and twisting. Secure the cable accordingly if necessary.



## 12.2 Mounting or replacement of the pulse generator 2340-00000030

☞ See Figure 40

### 12.2.1 Subsequent mounting

Use a hexagon socket screw key (WAF 6) to unscrew the plug screw (1) (M12x1) out of the cover (2) of the flow meter module (3)

☞ The subsequent mounting of the pulse generator corresponds to the mounting description for the pulse generator replacement, Chapter 12.2.2. Proceed in the following according to this description.

- Mount the pulse generator according to the mounting description contained in Chapter 12.2.2 "Mounting the new pulse generator"

### 12.2.2 Pulse generator replacement

At the defective pulse generator:

- Remove the cable socket (4) of the pulse generator (5) and place it aside
- at the defective pulse generator (5), loosen the locknut (6) (WAF 17) from the cover (2) of the flow meter module (3) and unscrew it slightly
- Unscrew the pulse generator (5) by hand from the cover (2)

☞ If the pulse generator cannot be loosened by hand, then its locknut (6) is to be locked using the second locknut (7) which is enclosed with the new pulse generator. The pulse generator can be removed accordingly using an open-end wrench (WAF 17).

### ***Mounting of the new pulse generator***

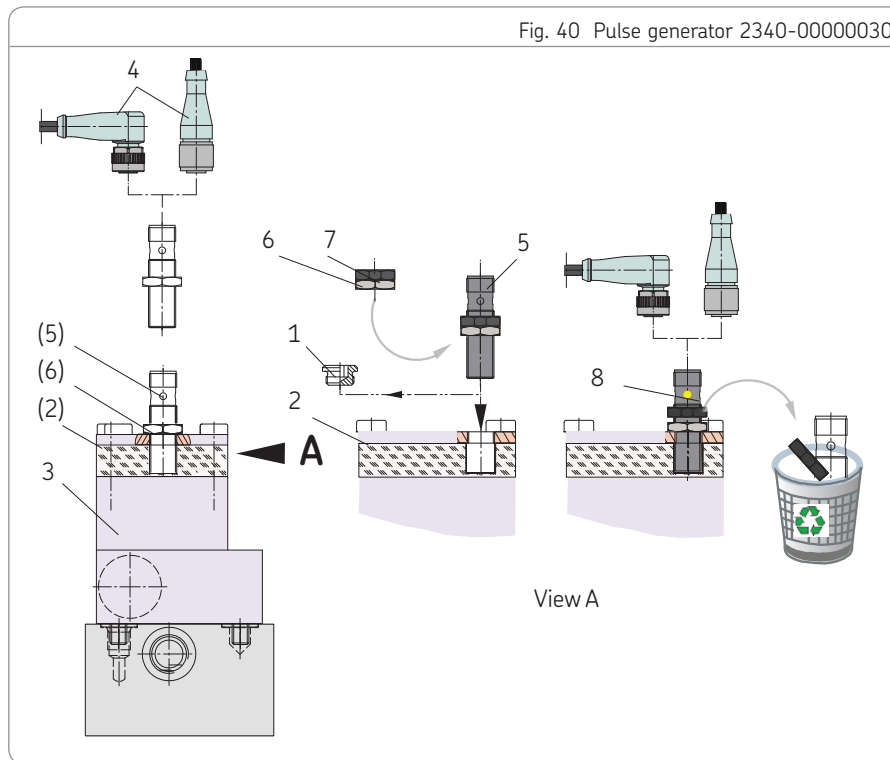
- Turn the two locknuts (6) (7) already mounted on the new pulse generator (5) into the upper third of the thread, in the direction of the plug connection
- Lock the two locknuts (6) (7) against one another
- Carefully place the new pulse generator (5) at the cover thread (2) screw it in slightly by hand
- Tighten pulse generator (3) with a torque of  $6 \pm 1$  Nm
- Loosen the locking of the two locknuts (6) (7)
- Lock the locknut (6) in the direction of the cover (2)
- Unscrew the locknut (7)

- Connect the cable socket (4) to the pulse generator (5)
- Dispose of the old pulse generator (5) and locknut (7) correctly

### 12.2.3 Run a function check

- Activate the flow limiter system
- ☞ Requirements: Supply voltage must be available at the pulse generator, gear wheels in the gear chamber must rotate
- ☞ With correct assembly and rotating gear wheels, the diode (8) located at the pulse generator must light up with pulsating illumination.
- Check the functionality of the new pulse generator via its diode

Fig. 40 Pulse generator 2340-00000030



## 13. Shutdown, disposal

### 13.1 Temporary shutdown

Temporary shutdown is performed by:

- Switching off the main machine
- Depressurize the signal transmitter

### 13.2 Permanent shutdown, disassembly

Permanent shutdown and disassembly of the product must be planned properly by the operator and conducted in compliance with all applicable requirements.

### 13.3 Disposal

#### Countries within the European Union

Waste should be avoided or minimized to the extent possible. The disposal of products contaminated with lubricant must be performed by a recognized waste disposal company in compliance with environmental protection requirements and waste disposal regulations as well as the requirements of local authorities.



The producer of waste is responsible for its specific classification, as the European Waste Catalog provides for different disposal keys for waste that is the same but of different origin.

Dispose of or recycle electrical components in accordance with WEEE Directive 2012/19/EU.



Plastic or metallic parts can be disposed of as industrial waste.

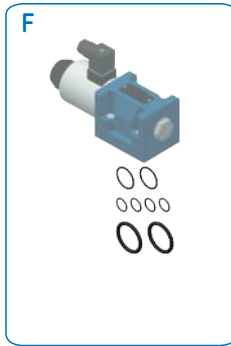
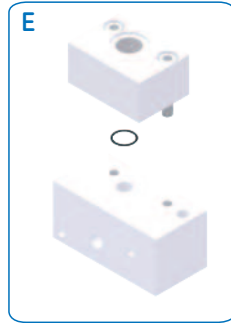
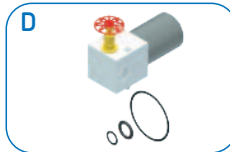
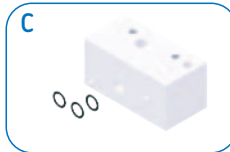
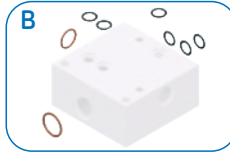
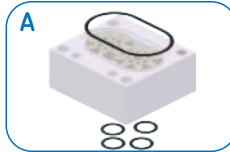
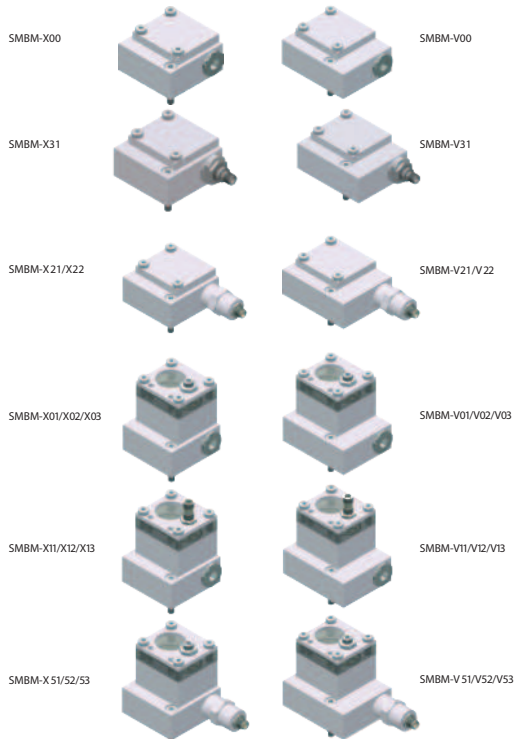


#### Countries outside the European Union

Disposal is carried out according to the applicable laws and regulations of the country.


# 14. Spare parts


Fig. 41 Spare parts and spare parts kits

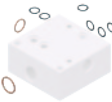


The spare parts groups are used exclusively as replacement for defective parts identical in construction. Modifications to existing products by the use of spare parts are therefore not permitted.





A	Gasket set for gear chamber	Pcs.	Item number		
			24-0404-2644		
	O-Ring 51x2	1	96-9176-0062		88
	O-Ring 12x2	4	WVN532-12x2		


D	Gasket set for oil filter	Pcs.	Item number		
			24-0404-2293		
	O-Ring 56x3.5	1	96-9060-0062		000
	O-Ring 18x3	1	96-9066-0062		
	O-Ring 12x2	1	96-9031-0062		




B	Gasket set for base module	Pcs.	Item number		
			24-0404-2645		
	Copper sealing ring	1	DIN7603-A21X26-CU		000
	Copper sealing ring	1	DIN7603-A17X21-CU		
	O-Ring 12x2	5	WVN532-12x2		



E	Gasket set for Connection plate	Pcs.	Item number		
			24-0404-2648		
	O-Ring 16x2	1	WVN532-16X2		

C	Gasket set for Valve plate	Pcs.	Item number		
			24-0404-2647		
	O-Ring 12x2	3	WVN532-12x2		000

F	Gasket set for reversing valve	Pcs.	Item number		
			24-0404-2639		
	O-Ring 17x1	2	17x1.78-N-NBR90		00 0000 00
	O-Ring 9.8x1	4	9.81x1.5x1.78-NBR90		
	O-Ring 21.82x3	2	21.82x3.53-N-NBR70		

G	Connecting plate	Pcs.	24-0714-3440	
	Including O-ring and fastening screws For connection from above, assembly on filter plate 44-0714-2684	1		

Additional mounting equipment	Pcs.		
Comprised of stop screw 24-1821-2040 (instead of the signal transmitter) and O-ring 96-9019-0062	1	24-1821-2040	
O-ring for stop screw	1	96-9019-0062	
Throttle bushing SMBM-X with O-Rings	1	24-0220-2011	
Throttle bushing SMBM-V with O-Rings and retaining ring	1	24-0220-2022	

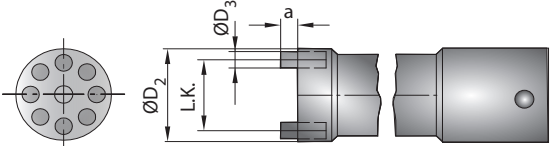
Additional mounting equipment	Pcs.		
Gear pair 333 lpl	1	24-1858-2220	
Gear pair 167 lpl	1	24-1858-2219	
Gear pair 83 lpl	1	24-1858-2218	
Acrylic glass cover for gear chamber O-ring 51x2	1	44-0412-2433 96-9176-0062	

Flow limiter SMBM-....	Pcs.	Item number
Pressure switch (piston detector), See Chapter 4.2	1	24-1884-2785
Signal transmitter, (see Chapters 4.3. and 6.7)	1	24-1072-2124
Pulse generator (see Chapters 4.4 and 6.6)	1	2340-00000030
3/2-Changeover valve	1	24-1254-2486
O-Ring 12x2	1	WVN532-12x2
Packing ring plug screw	1	DIN 7603-A17x21-CU



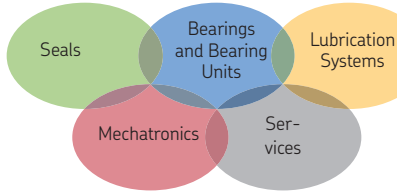
## 15. Accessories

### 15.1 Fitting tool for check valve 24-2104-2049

Fitting tool for check valve (with plug-in sleeve for torque wrench)	$\varnothing D_2$	a	$\varnothing D_3$	Hole circle L.K.	Pcs.	Item number
	8.6	2	1.2	6.9 ±0.05	1	2350-00000078

### 15.2 Cable boxes

Cable boxes, M12x1	Pcs.	Item number
Cable box straight, 4-pin	1	179-990-371
Cable box angled, 4-pin	1	179-990-372
Cable box straight, 3-pin, with 2 m cable	1	2370-00000053
Cable box straight, 3-pin, with 5 m cable	1	179-990-381
Cable box angled, 3-pin, with 5 m cable	1	179-990-381



### The Power of Knowledge Engineering

Over the course of more than a century, SKF has specialized in five fields of competence and acquired a wide range of application expertise. We utilize this experience to provide innovative solutions to OEMs and other manufacturers in practically all industrial sectors worldwide.

Our five fields of competence are: Bearings and bearing units, seals, lubrication systems, mechatronics (combining mechanical and electronic components to improve the capability of classic systems), and extensive services from 3-D computer simulations and modern condition monitoring systems for high reliability to system management. SKF is a leading global company and guarantees its customers uniform quality standards and global product availability.

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Version 01

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# EC Declaration of Incorporation acc. to Machinery Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer, SKF Lubrication Systems GmbH, Hockenheim Plant, 2. Industriestr. 4, DE - 68766 Hockenheim, hereby declares the conformity of the partly completed machinery

Designation: Flow limiter

Type: **SMBM-...**

Item number: -\*

Year of manufacture: See type plate

with the essential protection requirements of Machinery Directive 2006/42/EC at the time of placing on the market.

1.1.2 · 1.1.3 · 1.3.2 · 1.3.4 · 1.5.1 · 1.5.6 · 1.5.8 · 1.5.9 · 1.6.1 · 1.7.1 · 1.7.3 · 1.7.4

The special technical documentation described in Annex VII, Part B of this Directive has been compiled.

We undertake to transmit, in response to a reasoned request by the national authorities, the special documents for this partly completed machine.

The Head of Technical Standards is the authorized representative for the technical documentation. See the manufacturer information for the address.

Furthermore, the following Directives and (harmonized) standards were applied in the applicable areas:

2011/65/EU                      RoHS II  
 2014/30/EU                      Electromagnetic Compatibility | Industry

Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
DIN EN ISO 12100	2011	DIN EN 60947-5-1	2010	DIN EN 61000-6-2	2006	DIN EN 61000-6-4	2011
DIN EN 809	2012	DIN EN 61131-2	2008	Correction	2011	DIN EN 60947-5-1	2010
DIN EN 60204-1	2007	Correction	2009	DIN EN 61000-6-3	2011		
Correction	2010	DIN EN 60034-1	2015	Correction	2012		
DIN EN 50581	2013	DIN EN 61000-6-1	2007				

The partly completed machinery must not be put into service until it has been established that the machinery into which it is to be incorporated is in compliance with the provisions of the Machinery Directive 2006/42/EC and all other applicable Directives.

Hockenheim, 8/18/2020

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