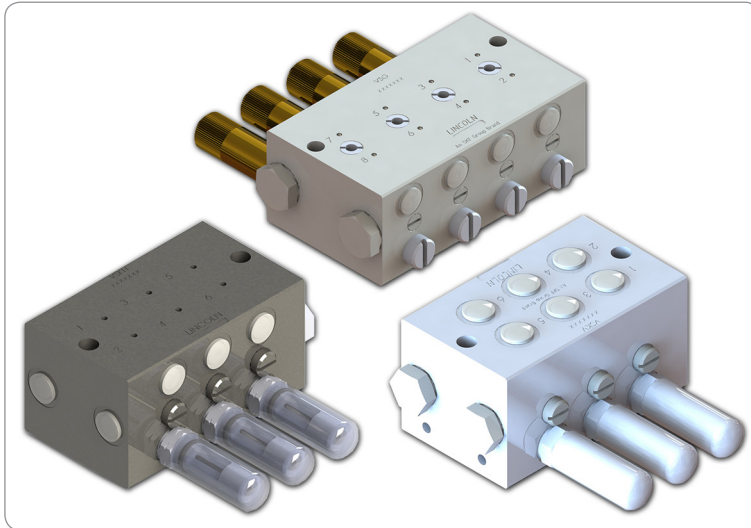


Lubricant metering devices
for dual-line systems
VSG and VSK series



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Version 01
07/11/2018



Legal notice

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Training courses

In order to provide a maximum of safety and economic viability, SKF carries out detailed training courses. It is recommended that the training courses are attended. For more information please contact the respective 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.

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Disclaimer

The manufacturer shall not be held responsible for damages caused by:

- Non appropriate use
faulty assembly, operation, setting, maintenance, repair or accidents
- Use of inappropriate lubricants
- Improper or late response to malfunctions
- Unauthorized modifications of the product
- Intent or negligence
- Use of non-original SKF spare parts
- Faulty planning or layout of the centralized lubrication system

Liability for loss or damage resulting from the use of our products is limited to the maximum purchase price. Liability for consequential damages of whatever kind is excluded.

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Explanation of symbols, signs and abbreviations

The following abbreviations may be used within these instructions. Symbols within safety notes mark the kind and source of the hazard.

	General warning		Dangerous electrical voltage		Risk of falling		Hot surfaces
	Unintentional intake		Crushing hazard		Pressure injection		Suspended load
	Electrostatically sensitive components		Potentially explosive atmosphere		Keep unauthorized persons away		Wear personal protective equipment (protective clothes)
	Wear personal protective equipment (goggles)		Wear personal protective equipment (face shield)		Wear personal protective equipment (gloves)		General obligation
	Wear personal protective equipment (safety shoes)		Disconnect product from mains		Protection by extra low voltage (protection class III)		Safe galvanic isolation (protection class III)
	Protective conductor (protection class I)		Protection y double or reinforced insulation (protection class II)		Disposal of waste electrical and electronic equipment		
	CE marking		Disposal, recycling				

	Warning level	Consequence	Probability	Symbol	Meaning
	DANGER	Death, serious injury	imminent	●	Chronological guidelines
	WARNING	Death, serious injury	possible	○	Lists
	CAUTION	Minor injury	possible		Refers to other facts, causes, or consequences
	NOTICE	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
poss.	possibly	h	hour	in.	inch
if appl.	if applicable	s	second	psi	pounds per square inch
incl.	including	d	day	sq. in.	square inch
min.	minimum	Nm	Newtonmeter	cu. in.	cubic inch
max.	maximum	ml	millilitre	mph	miles per hour
min.	minute	ml/d	millilitre per day	rpm	revolutions per minute
etc.	et cetera	cm ³	cubic centimetre	gal.	gallon
e.g.	for example	mm	millimetre	lb.	pound
kW	kilowatt	l	litre	hp	horse power
U	Voltage	dB (A)	sound pressure level	kp	kilopond
R	resistance	>	greater than	fpsec	feet per second
I	current	<	less than	conversion factors	
V	volt	±	plus/minus	Length	1 mm = 0.03937 in.
W	watt	∅	diameter	Area	1 cm ² = 0.155 sq.in
AC	alternating current	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
DC	direct current	rh	relative humidity		1 l = 2.11416 pints (US)
A	ampere	≈	approximately	Mass	1 kg = 2.205 lbs
Ah	ampere hour	=	equal to		1 g = 0.03527 oz.
Hz	frequency [Hertz]	%	per cent	Density	1 kg/cc = 8.3454 lb./gal.(US)
nc	normally closed contact	‰	per mille		1 kg/cc = 0.03613 lb./cu.in.
no	normally open contact	≥	greater than	Force	1 N = 0.10197 kp
N/A	not applicable	≤	less than	Pressure	1 bar = 14.5 psi
ft.	feet	mm ²	square millimetre	Temperature	°C = (°F-32) x 5/9
		rpm	revolutions per minute	Output	1 kW = 1.34109 hp
		↑	Increases a value	Acceleration	1 m/s ² = 3.28084 ft./s ²
		↓	Reduces a value	Speed	1 m/s = 3.28084 fpsec.
					1 m/s = 2.23694 mph

1. Safety instructions

1.1 General safety instructions

- The owner must ensure that safety information has been read by any persons entrusted with works on the product or by those persons who supervise or instruct the before-mentioned group of persons. In addition, the owner must also ensure that the relevant personnel are fully familiar with and have understood the contents of the Instructions. It is prohibited to commission or operate the product prior to reading the Instructions.
- These Instructions must be kept for further use.
- The described products were manufactured according to the state of the art. Risks may, however, arise from a usage not according to the intended purpose and may result in harm to persons or damage to material assets.
- Any malfunctions which may affect safety must be remedied immediately. In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.

- Protect the centralized lubrication system connected to the pump with a pressure control valve always.
- Incorrect installation or operation may result in damages due to poor or excessive lubrication of bearings or lubrication points.
- Use only original spare parts or parts authorised by us.

1.2 General behaviour when handling the product

- The product may be used only in awareness of the potential dangers, in proper technical condition, and according to the information in these instructions.
- 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.
- Keep unauthorized persons away. Wear personal protective equipment always.

- Precautionary operational measures and instructions for the respective work must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Safety-related protective and safety equipment must not be removed, modified or affected otherwise in its function and is to be checked at regular intervals for completeness and function.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Remedy occurring faults in the frame of responsibilities. Immediately inform your superior in the case of faults beyond your competence.

1. Safety instructions

1.3 Intended use

Providing lubrication points with lubricant in dual-line lubrication systems following the specifications, technical data and limits stated in these Instructions.

Usage is allowed exclusively for professional users in the frame of commercial and economic activities.

1.4 Foreseeable misuse

Any usage differing from the one stated in these Instructions is strictly prohibited, particularly a usage:

- outside the indicated ambient temperature range.
- with non-specified means of operation
- without adequate pressure control valve.
- of C3 versions in areas with aggressive and corrosive materials (e.g. with high salt concentration).
- of plastic parts in areas with high ozone levels or in areas with harmful radiation (e.g. ionising radiation).
- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) or HCS 29 CFR 1910.1200 marked with GHS01-GHS06 and GHS08 hazard pictograms.
- in an explosion protection zone.

1.5 Modifications of the product

Unauthorized conversions or modifications may result in unforeseeable impacts on safety. Therefore, any unauthorized conversions or modifications are expressly prohibited.

1.6 Prohibition of certain activities

Due to potential sources of faults that may not be visible or due to legal regulations the following activities may be carried out by manufacturer specialists or authorized persons only:

- Repairs of or changes on the pistons of the lubricant metering devices.

1.7 Painting of plastic parts

Painting of any plastic parts or seals of the described products is expressly prohibited. Remove or tape plastic parts completely before painting the superior machine

1.8 Inspections prior to delivery

The following inspections were carried out prior to delivery:

- Safety and functional tests

1.9 Markings on the product



Further to the findings of the workplace risk evaluation the operating company has to attach additional markings (e. g. warnings, signs giving orders, prohibition signs or labelling as specified by CLP or GHS), where appropriate.

1.10 Other applicable documents

In addition to these instructions, the following documents must be observed by the respective target group:

- Operational instructions and approval rules
- Safety data sheet of the lubricant used

Where appropriate:

- Project planning documents
- Additional information on special versions. You will find these in the special system documentation
- Any documents of other components required to set up the centralized lubrication system

1.11 Persons authorized to operate the pump

1.11.1 Operator

A person who is qualified by training, knowledge and experience to carry out the functions and activities related to normal operation. This includes avoiding possible hazards that may arise during operation.

1.11.2 Specialist in mechanics

Person with appropriate professional education, knowledge and experience to detect and avoid the hazards that may arise during transport, installation, start-up, operation, maintenance, repair and disassembly.

1.12 Specialist in electrics

Person with appropriate professional education, knowledge and experience to detect and avoid the hazards that may arise from electricity.

1.13 Provision of personal protective equipment

The operator must provide suitable personal protective equipment for the respective location of operation and the purpose of operation.

1.14 Operation

The following must be observed during commissioning and operation:

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

1.15 Emergency stopping

In case of an emergency stop the pump station by:

- Interrupting the power supply to the pump.
- Where appropriate, using measures determined by the operator, such as actuating the emergency stop switch of the superior machine.

1. Safety instructions

1.16 Transport, installation, maintenance, malfunctions, repair, shutdown, disposal

- All relevant persons must be informed of the activity prior to starting any work. Observe the precautionary operational measures and work instructions.
- Maintenance and repair work can be subject to restrictions at low or high temperatures (e.g. changed flow properties of the lubricant). Therefore, where possible, try to carry out maintenance and repair work at room temperature.
- Before carrying out any work, depressurize the product and the machine in which the product is to be installed and secure it against unauthorised switching on. Take suitable measures to ensure that moving, detached parts are blocked during work and that no limbs can be trapped by unintentional movements.
- Assemble the product only outside of the operating range of moving parts, at an adequate distance from sources of heat or cold. Other units of the machine or vehicle must not be damaged or impaired in their function by the installation.
- Dry or cover wet, slippery surfaces accordingly.
- Cover hot or cold surfaces accordingly.
- Do not touch cables or electrical components with wet or damp hands.
- Carry out works on electrical components only while the system is depressurized and use voltage isolated tools suitable for electrical works only
- Undertake drilling at non-critical, non-load bearing parts only. Use any available boreholes. Do not damage lines and cables when drilling.
- Observe possible abrasion points. Protect the parts accordingly.
- Fill lubrication lines with lubricant prior to connecting them to the metering device.

- All components used must be designed according to the maximum operating pressure and the maximum respectively minimum ambient temperature.
- Check all parts prior to their usage for contamination and clean, if necessary.
- Observe the specified tightening torques. When tightening, use a calibrated torque wrench.
- Avoid mixing up or wrong assembly of dismantled parts. Mark these parts accordingly.

1.17 Initial commissioning / daily start-up

Ensure that:

- All safety devices are completely available and functional
- All connections are correctly connected
- All parts are correctly installed

1.18 Cleaning

- Risk of fire and explosion when using inflammable cleaning agents Only use non-flammable cleaning agents suitable for the purpose.
- Do not use aggressive cleaning agents.
- Thoroughly remove residues of cleaning agents from the product.
- Do not use steam jet and high pressure cleaners. Electrical components may be damaged.
- Mark damp areas accordingly.

1. Safety instructions

1.19 Residual risks

1

Residual risk	Possible in life cycle											Prevention/ remedy
	A	B	C				G	H	K			
Personal injury/ material damage due to falling of raised parts	A	B	C				G	H	K			Keep unauthorized persons away. No people may remain under suspended loads. Lift parts with adequate lifting devices.
Personal injury/ material damage due to tilting or falling of the product because of non-observance of the stated tightening torques		B	C				G		K			Observe the specified tightening torques. Fix the product only to components with sufficient load capacity.
Personal injury or damage to material due to leaked lubricant		B	C	D	E	F	G		K			Be careful when connecting or disconnecting lubricant feed lines. Always use suitable hydraulic screw connections and lubrication lines for the stated pressures. Do not mount lubrication lines to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.
Tearing or damaging of lines when installed on moving machine parts			C	D								If possible, do not install on moving parts. If this cannot be avoided, use flexible hose lines.
Lubricant spraying out due to faulty component fitting or line connection			C	D		F	G					Use suitable hydraulic screw connections and lines for the stated pressures. Check these prior to commissioning for correct connection and damage.
Injury of persons because of loosening of the impressed balls when using C3 version in a strongly corrosive environment.				D	E	F	G	H				Only metering devices in C5 design are allowed to be used in corrosive environments.
Loss of the function of the visual function indicator in areas with magnetic respectively magnetizable chips/dusts.				D								Use the visual function indicator only in areas without magnetic or magnetizable chips/dusts.

Life phases:
 A = transport, B = installation, C = initial start-up, D = operation, E = cleaning, F = maintenance, G = fault, repair,
 H = shutdown, K = Disposal

2. Lubricants

2.1 General information

Lubricants are used specifically for certain application purposes. In order to fulfil their tasks, lubricants must fulfil various requirements.

The most important requirements for lubricants are:

- Reduction of abrasion and wear
- Corrosion protection
- Noise minimisation
- protection against contamination or penetration of foreign objects
- Cooling (primarily with oils)
- longevity (physical/ chemical stability)
- economic and ecological aspects

2.2 Selection of lubricants

SKF considers lubricants to be an element of system design. A suitable lubricant is selected already when designing the machine and forms the basis for the planning of a centralized lubrication system.

The selection is made by the manufacturer or operator of the machine, preferably together with the lubricant supplier based on the requirement profile defined.

Should you have little or no experience with the selection of lubricants for centralized lubrication systems, please contact SKF.

If required we will be glad to support customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

You will avoid possible downtimes through damage to your machine or system or damage to the centralized lubrication system.

2.3 Material compatibility

Lubricants must generally be compatible with the following materials:

- steel, grey iron, brass, copper, aluminium
- NBR, FPM, ABS, PA, PUR

2.4 Temperature characteristics

The lubricant used must be suitable for the specific ambient temperature of the product. The viscosity required for proper operation of the product must be adhered to and must not be exceeded in case of low temperatures nor fall below specification in case of high temperatures. Specified viscosities, see chapter Technical data.

2.5 Ageing of lubricants

After a prolonged downtime of the machine, the lubricant must be inspected prior to re-commissioning as to whether it is still suitable for use due to chemical or physical ageing. We recommend that you undertake this inspection already after a machine downtime of 1 week.

If doubts arise as to a further suitability of the lubricant, please replace it prior to re-commissioning and, if necessary, undertake initial lubrication by hand.

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

Please contact SKF, if you have further questions regarding lubricants.

You may request an overview of the lubricants tested by SKF.



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



Do not mix lubricants. This may have unforeseeable effects on the usability and therefore on the function of the centralized lubrication system.



When handling lubricants the relevant safety data sheets and hazard designations, if any, on the packaging have to be observed.



Due to the multitude of possible additives, individual lubricants, which according to the manufacturer's data sheets fulfil the necessary specification, may not, in fact, be suitable for use in centralized lubrication systems (e. g. incompatibility between synthetic lubricants and materials). In order to avoid this, always use lubricants tested by SKF.

2.6 Solid lubricants

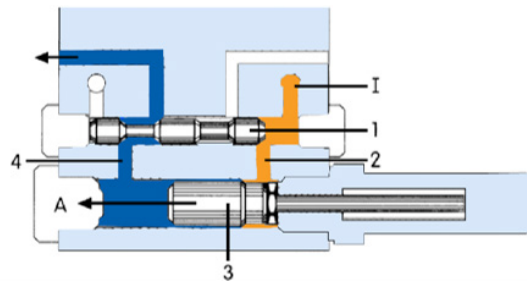
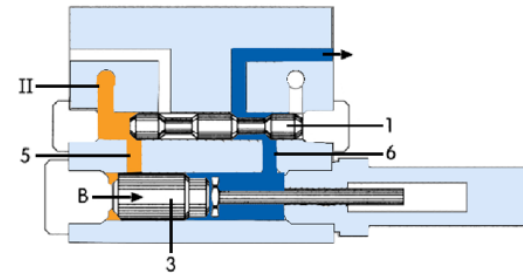
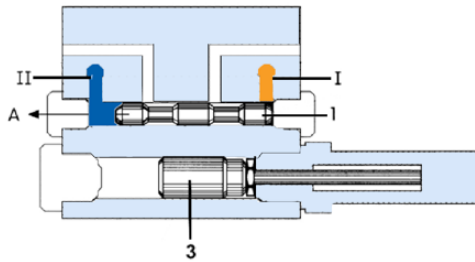
Lubricants containing solid lubricants may have a negative influence on the wear behaviour of centralized lubrication systems. For this reason, such lubricants must be checked in each individual case before use.

Please contact us for this purpose.

3. Overview, functional description

3.1 Component designation

Fig. 1: Component designation

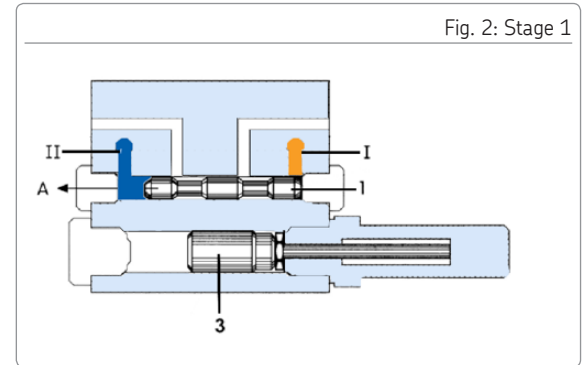


- | | |
|--------------------|------------------|
| 1 - Control piston | 4 - Channel |
| 2 - Channel | 5 - Channel |
| 3 - Supply piston | 6 - Channel |
| I - Main line 1 | II - Main line 2 |

3.2 Stage 1

Lubricant is fed to the metering device under pressure through main line I.

Control piston (Fig. 2: Pos. I) starts moving into the direction of the arrow (A) and pushes the lubricant in front of the control piston back through the relieved main line II (Fig. 2: Pos. II).

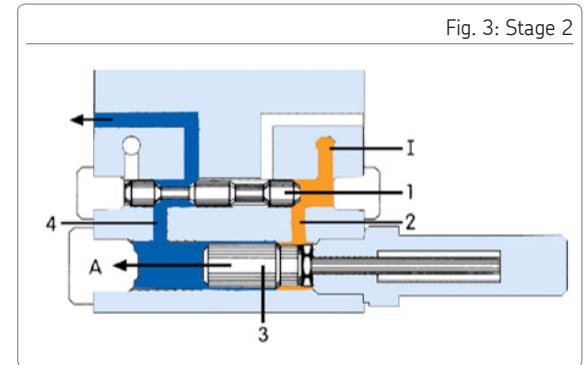


3.3 Stage 2

When the control piston (Fig. 3: Pos. 1) has released the channel (Fig. 3: Pos. 2), lubricant reaches the left front side of the supply piston (Fig. 3: Pos. 3) and moves it towards the left side into the direction of the arrow (A).

The lubricant in front of the supply piston is now fed to the lubrication point through the channel (Fig. 3: Pos. 4). As soon as the supply piston has reached its final position, the pressure in main line I rises up to the adjusted change-over pressure of the dual-line system.

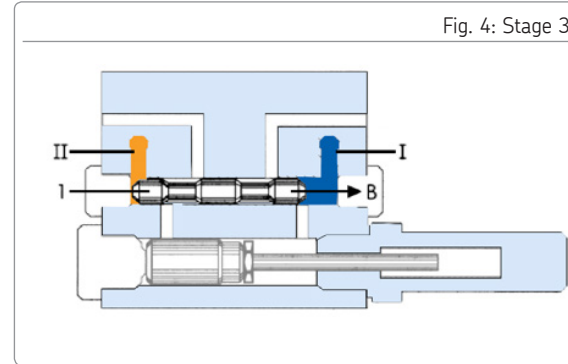
Now the change-over device of the dual-line system connects the currently pressurized main line I with the pump's lubricant reservoir. As a consequence the lubricant in the line is relieved and the pressure falls.



3.4 Stage 3

At the same time the change-over device connects main line II with the pump. The pressure in line II rises. The control piston (Fig. 4: Pos.1) now moves in the direction of the arrow (B). As a consequence the lubricant in front of the control piston is fed to the relieved main line.

Fig. 4: Stage 3



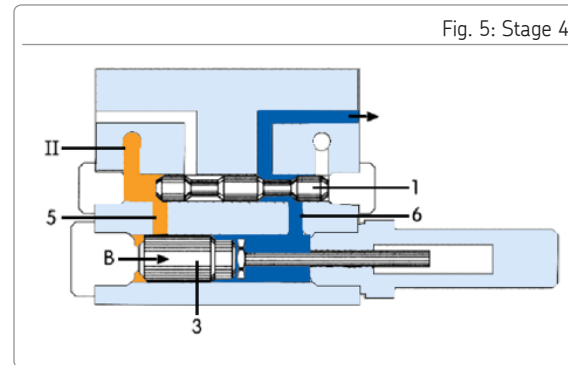
3.5 Stage 4

When the control piston (Fig. 5: Pos. 1) has released the channel (Fig. 5: Pos. 5), lubricant reaches the left front side of the supply piston (Fig. 5: Pos. 3) and moves it towards the right side into the direction of the arrow (B).

The lubricant in front of the supply piston is now fed to the lubrication point through the channel (Fig. 5: Pos. 6). As soon as the supply piston has reached its final position, the pressure in main line II rises up to the adjusted change-over pressure of the dual-line system.

Another change in pressure takes place in main lines I and II. Then the procedure repeats from stage 1 again.

Fig. 5: Stage 4



3.6 Metering devices with an odd number of outlets

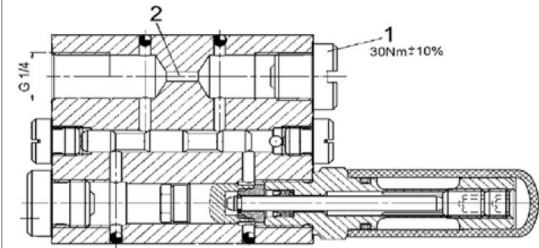
In case of metering devices with an odd number of outlets the two opposite outlets are connected by a connection channel (Fig. 6: Pos. 2).

The opposite outlet is closed by means of a cap screw. The output volume is double that of one outlet, as the lubricant volumes are cross-ported. If this is not wanted, the output volume of this pair of outlets must be regulated down accordingly (for the same output volume down to half of the output). The cap screw can be mounted on the other side, if required by the installation conditions.



If in case of metering devices with an even number of outlets one outlet is closed, the opposite outlet will block and no lubricant will be dispensed. The other outlets will still be provided with lubricant.

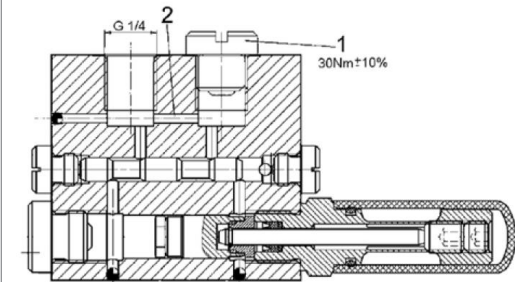
Fig. 6: Metering devices with an odd number of outlets VSKH



1 - Cap screw

2 - Connection channel

Fig. 7: Metering devices with an odd number of outlets VSKV



3.7 Metering device with metering screws VSKH/V D/KD

VSKH/VSKV	VSG	VSL
0.30	0.55	1.25
0.60	1.10	2.50
1.20	1.65	3.75
1.50	2.20	5.00

Variants for the output volume adjustment. All metering devices of the VS series can be supplied with metering screws as version D or with metering screws and indicator pin as version KD.

The metering screws limit the stroke of the working piston. The longer the metering screw, the lower the output volume. Unless stated otherwise in the order, the metering devices are supplied with metering screws for maximum supply.

Fig. 8: Metering devices with metering screws VSKH/V D

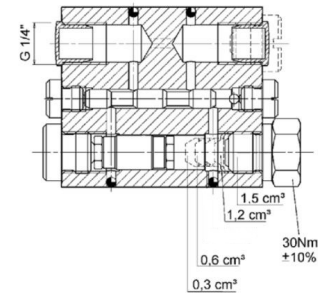
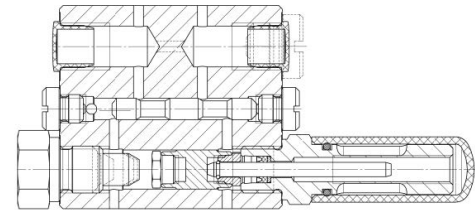


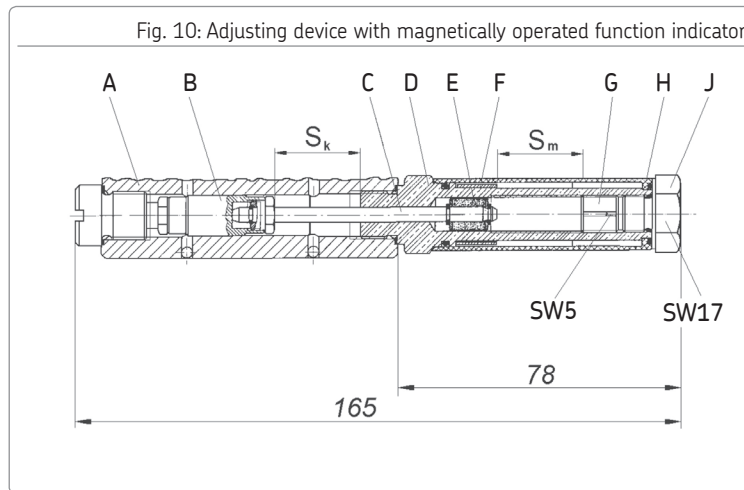
Fig. 9: Metering devices with indicator pin and metering screw VSKH/V KD



3.8 Magnetically operated function indicator

3.8.1 Functional principle

- The piston movement is transferred to the magnet (Fig. 10: Pos. E) via the piston pin (Fig. 10: Pos. C).
- In this way the magnetic field affects the indicator ring (Fig. 10: Pos. F), which then indicates the piston movement with the stroke $S_k = S_m$.
- The output volume is adjusted by modifying piston stroke S_k by means of the adjusting screw (Fig. 10: Pos. G).



- | | |
|-----------------------------|----------------------|
| A: Metering device body VSG | F: Indicator ring |
| B: Piston | G: Adjusting screw |
| C: Piston pin | H: Protective sleeve |
| D: Adjusting sleeve | J: Closure screw |
| E: Magnet | |

4. Technical data

	VSKH/VSKV	VSG	VSL
Outlets	1 to 8	1 to 8	1 to 8
Output/ stroke	0 – 1.5 cc	0 – 2.2 cc	0 – 5 cc
Min. pressure	35 bar	35 bar	35 bar
Max. pressure	400 bar	400 bar	400 bar
Min. temperature	-20 °C	-20 °C	-20 °C
Max. temperature	+80 °C (+120 °C with FKM seal)		
Inlet thread	G1/4	G3/8 or 3/8 NPT	G3/8 or 3/8 NPT
Outlet thread	G1/4	G1/4 or 1/4 NPT	G1/4 or 3/8 NPT
Lubricating oil/grease	Lubricating oils (min. 20 mm ² /s) and lubricating greases up to and including NLGI 3		
Material	Galvanized steel Stainless steel 1.4305 Stainless steel 1.4571	Galvanized steel Stainless steel 1.4305 Stainless steel 1.4571 Chemically nickel-plated (VSG-KR -DN)	Galvanized steel Stainless steel 1.4305

4.1 Type identification code

4.1.1 Type identification code VSG/VSL

The type identification code facilitates selection/identification of important features of the product. For the exact type identification code of the respective product, see the type identification plate or the product packaging.

V	S	G	-	4	-	V	A	-	K	R	-	F	K	M	-	V	A	-	K	N	-	A	-	1	4	3	0	5	Example
A				B		C			D				E or F			G			H		K					L			Category

A Product designation¹⁾	
VSG	Output volume max. 2,2 cm ³
VSL	Output volume max. 5,0 cm ³
B Number of outlets¹⁾	
1 - 8	
C Material design metering device body¹⁾	
_ = Galvanized steel	
VA = Stainless steel	
D Metering volume/Adjusting sleeve¹⁾	
D = with metering volume	
KD = with indicator pin and metering volume	
KR = with indicator pin and adjusting device	
E Output per stroke²⁾	
	VSG D VSG KD VSL D VSL KD
A =	0.55 1.25
B =	1.10 2.50
C =	1.65 3.75
D =	2.20 5.00
X =	Special sizes metering screws

F Material of the adjusting device¹⁾	
_ = Standard with PU seal up to 80 °C	
FKM = with FKM seal up to 120 °C	
G Material of the adjusting sleeve¹⁾	
_ = Galvanized steel	
VA = Stainless steel 1.4305	
H Monitoring¹⁾	
KN = with indicator pin and proximity switch	
KA = with indicator pin and adapter (proximity switch by the customer)	
KNP = Indicator pin and proximity switch, pluggable	
KS = with indicator pin and position switch	
NP = with piston detector, pluggable	
K USA version¹⁾	
A = NPTF thread	
L Material number of the metering device body¹⁾	
1.4305 = VA	

¹⁾ From these categories only one feature can be selected at a time.

²⁾ Unless ordered otherwise, the variants are always supplied with metering screws for maximum output

4.1.2 Type identification code VSG/VSL with magnetic adjustment and magnetic metering device

The type identification code facilitates selection/identification of important features of the product. For the exact type identification code of the respective product, see the type identification plate or the product packaging.

V	S	L	-	6	-	V	A	-	M	D	-	V	A	-	V	A	-	D	D	-	N	-	T	E	-	A	-	1	4	3	0	5	Example
A				B		C			D			E		F			G		H		I		J							K		Category	

A Product designation¹⁾	VSG	Output volume max. 2,2 cm ³	G Output per stroke²⁾	VSG D VSG KD	VSL D VSL KD
	VSL	Output volume max. 5,0 cm ³	A =	0.55	1.25
B Number of outlets¹⁾			B =	1.10	2.50
1 - 8			C =	1.65	3.75
C Material design metering device body¹⁾			D =	2.20	5.00
_ = Galvanized steel			X =	Special sizes metering screws	
VA = Stainless steel			H Monitoring¹⁾		
D Metering volume/Adjusting device¹⁾	MR	Adjusting device with magnetically operated indicator	KN	with indicator pin and proximity switch	
	MD	Magnetic indicator with adjustable output volume	KA	with indicator pin and adapter (proximity switch by the customer)	
E Metering volume/Adjusting device¹⁾			KS	with indicator pin and limit switch	
with-out		Adjusting sleeve made of steel	N	with piston detector	
	MS	Adjusting sleeve made of brass	NP	with piston detector, pluggable	
	VA	Adjusting sleeve made of 1.4305	I internal abbreviation		
F Protective cap¹⁾			J USA version¹⁾		
KF		Protective cap made of plastic	A	NPTF thread	
MS		Protective cap made of brass	K Material number of the metering device body¹⁾		
VA		Protective cap made of stainless steel 1.4305	1.4305	Stainless steel version 1.4305	
			1.4571	Stainless steel version 1.4571	

¹⁾ From these categories only one feature can be selected at a time.

²⁾ Unless ordered otherwise, the variants are always supplied with metering screws for maximum output

4.1.3 Type identification code for VSKH/VSKV

The type identification code facilitates selection/identification of important features of the product. For the exact type identification code of the respective product, see the type identification plate or the product packaging.

V	S	K	H	-	4	-	V	A	-	K	R	-	1.5	-	V	A	-	F	K	M	-	M	S	-	K	N	-	S	I	-	1.	4	3	0	5	Example
	A				B			C			D			E		F			G			H			I			J						K		Category

A Product designation¹⁾	
VSKH	Horizontal outlets
VSKV	Vertical outlets
B Number of outlets¹⁾	
1 - 8	
C Material design metering device body¹⁾	
_	= Galvanized steel
VA	= Stainless steel
D Metering volume/Adjusting device¹⁾	
KR	= with indicator pin and infinitely adjustable adjusting device, galvanized steel
KRR	= with indicator pin and infinitely adjustable adjusting device, galvanized steel, with reduced output volume (0-0.6 cm ³)
KD	= with indicator pin and metering screws
D	= with metering screws
E Output per stroke²⁾	
Variants D and KD are supplied with metering screws for maximum output (1.5 cm ³), unless otherwise ordered).	

¹⁾ From these categories only one feature can be selected at a time.

²⁾ Unless ordered otherwise, the variants are always supplied with metering screws for maximum output

F Material of the adjusting sleeve¹⁾	
_	= Galvanized steel
VA	= Stainless steel 1.4305
G Material of the adjusting device¹⁾	
_	= Standard with PU seal up to 80 °C
FKM	= with FKM seal up to 120 °C
H Protective cap¹⁾	
KF	= Protective cap made of plastic
MS	= Protective cap made of brass
VA	= Protective cap made of stainless steel 1.4305
I Monitoring¹⁾	
KN	= with indicator pin and proximity switch
KA	= with indicator pin and adapter (proximity switch by the customer)
KS	= with indicator pin and position switch
N	= with piston detector
NP	= with piston detector, pluggable
J Internal abbreviation	
K Material number of the metering device body¹⁾	
1.4305	= Stainless steel version 1.4305
1.4571	= Stainless steel version 1.4571

4.1.4 Type identification code VSKH/VSKV with magnetic adjusting device and magnetic metering volume

The type identification code facilitates selection/identification of important features of the product. For the exact type identification code of the respective product, see the type identification plate or the product packaging.

V	S	K	H	-	1	-	-	M	R	-	M	S	-	K	F	-	D	-	N	P	Example		
A					B			C			D			E			F			G		H	Category

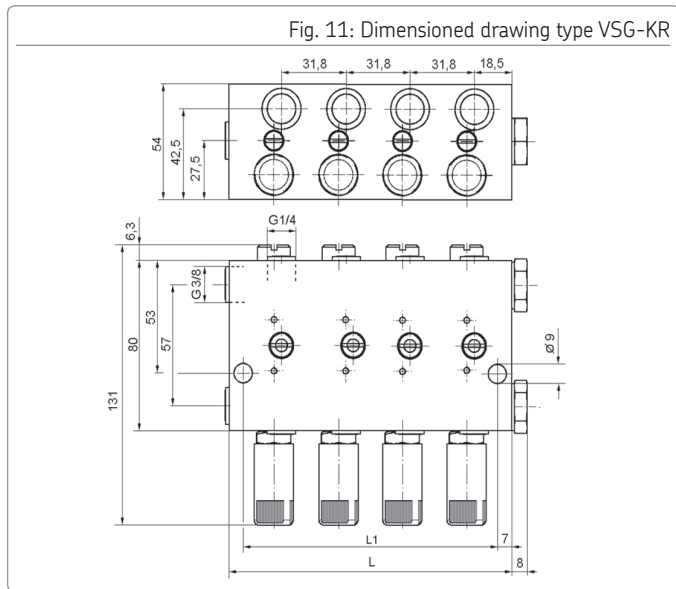
A Product designation¹⁾	G Output per stroke²⁾
VSKH Horizontal outlets	A = 0.30
VSKV Vertical outlets	B = 0.60
B Number of outlets¹⁾	C = 1.20
1 - 8	D = 1.50
C Material design metering device body¹⁾	X = Special sizes metering screws
_ = Galvanized steel	H Monitoring¹⁾
VA = Stainless steel	NP = with proximity switch, pluggable
D Metering volume/Adjusting device¹⁾	
MR = Adjusting device with magnetically operated indicator	
MD = Magnetic indicator with adjustable output volume	
E Metering volume/Adjusting device¹⁾	
without = Adjusting sleeve made of steel	
MS = Adjusting sleeve made of brass	
F Protective cap¹⁾	
KF = Protective cap made of plastic	
MS = Protective cap made of brass	

1) From these categories only one feature can be selected at a time.

2) Unless ordered otherwise, the variants are always supplied with metering screws for maximum output

4.2 Technical data sheets

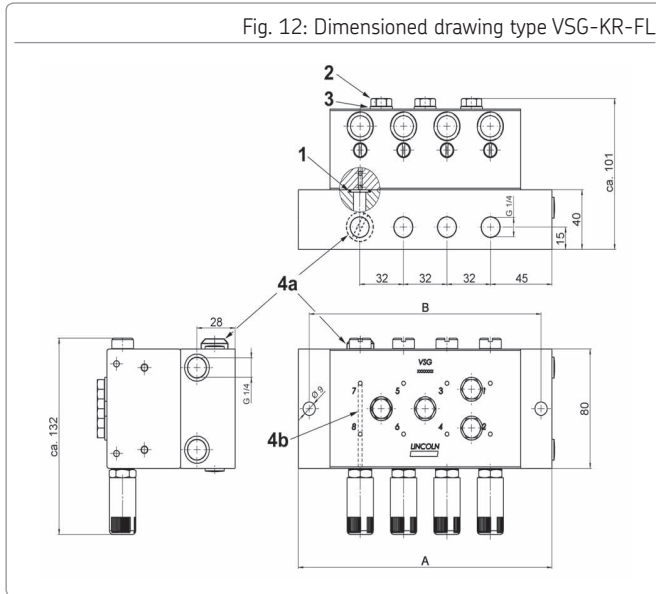
4.2.1 Lubricant metering device VSG-KR



Type	VSG2-KR	VSG4-KR	VSG6-KR	VSG8-KR
Part no.	620-40015-1	620-40015-3	620-40015-5	620-40015-7
Number of outlets	2	4	6	8
L1 (mm)	30.5	62	94	126
L (mm)	44.5	76	108	140

4.2.2 Lubricant metering device VSG-KR-FL

Fig. 12: Dimensioned drawing type VSG-KR-FL

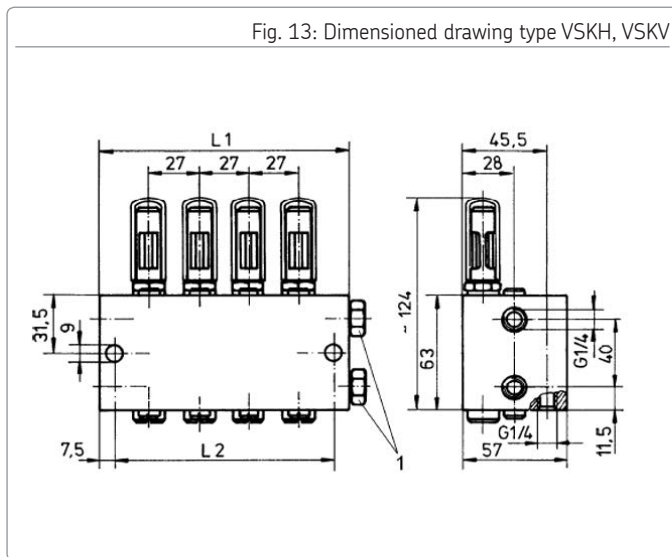


Item	Designation	Part number
1	O-ring 12 x 2	219-12223-5
2	Hexagon screw M8 x 70	200-13070-2
3	Washer 8 C	209-13077-1
4 a	Closure screw (for odd outlet numbers)	303-16284-1
4b	Outlet channels, drilled and sealed off with a ball (for odd outlet numbers)	

Metering device	A	B	Metering device assy.	Metering device body	Number of O-rings (item 1)
VSG 1-KR-FL	90	74	620-36319-5	620-36134-9	3
VSG 2-KR-FL	90	74	620-36319-1	620-36134-8	4
VSG 3-KR-FL	122	106	620-36319-6	620-36134-7	5
VSG 4-KR-FL	122	106	620-36319-2	620-36116-6	6
VSG 5-KR-FL	154	138	620-36319-7	620-26450-1	7
VSG 6-KR-FL	154	138	620-36319-3	620-36370-1	8
VSG 7-KR-FL	186	170	620-36319-9	620-26451-1	9
VSG 8-KR-FL	186	170	620-36319-4	620-26369-1	10

4.2.3 Lubricant metering devices VSKH, VSKV

Fig. 13: Dimensioned drawing type VSKH, VSKV

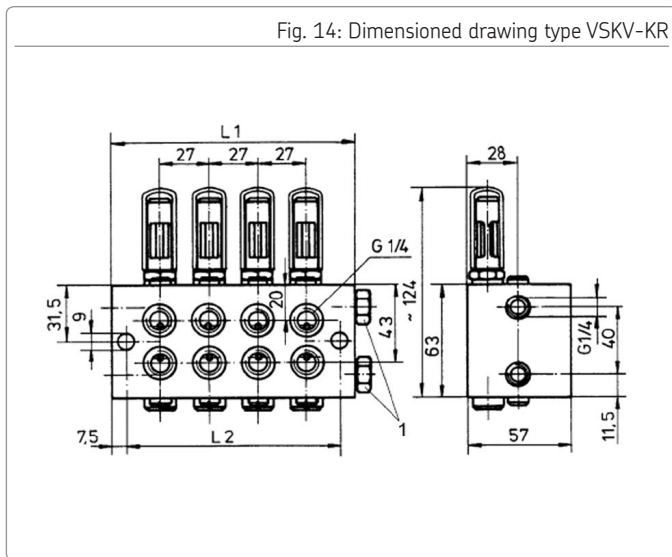


1 – cap screw G1/4 part no. 303-17441-1

Type	VSKH2-KR	VSKH4-KR	VSKH6-KR	VSKH8-KR
L1	51	79	107	135
L2	36	64	92	120

4.2.4 Lubricant metering device VSKV-KR

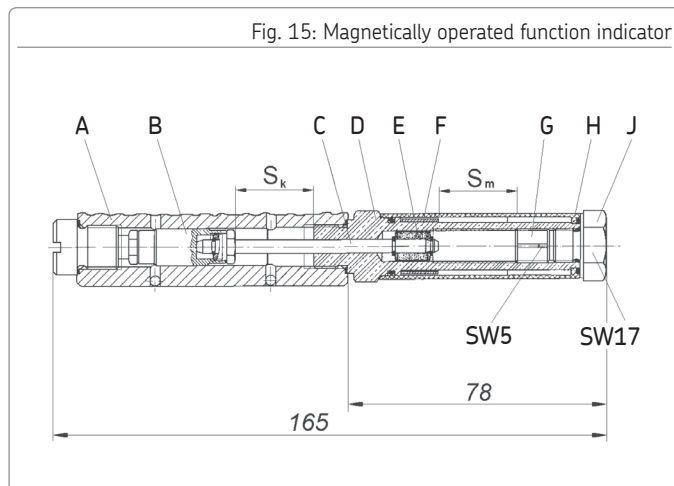
Fig. 14: Dimensioned drawing type VSKV-KR



1 – cap screw G1/4 part no. 303-17441-1

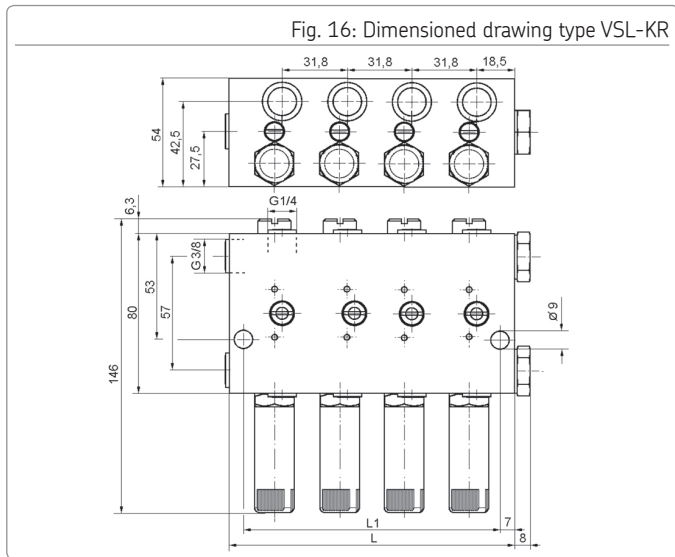
Type	VSKV2-KR	VSKV4-KR	VSKV6-KR	VSKV8-KR
L1	51	79	107	135
L2	36	64	92	120

4.2.5 Magnetically operated function indicator



- A: Metering device body VSG F: Indicator ring
 B: Piston G: Regulating screw
 C: Piston pin H: Protective sleeve
 D: Adjusting sleeve J: Closure screw
 E: Magnet

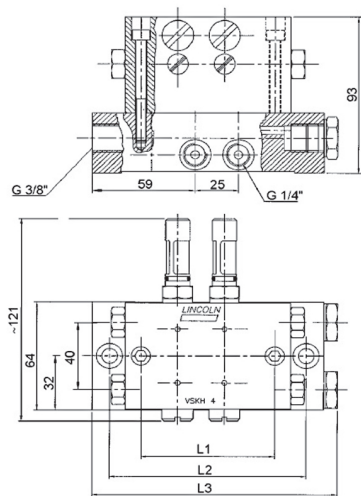
4.2.6 Lubricant metering devices VSL-KR



Type	VSL2-KR	VSL4-KR	VSL6-KR	VSL8-KR
Part no.	620-40062-3	620-40062-7	620-40064-3	620-40064-7
Number of outlets	2	4	6	8
L1 (mm)	30.5	62	94	126
L (mm)	44.5	76	108	140

4.2.7 Lubricant metering device VSKH-KRFL Protective cap MS

Fig. 17: Dimensioned drawing type VSKH-KRFL Protective cap MS



Type	VSKH2-KR-FL	VSKH4-KR-FL	VSKH6-KR-FL	VSKH8-KR-FL
Part no.	620-46023-2	620-46023-4	620-46023-6	620-46023-8
Number of outlets	2	4	6	8
L1 (mm)	52	77	102	127
L2 (mm)	88	113	138	163
L3 (mm)	116	141	166	191

5. Delivery, returns, and storage

5.1 Delivery

After receipt of the shipment, check the shipment for damage and completeness according to the shipping documents. Immediately report any transport damages to the forwarding agent.

Keep the packaging material until any discrepancies are resolved. During in-house transport ensure safe handling.

5.2 Returns

Clean all parts and pack them properly (i.e. following the regulations of the recipient country) before returning them.

Protect the product against mechanical influences such as impacts. There are no restrictions for land, sea or air transport.

Mark returns on the packaging as follows.



5.3 Storage

SKF products are subject to the following storage conditions:

- dry, dust- and vibration-free in closed premises
- no corrosive, aggressive materials at the place of storage (e. g. UV rays, ozone)
- protected against pests and animals (insects, rodents, etc.)
- possibly in the original product packaging
- shielded from nearby sources of heat and coldness
- in case of high temperature fluctuations or high humidity take adequate measures (e. g. heater) to prevent the formation of condensation water



Before application inspect the products with regard to possible damages occurred during their storage. This particularly applies for parts made out of plastic and rubber (embrittlement).

5.4 Storage temperature range

- In case of parts not filled with lubricant the admissible storage temperature corresponds to that of the admissible ambient temperature of the pump (see Technical data)
- In case of parts filled with lubricant the admissible storage temperature range is:
 - min. + 5 °C
 - max. + 35 °C



If the storage temperature range is not adhered to, the following work steps for replacing the lubricant may not in all cases lead to the desired result.

5.5 Storage conditions for parts filled with lubricant

The conditions mentioned in the following will have to be adhered to when storing products filled with lubricant,

5.5.1 Storage period of up to 6 months

The filled products can be used without having to take further measures.

5.5.2 Storage period from 6 to 18 months

Metering device

- Remove all connection lines and closure screws, if any
- Connect the pump primed with new lubrication grease suitable for the application purpose to the divider bar in such way that the opposite port of the divider bar remains open
- Let the pump run until new lubricant leaks from the divider bar

- Remove leaked lubricant
- Reinstall closure screws and connection lines

Lines

- Dismantle preassembled lines
- Ensure that both line ends remain open
- Prime lines with new lubricant

5.5.3 Storage period exceeding 18 months

To avoid dysfunctions consult the manufacturer before commissioning. The general procedure to remove the old grease filling corresponds to that of a storage period from 6 to 18 months.

6. Installation

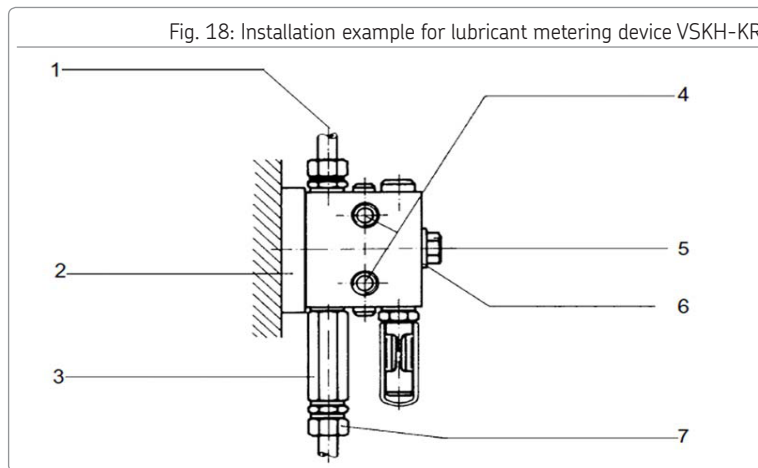
6.1 General information

Only qualified technical personnel may install the products described in these Instructions.

During assembly pay attention to the following:

- Mount the metering device at a suitable place following the lubrication plan.
- Mount the lubricant metering device in such way that the outlet does not touch the frame or the mounting plate.
- Only use the main lines and lubrication lines specified by SKF and observe the stated system pressures.
- Make sure to always connect the same line (I respectively II) to the same metering device inlet when connecting the main lines. This facilitates control, as all indicator pins are retracted or extended depending on the cycle.
- Mount the metering device on an even surface and without tension.
- When using base plates (see accessories) first weld the base plates without the metering devices, then mount the metering devices.
- Possibly protect the metering devices against dust. Observe the maximum admissible ambient temperature.

Fig. 18: Installation example for lubricant metering device VSKH-KR

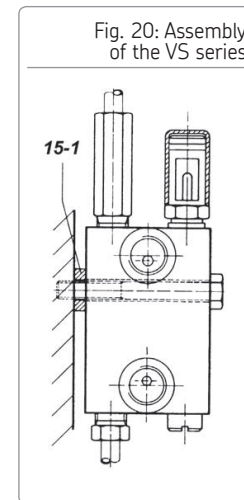
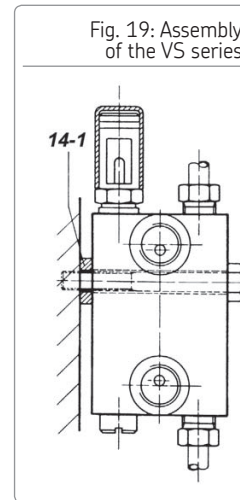


- | | |
|----------------------------|-------------------------------|
| 1 – Metering device outlet | 5 – Fastening screw M8 |
| 2 – Metering device plate | 6 – Washer $\varnothing 8,4$ |
| 3 – Extension piece | 7 – Straight screw-in fitting |
| 4 – Main line connection | |

- Mount the metering device easily accessible for inspection and assembly work.

6.2 Installation of metering devices of the VS series

- All metering devices can be mounted in any position. For reasons of simplicity, Figs. 19 and 20 show only the position with the indicator pin pointing upwards.
- The metering devices can still be mounted in such way that the outlets are positioned before (Fig. 19) or behind (Fig. 20) the indicator pin. An assembly following Fig. 20 has the advantage that the indicator pins are not partly hidden by the lubrication line.
- The disadvantage that the tubes cannot be connected so easily is avoided by using the extension piece.
- To avoid distortion when fixing the metering devices, elastic distance rings are used. This ensures reliable operation of the metering device also on uneven mounting surfaces.
- Metering devices of the KS series are additionally fitted with spacers.
- In addition, the mounting position with the lubrication feed lines in front of the limit switches and thus in front of the indicator pins is recommended here.



6.3 Replacing adjusting sleeves KR by KRFKM (FPM) on the VSG metering device



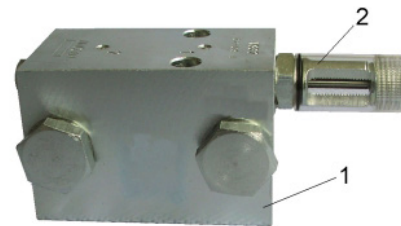
Pay attention to cleanliness during all work on the metering device.

- Switch off the pump respectively shut off the lubrication circuit.
- Reduce any existing residual pressure by carefully loosening the fittings.
- Separate the metering device from the system and clean its outside.
- Unscrew the protective cap from the adjusting sleeve.
- Loosen the adjusting sleeve with ring wrench width across flats 17 and carefully (in case of extended indicator pin) slide it over the indicator pin.



Do not pull the piston out of the metering device body.

Fig. 21: Metering device before assembly

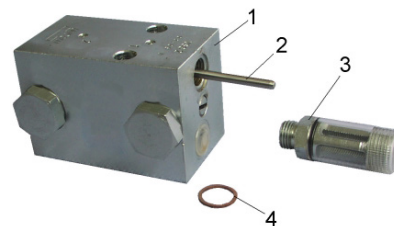


1 - Metering device block

2 - Adjusting sleeve

- Replace old copper sealing ring by a new one.

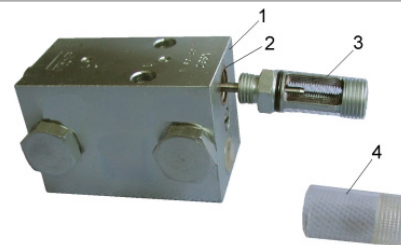
Fig. 22: Disassembled metering device



- | | |
|---------------------------|-------------------------|
| 1 - Metering device block | 3 - Adjusting sleeve |
| 2 - Indicator pin | 4 - Copper sealing ring |

- Carefully slide new adjusting sleeve over the indicator pin. (Characteristic: black marked windows)

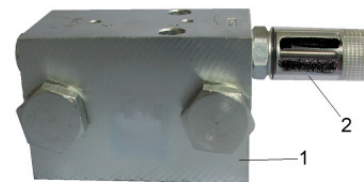
Fig. 23: Assembly of new adjusting sleeve



- | | |
|---------------------------|----------------------|
| 1 - Metering device block | 3 - Adjusting sleeve |
| 2 - Copper sealing ring | 4 - Protective cap |

- Fasten new adjusting sleeve with torque wrench (torque $30 \text{ Nm} \pm 10\%$).
- Mount metering device into the system again.

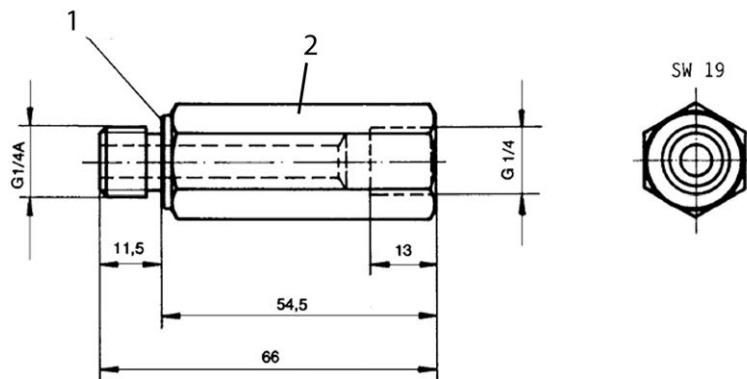
Fig. 24: Metering device mounted with new adjusting sleeve



- 1 - Metering device block
- 2 - Adjusting sleeve

6.4 Extension piece

Fig. 25: Extension piece for metering device VSKH-KR



1 – Sealing edge

2 – Extension piece, part no. 420-23628-1

6.5 Accessories

6.5.1 Cap screws for metering devices with 1 outlet per adjusting sleeve

Series	Thread	Part no.
VSG, VSL	G1/4	303-17526-2

6.5.2 Metering screws for KD and D variants

Series	Volume cm ³ /stroke	Part no.
VSG	0.55	303-17505-1
	1.10	303-17506-1
	1.65	303-17507-1
	2.20	303-17508-1
VSL	1.25	303-17509-1
	2.50	303-17510-1
	3.75	303-17511-1
	5.00	303-17512-1

6.5.3 Extension piece for straight screw-in fittings

Series	Extension piece	Part no.
VSG	G 1/4A to G 1/4	420-22139-1
VSL	G 1/4A to G 1/4	420-22140-1

6.5.4 Elastic spacers

Series	Thread	Spacer	Part no.
VSG, VSL	Ø 9 mm	8.5 x 18 x 5	421-21288-1

6.5.5 Check valves for metering device outlets

Tube diameter	Designation	Part no.
6 mm	GERV 6 - S G 1/4AVC	223-13052-1
8 mm	GERV 8 - L G 1/4 AVC	223-13052-2
10 mm	GERV 10-L G 1/4AVC	223-13052-3

7. Start-up

In order to warrant safety and function, a person assigned by the operator must carry out the following inspections. Immediately eliminate detected deficiencies. Deficiencies may be remedied by an authorized and qualified specialist only.

		Start-up check list	
7.1 Inspections prior to commissioning		YES	NO
Mechanical connections carried out correctly		<input type="checkbox"/>	<input type="checkbox"/>
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data		<input type="checkbox"/>	<input type="checkbox"/>
All components, such as lubrication lines and metering devices, have been correctly installed		<input type="checkbox"/>	<input type="checkbox"/>
Product protected with adequate pressure control valve		<input type="checkbox"/>	<input type="checkbox"/>
No visible damage, contamination and corrosion		<input type="checkbox"/>	<input type="checkbox"/>
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function		<input type="checkbox"/>	<input type="checkbox"/>
Indicator pin with visual indication mounted visibly		<input type="checkbox"/>	<input type="checkbox"/>
7.2 Inspections prior to commissioning			
No unusual noises, vibrations, accumulation of moisture, or odours present		<input type="checkbox"/>	<input type="checkbox"/>
No unwanted escape of lubricant (leakages) from connections		<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is supplied free from bubbles		<input type="checkbox"/>	<input type="checkbox"/>
Bearings and friction points are provided with the planned amount of lubricant		<input type="checkbox"/>	<input type="checkbox"/>
Tightness tested		<input type="checkbox"/>	<input type="checkbox"/>

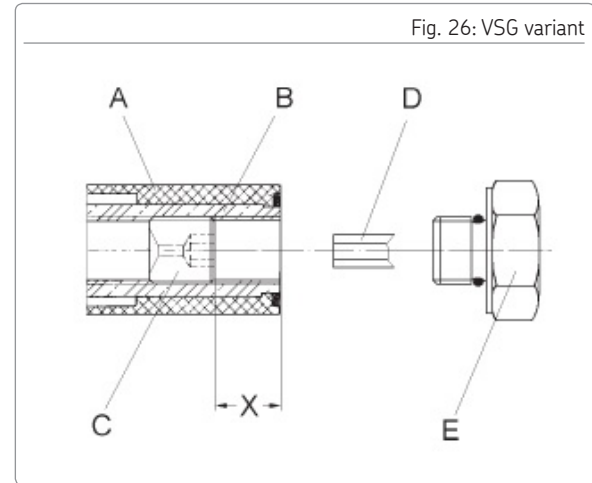
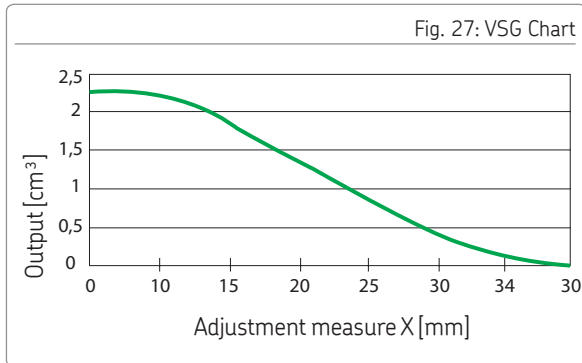
7.3 Adjusting the output volume

7.3.1 VSG variant

- Adjust the output volume only with the lubrication system being depressurized.
- When removing the closure cap the protective sleeve remains in its position.
- Factory setting:
Output volume $Q_{\max} = 2.3 \text{ cm}^3/\text{stroke}$

Adjusting the output volume:

- Remove closure screw.
- Adjust the output volume by turning the adjusting screw.
- 1 revolution = Output modified by 0.1 cm^3



A: Protective sleeve

B: Adjusting sleeve

C: Adjusting screw

D: Allen key AF 5

E: Closure screw

X: Adjustment measure

7. Start-up

7.3.2 VSG-KR variant for infinitely variable adjustment and visual function control

Infinite adjustment of the output volume is possible via the adjusting screw (8-2). Full output is achieved, if the adjusting screw is in its upper end position.

The more the adjusting screw is screwed in, the smaller will be the output.

Visual function control of respectively two outlets is effected via the indicator pin (8-3) which is firmly connected to the supply piston.

The movement of the indicator pin indicates that the metering device supplies lubricant.

Having set the output, the adjusting screw (8-2) is locked by means of the counter screw (8-1).



To save the adjustment, lock only with the indicator pin being retracted.

Fig. 28: Adjustment of the output (VSG metering devices)

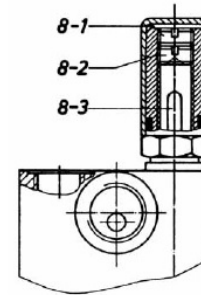
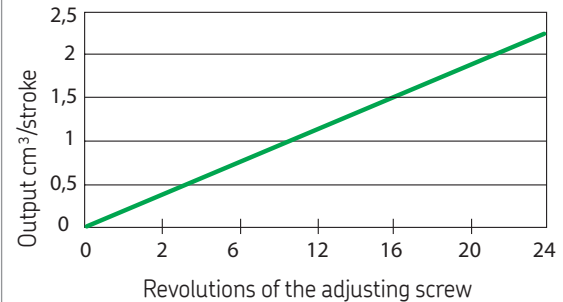


Fig. 29: Output diagram VSG-KR



7.3.3 D and KD variants for graduated adjustment of the output

All metering devices of the VS series can be supplied with metering screws as version D (Fig. 31) or with metering screws and indicator pin for visual function control as version KD (Fig. 32).

The exchangeable metering screws limit the stroke of the supply piston. The longer the metering screw, the lower is the output volume.

For each series there are available four metering screws that have to be ordered in case of need.

Unless stated otherwise in the order, the metering devices are supplied with metering screws for maximum supply.

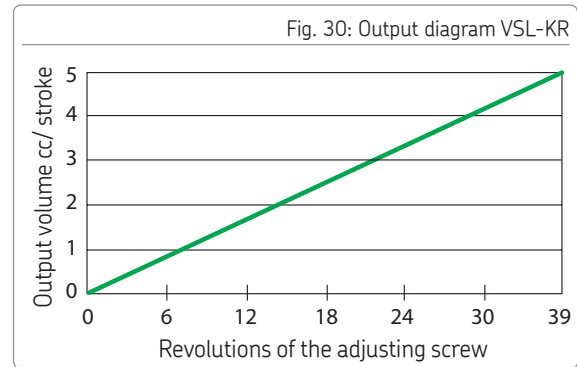


Fig. 31: D variant

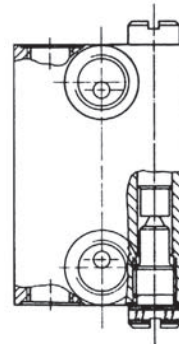
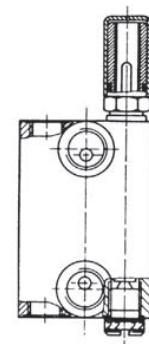


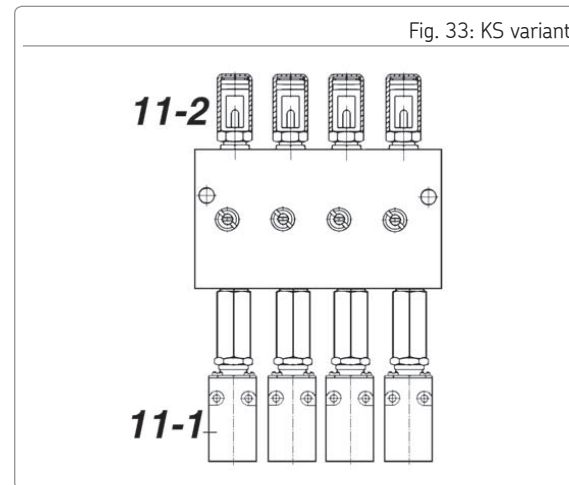
Fig. 32: KD variant



7.3.4 KS variant for visual function control and limit switch

For remote monitoring of the function of respectively two outlets the metering devices of the VSG and VSL series are available with limit switches (11-1). The stroke movement of the supply pistons is transmitted to the limit switches.

As the metering devices with attached limit switches also have the visual indication (11-2) described under Fig. 33, in case of a fault the non-functioning outlet pair of the metering device can be detected easily.

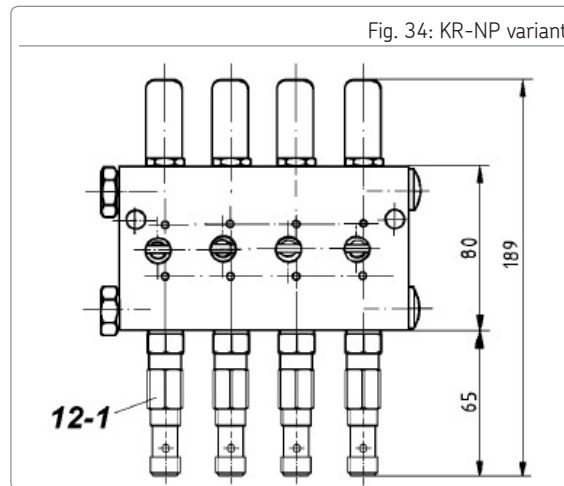


7.3.5 KR-NP variant

The VSG metering devices are available with a piston detector (12-1) for electronic monitoring.

The proximity switch is actuated without wear and contact directly via the respective working piston.

For this variant the minimum output is 0.4 cm^3 .

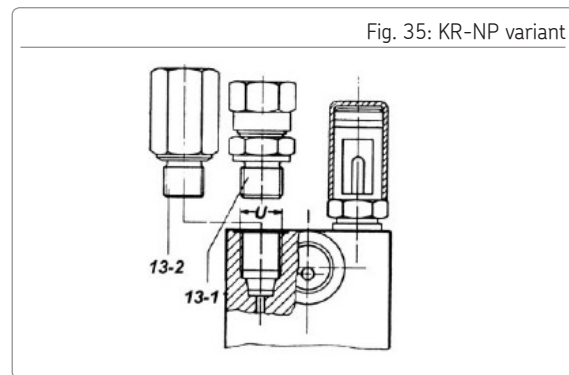


For lubrication lines of any diameter there are Screw-in fittings with cutting ring (13-1) are available for lubrication lines of any diameter. Extension pieces (13-2) are available for unfavourable mounting conditions.

7.3.6 Check valves for VS metering devices

In case of increased back pressures, the installation of check valves into the metering device outlets is recommended (see chapter 6.5.5).

Increased back pressures occur e.g. in case of downstream progressive metering devices.



7. Start-up

7.4 Cross-porting of outlets (lubricant metering device type types VSG, VSL)

- By cross-porting, it is achieved that the double lubricant volume is supplied via only one outlet of a pair of outlets.
Fig. 36 shows stage 2 and Fig. 37 shows stage 4 in case of a supply via the lower outlet only. In the VSG series as well as in the VSL series, all types have a lockable rotary slide valve for each pair of outlets.
- When the main lines are relieved (Fig. 38) (i.e. when the pump is switched off), the counter screw can be loosened and the rotary slide valve be rotated by 90°. In position A of the rotary slide valve, the connection channel between the two outlets is blocked and the supply takes place via both outlets. In position B the connection channel is open.
If one of the two outlets is closed with a cap screw, then double supply takes place via the other outlet.

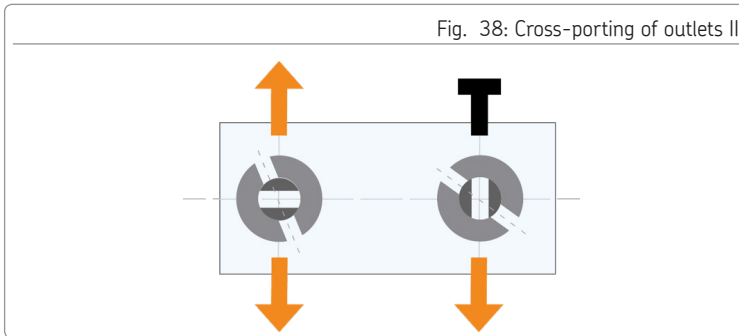


Fig. 36: Cross-porting of outlets I

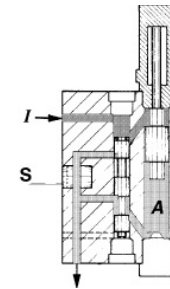
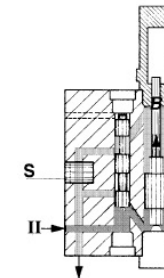


Fig. 37: Cross-porting of outlets II





8. Operation

SKF products operate automatically to the greatest possible extent.

Basically, activities during standard operation are limited to the function control of the metering devices.

9. Cleaning

	 WARNING
	<p>Electric shock</p> <p>Carry out cleaning works only on depressurized products that have been disconnected from the power supply. Do not touch cables or electrical components with wet or damp hands.</p> <p>Use steam-jet cleaners or high-pressure cleaners only in accordance with the degree of protection of the pump. Otherwise electrical components may be damaged.</p> <p>Performance of cleaning, required personal protective equipment, cleaning agents and devices following the valid operational regulations of the operator.</p>

9.1 Cleaning agents

Cleaning agents compatible with the material may be used only. (Materials, see chapter 2.3).



Thoroughly remove residues of cleaning agents from the product and rinse off with clear water.

9.2 Exterior cleaning

- Mark and secure wet areas
- Keep unauthorized persons away
- Thorough cleaning of all outer surfaces with a damp cloth
- Clean protective caps
- Thorough cleaning of dusty magnetic deposits

9.3 Interior cleaning

Normally, interior cleaning is not required. Should incorrect or contaminated lubricant have been filled, inside cleaning of the product will be required.

To do so, contact the SKF Customer Service.

10. Maintenance

Regular and appropriate maintenance is a prerequisite to detect and clear faults in time. The specific timelines have to be determined, verified at regular intervals and adapted, if necessary, by the operator based on the operating conditions. If needed, copy the table for regular maintenance activities.

Maintenance check list		
Activity to be done	YES	NO
Mechanical connections carried out correctly	<input type="checkbox"/>	<input type="checkbox"/>
All components, such as lubrication lines and metering devices, have been correctly installed	<input type="checkbox"/>	<input type="checkbox"/>
No visible damage, contamination and corrosion	<input type="checkbox"/>	<input type="checkbox"/>
No unusual noises, vibrations, accumulation of moisture, or odours present	<input type="checkbox"/>	<input type="checkbox"/>
No unwanted escape of lubricant (leakages) from connections	<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is supplied free from bubbles	<input type="checkbox"/>	<input type="checkbox"/>
Bearings and friction points are provided with the planned amount of lubricant	<input type="checkbox"/>	<input type="checkbox"/>
Check adjusting sleeve, indicator ring, protective sleeve and O-rings for damage	<input type="checkbox"/>	<input type="checkbox"/>

11. Troubleshooting







In addition to the indications regarding troubleshooting stated here, observe all indications regarding troubleshooting stated in the lubrication pump instructions. To check the individual outlets you may have to run the lubrication pump for a longer period of time as the single outlets are provided with lubricant one after the other and thus there may be required several cycles of the upstream metering device. If the fault cannot be determined and remedied, contact our Customer Service.

Fault table 1

Fault	Possible cause	Remedy
Metering device does not supply	Metering device is blocked	Replace component
	Pump is defective / pump is in the pause time	
	Change-over device is defective	
	Main-line is interrupted	
	Piston is worn	
	Blockade in the bearing or malfunction in the dual-line system, e.g. Pump does not supply, line interruption.	Check bearing point and dual-line system.
	Blockade in the metering device or in the line system.	Adjusting screw set to an output of 0 cm ³
		Verify setting of the adjustment screw.

12. Repairs

Repairs must be carried out by authorized and instructed persons only who are familiar with the repair prescriptions.

 WARNING	
	Risk of injury
	Before carrying out any repair work, take at least the following safety measures:
	<ul style="list-style-type: none">○ Keep unauthorized persons away○ Mark and secure work area○ De-pressurize the product
	<ul style="list-style-type: none">○ Disconnect the product from the power supply and secure it against being switched on○ Verify that no power is being applied○ Earth and short-circuit the product○ Where needed, cover neighbouring units that are live

13. Shutdown and disposal

13.1 Temporary shutdown

Temporarily shut the system down by:

- Switching off the superior machine

13.2 Final shutdown and disassembly

The final shutdown and disassembly of the product must be planned and carried out by the operator in a professional manner and in compliance with all regulations to be observed.

13.3 Disposal

Countries within the European Union

Disposal should be avoided or minimized wherever possible. Disposal of products contaminated with lubricant must be effected via licensed waste disposal contractor in accordance with environmental requirements and waste disposal regulations as well as local authority requirements.



The specific classification of the waste is in the waste producer's responsibility, as the European Waste Catalogue provides different waste disposal codes for the same type of waste but of different origin.

Plastic or metal parts

can be disposed of with the commercial waste.

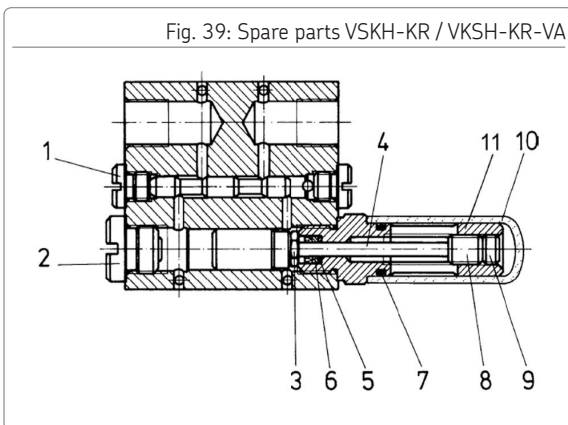
Electrical components have to be disposed of or recycled following WEEE directive 2012/19/EU.

Countries outside the European Union

The disposal has to be done according to the valid national regulations and laws of the country where the product is used.

14. Spare parts

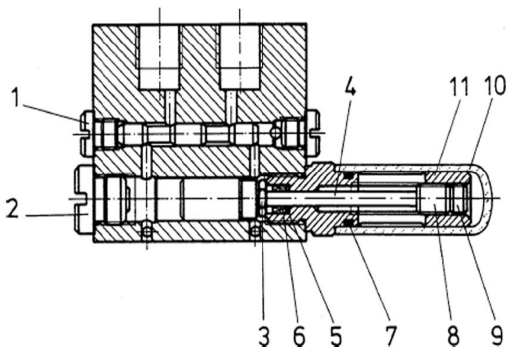
Fig. 39: Spare parts VSKH-KR / VKSH-KR-VA



14.1 Spare parts VSKH-KR / VKSH-KR-VA

Item	Designation	Part no. (KR)	Part no. (KR-VA)
1	Closure screw	303-19327-1	303-19327-1
2	Closure screw	303-19326-1	303-19326-1
3	Fixing screw	420-22351-3	420-22351-3
4	Pin with snap ring	520-32066-1	520-32066-1
5	Support disc	420-24127-1	420-24127-1
6	Standard grooved ring	220-12512-4	220-12512-4
	FKM grooved ring	220-13735-2	220-13735-2
7	O-ring	219-12223-4	219-12223-4
8	Threaded pin	204-12538-3	204-12538-3
9	Threaded pin	204-12111-3	204-12111-3
10	Protective cap	420-23569-1	420-23569-1
11	Adjusting sleeve, mounted with items 5, 6, 7		
	With polyurethane grooved ring	520-30828-1	520-30880-1
	with FKM grooved ring (KR, FKM)	520-31887-1	520-32031-1
	Adjusting sleeve assy. mounted with items 11, 8, 9, 10		
	with polyurethane grooved ring	520-36076-9	520-36700-1
	with FKM grooved ring (KR, FKM)	520-36700-3	520-36700-8

Fig. 40: Spare parts VSKV-KR / VKSV-KR-VA

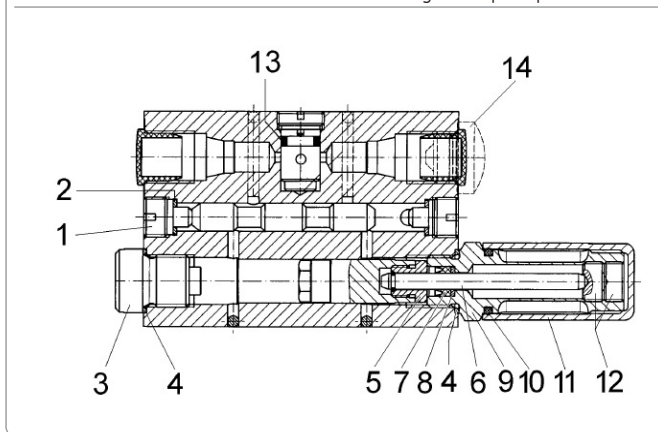


14.2 Spare parts VSKV-KR / VKSV-KR-VA

Item	Designation	Part no. (KR)	Part no. (KR-VA)
1	Closure screw	303-19327-1	303-19327-1
2	Closure screw	303-19326-1	303-19326-1
3	Fixing screw	420-22351-3	420-22351-3
4	Pin	301-17351-4	301-17351-4
5	Support disc	*	*
6	Grooved ring	*	*
7	O-ring	219-12223-4	219-12223-4
8	Threaded pin	204-12538-3	204-12538-3
9	Threaded pin	204-12111-3	204-12111-3
10	Protective cap	420-23569-1	420-23569-1
11	Adjusting sleeve (1.4305), mounted with items 5, 6, 7		
	with polyurethane grooved ring	520-30828-1	520-30880-1
	with FKM grooved ring	520-31887-1	520-32031-1
	Adjusting sleeve assy. (1.4305) mounted with items 11, 8, 9, 10		
	with polyurethane grooved ring	520-36076-9	520-36700-1
	with FKM grooved ring	520-36700-3	520-36700-8

* not available as spare part, included in item 11.

Fig. 41: Spare parts VSG-KR

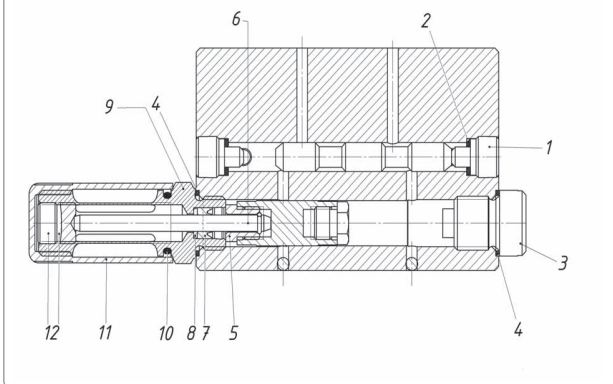


14.3 Spare parts VSG-KR

Item	Designation	Part no.
1	Cap screw M10 x 1	303-17404-1
2	Copper sealing ring 5 x 9 x 1	209-12158-8
3	Cap screw R1/4"	303-17515-1
4	Copper sealing ring 13.5 x 16 x 1	306-17827-1
5	Fixing screw M8 x 1	420-22350-1
6	Indicator pin assy.	520-32066-1
7	AU grooved ring 4 x 5 x 4 x 1.3 (standard)	220-12512-4
	FKM grooved ring 4 x 7.5 x 3 (high temperature)	220-13735-2
8	Support disc	420-24127-1
9*	Adjusting sleeve with AU grooved ring (standard)	520-31488-2
	Adjusting sleeve with FKM grooved ring	520-31899-2
10	O-ring 12 x 2	219-12223-5
11	Protective cap	420-24818-1
12	Threaded ring M10 x 1	303-17552-2
13	O-ring 6 x 2	219-12451-5
14	Closure screw	303-17526-2
	Adjusting sleeve assy. AU (items 4 + 9 + 11 + 2x12)	520-34011-1
	Adjusting sleeve assy. FKM (items 7 + 9)	520-34011-2

* including item 10 (O-ring 12 x 2)

Fig. 42: Spare parts VSG-KR-FL

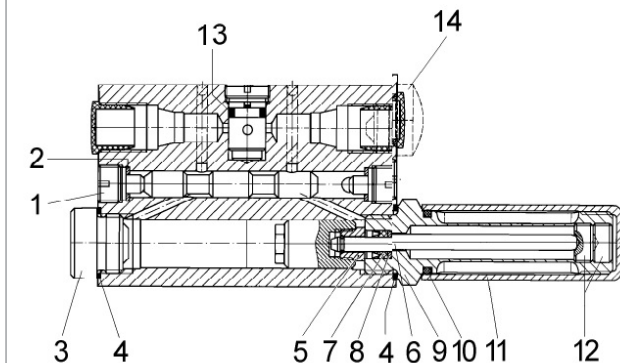


14.4 Spare parts VSG-KR-FL

Item	Designation	Part no.
1	Cap screw M10 x 1	303-17404-1
2	Copper sealing ring 5 x 9 x 1	209-12158-8
3	Cap screw R1/4"	303-17515-1
4	Copper sealing ring 13.5 x 16 x 1	306-17827-1
5	Fixing screw M8 x 1	420-22350-1
6	Indicator pin assy.	520-32066-1
7	AU grooved ring 4 x 5 x 4 x 1.3 (standard)	220-12512-4
	FKM grooved ring 4 x 7,5 x 3 (high temperature)	220-13735-2
8	Support disc	420-24127-1
9*	Adjusting sleeve with AU grooved ring (standard)	520-31488-2
	Adjusting sleeve with FKM grooved ring	520-31899-2
10	O-ring 12 x 2	219-12223-5
11	Protective cap	420-24818-1
	Adjusting sleeve assy. AU (items 7 + 9)	520-34011-1
	Adjusting sleeve assy. FKM (items 7 + 9)	520-34011-2
12	Threaded ring M10 x 1	303-17552-2

* including item 10 (O-ring 12 x 2)

Fig. 43: Spare parts VSL-KR

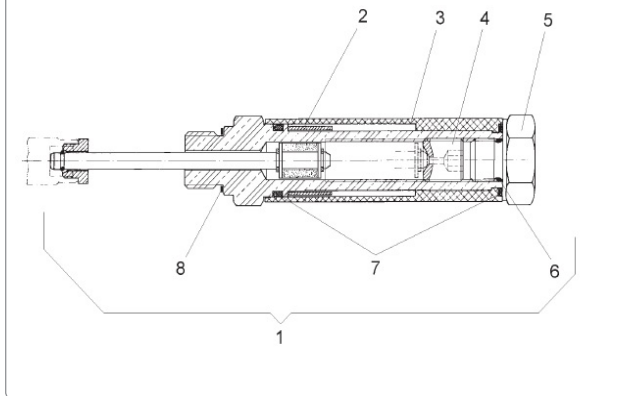


14.5 Spare parts VSL-KR

Item	Designation	Part no.
1	Cap screw M10 x 1	303-17404-1
2	Copper sealing ring 5 x 9 x 1	209-12158-8
3	Cap screw M16 x 1.5	303-17514-1
4	Copper sealing ring 16 x 19 x 1	306-18754-1
5	Fixing screw M8 x 1	420-22350-1
6	Indicator pin assy.	520-32065-1
7	AU grooved ring 4 x 5 x 4 x 1.3 (standard)	220-12512-4
	FKM grooved ring 4 x 7,5 x 3 (high temperature)	220-13735-2
8	Support disc	420-24127-1
9*	Adjusting sleeve with AU grooved ring (standard)	520-31487-2
	Adjusting sleeve with FKM grooved ring	520-31898-2
10	O-ring 12 x 2	219-12223-5
11	Protective cap	420-22136-2
12	Threaded ring M10 x 1	303-17552-2
13	O-ring 6 x 2	219-12451-5
14	Closure screw	303-17526-2
	Adjusting sleeve assy. AU (items 4 + 9 + 11 + 2x12)	520-34011-4
	Adjusting sleeve assy. FKM (items 7 + 9)	520-34011-5

* including item 10 (O-ring 12 x 2)

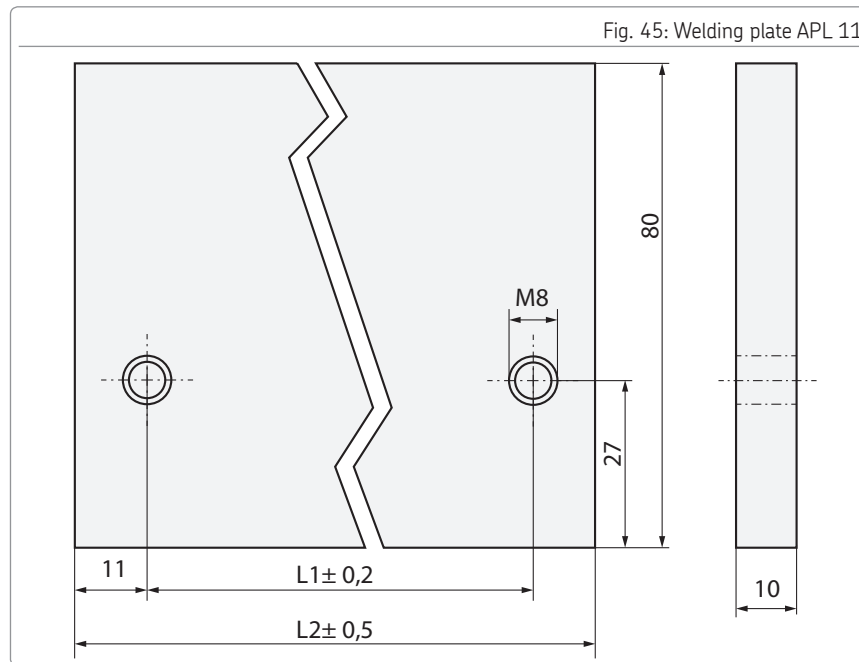
Fig. 44: Spare parts magnetically operated function indicator



14.6 Spare parts magnetically operated function indicator

Item	Designation	Units	Part no.
1	Adjusting sleeve, REP VSG-MR	1	520-32069-1
2	Indicator ring	1	420-24184-1
3	Protective sleeve	1	420-24360-1
4	Regulating screw	1	420-24192-1
5	Cap screw M10 x 1	1	303-19665-1
6	O-ring 7 x 1.5	1	219-12222-4
7	O-ring 13 x 1.5	2	219-14138-3
8	Copper sealing ring 13.5 x 16 x 1	1	306-17827-1

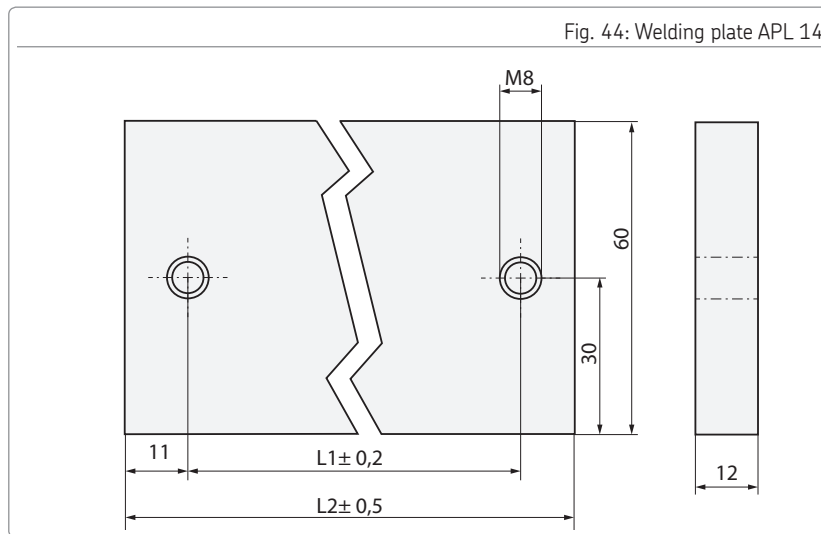
14.7 Welding plate APL 11



Materials: 1.0037

30.5	52	APL11 Welding plate VSG2, VSL2	432-21791-1
62	84	APL11 Welding plate VSG4, VSL4	432-21792-1
94	116	APL11 Welding plate VSG6, VSL6	432-21793-1
125.8	14.8	APL11 Welding plate VSG8, VSL8	432-21794-1

14.8 Welding plate APL 14



Materials: 1.0037			
36	58	APL14 Welding plate VSKH/V 2	432-23698-1
64	86	APL14 Welding plate VSKH/V 4	432-23699-1
92	114	APL14 Welding plate VSKH/V 6	432-23700-1
120	142	APL14 Welding plate VSKH/V 8	432-23701-1
147	169	APL14 Welding plate VSKH/V 10	432-72598-1
174	196	APL14 Welding plate VSKH/V 12	432-72599-1
201	223	APL14 Welding plate VSKH/V 14	432-72600-1
208	250	APL14 Welding plate VSKH/V 16	432-72601-1

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