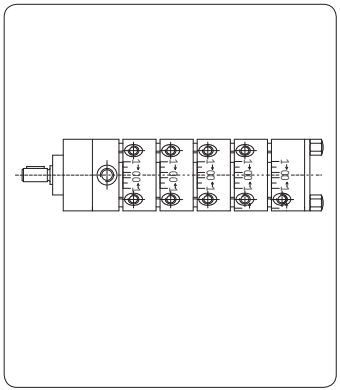
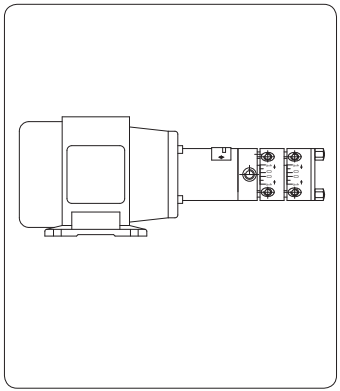
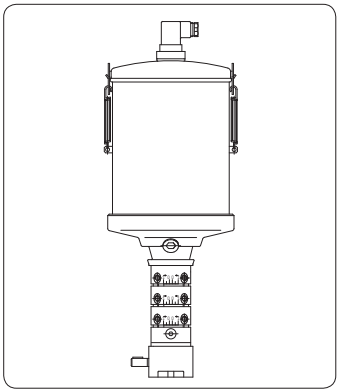
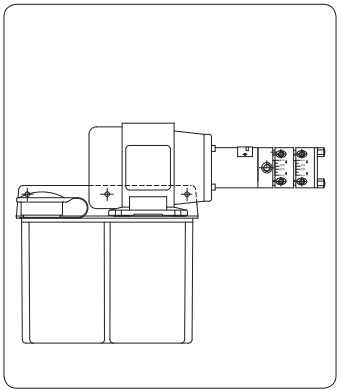
Multi-line pumps RA

for oils and greases

Assembly instructions acc. to EC Dir. 2006/42/EC
for partly completed machinery with associated operating instructions

EN

Version 1.0

Multi-line pump RA

Masthead
These original assembly instructions with associated operating instructions in accordance with EC Machinery Directive 2006/42/EC are an integral part of the described product and must be kept for future use.
These original assembly instructions with associated operating instructions have been prepared in accordance with the established standards and rules for technical documentation, VDI 4500 and EN 292.

Service

If you have technical questions, please contact the following offices:

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12277 Berlin
Germany
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Assembly instructions

Operating instructions

Information concerning EC Declaration of Conformity and EC Declaration of Incorporation

The product:
multi-line pump unit,

of the series: **RA**

is hereby confirmed to comply with the essential protection requirements stipulated by the following Directive(s) of the Council on the approximation of laws of the Member States:
○ Machinery Directive 2006/42/EC

Notes:

(a) This declaration certifies compliance with the aforementioned Directives, but does not constitute a guarantee of characteristics.
(b) The safety instructions in the documentation included with the product must be observed.
(c) The commissioning of the products here certified is prohibited until the machine, vehicle or similar in which the product is installed conforms with the provisions and requirements of the applicable Directives.
(d) The operation of the products at non-standard supply voltage, as well as non-adherence to the installation instructions, can negatively impact the EMC characteristics and electrical safety.

We further declare:

○ The aforementioned product is, according to EC Machinery Directive 2006/42/EC, Annex II Part B, designed for installation in machinery / for incorporation with other machinery to form a machine.
Within the scope of application of the EC Directive, commissioning shall be prohibited until the machinery in which this part is installed conforms with the provisions of this Directive.
○ The aforementioned product may, with reference to EC Directive 97/23/EC concerning pressure equipment, only be used in accordance with its intended use and in conformity with the instructions provided in the documentation.
The following must be observed in this regard:

The product is neither designed nor approved for use in conjunction with fluids of Group 1 (Dangerous Fluids) as defined in Article 2, Para. 2 of Directive 67/548/EEC of June 27, 1967.

The product is neither designed nor approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.
When used in conformity with their intended use, the products supplied by SKF Lubrication Systems Germany AG do not reach the limit values listed in Article 3, Para. 1, Clauses 1.1 to 1.3 and Para. 2 of Directive 97/23/EC. They are therefore not subject to the requirements of Annex 1 of the Directive. Consequently, they do not bear a CE marking in respect of Directive 97/23/EC. SKF Lubrication Systems Germany AG classifies them according to Article 3, Para. 3 of the Directive.
The Declaration of Conformity and Incorporation forms part of the product documentation and is supplied together with the product.

Explanation of safety and informational symbols and safety signal words

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions.
Please heed these instructions and proceed with special care in such cases. Please forward all safety instructions to other users.

Instructions attached directly to the machines/ grease lubrication pump units, such as
- rotational directional arrows and
- fluid connection labels,

must be followed. Replace such signs if the become illegible.

You are responsible!
Please read the assembly and operating instructions thoroughly and follow the safety instructions.

Hazard symbols

General hazard
DIN 4844-2-W000

Electrical voltage/current
DIN 4844-2-W008

Hot surface
DIN 4844-2-W026

Danger of being drawn into machinery
BGV 8A

Slip hazard
DIN 4844-2-W028

Warning of potentially explosive atmosphere
DIN 4844-2-W021

Safety signal words and their meaning

Signal word	Meaning
Danger!	Danger of bodily injury
Warning!	Danger of damage to property and the environment
Note!	Provides additional information

Informational symbols

Note

- Prompts an action
- Used for itemizing
- ➔ Points out other facts, causes, or consequences
- ☞ Provides additional information

Assembly instructions according to Machinery Directive 2006/42/EC, Annex VI

The assembly instructions fulfill the Machinery Directive indicated above with regard to partly completed machinery. Partly completed machinery, which includes the product described herein, is only intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment, thereby forming machinery to which the above-mentioned Directive applies.

1. Safety instructions

The operator of the described product must ensure that the assembly instructions are read and understood by all persons tasked with the assembly, operation, maintenance, and repair of the product. The assembly instructions must be kept readily available.

Note that the assembly instructions form part of the product and must accompany the product if sold to a new owner.

The described product is manufactured in accordance with the generally accepted rules and standards of industry practice and with occupational safety and accident prevention regulations. Risks may, however, arise from its usage and may result in physical harm to persons or damage to other material assets. Therefore the product may only be used in proper technical condition and in observance of the assembly instructions. In particular, any malfunctions which may affect safety must be remedied immediately.

In addition to the assembly instructions, statutory regulations and other general regulations for accident prevention and environmental protection must be observed and applied.

1.1 Intended use

Intended use is the use of the RA multi-line pump for the purpose of providing centralized lubrication.
The RA multi-line pump is constructed as a radial piston pump in a modular design. Up to five pump elements each with one, two, or four outlets can be “stacked” together. The displacement of the outlets is continuously variable (stepless adjustment) from outside.
The pump is suitable for use as a feed pump for circulating lubrication systems with low circulation rates (up to 30 cm3/min per outlet) or as a multi-circuit pump to supply multiple independent lubrication zones.
Its operating pressure is max. 63 bar, with up to 100 bar for short periods. The design of the RA multi-line pump permits it to pump both mineral-based and synthetic-based oils and greases. The use of synthetic oils requires prior approval from SKF Lubrication Systems.
Any other usage is deemed non-compliant with the intended use and could result in damage, malfunction, or even injury.
The use of synthetic oils requires prior approval from SKF Lubrication Systems.
Any other usage is deemed non-compliant with the intended use and could result in damage, malfunction, or even injury.

1.2 Authorized personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in the assembly instructions. Qualified technical personnel are persons who have been trained, assigned and instructed by the operator of the final product into which the described product is incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid any potential hazards.

The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.

1.3 Electric shock hazard

Electrical connections for the described product may only be established by qualified and trained personnel authorized to do so by the operator, and in observance of the local conditions for connections and local regulations (e.g., DIN, VDE). Serious injury or death and property damage may result from improperly connected products.

Danger!
Performing work on an energized pump or product may result in serious injury. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

1.4 System pressure hazard

Lubrication systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

1.5 Hydraulic pressure hazard

The described product is pressurized during operation. The product must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

1.6 Explosion protection information

Danger!
Only the pump models tested and approved by SKF Lubrication Systems in accordance with
ATEX Directive 94/9/EC are permitted to be used in areas with explosion protection. The relevant class of protection is engraved on the pump rating plate.

- When filling lubricant into the pump, make sure the lubricant is clean. The reservoir must be filled in good time (pay attention to fill level monitoring). The pump unit may only be filled via the filler socket. Lubricant may only be filled via the "reservoir cover" if absolutely certain that no potentially explosive atmosphere exists.
- In case of overfilling, the excessive amount of lubricant must be removed. Make sure there is no potentially explosive atmosphere when doing this.
- The switching circuits of the fill level monitor must be supplied by an intrinsically safe circuit, e.g., through the installation of an ATEX-compliant isolating switch by the customer. The unit must be grounded via a ground connection. The customer must install adequate overload protection for the power consumption of the motor.
- To avoid electrostatic discharge, lay hydraulic connecting lines in corrosion-resistant metal tubing, e.g., stainless steel pipe.
- When setting up the pump, make sure the setup location is level and not subject to vibrations or jolts.
- During maintenance work, use only tools intended for use in potentially explosive spaces or else make certain that there is no potentially explosive atmosphere present.
- The service life of the oil lubrication pump is limited. It must therefore undergo a function and leak test at regular intervals. Perform appropriate repairs in the event of malfunctions, leaks, or rust. Replace the pump if necessary.
- The user must make sure through the choice of the lubricant to be delivered that no chemical reactions capable of serving as ignition sources will occur in conjunction with the explosive atmospheres expected. The lubricant's ignition temperature has to be at least 50 Kelvin above the pump's maximum surface temperature (temperature class).

2. Lubricants

2.1 General information

All products from SKF Lubrication Systems may be used only for their intended purpose and in accordance with the information in the product's assembly instructions.

Intended use is the use of the products for the purpose of providing centralized lubrication/lubrication of bearings and friction points using lubricants within the physical usage limits which can be found in the documentation for the devices, e.g., assembly instructions/operating instructions and the product descriptions, e.g., technical drawings and catalogs.
Particular attention is called to the fact that hazardous materials of any kind, especially those materials classified as hazardous by EC Directive 67/548/EEC, Article 2, Para. 2, may only be filled into SKF centralized lubrication systems and components and delivered and/or distributed with such systems and components after consulting with and obtaining written approval from SKF Lubrication Systems.

No products manufactured by SKF Lubrication Systems are approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.
Other media which are neither lubricants nor hazardous substances may only be fed after consulting with and obtaining written approval from SKF Lubrication Systems.
SKF Lubrication Systems considers lubricants to be a component of the system design which must be factored into the selection of components and the design of centralized lubrication systems. The lubricating properties of the lubricants are critically important in making these selections.

2.2 Selection of lubricants

Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.

Warning!
The amount of lubricant required at a lubrication point is specified by the bearing or machine manufacturer. It must be ensured that the required quantity of lubricant is provided to the lubrication point. The lubrication point may otherwise not receive adequate lubrication, which can lead to damage and failure of the bearing.

The selection of a lubricant suitable for the lubrication task is made by the machine/system manufacturer and/or the operator of the machine/system in cooperation with the lubricant supplier.
When selecting a lubricant, the type of bearings/friction points, the expected load during operating, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.

If required, SKF Lubrication Systems can help customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

Please contact SKF Lubrication Systems if you have further questions regarding lubricants. Lubricants can be tested in the company's laboratory for their suitability for pumping in centralized lubrication systems (e.g., "bleeding"). You can request an overview of the lubricant tests offered by SKF Lubrication Systems from the company's Service department.

2.3 Approved lubricants

Only lubricants approved for the product may be used. Unsuitable lubricants can lead to failure of the product and damage to property.

Different lubricants must not be mixed, as mixing may result in damage and necessitate costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

The described product can be operated using lubricants that meet the specifications in the technical data. Depending on the product design, these lubricants may be oils, fluid greases, or greases.
Oils and base oils may be mineral, synthetic, and/or rapidly biodegradable. Consistency agents and additives may be added depending on the operating conditions.

Note that in rare cases, there may be lubricants whose properties are within permissible limit values but whose other characteristics render them unsuitable for use in centralized lubrication systems. For example, synthetic lubricants may be incompatible with elastomers.

2.4 Lubricants and the environment

Lubricants can contaminate soil and bodies of water. Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

It is important to note that lubricants are environmentally hazardous, flammable substances that require special precautionary measures during transport, storage, and processing. Consult the safety data sheet from the lubricant manufacturer.

for information regarding transport, storage, processing, and environmental hazards of the lubricant that will be used.
The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

2.5 Lubricant hazards

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, and repair of centralized lubrication systems. Leaks must be sealed without delay.

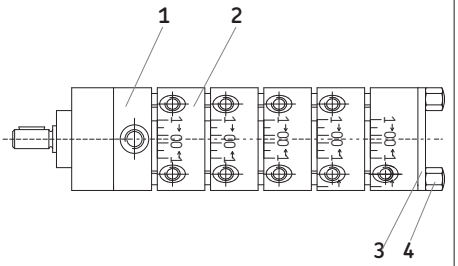
Lubricant leaking from centralized lubrication systems is a serious hazard. Leaking lubricant can create risks that may result in physical harm to persons or damage to other material assets.

Follow the safety instructions on the lubricant's safety data sheet.

Lubricants are hazardous substances. The safety instructions on the lubricant's safety data sheet must be strictly followed. The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

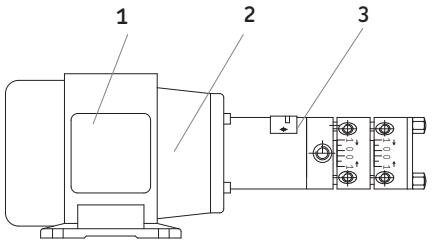
3. Overview

RA, rotary drive, coaxial



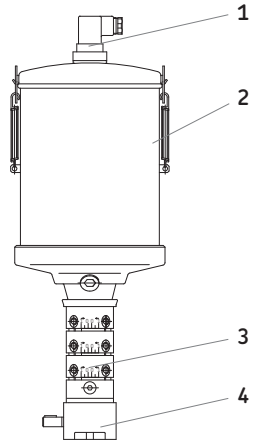
Item	Description
1	Initial section
2	Pump element
3	Sealing cap
4	Tie-rod with cap nut

RA, electric motor drive, coaxial



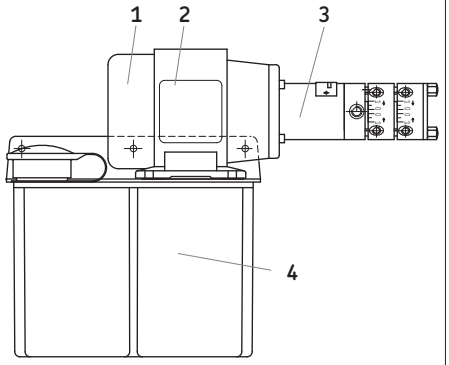
Item	Description
1	Terminal box
2	Electric motor
3	Radial piston pump

RA, rotary with bevel gear and grease reservoir



Item	Description
1	Fill level switch
2	Grease reservoir
3	Radial piston pump
4	Bevel gear

RA, electric motor drive with oil reservoir



Item	Description
1	Electric motor
2	Terminal box
3	Radial piston pump
4	Oil reservoir

4. Assembly

4.1 Setup and attachment

The product should 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. Make sure there is adequate air circulation to prevent the product from overheating. For the maximum permissible ambient temperature, see "Technical data."

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

- Existing supply lines must not be damaged by assembly work.
- 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 an adequate distance from sources of heat.
- Maintain safety clearances and comply with local regulations for assembly and accident prevention.
- Where there are great differences in the back pressures at the individual outlets, we recommend the use of screw unions with built-in check valve.

4.1.1 Assembly of the RA radial piston pump

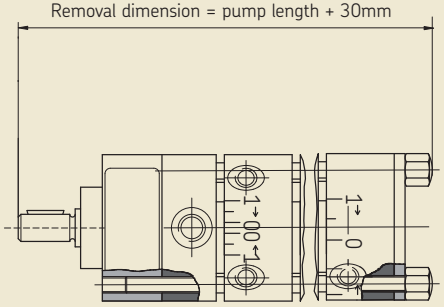
Install the pump on a flat surface or flange. The pump must not be under stress. Sufficient space must be provided during installation for later servicing and maintenance work.

Warning!
When drilling the assembly holes, you must be careful of any supply lines or other units, as well as of other hazards such as moving components.
Maintain safety clearances and comply with local regulations for assembly and accident prevention.

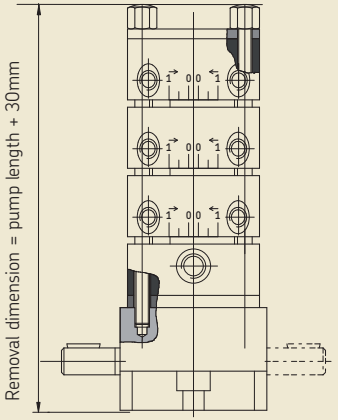
Warning!
The torque of the fastening screws depends on the customer's installation.

4.2 RA mounting position

RA, rotary drive, coaxial

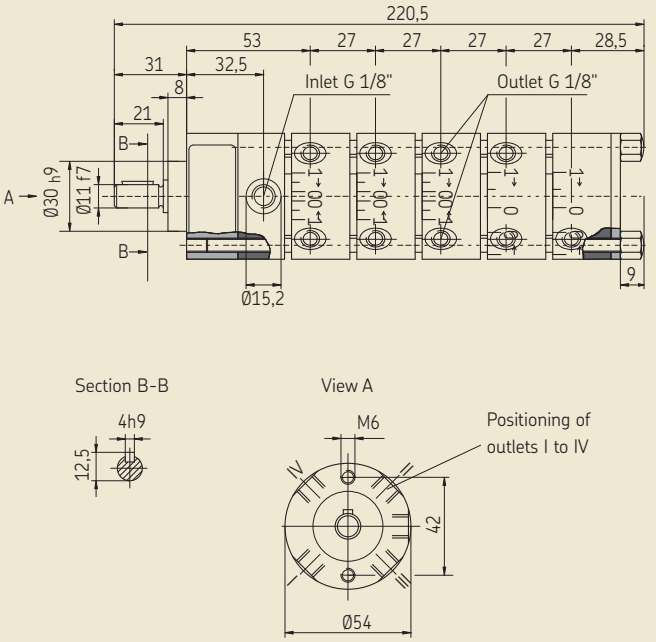


RA, rotary drive with bevel gear



4.2.1 Rotary drive, coaxial

RA, rotary drive, coaxial



Technical data

General

Mounting position	any
Ambient temperature	- 15 °C to +80 °C

Pump

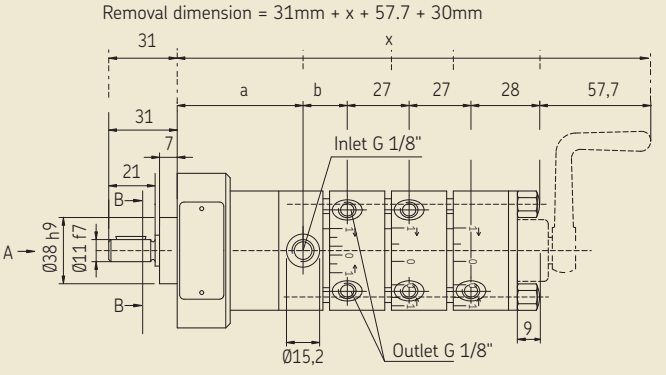
Type	radial piston pump
Operating pressure	63 bar [1])
Short-term pressure	100 bar
Number of stackable pump elements	max. 5
Outlet ports per pump element	1, 2 or 4
Displacement variability per pump element	continuously variable
Displacement per outlet and revolution of the pump shaft	max. 0.02 cm^3
Drive speed	10 to 1500 rpm
Direction of rotation	clockwise or counterclockwise (standard: clockwise)
Lubricant	mineral oils [2])
Lubricant temperature range	-15 °C to +80 °C
Operating viscosity	25 to 2500 mm^2/s
Suction head	500 mm
Intake tube inside diameter	≥ 4 mm

1) Max. operating pressure - see Figure 3 on page 45

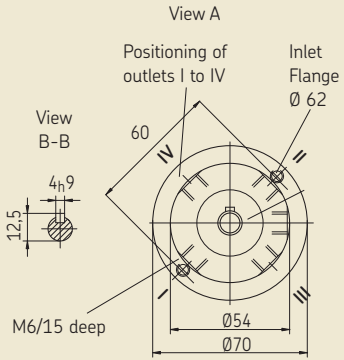
2) The use of synthetic oils requires consultation with SKF

4.2.2 Rotary drive with coaxial gear

RA, rotary drive with coaxial gear



a	b	Gear ratio
52.9	21	5:1
62.6	21	15:1
73.6	20.5	75:1
73	21	125:1



Drawing of a pump element with 4 outlets, with the outlets arranged at angles of 45° to each other

Technical data

General

Mounting position	any
Ambient temperature	-15 °C to +80 °C

Pump

Type	radial piston pump
Operating pressure	63 bar [1]
Short-term pressure	100 bar
Number of stackable pump elements	max. 5
Outlet ports per pump element	1, 2 or 4
Displacement variability per pump element	continuously variable
Displacement per outlet and revolution of the pump shaft	max. 0.02 cm^3
Drive speed	up to 3600 rpm
Direction of rotation	clockwise or counterclockwise (standard: clockwise)
Lubricant	mineral oils [2]
Lubricant temperature range	-15 °C to +80 °C
Operating viscosity	25 to 2500 mm^2/s
Suction head	500 mm
Intake tube inside diameter	≥ 4 mm

Coaxial gear

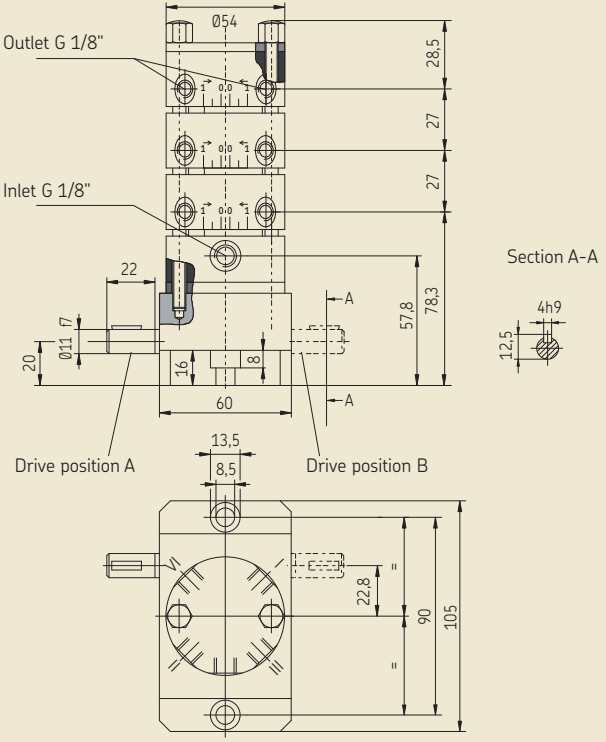
Ratio	5:1, 15:1, 25:1, 75:1, 125:1

1) = Max. operating pressure - see Figure 3 on page 45

2) The use of synthetic oils requires consultation with SKF

4.2.3 Rotary drive with bevel gear

RA, rotary drive with bevel gear



Technical data

General

Mounting position ..... any
Ambient temperature ..... -15 °C to +80 °C

Pump

Type ..... radial piston pump
Operating pressure ..... 63 bar [1])
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet and revolution of the pump shaft ..... max. 0.02 cm^3
Drive speed ..... 10 to 1500 rpm
Direction of rotation ..... clockwise or counterclockwise (standard: clockwise)
Lubricant ..... mineral oils [2])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity ..... 25 to 2500 mm^2/s
Suction head ..... 500 mm
Intake tube inside diameter ..... ≥ 4 mm

Bevel gear

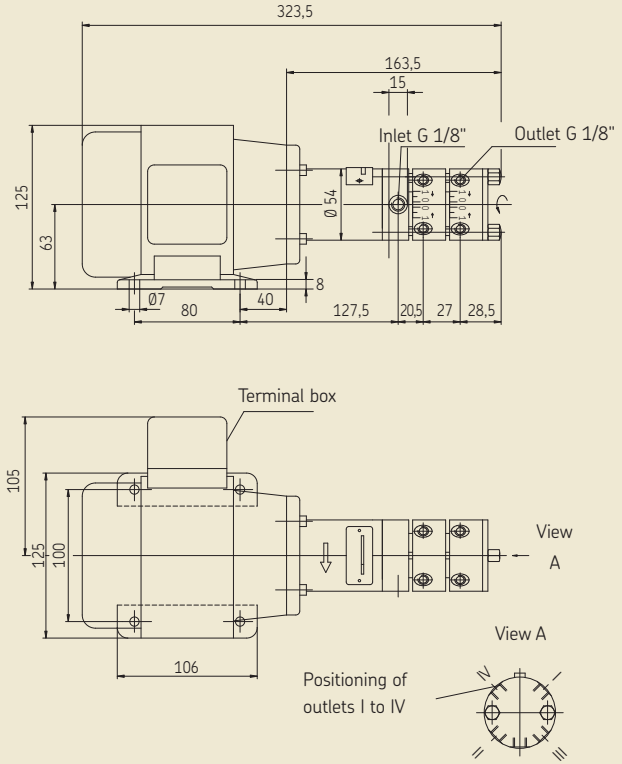
Ratio 10.5:1
Drive position ..... A or B

1) = Max. operating pressure - see Figure 3 on page 45

2) The use of synthetic oils requires consultation with SKF

4.2.4 RA, electric motor drive, coaxial

RA, electric motor drive, coaxial



Technical data

General

Mounting position	any
Ambient temperature	-15 °C to +60 °C

Pump

Type	radial piston pump
Operating pressure	63 bar [1])
Short-term pressure	100 bar
Number of stackable pump elements	max. 5
Outlet ports per pump element	1, 2 or 4
Displacement variability per pump element	continuously variable
Displacement per outlet and motor speed of 1500 rpm	27.2 cm^3/min)
Lubricant	mineral oils [2])
Lubricant temperature range	-15 °C to +80 °C
Operating viscosity	25 to 2500 mm^2/s
Suction head	500 mm
Intake tube inside diameter	≥ 4 mm

1) = Max. operating pressure - see Figure 3 on page 45
2) The use of synthetic oils requires consultation with SKF

4.2.4 RA, electric motor drive, coaxial

Technical data

Motor

Type/size . . . . . IM B34 / 63 C 90

Type of voltage . . . . . 3-phase AC voltage

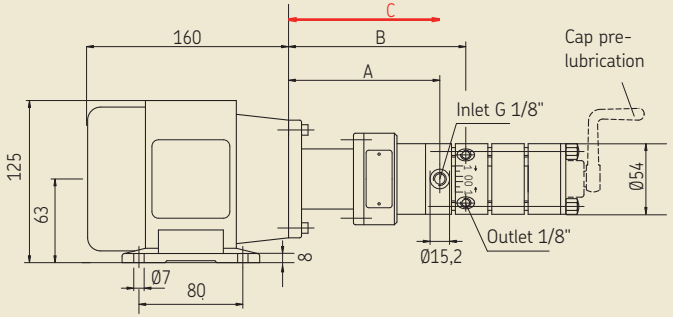
Rated speed [rpm]	**Frequency** [Hz]	**Rated output** [kW]	**Rated voltage** [V]	**Rated current** [A]	**Order code**
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/1.07	**AO**

Note

The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.5 RA, electric motor drive with coaxial gear

RA, electric motor drive with coaxial gear



Gear ratio	Dimensions mm		C with [..] pump elements mm				
	[A]	[B]	[1]	[2]	[3]	[4]	[5]
5:1	110.5	131.5	155	182	209	236	263
15:1	120.5	141.5	165	192	219	246	273
25:1	120.5	141.5	165	192	219	246	273
75:1	131	152	175	202	229	256	283
125:1	131	152	175	202	229	256	283

Technical data

General

Mounting position ..... any
Ambient temperature ..... -15 °C to +60 °C

Pump

Type ..... radial piston pump
Operating pressure ..... 63 bar [1])
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet and
motor speed of 1500 rpm ..... see table page 23
Lubricant ..... mineral oils [2])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity ..... 25 to 2500 mm^2/s
Suction head ..... 500 mm
Intake tube inside diameter ..... ≥ 4 mm

Coaxial gear

Ratio 5:1, 15:1, 25:1, 75:1, 125:1

1) = Max. operating pressure - see page 45
2) The use of synthetic oils requires consultation with SKF

Technical data

Motor

Type/size . . . . . IM B34 / 63 C 90
Type of voltage . . . . . 3-phase AC voltage

Rated speed [rpm]	**Frequency** [Hz]	**Rated output** [kW]	**Rated voltage** [V]	**Rated current** [A]	**Order code**
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/0.38	**AO**

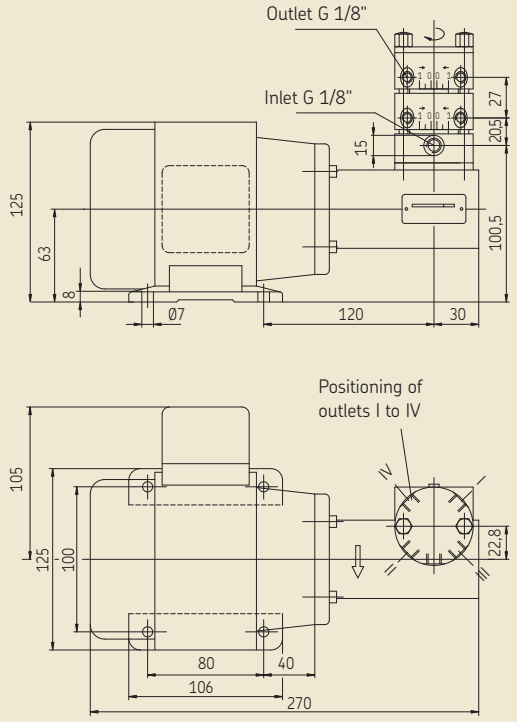
Displacement per outlet and pressure
at a motor speed of 1500 rpm

Gear ratio	**Displacement [cm^3/min.]**	**Max. delivery pressure [bar]**
5:1	Approx. 1.8 to approx. 5.44	63
15:1	Approx. 0.6 to approx. 1.81	63
25:1	Approx. 0.36 to approx. 1.09	50
75:1	Approx. 0.12 to approx. 0.36	20
125:1	Approx. 0.07 to approx. 0.21	10

Note
The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.6 RA, electric motor drive with bevel gear

RA, electric motor drive with bevel gear



Technical data

General

Mounting position ..... any
Ambient temperature ..... -15 °C to +60 °C

Pump

Type ..... radial piston pump
Operating pressure ..... 63 bar [1])
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet and
motor speed of 1500 rpm ..... 2.59 cm^3/min)
Lubricant ..... mineral oils [2])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity ..... 25 to 2500 mm^2/s
Suction head ..... 500 mm
Intake tube inside diameter ..... ≥ 4 mm

Bevel gear

Gear ratio 10.5:1

1) = Max. operating pressure - see page 45
2) The use of synthetic oils requires consultation with SKF

Technical data

Gearbox

Gear ratio 10.5:1

Motor

Type/size . . . . . IM B34 / 63 C 90

Type of voltage . . . . . 3-phase AC voltage

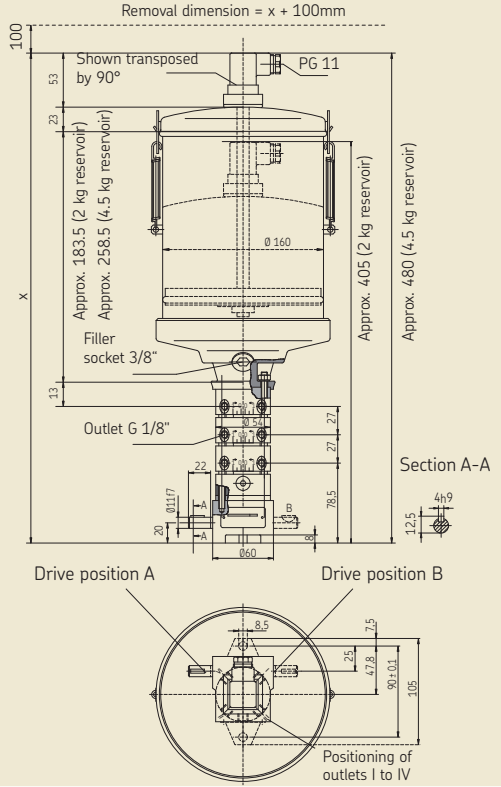
Rated speed [rpm]	**Frequency** [Hz]	**Rated output** [kW]	**Rated voltage** [V]	**Rated current** [A]	**Order code**
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/1.07	**AO**

Note

The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.7 RA, rotary drive with bevel gear and grease reservoir

RA, rotary drive with bevel gear and grease reservoir



Technical data

General

Grease reservoir capacity	2 or 4.5 kg
Mounting position	vertical
Ambient temperature	-15 °C to +80 °C
Filling	from above (through reservoir cover) or via filler socket
Fill level control	without/with fill level indicator

Pump

Type	radial piston pump
Operating pressure	63 bar
Short-term pressure	100 bar
Number of stackable pump elements	max. 3
Outlet ports per pump element	1, 2 or 4
Displacement variability per pump element	continuously variable
Displacement per outlet and revolution of the pump shaft	max. 0.02 cm^3
Drive speed range	100 to 1500 rpm
Direction of rotation	counterclockwise with drive position A; clockwise with drive position B
Lubricant	greases based on mineral oil [1])
Lubricant temperature range	-15 °C to +80 °C
Penetration as per NLGI	≤ 2

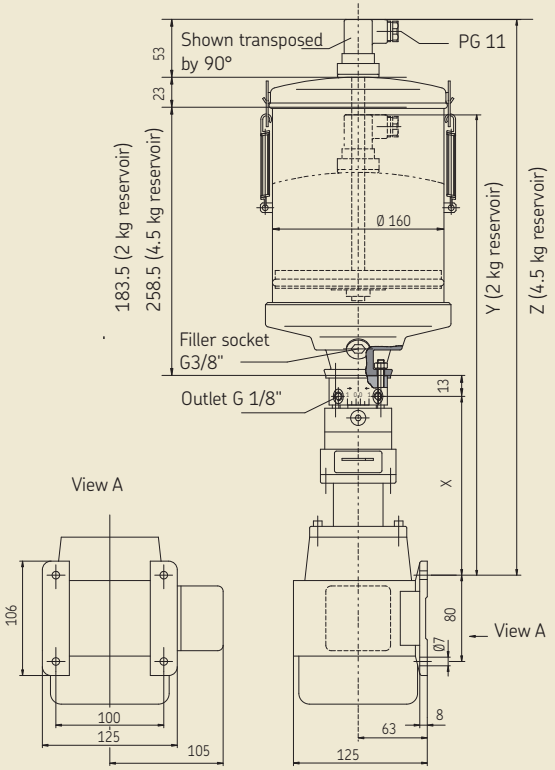
Bevel gear

Ratio	10.5:1
Drive position	A or B

1) The use of synthetic oils requires consultation with SKF

4.2.8 RA, rotary drive with coaxial gear and grease reservoir 2 kg; 4.5 kg

RA, electric motor drive with coaxial gear and grease reservoir



Gear ratio	[x] mm	[Y] mm	[Z] mm
5:1	171.5	444	519
15:1	181.5	454	529
25:1	181.5	454	529
75:1	192	464.5	539.5
125:1	192	464.5	539.5

Technical data

General

Grease reservoir capacity . . . . . 2 or 4.5 kg
Mounting position . . . . . vertical
Ambient temperature . . . . . -15 °C to +60 °C

Pump

Type . . . . . radial piston pump
Delivery pressure . . . . . 63 bar
Short-term pressure . . . . . 100 bar
Number of stackable pump elements . . . . . max. 1
Outlet ports per pump element . . . . . 1, 2 or 4
Displacement variability per pump element . . . . . continuously variable
Displacement per outlet and
motor speed of 1500 rpm . . . . . see table
Lubricant . . . . . greases based on mineral oil [1])
Lubricant temperature range . . . . . -15 °C to +80 °C
Penetration as per NLGI . . . . . ≤ 2

1) The use of synthetic oils requires consultation with SKF

Technical data

Gearbox

Gear ratio 5:1, 15:1, 25:1, 75:1, 125:1

Motor

Type/size . . . . . IM B34 / 63 C 90
Type of voltage . . . . . 3-phase AC voltage

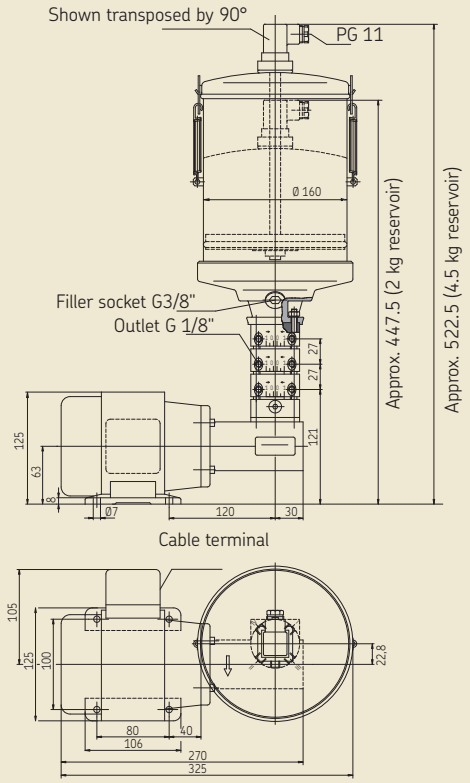
Rated speed [rpm]	**Frequency** [Hz]	**Rated output** [kW]	**Rated voltage** [V]	**Rated current** [A]	**Order code**
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/0.38	**AO**

Displacement per outlet and delivery pressure
at a motor speed of 1500 rpm

Gear ratio	**Displacement [cm³/min.]**	**Delivery pressure [max. bar]**
5:1	Approx. 1.63 to approx. 4.89	63
15:1	Approx. 0.54 to approx. 1.62	63
25:1	Approx. 0.32 to approx. 0.97	50
75:1	Approx. 0.10 to approx. 0.32	20
125:1	Approx. 0.06 to approx. 0.19	10

4.2.9 RA, electric motor drive with bevel gear and grease reservoir 2 kg; 4.5 kg

RA, electric motor drive with bevel gear and grease reservoir



Technical data

General

Grease reservoir capacity	2 or 4.5 kg
Mounting position	vertical
Ambient temperature	-15 °C to +60 °C
Filling	from above (through reservoir cover) or via filler socket
Fill level control	without/with fill level indicator

Pump

Type	radial piston pump
Operating pressure	63 bar
Short-term pressure	100 bar
Number of stackable pump elements	max. 3
Outlet ports per pump element	1, 2 or 4
Displacement variability per pump element	continuously variable
Displacement per outlet and motor speed of 1500 rpm	approx. 2.59 cm^3/min
Lubricant	greases based on mineral oil [1]
Lubricant temperature range	-15 °C to +80 °C
Penetration as per NLGI	≤ 2

1) The use of synthetic oils requires consultation with SKF

Technical data

Bevel gear

Ratio 10.5:1

Motor

Type/size . . . . . IM B34 / 63 C 90

Type of voltage . . . . . 3-phase AC voltage

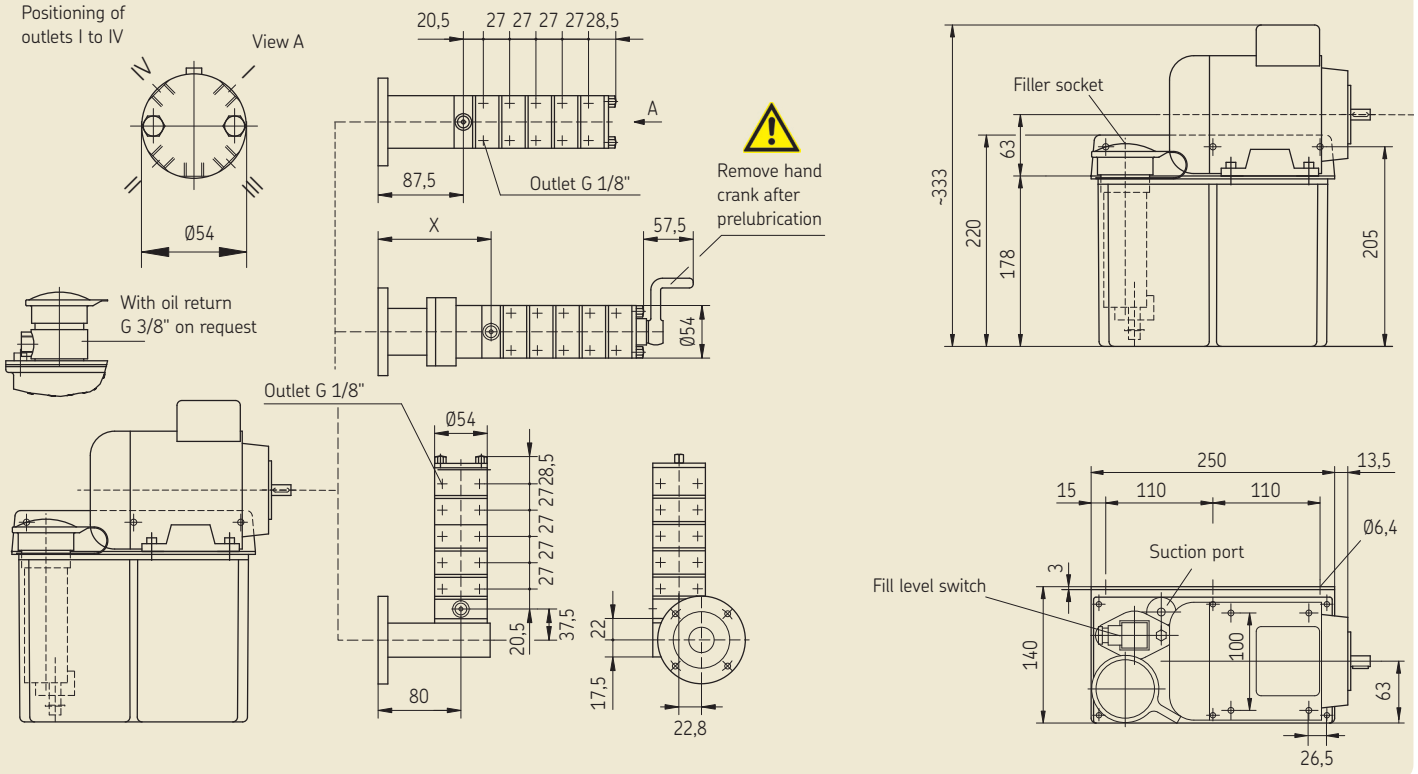
Rated speed [rpm]	**Frequency** [Hz]	**Rated output** [kW]	**Rated voltage** [V]	**Rated current** [A]	**Order code**
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/0.38	**AO**

Note

The motor specifications refer to three-phase motors from VEM.
There may be differences with motors from other manufacturers.
Observe the specifications on the rating plate.

4.2.10 RA, electric motor drive, with oil reservoir, 3 liters

RA, electric motor drive, with 3-liter oil reservoir



General

Mounting position	horizontal
Ambient temperature	- 15 °C to + 60 °C
Filling	via filler cap
Fill level control	without/with fill level indicator

Pump

Type ..... radial piston pump
Operating pressure ..... see table
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet ..... see table
Lubricant ..... mineral oil[1])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity. ..... 25 to 2500 mm^2/s

Gearbox

Gear ratio 1:1; 10.5:1; 5:1; 15:1; 25:1; 75:1; 125:1

Motor

Type/size ..... B3 / B14; 63 C 90
Type of voltage ..... 3-phase AC voltage

1) The use of synthetic oils requires consultation with SKF

Rated speed [rpm]	Frequency [Hz]	Rated output [kW]	Rated voltage [V]	Rated current [A]	Order code
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/1.07	**AO**

Table of dimensions for design, delivery rate and pressure

Gear ratio	Dimension X [mm]	Displacement per outlet [cm^3/min]	Delivery pressure [max. bar]
1:1	87.5	Approx. 27.2	63
5:1	110.5	Approx. 5.44	63
10.5:1	-	Approx. 2.59	63
15:1	120.5	Approx. 1.81	63
25:1	120.5	Approx. 1.09	50
75:1	131	Approx. 0.36	20
125:1	131	Approx. 0.22	10

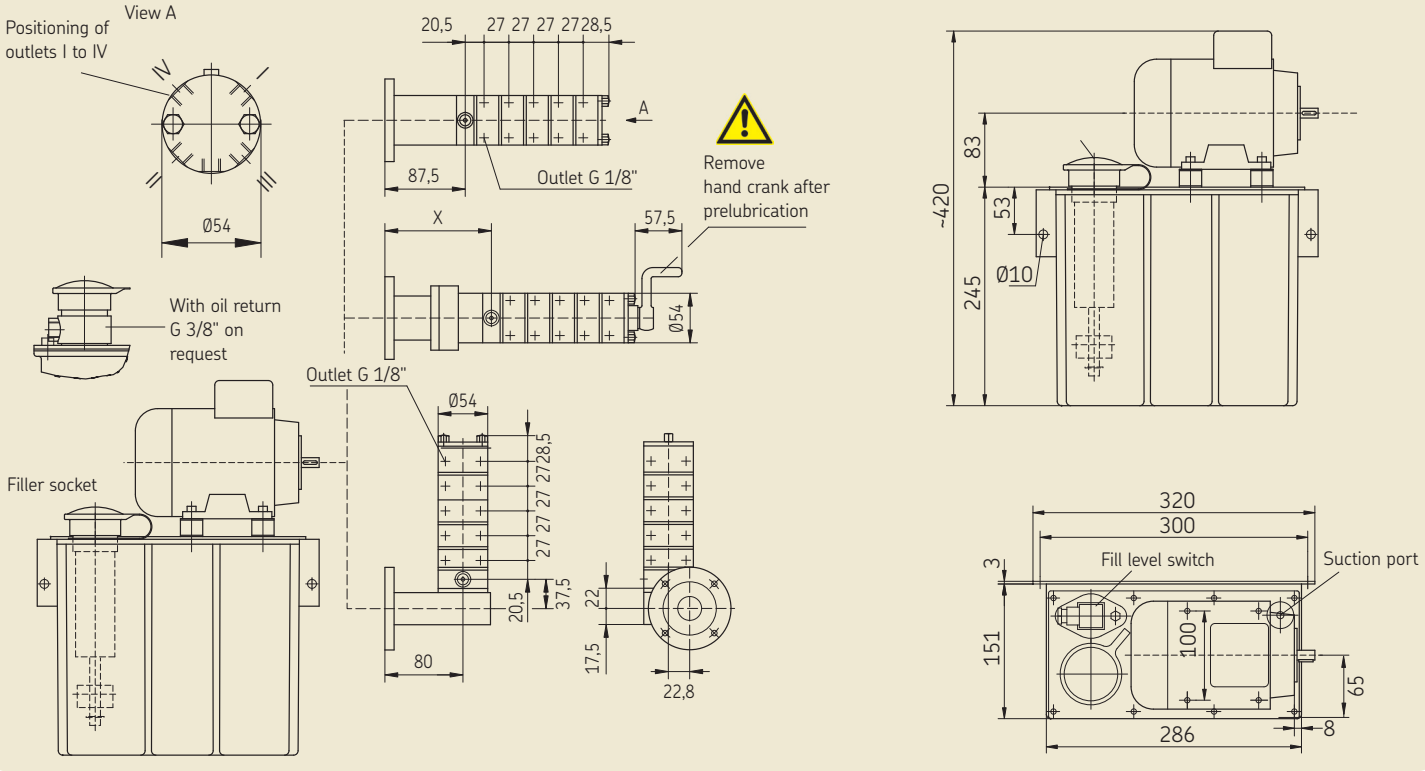
Reservoir

Design ..... 3-liter oil reservoir, polyamide, transparent

Note
The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.11 RA, electric motor drive, with oil reservoir, 7 liters

RA, electric motor drive, with 7-liter oil reservoir



General

Mounting position ..... horizontal
Ambient temperature ..... - 15 °C to + 60 °C
Filling.....via filler cap
Fill level control ..... without/with fill level indicator

Pump

Type ..... radial piston pump
Operating pressure ..... see table
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet ..... see table
Lubricant ..... mineral oil[1])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity..... 25 to 2500 mm^2/s

Gearbox

Gear ratio 1:1; 5:1; 10.5:1; 15:1; 25:1; 75:1; 125:1

Motor

Type/size ..... B3 / B14; 63 C 90
Type of voltage ..... 3-phase AC voltage

1) The use of synthetic oils requires consultation with SKF

Rated speed [rpm]	Frequency [Hz]	Rated output [kW]	Rated voltage [V]	Rated current [A]	Order code
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/1.07	**AO**

Table of dimensions for design, delivery rate and pressure

Gear ratio	Dimension X [mm]	Displacement per outlet [cm^3/min]	Delivery pressure [max. bar]
1:1	87.5	Approx. 27.2	63
5:1	110.5	Approx. 5.44	63
10.5:1	-	Approx. 2.59	63
15:1	120.5	Approx. 1.81	63
25:1	120.5	Approx. 1.09	50
75:1	131	Approx. 0.36	20
125:1	131	Approx. 0.22	10

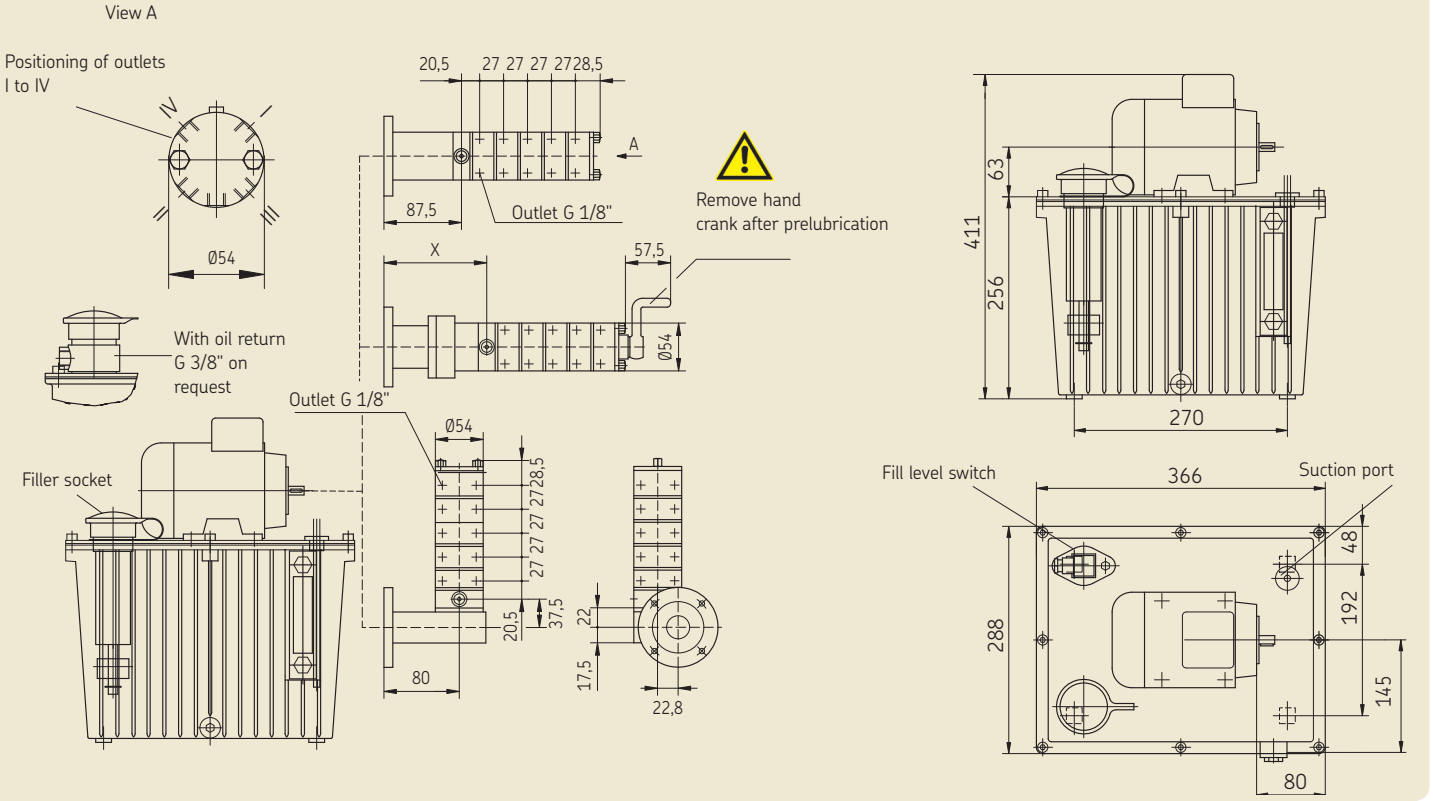
Reservoir

Design ..... 7-liter oil reservoir, polyamide, transparent

Note
The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.12 RA, electric motor drive, with oil reservoir, 15 liters

RA, electric motor drive, with 15-liter oil reservoir



General

Mounting position ..... horizontal
Ambient temperature ..... - 15 °C to + 60 °C
Filling..... via filler cap
Fill level control ..... without/with fill level indicator

Pump

Type ..... radial piston pump
Operating pressure ..... see table
Short-term pressure ..... 100 bar
Number of stackable pump elements ..... max. 5
Outlet ports per pump element ..... 1, 2 or 4
Displacement variability per pump element ..... continuously variable
Displacement per outlet ..... see table
Lubricant ..... mineral oil[1])
Lubricant temperature range ..... -15 °C to +80 °C
Operating viscosity..... 25 to 2500 mm^2/s

Gearbox

Gear ratio 1:1; 5:1; 10.5:1; 15:1; 25:1; 75:1; 125:1

Motor

Type/size ..... B3 / B14; 63 C 90
Type of voltage ..... 3-phase AC voltage

1) The use of synthetic oils requires consultation with SKF

Rated speed [rpm]	Frequency [Hz]	Rated output [kW]	Rated voltage [V]	Rated current [A]	Order code
1500	50	0.18	230/400	1.13/0.65	**AF**
1500	50	0.18	290/500	0.90/0.52	**AK**
1500	50	0.18	400/690	0.65/1.07	**AO**

Table of dimensions for design, delivery rate and pressure

Gear ratio	Dimension X [mm]	Displacement per outlet [cm^3/min]	Delivery pressure [max. bar]
1:1	87.5	Approx. 27.2	63
5:1	110.5	Approx. 5.44	63
10.5:1	-	Approx. 2.59	63
15:1	120.5	Approx. 1.81	63
25:1	120.5	Approx. 1.09	50
75:1	131	Approx. 0.36	20
125:1	131	Approx. 0.22	10

Reservoir

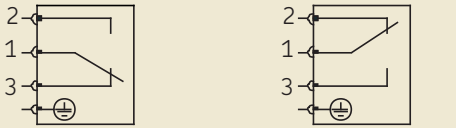
Design ..... 15-liter oil reservoir, aluminum

Note

The motor specifications refer to three-phase motors from VEM. There may be differences with motors from other manufacturers. Observe the specifications on the rating plate.

4.2.13 Fill level switches type E and type F for RA units with grease reservoir

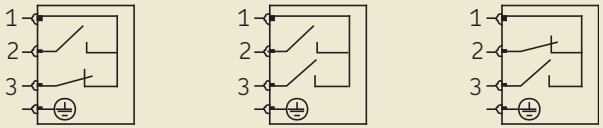
Fill level switch E



Switch position at minimum

Switch position above minimum

Wiring diagram for fill level switch F



Switch position at minimum

Switch position between minimum and maximum

Switch position at maximum

Fill level switch E

Design	reed contact
Switch design	1 switching point: min. (changeover)
Switching capacity, max.	60 W/VA
Switching voltage, max.	230 V AC/DC
Plug connection	DIN 43 650
Protection class of plug/socket	IP 65

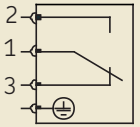
Fill level switch F

Design	reed contact
Switch design	2 switching points (min. - max.)
Switched current max.	1 A with AC/DC [1])
Switching voltage, max.	42 V AC/DC
Plug connection	DIN 43 650
Protection class of plug/socket	IP 65

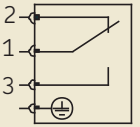
1) Provide spark quenching if there is inductive load

4.2.14 Fill level switch type V for RA units with oil reservoir

Wiring diagram for fill level switch V



Switch position at minimum



Switch position above minimum

Fill level switch V

Design . . . . . minimum monitoring
Contact voltage . . . . . 10 - 42 V AC, DC
Rated contact current 1A
Load contact . . . . . changeover (reed contact) [1])
Protection class IP65
Connection type . . . . . connector plug as per DIN 43 650

1) Other specification available on request

4.3 Electrical motor connection

Electric shock hazard
Electrical connections for the product may only be established by qualified and trained personnel authorized to do so by the operator.

The local conditions for connections and local regulations (e.g., DIN, VDE) must be observed. Serious injury or death and property damage may result from improperly connected products.

Warning!
Connect lines in accordance with the technical specifications and the local conditions for connections and local regulations (e.g., DIN, VDE).

Consult the motor's rating plate for the electrical characteristics of the motor, such as rated power, rated voltage, and rated current. Observe the guidelines in EN 60034-1 (VDE 0530-1) for operation at the limits of the ranges A (combination of ±5% voltage deviation and ±2% frequency deviation) and B (combination of ±10% voltage deviation and +3/-5% frequency deviation). This applies especially with regard to heating and deviations in operating parameters from the ratings on the motor's rating plate. The limits must never be exceeded.

Warning!
The available mains voltage (supply voltage) must be in accordance with the specifications on the rating plate of the motor or of the electrical components.

Check the fuse protection of the electrical circuit. Use only fuses with the prescribed amperage, else bodily injury and property damage may result.
Be sure to connect the motor so as to guarantee a continuously safe electrical connection (no protruding wire ends); use the assigned cable end fittings (e.g. cable lugs, wire end ferrules). Select connecting cables conforming to DIN VDE 0100 taking into account the rated current and the conditions of the specific system (e.g., ambient temperature, type of routing, etc. in accordance with DIN VDE 0298 or IEC / EN 60204-1). Details regarding electrical connection of the motor to the power supply, especially terminal and connector pin assignment, can be taken from the customer's drawing for the reservoir unit.

Warning!
When establishing electrical connection of the pump motor, be mindful of the correct direction of motor rotation.

If the direction of motor rotation is marked on the product by an arrow indicator, the motor's direction of rotation must match the arrow.

- Connect the pump unit motor according to the specifications on the motor rating plate and the motor characteristics.

4.4 Lubrication line connection

The lubrication line must be connected to the lubrication unit in such a way that no forces can be transferred to the assembled lubrication unit (stress-free connection).

Danger!
The fittings used to connect the lubrication line should be rated for the maximum operating pressure of the lubrication unit. If they are not, the lubrication line system needs to be protected from excessive pressure by means of a pressure-limiting valve.

For operating pressures up to 45 bar as can occur especially in single-line piston distributor systems, SKF fittings for solderless pipe unions can be used (double tapered sleeves or tapered sleeves). For higher operating pressures up to 250 bar as can occur especially in progressive centralized lubrication systems, SKF cutting-sleeve screw unions conforming to DIN 2353 can be used. If using fittings from other manufacturers, pay careful attention to the assembly instructions and technical specifications provided by the manufacturer.

4.4.1 Lubrication line arrangement

When arranging the main lubricant lines and the lubrication point lines, observe the following instructions in order to ensure that the entire lubrication system functions smoothly.
The main lubricant line must be dimensioned in accordance with the maximum operating pressure occurring in the lubrication unit used and the displacement of that lubrication unit.
If possible, the main lubricant line should rise upward from the lubrication unit and be ventable at the highest point on the lubrication line system. Lubricant distributors at the end of the main lubricant line must be installed such that the outlets of the lubricant distributors point upwards. If the system configuration requires that the lubricant distributors be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line.
The pipes, tubes, shutoff valves and directional control valves, fittings, etc. that will be used must be designed for the maximum operating pressure of the lubrication unit, the permissible temperatures and the lubricants that will be delivered. The lubrication line system also needs to be protected from excessive pressure by means of a pressure-limiting valve.
All components of the lubrication line system such as pipes, hoses, shutoff valves and directional control valves, fittings, etc. must be carefully cleaned before assembly. No seals in the lubrication line system should protrude inwards in a way that disrupts the flow of the lubricant and could allow contaminants to enter the lubrication line system.

Warning!
Lubrication lines must always be free of leaks. Lubrication lines should always be arranged so that air pockets cannot form anywhere. Avoid changes in the cross-section of the lubrication line from small to large cross-sections in the direction of flow of the lubricant. When the cross-section does change, the transition should be gentle.

The flow of lubricant in the lubrication lines should not be impeded by the incorporation of sharp bends, angle valves, or flap valves. Unavoidable changes in the cross-section in lubrication lines must have smooth transitions. Sudden changes of direction should be avoided if possible.

Warning!
Centralized lubrication systems must always be free of leaks. Leaking lubricant is hazardous due to the 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 without delay.

Lubricant leaking from centralized lubrication systems is a serious hazard. Leaking lubricant can create risks that may result in physical harm to persons or damage to other material assets.

Warning!
Follow the safety instructions on the lubricant's safety data sheet.

Lubricants are hazardous substances. The safety instructions on the lubricant's safety data sheet must be strictly followed. The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

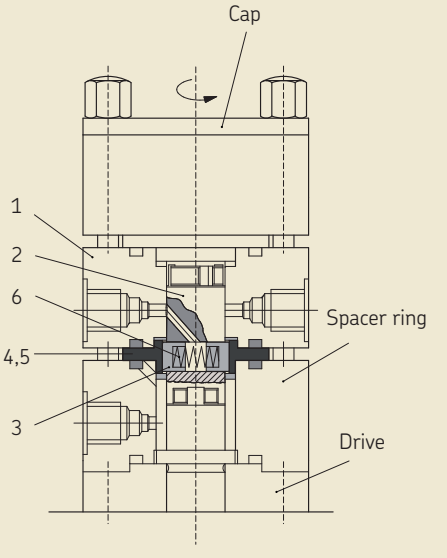
Warning!
The grease pump must never be put into operation without the reservoir cover fitted properly in place.

Warning!
Never seal off outlets on the RA pump that are not required (see faults table).

5. Design

In its basic design, the RA multi-line pump is comprised of a drive, spacer ring with the lubricant inlet, at least one pump element, and a cap.
The pump element shown in Figure 1 in its pressure phase is comprised of the pump ring (1), the pump shaft (2) with the two radial pump pistons (3) and the track ring with elliptical inner contour (4), which is permanently joined to the adjusting plate (5). The pump ring (1) houses the suction grooves and the pressure bores. The pump shaft, which also acts as the drive shaft for the next pump element via the embedded coupling, is designed as a rotary valve.
The two pump pistons are pressed against the inner side of the track ring by the spring (6).

Fig. 1 Pump element in the pressure phase



5.1 Mode of operation

As the pump shaft turns, the two pump pistons move apart due to the spring loading, until the outer dead center is reached. Until the outer dead center is reached, the control bore in the pump shaft connects the space between the two pump pistons with a lubricant inlet in the spacer ring. This is the suction phase. Due to the elliptically shaped track ring, the pump pistons move together against the spring force as the pump shaft continues to turn, until the inner dead center is reached. Until the inner dead center is reached, the control bore in the pump shaft connects the space between the two pump pistons with a lubricant outlet in the pump ring. This is the pressure phase.
The displacement can be varied continuously (steplessly) with the adjusting plate using the phase control method, meaning that the track ring position is changed relative to the position of the control bore in the pump shaft.
The stroke of the two pistons remains the same in every phase variation; it is fully effective or only partially effective, depending on the setting.

5.2 Adjusting the displacement

The adjusting plate (**1**) is adjusted when the pump is at a standstill and after loosening the two cap nuts. A locking pin (**2**) fitted between the two rotation direction scales prevents any accidental changes of rotation direction.

- Switch off the pump
- Slightly loosen the cap nuts (2x)
- Adjust the adjusting plate (**1**) using the rotation direction scale (**3**) according to the following description and the adjusting tables on page 45
- Evenly tighten the cap nuts (2x) with a torque of 8 Nm

The displacement of the RA pumps for oils and greases (reference viscosity 140 mm^2/s) as a function of drive speed and gear ratio is shown in Figure **2**.

Figure **3** illustrates the achievable continuous operating pressure as a function of operating viscosity and piston stroke rate.

$$\text{Piston stroke rate } Z = \frac{\text{Drive speed [n]}}{\text{Gear ratio [i]}}$$

The maximum operating pressure varies according to the operating viscosity of the lubricating medium and the given piston stroke rate. Restrictions apply to the permitted operating viscosity at piston stroke rates > 50 rpm.

The individual pump elements can be set to no less than 1/3 capacity.
Setting 0 = 1/3 capacity

Pump element

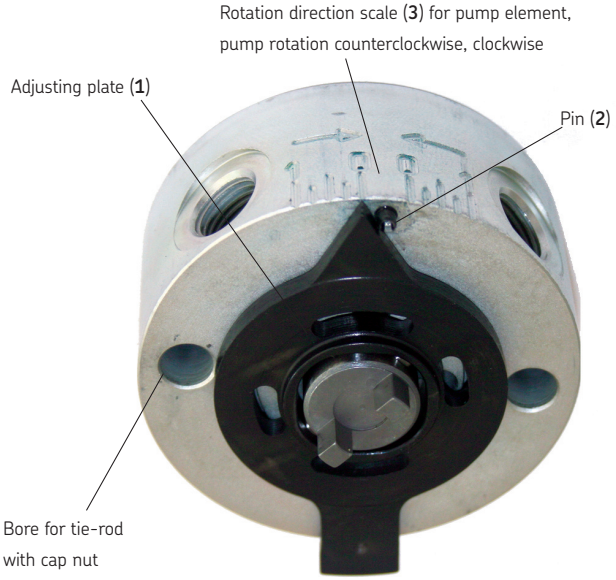


Fig. 2 Displacement

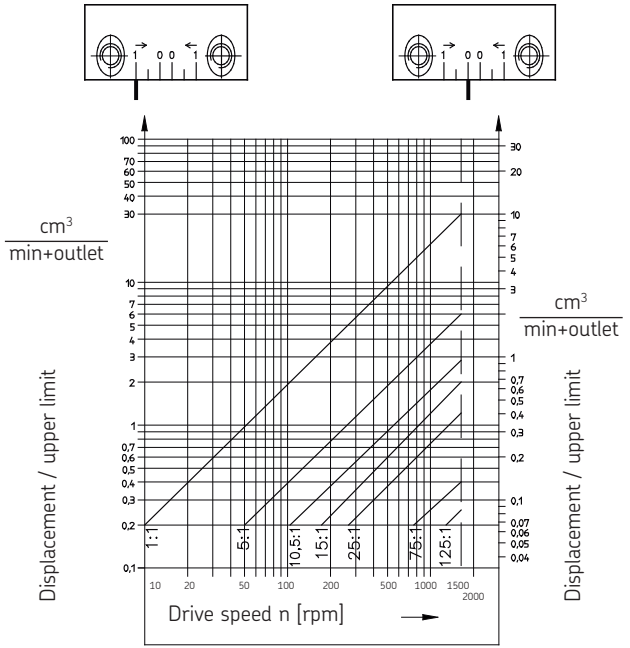
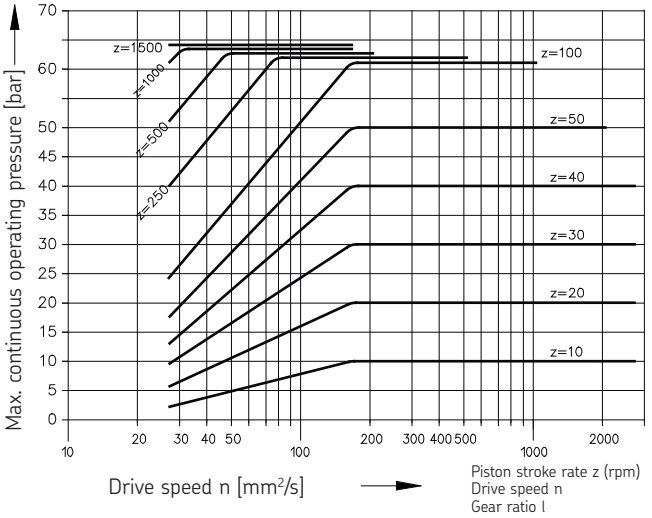


Fig. 3 Continuous operating pressure

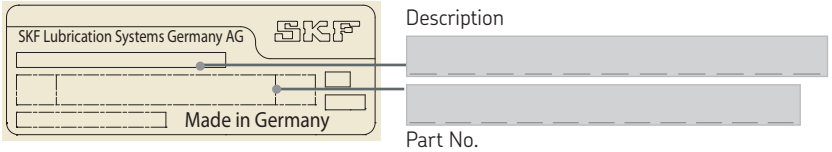


6 Note on the rating plate

The rating plate on the oil lubrication pump unit provides important data such as the type designation, order number, barcode, and serial number.
To avoid loss of this data in case the rating plate becomes illegible, these characteristics should be entered in the following table.

- Enter key data from rating plate in the table.

Key data from rating plate



Multi-line pump RA

for oils and greases

Operating instructions associated with assembly instructions

acc. to EC Dir. 2006/42/EC for partly completed machinery

1. Safety instructions

General information

Warning!
These operating instructions must be read and properly understood by the assembler and the responsible technical personnel/operator before assembly and commissioning.

The safety instructions listed in Chapter 1, "Safety instructions," in the assembly instructions also apply without restrictions to these operating instructions.

In addition to the operating instructions, general statutory regulations and other binding regulations for accident prevention and for environmental protection (recycling/disposal) must be observed and applied.

Disclaimer of liability

SKF Lubrication Systems shall not be held liable for damages:

- Caused by contaminated or unsuitable lubricants
- Caused by the installation of non-original SKF components or SKF spare parts
- Caused by inappropriate usage
- Resulting from improper assembly, configuration, or filling
- Resulting from improper response to malfunctions
- Caused by independent modification of system components
- Only media approved for these types of pump units may be used. Unsuitable media may result in pump unit failure and potentially severe injury or death and property damage.

2. Lubricants

Warning!
The information on lubricants listed in Chapter 2, "Lubricants," in the assembly instructions also applies without restrictions to these operating instructions.

3. Transport, delivery, and storage

SKF Lubrication Systems products are packaged in accordance with standard commercial practice according to the regulations of
the recipient's country and DIN ISO 9001.
During transport, safe handling must be ensured and the product must be protected from mechanical effects such as impacts.
The transport packaging must be marked "Do not drop!".

Warning!
Do not tilt or drop the product.

There are no restrictions for land, air or sea transport.
After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. Keep the packaging material until any discrepancies have been resolved.
SKF Lubrication Systems Germany AG products are subject to the following storage conditions:

3.1 Lubrication units

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: max. 24 months
- Permissible humidity: < 65%
- Storage temperature: 10 - 40°C
- Light: avoid direct sun or UV exposure and shield nearby sourcesof heat

3.2 Electronic and electrical devices

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: max. 24 months
- Permissible humidity: < 65%
- Storage temperature: 10 - 40°C
- Light: avoid direct sun or UV exposure and shield nearby sources of heat

3.3 General notes

- The product(s) can be enveloped in plastic film to provide low-dust storage.
- Protect against ground moisture by storing on a shelf or wooden pallet.
- Bright-finished metallic surfaces, especially wearing parts and assembly surfaces, must be protected using long-term anticorrosive agents before storage
- At approx. 6-month intervals: check for corrosion. If there are signs of corrosion, reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.

4. Assembly

4.1 Information on assembly

The assembly procedure for the multi-line pump units is described in detail in the assembly instructions associated with these operating instructions. Information/instructions about assembling the radial piston pump beyond the scope of the assembly instructions are contained later in this chapter.

4.2 Assembly of pump unit

- Assembly must be performed in accordance with the included assembly instructions and the additional information/instructions contained in this chapter.

5. Design and function

5.1 General information

The RA multi-line pump is a positive-displacement pump with multiple utilizable outlets. The displacement is continuously variable.

5.2 Design and mode of operation of the multi-line pump

The RA multi-line pump is constructed as a radial piston pump in a modular design. Up to five pump elements each with one, two, or four outlets can be “stacked” together so that the number of outlets can be adapted to current requirements in the best possible way.
This simple stacking design also allows for subsequent expansion and reduction of the number of pump outlets.
The displacement of a pump element's outlets is continuously variable (stepless adjustment) from outside. Continuous variability and a wide speed range guarantee an extremely broad spectrum of delivery rates. This makes the pump highly attractive as a feed pump for circulating lubrication systems with low circulation rates (up to 30 cm^3/min per outlet) or as a multi-circuit pump to supply multiple independent lubrication zones.

The pump can be driven in either direction of rotation, as desired. Its operating pressure is max. 63 bar, with up to 100 bar for short periods. The design of the RA multi-line pump permits it to pump both mineral-based and synthetic-based oils and greases.

6. Commissioning

Note
Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.

Warning!
Only fill with clean lubricant and an appropriate device. Contaminated lubricants can result in severe system malfunction. The lubricant reservoir must be filled without introducing bubbles.

Warning!
Different lubricants must not be mixed, as mixing may result in damage and necessitate costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

6.1 Condition on delivery

When delivered, the adjusting plates are set to "1", the maximum setting. Do not reduce the delivery rate setting of the pump until the pump has been shown to function properly.

6.2 Commissioning

Note about the grease lubrication pump
Before initial commissioning, fill the reservoir with oil up to about 1 cm above the strainer (ISO VG 150 to ISO VG 420).
The grease intended for use during operation can then be filled into the unit.
The pump can then be put into operation until grease without bubbles discharges from the outlets.

Warning!
The grease pump should never be put into operation without the reservoir cover fitted properly in place.

Never seal off outlets on the RA pump that are not required (see faults table).

Warning!
In the case of pumps with prelubrication (and hand crank), make sure the direction of rotation is correct. Once the hand crank is pushed in, it is connected to the pump shaft via the free-wheeling mechanism; prelubrication should therefore only be performed when the pump shaft is at a standstill. Otherwise the hand crank will begin to move in sudden jerks.

7. Shutdown

7.1 Temporary shutdown

The described product can be temporarily shut down by disconnecting the electrical, pneumatic, and/or hydraulic supply connections.
The safety instructions in these assembly instructions must be observed when doing so.
If the product is to be shut down for an extended period of time, follow the instructions in Chapter 3, "Transport, delivery, and storage," in these operating instructions.
To recommission the product, follow the instructions in the "Assembly" and "Commissioning" chapters in the assembly instructions and operating instructions.

7.2 Permanent shutdown

If the product will be permanently shut down, the local regulations and laws regarding the disposal of contaminated equipment must be observed.
Lubricants can contaminate soil and bodies of water.

Warning!
Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

7.3 Dismantling and disposal

Warning!
The applicable national environmental regulations and statutes are to be adhered to when dismantling and disposing of the multiline pump unit.
The product can also be returned to SKF Lubrication Systems for disposal, in which case the customer is responsible for reimbursing the costs incurred.

8. Maintenance

Warning!
Performing work on an energized pump or product may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

Products from SKF Lubrication Systems are low-maintenance. However, all connections and fittings must be regularly inspected for proper seating to ensure proper function and to prevent hazards from arising.
If necessary, the product can be cleaned using mild cleaning agents that are compatible with the product's materials (non-alkaline, non-soap). For safety reasons, the product should be disconnected from the power supply and the hydraulic and/or compressed air supply.

Do not allow any cleaning agent to enter the interior of the product during cleaning.
It is not necessary to clean the interior of the product if the product is operated normally and intercompatible lubricants are used.
The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled into the product. If this occurs, please contact the Service department of SKF Lubrication Systems for assistance.

Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.

Only original spare parts from SKF Lubrication Systems may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are not permitted and nullify the statutory warranty.

SKF Lubrication Systems shall not be responsible for any damages resulting from improper assembly, maintenance, and repair of this product.

8.1 General information

The radial piston pumps function without maintenance in principle. Upstream and downstream filters must be cleaned in time or replaced on a regular basis. Observe the readings on visual and electrical contamination indicators, if present.
Dirt deposits on the surface of the motor impair cooling and must be removed regularly.

Only fill with clean oil. The purity of the lubricants used is the decisive factor in the service life of the pump and the lubricated machinery elements.
Only add oil via the filler socket.

The RA pump operates without maintenance. However, increased wear can occur if the two cap nuts are tightened unevenly. This can be identified by reduced pump speed or sluggishness of the pump shaft.

Warning!
When dismantling and assembling the pump, especially the pump elements, make sure all the components are positioned and aligned correctly.
Individual parts **cannot** be swapped out from one pump element to another. It is not possible to put them back in the right positions afterward.

If a synthetic oil is used as the pumped fluid, consult the lubricant manufacturer beforehand to find out whether it will corrode the seals (Perbunan) and whether it can be mixed with the previous lubricant.

9. Faults

The following tables provide an overview of possible malfunctions and their causes. Contact the Service department of SKF Lubrication Systems if you cannot remedy the malfunction.

Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.

All assembly, maintenance and repair work beyond this scope must be performed by the Service department of SKF Lubrication Systems.

Only original spare parts from SKF Lubrication Systems can be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are not permitted.

Warning!
Performing work on an energized pump or product may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

Warning!
The hot surface of a motor may cause burns. Motor surfaces may only be touched with appropriate gloves or after the motor has been shut off for an extended time.

Warning!
Lubrication systems are pressurized during operation. Lubrication systems must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

9.1 Commissioning malfunctions

Warning!
In cases of functional failure, always check whether all technical specifications have been adhered to in the existing operating conditions.

Fault	Cause	Remedy
No delivery and/or no pressure	1. Pump not vented 2. Motor stopped 3. Pump elements set too low 4. Viscosity too low 5. Speed too low	– Undo outlet screw unions, set the adjusting plate to "1", allow the pump to run until oil/grease without bubbles is discharged (Chapter 5.2) – Vent the unit (see Chapter 6.2 in the operating instructions) – Check the system voltage – Pump shaft is stuck (distortion, wear) – Set a higher delivery rate on the adjusting plate - Use higher-viscosity oil - Increase the speed
Displacement and/or pressure too low	1. Pump not vented 2. The direction of rotation of the pump shaft and the marking on the scale do not match 3. Wrong direction of motor rotation 4. Great difference in back pressures 5. An unused outlet is sealed off	– See above – Set the adjusting plate to the other scale (Chapter 5.2) (partial dismantling required) – Check electrical connections and reverse if necessary – Install screw unions with check valves – Remove screw plug
Grease/oil level switch	Please refer to separate instructions	– Increase intake pipe Ø or shorten suction line – Fill with oil of permissible operating viscosity

10. Accessories

Accessories (ordered separately)

Description	Dimensions	Order No.
Union nut	Ø 4-R 1/8" Ø 6-R 1/8"	44-0709-2040 44-0709-2041
Double tapered ring	Ø 4 Ø 6	44-0405-2002 406-001
Straight connector	Ø 4-R 1/8" K Ø 6-R 1/8" K Ø 8-R 1/8" K	404-403W 406-423W 408-423W
Banjo fitting	Ø 4-R 1/8" Ø 6-R 1/8" Ø 8-R 1/8"	96-7004-0058 96-7006-0058 96-7008-0058
GE screw union with check valve	Ø 4-R 1/8" K Ø 6-R 1/8" K	24-2103-2933 24-2103-2927
Banjo fitting with check valve	Ø 4-R 1/8" K Ø 6-R 1/8" K	24-2106-2016 24-2106-2017
Banjo fitting [1])	Ø 6-R 1/8"	24-2106-2390
Pressure regulating valve[2])	1/8"	24-2103-3680
Pressure regulating valve[3])	Ø 6-R 1/8" K	24-2103-3681

1) With additional connection thread for screwing pressure regulating valves in directly
2) Up to 90 bar, without pipe connection for RA pumps operated for short periods
3) Up to 60 bar, with pipe connection for continuous duty

SKF quick connectors

Adapter with cylindrical internal thread

Tube Ø A	Thread	Order No.
4	G 1/8"	404-040-VS
6	G 1/8"	456-004-VS

Banjo fitting with cylindrical internal thread

Tube Ø A	Thread	Order No.
4	G 1/8"	504-108-VS
6	G 1/8"	506-108-VS

Elbows with cylindrical internal thread

Tube Ø A	Thread	Order No.
4	G 1/8 taper	514-018-VS
6	G 1/8 taper	506-511-VS

Note
For further detailed information about SKF quick connectors and related tools, see our brochure on quick connector systems, brochure No. 1-0103-1-EN.

11. Spare parts

Spare parts (ordered separately)

Rotary drive, coaxial
Rotary drive with coaxial gear
Rotary drive with bevel gear
Electric motor drive, coaxial
Electric motor drive with coaxial gear
Electric motor drive with bevel gear and grease reservoir
Electric motor drive with coaxial gear and grease reservoir

Description	Order No.
Rotary drive, coaxial 1:1	**24-0701-3000**
Coaxial 5:1	**24-0701-3070**
Coaxial 5:1 with prelubrication	**24-0701-3080**
Coaxial 15:1	**24-0701-3071**
Coaxial 15:1 with prelubrication	**24-0701-3081**
Coaxial 25:1	**24-0701-3072**
Coaxial 25:1 with prelubrication	**24-0701-3082**
Coaxial 75:1	**24-0701-3073**
Coaxial 75:1 with prelubrication	**24-0701-3083**
Coaxial 125:1	**24-0701-3074**
Coaxial 125:1 with prelubrication	**24-0701-3084**

Description	Order No.
Bevel gear	
drive position A 10.5:1	**24-0701-3001**
drive position B 10.5:1	**24-0701-3002**
Spacer ring	
(only with gear ratio 1:1)	**24-1721-2000**
Pump element	
with 1 outlet	**24-1557-3520**
with 2 outlets	**24-1557-3521**
with 4 outlets	**24-1557-3522**
Stud bolt (tie-rod) for gear ratios 1:1 and 10.5:1[1)]	
for 1 pump element	**44-0717-2060**
for 2 pump elements	**44-0717-2061**
for 3 pump elements	**44-0717-2062**
for 4 pump elements	**44-0717-2063**
for 5 pump elements	**44-0717-2064**
Stud bolt (tie-rod) for gear ratios 5:1 and 125:1[1)]	
for 1 pump element	**44-0717-2069**
for 2 pump elements	**44-0717-2070**
for 3 pump elements	**44-0717-2071**
for 4 pump elements	**44-0717-2072**
for 5 pump elements	**44-0717-2073**
Washer 6.4 DIN 125[1)]	**DIN 125-B6.4-ST**
Nut M 6 DIN 934[1)]	**DIN 934-M6-8**
Cap	**44-0413-2610**
Cap nut M6-DIN 917[1)]	**95-0006-0917**

1) Two required per pump 2) Four required per pump

Spare parts (ordered separately)

Description	Order No.
Electric motor, order code AF Electric motor, order code AK Electric motor, order code AO	**On request**
Cheese-head screw[2]) M5x16 DIN 912	**DIN 912-M5x16-8.8**
Grease reservoir (2kg) without level switch with level switch E with level switch F	 **24-0254-2312** **24-0254-2334** **24-0254-2330**
Grease reservoir (4.5kg) without level switch with level switch E with level switch F	 **24-0254-2310** **24-0254-2335** **24-0254-2331**

2) Four required per pump

Rotary drive with bevel gear and grease reservoir

Description	Order No.
Bevel gear drive position A 10.5:1 drive position B 10.5:1	 **24-0701-3001** **24-0701-3002**
Spacer ring (only with gear ratio 1:1)	 **24-1721-2001**
Pump element with 1 outlet with 2 outlets with 4 outlets	 **24-1557-3520** **24-1557-3521** **24-1557-3522**
Stud bolt[1]) for 1 pump element for 2 pump elements for 3 pump elements	 **44-0717-2070** **44-0717-2071** **44-0717-2072**
Washer 6.4 DIN 125[1])	**DIN 125-B6.4-ST**
Nut M 6 DIN 934[1])	**DIN 934-M6-8**

1) Two required per pump

951-170-028-EN

All SKF products may be used only for their intended purpose as described in these assembly instructions with associated operating instructions. If assembly/operating instructions are supplied together with the products, they must be read and followed.
Not all lubricants can be fed using centralized lubrication systems. SKF can, on request, inspect the suitability of the lubricant selected by the user for pumping in centralized lubrication systems. Lubrication systems and their components manufactured by SKF are not approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.
Particular attention is called to the fact that hazardous materials of any kind, especially the materials classified as hazardous by EC Directive 67/548/EEC, Article 2, Para. 2, may only be filled into SKF centralized lubrication systems and components and delivered and/or distributed with such systems and components after consulting with and obtaining written approval from SKF.

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