Piston pump with/without lubricant reservoir

for use in centralized lubrication systems

Owner's Manual - Containing Installation, Operation and Maintenance Instructions

(Original installation instructions in accordance with EC-Machinery Directive 2006/42/EC)

Product series:

P.., PE.., PEF.., PEU.., PEW..
PF.., PFH.., PFP.., PFW.., PFPW..
PPU.., PHU.., PW..
204-.., 205-..

WARNING:
Read this owner's manual before installing, operating or maintaining the product. Failure to follow the instructions and safety precautions in this owner's manual could result in serious injury, death, or property damage. Keep for future reference.

Masthead

This owner's manual - containing installation, operation and maintenance instructions complies with EC-Machinery Directive 2006/42/EC and is an integral part of the described product. It must be kept for future use.

This owner's manual - containing installation, operation and maintenance instructions was created in accordance with the valid standards and regulations on documentation, VDI 4500 and EN 292.

Service

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Owner's Manual - Containing Installation, Operation and Maintenance Instructions
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Information concerning EC Declaration of Conformity and EC Declaration of Incorporation

The product

Piston pump with/without reservoir

of the series:

P.., PE.., PEF.., PEU.., PEW..
PF.., PFH.., PFP.., PFW.., PFPW..
PPU.., PHU.., PW..
204-.., 205-..

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
- Electromagnetic Compatibility 2004/108/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, Appendix 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.

General information

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 this owner's manual.

Please heed these instructions and proceed with special care in such cases. Please pass all safety instructions to other users.

Instructions attached directly to the equipment, such as rotational direction arrows and fluid connection labels, must be followed. Replace such signs if they become illegible.

- Rotational direction arrow
- Fluid connection label

You are responsible!

Please read the owner's manual thoroughly and follow the safety instructions.

☞ **Note**
Not every symbol and corresponding information described in the Safety Information is necessarily used in these instructions.

Table 1. Hazard symbols

Symbol	Standard	Meaning
	DIN 4844-2 W000	General hazard
	DIN 4844-2 W008	Voltage
	DIN 4844-2 W026	Hot surface
	DIN 4844-2 W028	Slip hazard

Table 2. Safety signal words and their meaning

Signal word	Meaning
Danger!	Danger of bodily injury
Warning!	Danger of damage to property or the environment
Note	Additional information

Table 3. Informational symbols

Symbol	Meaning
	Note
•	Prompts an action
o	Used for itemizing
➔	Refers to other facts, causes or consequences
☞	Provides additional information

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1. Safety instructions

The operator of the described product must ensure that the owner's manual is read and understood by all persons tasked with the assembly, operation, maintenance, and repair of the product. The owner's manual must be kept readily available.

Note that the owner's manual 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 owner's manual. In particular, any malfunctions which may affect safety must be remedied immediately.

In addition to the owner's manual, statutory regulations and other general regulations for accident prevention and environmental protection must be observed and applied.

1.1. Intended use

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

The described product is for supplying centralized lubrication systems with lubricant and is intended for use in centralized lubrication systems. Any other use is deemed non-compliant with the intended use and could result in damage, malfunction, or even injury.

In particular, the described 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 described 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.

Unless specially indicated otherwise, products from SKF Lubrication Systems Germany AG are not approved for use in potentially explosive areas as defined in the ATEX Directive 94/9/EC.

1.2. Authorized personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in the owner's manual. 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 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 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.

1.4. System pressure hazard

Danger!
Centralized 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. Compressed air hazard

Danger!
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.

Depending on the model design, the product may be able to be operated with compressed air.

1.6. Spring-loaded component hazard

Danger!
In the model design for manual operation, the described product contains an operating lever that is under spring preload. It is important to note that the operating lever is returned by spring force to its normal position after actuation. This presents a crushing hazard for the operator.

Depending on the model design, the product may be able to be operated manually.

1.7. Hydraulic pressure hazard

Danger!
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.

Depending on the model design, the product may be able to be operated hydraulically.

1.8. Warranty and liability

SKF Lubrication Systems Germany AG assumes no warranty or liability for the following:

- Non-compliant usage
- Improper assembly/disassembly or improper operation
- Use of unsuitable or contaminated lubricants
- Maintenance and repair work performed improperly or not performed at all
- Use of non-original SKF spare parts
- Alterations or modifications performed without written approval from SKF Lubrication Systems Germany AG
- Non-compliance with the instructions for transport and storage

2. Lubricants

2.1. General information

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

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 device, 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 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 Germany AG.

No products manufactured by SKF Lubrication Systems Germany AG 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 lubricant nor hazardous substance may only be fed after consulting with and obtaining written approval from SKF Lubrication Systems Germany AG.

SKF Lubrication Systems Germany AG considers lubricants to be a component of the system design and 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 bearing/friction point, the expected load during operation, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.

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

Please contact SKF Lubrication Systems Germany AG 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 Germany AG from the company's Service department.

2.3. Approved lubricants

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

Warning!
Different lubricants must not be mixed together. Doing so can cause damage and require extensive cleaning of the product/centralized 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.

Note that in rare cases, there may be lubricants whose properties are within the permissible limits 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

Warning!
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

Danger!
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.

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. Design and function

3.1. Model designs

Piston pumps with/without lubricant reservoir are lubricant supply pumps that are operated mechanically (manually), hydraulically or pneumatically. Piston pumps with/without lubricant reservoir are used to supply oils, fluid greases, or greases in centralized lubrication systems with piston distributors or progressive distributors.

See the ➔ technical documentation for technical details on piston-pumps with/without lubricant reservoir.

If no documentation is available, you can request the documentation directly from SKF Lubrication Systems Germany AG.

The most important technical data for piston pumps with/without lubricant reservoir are listed in ➔ Table 4.

Table 4. Model designs

Type designation	Type of actuation	Pressure relief valve	Pressure regulating valve	Delivery rate in cm^3/stroke	Operating pressure P2 in bar	Actuating pressure P1 in bar	Wall mounted	Reservoir mounted	Reservoir capacity in l	Lubricant		Comments
										Grease NLGI Grade	Oil viscosity in mm^2/s	
P-26-2	manual	yes	-	7	25 [1]	-	yes	-	-	-	15-150	[1] Achievable pressure depends on manual force exerted
P-27-2	manual	yes	-	7	25 [1]	-	-	yes	-	-	15-150	
P-36-3	hydraulic	yes	-	7	15 - 35	15 - 35	yes	-	-	-	15-150	
P-37-3	hydraulic	yes	-	7	15 - 35	15 - 35	-	yes	-	-	15-150	
P-38-4	hydraulic	yes	-	7	15 - 35	15 - 35	-	-	0.4	-	15-150	[1] Achievable pressure depends on manual force exerted
P-66-2	manual	yes	-	30	25 [1]	-	yes	-	-	-	15-150	
P-67-2	manual	yes	-	30	25 [1]	-	-	yes	-	-	15-150	
P-68-3	manual	yes	-	30	25 [1]	-	-	-	1.5	-	15-150	
P-76-2	hydraulic	yes	-	30	15 - 35	15 - 35	yes	-	-	-	15-150	
P-77-2	hydraulic	yes	-	30	15 - 35	15 - 35	-	yes	-	-	15-150	
P-78-3	pneumatic	yes	-	30	15 - 35	15 - 35	-	-	1.5	-	15-150	
P-86-2	pneumatic	yes	-	30	25	6.5 - 15	yes	-	-	-	15-150	
P-87-2	pneumatic	yes	-	30	25	6.5 - 15	-	yes	-	-	15-150	
P-88-3	pneumatic	yes	-	30	25	6.5 - 15	-	-	1.5	-	15-150	[1] Achievable pressure depends on manual force exerted
P-156	manual	yes	-	15	25 [1]	-	yes	-	-	-	15-150	
P-189	pneumatic	yes	-	7	4.8 x P1	3.5 - 10	-	-	0.85	-	15-150	
P-276	hydraulic	yes	-	50	20 - 35	35 - 150 [2]	yes	-	-	-	15-620	[2] For pressures above 35 bar, install a pressure regulating valve at the end of the system.
P-278-3	hydraulic	yes	-	50	20 - 35	35 - 150 [2]	-	-	1.5	-	15-620	
P-289	pneumatic	yes	-	10	4.9 x P1	3.5 - 10	-	-	1.8	-	15-620	

Continuation of Table 4. Model designs

Type designation	Type of actuation	Pressure relief valve	Pressure regulating valve	Delivery rate in cm^3/stroke	Operating pressure P2 in bar	Actuating pressure P1 in bar	Wall mounted	Reservoir mounted	Reservoir capacity in l	Lubricant		Comments
										Grease NLGI Grade	Oil viscosity in mm^2/s	
PF-289	pneumatic	yes	-	10	4.8 x P1	3,5 - 10	-	-	1,8	00, 000	-	
PW-289	pneumatic	yes	-	10	4.8 x P1	3,5 - 10	-	-	1,8	-	15-620	
P-886	pneumatic	yes	-	30	25	4 - 10	yes	-	-	-	15-150	
P-887	pneumatic	yes	-	30	25	4 - 10	-	yes	-	-	15-150	
P-888-3	pneumatic	yes	-	30	25	4 - 10	-	-	1,5	-	15-150	
PF-23	manual	no	-	2.5 (2 x 1.25)	100	-	-	-	1.5	2	-	Mounting position: pressure connection on top [1] Achievable pressure depends on manual force exerted
PFH-23	hydraulic	no	-	2.5 (2 x 1.25)	200	6 - 30	-	-	1.5	2	-	
PFP-23	pneumatic	no	-	2.5 (2 x 1.25)	190	6 - 30	-	-	1.5	2	-	
PFE 4-2	manual	manually operated	-	4	80	-	-	-	-	00, 000	-	
205-650-3	mechanical	yes	-	1.6	20	-	yes	-	-	-	15-150	Mounting position: pressure connection on top
204-150-3	mechanical	no	-	0.1	40	-	yes	-	-	-	15-150	
204-550-3	mechanical	no	-	0.4	40	-	yes	-	-	-	15-150	
204-650-3	mechanical	no	-	1.6	20	-	yes	-	-	-	15-150	
PHU 5	hydraulic	no	-	0.1 - 0.5	160	20 - 50	yes	-	-	2	-	
PPU 5	pneumatic	no	-	0.1 - 0.5	160	4.5 - 10	yes	-	-	2	-	
PPU 35	pneumatic	no	-	0.7 - 3.5	160	4.5 - 10	yes	-	-	2	-	
PHU 35	hydraulic	no	-	0.7 - 3.5	160	2 - 50	yes	-	-	2	-	
PFP-298	pneumatic	no	-	2 x 1.4	120 - 280	5 - 50	-	-	1.5	2	-	

3.2. Piston pumps for piston distributor systems

The manually, pneumatically or hydraulically actuated piston of the piston pump feeds the lubricant drawn from a separate lubricant reservoir or a reservoir mounted on the piston pump into the piston distributor system through the pressure relief valve and to the piston distributors.

3.2.1. Lubrication cycle sequence

The sequence of a lubrication cycle depends on the type of piston distributors in use. Piston distributors are differentiated into prelubrication distributors and relubrication distributors. Prelubrication distributors deliver the metered quantity of lubricant at the same time that pressure is built up in the lubricant line. Relubrication distributors supply the metered quantity of lubricant after the pressure relief procedure in the lubricant line.

3.2.2. Lubrication cycle of prelubrication distributor

After the delivery piston is actuated (manually, pneumatically or hydraulically), the lubricant is fed through the lubricant line to the prelubrication distributors via the pressure relief valve. The pressure built up in the centralized lubrication system meters the lubricant separately for each lubrication point and feeds it to the consuming points. After the working stroke, the actuating piston of the piston pump is returned to its normal position. In the process, it draws lubricant into the suction chamber. After pressure has been relieved in the lubricant line, the lubricant is shifted within the prelubrication distributor from the spring chamber into the metering chamber. The centralized lubrication system is ready for the next lubrication cycle.

3.2.3. Lubrication cycle of relubrication distributor

After the delivery piston is actuated (manually, pneumatically or hydraulically), the lubricant is fed through the lubricant line to the relubrication distributors via the pressure relief valve. The pressure built up in the centralized lubrication system feeds the lubricant into the storage chamber of the relubrication distributors. After the working stroke, the actuating piston of the piston pump is returned to its normal position and pressure is relieved in the centralized lubrication system, which meters the lubricant within the relubrication distributor and delivers to the lubrication point (relubrication effect). After the lubricant has been completely expelled to the lubrication point, the centralized lubrication system is ready for the next lubrication cycle.

3.2.4. Connected load

Since every working stroke of the piston pump triggers a new lubrication procedure, be sure that the connected load of the centralized lubrication system is a maximum of 2/3 of the delivery volume of the piston pump in order to ensure the necessary reserves for pressure build-up in the centralized lubrication system.

The connected load can be roughly calculated as follows:

Connected load
Sum of all volumes metered by the centralized lubrication system's distributors
+ 25% of this value (safety margin)
+ 1 cm^3 per meter of main line
(expansion loss, only for hose lines)
+ Compressibility loss per meter of main line acc. to ➔ Table 5 (only for centralized lubrication systems for grease supply)

Table 5. Compressibility loss in pipes conducting grease, in cm^3/m

Line 6 x 0.7	Line 8 x 0.7	Line 10 x 0.7
0.17	0.34	0.58

3.3. Piston pumps for progressive distributor systems

Piston pumps for progressive distributor systems differ from piston pumps for piston distributor systems in that they do not have a pressure relief valve. In these piston pumps, the lubricant drawn from a separate or attached lubricant reservoir is fed to the progressive distributors via the pressure regulating valve in the piston pump. The progressive distributors in turn distribute the lubricant to the individual lubrication points.

Piston pumps for progressive distributor systems can be actuated several times in sequence if the lubricant quantity of a piston stroke is not sufficient to fill the entire centralized lubrication system.

4. Assembly instructions

4.1. General information

Only qualified technical personnel may install, operate, maintain, and repair the piston pumps with/without lubricant reservoir described in the owner's manual. Qualified technical personnel are persons who have been trained, assigned and instructed by the operator of the final product into which the described piston pumps with/without lubricant reservoir are incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and operating 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 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.

Before assembling/setting up the piston pumps with/without lubricant reservoir, the packaging material and any shipping braces (e.g., plugs) must be removed. Keep the packaging material until any discrepancies have been resolved.

Warning!
The product must not be tilted or dropped.

During all assembly work on machinery, observe the local accident prevention regulations as well as the applicable operating and maintenance specifications.

4.2. Setup and attachment

Piston pumps with/without lubricant reservoir should be protected from humidity and vibration, and should be mounted so that they are easily accessible, allowing all further installation work to be done without difficulty and allowing the piston pumps to be filled easily.

Ensure that there is sufficient air circulation to prevent excessive heating of the piston pump. For the maximum permissible ambient temperature, see ➔ "Technical data."

For product-specific technical data, see the relevant ➔ documentation. If no documentation is available, you can request the documentation directly from SKF Lubrication Systems Germany AG.

Consult the ➔ technical documentation for the mounting position.

The fill level in the lubricant reservoir and all other visual indicators must be clearly visible.

Ensure sufficient clearance for operation of the hand lever on manually operated piston pumps.

Drill the assembly holes for mounting the piston pump as specified in the ➔ technical documentation.

If no documentation is available, the dimensions and location of the fastening holes on the connecting flange can be determined by taking measurements.

If no documentation is available, you can request the documentation directly from SKF Lubrication Systems Germany AG.

Attach the piston pump to the intended mounting location using appropriate fastening materials (e.g., bolts, washers, and nuts).

Warning!
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.

4.3. Compressed air connection (pneumatically operated piston pump)

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

Danger!
Ensure that the main air valve is closed before connecting the piston pump to the compressed air supply.

Warning!
The maximum primary air pressure indicated for operation of the piston pump must not be exceeded.

The compressed air to be used here must comply with at least quality class 5 as defined by ➔ DIN ISO 8573-1:

- Max. particle size 40 µm
- Max. particle density 10 mg/m³
- Pressure dew point 7°C
- Water content max. 7800 mg/m³
- Residual oil content max. 25 mg/m³

Through the use of the appropriate compressed air quality class, compressed air preparation can be optimized and machine downtime and higher maintenance costs avoided.

The pneumatic connection is established via the connector labeled P1 on the piston pump's housing.

See the ➔ technical documentation for more information about the compressed air connection.

If no documentation is available, you can request the documentation directly from SKF Lubrication Systems Germany AG.

4.4. Hydraulic connection (hydraulically operated piston pump)

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

Danger!
Ensure that the hydraulic supply is depressurized before connecting the piston pump to the hydraulic supply.

Warning!
The maximum hydraulic oil pressure indicated for operation of the piston pump must not be exceeded.

The hydraulic connection is established via the connector labeled P1 on the piston pump's housing. See the ➔ technical documentation for more information about the hydraulic connection.

If no documentation is available, you can request the documentation directly from SKF Lubrication Systems Germany AG.

4.5. Lubrication line connection

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

Warning!
The fittings used to connect the lubrication line should be designed for the maximum operating pressure of the single-piston pump. 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 lubrication line screw unions can be used (double tapered sleeves or tapered sleeves).

For 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 data from the manufacturer.

4.6. Lubrication line arrangement

When arranging the main lubricant lines and 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 delivery volume 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, hoses, 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.

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!
Lubrication lines must always be free of leaks. 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.

Danger!
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.

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

The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

5. Transport, delivery, and storage

5.1. Transport

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

Warning!
The product must not be tilted or dropped.

There are no restrictions for land, air or sea transport.

5.2. Delivery

Upon receiving the shipment, please check the product(s) for possible damage, and ensure that the shipment is complete according to the shipping documents. Keep the packaging material until any discrepancies have been resolved.

5.3. Storage

SKF Lubrication Systems Germany AG products are subject to the following storage conditions:

5.3.1. Storage of 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 sources of heat

5.3.2. Storage of 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

5.3.3. Storage - general information

- 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 anti-corrosive agents before storage.
- At approx. 6-month intervals: Check for corrosion. If there are signs of corrosion, remove them then reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.

6. Operation

6.1. General information

The described product functions automatically. The lubricant transport in the lubrication lines should, however, be subjected to regular visual inspection.

The lubricant fill level in the lubricant reservoir, if present, should likewise be subjected to regular visual inspection. If the lubricant fill level is too low, top up to the maximum mark as described in Chapter "Commissioning."

During operation, observe the following instructions to provide for trouble-free operation of the centralized lubrication system:

- Check the lubricant transport in the lubrication lines at regular intervals.
- Inspect the lubrication of the lubrication points at regular intervals.
- Perform a visual check of the lubricant fill level in the lubricant reservoir at regular intervals (including on piston pumps with fill level monitoring).

6.2. Commissioning

Inspect all pneumatic, hydraulic, and electrical (if present) connections before commissioning the piston pump.

After assembling the piston pump and arranging the lubrication lines, commission the centralized lubrication system by following these steps:

- Fill the lubricant reservoir.
- Venting the centralized lubrication system
- Checking the function of the centralized lubrication system

6.2.1. Lubricant filling

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

Warning!
Only fill using 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 together. Doing so can cause damage and require extensive cleaning of the piston pump/centralized 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 lubricant may only be fed without bubbles. The lubricant reservoir must be filled with clean lubricant without introducing bubbles.

- Remove the cap from the lubricant reservoir.
- Fill lubricant up to the maximum mark.
- Close the filling hole.

Then vent the piston pump and the centralized lubrication system.

6.2.2. Venting the centralized lubrication system

Warning!
The lubricant may only be fed without bubbles. Air pockets in the lubricant adversely affect the function of the centralized lubrication system and impair the reliability of lubricant delivery, which can result in damage to the lubrication points requiring lubrication.

The process of venting the centralized lubrication system can be facilitated by:

- Opening the ends of the main lines until bubble-free lubricant discharges.
- Filling long lubricant line sections before connecting.

The centralized lubrication system is vented as follows:

- Disconnect the main lubricant lines from the piston pump. Operate the piston pump until the lubricant emerging from the outlet is free of bubbles. Reinstall the main lubricant lines.

- Disconnect main lubricant line from master distributor. Operate the piston pump until the lubricant emerging from the main lubricant line is free of bubbles. Reinstall the main lubricant line.

- Disconnect lubricant branch lines from master distributor. Operate the piston pump until bubble-free lubricant discharges from all outlets of the master distributor. Reinstall the lubricant branch lines.

- Finally, check that the entire centralized lubrication system functions properly.

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 instructions in➔ Chapter 1, "Safety instructions" in this owner's manual 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 5, "Transport, delivery, and storage" in this owner's manual.

To recommission the product, follow the instructions in ➔ Chapter 4, "Assembly instructions," and Chapter 6, "Operation" in this owner's manual.

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.

Warning!
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.

The product can also be returned to SKF Lubrication Systems Germany AG for disposal, in which case the customer is responsible for reimbursing the costs incurred.

8. Maintenance

Danger!
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.

Danger!
Centralized 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.

Danger!
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.

Products from SKF Lubrication Systems Germany AG 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 Germany AG 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 Germany AG may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited and nullify the statutory warranty.

SKF Lubrication Systems Germany AG shall not be held liable for damages resulting from improperly performed assembly, maintenance or repair work on the product.

9. Faults

➔ Table 6 provides an overview of possible malfunctions and their causes. Contact the Service department of SKF Lubrication Systems Germany AG if you cannot remedy the malfunction.

Danger!
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.

Danger!
Centralized 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.

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

Table 6. Fault analysis and rectification

Malfunction	Possible cause	Rectification
Power transmission from the actuating mechanism to the piston pump is interrupted	Driver pin is broken	Disassemble the piston pump in observance of the safety instructions and replace the broken components.
	Seals in the actuating cylinder are defective	
	Return spring is broken	
Piston pump does not deliver medium No pressure build-up	Too little lubricant in lubricant reservoir	Top up lubricant; check float switch, if installed
	Wrong lubricant	Remove lubricant from entire system and dispose of lubricant properly; fill system with suitable lubricant and vent system.
	Air in the system	Vent the system until lubricant without bubbles discharges at the lubrication points.
	For all other work, relieve pressure in the centralized lubrication system and the actuating cylinder on pneumatically or hydraulically actuated piston pumps.	
	Pressure regulating valve does not work	Check the pressure regulating valve for contamination and damage, clean or replace as necessary.
	Pressure relief valve does not close	Check the pressure relief valve for contamination and damage, clean or replace as necessary.
	Discharge or suction valves do not close.	Remove and inspect the valves, clean or replace as necessary.

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

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

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All SKF Lubrication Systems Germany AG products may be used only for their intended purpose as described in this owner's manual 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 lubricants selected by the user for pumping in centralized lubrication systems. Lubrication systems and their components manufactured by SKF Lubrication Systems Germany AG 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 those materials classified as hazardous by EC Directive 67/548/EEC, Article 2, Para. 2, may only be filled into SKF Lubrication Systems Germany AG 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 Germany AG.

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