

FK Grease Lubrication Pump Unit

for use in progressive, single-line and dual-line centralized lubrication systems



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Read these instructions before installation or start-up of the product and keep them readily available for consultation.

Original EC Declaration of Incorporation in accordance with Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer hereby declares at its sole responsibility that the partly completed machinery conforms to the essential health and safety requirements of the Machinery Directive 2006/42/EC, Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.

The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is the manufacturer.

Designation: Grease Lubrication Pump Unit
Type: FK
Item number: 774-*, 6774-*

Furthermore, the following directives and standards were applied in the respective applicable areas:

2006/42/EC: Machinery Directive

2014/30/EU: Electromagnetic Compatibility

2011/65/EU: RoHS II

EN ISO 12100:2010 EN 809:1998+A1:2009/AC:2010 EN 60204-1:2018

EN 60947-5-1:2004/A1:2009 EN IEC 60947-5-2:2020

EN IEC 63000:2018

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

Walldorf, 29.11.2021

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Original UK Declaration of incorporation according to the Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex II

The manufacturer hereby declares under sole responsibility that the partly completed machinery complies with the essential health and safety requirements of UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.

The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR.

Designation: Grease Lubrication Pump Unit
Type: FK
Item number: 774-*, 6774-*

Furthermore, the following regulations and standards were applied in the respective applicable areas:

Electromagnetic Compatibility Ordinance 2016 No. 1091

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032

EN ISO 12100:2010 EN 809:1998+A1:2009/AC:2010 EN 60204-1:2018

EN 60947-5-1:2004/A1:2009 EN IEC 60947-5-2:2020

EN IEC 63000:2018

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Appendix to Declaration of Incorporation in accordance with 2006/42/EC, Annex II, No. 1 B

Description of the essential health and safety requirements according to 2006/42/EC, Annex I, which have been applied and fulfilled:

Table 1

Appendix to Declaration of Incorporation

Piston pumps with reservoir, with/without external motor, without control unit

Types: P205, P208, P212, P215, P230, ZPUxx, JM, FF, FB, FK, RA, TA, TB

No.:	Essential health and safety requirement	Applicable:	Fulfilled:
1.1	Principles		
1.1.2	Principles of safety integration	Yes	Yes
1.1.3	Materials and products	Yes	Not completely fulfilled ¹⁾
1.1.5	Design of machinery to facilitate its handling	Yes	Yes
1.1.6	Ergonomics	Yes	Not completely fulfilled ²⁾
1.2	Control systems		
1.2.1	Safety and reliability of control systems	Yes	Yes
1.2.3	Starting	Yes	Yes
1.2.6	Failure of the power supply	Yes	Yes
1.3	Protection against mechanical hazards		
1.3.1	Risk of loss of stability	Yes	Yes
1.3.2	Risk of break-up during operation	Yes	Not completely fulfilled ³⁾
1.3.4	Risks due to surfaces, edges or angles	Yes	Yes
1.3.7	Risks related to moving parts	Yes	Yes
1.3.9	Risks of uncontrolled movements	Yes	Yes
1.5	Risks due to other hazards		
1.5.1	Electricity supply	Yes	Yes
1.5.6	Fire	Yes	Yes
1.5.8	Noise	Yes	Yes
1.5.13	Emissions of hazardous materials and substances	Yes	Yes
1.5.15	Risk of slipping, tripping, or falling	Yes	Not completely fulfilled ⁴⁾
1.6	Servicing		
1.6.1	Machinery maintenance	Yes	Yes
1.6.2	Access to operating positions and servicing points	Yes	Not completely fulfilled ⁵⁾
1.6.4	Operator interventions	Yes	Yes
1.7	Information		
1.7.1	Information and warnings on the machinery	Yes	Yes
1.7.1.1	Information and information devices	Yes	Yes
1.7.2	Warning of residual risks	Yes	Yes
1.7.3	Marking of machinery	Yes	Yes
1.7.4	Operating instructions/assembly instructions	Yes	Yes
1.7.4.1	General principles for the drafting of operating instructions/assembly instructions	Yes	Yes
1.7.4.2	Contents of the operating instructions/assembly instructions	Yes	Yes
1.7.4.3	Sales literature	Yes	Yes

¹⁾ The product is designed for operation with non-hazardous media. The owner-operator must check whether the lubricant used has certain hazardous effects (such as sensitization). The installation of a drip pan could be required. Pressure-relief valves must also be used.

²⁾ The operator must ensure that the pump is integrated into the higher-level machine in such a way that the pump can be operated and filled ergonomically.

³⁾ The operator must protect the lubrication system against excessive pressure. This should be done by fitting every pump element with a pressure limiting valve with suitable opening pressure (see the "Technical data" for the pump in question).

⁴⁾ Not relevant inside the incomplete machine (pump), only outside the partially completed machine. The machine's owner or operator is responsible here.

⁵⁾ The owner-operator must ensure that the pump is integrated into the main machine in such a way that it can be operated without danger.

Masthead

Manufacturer

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Warranty

The instructions contain no statements regarding the warranty or liability for defects. That information can be found in our General Terms of Payment and Delivery.

Training

We conduct detailed training in order to enable maximum safety and efficiency. We recommend taking advantage of this training. For further information, contact your authorized SKF dealer or the manufacturer.

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Safety alerts, visual presentation, and layout

While reading these instructions, you will encounter various symbols, illustrations, and text layouts intended to help you navigate and understand the instructions. Their meaning is explained below.

Safety alerts:

Activities that present specific hazards (to life and limb or possible damage to property) are indicated by safety alerts. Always be sure to follow the instructions given in the safety alerts.

DANGER

These safety alerts indicate an imminent danger. Ignoring them will result in death or serious injury

WARNING

These safety alerts indicate potentially imminent danger. Ignoring them could result in death or serious injury

CAUTION

These safety alerts indicate potentially imminent danger. Ignoring them could result in minor injury

NOTICE

These safety alerts indicate a potentially harmful situation. Ignoring them could result in damage to property or malfunctions

Illustrations:

The illustrations used depict a specific product. For other products, they may have the function of a diagram only. This does not alter the basic workings and operation of the product.

Text layout:

- **First-order bulleted lists:** Items on a bulleted list start with a solid black dot and an indent.
 - **Second-order bulleted lists:** If there is a further listing of subitems, the second-order bulleted list is used.
- 1 **Legend:** A legend explains the numbered contents of an illustration, presented as a numbered list. Items in a legend start with a number (with no dot) and an indent.
 - **Second-order legend:** In some cases, the numbered contents of an image represent more than just one object. A second-order legend is then used.
- 1. **Instruction steps:** These indicate a chronological sequence of instruction steps. The numbers of the steps are in bold and are followed by a period. If a new activity follows, the numbering starts again at “1.”
 - **Second-order instruction steps:** In some cases, it is necessary to divide up a step into a few substeps. A sequence of second-order instruction steps is then used.

1 Safety instructions

1.1 General safety instructions

- Putting the products into operation or operating them without having read the instructions is prohibited. The operator must ensure that the instructions are read and understood by all persons tasked with working on the product or who supervise or instruct such persons. Retain the instructions for further use.
- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Any faults that could affect safety must be remedied according to responsibility. The supervisor must be notified immediately in case of malfunctions outside one's individual scope of responsibility.
- Unauthorized modifications and changes can have an unpredictable effect on safety and operation. Unauthorized modifications and changes are therefore prohibited. Only original SKF spare parts and SKF accessories may be used.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- The components used must be suitable for the intended use and the applicable operating conditions, e.g. max. operating pressure and ambient temperature range, and must not be subjected to torsion, shear, or bending.

1.2 General electrical safety instructions

- Electrical devices must be kept in proper condition. This must be ensured by periodic inspections in accordance with the relevant applicable standards and technical rules. The type, frequency, and scope of the inspections must be determined in accordance with the risk assessment to be carried out by the operator. Work on electrical components may be performed only by qualified electricians. Connect the electrical power only in accordance with the valid terminal diagram and in observance of the relevant regulations and the local electrical supply conditions.
- Work on electrical components may be performed only in a voltage-free state and using tools suitable for electrical work. Do not touch cables or electrical components with wet or moist hands.
- Fuses must not be bridged. Always replace defective fuses with fuses of the same type.
- Ensure proper connection of the protective conductor for products with protection class I. Observe the specified enclosure rating.
- The operator must implement appropriate measures to protect vulnerable electrical devices from the effects of lightning during use. The electrical device is not furnished with a grounding system for the dissipation of the respective electric charge and does not have the voltage strength necessary to withstand the effects of lightning.

1.3 General behaviour when handling the product

- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Keep unauthorized persons away.
- Wear personal protective equipment always.
- Precautionary operational measures and instructions for the respective work must be observed.
- In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.
- Precautionary operational measures and instructions for the respective work must be observed. Uncertainty seriously endangers safety.
- Safety-related protective and safety equipment must not be removed, modified or affected otherwise in its function and is to be checked at regular intervals for completeness and function.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Remedy occurring faults in the frame of responsibilities. Immediately inform your superior in the case of faults beyond your competence.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

1.4 Intended use

Supply of lubricants.

The product is intended solely for installation in another machine.

Use is only permitted within the scope of commercial or economic activity by professional users, in compliance with the specifications, technical data, and limits specified in this manual.

1.5 Persons authorized to use the product

Operator

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

Specialist in electrics

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

Specialist in mechanics

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

1.6 Foreseeable misuse

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

- Use of non-specified consumables, contaminated lubricants, or lubricants with air inclusions.
- Use of C3 versions in areas with aggressive, corrosive substances (e.g., high salt load).
- Use of plastic parts in areas with high exposure to ozone, UV light, or ionizing radiation.
- Use to supply, convey, or store hazardous substances and mixtures as defined in the CLP Regulation (EC 1272/2008) or GHS with acute oral, dermal, or inhalation toxicity or substances and mixtures that are marked with hazard pictograms GHS01-GHS06 and GHS08.
- Use to supply, convey, or store Group 1 fluids classified as hazards as defined in the Pressure Equipment Directive (2014/68/EU) Article 13 (1) a).
- Use to supply, convey, or store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature.
- Use in an explosion protection zone.
- Use without proper securing against excessively high pressures, in the case of pressurized products.
- Use outside of the technical data and limits specified in this manual.

1.7 Referenced documents

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

- Company instructions and approval rules

If applicable:

- Safety data sheet of the lubricant used
- Project planning documents
- Supplementary information regarding special designs of the pump. This you will find in the special system documentation.
- Instructions for other components for setting up the centralized lubrication system.

1.8 Prohibition of certain activities

- Replacement of or modifications to the pistons of the pump elements
- Repairs or modifications to the drive.

1.9 Painting plastic components and seals

The painting of any plastic components and seals of the products described is prohibited. Completely mask or remove plastic components before painting the main machine.

1.10 Safety markings on the product

Fig. 1	
	Risk of dangerous electrical voltage (on the motor's terminal box; VAC pumps only)
	Risk of wrapping, pinching, crushing, or shearing when the reservoir cover is open
	Direction of pump rotation

Possible safety markings on the product

1.11 Note on the type plate

The type plate provides important data such as the type designation, order number, and sometimes regulatory characteristics. To avoid loss of this data in case the type plate becomes illegible, it should be entered in the manual.



Type plate (example)

Table 2	
Table for copying out the type plate	
Material number (1):	_____
Type designation (2):	_____

1.12 Notes on CE marking



CE marking is effected following the requirements of the applied directives requiring a CE marking:

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

1.13 Note on Low Voltage Directive

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

1.14 Note on Pressure Equipment Directive

Due to its performance characteristics, the product does not reach the limit values defined in Article 4, Paragraph 1, Subparagraph (a) (ii) and is excluded from the scope of Pressure Equipment Directive 2014/68/EU in accordance with Article 1, Paragraph 2 Subparagraph (f).

1.15 Note on UKCA marking



The UKCA conformity marking confirms the product's conformity with the applicable legal provisions of Great Britain.

1.16 Note on EAC marking



The EAC conformity marking confirms the product's conformity with the applicable legal provisions of the Eurasian customs union.

1.17 Note on China RoHS mark



The China RoHS mark confirms that there is no danger to persons or the environment from the regulated substances contained within for the intended period of use (year number shown in the circle).

1.18 Emergency shutdown

This is done by a course of action to be defined by the operator.

1.19 Assembly, maintenance, fault, repair

Prior to the start of this work, all relevant persons must be notified of it. At a minimum, the following safety measures must be taken before any work is done:

- Unauthorized persons must be kept away
- Mark and secure the work area

- Cover adjacent live parts
 - Dry any wet, slippery surfaces or cover them appropriately
 - Cover hot or cold surfaces appropriately
- Where applicable:

- Depressurize
- Isolate, lock and tag out
- Check to ensure live voltage is no longer present
- Ground and short-circuit.

The product should be protected as much as possible from humidity, dust, and vibration, and should be installed so that it is easily accessible. Ensure an adequate distance from sources of heat or cold. Any visual monitoring devices present, such as pressure gauges, min./max. markings, or oil level gauges must be clearly visible. Observe the mounting position requirements.

Drill required holes only on non-critical, non-load-bearing parts of the operator's infrastructure. Use existing holes where possible. Avoid chafe points. Immobilize any moving or detached parts during the work. Adhere to the specified torques.

If guards or safety devices need to be removed, they must be reinstalled immediately following conclusion of work and then checked for proper function.

Check new parts for compliance with the intended use before using them.

Avoid mixing up or incorrectly assembling disassembled parts. Label parts. Clean any dirty parts.

1.20 First start-up, daily start-up

Ensure that:

- All safety devices are fully present and functional
- All connections are properly connected
- All parts are correctly installed
- All warning labels on the product are fully present, visible, and undamaged
- Illegible or missing warning labels are immediately replaced.

1.21 Residual risks

Table 3

Residual risks		
Residual risk	Possible in lifecycle	Avoidance / Remedy
Personal injury / property damage due to falling of hoisted parts	A B C G H K	Unauthorized persons must be kept away. Nobody is allowed to be present below hoisted parts. Lift parts using suitable and tested lifting gear.
Personal injury/property damage due to tilting or falling product due to non-compliance with specified torques	B C D E F G	- Adhere to the specified torques - Mount the product only on components with a sufficient load-carrying capacity. - If no torques are specified, use those specified for the screw size for screws of strength class 8.8.
Personal injury / property damage due to electric shock	B C D E F G H	- Inspect power cables for damage prior to initial use and then at regular intervals. - Before connecting the pump unit, de-energize all relevant electrical components. Observe any discharge times. - Do not install the cable on moving parts or wearing spots. If this cannot be avoided, use anti-kink coils and/or conduits.
Personal injury / property damage due to spilled, leaked lubricant	B C D E F G H K	- Be careful when filling the reservoir and then connecting or disconnecting the lubricant lines. - Use only hydraulic screw unions and lubrication lines suitable for the specified pressure. - Do not install lubrication lines on moving parts or chafe points. If this cannot be avoided, use flexible hose lines or anti-kink coils and/or conduits. - Promptly apply suitable binding agents and then remove the spilled or leaked lubricant. - Follow operational instructions for handling the lubricants and contaminated parts.
Injury from contact with the stirring paddle when filling the pump	C D F	Preferably fill via the fill connection. Fill from the top, only when the paddle is motionless, and with the pump de-energized. Do not reach into the reservoir while filling.
Objects falling into the motor vent	C D E F	If the motor is installed vertically and there is a risk of objects (such as stones, metal chips, etc.) falling into the motor vent, a suitable canopy must be fitted.
Injury from hot/faulty motor	E F G	Switch off the pump. Let parts cool off; remedy the cause.

Lifecycle phases: A = Transport, B = Assembly, C = First start-up, D = Operation, E = Cleaning, F = Maintenance, G = Malfunction, repair, H = Shutdown, K = Disposal

2 Lubricants

2.1 General information

Lubricants are selected specifically for the relevant application. The manufacturer or operator of the machine should ideally make the selection in consultation with the supplier of the lubricant. If you have no or little experience in selecting lubricants for lubrication systems, please contact us. We would be happy to assist you in selecting suitable lubricants and components to build a lubrication system optimized for your particular application. Consider the following points when selecting/using lubricants. This will spare you potential downtime and damage to the machine or lubrication system.

2.2 Material compatibility

The lubricants must generally be compatible with the following materials:

- Plastics: ABS, CR, FPM, NBR, NR, PA, PET, PMMA, POM, PP, PS, PTFE, PU, PUR
- Metals: steel, gray cast iron, brass, copper, aluminum.

2.3 Temperature properties

The lubricant used must be suitable for the specific ambient temperature of the product. The viscosity approved for proper functioning must neither be exceeded at low temperatures nor fall too low at high temperatures. For the approved viscosity, see the "Technical data" chapter.

2.4 Aging of lubricants

Based on past experience with the lubricant used, checks should be conducted at regular intervals defined by the operator, to determine whether the lubricant needs to be replaced due to aging processes (oil separation). In case of doubt regarding the continued suitability of the lubricant, it must be replaced before the system is started up again. If you do not yet have any experience with the lubricant used, we recommend conducting a check after just one week.

2.5 Avoidance of faults and hazards

To avoid faults and hazards, please observe the following:

- When handling lubricants, observe the relevant safety data sheet (SDS) and any hazard labeling on the packaging.
- Due to the large number of additives, some lubricants that meet the pumpability requirements specified in the manual are not suitable for use in centralized lubrication systems.
- Whenever possible, always use SKF lubrication greases. They are ideal for use in lubrication systems.
- Do not mix lubricants. This can have unpredictable effects on the properties and usability of the lubricant.
- Use lubricants containing solid lubricants only after technical consultation with SKF.
- The lubricant's ignition temperature has to be at least 50 kelvin above the maximum surface temperature of the components.

2.6 Solid lubricants

Solid lubricants may only be used after prior consultation with SKF. When solid lubricants are used in lubrication systems, the following rules generally apply:

Graphite:

- Maximum graphite content 8%
- Maximum grain size 25 µm (preferably in lamellar form).

MoS₂:

- Maximum MoS₂ content 5%
- Maximum grain size 15 µm.

Copper:

- Lubricants containing copper are known to lead to coatings forming on pistons, bore holes, and mating surfaces. This can result in blockages in the centralized lubrication system.

Calcium carbonate:

- Lubricants containing calcium carbonate are known to lead to very heavy wear on pistons, bore holes, and mating surfaces.

Calcium hydroxide:

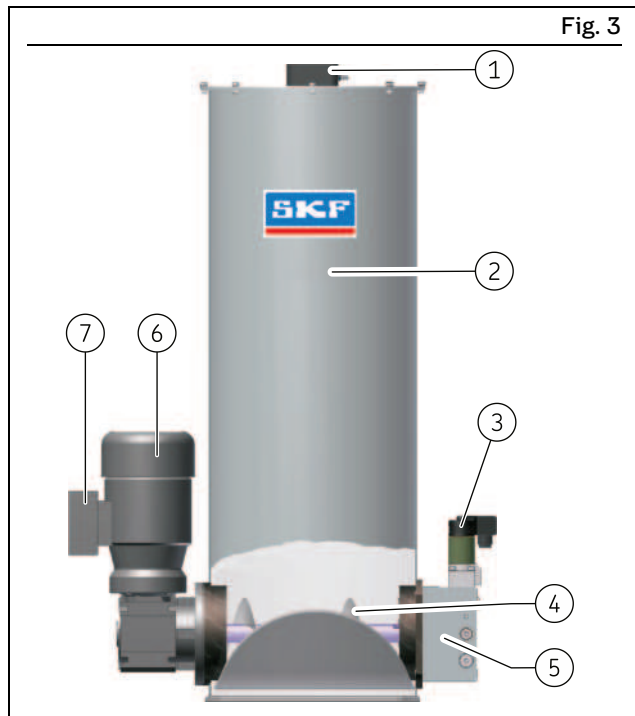
- Lubricants containing calcium hydroxide are known to harden considerably over time, which can lead to failure of the centralized lubrication system.

PTFE, zinc, and aluminum:

- For these solid lubricants, it is not yet possible to define any limit values for use in lubrication systems on the basis of existing knowledge and practical experience.

3 Overview, functional description

3.1 Overview



Components

- | | |
|---|-----------------------------------|
| 1 Ultrasonic sensor (optional) | 5 Radial piston pump |
| 2 Lubricant reservoir | 6 Geared motor |
| 3 3/2 directional solenoid valve (optional) | 7 Electrical connection for motor |
| 4 Screw conveyor drive shaft | |

The FK pump unit is a multi-function piston pump whose modular design makes it very versatile.

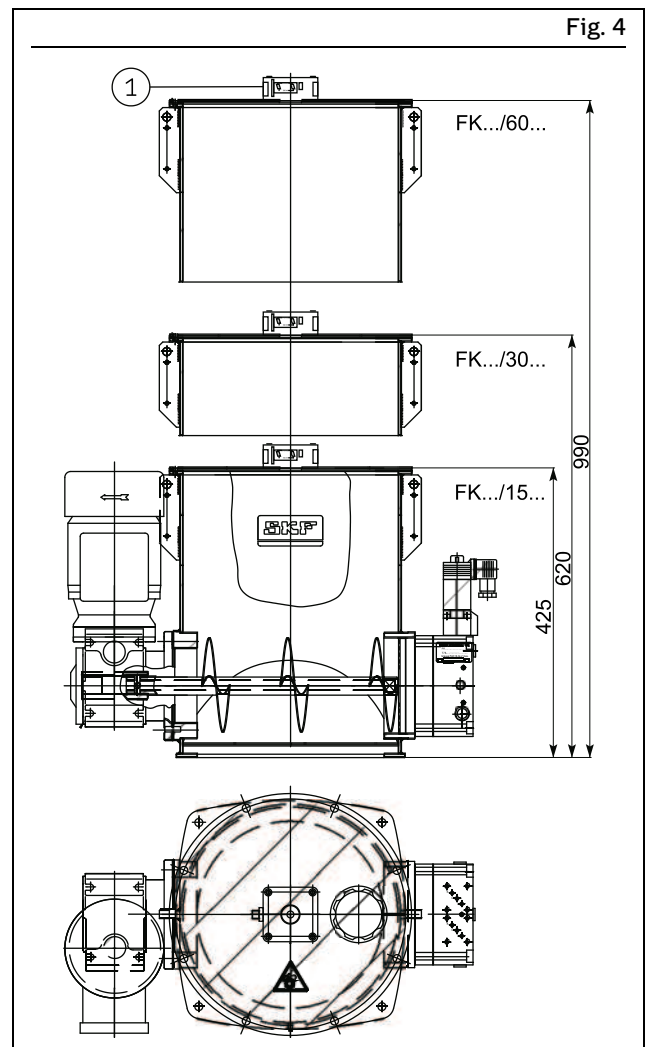
The FK pump unit can be used as a progressive, single-line or dual-line pump unit with or without integrated changeover valves.

The modular design of the pump also allows it to be retrofitted from one of the above-mentioned lubrication systems to another system.

NOTE

Retrofitting can only be performed by SKF Service and is therefore not described in these instructions.

3.2 Design



FK pump designs

- 1 Ultrasonic sensor (optional, design "U2")

The FK grease lubrication pump unit, which was designed to handle demanding usage, is available in reservoir sizes of 15 kg, 30 kg and 60 kg.

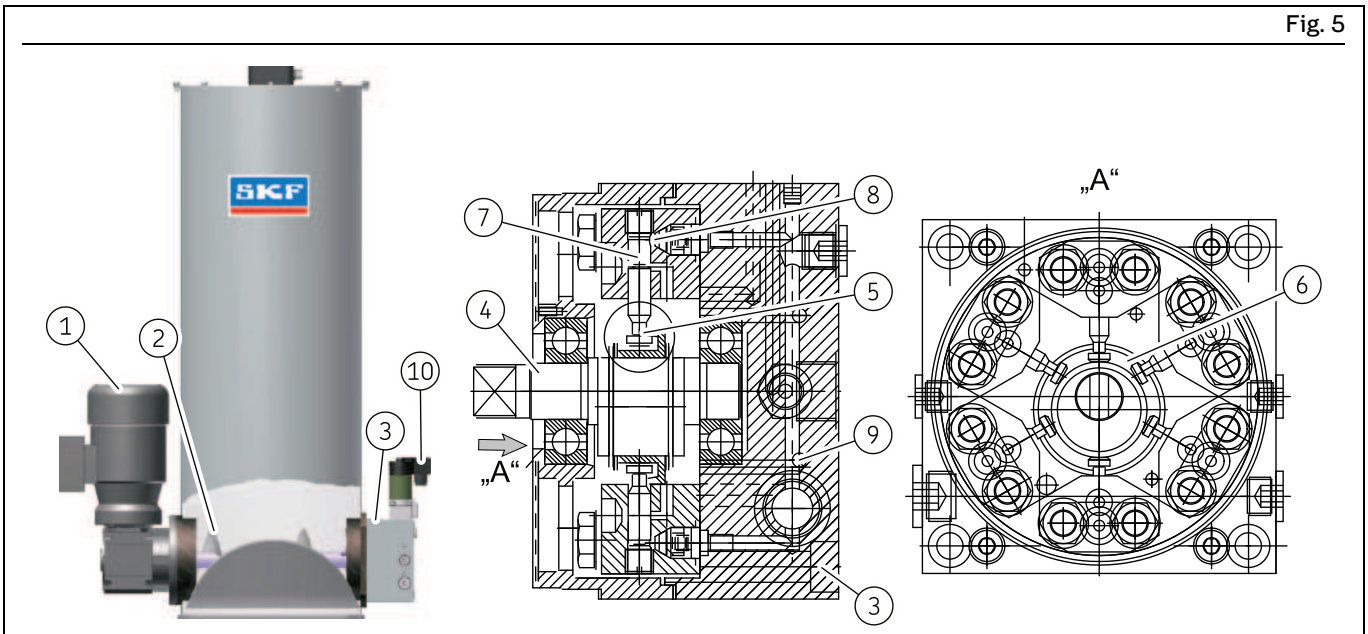
A screw conveyor drive shaft fastened to the geared motor drives the pump unit and feeds grease to the radial piston pump flanged to the opposite side. Depending on the delivery output required, the radial piston pump can be equipped with up to six pump elements (internally consolidated).

Based on the application, the radial piston pump is supplied as a progressive, single-line or dual-line pump, with or without reversing function.

The fill level is monitored by an optional ultrasonic sensor with maximum and minimum switching points.

3.3 Functional description

Fig. 5



Structure and functioning of the FK radial piston pump

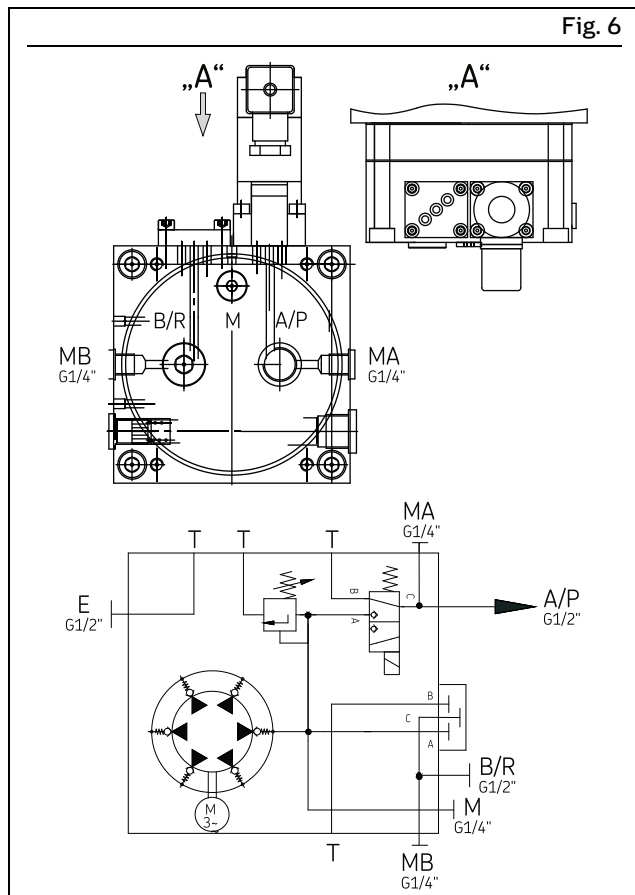
- | | |
|------------------------------|-----------------------------------|
| 1 Geared motor | 6 Cam disc |
| 2 Screw conveyor drive shaft | 7 Pump element |
| 3 Radial piston pump | 8 Check valve |
| 4 Eccentric shaft | 9 Ring line |
| 5 Pump piston | 10 3/2 directional solenoid valve |

The FK pump unit is driven by an electric geared motor (1) that is radially flanged to the left side of the reservoir. A screw conveyor drive shaft (2) flanged to the geared motor delivers the lubricant in the reservoir to the radial piston pump (3) on the opposite side of the reservoir and drives it as well.

Piston stroke motions by the radial piston pump (3) are performed using a rotating eccentric shaft (4). Piston return (suction phase) is performed by positively driven pump pistons (5) that run in a cam disc (6). Depending on the volume of lubricant required, the radial piston pump can be equipped with up to six pump elements (7). Each pump element delivers the lubricant via its dedicated check valve (8) into a common downstream ring line (9).

This protects the radial piston pump from potential pressure spikes. The further course of the lubricant depends on the specific pump usage: whether it is used as a progressive, single-line, or dual-line pump (see the descriptions below for the individual variants).

3.3.1 FK1 pump unit for single-line centralized lubrication systems



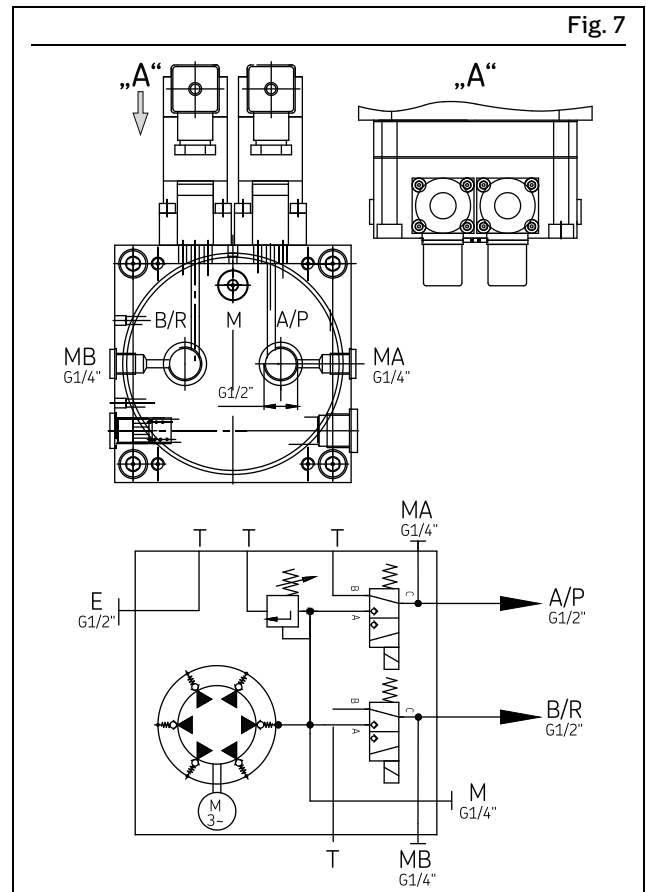
FK1 connection drawing

The lubricant that comes from the ring line (Fig. 5/9) is delivered to the inlet of the 3/2 directional solenoid valve (Fig. 5/10) flanged onto the pump.

When the solenoid valve is activated, the lubricant flows to the pump outlet (Fig. 6/A/P). After this, the lubricant is passed on through the main lubricant line to the downstream single-line metering devices.

When the 3/2 directional solenoid valve is de-energized, the pressure is relieved in the main lubricant line and lubricant goes back to the lubricant reservoir (Fig. 6/T).

3.3.2 FK2 pump unit for dual-line centralized lubrication systems with integrated changeover valves



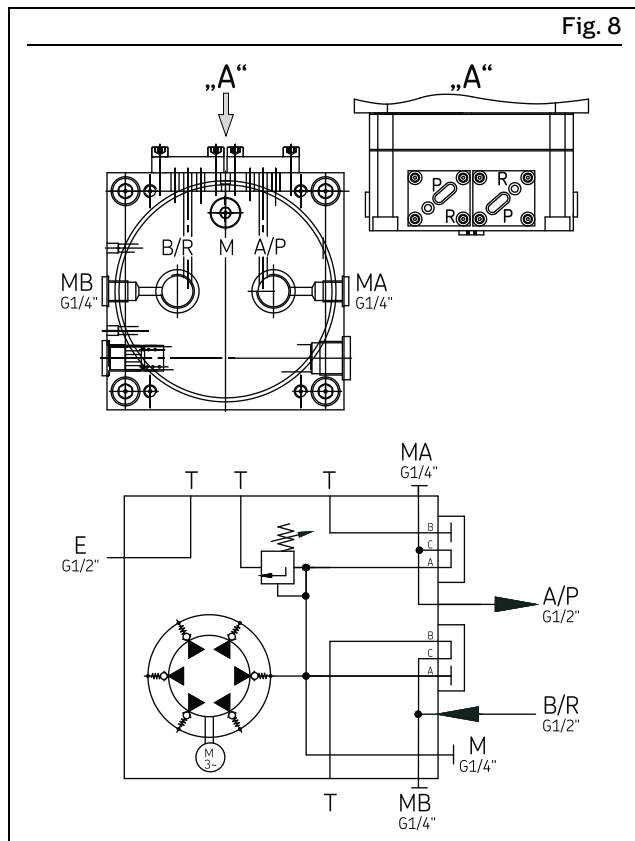
FK2 connection drawing

The lubricant that comes from the ring line (Fig. 5/9) is delivered to the inlets of both 3/2 directional solenoid valves (Fig. 5/10).

If the 3/2 directional solenoid valve for connection A is activated, the lubricant flows to outlet A. From there it passes through the connected main lubricant line to the downstream dual-line metering devices. At the same time, pressure in the second main lubricant line is relieved. This is done by the second, non-activated directional solenoid valve B, taking lubricant back to the lubricant reservoir (Fig. 7/T).

When the required system pressure is reached, both directional solenoid valves switch over, so that the main lubricant line that was pressurized is now relieved, and the unpressurized main lubricant line is now pressurized. In a de-energized state, both main lines are relieved.

3.3.3 FK3 pump unit for dual-line centralized lubrication systems without integrated changeover valves

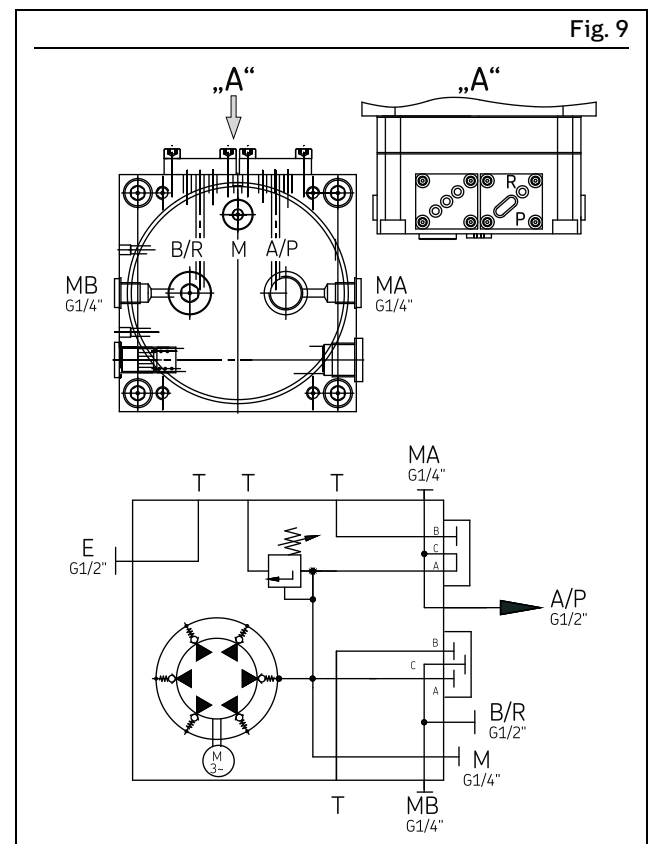


FK3 connection drawing

Lubricant that comes from the ring line (Fig. 5/9) is delivered to pump outlet (Fig. 8/„A/P“). From there it is passed to the downstream external changeover valves.

The pump outlet (Fig. 8/„B/R“) serves to return the lubricant from the downstream changeover valve or pressure relief of one of the two main lines into the lubricant reservoir (Fig. 8/„T“).

3.3.4 FK4 pump unit for progressive centralized lubrication systems



FK4 connection drawing

Lubricant that comes from the ring line (Fig. 5/9) is delivered to pump outlet (Fig. 9/„A/P“). From there it is passed to the downstream progressive metering devices. The pump outlet (Fig. 9/„B/R“) is closed on pump design FK4.

4 Technical data

4.1 FK pump

Table 4

Technical data of the pump

Parameter

Number of pump elements	1	2	3	4	5	6
Delivery rate	0.67 kg/h	1.34 kg/h	2.00 kg/h	2.64 kg/h	3.34 kg/h	4.00 kg/h
Operating pressure	max. 400 bar [5800 psi]					
Operating temperature	-25 to +60 °C [-13 to +140 °F]					
Pressure limiting valve	Factory-set 200 bar, 300 bar or 400 bar					
Pipe thread for pressure, relief, and filling lines	G 1/2"					
Lubricant	Mineral oils or environmentally compatible oils from ISO VG 46 to greases of NLGI Grade 3 (consultation required for synthetic oils) Dynamic viscosity (oil): $\geq 50 \text{ mm}^2/\text{s}$ Worked penetration (grease): $> 220 \cdot 10^{-1} \text{ mm}$					
Drive motor	See section Drive motors, Page 17					
Mounting position	Vertical					

Table 5

Empty weight of pump

Parameter

Reservoir	15 kg	30 kg	60 kg
Weight (approx.)	46.2 kg	52.3 kg	64.0 kg

4.2 Drive motors

Table 6

Technical data for AC motors					
Item number		84-1731-4801	84-1731-4802	84-1731-4812	84-2731-5801
Nominal voltage	[VAC]	230 / 400 ±10%	290 / 500 ±10%	400 / 690	400 / 690
Frequency f	[Hz]	50	50	50	60
Rated capacity P	[kW]	0.37	0.37	0.37	0.37
Output speed	[rpm]	1405 / 35	1360 / 34	1360 / 34	1675 / 42
Output torque M	[Nm]	60	62	62	51.6
Gear reduction ratio		40:1	40:1	40:1	40:1
Rated current I _N	[A]	1.58 / 0.91	1.10 / 0.64	1.10 / 0.64	1.10 / 0.64
Power factor cos φ		0.76	0.75	0.75	0.8
Application factor		1.4	1.3	1.3	1.6
Operating mode		S1	S1	S1	S1
Insulation class		F	F	F	F
Enclosure rating		IP55	IP55	IP55	IP55
Gearbox options					
Item number of base module		60591400	60591400	60591400	Universal gearbox
Flange		FA/I	FA/I	FA/I	B5
Type		B14 C105	B14 C105	B14 C105	Attachment cylinder
					IEC71 B14 C105
Cover hood		HA	HA	HA	HB
Lubricant		Oil, ISO VG 680	Oil, ISO VG 680	Oil, ISO VG 680	Oil, ISO VG 680
Lubricant quantity	[l]	0.095	0.095	0.095	0.095

Table 7

Technical data for DC motor		
Item number		84-0020-4401
Voltage U _a / U _e	[VDC]	24
Power	[kW]	0.16
Output speed	[rpm]	1000
Power consumption	[A]	6.4
I _a		
Power consumption	[A]	2.9
I _e		
Operating mode		S1
Insulation class		F
Enclosure rating		IP54
Worm drive		
Item number		24-0701-3508
Gear reduction ratio		80:1
Flange		B5
Type		Attachment cylinder
		IEC71 B14 C105
Cover hood		HB

4.3 Ultrasonic sensor

Table 8

Technical data	
Parameter	Value
Type	Ultrasonic sensor, 2 adjustable switching points (max., min.)
Sensing range	60 to 1000 mm
Setting range	90 to 1000 mm
Operating voltage U _B	10 to 30 VDC
Residual ripple	±10 %
No-load power consumption	≤ 50 mA
Connection type	M12 connector, 5-pin
Response delay	approx. 150 ms
Enclosure rating per EN 60529	IP65
Operating temperature range	-25 °C to +70 °C
Conformity with standards	EN IEC 60947-5-2
Display and control elements	2 x yellow LED (LED shows steady light: switching points 1/2, LED flashing: teach-in function), 1 x red LED (fault indication) 2 x buttons (teaching the switching points)
Housing material	PBT, polyester, ultrasonic transducer: PUR, epoxy resin with glass contents
Switching output	2 pnp switching outputs, selectable NO-/NC contact

Table 9

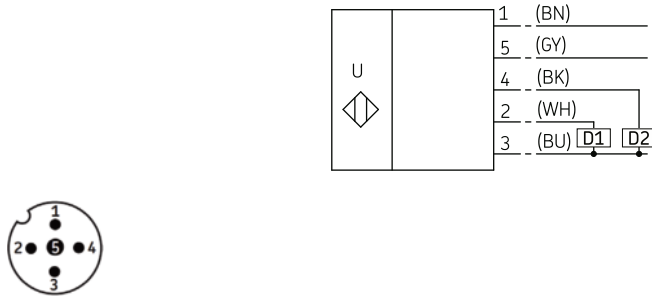
Electrical connection			
			
1	+ U _B	Brown (BN)	
3	- U _B	Blue (BU)	
4	Switching output D1 (max.)	Black (BK)	
2	Switching output D2 (min.)	White (WH)	
5	Sync	Gray (GY)	

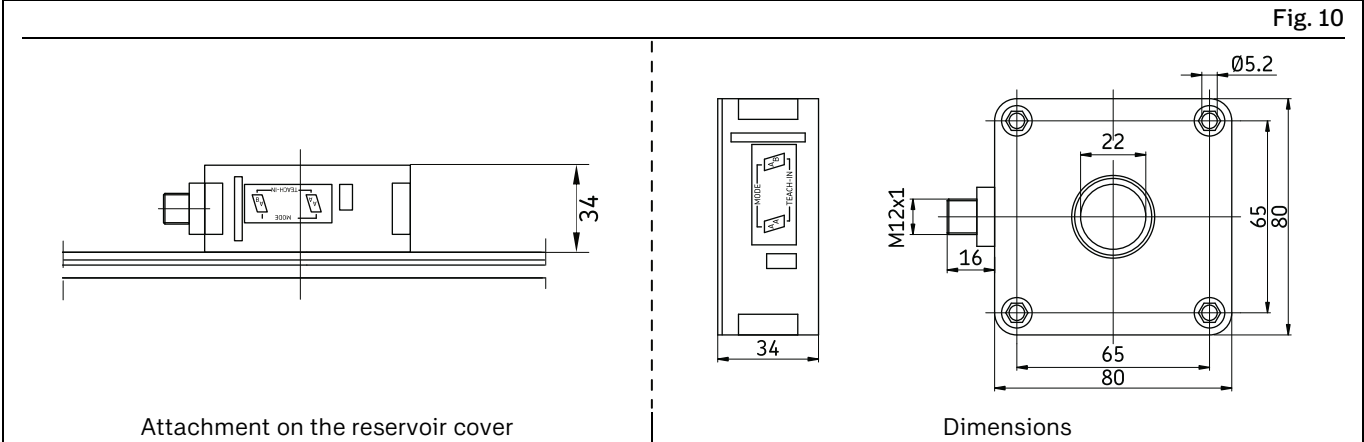
Table 10

Display of the circuit states

Parameter	Switching points		Display of the LEDs	
	D1	D2		
Full signal (max.)	A	B	A	B
Empty signal (min.)	B	A	B	A

A = switched (light is on), B = not switched (light is not on)

Dimensions:



Dimensions

4.4 3/2 directional solenoid valve

Table 11	
Technical data	
Parameter	Value
Design	3/2 directional solenoid valve
Basic position	closed when de-energized
Operating voltage U_b	24 VDC
Rated current	1.1 A
Rated capacity	26 W
Duty cycle	100 % duty cycle (at max. +35 °C)
Enclosure rating	IP65
Connection type	Plug connector DIN EN 175301-803
Connection diagram	 + 1 - 2 ⏏

4.5 Type identification code for FK pump

Example: FK 2 / 15 U2 1M 04 / 6 / 400 M2 3 / 0001 AF 07													
Type series: FK Grease Lubrication Pump Unit													
Design:													
1 Unit for single-line centralized lubrication systems													
2 Unit for dual-line centralized lubrication systems with changeover valves													
3 Unit for dual-line centralized lubrication systems without changeover valves													
4 Unit for progressive systems													
Reservoir capacity:													
15 15 kg													
30 30 kg													
60 60 kg													
Fill level monitoring:													
X Without													
U2 Ultrasonic sensor with 2 switching points													
Drive type:													
1M													
Gear ratio:													
04 40:1													
Delivery volume:													
1 0.67 kg/h (12.3 cm ³ /min)													
2 1.34 kg/h (24.7 cm ³ /min)													
3 2.00 kg/h (37.0 cm ³ /min)													
4 2.64 kg/h (49.3 cm ³ /min)													
5 3.34 kg/h (61.7 cm ³ /min)													
6 4.00 kg/h (74.0 cm ³ /min)													
Pressure limiting valve:													
200 200 bar (for progressive, single-line and dual-line centralized lubrication systems)													
300 300 bar (for progressive, single-line and dual-line centralized lubrication systems)													
400 400 bar (for dual-line centralized lubrication systems)													
Pressure gauge:													
/ without pressure gauge													
MA 1x pressure gauge (for progressive, single-line and dual-line systems)													
M2 2x pressure gauge (for dual-line systems)													
Fill connection/Screw cap:													
0 without filler coupling													
1 with filler coupling													
2 without filler coupling with screw cap													
3 with filler coupling and screw cap													

Example: **FK 2 / 15 U2 1M 04 / 6 / 400 M2 3 / 0001 AF 07**

Design key

0001 Basic design

4001 Basic design with control cabinet and control unit (on request)

Motor data ¹⁾:

AF Motor speed 1500 rpm, nominal voltage 230/400 VAC, 50 Hz

Enclosure rating of the motor:

07 IP55 F

¹⁾ Other specifications available on request

5 Delivery, returns, storage

5.1 Delivery

After receipt of the shipment, it must be inspected for any shipping damage and for completeness according to the shipping documents. Immediately inform the transport carrier of any shipping damage. The packaging material must be preserved until any discrepancies are resolved.

5.2 Return shipment

Before return shipment, all contaminated parts must be cleaned. If this is not possible or practical, e.g. if it would impede fault detection in the case of complaints, the medium used must always be specified. In the case of products contaminated with hazardous substances as defined by GHS or CLP regulations, the safety data sheet (SDS) must be sent with the product and the packaging must be labelled in accordance with GHS/CLP. There are no restrictions for land, air, or sea transport. The choice of packaging should be based on the specific product and the stresses to be expected during transport (e.g., necessary anti-corrosion measures in the case of shipment by sea). In the case of wooden packaging, the applicable import regulations and the IPPC standards must be observed. Required certificates must be included in the shipping documents. The following information, as a minimum, must be marked on the packaging of return shipments.



Marking of return shipments

5.3 Storage

The following conditions apply to storage:

- Dry, low-dust, vibration-free, in closed rooms
- No corrosive, aggressive substances at the storage location (e.g., UV rays, ozone)
- Protected against animals (insects, rodents)
- If possible, keep in the original product packaging
- Protected from nearby sources of heat or cold
- In the case of large temperature fluctuations or high humidity, take appropriate measures (e.g., heating) to prevent the condensation of water
- Before usage, check products for damage that may have occurred during storage. This applies in particular to parts made of plastic (due to embrittlement).

5.4 Storage temperature range

For parts not filled with lubricant, the permitted storage temperature is the same as the permitted ambient temperature range (see "Technical data").

5.5 Storage conditions for products filled with lubricant

For products filled with lubricant, the permitted storage temperature range is:

minimum	+ 5 °C	[+41 °F]
maximum	+ 35 °C	[+95 °F]

If the storage temperature range is not maintained, the following steps for replacing the lubricant may not lead to the desired result under certain circumstances.

5.5.1 Storage period up to 6 months

Filled products can be used without implementing additional measures.

5.5.2 Storage period between 6 and 18 months

Pump:

- Connect the pump to a power source
- Switch on the pump and run it until lubricant comes out of every outlet without air bubbles
- Disconnect the pump from the power source
- Remove and dispose of the lubricant that came out

Lines:

- Remove pre-installed lines
- Ensure that both ends of the line are open
- Fill the lines completely with fresh lubricant

Metering devices:

NOTE

Due to the large number of different metering devices, no universally valid statement can be made regarding the removal of the old lubricant and correct bleeding after filling with new lubricant. The instructions can be found in the technical documentation of the specific metering device used.

5.5.3 Storage period more than 18 months

To prevent faults, the manufacturer should be consulted before start-up. The basic procedure for removal of the old lubrication filling corresponds to that for storage periods between 6 and 18 months.

5.6 Declaration of decontamination

If the product came in contact with harmful substances, make sure to thoroughly clean the product before returning it to us. Due to statutory provisions and for the safety of our employees and operation facilities we further need a fully completed and signed "Declaration of decontamination".

6 Assembly

6.1 General safety instructions

Observe the safety instructions and the technical data in this manual. Additionally, during assembly pay attention to the following:

- Only qualified and authorized technical personnel may install the products described in this manual.
- Adhere to safety distances and legal prescriptions on assembly and prevention of accidents.
- Possibly existing visual monitoring devices, e.g. pressure gauges, MIN/MAX markings, oil inspection glasses must be clearly visible.
- Protect the product against humidity, dust and vibrations.
- Install the product in an easily accessible position. This facilitates other installations, control and maintenance work.

6.2 Internal transportation

WARNING



Risk of injury due to heavy weight

Improper handling of heavy components can lead to injuries and damage.

- Use suitable equipment to lift and transport heavy loads.
- Always secure loads to prevent unintended movement.
- Wear safety shoes.
- Keep an adequate safe distance away from suspended loads.
- Never walk under a suspended load.

WARNING



Risk of injury due to transportation devices

Improper use of transportation devices can lead to injuries and damage.

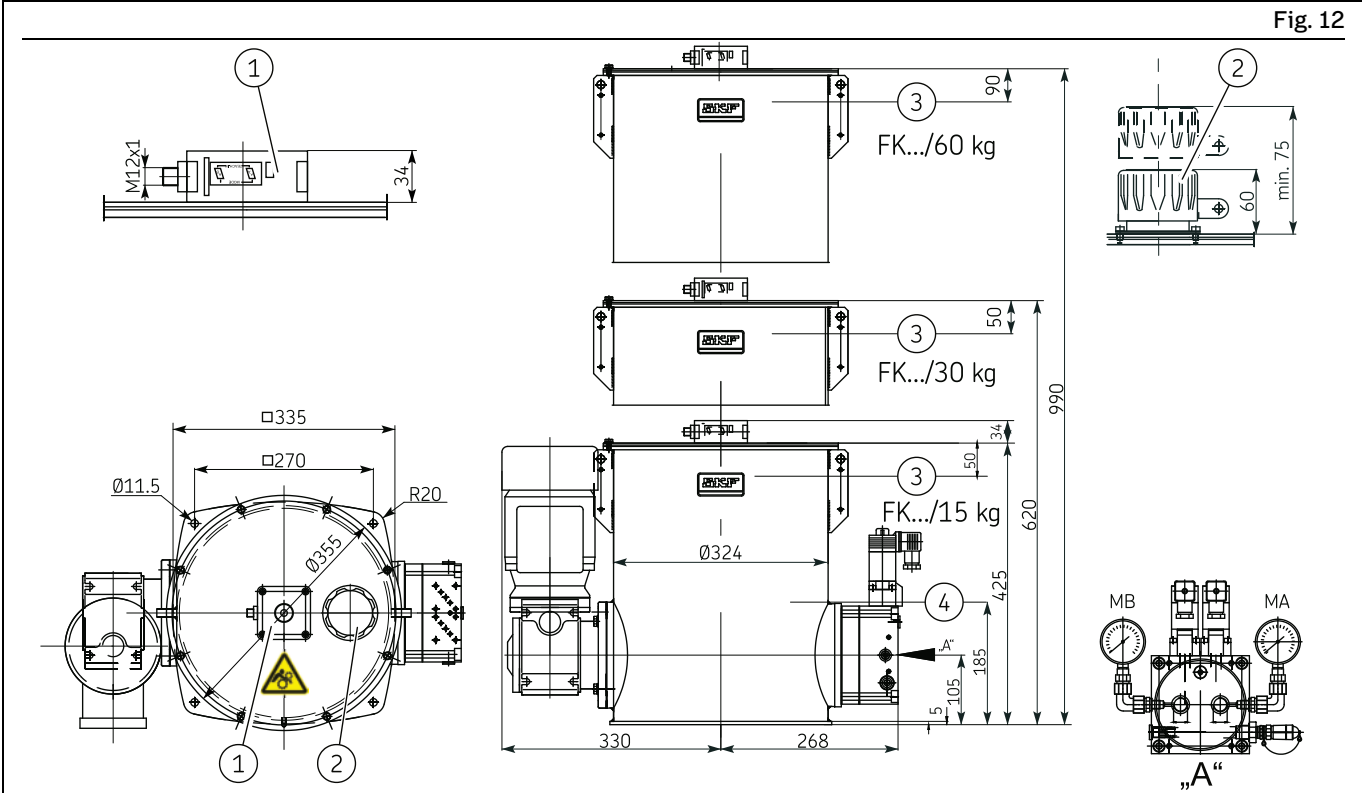
- Transportation devices, such as forklifts and cranes, may only be used by authorized personnel.

Observe the following points for internal transportation of the pump:

- SKF recommends that the customer use a height-adjustable pallet jack or a forklift for transport to the installation or storage location.
- During transportation, use at least two ratchet straps to secure the pump against the tipping over.
- The lifting equipment provided by the customer, such as forklifts, pallet jacks, ratchet straps, transport nets, etc. must be designed for the total weight of the pump plus a safety margin.

6.3 Dimensions

In order to have sufficient space for maintenance work or for the attachment of additional components for the construction of a centralized lubrication system on the pump, sufficient clearance should be provided for in every direction in addition to the specified dimensions.



Dimensions in mm

- 1 Fill level monitoring (optional U2)
2 Screw cap (optional)
- 3 Switching point for max. fill level
4 Switching point for min. fill level

Table 12

Minimum clearance height for installation		
Reservoir	With fill level monitoring	With screw cap
FK.../15 kg	470 mm	500 mm
FK.../30 kg	665 mm	695 mm
FK.../60 kg	1035 mm	1065 mm

6.4 Assembly

6.4.1 Safety instructions

⚠ WARNING



Risk of injury from the rotation of the screw conveyor drive shaft.

The rotating screw conveyor drive shaft may cause injury if the reservoir cover is not installed.

- Do not switch on the pump unless the reservoir cover is installed

The FK grease lubrication pump unit must be installed on a level surface. The pump's base plate must not be under stress.

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.

6.4.2 Mounting equipment required

The FK grease lubrication pump unit is installed using 4 screws (and washers).

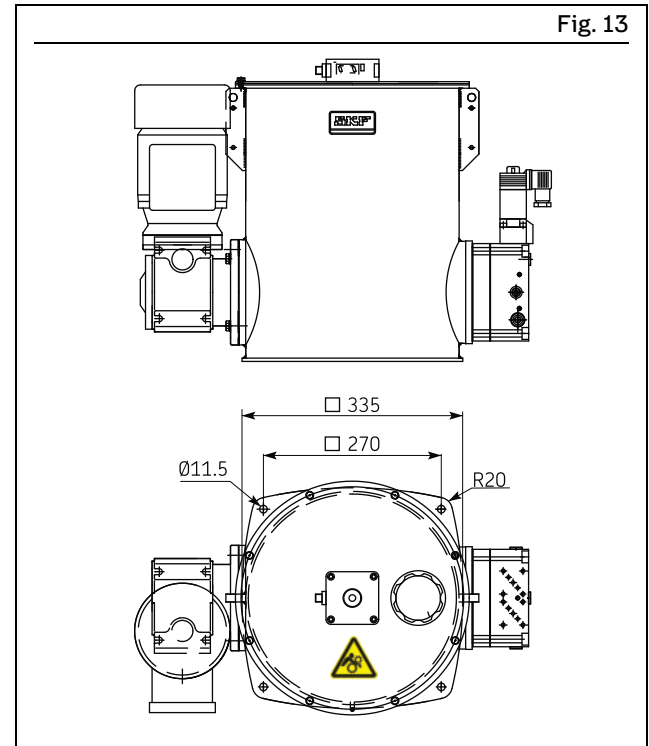
If M10 tapped bores are used to fasten the unit, the screws must have a minimum length of 20 mm.

Fastening material to be provided by the customer:

- Hexagon head screws (4x) acc. to DIN EN ISO 4017:2022-10 M10x20-8.8
- Washers (4x) acc to DIN EN ISO 7090.

6.4.3 Assembly of pump unit

Fig. 13



Assembly holes in mm

1. Drill assembly holes (M10) acc. to assembly drawing (Fig. 13) and the conditions on the surface.
2. Clean the surface to remove drilling chips.
3. Place the pump unit on the surface and roughly align it.
4. Pass hexagon head screws (4x) acc. to DIN EN ISO 4017:2022-10 M10x20-8.8 with associated washers (4x) acc. to DIN EN ISO 7090 through the fixing holes on the pump baseplate and apply the screws to the M10 threads on the surface.
5. Gently tighten hexagon head screws (4x).
6. Align pump unit, tighten hexagon head screws with following torque:
 - Tightening torque: 50 Nm.

6.5 Connection of the lubrication line

⚠ CAUTION



Risk of slipping

Exercise caution when handling lubricants. Immediately remove and bind any leaked lubricants.

NOTICE

Damage to the higher-level machine caused by faulty planning of the centralized lubrication system

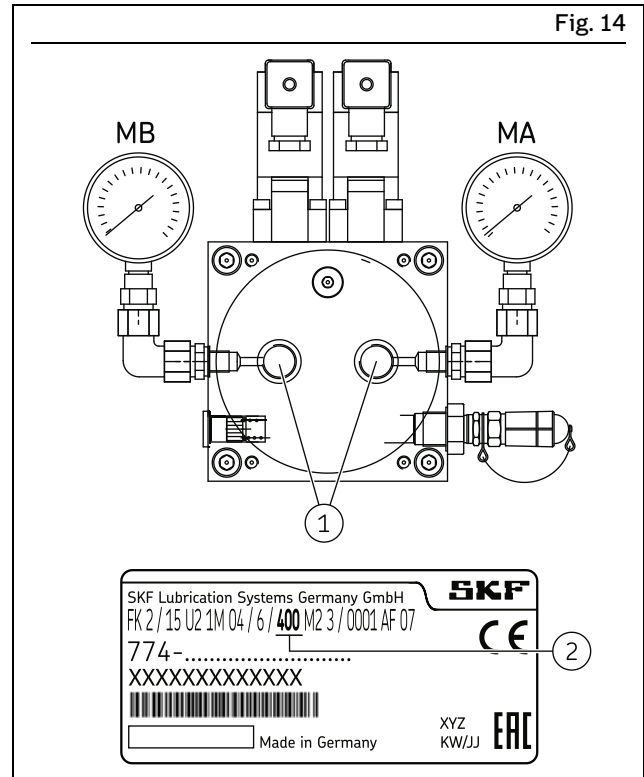
All parts for the construction of the centralized lubrication system must be designed for the maximum operating pressure that occurs, the permissible ambient temperature range, the required delivery volume, and the lubricant to be supplied.

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

- Generally valid regulations and company regulations regarding the laying of pressurized pipe and hose lines must be observed.
- Use only clean, pre-filled components and lubrication piping.
- Secure every lubricant line on the pump against excessive pressure through the use of a suitable pressure limiting valve (only in the case of pumps without an internal pressure limiting valve).
- The main lubricant line should be routed on a rising gradient and should be able to be bled at the highest point. Lubrication lines should always be arranged so that air inclusions cannot form anywhere.
- Install lubricant metering devices at the end of the main lubricant line such that the outlets of the lubricant metering devices point upwards wherever possible.
- If the system configuration requires that the lubricant metering devices be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line.
- The flow of lubricant should not be impeded by the presence of sharp bends, angle valves, flap valves, seals protruding inward, or changes in cross-section (large to small). Unavoidable changes in the cross-section in lubrication lines must have smooth transitions.
- Connect the lubricant lines in such a way that no mechanical forces are transferred to the product (stress-free connection).
- Lubrication piping is to be positioned in such a way that they cannot become kinked, pinched or frayed.

6.5.1 Connecting the radial piston pump

Fig. 14



Screw unions on pump

1 Connections A/P and B/R 2 Maximum operating pressure

All pump designs (F1, F2, F3 or F4) of the FK pump unit have the same pipe thread G1/2".

- For the assignment of the connections, see Connection variants, Page 29 .

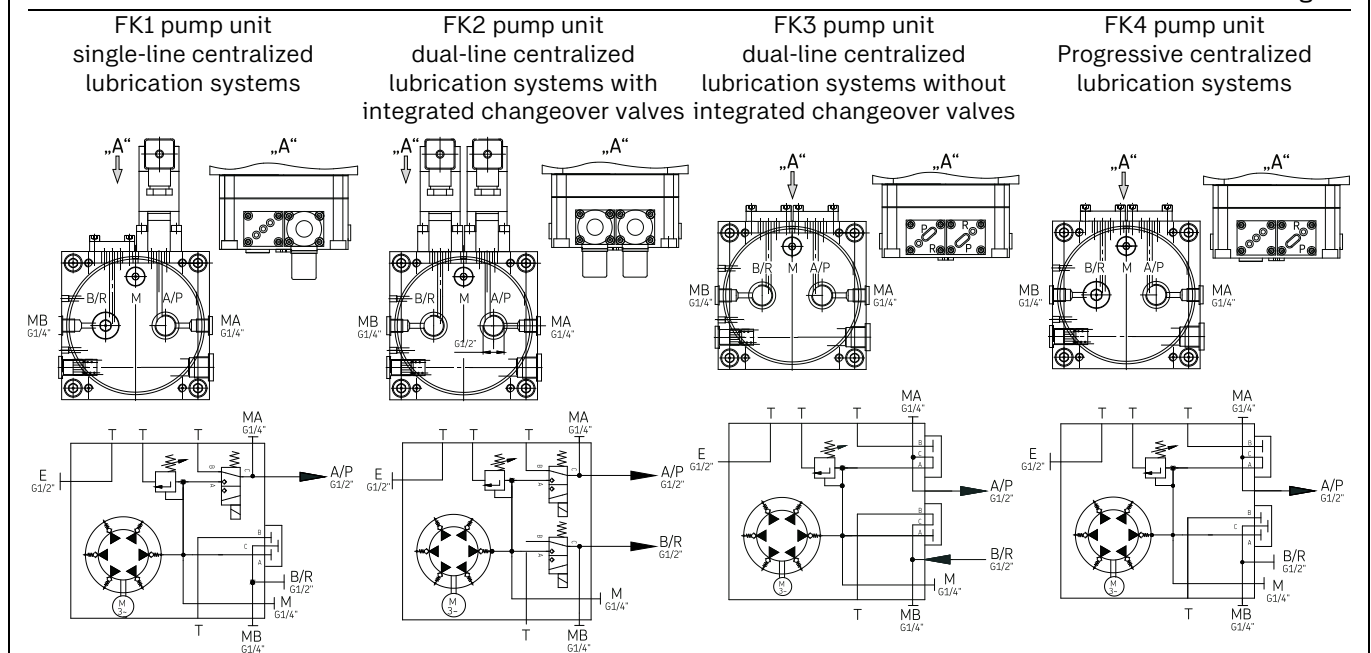
The G1/2" screw union and the downstream piping or tubing must correspond to the maximum permissible operating pressure for the pump unit.

The specification for the factory-set maximum operating pressure is contained in the order number and should be obtained from the order confirmation. The type plate can also be used for further verification.

When selecting the screw unions, piping, and tubing connections, SKF recommends using only the heavy-duty series.

6.5.2 Connection variants

Fig. 15



Connection variants

Table 13

Connection assignment

Connection	FK1 pump unit	FK2 pump unit	FK3 pump unit	FK4 pump unit
A/P	Main lubrication line	Main lubrication line A	Main lubrication line	Main lubrication line
B/R	—	Main lubrication line B	Return line pressure relief	—
E	Fill connection (optional)	Fill connection (optional)	Fill connection (optional)	Fill connection (optional)
T	Lubricant reservoir	Lubricant reservoir	Lubricant reservoir	Lubricant reservoir
MA	Pressure gauge	Pressure gauge A	Pressure gauge A	Pressure gauge A / B
MB	—	Pressure gauge B	Pressure gauge B	—
M	Test connection for pressure limiting valve or additional lubrication line	Test connection for pressure limiting valve or additional lubrication line	Test connection for pressure limiting valve or additional lubrication line	Test connection for pressure limiting valve or additional lubrication line

6.6 Filling with lubricant

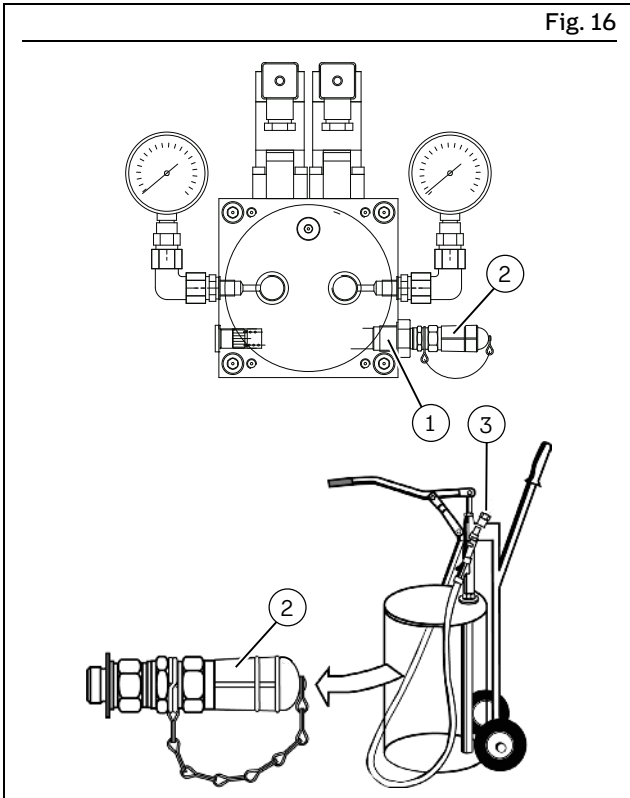
NOTICE

Operational malfunctions due to improper filling with lubricant

Filling through the reservoir cover may introduce air pockets and contaminate the fill level monitoring system, and is therefore not permitted.

- The grease lubrication pump unit may only be filled via the fill connection.

Fig. 16



Filling via the fill connection

- 1 Fill connection G 1/2" 3 Coupling socket
2 Filler coupling (optional)

The pump unit is filled through the fill connection (1) on the radial piston pump.

Optionally, the pump unit can be fitted with a filler coupling (2) (item number 995-000-705) for filling with a filling pump.

A corresponding coupling socket (3) (item number 995-001-500) must be mounted on the filling pump. The cap on the fill connection must be removed before filling.

6.7 Electrical connection

6.7.1 Drive motor

⚠ WARNING



Electric shock

Work on electrical components may be performed only by qualified electricians.



At a minimum, the following safety measures must be taken before any work on electrical components is done:

- Isolate, lock and tag out
- Check to ensure the absence of voltage
- Ground and short-circuit the product
- Cover any live parts in the surrounding area

Observe the guidelines in EN 60034-1 (VDE 0530-1) for operation at the limits of the ranges A (combination of $\pm 5\%$ voltage deviation and $\pm 2\%$ frequency deviation) and B (combination of $\pm 10\%$ voltage deviation and $\pm 3\%$ 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.

Observe the following instructions for a safe connection:

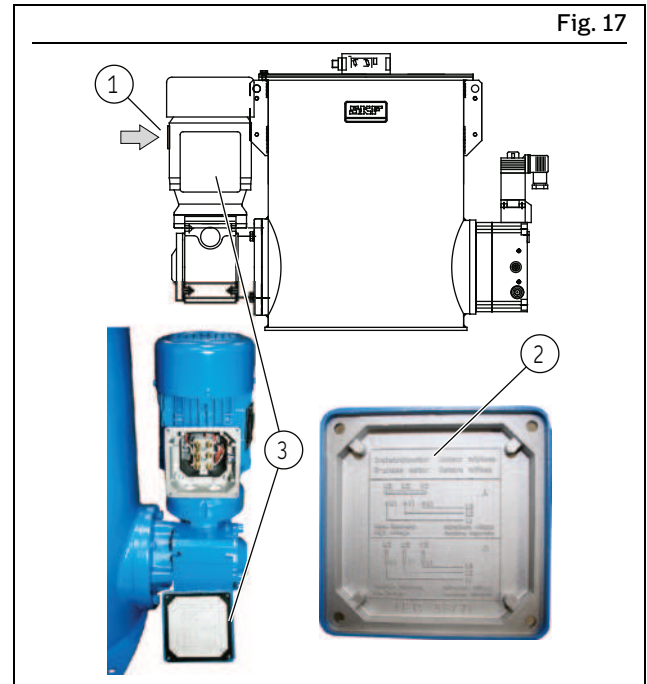
- Be sure to connect the motor so as to guarantee a continuously safe electrical connection (no protruding wire ends); use the assigned cable end fittings (e.g., cable lugs, wire end ferrules).

Select power 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 and EC / EN 60204-1).

- Connect the electrical lines in such a way that no mechanical forces are transferred to the product.
- The pump must be secured with a suitable external fuse (see terminal diagram).

Electrical connection of the drive motor:

Fig. 17



Motor connection

1 Type plate (motor)

2 Terminal diagram

3 Terminal box

The pump is connected electrically in accordance with the specifications of the motor manufacturer. For the technical data of the drive motors, see section Drive motors, Page 17 .

For the terminal diagram, see the terminal box of the motor.

6.7.2 Ultrasonic sensor

Connect the ultrasonic sensor with a 5-pin M12 connector.

- For the pin assignment and technical specifications, see

Ultrasonic sensor, Page 18 .

6.7.3 3/2 directional solenoid valves

Connect the 3/2 directional solenoid valves with a plug-in valve connector as defined by DIN EN 175301-803.

- For the pin assignment and technical specifications, see 3/2 directional solenoid valve, Page 20 .

7 First start-up

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

7.1 Inspections before first start-up

Table 14		
Checklist: Inspections before first start-up		
Inspections to be performed	YES	NO
Electrical connection established correctly.	☐	☐
Mechanical connection established correctly.	☐	☐
The performance characteristics for the aforementioned connections match the specifications in the "Technical data".	☐	☐
All components, e.g. lubrication lines, are pre-filled with the correct lubricant and correctly installed.	☐	☐
No apparent damage, contamination, or corrosion.	☐	☐
Product is protected by a suitable pressure limiting valve.	☐	☐
Any dismantled protective and monitoring equipment is fully reinstalled and functional.	☐	☐
All warning labels on the product are present and in proper condition.	☐	☐
The lubricant used matches the permissible specifications of the pump and the intended use.	☐	☐

7.2 Inspections during first start-up

Table 15		
Checklist: Inspections during first start-up		
Inspections to be performed	YES	NO
No unusual noises, vibrations, moisture accumulation, or odors present.	☐	☐
No undesired discharge of lubricant at connections (leakage).	☐	☐
Lubricant is fed without bubbles.	☐	☐
The bearings and friction points requiring lubrication receive the planned lubricant volume.	☐	☐

7.3 Prerequisites for first start-up

Before starting up the product for the first time, check the following points:

- The items in the checklist “Inspections before first start-up” have been completed.
- The lubricant reservoir must be filled with clean lubricant without introducing bubbles.

7.4 Check the direction of rotation of the drive motor

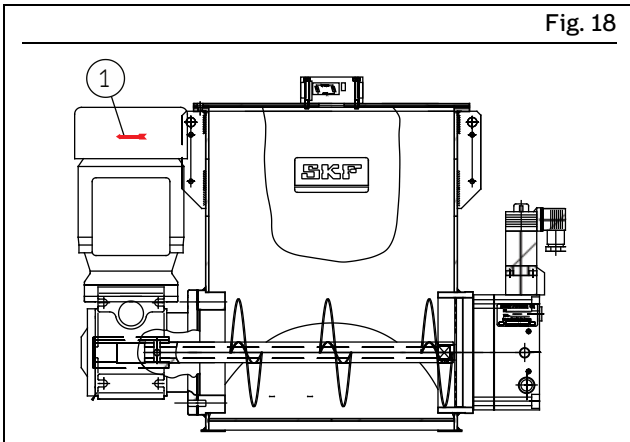


Fig. 18

Arrow indicator on pump motor

1. Switch on the drive motor briefly (for about 1 second).
2. Check the direction of motor rotation based on the arrow (1) attached to the motor housing.
 - If the direction of rotation is incorrect, check the phase sequence and change it in the terminal box of the motor.

7.5 First start-up

The procedure varies depending on the design of the pump unit. Note the assignment of the pump connections as specified in section Connection variants, Page 29 .

NOTE

The first start-up of the pump must be performed without the lubricant lines connected! This prevents air from getting into the lubricant lines.

7.5.1 FK1 pump unit

For single-line centralized lubrication systems:

1. Switch on the 3/2 directional solenoid valve.
2. Switch on the drive motor of the pump unit.
 - After several minutes (depending on the number of installed pump elements), bubble-free grease should discharge from pump outlet "P".
 - If this does not occur, bleed the pump again as described in section Bleeding the pump, Page 33 .
3. Switch off the drive motor of the pump unit.
4. Reconnect the lubrication line.

7.5.2 FK2 pump unit

For dual-line centralized lubrication systems with changeover valves fitted on the pump:

1. Switch on the power supply to the 3/2 directional solenoid valve "A".
2. Switch on the drive motor of the pump unit.
 - After several minutes (depending on the number of installed pump elements), bubble-free grease should discharge from pump outlet "A/P".
 - If this does not occur, bleed the pump again as described in section Bleeding the pump, Page 33 .
3. Switch on the 3/2 directional solenoid valve "B" and switch off the 3/2 directional solenoid valve "A".
 - After several minutes (depending on the number of installed pump elements), bubble-free grease should discharge from pump outlet "B/R".
4. Switch off the drive motor of the pump unit.
5. Reconnect the lubrication lines.

7.5.3 FK3 and FK4 pump units

For centralized lubrication systems with separate changeover valves and for progressive systems:

1. Switch on the drive motor of the pump unit.
 - After several minutes (depending on the number of installed pump elements), bubble-free grease should discharge from pump outlet "P".
 - If this does not occur, bleed the pump again as described in section Bleeding the pump, Page 33 .
2. Switch off the drive motor of the pump unit.
3. Reconnect the lubrication line.

7.6 Bleeding the pump

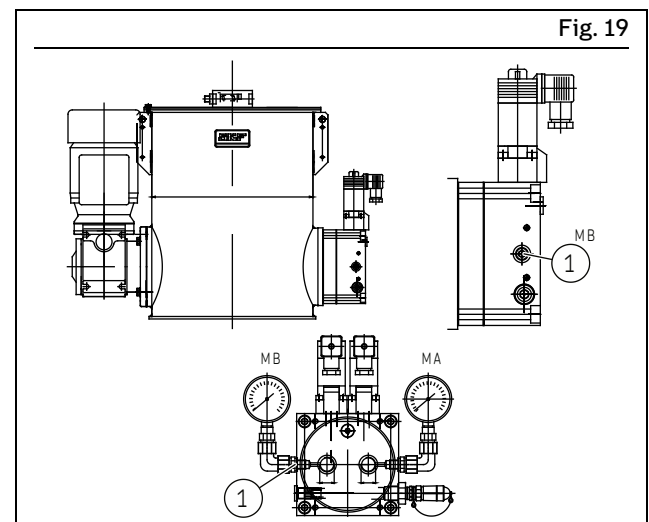


Fig. 19

Bleeding the FK pump unit

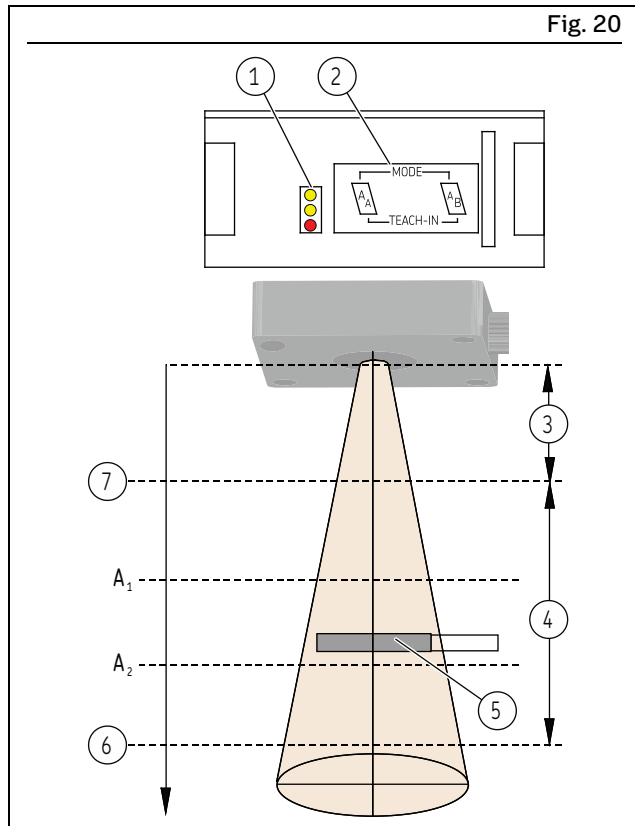
The grease lubrication pump has already been tested with oil and bled at the factory. It could be necessary to bleed the pump again, during first start-up or in the event of faults:

1. Remove screw unions (or pressure gauge) from connection MB (1).
2. Allow the pump unit to run until grease without bubbles discharges from the hole for connection MB.
3. Apply screw unions (or a pressure gauge) to connection MB and tighten.

7.7 Adjusting the switching points of the ultrasonic sensor

NOTE

The max./min. switching points are factory-set based on the reservoir size of the pump unit.
If the switching points need to be adjusted by the user, the parameters must be set as described below.



Configuration of U2 ultrasonic sensor

- | | |
|----------------------|-------------------------------------|
| 1 LED window | 6 Longest sensing distance |
| 2 Membrane keypad | 7 Shortest sensing distance |
| 3 Close range | A ₁ Switching point max. |
| 4 Sensing range | A ₂ Schaltpunkt min. |
| 5 Object (lubricant) | |

Parameterization

The sensor parameters can be set using two buttons. Button A1 is used to start the teach-in mode for switching point 1, and button A2 is used to start the teach-in mode for switching point 2.

The sensor switches to sensitivity adjustment mode if both buttons are pressed when the power is turned on.

If parameterization is not completed within five minutes, the sensor terminates the procedure and leaves the settings unchanged.

Teaching the switching point A₁ (maximum level)

1. Press membrane button A1 >2 s.

- The sensor enters teach-in mode for switching point A₁.
2. Position the target object at the desired distance.
 - The sensor's LEDs show whether the target object is detected. When the object is detected, the yellow LED flashes; when it is not detected, the red LED flashes.
 3. Briefly press membrane button A1.
 - The sensor ends the teach-in procedure for switching point 1 and saves the value in non-volatile memory. The taught-in value is invalid in case of an uncertain object (red LED flashes irregularly). The teach-in mode is left.

Teaching the switching point A₂ (maximum level)

The teach-in procedure for switching point A₂ (minimum) is performed using membrane button A2 in the same way as described above.

8 Operation

SKF products operate largely automatically. The activities required during normal operation are limited primarily to inspection of the fill level, timely refilling of lubricant, and cleaning the exterior of the product if contaminated.

8.1 Operating the pump

The pump is operated via the control of the centralized lubrication system. For information on pump operation, see the system documentation for the centralized lubrication system.

8.2 Top up lubricant

See section Filling with lubricant, Page 30 .

9 Maintenance

Careful and regular maintenance is required in order to detect and remedy possible faults in time. The operator must always determine the specific intervals according to the operating conditions, review them regularly, and adjust them where necessary. If necessary, copy the table for regular maintenance activities.

Grease lubrication pump units of the FK series are generally maintenance-free. In order to prevent malfunctions due to external forces, a visual inspection, should, however, be performed every 100 operating hours. The pump unit must be switched off during the inspections. Maintenance work beyond this scope must be performed by SKF Service personnel.

Table 16

Checklist: Maintenance activities every 100 hours of operation

Component	Activity to be performed	YES	NO
Geared motor	Fan slots on the fan impeller of the drive motor inspected for dirt/clogging	☐	☐
Geared motor / radial piston pump	Inspected for loosened screw unions	☐	☐
Geared motor / radial piston pump	Inspected for undesired grease discharge	☐	☐
Directional solenoid valves / ultrasonic sensor	Inspected for loose cable connections and damage	☐	☐
Pump unit	Inspected for contamination and damage	☐	☐

10 Cleaning

10.1 Basics

Cleaning should be carried out in accordance with the operator's own company rules, and cleaning agents and devices and the personal protective equipment to be used should likewise be selected in accordance with those rules. Only cleaning agents compatible with the materials may be used for cleaning. Completely remove any cleaning agent residue left on the product and rinse with clear water. Unauthorized persons must be kept away. Use signage to indicate wet areas.

10.2 Interior cleaning

The interior normally does not need to be cleaned. The interior of the product must be cleaned if incorrect or contaminated lubricant accidentally enters the product. Please contact our Service department.

10.3 Exterior cleaning

Do not allow any cleaning fluid to enter the interior of the product during cleaning.

WARNING

Risk of fatal electric shock



Cleaning work may only be performed on products that have been de-energized first. When cleaning electrical components, be mindful of the IP enclosure rating.

WARNING

Serious injury from contact with or inhalation of hazardous substances



Wear personal protective equipment. Observe the safety data sheet (SDS) of the hazardous substance. Avoid contaminating other objects or the environment during cleaning.



If products have ultrasonic sensors, the active sensor surface must be cleaned with a cloth when it becomes contaminated.

11 Faults, causes, and remedies

⚠ WARNING



Risk of injury

At a minimum, the following safety measures must be taken before any repairs:



- Unauthorized persons must be kept away
- Mark and secure the work area
- Depressurize the product
- Isolate the product, and lock and tag it out
- Check to ensure live voltage is no longer present
- Ground and short-circuit the product
- Cover any adjacent live parts.



⚠ CAUTION



Burn injury hazard

The hot surfaces of a pump unit could cause burns.



- Allow the motor and the pump unit to cool down.
- Wear protective gloves.

NOTE

Dismantling of the product or individual parts of the product within the statutory warranty period is prohibited and voids any claims.

NOTE

Unauthorized modifications and changes can have an unpredictable effect on safety and operation. Unauthorized modifications and changes are therefore prohibited. Only original SKF spare parts and SKF accessories may be used.

11.1 Commissioning malfunctions

Table 17

Fault table

Fault	Possible cause	Remedy
Delivery volume and/or delivery pressure too low without supply lines connected	• Air in the pump element • Driveshaft rotating in wrong direction	• Fill and bleed in accordance with section First start-up, Page 32 • Check electrical connections and power supply
No delivery (with pipe connections and supply lines not yet connected)	• Air in the pump element • Drive motor does not run	• Fill and bleed in accordance with section First start-up, Page 32 • Check electrical connections • Clean the venting slots on the motor • Replace the geared motor if necessary

11.2 Operational malfunctions

Table 18

Fault table

Fault	Possible cause	Remedy
Delivery volume or delivery pressure too low without lines connected	- Air in the pump element - Pump element is clogged - Drive shaft speed is too low	- Fill and bleed in accordance with section First start-up, Page 32 - See "No delivery" malfunction - Check electrical connections and power supply - Remove foreign substances if screw conveyor is jammed - Violation of the permissible operating temperature range of -25 °C to + 60 °C - Replace the geared motor if necessary - SKF Service - Remove and clean radial piston pump - Fill and bleed in accordance with section First start-up, Page 32 - Disassemble and clean the 3/2 directional solenoid valve, replace if necessary
No delivery	- Pump element on radial piston pump defective. Check valve on radial piston pump defective or clogged - On designs F1 and F2 3/2 directional solenoid valve does not switch over completely - The lubricant's field of application does not correspond to the external conditions (temperature range) - Pump element is clogged - Pump element is defective - Safety valve is leaky - Drive motor does not run - Cylindrical pin on screw conveyor broken, no pump drive - Fill level monitoring (U2) is set incorrectly - On designs F1 and F2 3/2 directional solenoid valve does not switch	- Replace the lubricant - Empty and clean the lubricant reservoir - SKF Service - Remove and clean the radial piston pump with pump element - Fill and bleed in accordance with section First start-up, Page 32 - SKF Service - Remove the radial piston pump, replace the pump element - Fill and bleed in accordance with section First start-up, Page 32 - SKF Service - Clean or replace the safety valve in the radial piston pump - Check electrical connections - Clean the venting slots on the motor - Replace the geared motor if necessary - SKF Service - Remove radial piston pump, remove screw conveyor, apply new cylindrical pin to screw conveyor. Remove broken cylindrical pin parts from pump, install screw conveyor and radial piston pump - Fill and bleed in accordance with section First start-up, Page 32 - Reconfigure the fill level monitoring in accordance with section Adjusting the switching points of the ultrasonic sensor, Page 35 - Inspect the connections on directional solenoid valves for proper seating - Inspect the 3/2 directional solenoid valve for proper functioning (of the solenoid), replace if necessary. - Check the control of the directional solenoid valves for proper run time function - Clean

11.3 Malfunctions on fill level control (ultrasonic sensor)

Table 19

Fault table

Fault	Possible cause	Remedy
No output signal	- Loose M12 connector on the ultrasonic sensor - Switching points are no longer programmed into the ultrasonic sensors or are set incorrectly - Ultrasonic sensor is contaminated - Ultrasonic sensor is defective	- Screw the M12 connector firmly in place - Reconfigure the switching points in accordance with section Adjusting the switching points of the ultrasonic sensor, Page 35 - Remove and clean the ultrasonic sensor - Replace the ultrasonic sensor
Grease reservoir not filled to maximum	Ultrasonic sensor calibrated incorrectly	Reconfigure the switching points in accordance with section Adjusting the switching points of the ultrasonic sensor, Page 35
Pump switches off before reaching minimum	Ultrasonic sensor calibrated incorrectly	Reconfigure the switching points in accordance with section Adjusting the switching points of the ultrasonic sensor, Page 35

NOTE

Please contact our Customer Service if you cannot determine or resolve the error.

12 Shutdown, disposal

12.1 Temporary shutdown

Temporary shutdowns should be done by a course of action to be defined by the operator.

12.2 Permanent shutdown, disassembly

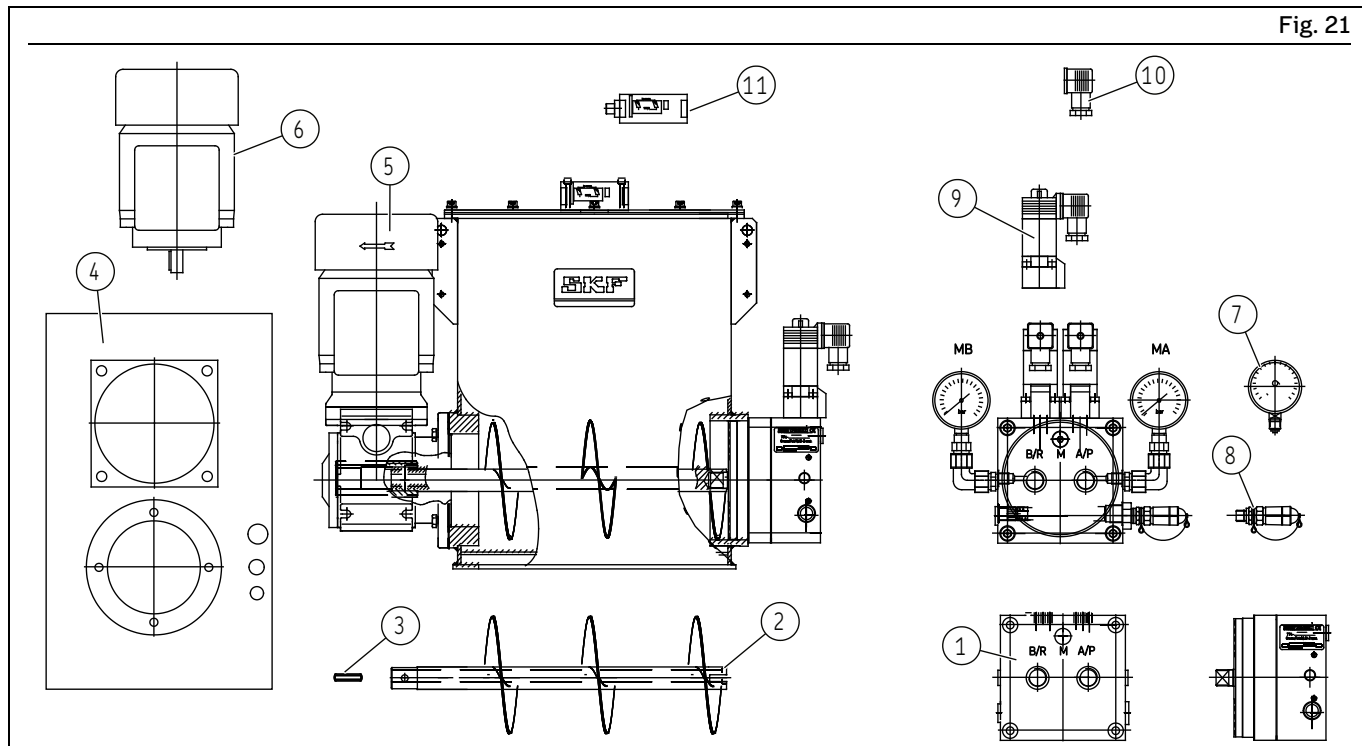
Permanent shutdown and disassembly of the product must be planned properly by the operator and conducted in compliance with all applicable laws and regulations.

12.3 Disposal

The waste producer/operator must dispose of the various types of waste in accordance with the applicable laws and regulations of the country in question.

13 Spare parts

Spare parts may be used exclusively for replacement of identical defective parts. Modifications with spare parts on existing products are not allowed.



Spare parts drawing for FK pump units

Table 20

Spare parts list for FK pump units

No.	Qty	Description	Item number
1	1	Radial piston pump, complete	on request
2	1	Screw conveyor drive shaft	24-2252-2028
3	1	Cylindrical pins	DIN 6325-8M6x28
4	1	Washer kit for reservoir-motor/reservoir-pump	24-0404-2616
5	1	Worm gear drive motor	See Drive motors, Page 17
6	1	Geared motor	on request
7	1	Pressure gauge 400 bar	169-140-001
	1	Pressure gauge 600 bar	169-140-002
8	1	Filler coupling	995-000-705
9	1	3/2 directional solenoid valve 24 VDC	2350-00000165
10	1	Plug connector 24-230 VAC / DC	24-1882-2167
11		U2 ultrasonic sensor with 2 switching points	
	1	for reservoir sizes 15 kg and 30 kg	24-1884-2491
	1	for reservoir size 60 kg	24-1884-2494

14 Appendix

14.1 China RoHS Table

Table 21

部件名称 (Part Name)	有毒害物质或元素 (Hazardous substances)					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0	0
本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)						
0 :	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)					
X :	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)					

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