

# MSU Gear Pump Unit

for industrial machinery for use in  
single-line centralized oil lubrication systems

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

EN



Version 03



## Masthead

These assembly instructions with associated operating instructions according to EC Machinery Directive 2006/42/EC are an integral part of the described product and must be kept for future use.

These assembly instructions with associated operating instructions have been prepared in accordance with the established standards and rules for technical documentation, VDI 4500 and EN 292.

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## Information concerning EC Declaration of Conformity and EC Declaration of Incorporation

The product,  
compact unit  
of the series: **MSU**

is hereby confirmed to comply with the essential protection requirements stipulated by the Directive(s) of the Council on the approximation of laws of the Member States concerning:

- **Machinery Directive 2006 2006/42/EG**
- **Electromagnetic Compatibility 2014/30/EU**
- **Low Voltage Devices 2014/35/EU**
- **RoHS II Directive 2011/65/EU**

### Notes:

- (a) This declaration certifies compliance with the aforementioned Directives but does not constitute a guarantee of characteristics.
- (b) The safety instructions in the documentation included with the product must be observed.
- (c) The commissioning of the products here certified is prohibited until the machine, vehicle, or similar in which the product is installed conforms with the provisions and requirements of the applicable Directives.

(d) The operation of the products at non-standard supply voltage, as well as non-adherence to the installation instructions, can negatively impact the EMC characteristics and electrical safety.

We further declare:

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

The product is neither designed nor approved for use in conjunction with fluids of Group 1 (Dangerous Fluids) as defined in Article 2, Para. 2 of Directive 67/548/EEC of June 27, 1967. The product is neither designed nor approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.

When used in conformity with their intended use, the products supplied by SKF Lubrication Systems Germany GmbH 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 GmbH classifies them according to Article 3, Para. 3 of the Directive. The Declaration of Conformity and Incorporation forms part of the product documentation and is supplied together with the product.

## Explanation of symbols and signs

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions.

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

Instructions placed directly on the machines/ grease lubrication pump units, such as:

- Rotation arrows
- Fluid connection labels

must be followed and kept in fully legible condition.



**You are responsible!**

Please read the assembly and operating instructions thoroughly and follow the safety instructions.

### Hazard symbols



General hazard  
DIN 4844-2-W000



Electrical voltage/current  
DIN 4844-2-W008



Hot surface  
DIN 4844-2-W026



Danger of being drawn into machinery  
BGV 8A



Slipping hazard  
DIN 4844-2-W028

### Indicators used with safety instructions and their significance

#### Signal word meaning

**Danger!** Danger of bodily injury

**Warning!** Danger of damage to property and the environment

**Note!** Provides additional information

### Informational symbols




Note!


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



Environmentally sound disposal


# 1. Safety instructions

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

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

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

instructions. In particular, any malfunctions which may affect safety must be remedied immediately.

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

## 1.1 Intended use

The gear pump units of the SKF MSU series are designed for the supply of centralized lubrication systems in plants and machines. The gear pump units pump mineral oil based and synthetic oil based lubricants with an operating viscosity of 20 to 2000 mm<sup>2</sup>/s depending on the type of operation.

**S3 10% ON-time,** 10-minute switching cycle:  
20 to 120 mm<sup>2</sup>/s ;

**S3 3% ON-time,** 30-minute switching cycle:  
20 to 2000 mm<sup>2</sup>/s

Any other usage is deemed non-compliant with the intended use.

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 product described here 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 GmbH 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 assembly instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the described product is incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are authorized to identify and perform necessary actions while avoiding any risks which may arise.

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). Significant bodily injury 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



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 decommissioning.

## 1.5 Existing residual risks (residual risk assessment)

Residual risk	Remedy
<b>Life cycle: Assembly</b>	
During installation of the lubrication line - The pump outlet port has broken off from the pump housing due to inadequate counterforce at the pump outlet port.	<ul style="list-style-type: none"> <li>• Apply an open-end wrench (size 14 mm) to the pump outlet port and counter the following turning torque</li> </ul>
Reservoir rupture due to excess filling by the filling pump.	<ul style="list-style-type: none"> <li>• Monitor the filling process and stop filling once the "MAX" mark is reached</li> </ul>
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts</li> </ul>
Tearing/damage to lines when installed on moving machine components	<ul style="list-style-type: none"> <li>• If possible, do not install on moving parts; if this cannot be avoided, use flexible hose lines.</li> </ul>
<b>Life cycle: Commissioning/operation</b>	
Lubricating oil spraying out due to faulty component fitting/line connection.	<ul style="list-style-type: none"> <li>• Tighten all components with the appropriate torques. Use hydraulic connections and lines suitable for the indicated pressures. These must be checked for proper connection and for damage prior to commissioning.</li> </ul>
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts.</li> </ul>
<b>Life cycle: Setup, retrofit</b>	
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts</li> </ul>



Residual risk	Remedy
Fire hazard when working with an open cap	<ul style="list-style-type: none"> <li>• Turn off pump unit and allow motor to cool down prior to performing work</li> </ul>
<b>Life cycle: Malfunctions, fault-finding</b>	
Strong heating of the motor due to a motor jam	<ul style="list-style-type: none"> <li>• Turn off the pump motor and let it cool down. Remedy the cause</li> </ul>
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts</li> </ul>
Fire hazard when working with an open cap	<ul style="list-style-type: none"> <li>• Turn off pump unit and allow motor to cool down prior to performing work</li> </ul>
<b>Life cycle: Maintenance, repair</b>	
Electric shock (AC voltage design)	<ul style="list-style-type: none"> <li>• De-energize the MSU prior to maintenance work</li> </ul>
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts</li> </ul>
Fire hazard when working with an open cap	<ul style="list-style-type: none"> <li>• Turn off pump unit and allow motor to cool down prior to performing work</li> </ul>
<b>Life cycle: Decommissioning, disposal</b>	
Environmental contamination by lubricants and wetted parts	<ul style="list-style-type: none"> <li>• Dispose of contaminated parts according to the applicable legal/company rules</li> </ul>
People slipping due to floor contamination with spilled/leaked lubricant	<ul style="list-style-type: none"> <li>• Exercise caution when filling and when closing the filler socket cap</li> <li>• Promptly apply suitable binding agents and remove the leaked/spilled lubricant</li> <li>• Follow operational instructions for handling oils and contaminated parts</li> </ul>
Environmental contamination by lubricants and wetted parts	<ul style="list-style-type: none"> <li>• Dispose of contaminated parts according to the applicable legal/company rules</li> </ul>

## 2. Lubricants

### 2.1 General information



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

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

No products manufactured by SKF Lubrication Systems Germany GmbH 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 consultation with and written approval from SKF Lubrication Systems Germany GmbH. SKF Lubrication Systems Germany GmbH considers lubricants to be an element of system design and must always 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.

When selecting a lubricant, the type of bearing/friction point, their expected load during operation, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.



SKF Lubrication Systems Germany GmbH supports customers in the selection of suitable components for feeding the selected lubricant and in the planning and design of a centralized lubrication system.

Please contact SKF Lubrication Systems Germany GmbH if you have further questions regarding lubricants.

You can request an overview of the lubricant tests offered by SKF Lubrication Systems Germany GmbH 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 to property damage.



#### **Warning!**

Different lubricants must not be mixed together. Doing so can cause damage and require costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

The product described here 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 permissible limit values but whose other characteristics render them unsuitable for use in centralized lubrication systems. For example, synthetic lubricants may be incompatible with elastomers.

## 2.4 Lubricants and the environment



### Warning!

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

It is important to note that lubricants are environmentally hazardous, flammable substances which 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. Be mindful of any lubricant leaking out during assembly, operation, maintenance, and repair of centralized lubrication systems. Leaks must be sealed off 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.

### 3. Overview

Unit components		
Item	Description	Chapter
1	Fastening holes	4.3/4.31
2	Pressure-regulating valve	
3	Lubricant reservoir	OI Chap. 5.3
4	Filler socket with strainer	
5	Float switch (fill level switch)	4.4.3
6	Pushbutton (DK)	OI Chap. 6.1
7	Cable fitting	4.3.2
8	Electrical connection	4.4 - 4.4.31
9	Pressure switch	
10	Cover cap	4.4.2
11	Pressure gauge	OI Chap. 12
12	Screw plug	9.2
13	Fuse (24 VDC)	OI Chap. 9.4

*OI = Operating instructions*

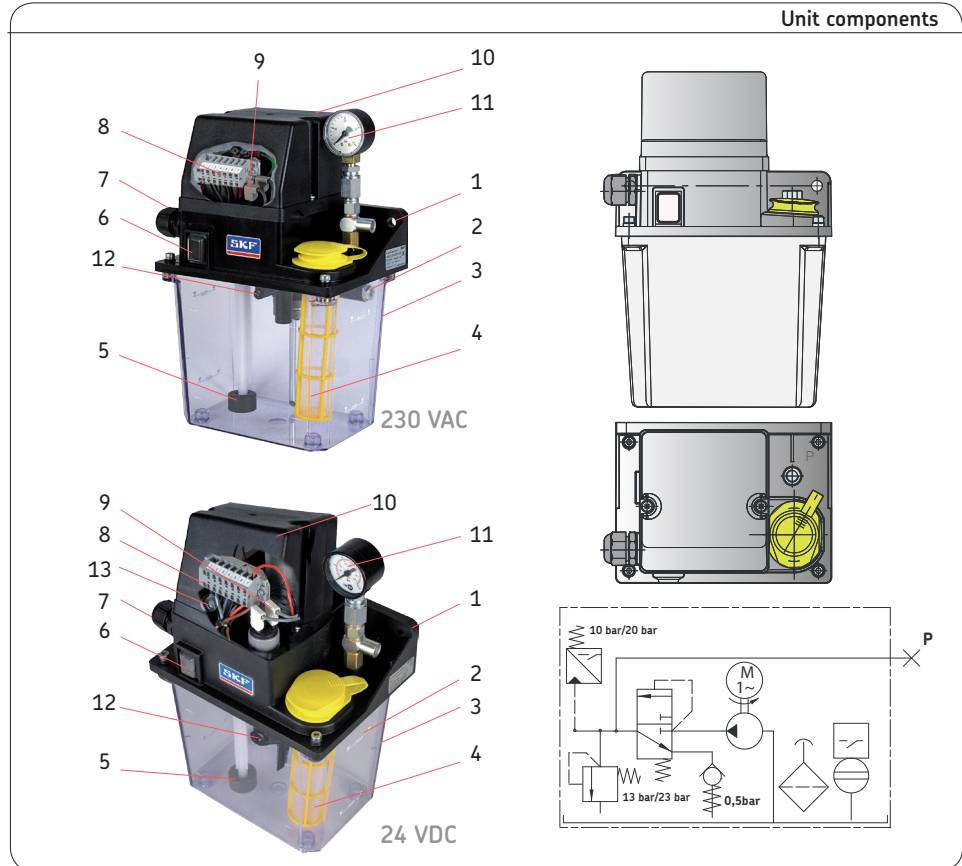


Table of product codes

	<b>MSU</b>	<b>x-x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>0</b>	<b>+xxx</b>
<b>Compact unit for oil supply of product series MSU</b>	┌										
<b>Delivery rate</b> 1 = 0,1 l/min		┌									
<b>Operating pressure</b> 1 = 13 bar 2 = 23 bar		┌									
<b>Lubricant reservoir</b> 1 = 2 liters, plastic		┌									
<b>Fill level monitoring</b> 0 = without fill level monitoring A = with float switch, NC contactt		┌									
<b>Pressure switch</b> 0 = without pressure switch A = with pressure switch NO-contact, 10 bar <sup>1)</sup> B = with pressure switch NO-contact, 20 bar <sup>2)</sup>		┌									
<b>Voltage key</b> 428 = 230 VAC, 50/60 Hz 410 = 220 VAC, 50/60 Hz 924 = 24 VDC		┌									
<b>Platzhalter</b> 0 = not available		┌									
<b>Pushbutton</b> 0 = without pushbutton 1 = with pushbutton		┌									
<b>Pump outlet port</b> 0 = M10x1 (optionally with double-cone olive fitting acc. to DIN 3862) 1 = Quick connector (tube Ø 6 mm) 2 = Swivel quick connector (tube Ø 6 mm)		┌									
<b>Pressure gauge</b> 0 = without Pressure gauge 1 = with Pressure gauge 25 bar <sup>1)</sup> 2 = with Pressure gauge 40 bar <sup>2)</sup>		┌									
<b>Electric connection port</b> 1 = 1x Cable connector M20x1,5 2 = 2x Cable connector M20x1,5		┌									
1) only Version Operating pressuer 13 bar 2) only Version Operating pressuer 23 bar											

### 3.1.1 Order examples

#### MSU1-11AA10010+428

MSU series compact unit for an oil delivery rate of 0.1 l/min. **(1)**, operating pressure 13 bar **(1)**, with a 2 liter lubricant reservoir **(1)**, with oil level monitoring (flow switch) **(A)**, with pressure switch, NO-contact 10 bar **(A)**, with 1x cable gland M20x1.5 **(1)**, with pressure gauge 25 bar **(1)**, connection port (for main line) M10x1 (port thread) **(0)**, with push-button **(1)**, place-holder **(0)**, rated voltage 230 VAC **(+428)**

#### MSU1-21AB12010+428

MSU series compact unit for an oil delivery rate of 0.1 l/min. **(1)**, operating pressure 23 bar **(2)**, with a 2 liter lubricant reservoir **(1)**, with oil level monitoring (flow switch) **(A)**, with pressure switch, NO-contact 20 bar **(B)**, with 1x cable gland M20x1.5 **(1)**, with pressure gauge 40 bar **(2)**, connection port (for main line) M10x1 (port thread) **(0)**, with push-button **(1)**, place-holder **(0)**, rated voltage 230 VAC **(+428)**

## 4. Assembly

### 4.1 General information

Only qualified technical personnel may install, operate, maintain, and repair the MSU gear pump unit. 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 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 MSU gear pump unit, the packaging material and any shipping braces (e.g., plugs) must be removed. The packaging material must be preserved until any discrepancies are resolved.

### 4.2 Setup and attachment

The pump unit should be installed in a place protected from contamination, water splashes, and vibrations. It should, however, be easily accessible so that all further installation work can be performed without difficulty and the device can be filled easily later.

The fill level of the reservoir must be clearly visible.

The unit is mounted in a vertical position.

Assembly holes must be made according to the diagram later in this text (Chapter 4.3.1).

Design specifications and conditions of the manufacturer and the object must be observed when installing the pump unit.



#### **Warning!**

Do not tilt or drop the MSU gear pump unit.

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.
- The product must be mounted vertically in accordance with the specifications of the documentation.
- Pressure gauges, oil level glasses, and other visual monitoring equipment must be clearly visible.
- Protruding parts such as pressure gauges may not be misused as handles or grips.
- Do not tilt or drop the MSU gear pump unit.

**Warning!**

On the pump units' electrical connections, ensure that appropriate measures prevent interference between signals due to inductive, capacitive, or electromagnetic couplings. Shielded cables must be used in places where electrical interference fields can distort signal transmissions despite separate laying of cables.

The rules and empirical values for "EMC-compliant" cabling must be taken into consideration.

**Warning!**

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

#### 4.2.1 Mounting equipment

Install the pump units on the system/machine using two M8 screws with a minimum length of 20 mm.

Fastening material to be provided by the customer:

- Hexagon socket screws (2x) per DIN912-M8x...-8.8
- Washers (2x) per DIN 125-B8, 4 pc.
- (if necessary)Hexagon nuts (2x) per DIN439-BM8-6

**Note!**

The torque of the fixing screws (hexagon socket screws) depends on the customer's installation. SKF recommends a torque between 12 and 15 Nm.

#### 4.2.2 Motor ventilation/Minimum mounting dimensions

The MSU gear pump unit is equipped with two venting slots (see page 18, Fig. 1) to prevent condensation from forming. During the following assembly procedure, make sure that these venting slots are not closed.

The gear pump unit must therefore be installed on a level and firm (not soft) surface.

To ensure enough space for maintenance work and for any disassembly of the pump unit, ensure that the minimum mounting dimensions (see pages 18-19, Fig. 1 and Fig. 2) are maintained.



### 4.3 Assembly of the MSU gear pump

☞ See Figure 1 on the following page

- Make assembly holes  $\varnothing$  8.8 mm (2x) according to the drilling pattern in Figure 1 at the mounting location; deburr the assembly holes
- Place the MSU gear pump unit at the mounting location and align it to the holes
- Apply the fixing screws (M8) (2x) with washers (2x) to the fastening holes on the MSU and the mounting location; if necessary, tighten gently using M8 nuts (2x)
- Align the gear pump unit



#### Note!

Ensure clearance for the venting slot (see Fig. 1 and Chapter 4.2.2).



#### Note!

The torque of the fixing screws is determined by the customer. SKF recommends a torque between 12 and 15 Nm.

- Tighten the fixing screws (M8) (2x) using a torque wrench

#### Connect a lubrication line to the pump outlet

☞ See Figure 2

At Port pump outlet: For quick connector version the lubricant line has to be cut and connect to quick connector. For Version M10x1 proceed as follows:

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



#### Note!

The fittings and tubes used for the connection of the lube points must withstand the operating pressures listed in table 1.

☞ To prevent the pump outlet port from possibly breaking off from the pump housing in the following assembly proce-

#### Operating pressures, tubes and fittings, table 1

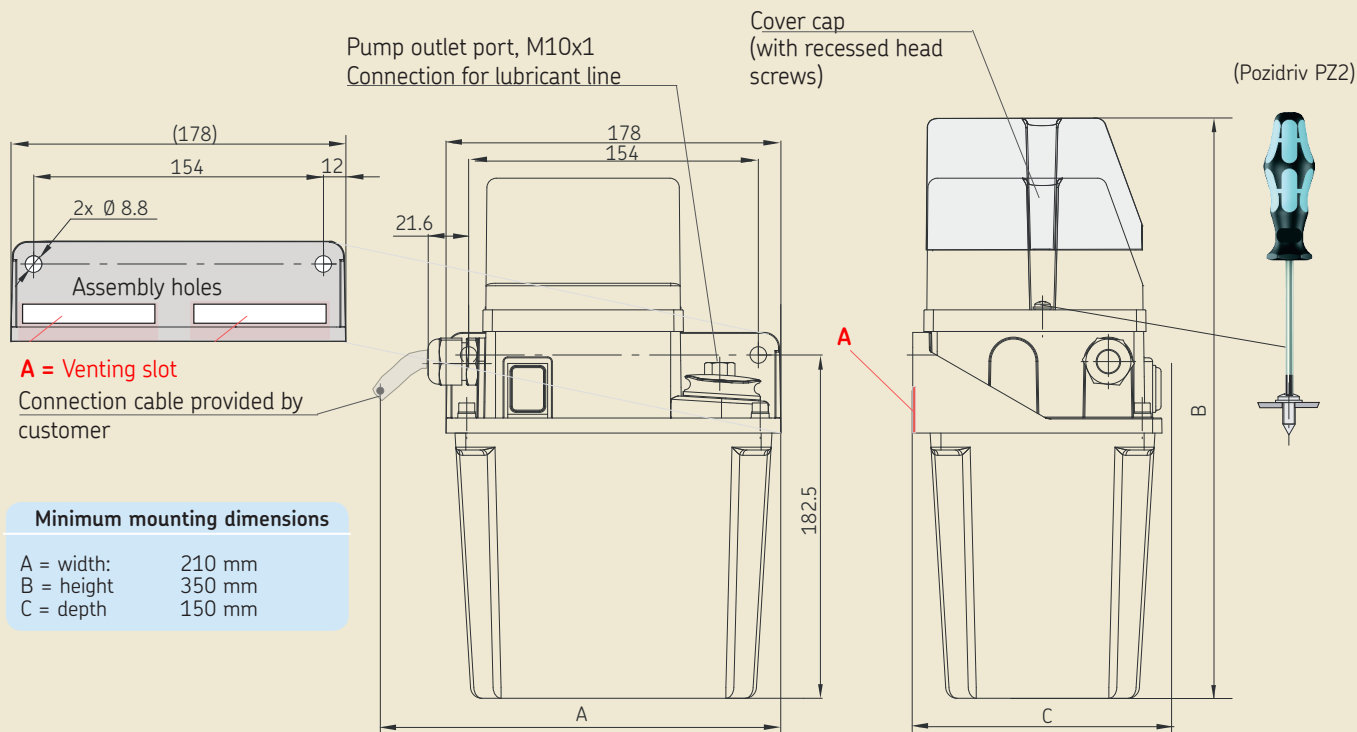
Version MSU1-1... +XXX	> 14 bar
Version MSU1-2 ... +XXX	> 25,5 bar

sure (see Fig. 1), counterforce against the turning torque must be maintained using an open-end wrench (size 14 mm) applied to the pump outlet port.

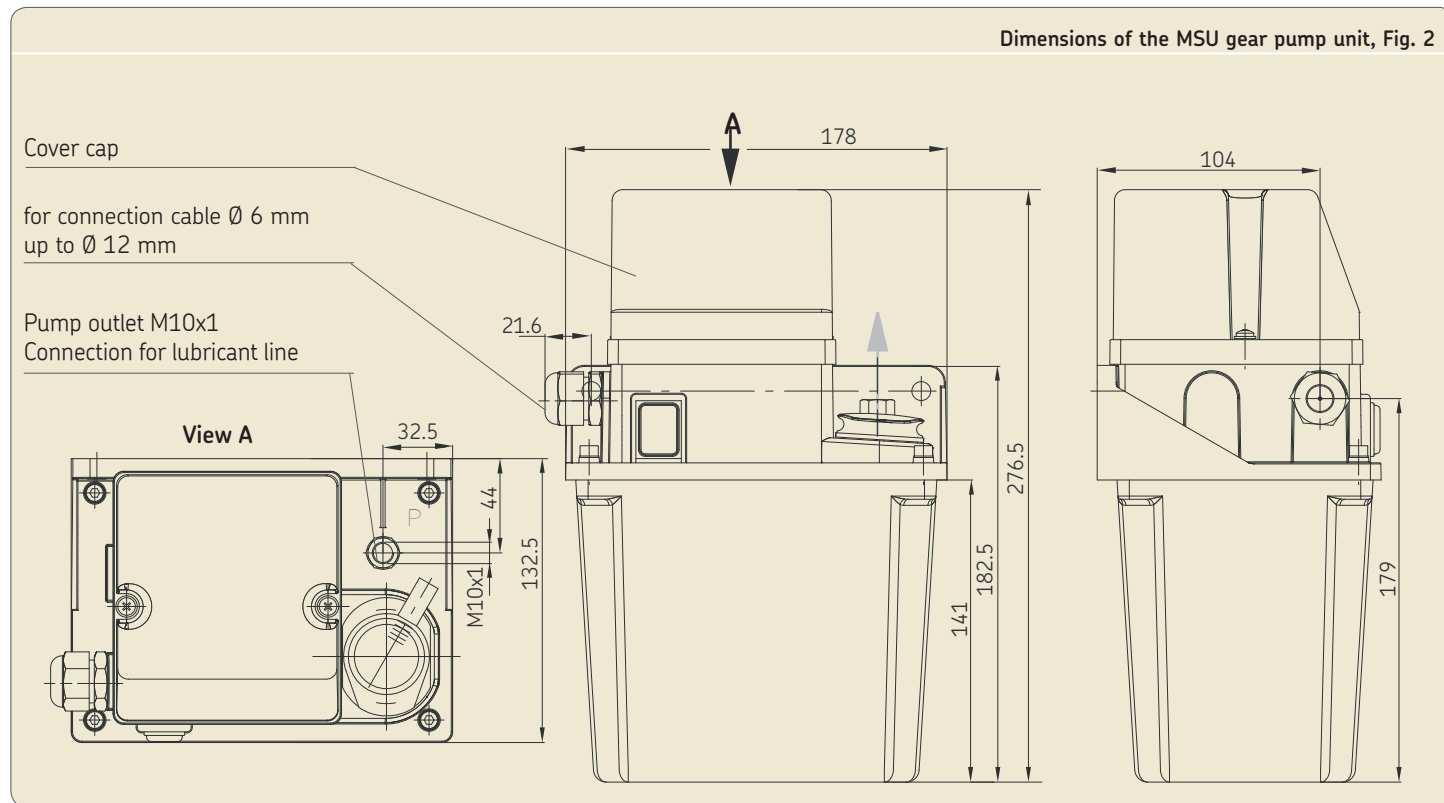
- Position the lubricant line with connection thread M10x1 on the thread of the pump outlet port.
- Place an open-end wrench (size 14 mm) on the hexagon screw of the pump outlet port
- Screw the lubricant line into the pump outlet port; in the process, use the open-end wrench to maintain counterforce against the turning torque

## 4.3.1 Mounting diagram

Mounting diagram, Fig. 1



### 4.3.2 Dimensions of the MSU gear pump unit



## 4.4 Electrical connection

### 4.4.1 General information

The MSU gear pump unit is driven by a 230 V 50/60 Hz single-phase AC motor or optionally by a 24 VDC DC motor.

In both designs, the cables are introduced through a cable fitting with a clamping range of  $\emptyset$  6 to  $\emptyset$  12 mm and the unit's electrical connections are established through terminal blocks with tension springs (maximum conductor cross-section: 2.5 mm, conductor stripping length: 8-9 mm). Only the protective earth conductor (in the AC design) is connected by the customer using a flat tab receptacle measuring 6.3 x 0.8 mm.



#### **Danger!**

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



#### **Danger!**

The available mains voltage (supply voltage) must be in accordance with the specifications on the rating plate of the motor or of the electrical components. Check the fuse protection of the electrical circuit. Use only fuses with the prescribed amperage, else bodily injury and property damage may result.

Consult Chapter 4.4.3 for the electrical characteristics of the electric motor, such as rated power, rated voltage, and rated current. The electrical circuit diagram of the MSU gear pump unit is affixed inside the unit's cover cap and can be accessed by removing the cap. The MSU gear pump unit is supplied without a control unit. The MSU (and thereby the lubrication interval) is controlled by the customer's control unit for the machine on which the MSU is mounted.

#### 4.4.2 Electric motor and sensor connections

- ☞ See Figure 1, Fig. 4 to Fig. 6
- ☞ The cover cap is secured by two recessed head screws.
- Loosen screws on both sides of the motor's cover cap using a crosstip screwdriver.
- Carefully lift the cover cap.
- Draw the connection cable provided by customer into the cable fitting.
- Connect the cable according to the wiring diagram (Fig. 3 to Fig. 8), the wiring diagram in the cover cap, or the SKF customer drawing.
- Tighten the cable fitting.
- Carefully apply the cover cap and place recessed head screws on both sides.
- Fasten the screws finger-tight with equal force.

#### 4.4.3 Electrical characteristics, 230 VAC design

##### Electrical characteristics of the 230 VAC design

Protection class per EN 60529	IP 54	
<b>Motor</b>		
Operating voltage	230 VAC	
Frequency	<b>50 Hz</b>	<b>60 Hz</b>
Rated speed	2800 rpm	3300 rpm
Rated current $\pm 15\%$	0.895 A	0.672 A
Rated output	90.44 W	80.32 W
Duty type per VDE0530		
	* S3, 10% ON-time, 10-min. switching cycle (1 min. runtime, 9 min. interval time) at operating viscosity between 20 - 120 mm <sup>2</sup> /s	
	* S3, 3% ON-time, 30-min. switching cycle (1 min. runtime, 29 min. interval time) at operating viscosity between 20 - 2000 mm <sup>2</sup> /s	
Recommended fuse (line protection)	B 6A	
Fuse	Thermal circuit breaker, critical temperature +95 °C	
<b>Pressure switch</b>		
Contact type	NO-contact	
Switched voltage <sup>1)</sup>	10 V to 36 VDC/10 V to 25 VAC	
Switched current <sup>2)</sup>	1 A (resistive load)	
Switching capacity <sup>2)</sup>	10 W/VA (resistive load)	
Operating pressures max.	<b>13 bar</b>	<b>23 bar</b>
Switching pressure	10 bar	20 bar
<b>Float switch</b>		
Function	Opens when fill level too low (NC)	
Switching voltage	10 V to 36 VDC/10 V to 25 VAC	
Switched current <sup>2)</sup>	0.25 A (resistive load)	
Switching capacity <sup>2)</sup>	3 W/VA (resistive load)	

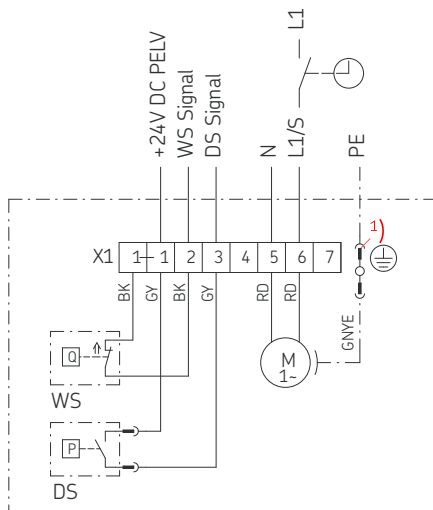
1) Protective measure:  
Protective Extra Low Voltage (PELV) per EN 60204-1/IEC 60204-1,  
HD60364-4-41 (DIN VDE 0100-410)/IEC60364-4-41

2) When switching inductive loads, take appropriate measures to protect contacts.

Wiring diagram without pushbutton, Fig. 3

MSU1-1xxxxxx0x+428/429/434/410/436  
MSU1-2xxxxxx0x+428/429/434/410/436

230V/115V/100V/220V/200V  
50/60Hz

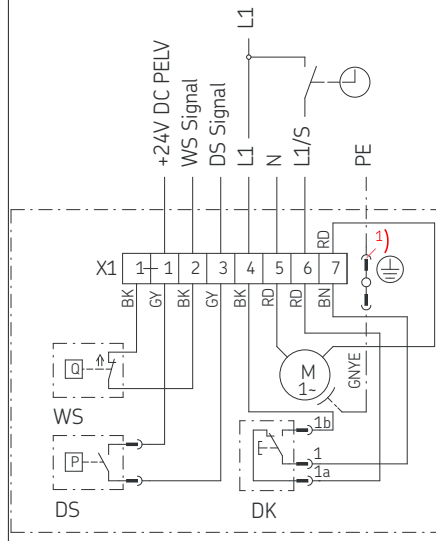


1) Flat tab receptacle 6.3x0.8

Wiring diagram with pushbutton, Fig. 4

MSU1-1xxxxxx1x+428/429/434/410/436  
MSU1-2xxxxxx1x+428/429/434/410/436

230V/115V/100V/220V/200V  
50/60Hz

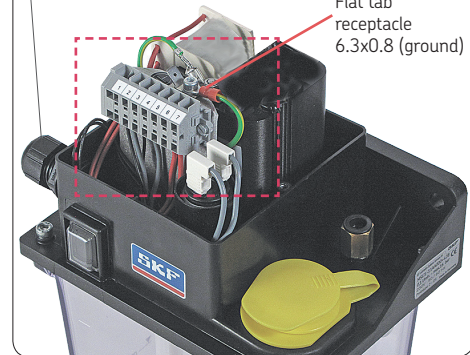


1) Flat tab receptacle 6.3x0.8

Terminal strip, Fig. 5

Cable fitting M20x1.5, cable harness output  
Clamping range 6 to 12 mm

Flat tab  
receptacle  
6.3x0.8 (ground)



Legend to Figures 3 and 4

- M** = Pump motor
- WS** = Float switch, contacts shown for full reservoir
- DS** = Pressure switch, max. 42V; 30VA; 0.7A
- L1/S** = Connection for control unit
- L1/N** = Connection for operating voltage
- DK** = Pushbutton (manual interim lubrication)

#### 4.4.4 Electrical characteristics, 24 VDC design

##### Electrical characteristics, 24 VDC design

Protection class per EN 60529	IP 54
<b>Motor</b>	
Operating voltage	24 VDC
Rated speed	3600 rpm
Rated current	2.3 A
Starting current	13.5 A
Rated output	55 W
Duty cycle per DIN EN 60034-1	
* S3, 10% ON-time, 10-min. switching cycle (1 min. runtime, 9 min. interval time) at operating viscosity between 20 - 120 mm <sup>2</sup> /s	
* S3, 3% ON-time, 30-min. switching cycle (1 min. runtime, 29 min. interval time) at operating viscosity between 20 – 2000 mm <sup>2</sup> /s	
Integrated equipment protection	Cartridge fuse link (5x20 mm) T2A <sup>3</sup> per DIN EN 60127-2 (VDE 0820-2) standard sheet 3
Recommended line protection per DIN 60898	B 6A or C4A

#### Pressure switch

Contact type	NO-contact
Switched voltage <sup>1)</sup>	10 V to 36 VDC/10 V to 25 VAC
Switched current <sup>2)</sup>	1 A (resistive load)
Switching capacity <sup>2)</sup>	10 W/VA (resistive load)
Operating pressures max.	<b>13 bar</b>   <b>23 bar</b>
Switching pressure	10 bar   20 bar

#### Float switch

Function	Opens when fill level too low (NC)
Switching voltage	10 V to 36 VDC/10 V to 25 VAC
Switched current <sup>2)</sup>	0.25 A (resistive load)
Switching capacity <sup>2)</sup>	3 W/VA (resistive load)

1) Protective measure: Protective Extra Low Voltage (PELV) per EN 60204-1/IEC 60204-1, HD60364-4-41 (DIN VDE 0100-410)/IEC60364-4-41

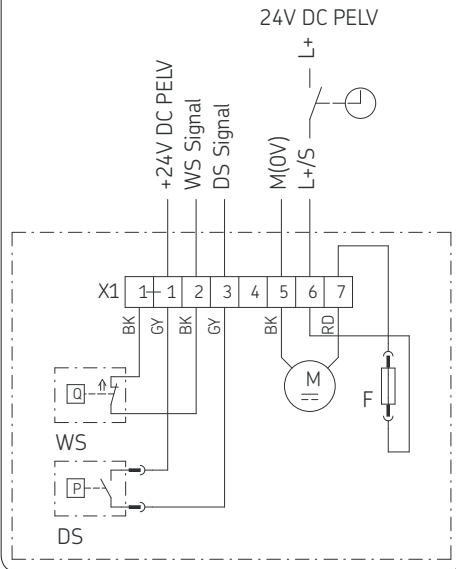
2) When switching inductive loads, take appropriate measures to protect contacts.

3) Minimum short-circuit current of 6A must be ensured.



Wiring diagram without pushbutton, Fig. 6

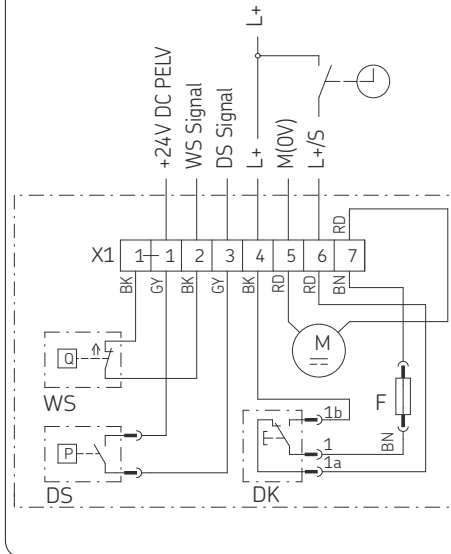
MSU1-1xxxxxx0x+924  
MSU1-2xxxxxx0x+924



Wiring diagram with pushbutton, Fig. 7

MSU1-1xxxxxx1x+924  
MSU1-2xxxxxx1x+924

24V DC PELV



Terminal strip, Fig. 8

Cable fitting M20x1.5, cable harness output



Legend to Figures 6 and 7

- M** = Pump motor
- WS** = Float switch, contacts shown for full reservoir
- DS** = Pressure switch, max. 42V; 30VA; 0.7A
- L1/S** = Connection for control unit
- L1/N** = Connection for operating voltage
- DK** = Pushbutton (manual interim lubrication)

## 4.5 Lubrication line arrangement

The pipes, hoses, shutoff valves, 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.

All components of the lubrication line system such as pipes, tubes, shutoff valves, directional control valves, fittings, etc. must be carefully cleaned before assembly. No seals should protrude inward in the lubrication line system, as this could hinder lubricant flow and introduce contaminants into 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.



### Note!

Lubrication lines must always be free of leaks. Lubricants can contaminate soil and bodies of water. Lubricants must be properly used and disposed of. 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. Be mindful of any lubricant leaking out during assembly, operation, maintenance, and repair of centralized lubrication systems. Leaks must be sealed off 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.



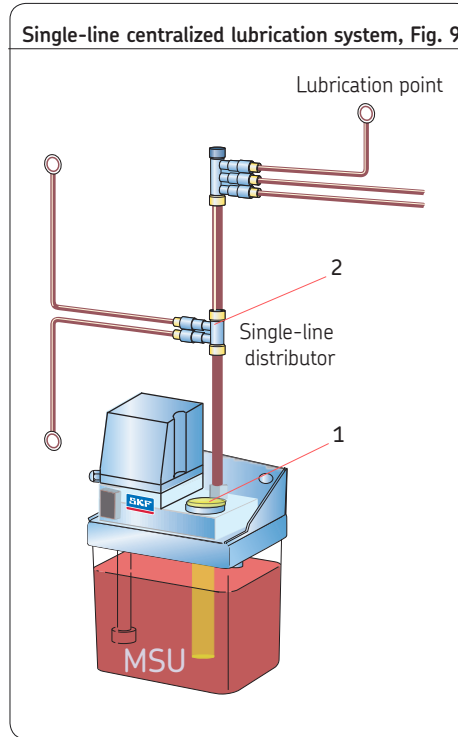
Follow the safety instructions on the lubricant's safety data sheet.

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

#### 4.6 Venting the centralized lubrication system

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

- Opening the ends of the main pipes until lubricant without bubbles is discharged.
- Filling long pipe sections before connecting to the lubrication points.
- Fill the MSU pump gear unit with lubricant via the filler socket (1)
- Remove the lubricant line at the inlet to the first distributor (2)
- Allow the pump to run until lubricant without bubbles discharges.
- Mount the lubrication line.
- Repeat the venting procedure at the next distributor.
- Allow pump to run until oil can be seen discharging at all lubrication points.

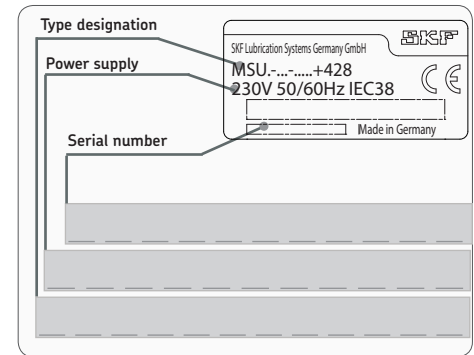


#### 4.7 Note on the rating plate

The rating plate on the MSU gear pump provides important key data such as designation and material description (or customer number).

To avoid loss of this data in case the rating plate becomes illegible, these characteristics should be entered in the following table:

- Enter key data from rating plate in the following table.





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## MSU Gear Pump Unit

**Operating instructions associated  
with assembly instructions**

## 1. Safety instructions

### 1.1 General information

**Note!**

These operating instructions must be read and properly understood by the installer and the responsible technical personnel/operator before installation and commissioning.

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



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

### 1.2 Disclaimer of liability

SKF Lubrication Systems Germany GmbH shall not be responsible for damages:

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

## 2. Lubricants

**Note!**

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

## 3. Transport, delivery, and storage

### 3.1 General information

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



#### Note!

The product must not be tilted or dropped.

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

After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. The packaging material must be preserved until any discrepancies are resolved. SKF Lubrication Systems Germany GmbH products are subject to the following storage conditions:

### 3.2 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 - + 50°C
- Light: avoid direct sun or UV exposure and shield nearby sources of heat.

### 3.3 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 - + 50°C
- Light: avoid direct sun or UV exposure and shield nearby sources of heat.

### 3.4 General notes

- The product(s) can be enveloped in plastic film to provide low-dust storage.
- Protect against ground moisture by storing on a shelf or wooden pallet.
- Bright-finished metallic surfaces, especially wearing parts and assembly surfaces, must be protected using long-term anti-corrosive agents before storage.
- At approx. 6-month intervals: Check for corrosion. If there are signs of corrosion, reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.
- Protruding parts such as pressure gauges may not be misused as handles or grips.

## 4. Assembly

### 4.1 Information on assembly

The assembly procedure for the MSU gear pump unit is described in detail in the assembly instructions associated with these operating instructions.

## 5. Design and function

### 5.1 General information

The MSU is a reservoir unit with an electrically driven gear pump that contains all hydraulic and electrical components required for the operation of a piston distributor system. Thanks to its compact construction, the MSU gear pump unit can be used to set up piston distributor systems to lubricate small machines, machine groups, and systems very easily and with low mounting effort.

### 5.2 Design

The MSU gear pump unit consists primarily of an electrically driven gear pump, a lubricant reservoir, a pressure switch for electrical pressure monitoring, and a fill level switch for monitoring the minimum fill level.

A pressure relief valve and a pressure-regulating valve are also installed.

The pressure-regulating valve is required in order to limit the maximum permissible system pressure in the centralized lubrication system to a maximum value. The pressure valve is adjusted to a maximum system pressure of 13 or 23 bar.

The pressure relief valve is used to relieve the system pressure built up during a lubricating cycle to a residual pressure of  $\leq 0.5$  bar once the pump motor is turned off. This is required for the operation of the piston distributors.

The MSU is available in the voltage designs 230 VAC, 220 VAC, 200 VAC, 115 VAC, 100 VAC, 50/60Hz, und 24 VDC.

The filler socket in the reservoir is accessible from outside the unit and is equipped with a filler screen.

The MSU can optionally be equipped with a pressure gauge for visual pressure monitoring.



### 5.3 Functional description

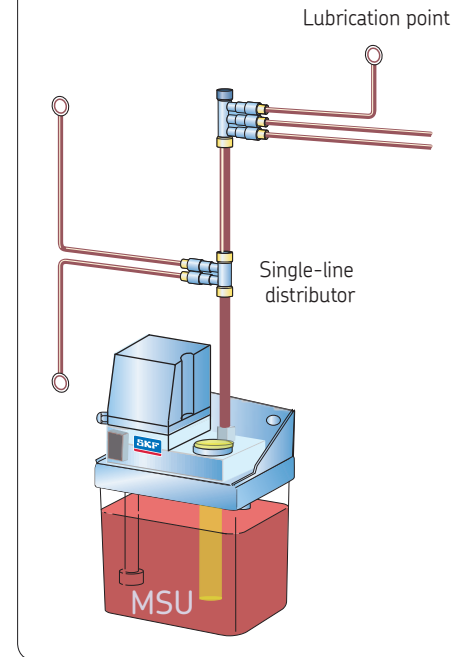
The MSU gear pump unit is designed to supply intermittently operated single-line centralized oil lubrication systems.

The unit's gear pump feeds the lubricant from the lubricant reservoir, through an integrated pressure-regulating and pressure relief valve, and to the system's piston distributors. Under the lubricant pressure, lubricant is metered in the distributors separately for each lubricant point and fed to the lubrication points. Once the pump is turned off, the integrated pressure relief valve reduces the pressure within the system/distributors to approx. 0.5 bar. This allows the lubricant in the distributor's metering chambers to be shifted to the respective delivery chambers. The distributors are then ready for the next lubrication cycle.

The lubrication cycles are controlled by external actuation through a control system provided by the customer for the machine requiring lubrication.

The lubricating frequency, ON-time, and interval time are set by the customer. An interim lubrication can be triggered manually on the design with a pushbutton. A pressure switch monitors the function of the unit. It sends a signal to the machine control unit to turn off the unit after successful metering (a completed lubrication cycle). A pressure gauge can be connected to the pressure port. A float switch is provided to control the minimum fill level; its contacts open once the minimum fill level is reached. This warning signal is likewise evaluated by an external control system (provided by the customer).

Single-line centralized lubrication system, Fig. 1

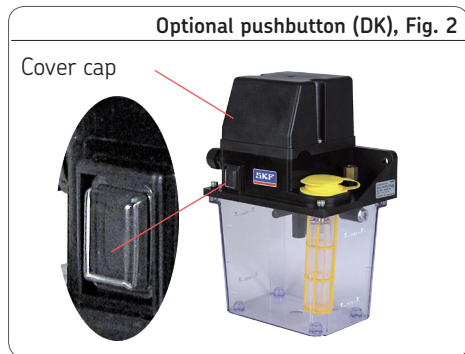


## 6. Control elements

### 6.1 Pushbutton DK

The MSU gear pump unit can optionally be equipped with a pushbutton for manually triggering an interim lubrication. This is often used when performing setup work on the machine/system.

The MSU gear pump unit delivers lubricant as long as the pushbutton remains pressed.



## 7. Commissioning

### 7.1 General information

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



#### **Burn injury hazard!**

Running the pump for an extended time causes the pump motor to heat and may create a burn hazard if the cover cap is open (see Fig. 2).

Commissioning work may only be performed on the MSU with open cover cap if the motor is no hotter than lukewarm:

The lubricant fill level in the lubricant reservoir should be subjected to regular visual inspection. If the lubricant fill level is too low, lubricant needs to be topped up to the maximum mark.



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



#### **Note!**

Only fill using clean lubricant and an appropriate device. Contaminated lubricants can result in severe system malfunction.



#### **Note!**

Different lubricants must not be mixed together. Doing so can cause damage and require costly and complicated 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.

## 8. Decommissioning and disposal

### 7.2 Commissioning procedure

Before the product is commissioned, all electrical and hydraulic connections must be inspected.

#### Commissioning

Prior to commissioning, the centralized lubrication system must be vented as described in the assembly instructions, Chapter 4.6.

#### Recommissioning

The lubricant may only be fed without bubbles. The lubricant reservoir must be filled with clean lubricant. The product is then operated until lubricant without bubbles is discharged at all lubrication points.

Air pockets in the lubricant adversely affect the function of the device and impair the reliability of lubricant delivery, which can result in damage to the lubrication points requiring lubrication.

### 8.1 Temporary shutdown

The described product can be temporarily shut down by disconnecting the electrical and hydraulic supply connections.

The safety instructions in the assembly instructions must be observed when doing so. If the product will be shut down for an extended period of time, the instructions in Chapter 3, "Transport and storage," must be observed.

To recommission the product, follow the safety instructions in Chapter 1 of the assembly instructions and Chapter 4.6, "Venting the centralized lubrication system."

The commissioning procedure described in Chapter 7.2 of these operating instructions must also be followed.

### 8.2 Permanent shutdown

If the product will be permanently shut down, the local regulations and laws regarding the disposal of contaminated equipment must be observed.



#### Note!



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

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

The parts are recyclable.

## 9. Maintenance and service



### **Danger!**

Performing work on products that have not been de-energized 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. 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 decommissioning.



### **Burn injury hazard!**

Running the pump for an extended time causes the pump motor to heat and may create a burn hazard if the cover cap is open (see Fig. 2). Maintenance work may only be performed on the MSU with open cover cap if the motor is no hotter than lukewarm:

SKF Lubrication Systems Germany GmbH products 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 must first 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 GmbH for assistance.



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



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

### 9.1 General information

The maintenance intervals depend on customer-specific settings and operating conditions. The customer is therefore responsible for determining and observing the maintenance intervals on its own.

The operator/operating personnel must perform visual fill level control of the lubricant reservoir at regular intervals. The control intervals depend on the amount of lubricant required and the pump's runtime. The operator/operating personnel must therefore determine the intervals on their own based on the specific conditions of usage.

If the reservoir has been emptied, the entire system must be ventilated after refilling (assembly instructions, Chapter 4.6, and possibly Chapter 10.2 of these operating instructions).



The purity of the lubricants used is the decisive factor in the service life of the gear pump.

### 9.2 Maintenance and repair

The following maintenance and repair work must be performed on a regular basis:

- Inspect fill level in lubricant reservoir.
- Regularly inspect system components for leaks.
- Inspect venting slots, rear of the MSU (see assembly instructions, Chapter 4.3.1) for contamination and remove any contamination found.
- Inspect electrical cables for damage.
- Inspect electrical connections and contacts.
- The function of the MSU and the system components can be inspected by triggering an interim lubrication (by pressing the DK pushbutton).
- Inspect electrical connections in case of malfunction notifications (on customer's control unit).
- Visually inspect lubrication of bearings.

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

### 9.3 Service

If you encounter problems or have any questions, please contact our sales and service centers or our representatives abroad. A list with current addresses is available on the Internet at:

[www.skf.com/lubrication](http://www.skf.com/lubrication)

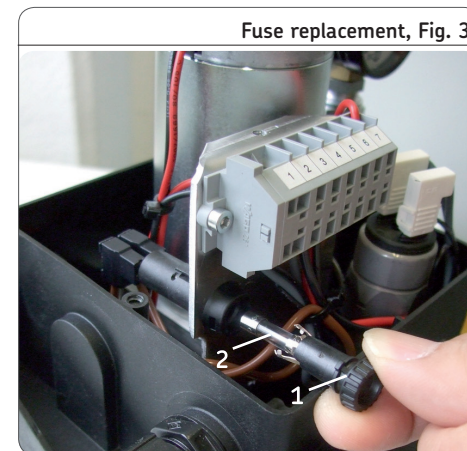
## 9.4 Replacing a defective fuse (24 VDC)



### Note!

The cause of the malfunction must be resolved prior to replacing the defective fuse.

- Resolve the cause of the malfunction
- Disconnect the MSU gear pump from the power supply
- Loosen screws on both sides of the motor's cover cap using a crosstip screwdriver.
- Carefully lift the cover cap and put it aside.
- Push in the bayonet closure (1) of the fuse housing and loosen it counterclockwise
- Replace the defective fuse (2) (see "Accessories" chapter) with a new fuse of the same type.
- Push the bayonet closure (1) of the fuse housing into the fuse box and turn it clockwise to seal
- Apply the cover cap and tighten both recessed head screws.
- Connect the MSU gear pump to the power supply.
- Turn on the MSU gear pump.
- Conduct a functional test.



## 10. Operational and pump faults

### 10.1 General information

The following table on page 40 provides an overview of possible malfunctions and their causes. If you cannot remedy the malfunction, the pump unit needs to be replaced; you may also contact the Service department of SKF Lubrication Systems Germany GmbH.

### 10.2 Venting the pump unit



The pump unit should only be vented in case of malfunction as described in the troubleshooting section on page 40. **Venting is not necessary for normal commissioning or recommissioning.**

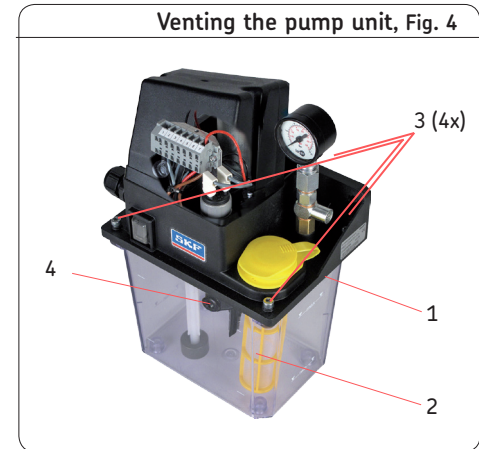
- Turn off the MSU gear pump unit.
- Fill the lubricant reservoir (1) to the maximum mark via the filler socket (2).
- Gently loosen the screws on the reservoir (3) (4x).

☞ There is a seal between the lubricant reservoir and the pump housing. It must not be damaged during when loosening the lubricant reservoir.

- Secure the lubricant reservoir against falling.
- Loosen the lubricant reservoir by gently tilting it away from the pump housing; unscrew the reservoir screws (4x).
- Lower the lubricant reservoir until the screw plug (4) can be loosened using a Torx wrench (Tx25).
- Loosen the screw plug using a Torx wrench 2 to a maximum of 3 turns (counter-clockwise).
- Turn on the MSU and leave running until lubricating oil without bubbles discharges from the screw plug.
- Fasten the screw plug finger-tight.

- Turn off the MSU.
- Place the lubricant reservoir onto the pump housing and fasten it finger-tight using reservoir screws.

Venting the pump unit, Fig. 4



## Unit and system malfunctions

Fault	Possible cause	Rectification
Unit motor fails to start when the operating voltage is applied	No operating voltage on motor	<ul style="list-style-type: none"> <li>• Check mains connection, check mains plug and/or cable; connect properly if necessary.</li> <li>• Check operating voltage on motor.</li> <li>• Check fuse; if necessary, replace line protection or equipment protection (only on 24 VDC).</li> </ul>
	Thermal circuit breaker tripped (only on AC design)	<ul style="list-style-type: none"> <li>• Observe the permissible operating conditions.</li> </ul>
	Pump blocked Pump motor blocked	<ul style="list-style-type: none"> <li>• Measure motor current. If current is impermissibly high: replace the MSU gear pump unit.</li> </ul>
Motor runs with difficulty at low speed	Sluggish pump Sluggish motor	<ul style="list-style-type: none"> <li>• Measure motor current. If current is impermissibly high: replace the MSU gear pump unit.</li> </ul>
Pump does not convey lubricant; no pressure build-up	Air in the pump intake duct	<ul style="list-style-type: none"> <li>• Vent the MSU as described in Chapter 10.2</li> </ul>
	Pressure-regulating valve does not close	<ul style="list-style-type: none"> <li>• Replace the MSU</li> </ul>
	Unsuitable lubricant (see technical data)	<ul style="list-style-type: none"> <li>• Remove lubricant from entire system and dispose of lubricant in the proper manner</li> <li>• Fill system with suitable lubricant</li> </ul>
	Pressure too high, pressure-regulating valve is jammed or defective	<ul style="list-style-type: none"> <li>• Replace the MSU gear pump unit</li> </ul>
	Ambient temperature too low (see technical data)	<ul style="list-style-type: none"> <li>• Increase ambient temperature</li> </ul>
No pressure build-up in the centralized lubrication system	Air in the centralized lubrication system	<ul style="list-style-type: none"> <li>• Venting the centralized lubrication system</li> </ul>
	Fill level too low	<ul style="list-style-type: none"> <li>• Top up lubricant</li> </ul>



## 11. Technical data

### 11.1 Electrical characteristics

The electrical characteristics for the pump motor, pressure switch, and float switch are given in Chapter 4.4.3, "Electrical characteristics," of the assembly instructions.

#### MSU characteristics

Pump unit	230 VAC/50 Hz	230 VAC/60 Hz	24 VDC
	Flow rate <sup>1)</sup>	0.1 l/min	0.12 l/min
Operating pressure <sup>2)</sup>	MSU1-1XXXXXXXX+XXX	13 <sup>+1.0</sup> / <sub>-1.5</sub> bar	
	MSU1-2XXXXXXXX+XXX	23 <sup>+2.5</sup> / <sub>-1.5</sub> bar	
Ambient temperature	+ 10 °C to + 50°C		
Pumped medium	Oil with mineral or synthetic base		
Compatible with:	Plastics, NBR elastomers, copper, copper alloys		
Oil operating viscosity	Depends on duty type: *S3, 10 % ON-time = 20 to 120 mm <sup>2</sup> /s *S3, 3% ON-time = 20 to 2000 mm <sup>2</sup> /s		
Reservoir capacity	1.8 liters		
Protection class per EN 60529	IP 54		

1) Based on an operating viscosity of 140 mm<sup>2</sup>/s (cSt) at a back pressure of p=5 bar at 50 or 60 Hz.

2) Corresponds to the specified value of the integrated pressure-regulating valve at oil viscosity of 140 cSt. between 20-500 cSt:  $13^{+1.0}_{-1.5}$  bar.

## 12. Accessories

Pressure gauge, complete, Fig. 5



### Accessories

Fig.	Description	Order No.
5	Pressure gauge 0 to 25 bar, complete Pressure gauge 0 to 40 bar, complete	<b>169-102-506.U1</b> <b>169-104-008.U1</b>
-	Fuse Cartridge fuse link (5x20 mm) T2A per DIN EN 60127-2 (VDE 0820-2) standard sheet 3	<b>179-990-206</b>



## 951-170-214-EN

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