# Lubrication pump P215


| | |
|---|---|
| Created on: | **06.08.2024** |
| Document no.: | **951-171-081-EN** |
| Version: | **04** |

Read these instructions before installation or start-up of the product and keep them readily available for later 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: | Electrically operated pump for the supply of lubricants within a centralized lubrication system |
| Type: | Pump P215 |
| Item number: | 660-xxxxx-x |
| | 6600-xxxxxxxx |

Furthermore, the following directives and standards were applied in the respective applicable areas:
2006/42/EC: Machinery Directive
2011/65/EU: RoHS II
2014/30/EU: Electromagnetic Compatibility

| | | |
|---|---|---|
| EN ISO 12100:2010 | EN 809+A1/AC:2010 | EN 60204-1:2018 |
| EN IEC 63000:2018 | EN 60947-5-1:2017 | EN IEC 60947-5-2:2020 |

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, 03.02.2021

| | |
|---|---|
| Jürgen Kreutzkämper | Stefan Schürmann |
| Manager, R&D | Manager, PD |
| Germany | Germany South |

Manufacturer: SKF Lubrication Systems Germany GmbH, Heinrich-Hertz-Str. 2-8, 69190 Walldorf, Germany

## 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: | Electrically operated pump for the supply of lubricants within a centralized lubrication system |
| Type: | Pump P215 |
| Item number: | 660-xxxxx-x |
| | 6600-xxxxxxxx |

Furthermore, the following regulations and standards were applied in the respective applicable areas:
Supply of Machinery (Safety) Regulations 2008 No. 1597
Electromagnetic Compatibility Ordinance 2016 No. 1091
Electrical Equipment (Safety) Regulations 2016 No. 1101
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032

| | | |
|---|---|---|
| EN ISO 12100:2010 | EN 809+A1/AC:2010 | EN 60204-1:2018 |
| EN IEC 63000:2018 | EN 60947-5-1:2017 | EN IEC 60947-5-2:2020 |

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Walldorf, 03.02.2021

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| Jürgen Kreutzkämper | Stefan Schürmann |
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Manufacturer: SKF Lubrication Systems Germany GmbH, Heinrich-Hertz-Str. 2-8, 69190 Walldorf, Germany

**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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**Authorized local distributors**
- Great Britain -
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OX16 2RT, GBR.

- North America -
SKF Lubrication Business Unit
Lincoln Industrial
5148 North Hanley Road, St. Louis,
MO. 63134 USA

- South America -
SKF Argentina Pte. Roca 4145,
CP 2001 Rosario, Santa Fe

**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.

# Table of contents

# 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

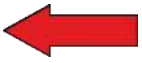
- Replacement of or modifications to the pistons of the pump elements
- Repairs or modifications to the drive.

## 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 (for VAC pumps only) |
|  | Risk of wrapping, pinching, crushing, or shearing when the reservoir lid is open (only for reservoirs with filling from above) |
|  | Risk of injury from spring tension (only for pumps with a follower plate) |
|  | Direction of rotation of the pump (stirring paddle) |
|  | Read the instructions (before initial filling of a pump with double-lip follower plate delivered without lubricant) |

Possible safety markings on the product

**NOTE**

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

## 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, these characteristics should be entered in the manual.

Model:

_____

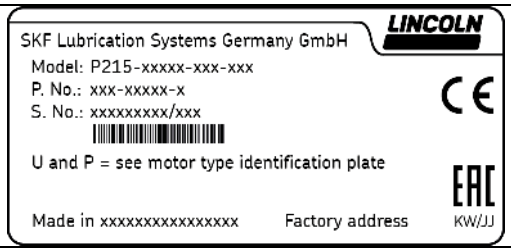
P.No.: _____S. No.:_____

(CW/YY):

_____

Calendar week/year of manufacture

Fig. 2




Type plate (example)

## 1.12 Notes on CE marking

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

- 2006/42/EC Machinery directive
- 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 UKCA marking

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

## 1.15 Note on EAC marking

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

## 1.16 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).

## 1.17 Emergency shutdown

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

## 1.18 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.

## 1.19 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.

## 1.20 Residual risks

Table 2

**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<br>• Mount the product only on components with a sufficient load-carrying capacity.<br>• 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.<br>• Before connecting the pump unit, de-energize all relevant electrical components. Observe any discharge times.<br>• 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.<br>• Use only hydraulic screw unions and lubrication lines suitable for the specified pressure.<br>• 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.<br>• Promptly apply suitable binding agents and then remove the spilled or leaked lubricant.<br>• 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. |
| Injury from hot/faulty motor | E F G | • Switch off the pump. Let parts cool off; remedy the cause. |
| Injury due to spring tension in reservoirs<br>with a follower plate | F G H | • Wait until tension has been relieved on the spring as much as possible (i.e., the reservoir is empty) before removing a reservoir with a follower plate. Provide a suitable protective measures when loosening the reservoir, e.g., a retaining strap. Do not work with your head directly above the reservoir. |

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.

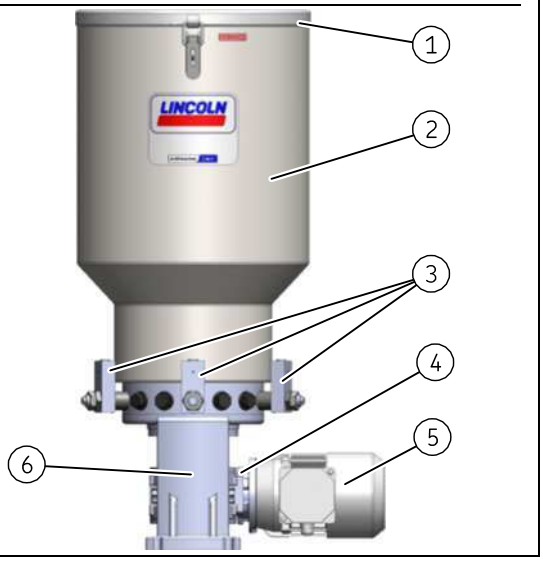
# 3 Overview, functional description

## 3.1 Pump

In the following you will find an overview of the most important functions and equipment features of the pump:

**Overview:**

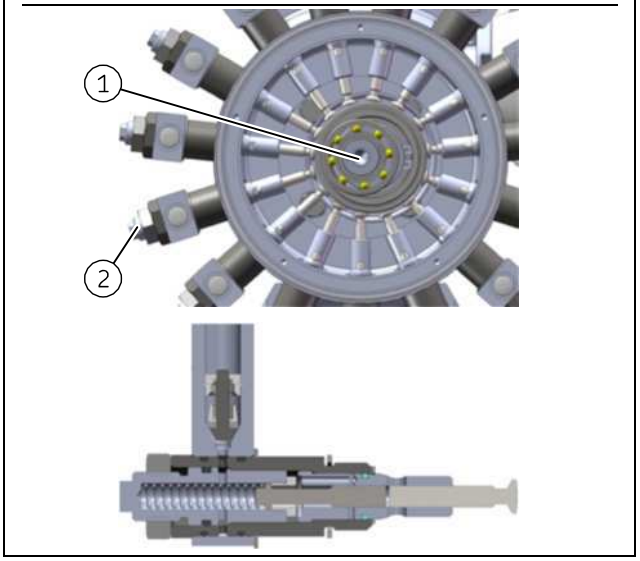
Fig. 3




Main components

**Legend to Figure 3:**
1 Reservoir cover
2 Reservoir with stirring paddle
3 Pump elements (1-15)
4 Gearbox
5 Motor
6 Pump housing

Fig. 4




Eccentric shaft

**Legend to Figure 4:**
1 Eccentric shaft
2 Pump elements (1-15)

**Functional description:**
The gearbox (fig. 3/4) reduces the speed of the motor (fig. 3/5) to the speed required for the eccentric shaft (fig. 4/1).

The eccentric shaft (Fig. 4/1) drives the pump elements (Fig. 3/3 and Fig. 4/2) and the stirring paddle.

The stirring paddle homogenizes the lubricant, purges it of air, and pushes it toward the suction bores of the pump elements (Fig. 3/3 and Fig. 4/2).

The pump elements (Fig. 3/3 and Fig. 4/2) pump the lubricant by the motion of their pistons.

This involves a suction phase (when the lubricant is suctioned out of the reservoir) and then a pressure phase (when the lubricant is pumped into the lubrication line).

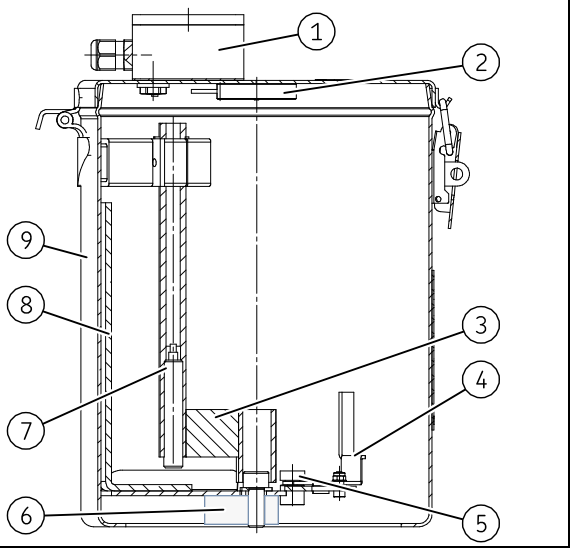
A sensor detects the level of lubricant remaining in the reservoir (and issues a full or low-level signal, when applicable).

## 3.2 Fill level monitoring XBI / XLI

In the following you will find an overview of the most important functions and equipment features of the fill level monitoring:

**General overview:**

Fig. 5




Main components – XBI

**Legend to Figure 5:**
1 Terminal box
2 Capacitive sensor (full signal)
3 Fixed paddle
4 Guide plate
5 Magnet
6 Cam
7 Reed switch (low-level signal)
8 Stirring paddle
9 Reservoir

**Functional description – fill level monitoring:**
The low-level signal mechanism comprises the reed switch (Fig. 5/7) and the magnet (Fig. 5/5) fastened to the baffle plate (Fig. 5/4). The baffle plate can rotate to a limited extent, and is joined to the stirring paddle (Fig. 5/8).

As long as the baffle plate is in the grease, the grease acts as a drag on it every time the stirring paddle rotates. The magnet (Fig. 5/5) constantly moves toward the center of the reservoir. Its guiding part is therefore constantly on the cam (Fig. 5/6) of the housing assembly.

Shortly after passing the fixed paddle (Fig. 5/3), the cam forces the magnet out toward the reservoir wall. However, the drag of the grease on the baffle plate always directs the magnet back toward the center of the reservoir. In this position of rotation, the magnet (Fig. 5/5) cannot activate the reed switch.

If the grease falls to a minimum level (so that it does not apply any drag), the magnet stays in the outer position (reservoir wall) where it activates the reed switch (Fig. 5/7) during every rotation. This produces an intermittent low-level signal.

**Functional description – reed switch (low-level signal):**
The reed switches are fitted with hermetically sealed reed contacts. They are activated by the magnetic field of a magnet, without any contact or wear.

**NOTE**
The lifetime of the reed switch is heavily dependent on the load conditions. Since the maximum switching capacity specifications apply to purely resistive loads, which are not always ensured in practice, appropriate contact protection measures are required in the case of deviating loads.

**Functional description – capacitive sensor (full signal):**
The sensor for the full signal (Fig. 5/2) operates on a capacitive principle. The sensor is factory-set. When the reservoir is filled with lubricant, the sensor is triggered approx. 8 to 2 mm before the sensor surface is reached, depending on the dielectric properties of the lubricant, and reports “reservoir full.”

# 4 Technical data

## 4.1 Pump

Table 3

**Technical data**

| Parameter | Value |
|---|---|
| Operating temperature | min.: - 25°C<br>max.: + 70°C |
| Operating pressure[1)] | max.: 350 bar |
| Mounting position | Upright, i.e., with the reservoir at top. Max. deviation 5° |
| Sound pressure level | < 70 dB(A) |
| Reservoir versions: | 2 liter / 4 liter / 8 liter (plastic), 10 liter / 30 liter / 100 liter (sheet steel) |
| Weight[2)] | Approx. 18 kg to approx. 35 kg |
| Electrical connection | This is performed according to the respective installation requirements for electrical systems<br>Voltage tolerance: ± 5 %<br>Frequency tolerance: ± 2 %<br>Waveform and network symmetry must be maintained |
| IP protection class | Motor: See the type plate of the motor, or the “Technical data” of the motors<br>Ultrasonic sensor: IP65 |
| Low-level signal/full signal | See type identification code for reservoir versions |
| Maximum delivery rate[3)] | Per pump element:<br>• K5 (piston Ø 5 mm): ca. 0.11 ccm / stroke<br>• K6 (piston Ø 6 mm): ca. 0.16 ccm / stroke<br>• K7 (piston Ø 7 mm): ca. 0.23 ccm / stroke |
| Filling options | • Via the fill connection<br>• Via the reservoir cover |
| Connections/outlets | 15 x outlet (pump element)<br>G1/4“ for lubrication piping<br>If fewer than 15 pump elements are used, an outlet can be used as a fill connection<br>The following adapters are available as accessories:<br>Fill connection G ¼“<br>Fill connection G ½“ |
| Direction of pump rotation | The direction of rotation is always clockwise (CW). Observe the arrow on the reservoir. If the direction of rotation is different: Switch the pump off immediately and check the electrical connection. |
| Permissible speeds | • Grease:<br>min.: 2.5 rpm<br>max.: 30 rpm<br>• Oil:<br>min.: 2.5 rpm<br>max.: 35 rpm<br>If the pump is delivered without a motor and gearbox, compliance with these speeds must be ensured by selecting a suitable motor and gearbox |

[1)] All system parts must be designed for the maximum operating pressure. Every pump element must be safeguarded with a suitable pressure limiting valve to prevent higher pressures.

[2)] The weight of the empty pump lies somewhere within the weight range specified, depending on the components fitted (e.g., a number of pump elements, reservoir capacity, motor and gearbox versions). The weight of the lubricant in the reservoir would need to be added to this weight.

[3)] The specifications are valid for grease of NLGI Grade 2 at + 20 °C and 100 bar back pressure. Other conditions, such as a different NLGI Grade, temperature, or back pressure may cause a different delivery rate, which must be considered in the design of the lubrication points.

Table 4

**Tightening torques**

| Component | Required torque |
|---|---|
| Pump element in housing | 25 Nm  2.5 Nm |
| Pressure limiting valve in pump element | 6 Nm ± 0.6 Nm |
| Plug screws with housing | 14 Nm ± 0.1 Nm |
| Fill connection / return to reservoir | 10 Nm ± 0.1 Nm |
| Grease nipple / adapter for grease nipple | 10 Nm ± 0.1 Nm |
| Reservoir with pump housing | 25 Nm ± 0.2 Nm |
| Ultrasonic sensor with cover | 1.5 ± 0.2 Nm |

**NOTE**

If no torques are specified for threaded connectors, use torques according to screw/bolt size for grade 8.8 screws/bolts.

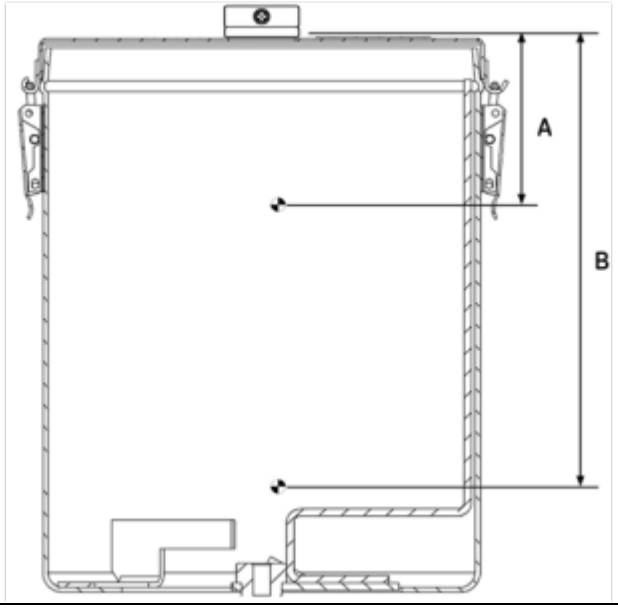
Table 5

**Storage until initial use**

| Parameter | Value |
|---|---|
| Temperature range | min.: - 20 °C<br>max.: + 40 °C |
| Humidity (relative) | max.: 90 % |
| Storage time | max.: 24 months |
| Other prerequisites | • In the original packaging<br>• In dry, low-dust rooms<br>• No direct sun or UV radiation<br>• No corrosive substances in the storage area<br>• No shocks or vibrations<br>• Protected against animals (insects, rodents, etc.)<br>• Other specifications in chapter 2 and chapter 5 of these instructions |

## 4.2 Ultrasonic sensor 664-853xx-x

Fig. 6




Ultrasonic sensor

Table 6

**Technical data (full signal/low-level signal/minimum clearance)**

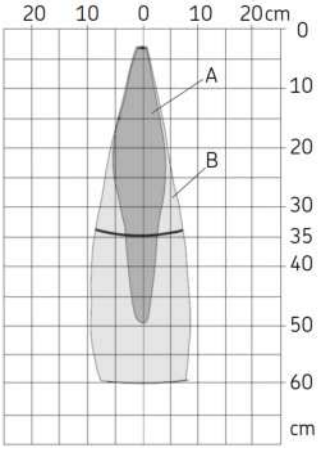
| Reservoir capacities/versions | Switching points |
|---|---|
| 4 / XYBU | Full signal A: approx. 65 mm<br>Low-level signal B: approx. 180 mm |
| 8 / XYBU | Full signal A: approx. 65 mm<br>Low-level signal B: approx. 245 mm |
| 10 / XYBU | Full signal A: approx. 65 mm<br>Low-level signal B: approx. 210 mm |
| 30 / XYBU | Full signal A: approx. 65 mm<br>Low-level signal B: approx. 420 mm |
| 100 / XYBU | Full signal A: approx. 220 mm<br>Low-level signal B: approx. 670 mm |

**NOTE**

The minimum clearance between the lubricant and the ultrasonic sensor is 60 mm. If this distance is not maintained, undefined switching states of the ultrasonic sensor could result in faulty measurement results.

Table 7

**Technical data**

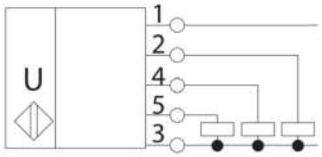
| Parameter | Value |
|---|---|
| Blind zone | 0-65 mm |
| Sensing range | 600 mm |
| Ultrasonic frequency | Approx. 400 kHz |
| Sonic frequency | 3.7 Hz |
| Resolution | 0.18 mm |
| Accuracy | ± 1 % |
| Reproducibility | ± 15 % |
| Sensing range in centimeters |  The dark gray areas (A) indicate the range in which the standard reflector (a tube) is reliably detected. The light gray areas (B) represent the range in which a large reflector (such as the lubricant surface) is still detected provided that it is optimally aligned to the sensor. No evaluation is possible outside the light gray area. |
| Operating voltage $U_B$ | 9-30 VDC (reverse polarity resistant) |
| Residual ripple | ± 10% |
| No-load power consumption | ≤ 60mA |
| Connection type | M12 connector, 5-pin |
| Response delay | 272 ms |
| Readiness delay | < 300 ms |
| Enclosure rating per EN 60529 | IP65 / IP67 (depending on the cable box used) |
| Operating temperature range | - 40 °C to + 70 °C |
| Switching points | Full signal D1; low-level signal D2 according to the reservoir size; pre-empty signal D3 programmable upon customer request, preset to 10 mm above the low-level signal (use is optional) |
| Conformity with standards | DIN EN IEC 60947-5-2 |
| Display elements | LED green/LED orange<br>Switching output set/not set |
| Housing material | PBT, polyester, ultrasonic transducer: PUR, epoxy resin with glass contents |
| Switching output | 3x pnp; UB-2V; Imax = 3 x 200 mA; NO contact, short-circuit proof |

**NOTE**

The specified enclosure rating is contingent on the use of connection sockets and cables suitable for that enclosure rating. If connection sockets and cables with a lower protection rating are used, the lowest of those protection ratings will apply.

Table 8

**Electrical connection**






| | | Cable colors in accordance with IEC 60757 |
|---|---|---|
| 1 | + $U_B$ | Brown (BN) |
| 3 | - $U_B$ | Blue (BU) |
| 4 | D2 | Black (BK) |
| 2 | D1 | White (WH) |
| 5 | D3 / Com | Gray (GY) |

Table 9

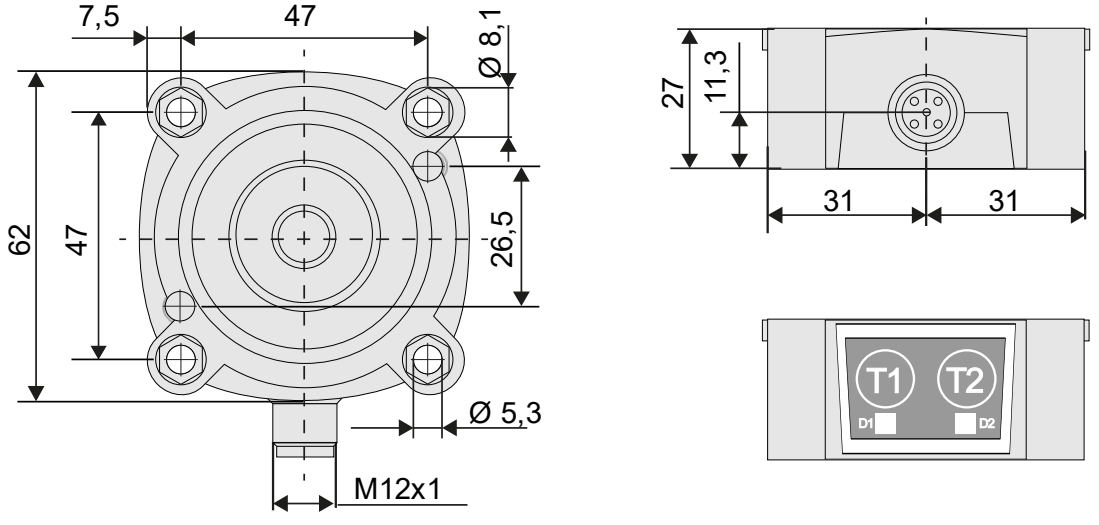
**Display of the circuit states**

| Parameter | Switching points | | | Display of the LEDs | | | | |
|---|---|---|---|---|---|---|---|---|
| | D1 | D2 | D3 | D1 (up to 10/21) | D1 (from 10/21 ) | D2 (up to 10/21) | D2 (from 10/21 ) | -- |
| Full signal (high level) | A | A | B | Orange | Green | Orange | Green | C |
| Between full signal and pre-empty signal | B | A | B | Green | Orange | Orange | Green | C |
| Pre-empty signal | B | A | A | Green | Orange | Orange | Green | D |
| Low-level signal | B | B | B | Green | Orange | Green | Orange | C |

A = switched, B = not switched, C = steady, D = flashing

**Dimensions:**

Fig. 7




Dimensions

## 4.3 Fill level monitoring XBI / XLI

### 4.3.1 Low-level signal – reed switch (reservoir XBI / XLI)

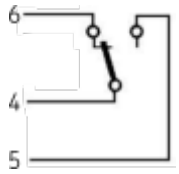
Table 10

**Technical data**

| Parameter | Value |
|---|---|
| Maximum switching voltage | 230 V AC |
| Switching capacity | 60 VA |
| Switched current | 1 A |
| Permissible ambient temperature | - 25 °C to + 80 °C |
| Enclosure rating | IP65 |
| Material | Brass, nickel-plated |
| Power lead | PUR 3 x 0.34 $mm^2$ |

Table 11

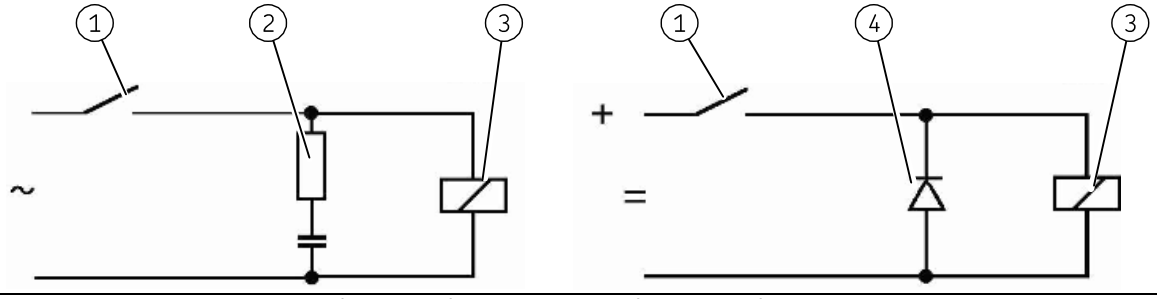
**Wiring diagram (changeover contact)**

| Wiring diagram | Terminal (in the terminal box) | Color (IEC 60757) |
|---|---|---|
|  | 6 | Blue (BU) |
| | 4 | Brown (BN) |
| | 5 | Black (BK) |



**Terminal diagrams for alternating current/direct current:**

Fig. 8

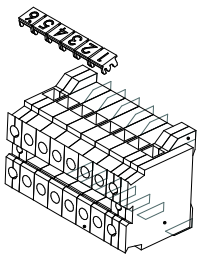
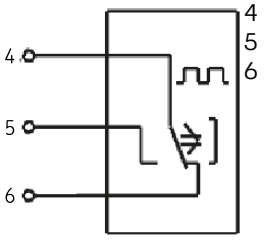



Terminal diagram for alternating current (left figure) / direct current (right figure)

**Legend to Figure 8:**
1 Reed switch
2 RC element
3 Load
4 Diode

Table 12

**Terminal diagram – terminal box**

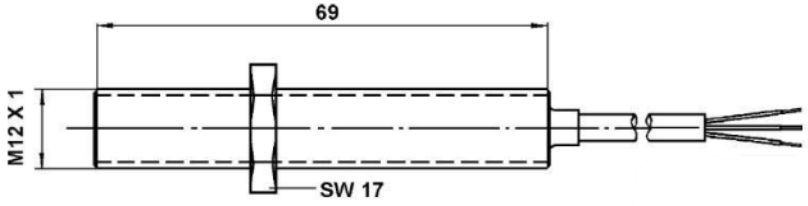
| Terminal diagram | Terminal | Color (IEC 60757) |
|---|---|---|
|   |   | Brown (BN)<br>Black (BK)<br>Blue (BU) |

**NOTE**

The fill level monitoring low-level signal (XBI / XLI) is an intermittent signal. An analyzing unit is required to process this signal. This unit is not included in the delivery from SKF.

**Dimensions:**

Fig. 9




Dimensions

## 4.3.2 Full signal – capacitive sensor (XBI reservoir)

Table 13

**Technical data**

| Parameter | Value |
|---|---|
| Connection | Cable |
| Rated operating current (Ie) | 150 mA |
| Rated insulation voltage (Ui) | 75 V DC |
| Operating voltage max. (UB) | 30 V DC |
| Operating voltage min. (UB) | 10 V DC |
| Function indicator | YES |
| Short-circuit-proof | YES |
| No-load current, damped | < 15 mA |
| Residual ripple | 10 % |
| Enclosure rating | IP 67 |
| Switching output | PNP / NPN (selectable) |
| Protected against polarity reversal | YES |
| Switching function | NC/NO contact (selectable) |
| Switching frequency | 50 Hz |
| Rated sensing distance (Sr) | 2...25 mm |
| Installation | Flush mountable |
| Power lead | 2 m / 3 x 0.25 $mm^2$ PVC |

Table 14

**Wiring diagram**

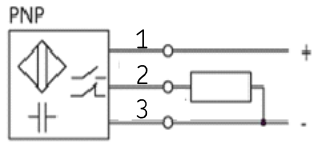
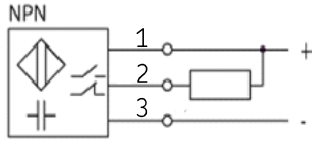
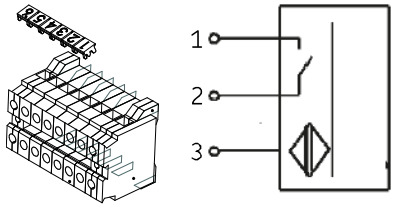
| Wiring diagram | Terminal (in the terminal box) | Color (IEC 60757) |
|---|---|---|
|  | 1 | Brown (BN) |
| | 2 | Black (BK) |
|  | 3 | Blue (BU) |

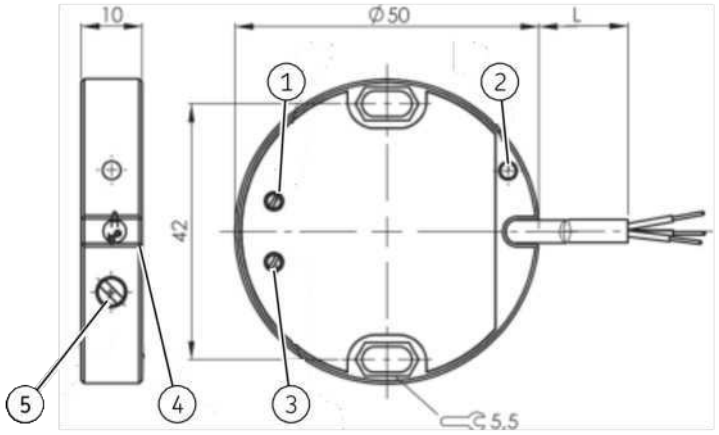
Table 15

**Terminals in the terminal box**

| Wiring diagram | Terminal | Color (IEC 60757) |
|---|---|---|
|  | 1 | Brown (BN) / (L+) |
| | 2 | Black (BK) |
| | 3 | Blue (BU) / (L-) |

**Sensor overview:**

Fig. 10




Sensor overview

**Legend to Figure 10:**
1 PNP or NPN selectable
2 LED function indicator
3 NO/NC selectable
4 Active area
5 Potentiometer – factory-set

## 4.4 Motors

**NOTE**

When operating under conditions of high humidity and sharply fluctuating temperatures, motors with condensate drainage holes or anti-condensation heating should be used.

**NOTICE**

**Mounting motors in a different position**
**Malfunction / damage**

The motor should only be mounted in a different position if the condensation of water and the entry of foreign bodies into the air inlets can be excluded. Remove any condensation water with a suitable suction device, and fit a protective device for the air inlets.

### 4.4.1 Multi-range motors

Table 16

**Technical data**

| | | |
|---|---|---|
| **Motor/pump combination:** | | |
| Motor type | T63B4 | TN63 |
| Pump model | P215-M100 / P215-M490 | P215-M049 |
| Parameter | Value | |
| Voltage | 230 / 400 V +/- 10 % // 265 / 460 V +/- 10 % | 230 / 400 V +/- 10 % // 265 / 460 V +/- 10 % |
| Frequency | 50 Hz // 60 Hz | 50 Hz // 60 Hz |
| Rated capacity | 0.18 kW // 0.21 kW | 0.25 kW // 0.29 kW |
| Rated speed | 1360 $min^{-1}$ // 1632 $min^{-1}$ | 1334 $min^{-1}$ // 1600 $min^{-1}$ |
| Rated current | 1.2 / 0.7 A | 2.5 / 1.4 A |
| Starting current | 2.6 x rated current | 2.5 x rated current |
| Rated torque | 1.3 Nm | 1.7 Nm |
| Efficiency | 54 % η | 62 % η |
| Power factor | 0,68 cos ϕ | 0,55 cos ϕ |
| Operating mode | S1 | S1 |
| Type | B14 | B14 |
| Frame size | 63 | 63 |
| Enclosure rating | IP55 | IP55 |
| Insulation class | F | F |
| Flange | 90 mm | 90 mm |
| Shaft | 11 x 23 mm | 11 x 23 mm |
| Weight | - | - |
| Explosion protection | - | - |
| NEMA | - | - |
| UL cert. no. | - | - |
| Special design, electrical | - | - |
| Special design, mechanical | - | - |
| Terminal box | Left [1)] | Left [1)] |
| Screwed gland | On the fan side [1)] | On the fan side [1)] |
| Type plate | Top [1)] | Top [1)] |

[1)] Arrangement when looking at the fan impeller

## 4.4.2 Single-range motors

Table 17

**Technical data**

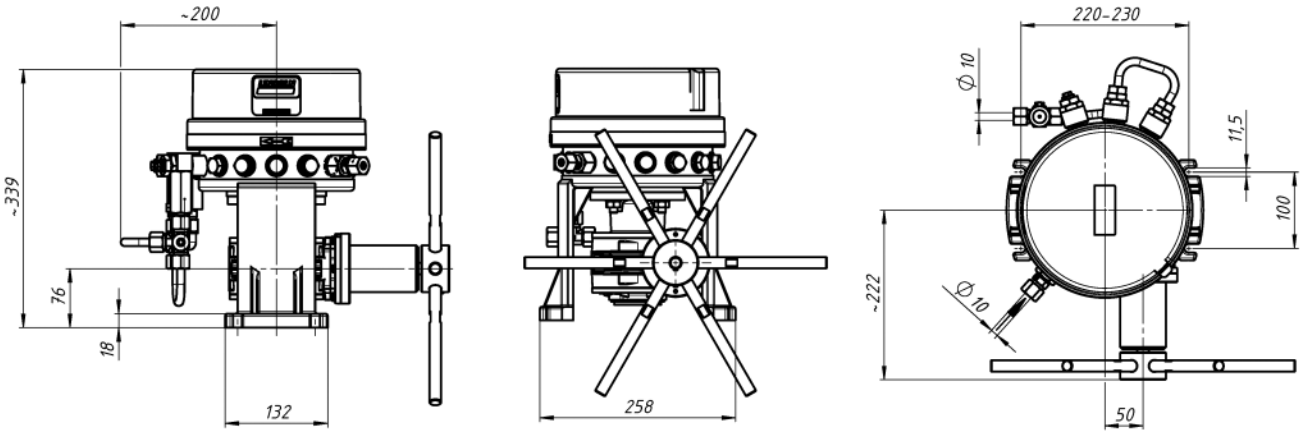
| **Motor/pump combination:** | | |
|---|---|---|
| Motor type | TN63B/ T63B | TN63 |
| Pump model | P215-M100 / P215-M490 | P215-M049 |
| Parameter | Value | |
| Voltage | 290 / 500 V +/- 10 % | 290 / 500 V +/- 10 % |
| Frequency | 50 Hz | 50 Hz |
| Rated capacity | 0.18 kW | 0.25 kW |
| Rated speed | 1360 $rpm^{-1}$ | 1400 $rpm^{-1}$ |
| Rated current | 1.0 / 0.6 A | 2.0 / 1.12 A |
| Starting current | 2.5 x rated current | 2.5 x rated current |
| Rated torque | 1.3 Nm | 1.7 Nm |
| Efficiency | 62 % η | 62 % η |
| Power factor | 0,69 cos ϕ | 0,55 cos ϕ |
| Operating mode | S1 | S1 |
| Type | B14 | B14 |
| Frame size | 63 | 63 |
| Enclosure rating | IP55 | IP55 |
| Insulation class | F | F |
| Flange | 90 mm | 90 mm |
| Shaft | 11 x 23 mm | 11 x 23 mm |
| Weight | - | - |
| Explosion protection | - | - |
| NEMA | - | - |
| UL cert. no. | - | - |
| Special design, electrical | - | - |
| Special design, mechanical | - | - |
| Terminal box | Left [1)] | Left [1)] |
| Screwed gland | On the fan side [1)] | On the fan side [1)] |
| Type plate | Top [1)] | Top [1)] |

[1)] Arrangement when looking at the fan impeller

## 4.5 Dimensioned drawings

### 4.5.1 2XNFL

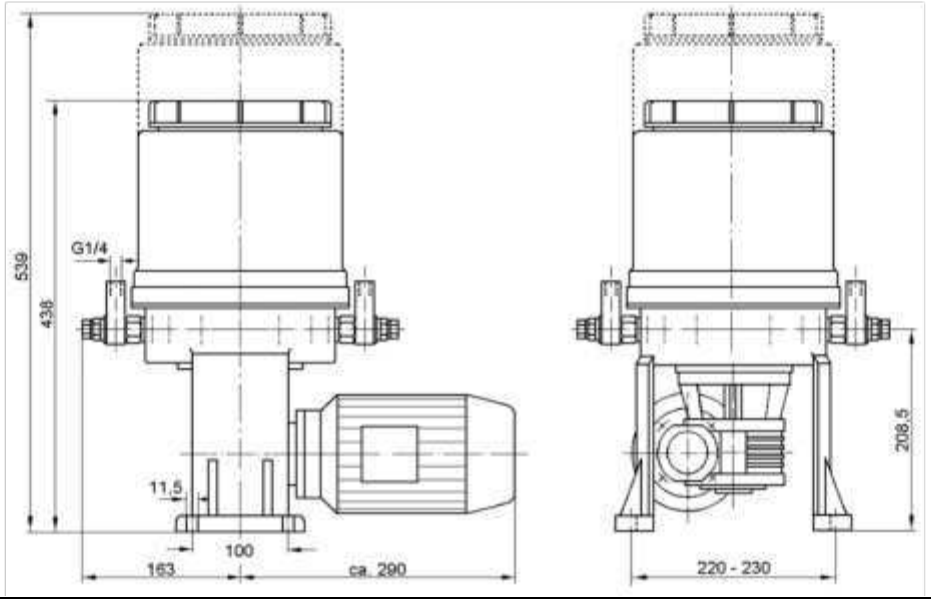
Fig. 11




2XNFL

### 4.5.2 M100 / M049 - 4XN / 8XN

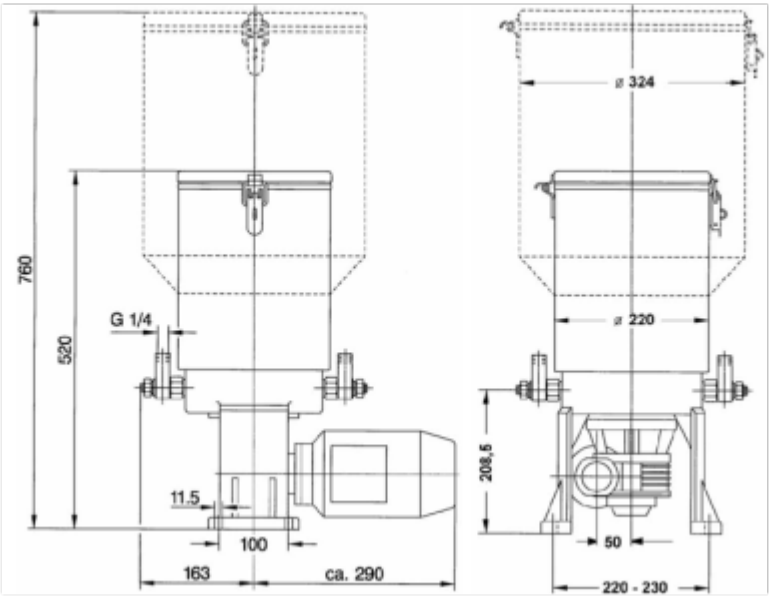
Fig. 12




M100 / M049 – 4XN / 8XN

## 4.5.3 M100 / M049 - 10XN / 10YN / 30XN / 30YN

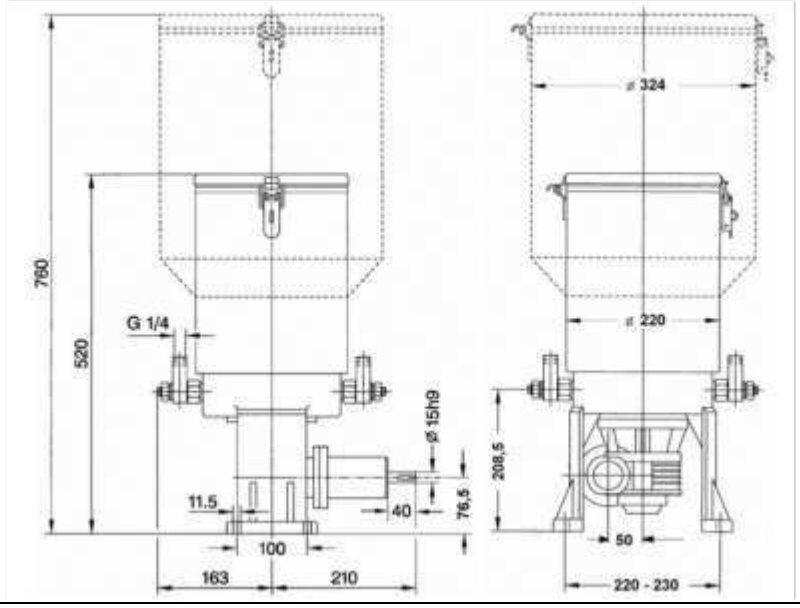
Fig. 13




M100 / M049 – 10XN / 10YN / 30XN / 30YN

## 4.5.4 F100 / F049 - 10XN / 10YN / 30XN / 30YN - With free shaft end

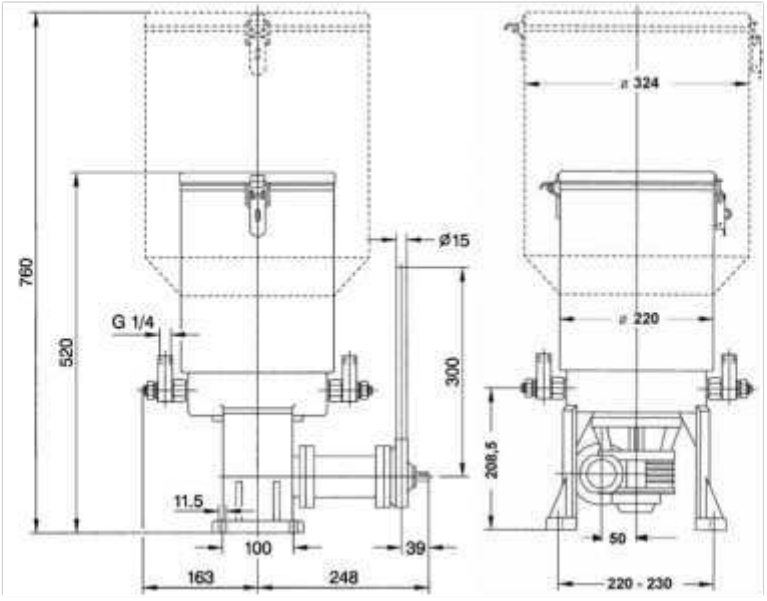
Fig. 14




F100 / F049 – 10XN / 10YN / 30XN / 30YN – With free shaft end

## 4.5.5 10XN / 10YN 30XN / 30YN - ...with pendulum drive

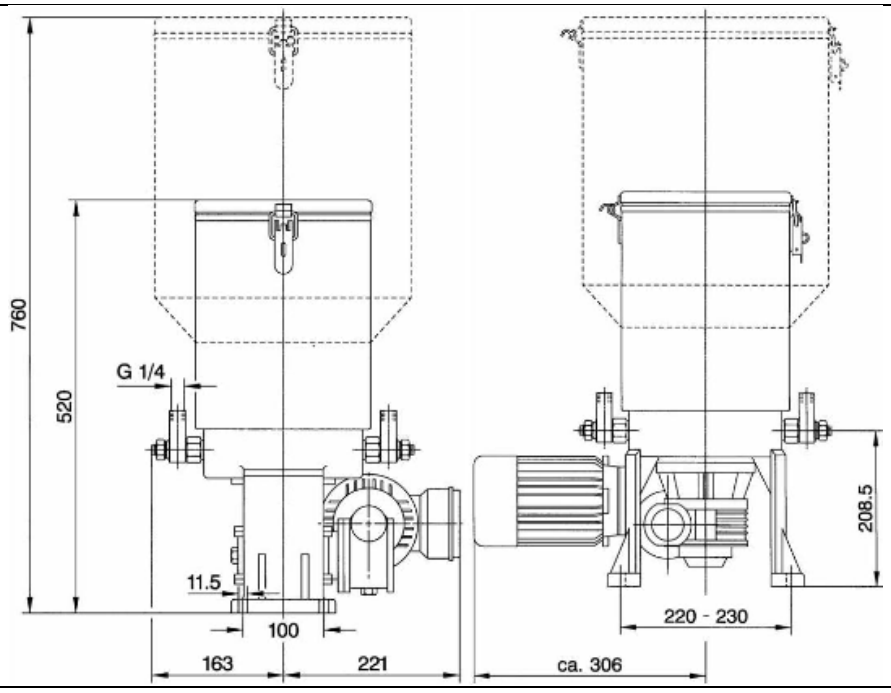
Fig. 15




10XN / 10YN 30XN / 30YN - ...with pendulum drive

## 4.5.6 M 490- 10XN / 10YN / 30XN / 30YN - ...with double gearbox and motor

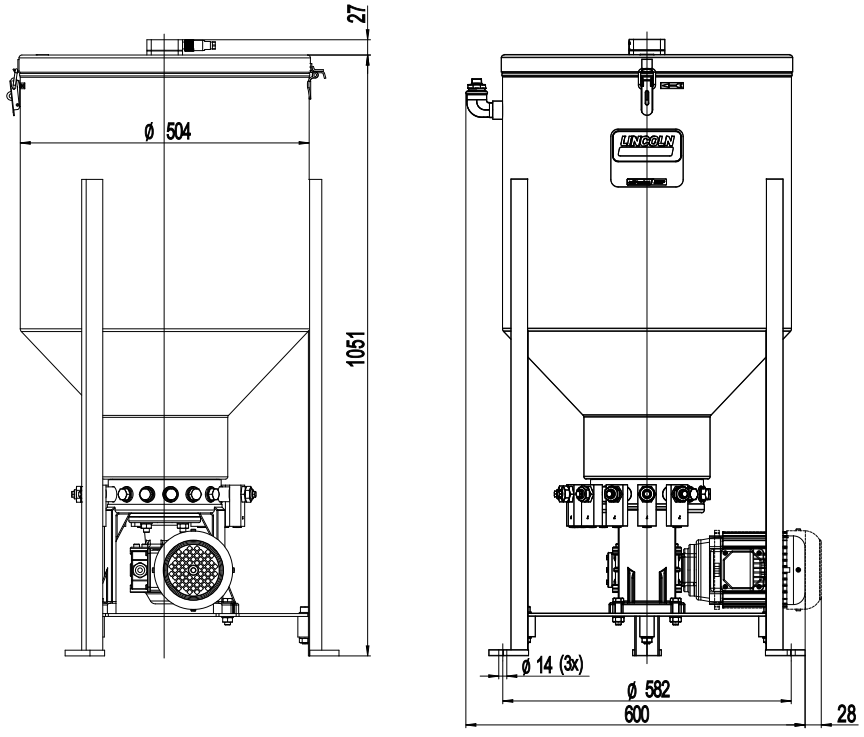
Fig. 16




M 490- 10XN / 10YN / 30XN / 30YN - ...with double gearbox and motor

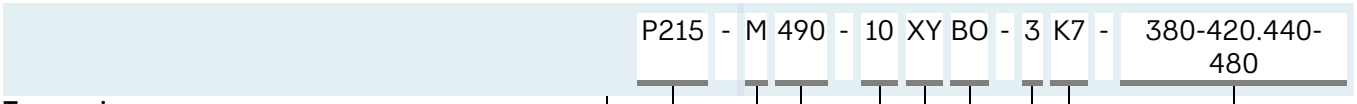
## 4.5.7 M100 / M049 - 100XY...

Fig. 17




M100 / M049 – 100XY...

## 4.6 Type identification code for pump P215




**Type series:**
P215 Pump P215 for grease and oil

**Drive assembly:**
M Three-phase flange-mounted motor
F Free shaft end
P Pendulum drive

**Transmission ratio:**
490 i = 490 : 1
100 i = 100 : 1
049 i = 049 : 1
007[1)] i = 07 : 1

**Reservoir assembly:**
2[2)] 2-liter plastic reservoir
4 4-liter plastic reservoir
8 8-liter plastic reservoir
10 10-liter sheet steel reservoir
30 30-liter sheet steel reservoir
100 100-liter sheet steel reservoir
..... Without reservoir

**Lubricant:**
(for reservoir versions, see Table 18)
Y for oil
X for grease
XY For grease and oil

**Reservoir versions:**
(for possible combinations, see Table 18)
B Reservoir with full and low-level signal
N Reservoir without level control
L Reservoir with low-level signal
I Reservoir with low-level signal / reed switch
F Reservoir with follower plate
FL[3)] Flat reservoir
P Reservoir with level control and pre-warning
BO Reservoir with filling from above
U Reservoir with level control / ultrasonic sensor
AU Reservoir with level control / analog ultrasonic sensor
PU Reservoir with level control and pre-warning / ultrasonic sensor

**Number of pump elements:**
_1-15 1 to 15 pump elements
.... Without pump elements

**Pump elements:**
K5 Piston diameter 5 mm
K6 Piston diameter 6 mm
K7 Piston diameter 7 mm
.... Without pump elements

[1)] Only for drive assembly "P" and "F"
[2)] Only available with drive assembly "F", drive sprocket, and transmission ratio 007 (i = 07 : 1)
[3)] Only available as 2 liter plastic reservoir (type 2XNFL)

| P215 | - | M | 490 | - | 10 | XY | BO | - | 3 | K7 | - | 380-420.440-480 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Motor:**

380-420.440-480
: Multi-range motor for line power 380-420 V / 50 Hz and 440-480 V / 60 Hz with star connection

500
: Single-range motor for line power 500 V / 50 Hz

000
: Pump without motor, but with connection flange

Low-level
: Pump without motor and without connection flange

Table 18

**Reservoir versions**

| Code | | | Possible reservoir capacities 2 l | 4 l | 8 l | 10 l | 30 l | 100 l | Description |
|---|---|---|---|---|---|---|---|---|---|
| X | B | | | | | √ | √ | | Reservoir with full/low-level signal (reed switch) |
| X | B | F | | | | | √ | | Reservoir with full/low-level signal and follower plate (position switch) |
| X | B | I | | | | √ | √ | | Reservoir with full and low-level signals (magnetic proximity switch) |
| X | B | P | | | | | √ | | Reservoir with full and low-level signals and pre-warning (position switch) |
| X | L | | | | | √ | √ | | Reservoir with low-level signal (reed switch) |
| X | L | F | | | | | √ | | Reservoir with low-level signal and follower plate (position switch) |
| X | L | I | | | | √ | √ | | Reservoir with low-level signals (magnetic proximity switch) |
| X | N | BO | | | √ | | | | Reservoir without level control, filling from the top |
| X | N | F | | | | | √ | | Reservoir without level control, with follower plate |
| X | N | FL | √ | | | | | | Flat reservoir without level control |
| XY | B | | | | | √ | √ | | Reservoir with full and low-level signals (capacitive proximity switch) |
| XY | B | AU | | | | √ | √ | | Reservoir with full and low-level signals (analog ultrasonic sensor) |
| XY | B | PU | | | √ | √ | √ | √ | Reservoir with full and low-level signals and pre-warning (ultrasonic sensor) |
| XY | B | U | | √ | √ | √ | √ | √ | Reservoir with full and low-level signals (ultrasonic sensor) |
| XY | L | | | | | √ | √ | | Reservoir with low-level signal (capacitive proximity switch) |
| XY | N | | | √ | √ | √ | √ | √ | Reservoir without level control |
| Y | B | | | | | √ | √ | √ | Reservoir with full/low-level signal (floating reed switch) |
| Y | B | P | | | | | √ | | Reservoir with full and low-level signals and pre-warning (magnetic float switch) |
| Y | L | | | | | √ | √ | | Reservoir with low-level signal (floating reed switch) |
| Y | L | P | | | | | √ | | Reservoir with low-level signal and pre-warning (capacitive proximity switch) |

# 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.

Fig. 18

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

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.

**⚠ 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 following instructions for a safe connection:

- The electrical connection must be implemented in accordance with the specifications of the standards of the DIN VDE 0100 series or of the standards of the IEC 60364 series, respectively
- 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)

The electrical connection is established in accordance with the type of connection of the specific pump.

1. Assemble the required cables in accordance with the respective connection diagram or use preassembled cables for the connection.
2. Connect plugs with their respective bushes and secure them against becoming loose using the type of securing method specified for the quick disconnect couplings. Only this way is a safe connection and compliance with the enclosure rating secured.

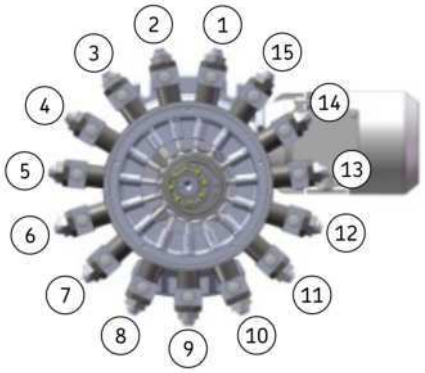
**NOTE**

Connect the cables in such a way that no tensile forces can be transferred to the product.

## 6.1 Important notes regarding installation of the pump elements

The individual pump elements should be installed in the order shown on the figure 19 and the table 19.

Fig. 19




Mounting position of the pump elements

Table 19

**Mounting position pump elements**

| Quantity | Position | Quantity | Position |
|---|---|---|---|
| 1 | 5 | 9 | 1 - 9 |
| 2 | 4, 5 | 10 | 1 - 10 |
| 3 | 4 - 6 | 11 | 1 - 11 |
| 4 | 3 - 6 | 12 | 1 – 11, 15 |
| 5 | 3 - 7 | 13 | 1 – 12, 15 |
| 6 | 2 - 7 | 14 | 1 – 13, 15 |
| 7 | 2 - 8 | 15 | 1 - 15 |
| 8 | 1 - 8 | | |

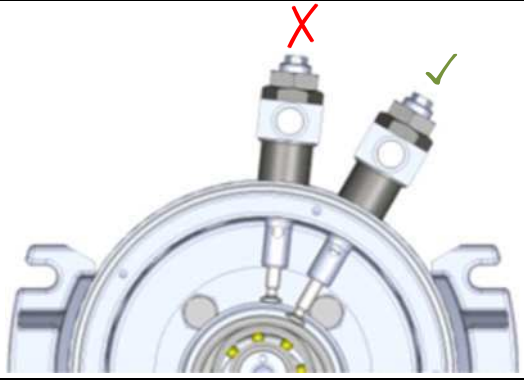
**NOTE**

The pump elements are set at the factory to minimum delivery, to improve the suction characteristics (by minimizing the space for air in the pump element). After first start-up, the pump elements must be set to the required delivery rate.

## 6.2 Installing the pump elements

1. Switch off the pump and secure it against being switched back on (lock it out).

Fig. 20



Correct position of the pump elements

**NOTICE**

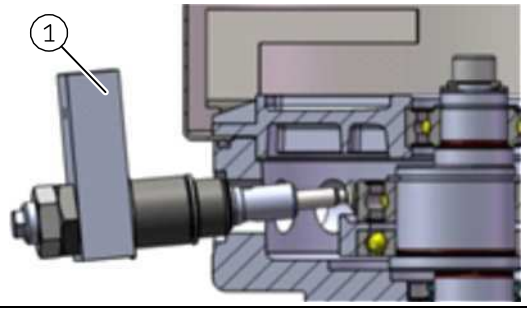
**Possible damage to the pump**

Incorrectly installed pump elements can result in damage to the pump:

- Make sure that every pump element is sitting correctly in the groove on the driver ring (Fig. 20).

2. **Only for version with oil:** Empty the reservoir until the lubricant is below the level of the pump elements.
3. Remove the plug screw.
4. **Only for version with grease:** With the reservoir full, use a suitable tool (such as a screwdriver) to open a channel to the driver ring.
5. Pull the piston about 30 mm out of the pump element.

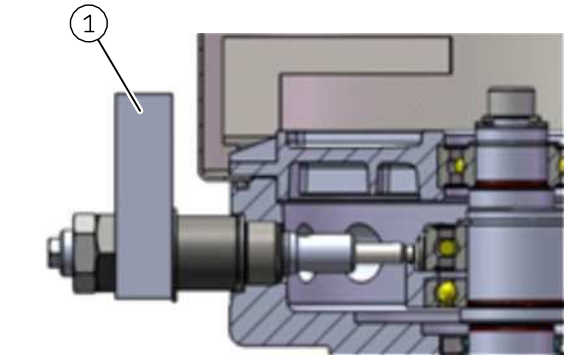
Fig. 21




Inserting the pump elements

6. Insert the pump elements in a tilted position (Fig. 21/1).

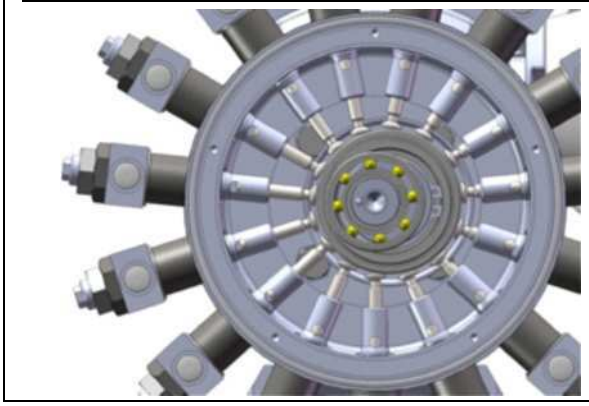
Fig. 22




Engaging the pump elements

7. Engage the pump elements in the driver ring in a straight position (Fig. 22/1).
8. Fasten the pump elements with a torque wrench; torque to apply: 35 Nm.

Fig. 23



Check the position

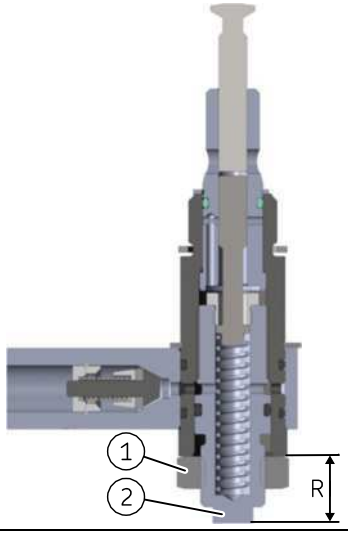
9. With the reservoir unfilled, also check the position of the pump elements in the groove of the driver ring from above (Fig. 23).
10. **Only for version with oil:** Fill the reservoir with oil.
11. Switch on the pump.
12. Check that the pump elements are working correctly.
13. Switch off the pump.

## 6.3 Setting the pump elements

**NOTE**

The delivery rate of the pump elements can also be set during operation.

Fig. 24




Setting the delivery rate

1. Undo the locknut (Fig. 24/1).
2. To set the delivery rate, turn the spindle (Fig. 24/2) in the relevant direction:

- ↻ = lower delivery rate
- ↺ = higher delivery rate.

Table 20

**Delivery rate**

The dimension R indicates the approx. delivery rate:

| | |
|---|---|
| R = 22.0 mm | Full output |
| R = 20.5 mm | ¾ output |
| R = 19.0 mm | ½ output |
| R = 17.5 mm | ¼ output |

3. After setting the delivery rate, tighten the locknut (Fig. 24/1) again; torque to apply: 15 Nm - 1 Nm.

## 6.4 Filling the reservoir with lubricant

**⚠ WARNING**

**Hand injury from stirring paddle**

Touching the stirring paddle when it is in motion can result in serious injury

- Before opening the reservoir cover, switch off the pump and secure it against being switched back on (lock it out)
- Fill the reservoir with lubricant via the reservoir cover only when the pump is at a standstill
- Never reach into the reservoir when the pump is running.

**NOTICE**

**Possible faults in the centralized lubrication system**

Incorrect filling of the reservoir can result in faults in the centralized lubrication system
Make sure that:

- No contaminants enter the reservoir
- The ultrasonic sensor does not come into contact with the lubricant
- The clearance between the lubricant and the ultrasonic sensor is at least 60 mm.

**NOTICE**

**Possible damage to the machine / system**

Do not mix lubricants. This can have unpredictable effects on the usability of the centralized lubrication system and thus on its functioning.

Due to the large number of possible additives, it is possible that individual lubricants that meet the required specifications according to the manufacturer's data sheet are not suitable for use in centralized lubrication systems (e.g., incompatibility between synthetic lubricants and materials). To avoid this, always use lubricants that have been tested by SKF.

An overview of the tested lubricants is available on request from the Service department.

### 6.4.1 Filling via the reservoir cover

Fig. 25


Reservoir cover

1. Switch off the pump and secure it against being switched back on (lock it out).
2. Open the reservoir cover (Fig. 25/1).
3. Fill with lubricant.
4. Close the reservoir cover (Fig. 25/1).
5. Switch on the pump.

### 6.4.2 Filling via the fill connection

**Automatic filling:**
The filling pump is controlled by the full and low-level signals of the pump, combined with a higher-level control.

**Manual filling:**
Get a second person to observe the filling process.

1. Switch on the filling pump.
2. Fill the reservoir.
3. Switch off the filling pump.

## 6.5 Accidental filling with wrong lubricant

Proceed as follows if an incorrect lubricant is accidentally filled:

1. Switch off the pump and secure it against being switched back on (lock it out).
2. Remove the lubricant.
3. Clean the reservoir/pump housing and also, if necessary, the piping system.
4. Fill with lubricant. Make sure the specifications are correct
5. Switch on the pump.
6. Inform your supervisor so the error can be avoided by organizational changes in future.

# 7 First start-up

**NOTICE**

**Possible damage to the machine**

Fill the delivery lines with lubricant, and lubricate the lubrication points manually. Otherwise, it is possible that bearings will be damaged by a lack of lubrication.

Ensure that all parameters, variables, and consumables are correctly configured and available.

Any identified deviations must be resolved immediately.

To ensure safety and functionality, the person specified by the operator is required to inspect certain areas of the centralized lubrication system prior to initial commissioning. Any detected deficiencies must be reported immediately to the supervisor. The correction of deficiencies must be done exclusively by a specialist.

## 7.1 Inspections before first start-up

Table 21

**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 22

**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 Activating the pump

Activate the pump by:

– Switching on the machine contact

– Using your own control unit (supplied by customer, not by SKF).

# 8 Operation

## 8.1 Daily start-up

The activities to be performed in normal operation are listed below.

### 8.1.1 Inspections

For the activities listed in section 7 First start-up, the owner-operator must define suitable inspection periods according to the specific situation in which in the pump is operated.

### 8.1.2 Filling the reservoir during operation

The reservoir is filled as described in section 6.4 Filling the reservoir with lubricant.

### 8.1.3 Cleaning

See section 10Cleaning.

# 9 Maintenance and repair

**⚠ 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.

The pump is largely maintenance-free.

However, the following should be checked at regular intervals and, if necessary, replaced with new parts:

- Pressure limiting valves (tolerance range + 5 % / - 10 %)
- Check valves
- Pump elements

Checked and replaced with new parts as needed.

# 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

**⚠ DANGER**

**Electric shock**

**Disconnect the product from the power supply before any work on electrical components**

- Assembly, maintenance, and repair work may only be performed by qualified technical personnel
- De-energize the product prior to beginning work
- Local electrical operating conditions and regulations (e.g., DIN, VDE) must be observed

Table 23

**Fault table**

| Fault | Possible cause | Remedy |
|---|---|---|
| Pump motor does not run (no pumping noise) | Fault in the main machine / the external control unit.<br>Motor circuit breaker tripped | Check the electrical power lines, the external control, and/or the motor circuit breaker. |
| Motor runs but pump does not deliver medium | • Reservoir empty<br>• Air in lubricant<br>• Suction bore of the pump element clogged<br>• Check valve is faulty or contaminated<br>• Pump element is worn (little pressure build-up)<br>• Faulty pressure limiting valve / fault at the lubrication point (grease coming out of the pressure limiting valve)<br>• Blockage in the downstream lubrication system (grease coming out of the over-pressure valve) | • Visually inspect and top up if needed<br>• Bleed the air<br>• Remove and clean the pump element<br>• Replace the check valve<br>• Replace pump element<br>• Determine the cause<br>• Replace pressure limiting valve<br>• Determine and resolve the cause. |

# 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

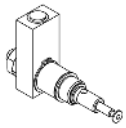
The waste producer/operator must dispose of the various types of waste in accordance with the applicable laws and regulations of the country in question.

# 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.

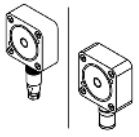
## 13.1 Pump elements

Table 24

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Pump element with 5 mm piston diameter | 1 | 600-27464-2 |  |
| Pump element with 6 mm piston diameter | 1 | 600-25046-3 | |
| Pump element with 7 mm piston diameter | 1 | 600-25047-3 | |
| Plug screw M22x1.5 | 1 | 303-19285-1 |  |

## 13.2 Monitoring/ultrasonic sensors

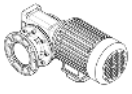
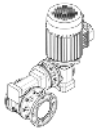
Table 25

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Ultrasonic sensor for 4 liter reservoir (XYBU) | 1 | 664-85314-1 | |
| Ultrasonic sensor for 8 liter reservoir (XYBU) | 1 | 664-85314-2 |  |
| Ultrasonic sensor for 10 liter reservoir (XYBU) | 1 | 664-85313-8 | |
| Ultrasonic sensor for 30 liter reservoir (XYBU) | 1 | 664-85313-9 | |
| Ultrasonic sensor for 100 liter reservoir (XYBU) | 1 | 664-85315-8 | |

## 13.3 Drive / motor with gearbox

Table 26

**Pre-installed drive**

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Multi-range motor 0.18 / 0.21 kW, 380-420 / 440 – 480 V with gearbox i = 100:1 | 1 | 245-13915-1 | |
| Multi-range motor 0.25 / 0.29 kW, 380-420 / 440 – 480 V with gearbox i = 49:1 | 1 | 245-13916-1 |  |
| Single-range motor 0.18 kW, 290-500 V / 440-480 V with gearbox i = 100:1 | 1 | 245-13921-1 | |
| Single-range motor 0.25 kW, 290-500 V / 440-480 V with gearbox i = 49:1 | 1 | 245-13922-1 | |
| Multi-range motor 0.18 / 0.21 kW 380-420 / 440 – 480 V with gearbox i = 490:1 | 1 | 245-13918-1 |  |
| Single-range motor 0.18 kW 290 / 500 V with gearbox i = 490:1 | 1 | 245-13923-1 | |
| Pendulum drive, complete | 1 | 660-28575-1 | Not shown |

## 13.4 Motors

Table 27

**Multi-range motors**

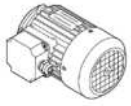
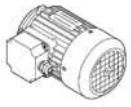
| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Motor 50 / 60 Hz 380-420 V / 440-480 V, 0.18 / 0.21 kW; for gearbox i = 100:1 | 1 | 245-13913-1 |  |
| Motor 50 / 60 Hz 380-420 V / 440-480 V, 0.25 / 0.29 kW; for gearbox i = 49:1 | 1 | 245-13914-1 | |

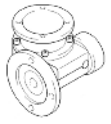
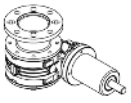
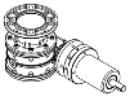
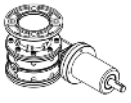
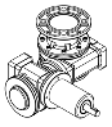
Table 28

**Single-range motors**

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Motor 50 Hz 290-500 V / 440-480 V, 0.18 kW, for gearbox i = 100:1 | 1 | 245-13919-1 |  |
| Motor 50 Hz 290-500 V / 440-480 V, 0.25 kW, for gearbox i = 49:1 | 1 | 245-13920-1 | |

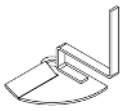
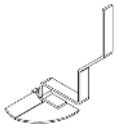
## 13.5 Gearboxes

Table 29

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| Gearbox i = 100:1 | 1 | 246-14145-1 |  |
| Gearbox i = 49:1 | 1 | 246-14145-2 | |
| Gearbox i = 490:1 | 1 | 246-14146-1 | |
| Gearbox i = 7:1, drive with free shaft extension | 1 | 660-28645-1 |  |
| Gearbox i = 49:1, drive with free shaft extension | 1 | 660-28573-1 |  |
| Gearbox i = 100:1, drive with free shaft extension | 1 | 660-28574-1 |  |
| Gearbox i = 490:1, drive with free shaft extension | 1 | 660-28572-1 |  |

## 13.6 Reservoirs/covers/stirring paddles

Table 30

| Designation | Pcs. | Item number | Figure |
|---|---|---|---|
| 4-liter plastic reservoir | 1 | 444-24673-1 |  |
| 8-liter plastic reservoir | 1 | 444-24674-1 |  |
| Cover for 4/8 liter plastic reservoir | 1 | 444-70641-1 |  |
| Cover for 4/8 liter plastic reservoir with holes for ultrasonic sensor | 1 | 444-24466-1 |  |
| Stirring paddle, complete, for 4/8/10 liter reservoir | 1 | 560-32128-1 |  |
| Stirring paddle, complete, for 30 liter reservoir | 1 | 560-32129-1 |  |
| Fixed paddle for 4/8/10/30 liter reservoir | 1 | 460-24566-1 |  |

# 14 Appendix

## 14.1 Cable colors in accordance with IEC 60757

Table 31

**Cable colors in accordance with IEC 60757**

| Abbreviation | Color | Abbreviation | Color | Abbreviation | Color | Abbreviation | Color |
|---|---|---|---|---|---|---|---|
| BK | Black | GN | Green | WH | White | PK | Pink |
| BN | Brown | YE | Yellow | OG | Orange | TQ | Turquoise |
| BU | Blue | RD | Red | VT | Violet | GY | Gray |
| GNYE | Green/Yellow | RDWH | Red/White | GD | Gold | SR | Silver |

Not all cable colors need to be used in the terminal diagrams.

## 14.2 China RoHS Table

Table 32

| 部件名称 (Part Name) | 有毒害物质或元素 (Hazardous substances) | | | | | |
|---|---|---|---|---|---|---|
| | 铅 Lead (Pb) | 汞 Mercury (Hg) | 镉 Cadmium (Cd) | 六价铬 Hexavalent Chromium (Cr(VI)) | 多溴联苯 Polybrominated biphenyls (PBB) | 多溴二苯醚 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.)

O：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.)

Notes / Notizen / Apuntes

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