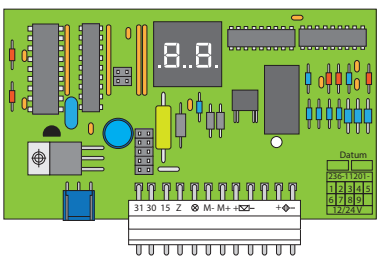
Service Instructions

EN

# Lubricant pumps P223 and P233
# Replacement of control PCB MF01/02 and MDF01/02

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# Legal disclosure

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**Training courses**
In order to provide a maximum of safety and economic viability, SKF carries out detailed training courses. It is recommended that the training courses are attended. For more information please contact the respective SKF Service address.

**Copyright**


**Warranty**
The instructions do not contain any information on the warranty. This can be found in our general terms and conditions.

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**Disclaimer**
The manufacturer shall not be held responsible for damages caused by:

- Non appropriate use
  faulty assembly, operation, setting, maintenance, repair or accidents
- Use of inappropriate lubricants
- Improper or late response to malfunctions
- Unauthorized modifications of the product
- Intent or negligence
- Use of non-original SKF spare parts
- Faulty planning or layout of the centralized lubrication system

Liability for loss or damage resulting from the use of our products is limited to the maximum purchase price. Liability for consequential damages of whatever kind is excluded.

# Table of contents

# Explanation of symbols, signs and abbreviations

The following abbreviations may be used within these instructions. Symbols within safety notes mark the kind and source of the hazard.

| | | | |
|---|---|---|---|
|  General warning |  Dangerous electrical voltage |  Risk of falling |  Hot surfaces |
|  Unintentional intake |  Crushing hazard |  Pressure injection |  Suspended load |
|  Electrostatically sensitive components |  Potentially explosive atmosphere |  Keep unauthorized persons away. | |
|  Wear personal protective equipment (goggles) |  Wear personal protective equipment (face shield) |  Wear personal protective equipment (gloves) |  Wear personal protec-tive equipment (protective clothes) |
|  Wear personal protective equipment (safety shoes) |  Release the product. |  General obligation | |
|  Protective conductor (protection class) |  Protection y double or rein-forced insulation (protection class II) |  Protection by extra low volt-age (protection class III) |  Safe galvanic isolation (pro-tection class III) |
|  CE marking |  Disposal, recycling |  Disposal of waste electrical and electronic equipment |  Li-ion Disposal, recycling of lithium-ion batteries |

| | Warning level | Consequence | Probability |
|---|---|---|---|
|  | DANGER | Death, serious injury | imminent |
|  | WARNING | Death, serious injury | possible |
|  | CAUTION | Minor injury | possible |
| | NOTICE | Property damage | possible |

| Symbol | Meaning |
|---|---|
| ● | Chronological guidelines |
| ○ | Lists |
|  | Refers to other facts, causes, or consequences |

Abbreviations and conversion factors

| | | | | | |
|---|---|---|---|---|---|
| re. | regarding | °C | degrees Celsius | °F | degrees Fahrenheit |
| approx. | approximately | K | Kelvin | Oz. | ounce |
| i.e. | that is | N | Newton | fl. oz. | fluid ounce |
| poss. | possibly | h | hour | in. | inch |
| if appl. | if applicable | s | second | psi | pounds per square inch |
| incl. | including | d | day | sq. in. | square inch |
| min. | minimum | Nm | Newtonmeter | cu. in. | cubic inch |
| max. | maximum | ml | millilitre | mph | miles per hour |
| min. | minute | ml/d | millilitre per day | rpm | revolutions per minute |
| etc. | et cetera | cc | cubic centimetre | gal. | gallon |
| e.g. | for example | mm | millimetre | lb. | pound |
| kW | kilowatt | l | litre | hp | horse power |
| U | voltage | dB (A) | sound pressure level | kp | kilopond |
| R | resistance | > | greater than | fpsec | feet per second |
| I | current | < | less than | Conversion factors | |
| V | volt | ± | plus/minus | Length | 1 mm = 0.03937 in. |
| W | watt | Ø | diametre | Area | 1 $cm^2$ = 0.155 sq.in |
| AC | alternating current | kg | kilogram | Volume | 1 ml = 0.0352 fl.oz. |
| DC | direct current | rh | relative humidity | | 1 l = 2.11416 pints (US) |
| A | ampere | ≈ | approximately | Mass | 1 kg = 2.205 lbs |
| Ah | ampere hour | = | equal to | | 1 g = 0.03527 oz. |
| Hz | frequency [Hertz] | % | per cent | Density | 1 kg/cc = 8.3454 lb./gal(US) |
| nc | normally closed contact | ‰ | per mille | | 1 kg/cc = 0.03613 lb./cu.in. |
| no | normally open contact | ≥ | greater than | Force | 1 N = 0.10197 kp |
| N/A | not applicable | ≤ | less than | Pressure | 1 bar = 14.5 psi |
| ft. | feet | $mm^2$ | square millimetre | Temperature | °C = (°F-32) x 5/9 |
| | | rpm | revolutions per minute | Output | 1 kW = 1.34109 hp |
| | | ↑ | Increases a value | Acceleration | 1 $m/s^2$ = 3.28084 $ft./s^2$ |
| | | ↓ | Reduces a value | Speed | 1 m/s = 3.28084 fpsec. |
| | | | | | 1 m/s = 2.23694 mph |

# 1. Safety instructions

It is prohibited to replace the control PCB prior to reading the Instructions. Any unclear points regarding proper condition or correct assembly must be clarified. Replacement is prohibited until issues have been clarified

## 1.1 General safety instructions

- Keep unauthorized persons away.
- The product may be replaced only in awareness of the potential dangers, in proper technical condition, and according to the information in these instructions
- The specified operating steps and their sequences must be observed.
- 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

## 1.2 Persons authorized to replace the product

### 1.2.1 Specialist in electrics

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

Works on electrical components may be carried out by specialists in electrics only while the system is depressurized and by using voltage isolated tools suitable for electrical works. Observe any waiting periods for discharging, if necessary

Carry out works on electrical components only while the system is depressurized and use voltage isolated tools suitable for electrical works only

## 1.3 Emergency stopping

Emergency stopping is done by interrupting the power supply to the pump

## 1.4 ESD protection measures

The operator may impose further ESD protective measures (e.g. ESD screen mats) These protective measures need to be adhered to as well.

The following ESD protection measures must be taken to prevent damage caused by electrostatic discharge:

- Wear a wrist grounding strap
- Always wear ESD clothes and shoes
- Dissipative or antistatic work surface and floor covering
- Always use tools suitable for ESD environments
- Remove all non-conductive materials, such as plastic foils and polystyrene, from the work area

## 1.5 Residual risks

| Residual risk | Prevention/ remedy |
|---|---|
| Damage of internal cables or plugs during disassembly / assembly of the housing cover. | Do not loosen plug by force. Always unlock the plug. Do not pull the cables or use cable to hold the cover. No tensile forces may be exerted on the cables. |
| Wrong installation of the control PCB next to the guide rails in the pump housing. | After the installation verify that the control PCB is located in the two guide rails |
| Damage of the control PCB and possibly of the power supply board of V AC pumps caused by electrostatic discharge. | Take ESD protective measures as described above |
| Loss of electrical protective functions due to faulty installation. | After the installation carry out a safety check following DIN IEC 60204-1 (conduct and scope of test, see next page) |
| Moisture entering the pump due to usage of the old housing cover/ the old drain hose. | After replacement of the control PCB, make sure to close the pump with the new housing cover and the new drain hose always. Only by doing so the new IP protection class of the pump can be ensured. |
| Another defect of the control PCB after replacement due to still faulty wiring of the external connection cables. | If the defect on the control PCB occurred immediately after the first commissioning, all external connection cables must be checked with regard to a possible faulty wiring by comparing their wiring to that of the wiring diagram in the pump instructions. |

### 1.6 Inspections prior to delivery

The described products were manufactured according to the state of the art. The following inspections were carried out prior to delivery:

- Safety and functional tests
- Electrical inspections following ISO EN 60204-1

### 1.7 Other applicable documents

In addition to these instructions, the following documents must be observed by the respective target group:

- The instructions of the pump, into which the control PCB shall be integrated
- Operational instructions and approval rules

### 1.8 Intended use

The replacement kits described serve to replace a defective control PCB of the pump models P223 and P233. Please find the corresponding replacement kits in chapter Spare parts.

### 1.9 Export licence

Depending on the respective current situation of the foreign trade legislation, parts of the electric control unit may require an export licence. The customer will obtain an export licence for his goods on his own responsibility and will proceed only in accordance with the provisions of this licence.

### 1.10 Disposal

**Countries within the European Union**

- Dispose of or recycle electrical equipment following WEEE directive 2012/19/EU.
- Dispose of or recycle batteries following battery directive 2002/96/EU.
- Parts made of plastic or metal can be disposed of with the commercial waste.

**Countries outside the European Union**

Disposal of the different materials has to be done according to the valid national regulations and laws of the country where the product is used.

# 2. Delivery, returns, and storage

## 2.1 Delivery

After receipt of the shipment, check the shipment for damage and completeness according to the shipping documents. Immediately report any transport damages to the forwarding agent.

Keep the packaging material until any discrepancies are resolved. During in-house transport ensure safe handling.

## 2.2 Returns

Clean all parts and pack them properly (i.e. following the regulations of the recipient country) before returning them.

Protect the product against mechanical influences such as impacts.

Mark returns on the packaging as follows.

When returning parts containing batteries or accumulators, further labelling and special packaging may be necessary. Heed possible restrictions regarding air transportation.

## 2.3 Storage

SKF products are subject to the following storage conditions:

- dry, dust- and vibration-free in closed premises
- no corrosive, aggressive materials at the place of storage (e. g. UV rays, ozone)
- protected against pests and animals (insects, rodents, etc.)
- possibly in the original packaging
- shielded from nearby sources of heat and coldness

Before application inspect the products with regard to possible damages occurred during their storage. This particularly applies for parts made out of plastic (embrittlement).

### 2.3.1 Storage temperature range

| | | |
|---|---|---|
| min. | + | 5 °C [+41 °F] |
| max. | + | 35 °C [+95 °F] |

In case of high temperature fluctuations or high humidity take adequate measures (e. g. heater) to prevent the formation of condensation water on the control PCB

# 3. Assembly / Disassembly

**WARNING**

**Risk of injury**

Before carrying out any repair work, take at least the following safety measures:

- Keep unauthorized persons away.
- Mark and secure work area.
- De-pressurize the product.
- Disconnect the product from the power supply and secure it against being switched on.
- Verify that no power is being applied
- Earth and short-circuit the product.
- Where needed, cover neighbouring units that are live.

**NOTICE**

**Damage to the pump**

If the defect of the control PCB occurred directly during the first commissioning of the pump, probably the wiring of the external connection cables to the pump is faulty. In this case check the external wiring before replacing the control PCB, as otherwise the fault will occur again.

The work steps to be carried out will be illustrated on the control PCB MF01 and are the same for all control PCBs described in these instructions.

## 3.1 Preparations before the replacement of the control PCB

The work should possibly be done at room temperature. In case of low temperatures it may be more difficult to loosen the locking of the plugs on the control PCB.

Before the replacement of the control PCB the following activities may have to be carried out.

- Check the control PCB replacement kit for accordance with the documentation and the intended purpose
- Inform the superior or machine responsible about the replacement
- Clean pump, if dirty. Make sure that no dirt enters the open pump
- Loosen connection cable on pump
- Loosen lubrication lines. Take the necessary protective measures against leaking lubricant and contamination of the lubricant in the lubricants
- Disassemble the pump at the place of use. Keep the fastening material for further use

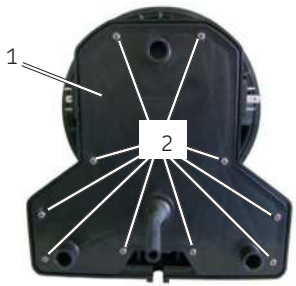
### 3.2 Replacement of the control PCB

- Take ESD protective measures as described in chapter Safety instructions

For easier replacement, the pump should be tilted into a horizontal position to facilitate access to the housing cover. To do so take measures against lubricant that may leak from the reservoir venting device.

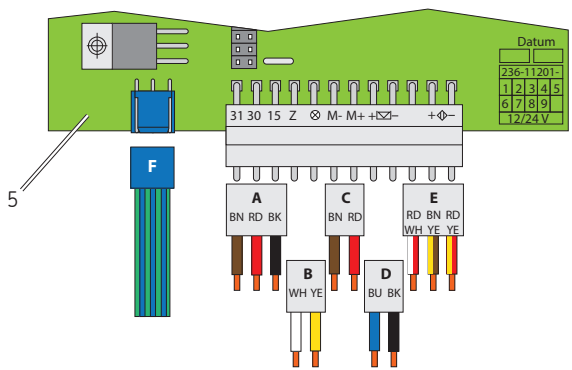
- Unscrew the screws (2) from the housing cover (1)
- Remove housing cover (2)
- Unlock blue plug (F) of the membrane keypad and remove it from the control PCB (5)
- Unlock plugs (A,B,C,D, E) and remove them from the control PCB (5).
- Pull control PCB (5) out of the two lateral guide rails

Unscrew housing cover Fig. 1




Position of the control PCB Fig. 2


Connectors and plugs of the control PCB Fig. 3



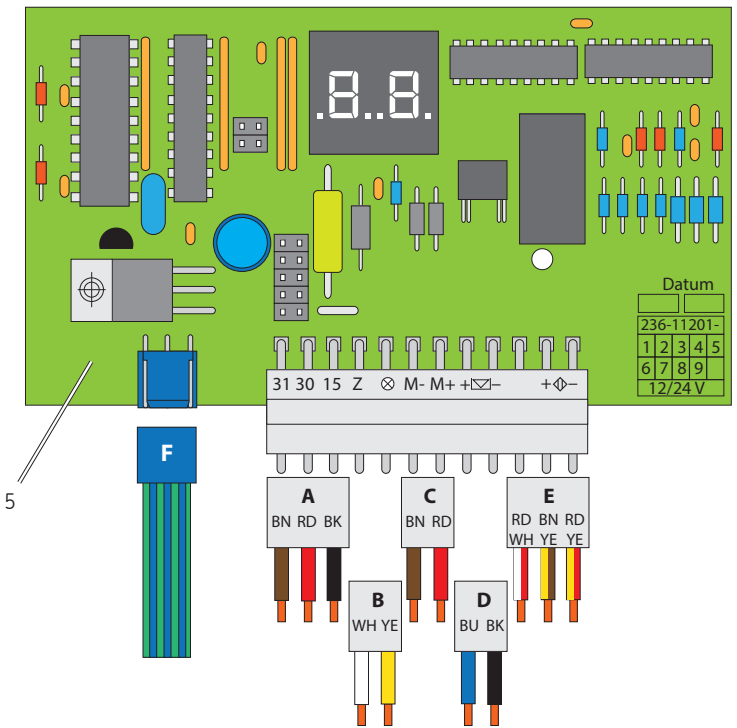
- Place new control PCB (5) into lateral guide rails and carefully push it into the pump housing
- Re-plug the plugs (A,B,C, D, E) and the plug for the membrane keypad (F) Make sure the plugs engage

| | | |
|---|---|---|
| Plug A | = | Voltage supply |
| Plug B | = | Signal |
| Pluc C | = | Motor connector |
| Plug D | = | Low level indication |
| Plug E | = | Sensors |
| Plug F | = | Membrane keypad |

The designation of the cable colours corresponds to IEC 60757

BN = brown
RD = red
BK = black
WK = white
YE = yellow

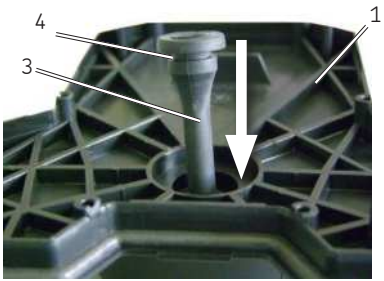
Connectors and plugs of the control PCB Fig. 4



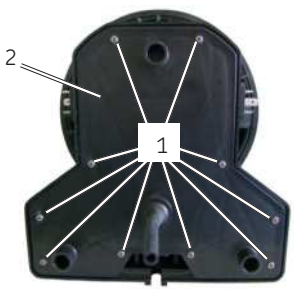
- Guide the drain hose (3) from rear through the new housing cover (1) until it safely engages in the housing cover (1) with its notch (4)
- Position housing cover (1) on pump housing again and retighten with new screws (1)

Tightening torque = 0.6 Nm ± 0.1 Nm [0.44 ft.lb. ± 0.01 ft.lb.] ± 0.01 ft.lb.]

Mount drain hose Fig. 5




Mount housing cover Fig. 6



### 3.3 Tests after replacement of the control PCB

After replacement of the control PCB carry out an electrical safety test according to ISO/ EN 60204-1.

### 3.4 Visual check

- Housing cover mounted properly. No visible damages to the pump
- Connection cable mounted correctly
- No leakages of lubricant on connections and from lubrication lines.

### 3.5 Electrical safety test

Use measuring equipment following EN 61557 for the mentioned electrical tests.

- Testing the protective conductor system with regard to conductivity
- Insulation test (terminals L and N bridged against PE).

### 3.6 Electrical functionality test

- Carry out electrical functionality test following the instructions (Trigger an additional lubrication)

### 3.7 Filing

After the replacement of the control PCB the scope and findings of the test have to be recorded in writing and handed over for filing to the person responsible for machine operation.

### 3.8 Installation and commissioning of the pump at the place of use

Assembly and start-up at the place of use shall be carried out as described in the instructions of the pump.

# 4. Spare parts

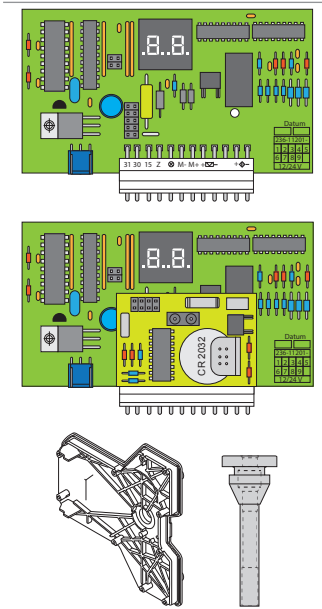
The spare parts assemblies may be used exclusively for replacement of identical defective parts. Modifications with spare parts on existing products are not allowed. Exceptions to this are the pump elements and the optional filling connection.

## 4.1 Replacement kits of control PCB types MF01, MF02, MDF01, MDF02

| Designation | Pump | Qty. | Part number |
|---|---|---|---|
| Replacement kit of control PCB type MF01, terminal 15/30 bridged | P223 | 1 | 544-60438-1 |
| Replacement kit of control PCB type MF02, terminal 15/30 not bridged | P223 | 1 | 544-60439-1 |
| Replacement kit of control PCB type MDF01, terminal 15/30 bridged | P233 | 1 | 544-60440-1 |
| Replacement kit of control PCB type MDF02, terminal 15/30 not bridged | P233 | 1 | 544-60441-1 |

Delivering including housing cover, drain hose, and the corresponding number of screws required for installation of the housing cover

Fig. 7



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