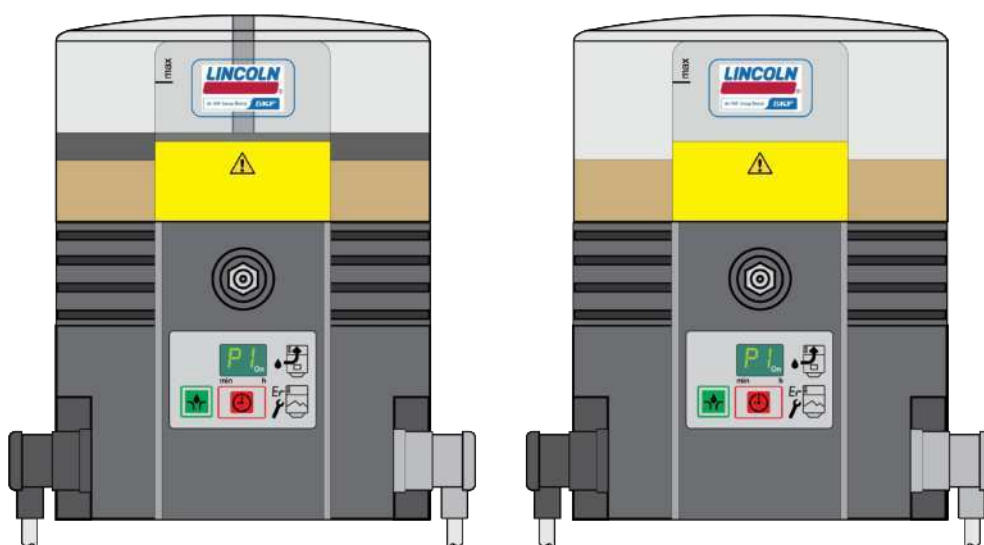


# Lubrication system QLS 301 / QLS 401



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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 feeding of lubricants in interval operation inside a centralized lubrication system  
Type: QLS 301 / QLS 401  
Item number: P301XXXXXXXXX / P401XXXXXXXXX / 650-XXXXX-X

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

2006/42/EC: Machinery Directive

2014/30/EU: Electromagnetic Compatibility

2011/65/EU: RoHS II

EN ISO 12100:2010      EN 60204-1:2018      EN IEC 61000-6-2:2019      EN IEC 61000-6-4:2019

EN 809+A1/AC:2010      EN IEC 63000:2019

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, 04.12.2023  
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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 feeding of lubricants in interval operation inside a centralized lubrication system  
Type: QLS 301 / QLS 401  
Item number: P301XXXXXXXXX / P401XXXXXXXXX / 650-XXXXX-X

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

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

EN ISO 12100:2010      EN 60204-1:2018      EN IEC 61000-6-2:2019      EN IEC 61000-6-4:2019

EN 809+A1/AC:2010      EN IEC 63000:2019

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 UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 and all other applicable Directives.

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

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

Table 1			
Appendix to Declaration of Incorporation			
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	Partially <sup>1)</sup>
1.1.5	Design of machinery to facilitate its handling	Yes	Yes
1.1.6	Ergonomics	Yes	Partially <sup>2)</sup>
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	Partially <sup>3)</sup>
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	Yes
1.6	Servicing		
1.6.1	Machinery maintenance	Yes	Yes
1.6.2	Access to operating positions and servicing points	Yes	Partially <sup>4)</sup>
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

<sup>1)</sup> 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.

<sup>2)</sup> The integrator must ensure that the pump is integrated into the machine in such a way that it can be filled and operated ergonomically.

<sup>3)</sup> The operator must protect the pump against excessive pressure. For this purpose, a pressure limiting valve with suitable opening pressure must be provided on each pump element.

<sup>4)</sup> The owner-operator must ensure that the pump is integrated into the machine in such a way that it can be operated without danger.

# Masthead

## Manufacturer

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## Authorized local distributors

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- 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.

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# Safety alerts, visual presentation, and layout

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

## Safety alerts:

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

### DANGER

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

### WARNING

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

### CAUTION

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

### NOTICE

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

## Illustrations:

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

## Text layout:

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

# 1 Safety instructions

## 1.1 General safety instructions

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

## 1.2 General electrical safety instructions

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

## 1.3 General behaviour when handling the product

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

## 1.4 Intended use

Supply of lubricants.

The product is intended solely for installation in another machine.

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

## 1.5 Persons authorized to use the product

### Operator

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

### Specialist in electrics

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

### Specialist in mechanics

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



## 1.6 Foreseeable misuse

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

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

## 1.7 Referenced documents

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

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

## 1.8 Prohibition of certain activities

- Replacement of or modifications to the pistons of the pump elements
- Repairs or modifications to the drive.
- Alterations to the control circuit board beyond adjustment of lubrication times and interval times or replacement in case of defect.

## 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

Table 2

### Safety markings on the product



Risk of hand injuries

ADR  
TÜ.EGG.047-01

For pumps with ADR approval

### NOTE

In accordance with the results of the workstation risk assessment, additional labels (e.g., warnings, safety alerts, prohibition signs, or labels in accordance with GHS) are to be attached by the operator if necessary

## 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.: \_\_\_\_\_

(CW/YY): \_\_\_\_\_

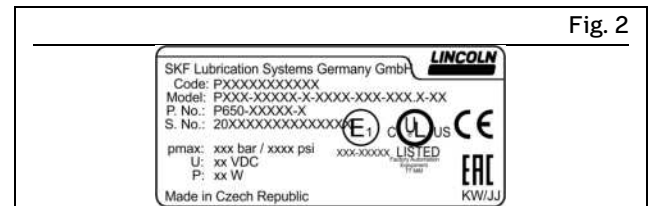
Calendar week/year of manufacture

Fig. 1



Type plate UL (example)

Fig. 2



Type plate UL and E1 (example)

## 1.12 Notes on CE marking



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

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

## 1.13 Note on Low Voltage Directive

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

## 1.14 Note on Pressure Equipment Directive

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

## 1.15 Note on UKCA marking



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

## 1.16 Note on UL mark



The UL Mark certifies that the product has UL certification of compliance with U.S. and Canadian safety regulations.

## 1.17 Note on ECE mark



The ECE test mark (E1) confirms that an ECE type approval (components requiring approval on motor vehicles) has been granted for a product which bears this mark on its type plate.

## 1.18 Note on EAC marking



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

## 1.19 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).

## 1.20 Emergency shutdown

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

## 1.21 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.

## 1.22 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.

## 1.23 Residual risks

Table 3

Residual risks										
Residual risk	Possible in lifecycle						Avoidance / Remedy			
Personal injury / property damage due to falling of hoisted parts	A	B	C				G	H	K	Unauthorized persons must be kept away. Nobody is allowed to be present below hoisted parts. Lift parts using suitable lifting gear.
Personal injury / property damage due to tilting or falling product due to non-compliance with specified torques		B	C				G			Adhere to the specified torques. Mount the product only on components with a sufficient load-carrying capacity. If no torques are specified, use those specified for the screw size for screws of strength class 8.8.
Personal injury / property damage caused by electric shock resulting from power lead damage		B	C	D	E	F	G	H		Inspect power leads for damage prior to initial use and then at regular intervals. Do not install cables on moving parts or chafe points. If this cannot be avoided, use anti-kink coils and/or conduits.
Personal injury, property damage due to spilled, leaked lubricant		B	C	D		F	G	H	K	Be careful when filling the reservoir and then connecting or disconnecting the lubricant lines. Use only hydraulic screw unions and lubrication lines suitable for the specified pressure. Do not mount lubrication lines on moving parts or chafe points. If this cannot be avoided, use anti-kink coils and/or conduits.
Loss of electrical protective function due to incorrect assembly of the electrical components after a repair							G			An electrical safety check in accordance with EN 60204-1 must be performed after the replacement of electrical components.
Reservoirs with a follower plate are under spring tension							G			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 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).

#### **MoS<sub>2</sub>:**

- Maximum MoS<sub>2</sub> 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.

### 2.7 Chisel pastes

Due to their high resistance to pressure and temperature, chisel pastes are used to reduce wear on insert tools and wear bushings on hydraulic and pneumatic hammers, stone crushers and hydraulic grabs. Before use, observe the safety data sheet (SDS) and the technical data and application limits of the respective chisel paste.

Chisel pastes may be pumped only with SKF pumps and pump elements developed for this application.

Chisel pastes are special lubricants and must not be used as a lubricant for bearings.

Grease guns filled with chisel paste must be permanently marked with a corresponding note.

#### **NOTE**

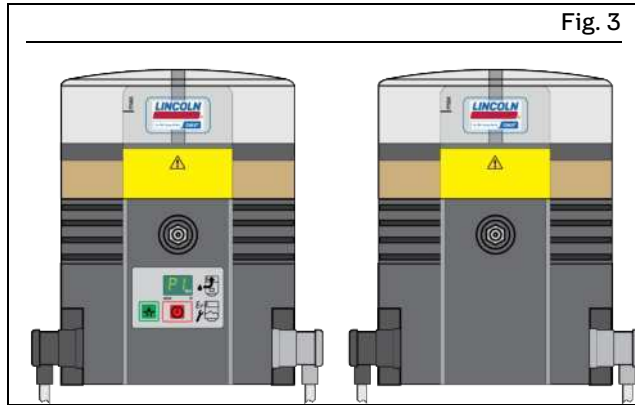
The use of chisel paste requires prior consultation with the SKF Product Management.

## 3 Overview, functional description

### 3.1 Versions of the QLS system

In the following you will find an overview of the most important functions and equipment features of the pump versions for the QLS system.

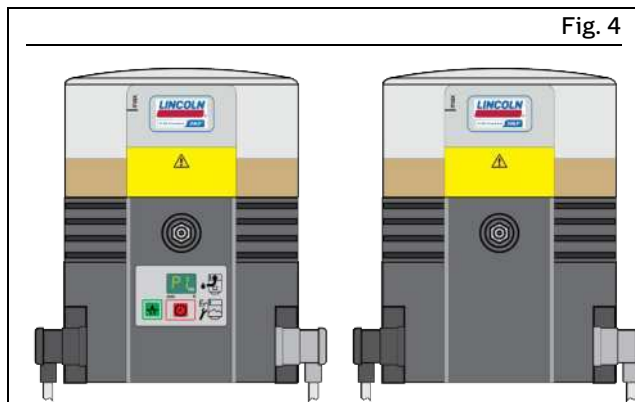
#### 3.1.1 QLS 301



QLS 301 (with and without control)

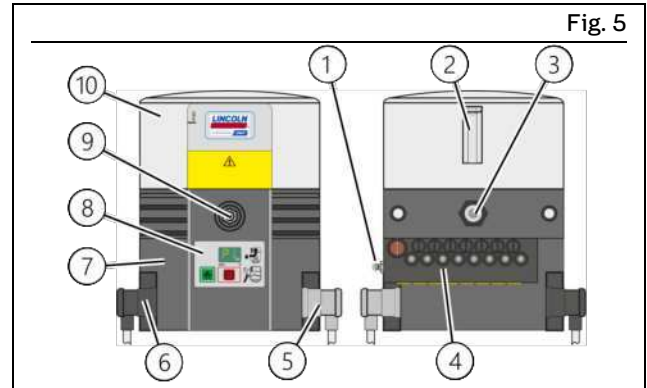
- With follower plate
- With and without control
- With 12 VDC or 24 VDC
- With 120 V AC or 230 V AC
- With rear- or bottom-mounted SSV metering device
- With external SSV metering device.

#### 3.1.2 QLS 401



QLS 401 (with and without control)

- With and without control
- With 12 VDC or 24 VDC
- With 120 V AC or 230 V AC
- With rear- or bottom-mounted SSV metering device
- With external SSV metering device
- With rear-mounted SSVDV metering device.



Front and rear view

#### Legend to Figure 5:

##### 1 Emergency lubrication nipple

Used to supply the connected lubrication points with lubricant in the event of a pump fault or other difficulties.

##### 2 Reservoir ventilation

This is used for bleeding the reservoir when filling with lubricant and for ventilation of the reservoir during operation.

##### 3 Pump elements

The pump can be equipped with up to **max. 2** pump elements. Each pump element must be secured with a suitable pressure limiting valve. Use plug screws to close off unneeded outlets.

##### 4 Metering device

Used for metering and distributing the lubricant, and also for switching off the pump when the work cycles are completed, by means of an indicator pin and a proximity switch. There are different SSV and SSVDV metering devices available for different applications.

##### 5 Signal line

Used for connecting the pump to an external control device or signaling device.

##### 6 Power supply

Used for connecting the pump to an external power supply.

##### 7 Pump housing

This contains the motor and (depending on the pump version) various control circuit boards and possible connections (rectangular/bayonet connector).

##### 8 Membrane keypad

For displaying operational and error messages, and for modifying parameters (programming) on pumps with a control.

##### 9 Filler nipple

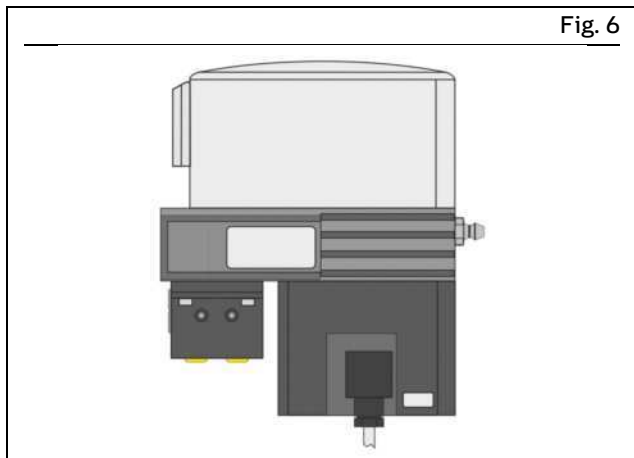
Used to fill the reservoir with clean and suitable lubricant.

##### 10 Reservoir

The reservoir stores the lubricant. Different reservoir designs and reservoir sizes exist in accordance with the pump variant.

## 3.2 Mounting positions of the metering devices

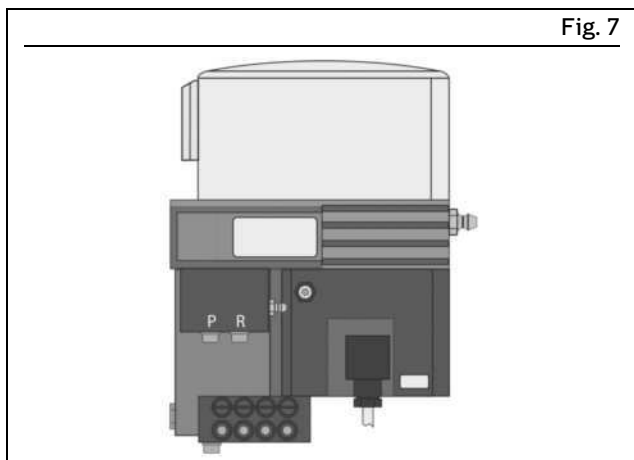
### 3.2.1 Rear-mounted metering devices



Rear-mounted metering devices

- With internal lubricant return through outlet “2” of the metering device
- The feed lines are connected with plastic pressure pipe or steel pipeline (Ø 6x1.5 mm)
- Metering device outlets are vertical (V)
- P301 + P401 SSVV 6, 8, 12, 18
- P401 SSVDV 6, 12, 16.

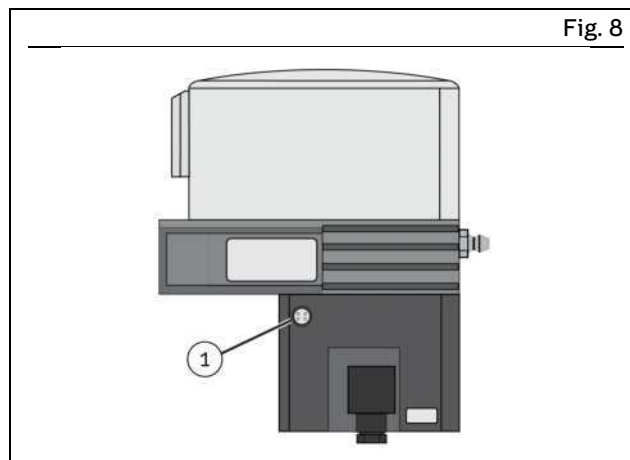
### 3.2.2 Bottom-mounted metering devices



Bottom-mounted metering devices

- With external lubricant return through return connection “R” of the terminal block.
- The feed lines are connected with plastic pressure pipe or steel pipeline (Ø 6x1.5 mm).
- Metering device outlets are horizontal (H)
- P301 + P401 SSV 12, 18.

### 3.2.3 Pump for external metering device



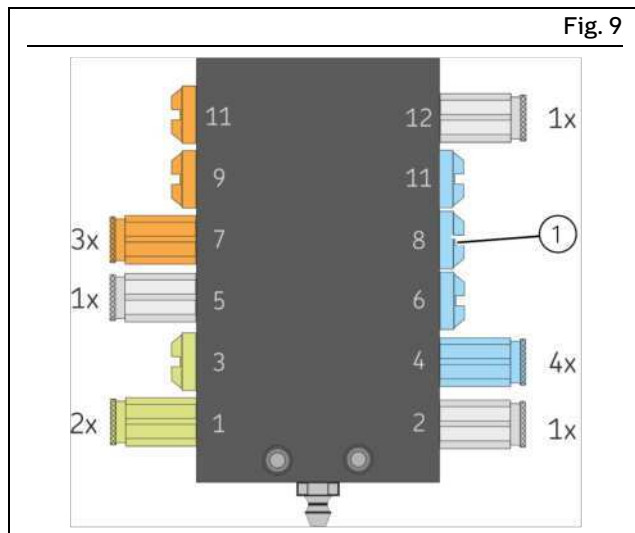
Pump for external metering device

#### Legend to Figure 8:

- 1 Connection of proximity switch
- The connection (Fig. 8/1) for the proximity switch of the external SSV metering device is on the pump housing. External SSV metering devices are supplied with a corresponding connector and a 2 m connection cable.



### 3.3 Changing the delivery rate with SSV metering devices



Changing the delivery rate with SSV metering devices (horizontal outlets)

#### Legend to Figure 9:

1 Outlets with plug screws

Approx. 0.2 ccm of lubricant is supplied per stroke and outlet. Closing off unneeded outlets with plug screws (Fig. 9/1) increases the delivery quantity at the next open outlet below on the same side by the quantity of lubricant of the closed outlets above. Maximum number of outlets that can be consolidated internally:

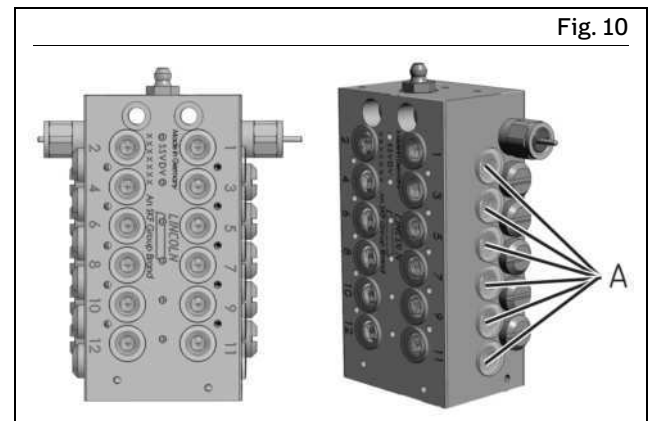
Table 4	
Maximum number of outlets that can be consolidated internally	
SSV metering device	Outlets
SSV 6	3
SSV 8	4
SSV 12	6
SSV 18	9

#### NOTE

Further consolidation of the delivery rate is possible only externally, with a tee connector.

### 3.4 Changing the delivery rate with SSVDV metering devices (rear-mounted)

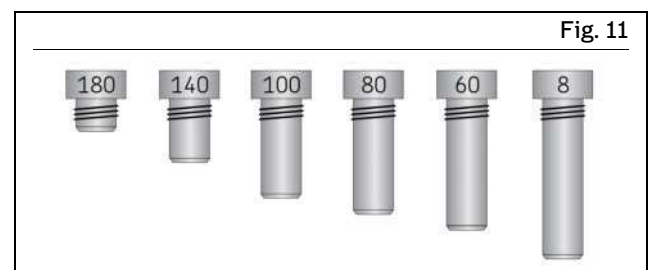
The delivery rate is set by screwing the relevant metering screw into the relevant outlet on the metering piston level (Fig. 10/A). In addition, the delivery rate can be further adjusted by closing outlets that are not required: see section "3.3 Changing the delivery rate with SSV metering devices".



Changing the delivery rate on SSVDV metering devices

#### Legend to Figure 10:

A Outlet of the metering piston level



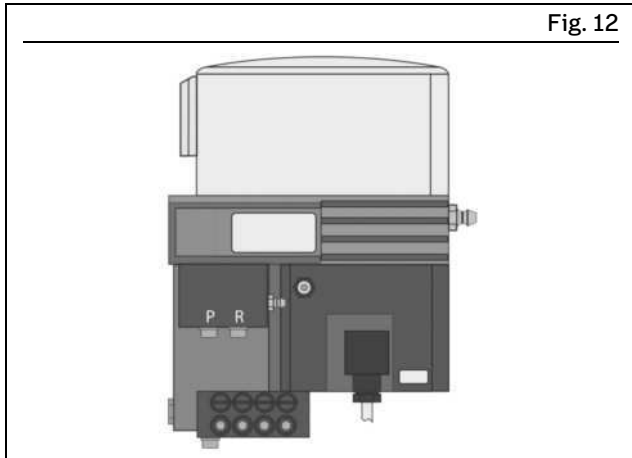
SSVDV metering screws

#### Metered volume of SSVDV metering screws:

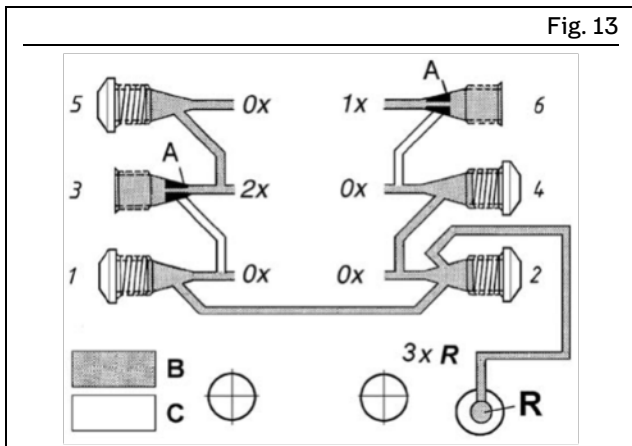
8 = 0.08 cm <sup>3</sup>	100 = 1.00 cm <sup>3</sup>
60 = 0.60 cm <sup>3</sup>	140 = 1.40 cm <sup>3</sup>
80 = 0.80 cm <sup>3</sup>	180 = 1.80 cm <sup>3</sup>

Table 5	
Maximum number of outlets that can be consolidated internally	
SSV metering device	Outlets
SSVDV 6	3
SSVDV 12	6
SSVDV 16	7

### 3.5 Return of unneeded lubricant



Bottom-mounted metering devices



Example: outlets 1, 2, and 4 returned to the pump

#### Legend to Figure 13:

- B Lubricant delivery
- C No lubricant delivery
- R Return line

#### 3.5.1 Rear-mounted metering devices

The lubricant is returned internally:

##### For an even number of outlets:

- by closing off outlet 2

##### For an odd number of outlets:

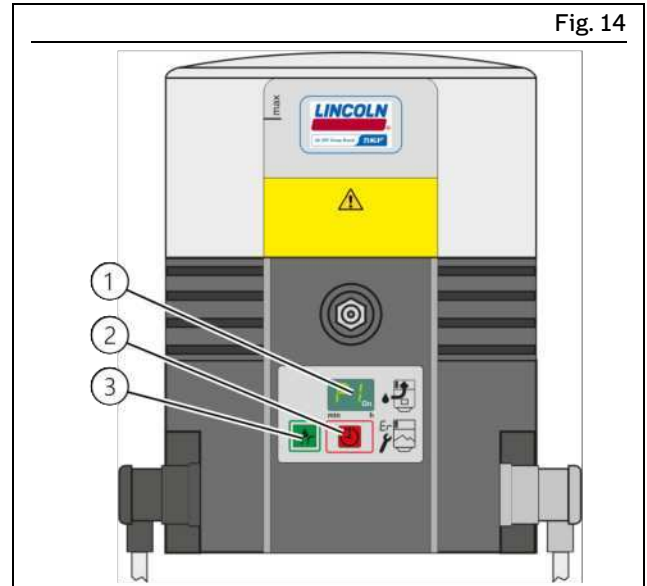
- by closing off outlets 2 and 1.

The lubrication lines are connected to the outlets with the highest numbers. The outlets with the lowest numbers are used for return.

#### 3.5.2 Bottom-mounted metering device or an external metering device

The lubricant is returned externally through the return line "R" (Fig. 11) of the terminal block. In the case of bottom-mounted metering devices, outlets 1 and 2 must not be closed, as doing so would cause a blockage of the metering device.

### 3.6 Membrane keypad



Membrane keypad with display

#### Legend to Figure 14:

- 1 Display
- 2 Red toggle button
- 3 Green setting button

On pumps with control, the membrane keypad with display is used for:

- Displaying operating statuses and fault codes
- Triggering additional lubrication
- Displaying and modifying parameters (programming).

All functions, except for the display of error messages, are available only during the pump's pause time. Settings are entered on the pump using the green setting button (Fig. 12/3) and the red toggle button (Fig. 12/2) and are shown on the display (Fig. 12/1).



### 3.6.1 Shown on the display in display mode of control circuit board S4





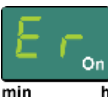
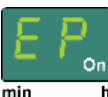




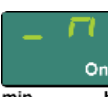




Table 6	
Shown on the display in display mode of control circuit board S4	
	<b>Ready for operation</b> The pump is in pause time. There are no error messages.
	<b>Pump is running</b> The pump is working. There are no error messages.
	<b>Pre-empty signal</b> The pump is in operating time. There is not much lubricant available. This indication alternates with the "Pump is running" indication.
	<b>Low-level signal</b> There is not enough lubricant. The pump finishes the current lubrication cycle. The pump cannot be restarted until the reservoir is refilled.
	<b>Error message Er</b> <ul style="list-style-type: none"> <li>• Back pressure is too high</li> <li>• Control circuit board is defective</li> <li>• An unspecified error occurred during the monitoring time.</li> </ul>
	<b>Error message EP</b> An error has occurred on the membrane keypad.
	<b>End of programming</b> Programming is finished. To apply the set values, you must confirm the programming by pressing the green button (Fig. 14/3) within 30 seconds.
	<b>NC contact</b> The output signal is set as an NC contact (normally closed). Programming step P4.
	<b>NO contact</b> The output signal is set as an NO contact (normally open). Programming step P4.
	<b>Fault/low-level signal</b> No differentiation between fault signals and low-level signals. Programming step P5.
	<b>Output signal programmed as NO contact</b> Low-level signal intermittent, malfunctions as continuous signal (ON). Programming step P5.

Table 6	
Shown on the display in display mode of control circuit board S4	
	<b>Output signal programmed as NC contact</b> Low-level signal intermittent, malfunctions as continuous signal (OFF). Programming step P5.
	<b>AC (display 1)</b> Shows the number of automatically activated work cycles. Counter value can be 0-9999 (counting consecutively). The display is comprised of three successive displays that change every 2 seconds.
	<b>Display 2</b> Shows the value for the thousands and hundreds.
	<b>Display 3</b> Shows the value for tens and ones. Example: 0625 = 625 automatically activated work cycles.

### 3.6.2 Shown on the display in programming mode of control circuit board S4

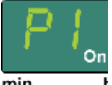













Table 7	
Shown on the display in programming mode of control circuit board S4	
	<b>Programming step P1</b> In this programming step, the hours value of the pause time is set.
	<b>Programming step P2</b> In this programming step, the minutes value of the pause time is set.
	<b>Programming step P3</b> In this programming step, the number of metering device circulations per work cycle is set.
	<b>Programming step P4</b> In this programming step, the type of output signal is set: <ul style="list-style-type: none"> <li>• nc = normally closed (NC)</li> <li>• no = normally open (NO).</li> </ul>
	<b>Programming step P5</b> In this programming step, you set whether any differentiation is made between fault signals (error messages) and low-level signals.
	<b>Programming step P6</b> In this programming step, you set how the pump starts when switched on: <ul style="list-style-type: none"> <li>• SP = start with pause time</li> <li>• SO = start with lubrication time.</li> </ul>
	<b>Start phase SP</b> When switched on, the pump starts with the pause time. Programming step P6.
	<b>Start phase SO</b> When switched on, the pump starts with the lubrication time. Programming step P6.
	<b>Remaining pause time: display 1</b> This is comprised of three successive displays that change every 2 seconds.
	<b>Display 2</b> Shows the remaining pause time in hours.
	<b>Display 3</b> Shows the remaining pause time in minutes. Example: 0110. Remaining pause time 1 hour and 10 minutes.
	<b>UC (display 1)</b>

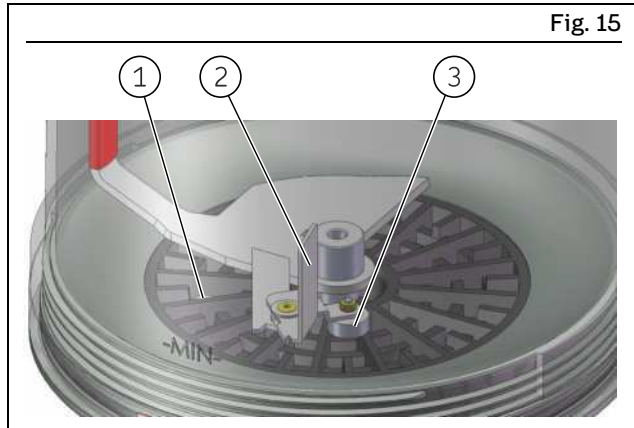
Table 7	
Shown on the display in programming mode of control circuit board S4	
Shows the number of manually activated additional lubrications. Counter value can be 0-9999 (counting consecutively). The display is comprised of three successive displays that change every 2 seconds.	
	<b>Display 2</b> Shows the value for the thousands and hundreds.
	<b>Display 3</b> Shows the value for tens and ones. Example: 0110 = 110 manually activated additional lubrications.

### 3.7 Principle of operation of the intermittent low-level signal

#### Components of the intermittent low-level signal

The intermittent low-level signal uses a contactless mechanism, comprised essentially of the following parts:

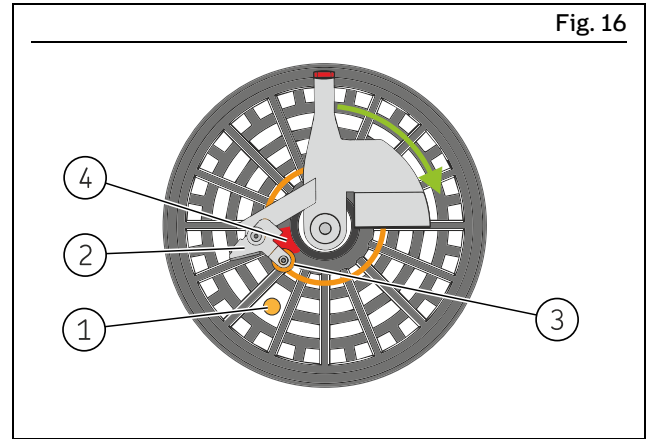
- Stationary reed switch (Fig. 15 to 17/1) in the reservoir bottom
- Mobile baffle plate (Fig. 15 to 16/2) connected to the stirring paddle, with a magnet (Fig. 15 to 17/3) and a cam (Fig. 16/4)



Perspective view

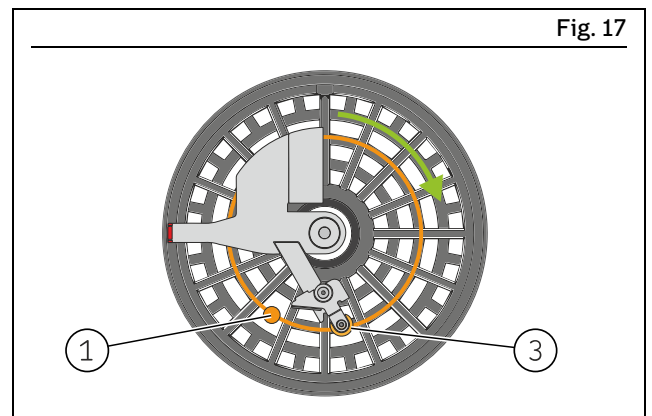
#### Functional description of the intermittent low-level signal

- 1 When the reservoir is filled with a lubrication grease that is suitable for the intermittent low-level signal, and the pump is running, the baffle plate (Fig. 15 to 16/2) is deflected outwards by the resistance of the lubrication grease.
- 2 As a result, the magnet (Fig. 15 to 17/3) connected to the baffle plate moves along its inner circular path (Fig. 16), which means that it **cannot** trigger a pulse on the reed switch (Fig. 15 to 17/1).
- 3 During each revolution, a cam (Fig. 16/4) forces the magnet and the pivot-mounted baffle plate back out onto the outer circular path (Fig. 17)
- 4 After passing the cam, the resistance of the lubricant pushes the baffle plate and the magnet back inwards, onto the inner circular path.



Magnet on inner circular path

- 5 When the lubricant level in the reservoir drops so far that the resistance of the lubrication grease is no longer enough to deflect the baffle plate (Fig. 15 to 16/2), the magnet (Fig. 15 to 17/3) stays on the outer path, triggering a pulse during each revolution as it slides over the reed switch (Fig. 15 to 17/1).
- 6 If the magnet (Fig. 15 to 17/3) moves over the reed switch (Fig. 15 to 17/1) on the outer circular path five times during one work cycle, a low-level signal is output directly on the pump's signal connection.



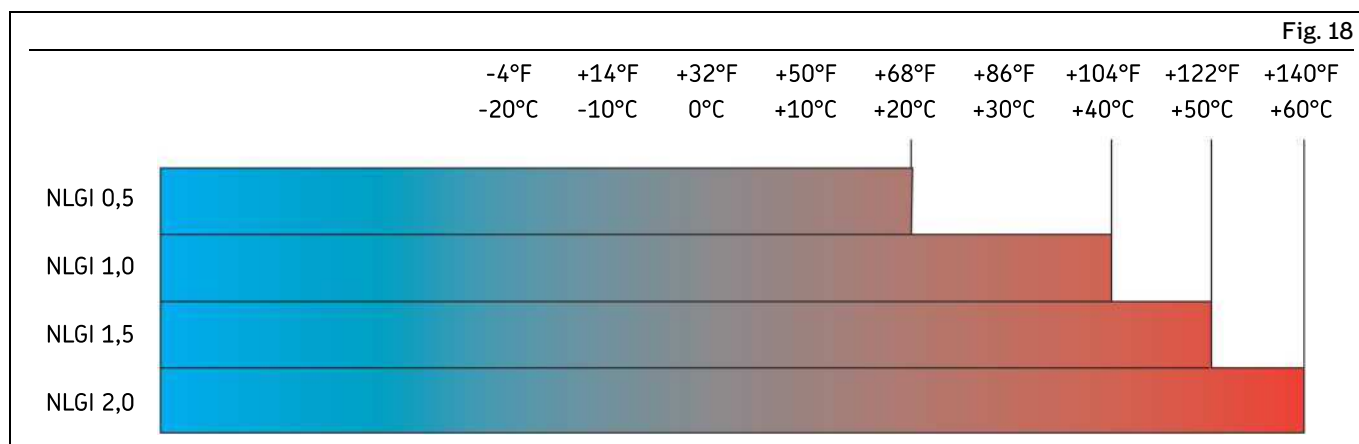
Magnet on outer circular path

## 3.8 Operational limits of the intermittent empty signal

For the correct functioning of the intermittent empty signal, the following lubricant consistencies must be maintained. The correct functioning of the intermittent empty signal is not guaranteed above the specified temperature range. The lower temperature ranges are contingent on the suitability of the respective lubricant for these temperatures. Excessively high consistency of the lubricant could otherwise lead to malfunctions such as interruption of the lubricant feeding or possibly to damage to the pump (e.g., bending of the stirring paddle).

### NOTE

The intermittent empty signal is not suitable for lubricating greases with an NLGI class  $\leq 0$ .



Operational limits of the intermittent empty signal

### 3.8.1 Processing of the low-level signals with external control and monitoring of the pump

This information applies to pumps without a control circuit board, with external control and monitoring by the owner-operator.

In order to avoid a premature low-level signal (e.g., caused by air inclusions or wave formation in the lubricant) in situations with external control and monitoring, the external control must be programmed to comply with the following conditions.

The pulses of the intermittent empty signal must be cleared after every work cycle.

### NOTICE

#### Premature low-level signal

The pulses must never be allowed to accumulate across multiple work cycles. This leads to a premature low-level signal.

#### Work cycle $\geq 32$ seconds:

- A minimum of 6 reed switch signals are required per work cycle.

#### Work cycle $\geq 24$ seconds $\leq 32$ seconds:

- A minimum of 4 reed switch signals are required per work cycle.

#### Work cycle $\leq 24$ seconds:

- The number of reed switch signals required must be adapted to suit the expected operating conditions. Please contact our Customer Service.

### 3.8.2 Display of the low-level signal

The empty signal is depicted as in the connection diagram by means of an external indicator light.

### 3.8.3 Remaining running time of the pump with a low-level signal

#### Pump with external control

The operator must ensure that the pump is stopped by the external control no later than 4 minutes after the low-level signal.

## 4 Technical data

### 4.1 General technical data

Table 8

Table 8

General technical data				
Parameter		Value		
Permiss. operating temperature		-25 °C to 70 °C		
Operating pressure		Max. 205 bar		
Mounting position		QLS 301: any <sup>1)</sup> QLS 401: upright (max. deviation ± 5°)		
Lubrication points		Max. 18		
Sound pressure level		< 70 dB (A)		
Reservoir size		QLS 301	1 liter	
		QLS 401	1 liter or 2 liters	
Filling		Via cone-type grease nipple, R 1/4		
Weight of the empty pump with SSV 12 metering device		Approx. 6 kg		
Lubricants		NLGI II and NLGI III <sup>2)</sup> lubrication grease / NLGI 00, 000 fluid grease		
Delivery rate <sup>2)</sup>		Approx. 0.12 ccm (per stroke)		Approx. 1.0 ccm (per stroke)
Maximum running time of the pump		25 minutes (V DC)		15 minutes (V AC)
	Temperature [°C]	-25 °C	-20 °C	+25 °C
12 V DC	Speed [rpm]	5.0	6.0 - 7.5	7.1 - 8.3
24 V DC	Speed [rpm]	5.3 - 6.0	6.2 - 7.3	7.3 - 8.3
120 V AC	Speed [rpm]	5.9 - 6.9	8.3	8.5 - 9.0
230 V AC	Speed [rpm]	2.5 - 5.8	6.5 - 6.8	6.9 - 7.1
The speeds given are dependent on back pressure and on temperature. The following applies as a general rule: the higher the back pressure and the lower the temperature, the lower the speed.				

<sup>1)</sup> Also rotary installation, as is typical in wind turbines for example. Maximum speed and maximum distance to the hub can be specified on request.

<sup>2)</sup> Lubrication greases of NLGI Grade III can be pumped only under particular operating conditions. Therefore, the pumpability of the grease should be clarified with SKF in advance.

## 4.2 Electrical system

Table 9

<b>Electrical system</b>				
Parameter	12 V DC	24 V DC	120 V AC (60 Hz)	230 V AC (50 Hz)
IP rating of bayonet connector	IP69K	IP69K	IP65	IP65
Power supply with rectangular connector (left)	Yes	Yes	Yes	Yes
Tolerance for input voltage	-20 / +30 %	-20 / +30 %	±10 %	±10 %
Power consumption (maximum)	≤ 2 A	≤ 1 A	≤ 1 A	≤ 0.5 A
Protection classes	PELV	PELV	PELV	PELV
Inputs	Protected against polarity reversal, short-circuit-proof, non-isolated			
Power supply with bayonet connector (left)	Yes	Yes	No	No
Power supply and fault signal with bayonet connector (left)	Yes	Yes	No	No
Fault signals with rectangular connector (right)	Yes	Yes	Yes	Yes
Protection and disconnection device required for isolation	Yes	Yes	Yes	Yes
Switching voltage	30 V AC / DC	30 V AC / DC	30 V AC / DC	30 V AC / DC
IP rating of rectangular connector	IP65/IP67 <sup>#</sup>	IP65/IP67 <sup>#</sup>	IP65/IP67 <sup>#</sup>	IP65/IP67 <sup>#</sup>
AC fault relay for low-level signal and error messages	30 V AC	30 V AC	30 V AC	30 V AC
Maximum switched current	5 A	5 A	5 A	5 A
DC fault relay for low-level signal and error messages	30 V DC	30 V DC	30 V DC	30 V DC
Maximum switched current	5 A	5 A	5 A	5 A
Residual ripple (DIN 41755)	± 5 %	± 5 %	± 5 %	± 5 %

<sup>#</sup> IP 67 only for rectangular connectors with a prefabricated cable.

## 4.3 Tightening torques

The torques specified below must be observed during assembly and repair of the pump.

Table 10

<b>Tightening torques</b>		
Component		Tightening torque
Pump on base, machine, or vehicle		18 Nm ± 1 Nm
Metering device on QLS pump		9 Nm ± 1 Nm
Pump element on pump housing		25 Nm ± 2 Nm
Outlet fitting on the metering device	Screw-in	17 Nm ± 1 Nm
	Plug-in	12 Nm ± 1 Nm
Screw fastening of indicator pin		18 Nm ± 1 Nm
Plug screw (outlet)		15 Nm ± 1 Nm
Plug screw (piston)		18 Nm ± 1 Nm
Union nut on outlet fitting	Plastic pipe/tube	10 Nm ± 1 Nm
	Steel pipe	11 Nm ± 1 Nm
Cover of pump housing		1.6 Nm + 0.8 Nm
Reservoir with pump housing		1.6 Nm ± 0.1 Nm

## 4.4 Factory settings for pumps with control circuit board S4

Table 11

### Factory settings for pumps with control circuit board S4

Programming step / value	Factory setting	Setting range
P1 Pause time in hours <sup>1)</sup>	6 hours	0–59 hours
P2 Pause time in minutes <sup>2)</sup>	0 minutes	0–59 minutes
P3 Metering device circulations per work cycle	1 circulation	V DC pumps: 1–5 circulations V AC pumps: 1–3 circulations <sup>3)</sup>
P4 Signal output of the fault relay	NO	NO (normally open) / NC (normally closed)
P5 Differentiation of low-level and fault signals	--	-- (no differentiation) -U (output signal as NC contact) -Π (output signal as NO contact)
P6 Start phase	SP	[SP] pump begins with pause time [SO] pump begins with lubrication time
Running time (maximum)	See section 4.1	Cannot be changed

<sup>1)</sup> Maximum setting for pause time = 59 hours 59 minutes

<sup>2)</sup> Minimum setting for pause time on V DC pump = 4 minutes / V AC pump = 20 minutes

<sup>3)</sup> To prevent pump faults caused by exceeding the maximum running time, the following values must be adhered to for the V AC versions:

- With SSV 6 + 8 max. 3 circulations
- With SSV 10– 18 max. 1 circulation

## 4.5 Usable reservoir volume

### NOTE

The usable reservoir volume is strongly dependent on the consistency (NLGI Grade) and working temperature of the lubricant used. With high consistency and a low temperature, usually more lubricant adheres to the inner surfaces of the reservoir/pump, leaving less lubricant available to be pumped.

Table 12

### Usable reservoir volume

Parameter	Usable reservoir volume	
	1 liter reservoir without low-level signal (XN)	2 liter reservoir without low-level signal (XN)
Lubricants with relatively high consistency <sup>4)</sup>	Approx. 0.5 liters	Approx. 1.6 liters
Lubricants with relatively low consistency <sup>5)</sup>	Approx. 1.0 liters	Approx. 2.0 liters
	1 liter reservoir with low-level signal (XL)	2 liter reservoir with low-level signal (XL)
Lubricants with relatively high consistency <sup>4)</sup>	Approx. 0.5 to 0.8 liters	Approx. 1.6 to 1.9 liters
Lubricants with relatively low consistency <sup>5)</sup>	Approx. 0.6 to 0.9 liters	Approx. 1.7 to 2.0 liters

<sup>4)</sup> Consistencies of NLGI 2 lubricants at +20 °C up to the maximum permissible lubricant consistency

<sup>5)</sup> Consistencies of NLGI 000 lubricants at +70 °C up to consistencies of NLGI 1.5 lubricants at +20 °C

## 4.6 Lubricant requirement when an empty pump is filled for the first time

### NOTE

The following volumes of lubricant are required in order to fill a new empty pump up to the MAX mark on the reservoir.

Table 13

#### Lubricant requirement when an empty pump is filled for the first time

Reservoir size	Quantity	
1 liters	1.75 liters $\pm$ 0.15	When using lubricants with relatively low consistency in pumps subjected to strong vibrations or tilting motions (e.g., heavy equipment for construction or agriculture), maintain a clearance of about 25 mm below the - MAX - mark on the reservoir. This stops lubricant from entering the reservoir ventilation. In the case of very strong vibrations, this value must be increased, and in the case of minimal vibrations, it can be reduced. Changing the filling height by 10 mm equates to a change in volume of approx. 0.2 liters.
2 liters	3.0 liters $\pm$ 0.10	



## Type identification code QLS 301

P301 3 1 4 1 2 1 5 4

### Basic type of the pump

P301

### Metering device

- 0 External metering device SSV 6-KNQLS, SSV 8-KNQLS
- 1 External metering device SSV 12-KNQLS, SSV 18-KNQLS
- 3 SSV 6 (rear-mounted)
- 4 SSV 8 (rear-mounted)
- 6 SSV 12 (rear-mounted or bottom-mounted)
- 9 SSV 18 (rear-mounted or bottom-mounted)

### Arrangement of metering device outlets

- 0 No metering device
- 1 Metering device outlets vertical (V)
- 2 Metering device outlets horizontal (H)

### Power supply voltage

- 2 12 V DC (available with or without control circuit board)
- 4 24 V DC (available with or without control circuit board)
- 6 120 V AC (available only with control circuit board)
- 8 230 V AC (available only with control circuit board)

### Reservoir version

- 1 1XL, (1L reservoir with low-level signal)

### Number of possible connections

- 0 1 connection at left, power supply (V DC / V AC) 1A  
Rectangular connector for industrial use
- 2 1 connection at left, power supply (V DC) 1A  
Low-level or fault signal, bayonet connector, for vehicles only
- 1 2 connections, 1 at left for power supply (V DC / V AC) 2A  
1 at right for low-level or fault signal, external  
Rectangular connector for industrial use

### Design of the connection socket

- 1 Rectangular connector, type A (industrial) <sup>1)</sup>
- 5 Bayonet connector, 4-pin (vehicles) <sup>2)</sup>

### Electrical connection type

- 1 With connection socket, without cable <sup>1)</sup>
- 5 With connection socket and 10 m cable <sup>1)</sup>
- 6 With connection socket and 10 m ADR cable <sup>1)</sup>
- 7 With connection socket (Bayonet) and 10 m cable <sup>2)</sup>
- 8 With connection socket (Bayonet) and 10 m ADR cable <sup>2)</sup>

### Control circuit boards

- 0 None
- 4 Control circuit board S4 for 12 / 24 V DC  
NC and NO contact, programmable, 1–5 cycles
- 4 Control circuit board S4 for 120 / 230 V AC  
NC and NO contact, programmable  
1–3 cycles (SSV 6 / SSV 8), 1 cycle (SSV 12 / SSV 18)

<sup>1)</sup> Connection types 1, 5, 6 can only be combined with the rectangular connector socket design (1).

<sup>2)</sup> Connection types 7, 8 can only be combined with the bayonet connector socket design (5).

## Type identification code QLS 401

	P401	3	1	4	0	1	1	5	4
<b>Basic type of the pump</b>									
P401									
<b>Metering device</b>									
0 External metering device SSV 6-KNQLS, SSV 8-KNQLS									
1 External metering device SSV 12-KNQLS, SSV 18-KNQLS									
3 SSV 6 (rear-mounted)									
4 SSV 8 (rear-mounted)									
6 SSV 12 (rear-mounted or bottom-mounted)									
9 SSV 18 (rear-mounted or bottom-mounted)									
<b>Arrangement of metering device outlets</b>									
0 No metering device									
1 Metering device outlets vertical (V)									
2 Metering device outlets horizontal (H)									
<b>Power supply voltage</b>									
2 12 V DC (available with or without control circuit board)									
4 24 V DC (available with or without control circuit board)									
6 120 V AC (available only with control circuit board)									
8 230 V AC (available only with control circuit board)									
<b>Reservoir version</b>									
0 1XN (1L reservoir without low-level signal)									
1 1XL (1L reservoir with low-level signal)									
2 2XN (2L reservoir without low-level signal)									
3 2XL (2L reservoir with low-level signal)									
<b>Number of possible connections</b>									
0 1 connection at left, power supply (V DC / V AC) 1A Rectangular connector for industrial use									
2 1 connection at left, power supply (V DC) 1A Low-level or fault signal, bayonet connector, for vehicles only									
1 2 connections, 1 at left for power supply (V DC / V AC) 2A 1 at right for low-level or fault signal, external Rectangular connector for industrial use									
<b>Design of the connection socket</b>									
1 Rectangular connector, type A (industrial) <sup>1)</sup>									
5 Bayonet connector, 4-pin (vehicles) <sup>2)</sup>									
<b>Electrical connection type</b>									
1 With connection socket, without cable <sup>1)</sup>									
5 With connection socket and 10 m cable <sup>1)</sup>									
6 With connection socket and 10 m ADR cable <sup>1)</sup>									
7 With connection socket (Bayonet) and 10 m cable <sup>2)</sup>									
8 With connection socket (Bayonet) and 10 m ADR cable <sup>2)</sup>									
<b>Control circuit boards</b>									
0 None									
4 Control circuit board S4 for 12 / 24 V DC NC and NO contact, programmable, 1–5 cycles									
4 Control circuit board S4 for 120 / 230 V AC NC and NO contact, programmable 1–3 cycles (SSV 6 / SSV 8), 1 cycle (SSV 12 / SSV 18)									

<sup>1)</sup> Connection types 1, 5, 6 can only be combined with the rectangular connector socket design (1)

<sup>2)</sup> Connection types 7, 8 can only be combined with the bayonet connector socket design (5)

## Type identification code QLS 401 SSVDV

P401 SSVDV16 AAAABBBB 24DC 1XN 2A 1 5 S4

### Basic type of the pump

P401

### Metering device

SSVDV 6 (rear-mounted, outlets vertical (V))

SSVDV 12 (rear-mounted, outlets vertical (V))

SSVDV 16 (rear-mounted, outlets vertical (V))

### Metering screws per outlet pair<sup>1)</sup>

A 0.08 cm<sup>3</sup> B = 0.14 cm<sup>3</sup> C = 0.20 cm<sup>3</sup> D = 0.30 cm<sup>3</sup>

E 0.40 cm<sup>3</sup> F = 0.60 cm<sup>3</sup> G = 0.80 cm<sup>3</sup> H = 1.00 cm<sup>3</sup>

I 1.40 cm<sup>3</sup> J = 1.80 cm<sup>3</sup>

### Supply voltage<sup>2)</sup>

12 V DC Available with or without control circuit board

24 V DC Available with or without control circuit board

### Reservoir version

1XN 1L reservoir without low-level signal

1XL 1L reservoir with low-level signal

2XN 2L reservoir without low-level signal

2XL 2L reservoir with low-level signal

### Number of possible connections

1A 1 connection at left, power supply  
Rectangular connector for industrial use

1A 1 connection at left, power supply  
Low-level or fault signal, bayonet connector

2A 2 connections, 1 at left for power supply  
1 at right for low-level or fault signal, external  
Rectangular connector

### Design of the connection socket

1 Rectangular connector, type A (industrial) <sup>3)</sup>

5 Bayonet connector, 4-pin (vehicles) <sup>4)</sup>

### Electrical connection type

1 Connection socket, without cable <sup>3)</sup>

5 Connection socket and 10 m cable <sup>3)</sup>

6 Connection socket and 10 m ADR cable <sup>3)</sup>

7 Connection socket (Bayonet) and 10 m cable <sup>4)</sup>

8 Connection socket (Bayonet) and 10 m ADR cable <sup>4)</sup>

### Control circuit boards

0 Without control circuit boards

S4 Control circuit board S4 for 12 / 24 V DC

NC and NO contact, programmable, 1–5 cycles

<sup>1)</sup>Indicates the installed metering screws per outlet pair, starting from the highest outlet pair. The number of letters in the identification code corresponds to half the outlets of the metering device.

<sup>2)</sup> This pump type is only available in V DC versions.

<sup>3)</sup> Connection types 1, 5, 6 can only be combined with socket design (1), rectangular connector.

<sup>4)</sup> Connection types 7, 8 can only be combined with socket design (5), bayonet connector.

## 5 Delivery, returns, storage

### 5.1 Delivery

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

### 5.2 Return shipment

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



Marking of return shipments

### 5.3 Storage

**The following conditions apply to storage:**

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

### 5.4 Storage temperature range

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

### 5.5 Storage conditions for products filled with lubricant

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

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

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

#### 5.5.1 Storage period up to 6 months

Filled products can be used without implementing additional measures.

#### 5.5.2 Storage period between 6 and 18 months

**Pump:**

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

**Lines:**

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

**Metering devices:**

#### NOTE

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

#### 5.5.3 Storage period more than 18 months

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

### 5.6 Declaration of decontamination

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

## 6 Assembly

### 6.1 General

Only qualified technical personnel may install the products named in the instructions.

During installation, pay attention to the following:

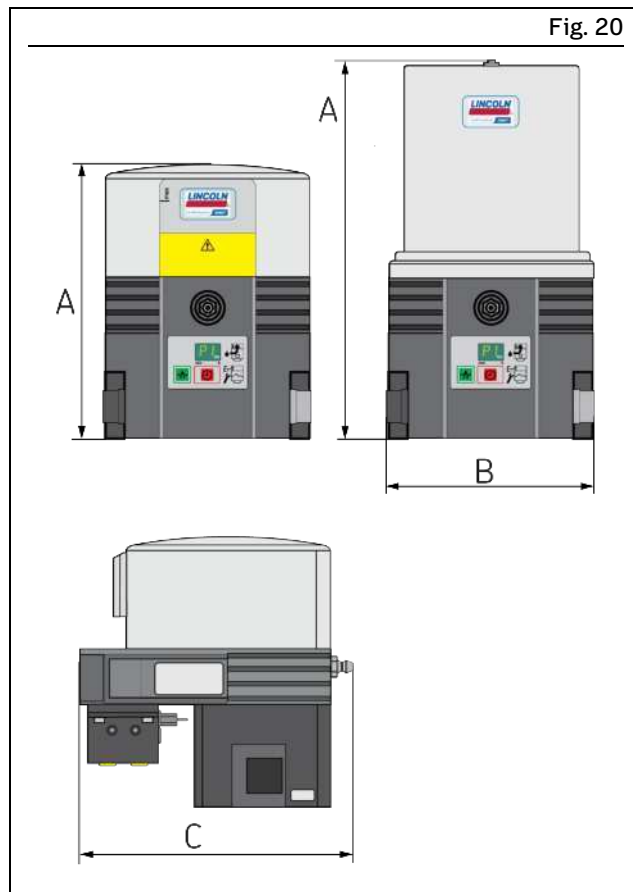
- Other units must not be damaged by assembly work
- The product must not be installed within range of moving parts
- The product must be installed at a sufficiently large distance from sources of heat or cold
- Observe the enclosure rating of the product
- Maintain safety clearances and comply with statutory regulations for assembly and accident prevention.
- Any visual monitoring equipment present, such as pressure gauges, min./max. markings, piston detectors, etc. must be clearly visible
- Follow the mounting position requirements in the "Technical data" chapter.

### 6.2 Installation location

The product should, to the extent possible, be protected from humidity and vibration, and should be installed so that it is easily accessible. This simplifies further installation and maintenance work.

### 6.3 Mounting dimensions

In order to have sufficient space for maintenance work or for the attachment of additional components for the construction of a centralized lubrication system on the pump, a clearance of at least 100 mm should be provided for in every direction in addition to the specified dimensions.



Mounting dimensions

Table 14

#### Mounting dimensions

Designation	Dimensions
A	230 mm (1 liter reservoir)
A	313 mm (2 liter reservoir)
	With bottom-mounted metering device A+ 40 mm
B	237 mm
C	215 mm
	With rear-mounted SSVDV metering device C+ 20 mm

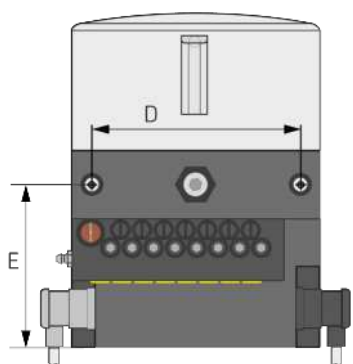
## 6.4 Assembly holes

### NOTICE

#### Possible damage to the main machine and the pump

The assembly holes should be created only on non-load-bearing parts of the main machine. Do not mount on two parts that move in opposite directions to one another (such as the machine base and machine superstructure). When installing, always use the accompanying mounting brackets and washers and comply with the specified torques.

Fig. 21



Fastening points

Table 15

#### Connection dimensions

Designation	Dimensions
D	146 mm (hole spacing)
E	110 mm (height)

Fasten at the fastening points (Fig. 21/D) using the fastening hardware included with the pump:

- 2x screws M8 (8.8) and 2 washers
- 2 x M8 nuts (self-locking)

**Tightening torque = 10 Nm ± 1,0 Nm**

## 6.5 Electrical connection

### ⚠ 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.

Proceed as follows for electrical connection:

#### Rectangular connector

- Configure the rectangular connector without cable by attaching a suitable cable to it. For connection of the cable, see the wiring diagram on the rectangular connector or the corresponding wiring diagram in these instructions: section 15Appendix
- Remove the protective caps on the electrical connections of the pump
- Place the plug connectors with seal on the connections and fasten using the screw.

### Bayonet connector

- Remove the protective caps on the electrical connections of the pump
- Place the connector on the connections and fasten by turning
- In the case of bayonet connectors assembled by the owner-operator, the pins must be assigned as shown in the wiring diagram in these instructions (see chapter 15).

#### NOTE

Observe the electrical characteristics: see also section 4 Technical data

## 6.6 Lubrication lines

### ⚠ CAUTION



**Risk of slipping**  
**Slipping hazard due to lubricant**

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

### NOTICE

#### Damage

#### Damage from lines under stress

Connect the lubricant lines in such a way that no forces are transferred to the product (stress-free connection).

All components of the centralized lubrication system must be designed for:

- The maximum operating pressure that occurs
- The permissible ambient temperature
- The delivery volume and the lubricant to be fed.

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

- Use only clean components and filled lubrication lines
- The main lubricant line should be routed on a rising gradient and should be able to be bled at the highest point. Lubrication lines should always be arranged so that air inclusions cannot form anywhere
- Install lubricant metering devices at the end of the main lubricant line such that the outlets of the lubricant metering devices point upwards wherever possible
- If the system configuration requires that the lubricant metering devices be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line
- The flow of lubricant should not be impeded by the presence of sharp bends, angle valves, flap valves, seals protruding inward, or changes in cross-section (large to small). Unavoidable changes in the cross-section in lubrication lines must have smooth transitions.

### 6.6.1 Connection of the lubrication lines

The following components can be used for connection:

- Quick disconnect couplings (see also section 14.8) / plastic pressure pipe
- Screw sleeves / high-pressure hose.

### 6.6.2 Maximum length of the lubrication lines

The maximum length of the lubrication lines is based on the back pressure in the system and is limited by the nominal pressure of the pressure limiting valve in the pump.

The back pressure is primarily affected by the following factors:

- NLGI Grade of the lubrication grease used
- Suitability of the lubrication grease used for the actual operating temperature (e.g., low-temperature grease).
- Diameter of the lubrication line
- Pressure in the bearing/at the lubrication point

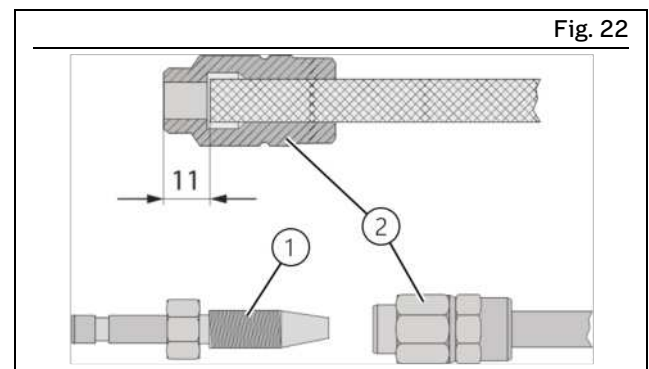
### 6.6.3 Assembling screw sleeves and hose connectors

#### NOTICE

#### Damage

#### Damage due to incorrect high-pressure hoses

Only high-pressure hoses with a screw sleeve and hose connector may be connected to check valves with reinforced collets.



Assembling screw sleeves and hose connectors

Legend to Figure 22:

- 1 Hose connector
- 2 Screw sleeve

Proceed as follows for installation:

1. Oil the screw sleeve (Fig. 22/2) and high-pressure hose.
2. Screw the screw sleeve (Fig. 22/2) counterclockwise onto the high-pressure hose until the dimension 11 mm (Fig. 22) is reached.
3. Screw the hose connector (Fig. 22/1) into the screw sleeve (Fig. 22/2).



## 6.7 Initial filling of a QLS 301 pump delivered without lubricant

### NOTICE

#### Damage to the main machine

Avoid air inclusions in the lubricant and under the follower plate. These can interfere with the suction characteristics of the pump, resulting in a poor delivery rate or no lubricant delivery.

### NOTICE

#### Damage to the pump

When filling, make sure no contamination enters the reservoir. Do not overfill the reservoir. Bear in mind the expansion of the lubricant due to increased temperature (important during storage or transportation of the pump, for example) and due to pressure relief after the filling procedure – this expansion could cause lubricant to block the reservoir ventilation.

When filling for the first time, proceed as described below:

#### Removing the reservoir and filling

Fig. 23



Unfastening and removing the reservoir

#### Legend to Figure 23:

- 1 Reservoir
- 2 Allen screw
- 3 Spring
- 4 Reservoir centering lug

1. Unscrew the M5 Allen screw (Fig. 23/2) from the center of the reservoir and keep it for later use, together with the packing ring located under it.
2. Lift the reservoir (Fig. 23/1) up and remove it. If necessary, first use a blunt tool to detach the reservoir on the side in the area of the reservoir centering lug (Fig. 23/4).
3. Remove the spring (Fig. 23/3).

Fig. 24



Filling the space under the reservoir with lubricant

#### Legend to Figure 24:

- 1 Filler nipple
  - 2 Sealing lip
  - 3 Follower plate
4. Place a grease gun on the filler nipple (Fig. 24/1).
  5. Press the follower plate (Fig. 24/3) downward onto the pump housing.
  6. Keep filling the pump until the follower plate (Fig. 24/3) starts to rise and some lubricant comes out at the side.
  7. Lightly grease the sealing lip (Fig. 24/2) of the follower plate with the lubricant that came out at the side.

#### Installing the reservoir

Fig. 25



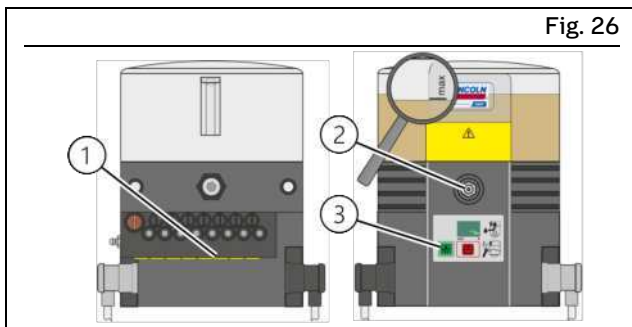
Installing the reservoir

#### Legend to Figure 25:

- 1 Reservoir
  - 2 Allen screw
  - 3 Spring
  - 4 Reservoir centering lug
8. Put the spring (Fig. 25/3) back on the central column of the reservoir.
  9. Press the reservoir (Fig. 25/1) by hand over the O-ring and all the way down. As you do so, make sure that the reservoir centering lug (Fig. 25/4) sits securely in the matching recess on the pump housing.
  10. Fasten the reservoir again with the M5 Allen screw (Fig. 25/2) and the washer. **Tightening torque = 1.6 Nm ± 0.1 Nm.**
  11. Fill the reservoir up to just below the - MAX - mark.
  12. Remove any contamination from the outside of the reservoir.



## 6.8 Initial filling of a QLS 401 pump delivered without lubricant



Initial filling of a QLS 401 pump delivered without lubricant

### Legend to Figure 26:

- 1 Transport caps
- 2 Filler nipple
- 3 Green setting button

When filling for the first time, proceed as described below:

1. Place a container under the pump to collect the lubricant that comes out.
2. Unscrew the yellow transport caps (Fig. 26/1) from the outlets of the metering device.
3. Use plug screws to close off unneeded outlets of the metering device.
4. Place the fill connection of the grease tool or transfer pump on the filler nipple (Fig. 26/2).
5. Fill the reservoir with lubricant up to the - MAX - mark.
6. Run the pump by pressing the button (Fig. 26/3) until lubricant comes out of the open outlets on the metering device.
7. Switch off the pump.
8. Remove the container for collecting the lubricant and dispose of the lubricant that came out in an environmentally friendly manner.

The pump is now ready for operation with the factory settings, or can be adapted by modifying the parameters (by programming).

# 7 First start-up

## 7.1 General

First start-up of the fully and correctly assembled QLS pump is performed using the machine contact or vehicle driver switch.

### NOTE

If “EP” or “Er” appears on the display after switch-on, there is a fault. For troubleshooting, see section “Malfunctions, causes and remedies”.

### Pumps with a control circuit board S4:

- If the power supply is interrupted within a minute of switch-on, the pause time starts again from the beginning when the pump is switched back on.
- If the power supply is interrupted more than a minute after switch-on, the control resumes from the point of interruption when the pump is switched back on.

## 7.2 Inspections before and during first start-up

To ensure safety and functionality, the person specified by the operator is required to perform the following inspections. Any detected deficiencies must be resolved immediately. The correction of deficiencies must be done exclusively by a specialist competent and authorized to do so.

### 7.2.1 Inspections before first start-up

Table 16

#### Checklist for first start-up

Inspections before first start-up	YES	NO
Electrical connection established correctly	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical connection established correctly	<input type="checkbox"/>	<input type="checkbox"/>
The performance characteristics for the aforementioned connections match the specifications in the “Technical data”	<input type="checkbox"/>	<input type="checkbox"/>
All components such as lubrication lines and metering devices are correctly installed	<input type="checkbox"/>	<input type="checkbox"/>
No apparent damage, contamination, or corrosion	<input type="checkbox"/>	<input type="checkbox"/>
Any dismantled protective and monitoring equipment is fully reinstalled and functional	<input type="checkbox"/>	<input type="checkbox"/>
All warning labels on the product are present and in proper condition	<input type="checkbox"/>	<input type="checkbox"/>
The lubrication time and pause time set on the pump's control circuit board match the planned lubrication time and pause time	<input type="checkbox"/>	<input type="checkbox"/>

### 7.2.2 Inspections during first start-up

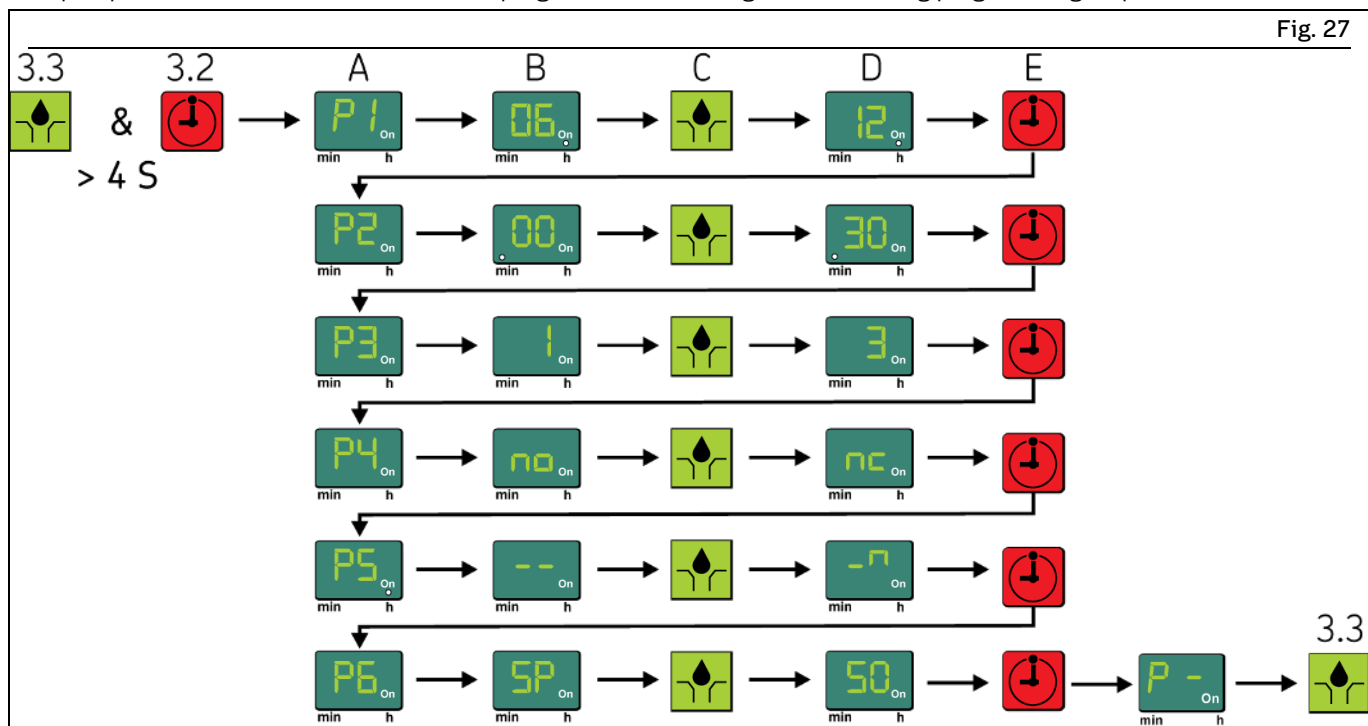
Table 17

#### Checklist for first start-up

Inspections during first start-up	YES	NO
No unusual noises, vibrations, moisture accumulation, or odors present	<input type="checkbox"/>	<input type="checkbox"/>
No undesired discharge of lubricant (leakages) at connections	<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is fed without bubbles	<input type="checkbox"/>	<input type="checkbox"/>
The bearings and friction points requiring lubrication receive the planned lubricant volume	<input type="checkbox"/>	<input type="checkbox"/>

## 7.3 Programming the control circuit board S4

QLS pumps with control circuit board S4 are programmed according to the following programming sequence:



Programming sequence for control circuit board S4

1. Press button 3.2 and button 3.3 (Fig. 27) at the same time for about 4 seconds to enter the first programming step, P1. When you release the buttons, the set value is displayed.
2. Modify the value for the programming step by pressing button 3.3 (Fig. 27).
3. Apply the modified value by pressing button 3.2 (Fig. 27) within 30 seconds, otherwise that value is lost.
4. Programming continues with the next programming step, P2.
5. When you confirm the last programming step, P6, programming is finished.

Table 18

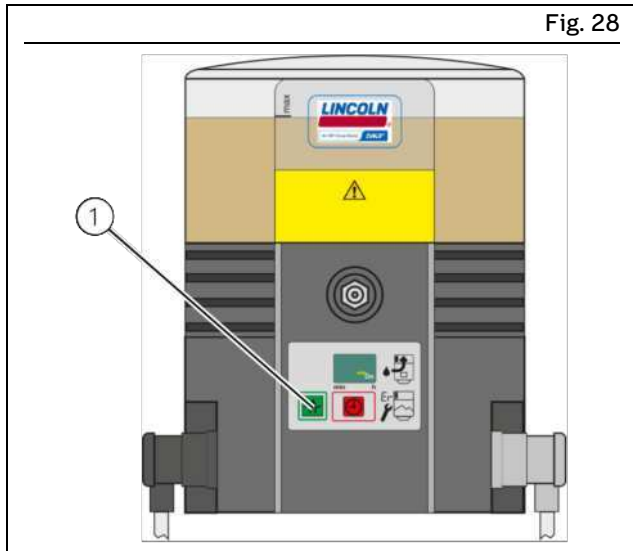
### Programming steps

Fig. 27	Display	Display	Setting
A	Programming step	P1	Pause time in hours
B	Possible value	P2	Pause time in minutes
C	Modify the value by pressing the button	P3	Metering device circulations per work cycle
D	Possible new value	P4	Output signal on the monitoring relay
E	<ul style="list-style-type: none"> <li>• Apply the modified value by pressing button 3.2 (Fig. 27) within 30 seconds and continue to the next programming step.</li> <li>• Apply/finish programming by pressing button 3.3 (Fig. 27) after the last programming step.</li> </ul>	P5	Differentiation between fault signals and low-level signals
		P6	Start phase

### NOTE

Programming is possible in only one direction (+). You can fast-forward through it by continuously pressing button 3.3 (Fig. 27).

## 7.4 Triggering additional lubrication



Triggering additional lubrication

### Legend to Figure 28:

1 Green button

To trigger additional lubrication, proceed as follows:

1. Press the green button (Fig. 28/1) for at least 2 seconds.
  - The pump starts to operate. At the same time, the expired pause time is reset.
  - The symbol for "Pump is running" appears on the display.

### NOTE

The duration of the additional lubrication is the set number of metering device circulations per work cycle.

# 8 Operation

## 8.1 General

SKF products operate largely automatically.

The activities required during normal operation are limited primarily to checking the pump for damage and proper functioning.

### Ensure that:

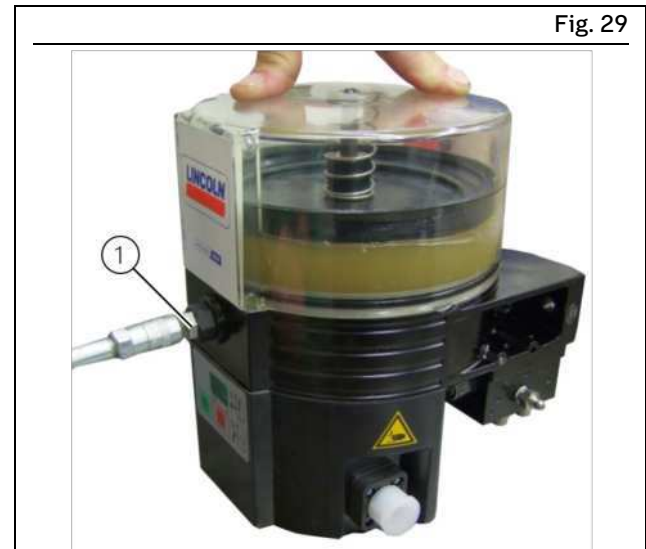
- All safety devices are fully present and functional
- All connections are properly connected
- All parts are correctly installed
- All warning labels on the product are fully present, visible, and undamaged
- Illegible or missing warning labels are immediately replaced.

### NOTICE

#### Possible damage to the pump and air in the lubrication system

In the case of pumps without a low-level signal, the fill level must be checked regularly and topped up with lubricant in good time.

## 8.2 Regular filling via the filler nipple



Regular filling via the filler nipple

### Legend to Figure 29:

1 Filler nipple

1. Connect the fill connection of the filling pump to the filler nipple (Fig. 29/1).
2. Switch on the filling pump and fill the reservoir up to just below the - MAX - marking.
3. Switch off the filling pump and disconnect it from the filler nipple (Fig. 29/1) of the pump.

## 9 Maintenance

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

Table 19

### Checklist: Maintenance activities

Activity to be performed	YES	NO
Mechanical and electrical system connections established correctly	<input type="checkbox"/>	<input type="checkbox"/>
The performance characteristics for the aforementioned connections match the specifications in the "Technical data"	<input type="checkbox"/>	<input type="checkbox"/>
All components such as lubrication lines and metering devices are correctly installed	<input type="checkbox"/>	<input type="checkbox"/>
No apparent damage, contamination, or corrosion	<input type="checkbox"/>	<input type="checkbox"/>
Any dismantled protective and monitoring equipment is fully reinstalled and functional	<input type="checkbox"/>	<input type="checkbox"/>
All warning labels on the product are present and in proper condition	<input type="checkbox"/>	<input type="checkbox"/>
No unusual noises, vibrations, moisture accumulation, or odors present	<input type="checkbox"/>	<input type="checkbox"/>
No undesired discharge of lubricant (leakages) at connections	<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is fed without bubbles	<input type="checkbox"/>	<input type="checkbox"/>
The bearings and friction points requiring lubrication receive the planned lubricant volume	<input type="checkbox"/>	<input type="checkbox"/>

# 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.



# 11 Faults, causes, and remedies

## 11.1 Mechanical faults

Table 20

### Mechanical faults on pumps with and without control

Fault	Possible cause / How to recognize the fault	Remedy
Air inclusion in the lubricant/in the lubrication system	<ul style="list-style-type: none"> <li>Visually inspect for bubbles in the lubricant</li> </ul>	<ul style="list-style-type: none"> <li>Bleed the lubricant (trigger additional lubrication several times if necessary)</li> </ul>
Reservoir ventilation clogged	<ul style="list-style-type: none"> <li>Visual inspection to check if there is lubricant in the reservoir ventilation</li> </ul>	<ul style="list-style-type: none"> <li>Remove lubricant from the reservoir ventilation</li> </ul>
Suction bore of the pump element clogged	<ul style="list-style-type: none"> <li>After removing the pump element</li> </ul>	<ul style="list-style-type: none"> <li>Remove and clean the pump element</li> </ul>
Piston of the pump element is worn	<ul style="list-style-type: none"> <li>Insufficient pressure build-up</li> </ul>	<ul style="list-style-type: none"> <li>Replace pump element</li> </ul>
Check valve in the pump element is defective		
Follower plate is stuck (pumps with a follower plate)	<ul style="list-style-type: none"> <li>Pump runs but does not deliver medium</li> </ul>	<ul style="list-style-type: none"> <li>Determine and resolve the cause</li> </ul>
Lubricant volume at one or more lubrication points deviates from the design values	<ul style="list-style-type: none"> <li>The pause time or the number of metering device circulations is set incorrectly</li> <li>Incorrect consolidation of outlets on the SSV metering device</li> <li>SSVDV metering device is set incorrectly</li> </ul>	<ul style="list-style-type: none"> <li>Check the settings of the pause time and the metering device circulations and correct if necessary</li> <li>Check the consolidation of the outlets and correct if necessary</li> <li>Check the metering screws and replace metering screws if necessary</li> </ul>
Pump is running permanently / pump does not switch off	<ul style="list-style-type: none"> <li>The indicator pin on the metering device is not moving within the sensing distance of the proximity switch, or the indicator pin is not located centrally in front of the proximity switch</li> </ul>	<ul style="list-style-type: none"> <li>Check the position and distance of the indicator pin (distance &lt; 0.5 mm) and correct if necessary</li> </ul>
Contact our Customer Service if you cannot determine or resolve the fault		

## 11.2 Error messages on pumps with control

Table 21

### Error messages on pumps with control

Error message on the display	Meaning	Remedy
Error message LI	<ul style="list-style-type: none"> <li>Pre-empty signal: There is only a small amount of lubricant left. This indication alternates with the "Pump is running" indication</li> </ul>	<ul style="list-style-type: none"> <li>Refill the reservoir</li> </ul>
Error message LL	<ul style="list-style-type: none"> <li>Low-level signal: There is no longer any lubricant available. The pump finishes the current lubrication cycle. Restart is not possible until the reservoir is refilled</li> </ul>	<ul style="list-style-type: none"> <li>Refill the reservoir</li> </ul>
Error message EP	<ul style="list-style-type: none"> <li>Fault in the membrane keypad or</li> <li>Fault in the display screen</li> </ul>	<ul style="list-style-type: none"> <li>Replace the membrane keypad</li> <li>Replace the control circuit board</li> </ul>
Error message Er	<ul style="list-style-type: none"> <li>Back pressure is too high</li> <li>Faulty circuit control board</li> </ul> <p>An unspecified error occurred during the monitoring time.</p>	<ul style="list-style-type: none"> <li>If possible, use a more suitable lubrication grease and/or reduce the line length</li> <li>Replace the control circuit board</li> <li>Have the pump checked by an electrician. The pump may need to be replaced</li> </ul>

Contact our Customer Service if you cannot determine or resolve the fault

## 11.3 Electrical faults on pumps with control

Table 22

### Electrical faults on pumps with control

Fault	Possible cause / How to recognize the fault	Remedy
Power supply to pump interrupted	<ul style="list-style-type: none"> <li>Identified by - display screen on the pump is off - fault in the main machine/vehicle.</li> <li>External fuse defective</li> </ul>	<ul style="list-style-type: none"> <li>See the documentation for the main machine or vehicle</li> <li>Check the external fuse and replace it if necessary</li> </ul>
Power supply from the control circuit board to the motor is interrupted	<ul style="list-style-type: none"> <li>The power supply connector (A1) on the pump is not fastened correctly</li> <li>Display screen of the pump is off</li> </ul>	<ul style="list-style-type: none"> <li>Check the connector (A1) for correct fastening and correct it if necessary</li> <li>Check the power supply from the control circuit board to the motor and correct it if necessary</li> </ul>
Motor is not running even though the segment display is rotating	<ul style="list-style-type: none"> <li>Motor connection is faulty</li> </ul>	<ul style="list-style-type: none"> <li>Check the motor connection according to the relevant wiring diagram</li> </ul>
Motor defective	<ul style="list-style-type: none"> <li>The pump does not run when additional lubrication is triggered, even though power is being supplied correctly, both from the outside to the pump and from the control circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Replace pump</li> </ul>

Contact our Customer Service if you cannot determine or resolve the fault



## 11.4 Electrical faults on pumps without control

Table 23

### Electrical faults on pumps without control

Fault	Possible cause / How to recognize the fault	Remedy
Power supply to pump interrupted	<ul style="list-style-type: none"> <li>The pump does not run when additional lubrication is triggered by external control</li> <li>Fault in the main machine or vehicle</li> <li>External fuse defective</li> </ul>	<ul style="list-style-type: none"> <li>See the documentation for the main machine or vehicle</li> <li>Check the external fuse and replace it if necessary</li> </ul>
Pump runs but does not deliver medium	<ul style="list-style-type: none"> <li>The power supply connector (A1) on the pump is not fastened correctly</li> <li>Faults in one or more downstream lubrication circuits or in the bearings</li> <li>Metering device blocked</li> </ul>	<ul style="list-style-type: none"> <li>Check the connector (A1) for correct fastening and correct it if necessary</li> <li>Disconnect the lubrication lines on the metering device one by one in order to find out where the blockage is. The blockage is behind the outlet that lubricant comes out of</li> <li>Replace the metering device with a new metering device</li> </ul>
Incorrect lubricant volume at the lubrication point	<ul style="list-style-type: none"> <li>Incorrect consolidation of outlets of the metering device</li> <li>Use of incorrect metering screws, in the case of SSVDV metering devices</li> </ul>	<ul style="list-style-type: none"> <li>Check the metering device and correct if necessary</li> <li>Check the metering device and correct if necessary</li> </ul>
Motor defective	<ul style="list-style-type: none"> <li>The pump does not run when additional lubrication is triggered even though power supply is present</li> </ul>	<ul style="list-style-type: none"> <li>The pump may need to be replaced</li> </ul>
Contact our Customer Service if you cannot determine or resolve the fault		

# 12 Repairs

## ⚠ WARNING



### Risk of injury

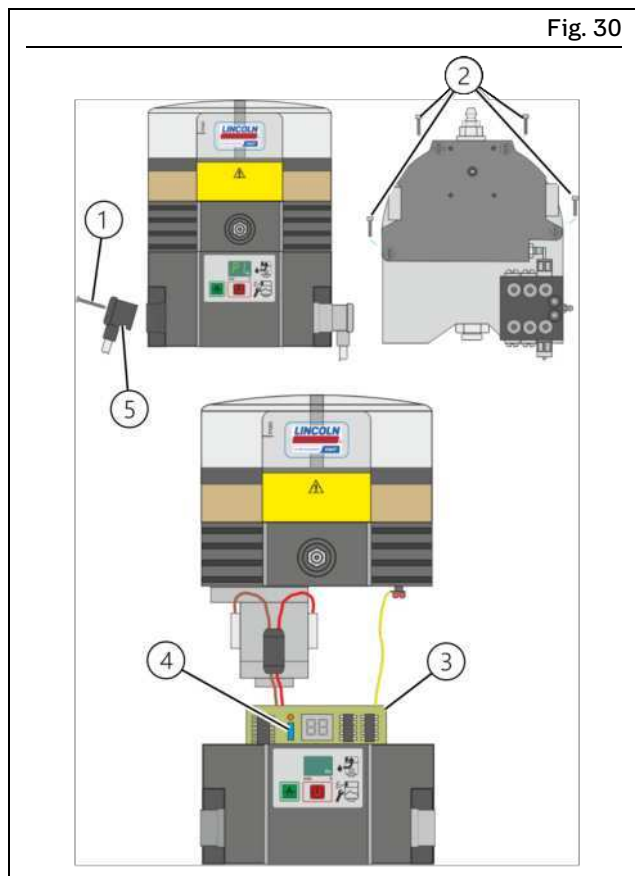
At a minimum, the following safety measures must be taken before any repairs:



- 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.

## 12.1 Replacing the membrane keypad

Proceed as follows to replace the membrane keypad :



Replacing the membrane keypad

### Legend to Figure 30:

- 1 Fastening screw – plug connector
- 2 Screws – pump housing
- 3 Control circuit board
- 4 Blue plug connector
- 5 Plug connector (A1)

1. Disconnect the pump electrically from the mains. Undo the fastening screw (Fig. 30/1) on the plug connector (Fig. 30/5) and pull out the plug connector.
  2. Undo the four screws on the cover of the pump housing (Fig. 30/2) and carefully remove it downwards.
  3. Carefully lift the control circuit board (Fig. 30/3) upwards out of its holder in the cover, until the blue plug connector (Fig. 30/4) of the control circuit board can be accessed easily.
  4. Disconnect the blue plug connector from the control circuit board.
  5. Carefully unstick the adhesive membrane keypad from the housing and remove it together with its connection cable.
  6. Insert the connection cable of the new membrane keypad into the opening for the membrane keypad in the front of the housing, and plug it into the matching port on the control circuit board. Make sure the connector is oriented correctly.
  7. Carefully insert the control circuit board into its holder.
  8. Stick the new adhesive membrane keypad onto the housing.
  9. Install the cover of the pump housing by inserting four new micro-encapsulated screws (Fig. 30/2).
- Tightening torque = 1.6 Nm + 0.8 Nm**
10. Reinsert the plug connector A1 to connect the pump to the power supply.

## 12.2 Replacing the control circuit board

To replace the control circuit board, follow the service instructions 951-151-000.

### 12.2.1 Checks after replacing the control circuit board

#### NOTE

An electrical inspection in accordance with EN 60204-1 must be performed after the replacement of the control circuit board.

#### Documentation and archiving

The scope and results of the inspection after replacement of the control circuit board must be recorded in writing and given to the party responsible for operation of the machine, for archiving.

## **13 Shutdown, disposal**

### **13.1 Temporary shutdown**

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

### **13.2 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.

### **13.3 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.

## 14 Spare parts

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

### 14.1 SSV metering device for QLS 301 / 401

Table 24			
SSV metering device for QLS 301 / 401			
Designation	Pcs.	Item number	Figure
SSV metering device 8 K bottom-mounted*	1	619-37586-1	Not shown
SSV metering device 12 K bottom-mounted*	1	619-37587-1	
SSV metering device 18 K bottom-mounted*	1	619-37588-1	
SSV metering device 6 K rear-mounted*	1	619-37589-1	
SSV metering device 8 K rear-mounted*	1	619-37782-1	
SSV metering device 12 K rear-mounted*	1	619-37590-1	
SSV metering device 18 K rear-mounted*	1	619-37591-1	
SSV 6 KN QLS external connection <sup>#</sup>	1	619-28945-1	
SSV 8 KN QLS external connection <sup>#</sup>	1	619-28946-1	
SSV 12 KN QLS external connection <sup>#</sup>	1	619-28950-1	
SSV 18 KN QLS external connection <sup>#</sup>	1	619-28953-1	

\* Includes indicator pin

# Includes indicator pin and sensor


### 14.2 SSVDV metering device for QLS 401

Table 25			
SSVDV metering device for QLS 401			
Designation	Pcs.	Item number	Figure
SSVDV metering device 6 K rear-mounted*	1	649-77599-1	Not shown
SSVDV metering device 10 K rear-mounted*	1	649-77600-1	
SSVDV metering device 12 K rear-mounted*	1	649-77601-1	
SSVDV metering device 16 K rear-mounted*	1	649-77602-1	

\* Includes indicator pin

### 14.3 Metering screws for SSVDV metering devices

Table 26

Metering screws for SSVDV metering devices					
Code	Length	Delivery volume	Pcs.	Item number	Figure
008 / A	46.7 mm	0.08 ccm / stroke	12	549-34254-1	
014 / B	45.9 mm	0.14 ccm / stroke	12	549-34254-2	
020 / C	44.7 mm	0.20 ccm / stroke	12	549-34254-3	
030 / D	42.7 mm	0.30 ccm / stroke	12	549-34254-4	
040 / E	40.7 mm	0.40 ccm / stroke	12	549-34254-5	
060 / F	36.7 mm	0.60 ccm / stroke	12	549-34254-6	
080 / G	32.7 mm	0.80 ccm / stroke	12	549-34254-7	
100 / H	28.7 mm	1.00 ccm / stroke	12	549-34254-8	
140 / I	20.8 mm	1.40 ccm / stroke	12	549-34254-9	
180 / J	12.8 mm	1.80 ccm / stroke	12	549-34255-1	
Set of 2 metering screws of each size			20	549-34255-2	

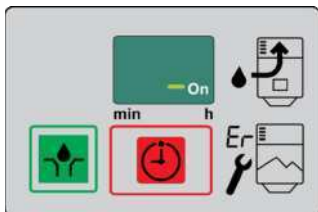
### 14.4 Seal set

Table 27

Seal set				
Designation	Pcs.	Item number	Figure	
Seal set, complete, for QLS 301	1	550-36979-8	Not shown	
Seal set, complete, for QLS 401	1	550-34178-1		

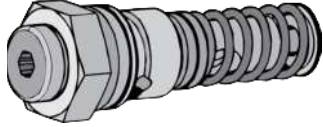
### 14.5 Membrane keypad (QLS 301 / QLS 401 with control)

Table 28

Membrane keypad				
Designation	Pcs.	Item number	Figure	
Membrane keypad, self-adhesive	1	236-14340-8		

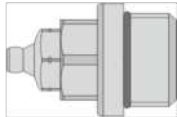
## 14.6 Pump element K6

Table 29

Pump element K6			
Designation	Pcs.	Item number	Figure
Pump element K6	1	650-28856-1	


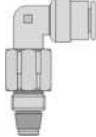

## 14.7 Adapter M22 x 1.5

Table 30

Adapter M22 x 1.5			
Designation	Pcs.	Item number	Figure
Adapter M22 x 1.5 with grease fitting A2	1	519-33959-1	


## 14.8 Quick disconnect couplings with check valve

Table 31

Quick disconnect couplings with check valve			
Designation	Pcs.	Item number	Figure
Quick disconnect coupling RVM 6510-6 M10x1	1	226-10337-3	
Quick disconnect coupling RVM 6511-6 M10x1	1	226-14091-4	
Quick disconnect coupling WRVM 6521-6 M10x1-S01	1	226-14091-8	

## 14.9 Reservoir

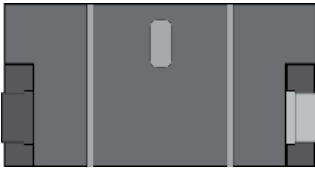
Table 32

Reservoir			
Designation	Pcs.	Item number	Figure
Transparent reservoir, 1 liter, with seal and sticker (QLS 301)	1	550-36979-2	
Transparent reservoir, 1 liter, with seal and sticker (QLS 401)	1	550-34179-1	
Transparent reservoir, 2 liter, with seal and sticker (QLS 401)	1	550-34179-4	

## 14.10 Housing cover replacement kit

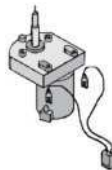
A replacement kit comprises: housing cover including diaphragm, membrane keypad, housing seal, plug connector for supply line with protective cap, the appropriate number of micro-encapsulated housing screws, and the required stickers.

Table 33

Housing cover replacement kit			
Designation	Pcs.	Item number	Figure
Connection type 1A1 V DC / rectangular connector / bottom-mounted metering device	1	550-34178-5	
Connection type 2A1 V DC / rectangular connector / bottom-mounted metering device	1	550-34178-4	
Connection type 1A1 V AC / rectangular connector / bottom-mounted metering device	1	550-34178-3	
Connection type 2A1 V AC / rectangular connector / bottom-mounted metering device	1	550-34178-2	
Connection type 1A1 V DC / bayonet connector / bottom-mounted metering device	1	550-34179-3	

## 14.11 VDC motors

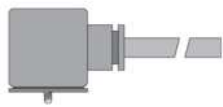
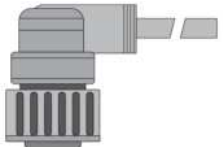
Table 34

VDC motors			
Designation	Pcs.	Item number	Figure
Pump motor, 12 V DC, with motor connection cable	1	550-36982-1	
Pump motor, 24 V DC, with motor connection cable	1	550-36982-2	

## 14.12 Electrical connections

Table 35

### Electrical connections

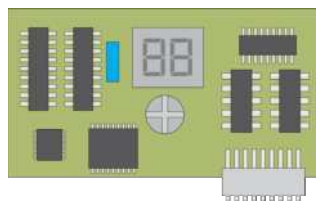
Designation	Pcs.	Item number	Figure
Rectangular connector connection socket (black) with 10 m cable (4-core)	1	664-36078-7	
Rectangular connector connection socket (gray) with 10 m cable (4-core)	1	664-36078-9	
Bayonet connector connection socket with 10 m cable (4-core)	1	664-34045-1	

## 14.13 Control circuit board replacement kit

A replacement kit comprises: control circuit board, housing seal, the appropriate number of micro-encapsulated housing screws, and the service instructions for replacing the control circuit board.

Table 36

### Control circuit board replacement kit

Designation	Voltage	Jumper	Pcs.	Item number	Figure
Control circuit board S4 SSV12+18	120 V AC	NO	1	550-34199-1	
Control circuit board S4 SSV6+8	120 V AC	YES	1	550-34199-2	
Control circuit board S4 SSV 12+18	230 V AC	NO	1	550-34199-3	
Control circuit board S4 SSV6+8	230 V AC	YES	1	550-34199-4	
Control circuit board S4	12 / 24 V DC	NO	1	550-34199-5	

## 14.14 Proximity switch replacement kit

Table 37

### Proximity switch replacement kit

Designation	Pcs.	Item number	Figure
Proximity switch with accessories QLS	1	550-36980-1	Not shown
Consisting of: Proximity switch, threaded gasket, nuts (3x), housing gasket			



# 15 Appendix

## 15.1 Cable colors in accordance with IEC 60757

Table 38

### 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.

## 15.2 Component abbreviations

Table 39

### Components

Abbreviation	Meaning	Abbreviation	Meaning
X1	Plug connector for port A1	LL	Low-level signal
X2	Plug connector for port A2	LLV	Low-level signal with pre-warning
X6	Plug connector for low-level signal connection	PCB	Control circuit board
X9	Plug connector for connection of external SSV metering device	mP	Microprocessor
CS	Cycle switch	mKP	Display
L	RFI suppression choke	MC	Machine contact
FE	Ferrite core	IS	Driver switch / ignition
PE	protective (earth) conductor	M	Motor
F1			
F2	External fuse		

Table 40

### Key to terminal diagram

GND	Ground (terminal 31)	15	Ignition/driver switch (terminal 15)
PE	Protective ground/neutral conductor	LLC	Low-level signal
+24 V	Power supply (terminal 30)	NC	Normally closed contact
DK (Z)	Additional lubrication/additional lubrication cycle	NO	Normally open contact
SLZ	Fault/good signal	M	Motor
CS+	Cycle switch +	X1.1	Bayonet connector (on the pump)
CS-	Cycle switch -	X1.2	Bayonet socket (external connection cable)

### NOTE

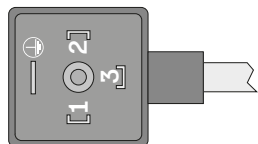
If there is more than one terminal diagram in this manual, you can tell which pump variant a diagram is for by looking at the details of the type identification code specified on each terminal diagram. You can find the type identification code in the manual in the Technical Data chapter.

## 15.3 Wire assignment of the connector plugs

Table 41

### Wire assignment of connection A1 / X1

Rectangular connector  
EN 175301-803 / EN 175301-803

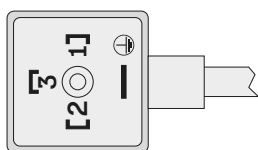


Pin 1	Pin 2	Pin 3	PE
Y RD	Y BN	Y BK	Y GN / YE

Table 42

### Wire assignment of connection A2 / X2

Rectangular connector  
EN 175301-803 / EN 175301-803

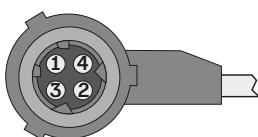


Pin 1	Pin 2	Pin 3	PE
Y RD	Y BN	Y BK	Y GN / YE

Table 43

### Wire assignment of connection A1 / X1

Bayonet connector ISO 15170-1



Pin 1	Pin 2	Pin 3	Pin 4
Y BK	Y BN	Y WH	Y YE

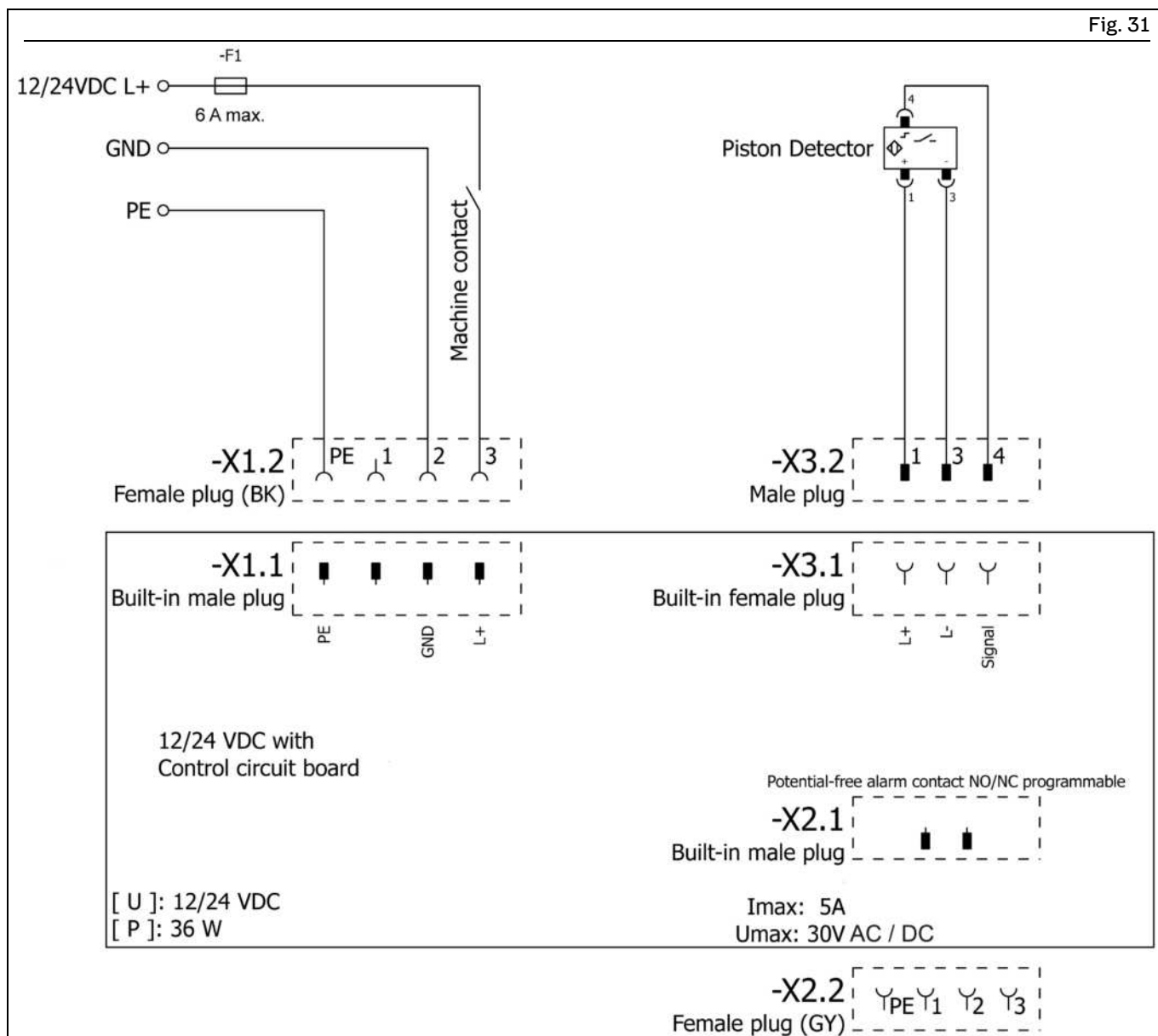
## 15.4 Circuit diagrams

### NOTE

For the meaning of each detail of the type identification code, see the type identification code in this manual. The actual type identification code details of your pump can be found on the type plate on the pump.

### 15.4.1 Circuit diagram 12/24 V DC, with rectangular connector and control circuit board S4

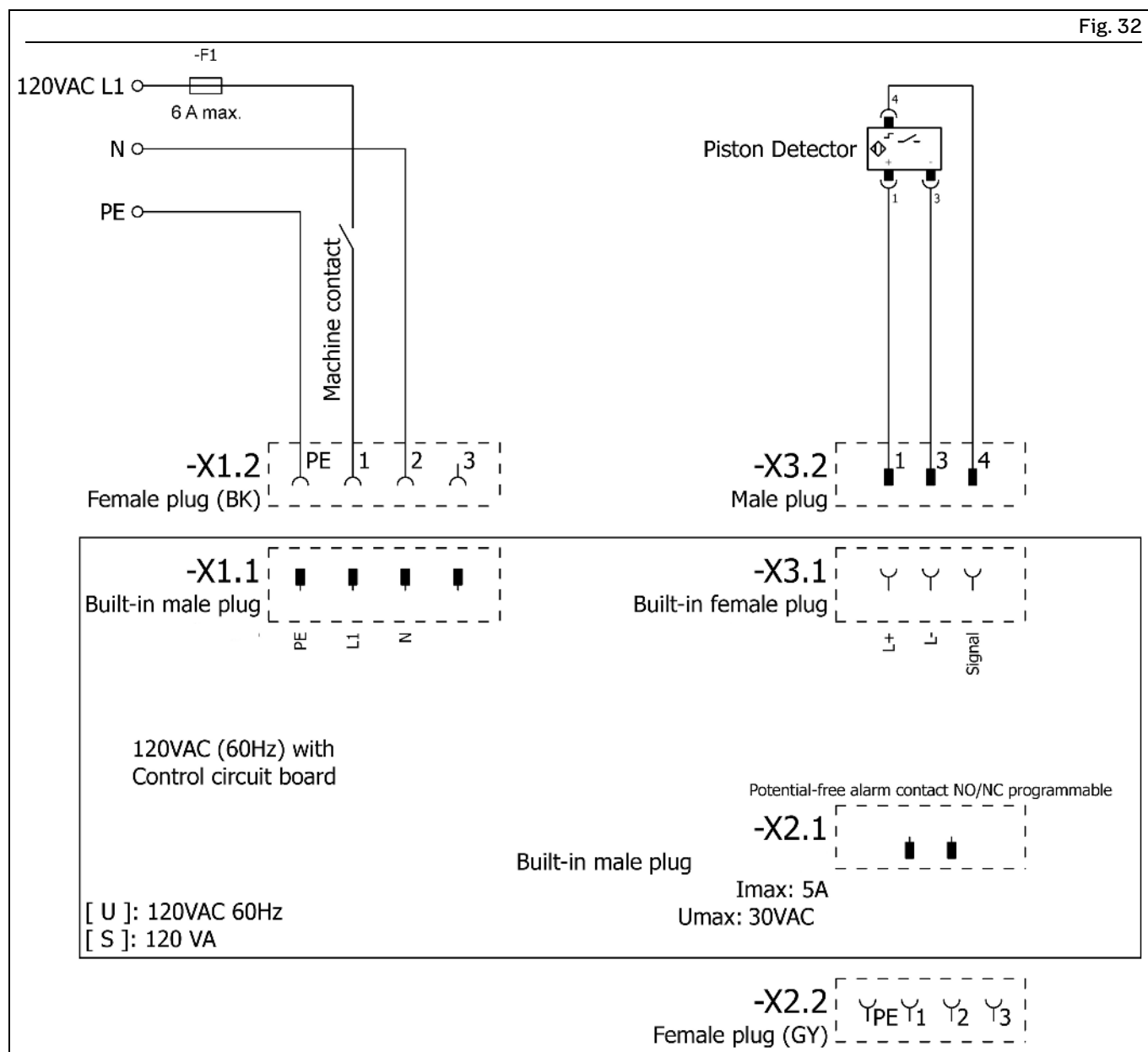
Valid for pumps with type identification codes that include  
PXXX-X-X-2/4-X-X-1-X-4



Circuit diagram 12/24 V DC, with rectangular connector and control circuit board S4

## 15.4.2 Circuit diagram 120 V AC, with rectangular connector and control circuit board S4

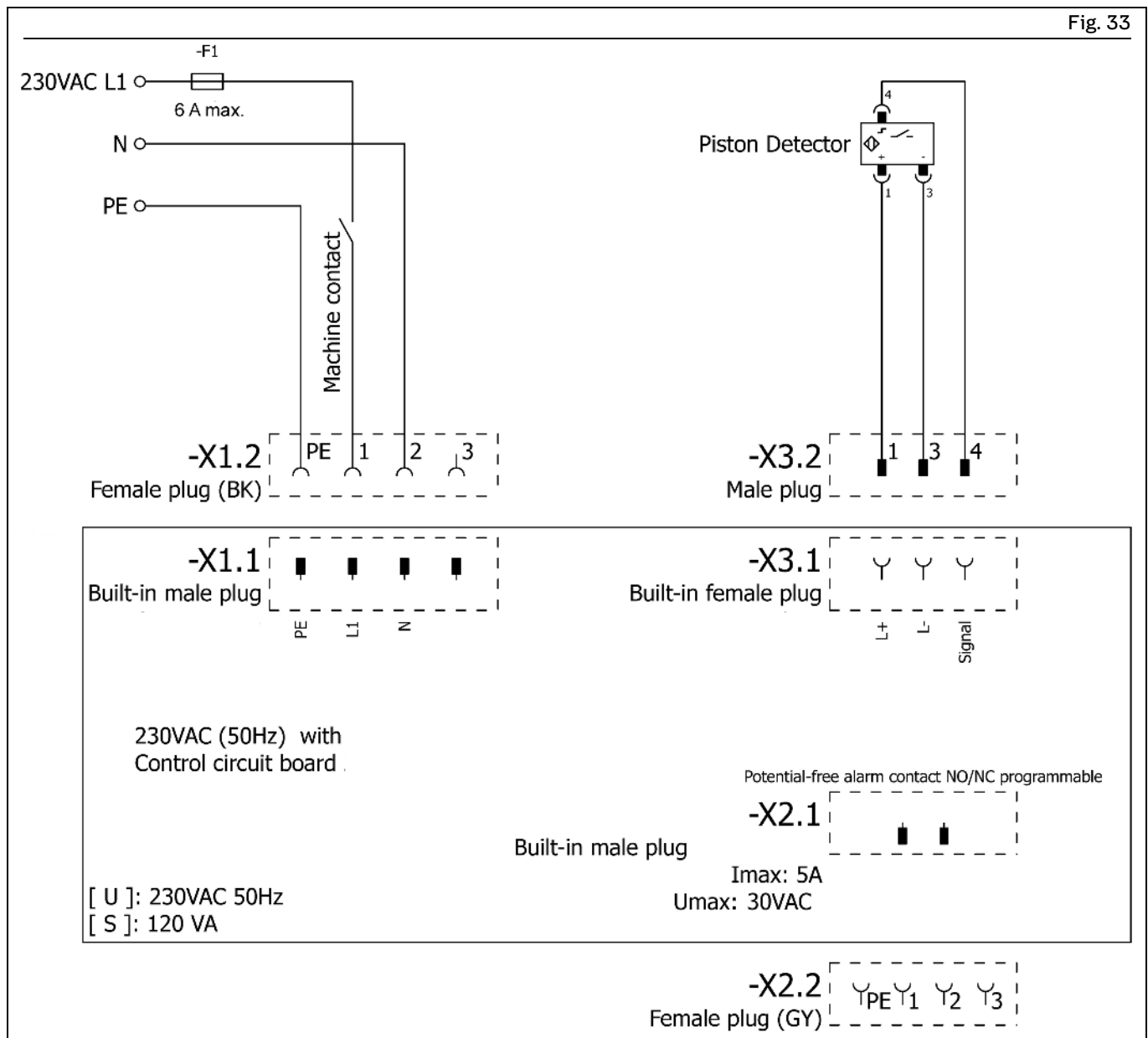
Valid for pumps with type identification codes that include  
PXXX-X-X-6-X-X-1-X-4



Circuit diagram 120 V AC, with rectangular connector and control circuit board S4

### 15.4.3 Circuit diagram 230 V AC, with rectangular connector and control circuit board S4

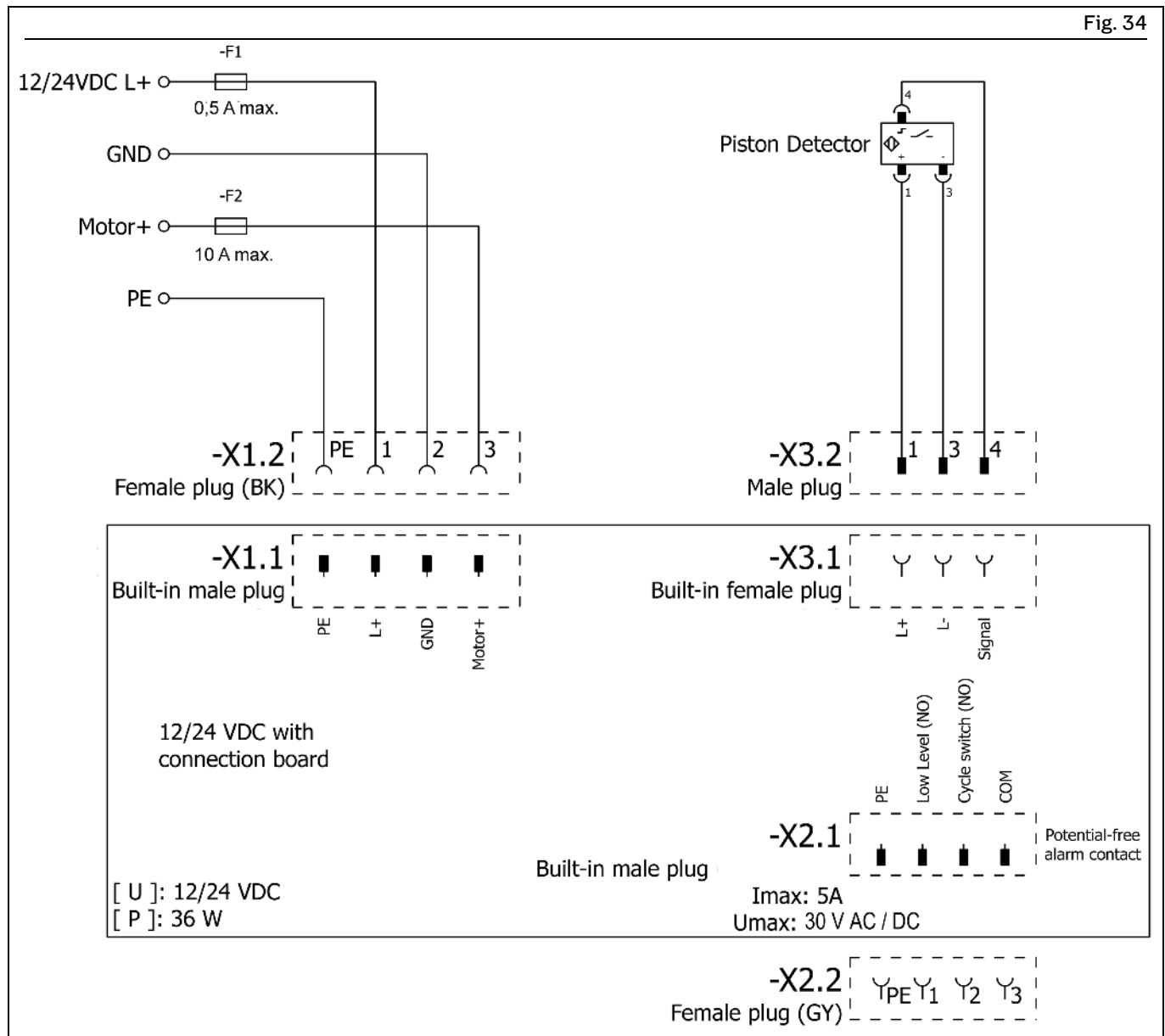
Valid for pumps with type identification codes that include  
PXXX-X-X-8-1-X-4



Circuit diagram 230 V AC, with rectangular connector and control circuit board S4

### 15.4.4 Circuit diagram 12/24 V DC, with rectangular connector with terminal board

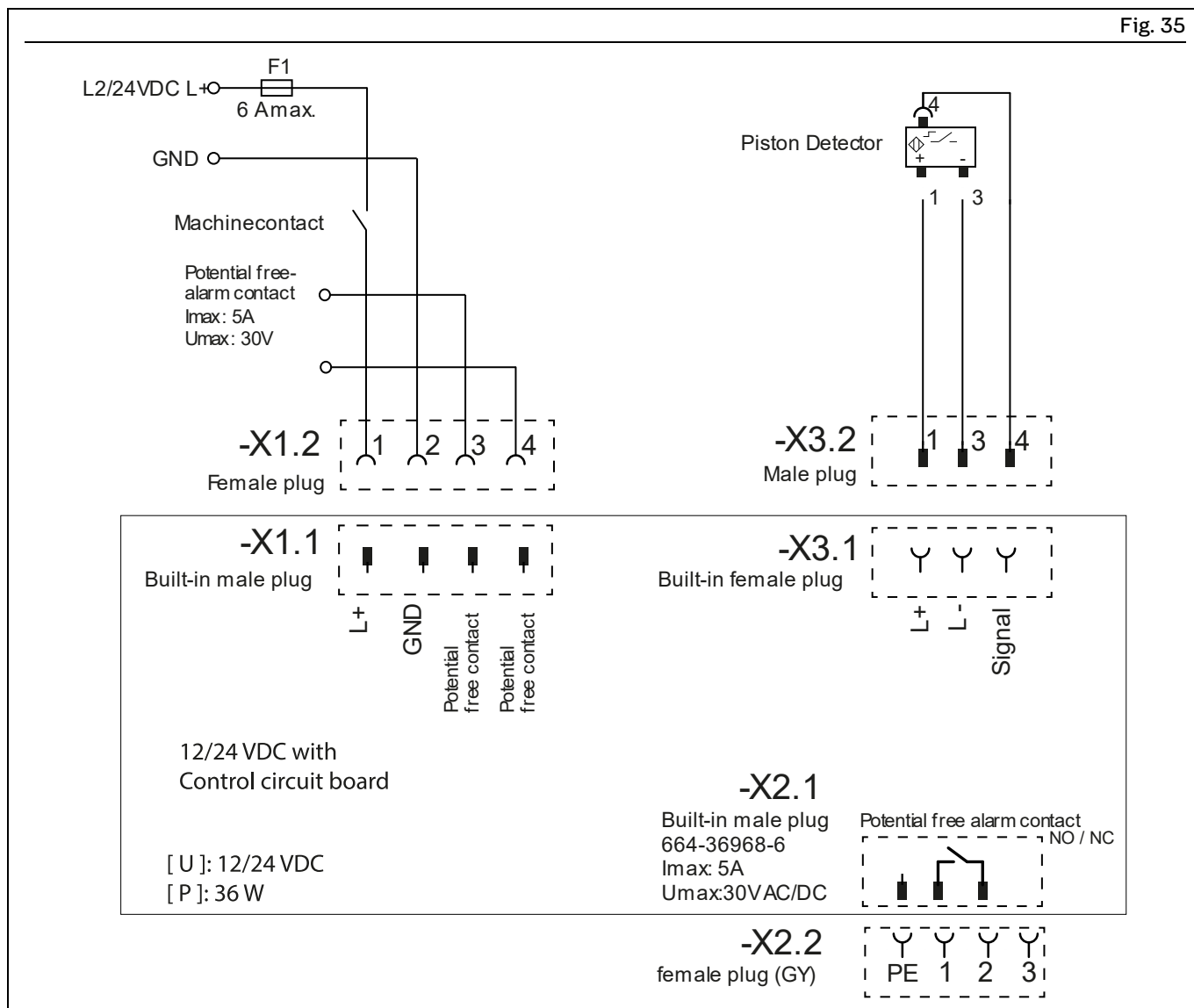
Valid for pumps with type identification codes that include  
PXXX-X-X-2/4-X-X-1-X-0



Circuit diagram 12/24 V DC, with rectangular connector with control circuit board

## 15.4.5 Circuit diagram 12/24 V DC, with bayonet connector and control circuit board S4

Valid for pumps with type identification codes that include  
PXXX-X-X-2/4-X-X-5-X-4

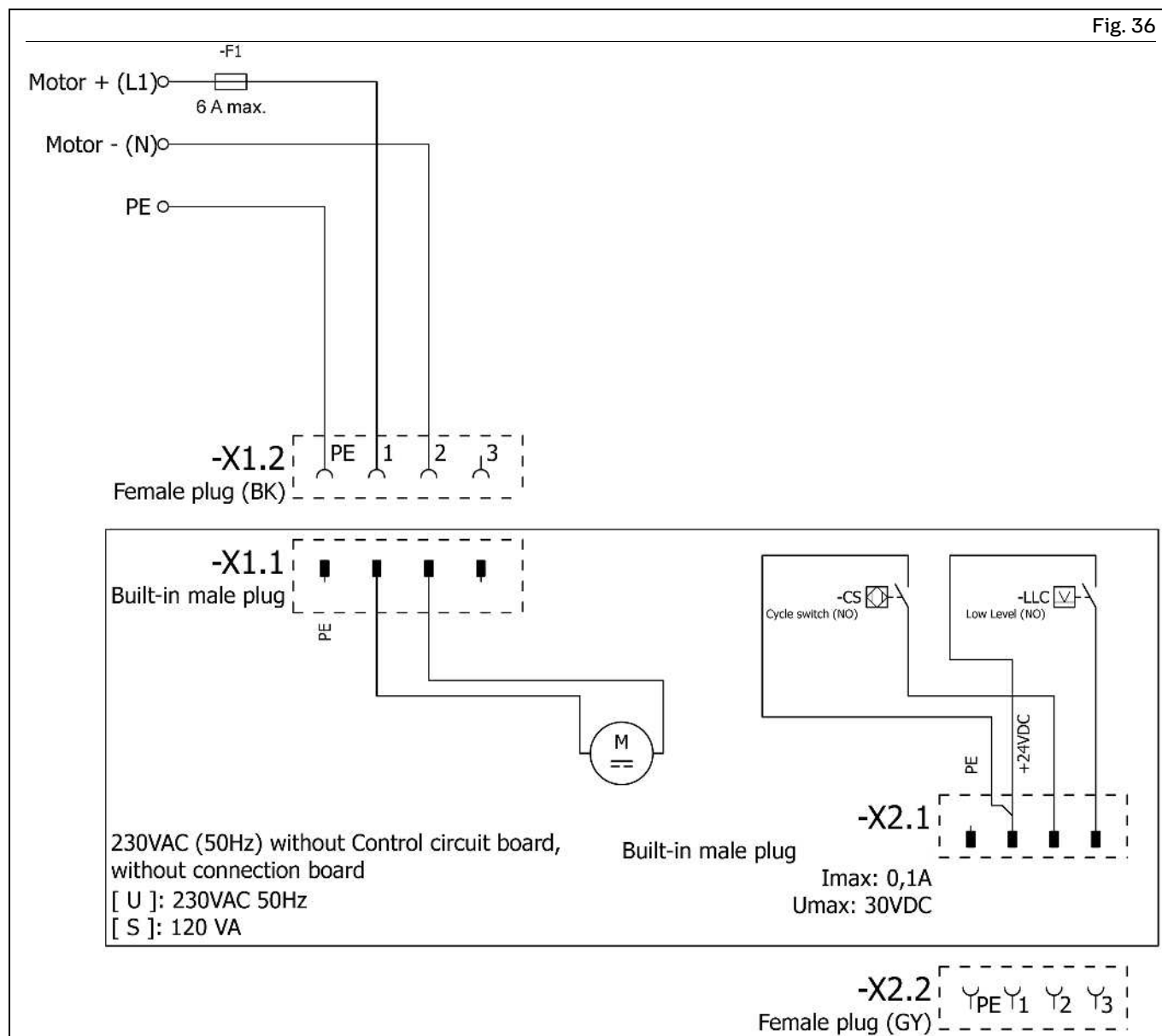


Circuit diagram 12/24 V DC, with bayonet connector and control circuit board S4

## 15.4.6 Circuit diagram 230 V AC, with rectangular connector and cycle switch, without control circuit board

Valid for type identification codes

PXXX-X-X-8-X-X-1-X-0



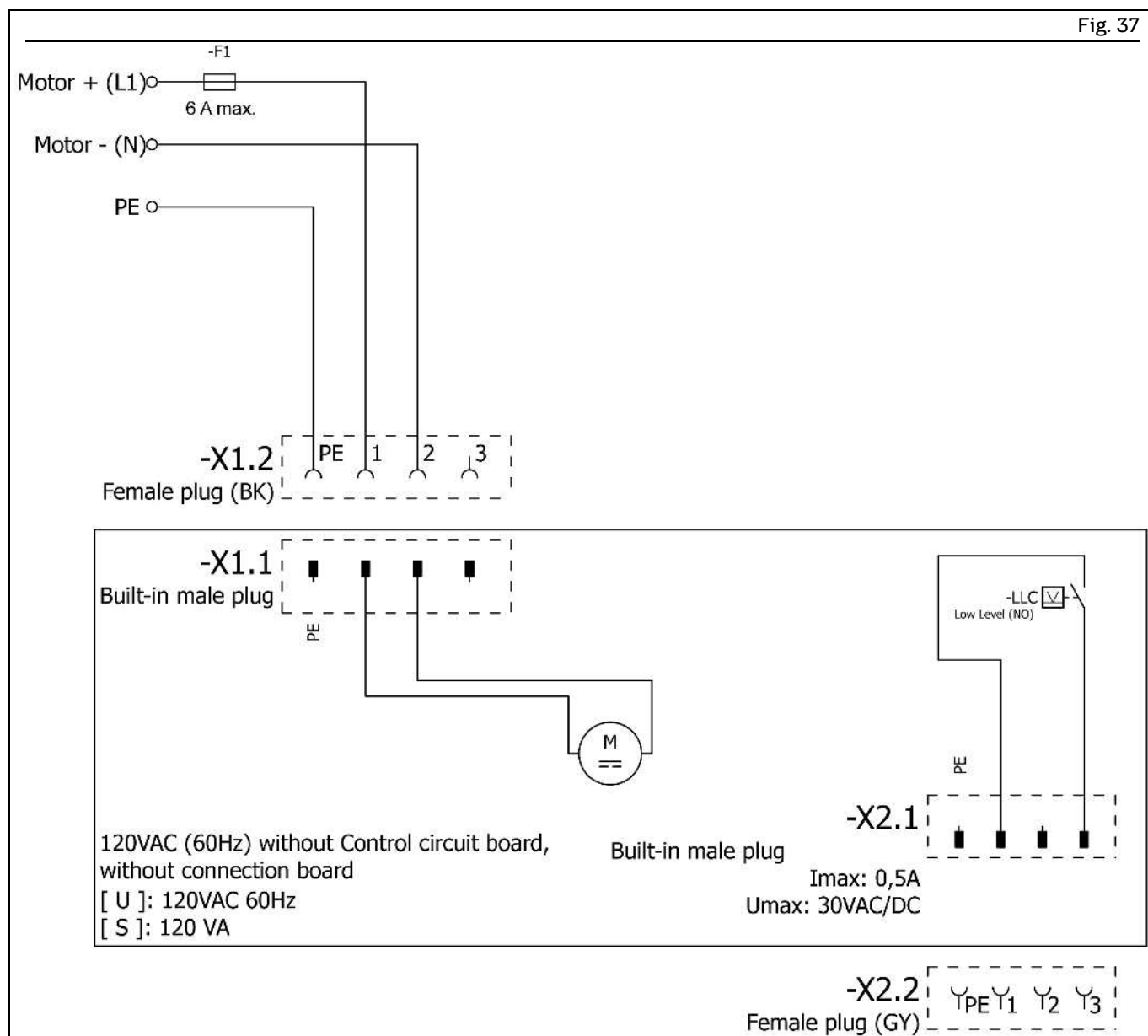
Circuit diagram 230 V AC, with rectangular connector and cycle switch, without control circuit board



## 15.4.7 Circuit diagram 120 V AC, with rectangular connector without control circuit board

Valid for type identification codes

PXXX-X-X-6-X-X-1-X-0



Circuit diagram 120 V AC, with rectangular connector without control circuit board

15.5 China RoHS Table

Table 44					
部件名称 (Part Name)	有毒害物质或元素 (Hazardous substances)				
	铅	汞	镉	六价铬	多溴联苯
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0
部件名称 (Part Name)	多溴二苯醚	邻苯二甲酸二丁酯	邻苯二甲酸丁苄酯	邻苯二甲酸二(2-乙基己基)酯	邻苯二甲酸二异丁酯
	Polybrominated diphenyl ethers (PBDE)	Dibutyl phthalate (DBP)	Benzyl butyl phthalate (BBP)	Bis (2-ethylhexyl) phthalate (DEHP)	Diisobutyl phthalate (DIBP)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	0	0	0	0	0
本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)					
0:	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)				
X:	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)				

[illegible]

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