

Piston pump P502



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Version 14

2020/07/23



EC Declaration of incorporation acc. to machinery directive 2006/42/EC

The manufacturer, SKF Lubrication Systems Germany GmbH, Walldorf Facilities, Heinrich-Hertz-Str. 2-8, DE - 69190 Walldorf, hereby declares that the partly completed machinery

Designation: Pump to supply lubricant within a centralized lubrication system

Types: P502

Part number: 658-XXXX-X

Year of construction: See type identification plate

complies with the following basic safety and health requirements of the EC machinery directive 2006/42/EC at the time when first being launched in the market.

1.1.2 · 1.1.3 · 1.3.2 · 1.3.4 · 1.5.1 · 1.5.6 · 1.5.8 · 1.5.9 · 1.6.1 · 1.7.1 · 1.7.3 · 1.7.4

The special technical documents were prepared following Annex VII part B of this directive. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The person empowered to assemble the technical documentation on behalf of the manufacturer is the head of standardization, See manufacturer's address.

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

2011/65/EU

RoHS II

2014/30/EU

Electromagnetic compatibility | Industry

2006/28/EC

Electromagnetic compatibility | Automotive

| Standard | Edition | Standard | Edition | Standard | Edition | Standard | Edition |
|------------------|---------|------------------|---------|------------------|---------|------------------|---------|
| DIN EN ISO 12100 | 2011 | DIN EN 60947-5-1 | 2010 | DIN EN 61000-6-2 | 2006 | DIN EN 61000-6-4 | 2011 |
| DIN EN ISO 809 | 2012 | DIN EN 61131-2 | 2008 | Amendment | 2011 | DIN EN 60947-5-1 | 2010 |
| DIN EN 60204-1 | 2007 | Amendment | 2009 | DIN EN 61000-6-3 | 2011 | | |
| Amendment | 2010 | DIN EN 60034-1 | 2011 | Amendment | 2012 | | |
| DIN EN ISO 50581 | 2013 | DIN EN 61000-6-1 | 2007 | | | | |

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of machinery directive 2006/42/EC and any other applicable directives.

Walldorf, April 20, 2016

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Legal notice

The instructions following machinery directive 2006/42/EC are part of the described product and must be kept at an accessible location for further use.

Warranty

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

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Explanation of symbols and signs

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions. Please read these instructions thoroughly and heed the warning and safety notes.

Please observe the warning and safety notes and exercise particular caution in these cases. Inform also other users accordingly.

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

| Symbol | Meaning |
|---|---|
| ● | Prompts an action |
| ○ | Used for itemizing |
|  | Refers to other facts, causes, or consequences |
| → | Provides additional information within procedures |

| Symbols | |
|---|---|
| Symbol | Meaning |
|  | General warning |
|  | Electrical component hazard, electrical shock hazard |
|  | Slipping hazard |
|  | Hazard from hot surfaces |
|  | Hazard from unintentional intake |
|  | Crushing hazard |
|  | Pressure injection hazard |
|  | Wear personal protective equipment (goggles) |
|  | Note |
|  | Environmentally sound disposal recycling |
|  | Environmentally sound disposal of waste electrical and electronic equipment |

Abbreviations and conversion factors

Abbreviations

| | |
|----------|----------------------|
| re. | regarding |
| approx. | approx. |
| °C | degrees Celsius |
| cu.in | cubic inch |
| dB (A) | sound pressure level |
| i.e. | that is |
| etc. | et cetera |
| poss. | possibly |
| °F | degrees Fahrenheit |
| fl.ou | fluid ounce |
| fpsec | feet per second |
| gal. | gallon |
| if appl. | if applicable |
| hp | horse power |
| a.a.r. | as a rule |
| in. | inch |
| incl. | including |
| K | Kelvin |
| kg | kilogram |
| kp | kilopond |
| kW | kilowatt |
| l | litre |
| lb. | pound |
| max. | maximum |
| min. | minimum |
| min. | minute |
| ml | millilitre |
| ml/d | millilitre per day |
| mm | millimetre |
| N | Newton |
| Nm | Newtonmeter |

| | |
|--------|------------------------|
| oz. | Ounce |
| psi | pounds per square inch |
| rh | relative humidity |
| s | second |
| sq.in. | square inch |
| etc. | et cetera |
| e.g. | for example |
| > | greater than |
| < | less than |
| ± | plus or minus |
| ∅ | diameter |
| mph | miles per hour |
| rpm | revolutions per minute |

Conversion factors

| | |
|--------------|---|
| Length | 1 mm = 0.03937 in. |
| Area | 1 cm ² = 0.155 sq.in |
| Volume | 1 ml = 0.0352 fl.oz. |
| | 1 l = 2.11416 pints (US) |
| Mass | 1 kg = 2.205 lbs |
| | 1 g = 0.03527 oz. |
| Density | 1 kg/cc = 8.3454 lb./gal(US) |
| | 1 kg/cc = 0.03613 lb./cu.in. |
| Force | 1 N = 0.10197 kp |
| Speed | 1 m/s = 3.28084 fpsec. |
| | 1 m/s = 2.23694 mph |
| Acceleration | 1 m/s ² = 3.28084 ft./s ² |
| Pressure | 1 bar = 14.5 psi |
| Temperature | °C = (°F-32) x 5/9 |
| Output | 1 kW = 1.34109 hp |

1. Safety instructions

1.1 General safety instructions

The owner must ensure that safety information has been read by any persons entrusted with works on the product or by those persons who supervise or instruct the before-mentioned group of persons. In addition, the owner must also ensure that the relevant personnel are fully familiar with and have understood the contents of the Instructions.

The instructions must be kept at hand together with the product for future reference. The Instructions are part of the product and must accompany the product when selling it. The described products were manufactured according to the state of the art.

Risks may, however, arise from its usage and may result in harm to persons or damage to material assets.

Any malfunctions which may affect safety must be remedied immediately. In addition to these Instructions, general statutory regulations and other regulations for accident prevention and environmental protection must be observed.

1.2 General behaviour when handling the product

- The product may be used only in awareness of the potential dangers, in proper technical condition, and according to the information in these instructions.
 - Technical personnel must familiarize themselves with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
 - Any unclear points regarding proper condition or correct assembly/ operation must be clarified. Operation is prohibited until issues have been clarified.
 - Unauthorized persons must be kept away.
 - Precautionary operational measures and instructions for the respective work must be observed.
 - Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- During operation, safety-related protective and emergency devices must not be removed, modified or affected otherwise in their function and are 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.
 - Wear personal protective equipment always.
 - When handling lubricants, adhere to the respective safety data sheets.

1.3 Qualified technical personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in this document. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid any potential hazards. The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364. Relevant country-specific definitions of qualified technical personnel apply for coun-



tries outside the scope of DIN VDE 0105 or IEC 364.

The core principles of these country-specific qualification requirements for technical personnel cannot be below those of the two standards mentioned above.

The operator of the final product is responsible for assigning tasks and areas of responsibility and for the responsibility and monitoring of the personnel. These areas must be precisely specified by the operator. The personnel must be trained and instructed if they do not possess the required knowledge.



Product training can also be performed by SKF in exchange for costs incurred.

1.4 Electric current hazard

| | | |
|---|--|----------------|
|  |  | CAUTION |
| | <p>Electric shock Working on products not disconnected from the power supply may cause personal injury and damage to property. Assembly, maintenance, and repair works may be performed by qualified and authorized personnel only on products previously disconnected from the power supply.</p> | |

Electrical connection may be carried out only by a qualified electrician authorized by the operator under consideration of the local connection conditions and legal prescriptions (e.g. VDE/ IEC).

1.5 System pressure hazard

| | | |
|---|--|----------------|
|  |  | WARNING |
| | <p>System pressure The product is pressurized during operation. It must be de-pressurized before starting assembly, maintenance, or repair works.</p> | |

1.6 Prohibition of certain activities

The following activities may be carried out by authorized SKF employees only.

- Replacement of or changes on the pistons of the pump elements

For pumps with control printed circuit board:

- Changes on the control printed circuit board exceeding adjustment of the lubrication and pause times or the replacement in case of defects.

1.7 Operation

The following must be observed during commissioning and operation.

- All information within this manual and the information within the referenced documents.
- All laws and regulations that the operator must observe.

1.8 Emergency stopping of the pump

In case of an emergency stop the pump by:

- actuating the emergency stop switch of the superior machine.
- switching off the machine or vehicle, in which the pump has been integrated.
- disconnecting the pump from the power supply.

1.9 Assembly, maintenance, malfunctions, shutdown, disposal

- All relevant persons (e.g. operating personnel, supervisors) must be informed of the activity prior to starting any work. Precautionary operational measures and work instructions must be observed.
- Ensure through suitable measures that moving/ detached parts are immobilized during the work and that no body parts can be caught in between by unintended movements.
- Assemble the product only outside of the operating range of moving parts, at an adequate distance from sources of heat or cold.
- Prior to performing work, the product and the machine or system in which the product is or will be integrated must be depressurized and secured against unauthorized activation.
- Carry out works on electrical components with voltage isolated tools only.
- Ensure proper grounding of the product.
- Drill required holes only on non-critical, non-load bearing parts.
- Other units of the superior machine must not be damaged or impaired in their function by the installation of the product.
- No parts of the centralized lubrication system may be subjected to torsion, shear, or bending.
- Use adequate lifting devices when working with heavy components.
- Avoid mixing up or wrong assembly of disassembled parts.
Mark parts properly.

1.10 Intended use

Supply of lubricants within a centralized lubrication system in intermittent operation following the specifications made in these Instructions:

- to establish a progressive system
- as a multi-line pump for direct supply to individual lubrication points.

1.11 Foreseeable misuse

Any usage of the product differing from the aforementioned conditions and stated purpose is strictly prohibited. Particularly prohibited are:

- Use in an explosive atmosphere
- Use without the integrated pressure reducing valve
- Use in continuous operation
- Painting the pump. Remove or tape pump completely before painting the superior machine
- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EC 1272/2008).

- to feed, forward, or store gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at the maximum permissible operating temperature.
- Use to feed, forward, or store glycol- or polyglycol based oils and greases. These may damage the reservoir.

1.12 Disclaimer of liability

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

- inappropriate usage
- wrong or improper assembly, operation, adjustment, programming, or maintenance
- improper or late response to malfunctions
- unauthorized modification of system components
- the installation of non-original SKF components or spare parts

1.13 Referenced documents

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

- Operational instructions and approval rules
- Safety data sheet (MSDS) of the lubricant or material used

If applicable

- Instructions of suppliers of purchased parts, project planning documents and other relevant documents.

The operator must supplement these documents with applicable national regulations for the country of use. When selling or forwarding the product, make sure to attach these Instructions to it.

1.14 Residual risks

| Residual risks | Remedy |
|--|---|
| Life cycle transport, assembly, start-up, operation, malfunction, troubleshooting, repair, maintenance, shutdown, disposal | |
| Dropping of lifted parts or tools | <ul style="list-style-type: none"> No people may remain under suspended loads. Keep unauthorized persons away. Secure suspended loads using suitable hoisting equipment (e.g. tapes, belts, ropes, etc.). |
| Falling of parts through insufficient fixing to the machine | <ul style="list-style-type: none"> Fix parts only to machine parts with sufficient load capacity. Observe the weight. Observe the stated tightening torques. If no tightening torques are stated, the tightening torques are to be applied to the screw size for 8.8 screws. Literature, see screw manufacturer. |
| Electrical shock due to defective connection cable | <ul style="list-style-type: none"> Check connection cable for damages. |
| People slipping due to floor contamination with spilled or leaked lubricant | <ul style="list-style-type: none"> Exercise caution when disconnecting or connecting the product's hydraulic connections Promptly apply suitable binding agents to remove the leaked or spilled lubricant Follow the operational instructions for handling lubricants and contaminated parts |
| Tearing or damaging of lines when installed on moving machine parts | <ul style="list-style-type: none"> If possible, do not install on moving parts. If this cannot be avoided, use flexible hose lines |
| Ripping out/ damage to lines due to assembly at chafing points or assembly with too little bending radius | <ul style="list-style-type: none"> Use protective pipes or spring coils |
| Lubricant spraying out due to faulty component fitting or line connection | <ul style="list-style-type: none"> Use hydraulic fittings and lines suitable for the indicated pressures. These must be checked for proper connection and damage prior to commissioning |
| Bursting reservoir if filled by a high-performance pump | <ul style="list-style-type: none"> Monitor the filling procedure and stop it when reaching the max marking of the reservoir |

| Residual risks | Remedy |
|--|---|
| Life cycle transport, assembly, start-up, operation, malfunction, troubleshooting, repair, maintenance, shutdown, disposal | |
| Contact with stirring paddle during "test operation" without reservoir after repair. | <ul style="list-style-type: none"> ○ Operate pump with reservoir always |
| Reservoirs with follower plate are subjected to spring load | <ul style="list-style-type: none"> ○ Remove reservoir only when spring is quite released, i.e. the reservoir is empty. If necessary, empty the reservoir first. Provide adequate protective measures - e.g. fastening straps - when loosening the reservoir. Do not work with your head directly above the reservoir |
| Contamination of the environment with lubricant and wetted parts | <ul style="list-style-type: none"> ○ Dispose of the parts following the relevant legal/ operational regulations |
| Strong heating of the motor due to a blockade | <ul style="list-style-type: none"> ○ Switch pump off, let parts cool down, eliminate cause. |
| Damage of the control pcb due to electrostatic discharge when replacing a defective control pcb | <ul style="list-style-type: none"> ○ Avoid electrostatic charge. Use ESD tools and ESD protective clothes, wear a grounding bracelet |
| Loss of electrical protective functions due to faulty installation of the control pcb | <ul style="list-style-type: none"> ○ After the installation carry out a safety check following DIN EN 60204-1 (conduct and scope of test, see chapter 9.6) |

2. Lubricants

2.1 General information

NOTICE

All products may be used only for their intended purpose and in accordance with the Instructions.

Intended use is the use of the products to lubricate bearings and friction points with lubricants within the physical limits that can be found in the relevant product documentation, e.g. operating instructions and product descriptions, e.g. technical drawings and catalogues.

Particular attention is called to the fact that hazardous materials of any kind, especially those materials classified as hazardous by CLP Regulation EC 1272/2008 annex I, part 2-5 may be filled into SKF centralized lubrication systems and components and delivered and/ or distributed with such systems and components only after consulting with and obtaining written approval from SKF.

All products manufactured by SKF are not admitted for use in combination with gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at the maximum permissible operating temperature.

Other material which is neither lubricant nor hazardous substance may be fed only after consultation with and written approval by SKF.

SKF considers lubricants to be an element of system design that must always be factored when selecting components and designing a centralized lubrication system. The lubricating properties of the lubricants are critically important when making these selections.

2.2 Selection of lubricants

NOTICE

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

The amount of lubricant required at the lube point is specified by the bearing or machine manufacturer. It must be ensured that the required lubricant volume is provided to the lubrication point. Otherwise the lubrication point may not receive adequate lubrication, which can lead to damage and failure of the bearing.

Selection of a lubricant suitable for the lubrication task is made by the machine or system manufacturer and/or the operator of the machine or system in cooperation with the lubricant supplier.

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

2.3 Approved lubricants

NOTICE

If required SKF can help customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

Please contact SKF if you have further questions regarding lubricants. It is possible for lubricants to be tested in the company's laboratory for their suitability for being pumped in centralized lubrication systems (e.g. "bleeding"). You can request an overview of the lubricant tests offered by SKF from the company's service department.

NOTICE

Only lubricants approved for the product may be used. Unsuitable lubricants can lead to failure of the product and to property damage.

NOTICE

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

The product described here can be operated using lubricants that meet the specifications in the technical data. Depending on the product design, these lubricants may be fluid greases or greases.

Mineral, synthetic, and/or rapidly biodegradable oils and base oils can be used. Consistency agents and additives may be added depending on the operating conditions.

Note that in rare cases there may be lubricants whose properties are within permissible limit values but whose other characteristics render them unsuitable for use in centralized lubrication systems. For example, synthetic lubricants may be incompatible with elastomers.



2.4 Lubricants and the environment

| NOTICE |
|---|
| Lubricants may pollute ground and waters. Lubricants have to be handled and disposed of properly. Observe the instructions by the machine manufacturer regarding the lubricants to be used. |

It is important to note that lubricants are environmentally hazardous, flammable substances that require special precautionary measures during transport, storage, and processing. Consult the safety data sheet from the lubricant manufacturer for information regarding transport, storage, processing, and environmental hazards of the lubricant that will be used.

The safety data sheet of a lubricant may be requested from the lubricant manufacturer.

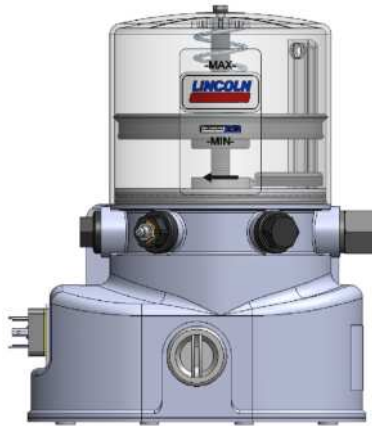
2.5 Lubricant hazard

| ! WARNING | |
|---|---|
|   | <p>Risk of slipping and injury Leaking lubricant is hazardous due to the risk of slipping and injury. Seal leaks without delay and remove spilled or leaked lubricant.</p> |

3. Overview, functional description

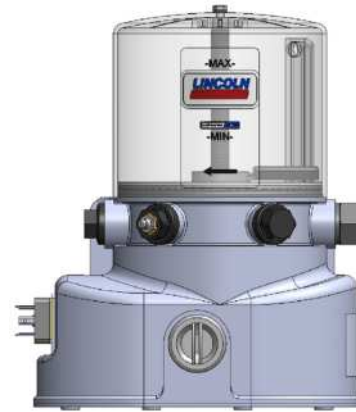
3.1 Described versions

P502 with follower plate Fig. 1



- with follower plate and low level signal (1XLF)
- with and without controller
- 12 / 24 V DC

P502 without follower plate Fig. 2



- without follower plate and without low level signal (1XN)
- with and without controller
- 12 / 24 V DC

1 Reservoir

The lubricant is stored in the reservoir. Depending on the pump version there are three different types of reservoirs.
 XN 1 L for lubricating grease
 XLF 1 L with follower plate and low level signal for lubricating grease.

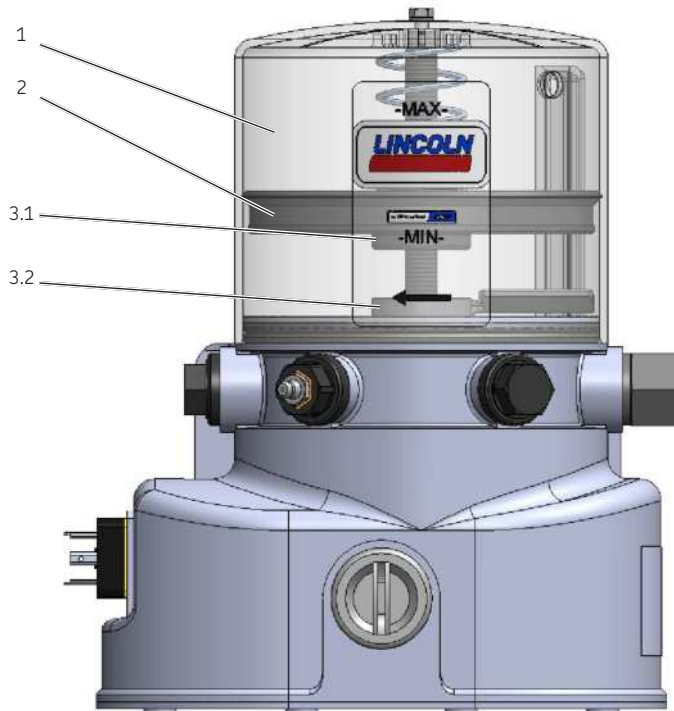
2 follower plate (in case of models with follower plate)

The spring-loaded follower plate pushes the lubricant down into the pump elements. This improves the suction behaviour of the pump. Pumps with follower plate can be used also in rotating applications (e.g. wind turbine generators).

3.1 /3.2 Magnet and magnetic switch for low level signal

The low level signal is enabled without contact by means of a magnet (3.1 in the follower plate and a magnetic switch (3.2) in the pump housing. As soon as the MIN reservoir filling level is reached, a low level signal is triggered.

Overview P502 with follower plate Fig. 3



4 Cap screw

When using the pump with one pump element only make sure to close the connection port for the second pump element with a closure screw.

5 Filler fitting (R1/4)

The filler fitting serves to fill the reservoir with lubricant.

6 Pump housing

Comprises the motor and, depending on the pump version, different control pcbs and different connecting options (square or bayonet plug or M 12 plug).

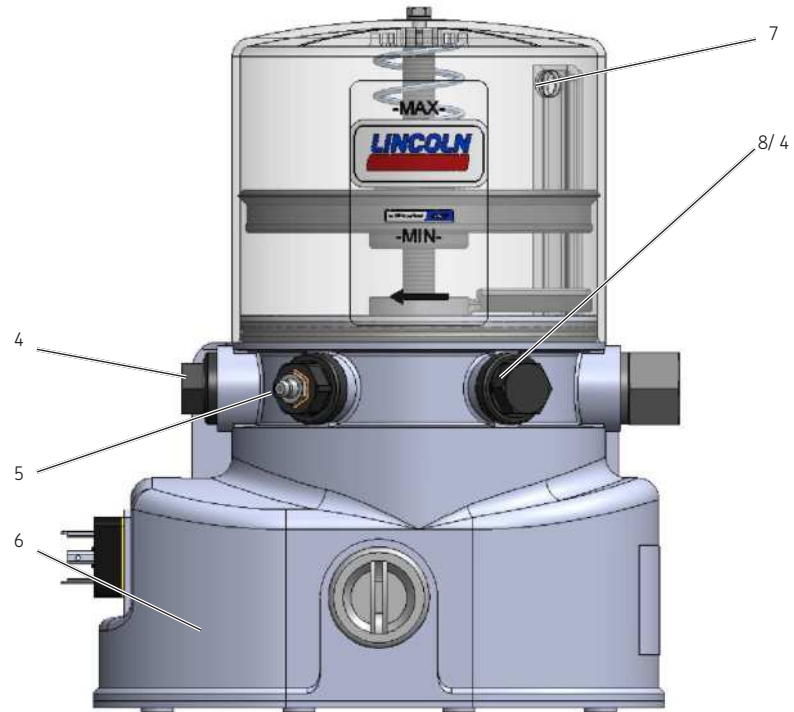
7 Reservoir venting device

Is used to vent the reservoir when filling it with lubricant or to vent the reservoir during operation.

8 Return-line connection

Is used to connect a return line or to fill the reservoir via a manual pump with corresponding adaptor. When delivering the pump the return-line connection is closed with a closure screw (4).

Overview P502 with follower plate Fig. 4



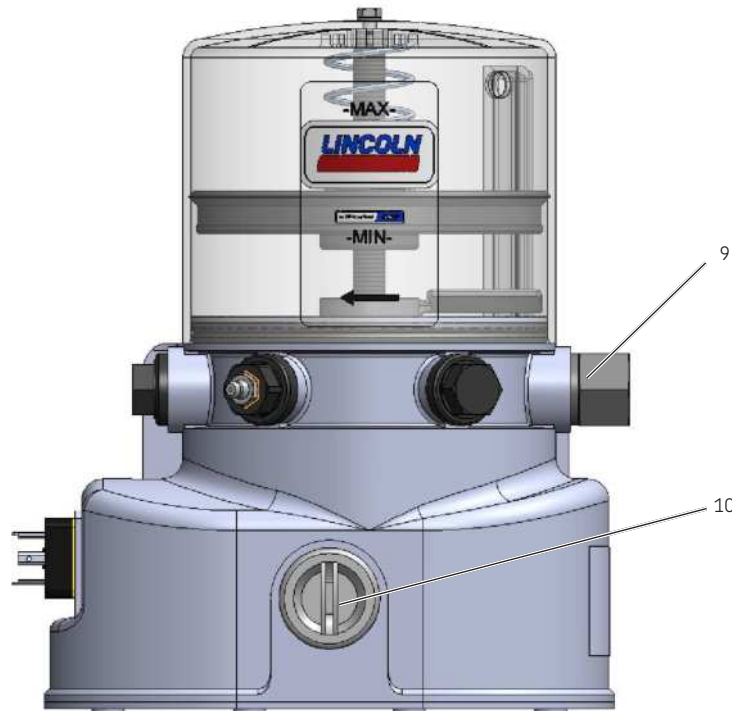
9 pump element

There can be mounted a maximum of 2 pump elements. The pump elements are actuated by the motor via an eccentric shaft. The pump elements generate the operating pressure and supply the lubricant out of the reservoir to the connected lubrication feed lines. Each pump element has to be secured by a pressure reducing valve following the maximum operating pressure.

10 Cover plate of control printed circuit board

The transparent cover plate of pumps with control unit allows to see the operating and error states (LED displays on the control pcb). Remove the cover plate (10) from the control pcb to trigger an additional lubrication cycle or to adjust lubrication and pause times.

Overview P502 with follower plate Fig. 5



11 Control PCB

All control pcbs are equipped with an EEPROM. Thus the pcb's data are protected against loss. As soon as the pump is switched off, after switching the pump on again the pause time respectively the lubrication time will continue from where it had been interrupted.

28/29 Electrical connections

The electrical connections on the left respectively on the right side of the pump housing have been provided for connection to the external power supply (28) and to external control or output devices (29) (e.g. PLC, signal lamp).

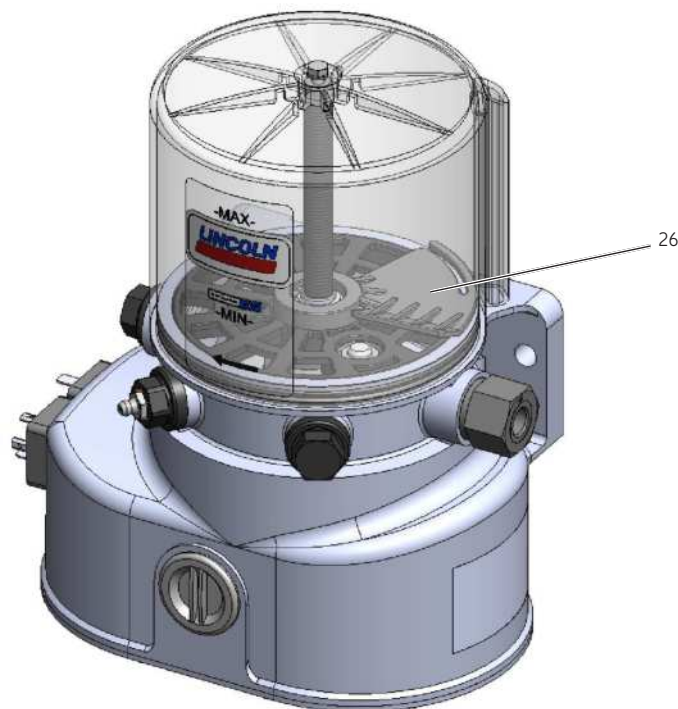
Overview P502 Fig. 6



26 Stirring paddle

The stirring paddle homogenizes and planes the lubricant. Transportability of the lubricant is improved and bleeding is reduced.

Overview P502 Fig. 7



4. Technical data

4.1 General technical data

| | |
|--|---|
| Admissible operating temperature | -25 °C to 70 °C |
| Operating pressure | 270 bar max. |
| Reservoir size | 1 litre |
| Filling of reservoir | via hydraulic lubrication fitting (optionally via cartridge with fitting or filling connection) |
| Lubricants | Lubricating greases NLGI II and NLGI III ¹⁾ / fluid greases NLGI 00, 000 |
| Connections | 2 x pump element with connection for feed line G 1/4" 1 x filling connection for cartridge M 22x1.5 1 x filling connection with hydraulic lubrication fitting R 1/4 |
| Feed lines | Plastic/ steel tube Ø 6 mm or Ø 8 mm |
| Installation position (pump without follower plate) | Reservoir on top. Deviation ± 5° max. |
| Installation position (pump without follower plate) | any ²⁾ |
| sound pressure level | < 70 dB (A) |
| Weight (empty) | approx. 4 kg |
| Speed | 9 ± 1 rpm ⁻¹ |
| ¹⁾ NLGI III lubricants can be supplied under certain application conditions only. These application conditions have to be clarified with SKF in advance. ²⁾ also rotating installation, like e.g. in wind turbine generators. Maximum speed and maximum distance to the hub on request. | |

4.2 Electrics

| | | |
|-------------------------------------|---|--------------|
| Supply voltage | 12 V DC | 24 V DC |
| Current consumption | max. 6.5 A | 3 A max. |
| Tolerance of input voltage | -20 / + 30 % | -20 / + 30 % |
| Inputs | protected against reverse polarity, short circuit proof, non-isolated | |
| IP type of protection | Square plug | IP 6K9K |
| | Bayonet plug | IP 65 |
| | M12 plug | IP 67 |
| Internal fusing | none | |
| External fusing (provided by owner) | 6 A (T) | 3 A (T) |
| Types of protection | SELV, PELV, FELV | |

4.3 Output volumes



Deviating operating conditions or deviated pump configuration result in a changed motor speed in the frame of the tolerances indicated in chapter 4.1. This influences the actual output per minute. If as a consequence the output needs to be adapted, this will be done by adapting the lubrication and pause time settings of the pump.

The stated outputs refer to NLGI II lubricating greases at an operating temperature of + 20 °C and a backpressure of 100 bar.

| Output quantities per pump element | per stroke | Factors influencing the output quantity (motor speed) | | | | |
|------------------------------------|------------|---|-----------|---|-----------|---|
| Pump element K5 | 0.12 cc | Operating temperature | > + 20 °C | ↑ | < + 20 °C | ↓ |
| Pump element K6 | 0.18 cc | Consistency class of lubricant | > NLGI II | ↓ | < NLGI II | ↑ |
| Pump element K7 | 0.24 cc | Back pressure | < 100 bar | ↑ | > 100 bar | ↓ |
| Pump element B7 | 0.10 cc | Number of pump elements | > 1 piece | ↓ | | |
| Pump element C7 | 0.24 cc | | | | | |

4.4 Factory settings of the lubrication and pause times of pumps with control pcb

Lubrication and pause times

Lubrication time 6 min The red rotary switch on the control pcb is in position 3

Pause time 6 hrs The blue rotary switch on the control pcb is in position 6



Low level signal

After a low level signal the run time is 4 min max. When the time has lapsed, the control unit stops the pump until the low level signal turns off due to filling of the reservoir.

4.5 Specified settings of the lubrication and pause times of pumps with control pcb

Lubrication and pause times



The following values are to be met by the external control unit to avoid damages to the pump.

Lubrication time 8 sec min. 30 min max.

Pause time 4 sec min.



Low level

The owner has to ensure that the pump is stopped by the external control unit latest 4 min after the low level signal.

4.6 Possible settings of the lubrication and pause times of pumps with control pcb

| | | | | | | | | | | | | | | | |
|---|---|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| Position of the rotary switch (blue) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Pause time in minutes ³⁾ | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 |
| Position of the rotary switch (blue) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Pause time in hours ³⁾ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Position of the rotary switch (red) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Lubrication time in seconds ³⁾ | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 |
| Position of the rotary switch (red) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Lubrication time in minutes ³⁾ | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |

³⁾ Time values for pause and lubrication times are factory-set via the jumpers on the control pcb (see chapter 6.11.3). The positions of the jumpers must not be changed by the owner.



Reference to the "0" position of the rotary switches

Never turn the rotary switches in the "0" position. This position is intended exclusively for the owner's purposes. In the "0" position the pump operates with the factory settings (see chapter 4.3) and fault F2 (see chapter 10.1) is indicated by the control pcb's LEDs.

4.7 Tightening torques

Adhere to the following tightening torques when installing or repairing the pump.

| | | |
|--|-----|----|
| Pump with base plate, machine, or vehicle | 18 | Nm |
| Pump element with pump housing | 20 | Nm |
| Counter nut at the adjustable pump element | 12 | Nm |
| Pressure control valve in the pump element | 8 | Nm |
| Lubrication fitting/ adaptor for lubrication fitting | 10 | Nm |
| Closure screw on housing cover | 0.8 | Nm |
| Reservoir on Reservoir axis | 2+1 | Nm |

4.8 Lubricant requirement for priming of an empty pump

To prime an empty pump up to the MAX marking of the reservoir, the following lubricant quantities are required.

| 1 XLF with follower plate and low level indication | 1 XN without follower plate and without low level indication |
|---|--|
| approx. 1.25 litres | approx. 1.4 litres |

The deviation between the lubricant quantity actually required for priming and the nominal volume of the reservoir results from the filling of the pump housing up to the MIN marking of the reservoir.

4.10 Notes related to the type identification plate

The type identification plate states important characteristics such as type designation, order number, etc.

To ensure that the loss of data due to an illegible type identification plate is avoided, the characteristics should be entered in the instructions.

P. No. _____

S. No. _____

Model _____

4.11 Notes related to the CE marking

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

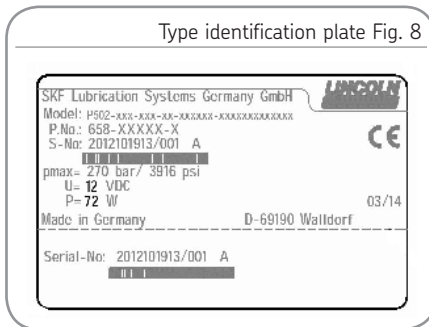
- 2014/30/EU Electromagnetic compatibility
- 2011/65/EU (RoHS II) Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Reference on Low Voltage Directive 2014/35/EU

The protective regulations of Low Voltage Directive 2014/35/EU are fulfilled according to annex I (1.5.1) of Machinery Directive 2006/42/EC.

Reference on Pressure Equipment Directive 2014/68/EU

Because of its performance data the product does not achieve the limit values defined in Article 4 (1) (a) (i) and is therefore excluded from the scope of application of Pressure Equipment Directive 2014/68/EU following Article 4 (3).



4.12 Type identification code

Type identification code

P502 - 1XN - 2K6 - 12 - 2A - 6 - 14 - V10

| | |
|--|--|
| <p>Basic type of pump P502</p> <p>Reservoir versions (plastic) 1XN 1L for grease (without follower plate, without low level indication) 1XLF 1L for grease (with follower plate and with low level indication)</p> <p>Pump elements ... Without pump elements [X]K5 Piston diameter = 5 mm [X]K6 Piston diameter = 6 mm [X]K7 Piston diameter = 7 mm [X]B7 Piston diameter = 7 mm [X] Number of pump elements (max. 2)</p> <p>Supply voltage 12 12 V DC 24 24 V DC</p> <p>Electrical connections on pump 1A 1 connection Left side for supply voltage, low level indication and illuminated pushbutton 2A 2 connections Left side for supply voltage Right side for low level indication and illuminated pushbutton</p> | <p>Control pcb's (without control pcb) (supply voltage, terminals 15+31) V10 - V13 (supply voltage, terminals 15+30+31) V20 - V23</p> <p>Pump connections to external devices Square plug with closure cap 00 Square plug with connection socket 01 Square plug with connection socket and 10 m cable 10 Bayonet socket with 10 m cable (4/4 wire) 14 Bayonet socket with 10 m cable (7/5 wire) 15 Bayonet socket with 10 m cable (7/6 wire) 16</p> <p>Type of connection Square plug 1 M12 plug 2 Bayonet plug ISO 15170-1, 4/4-pole 5 Bayonet plug ISO 15170-1, 7/5-pole 6 Bayonet plug ISO 15170-1, 7/6-pole 7</p> |
|--|--|

5. Delivery, returns, and storage

5.1 Delivery

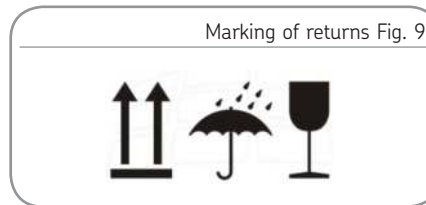
The products are packaged following the standard commercial practice according to the regulations of the recipient's country. During transport safe handling must be ensured.

After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. Keep the packaging material until any discrepancies are resolved.

5.2 Returns

Clean all parts and pack them properly before returning them. Protect the product against mechanical influences such as impacts. There are no restrictions for land, sea or air transport. Mark returns on the packaging as follows.

5.3 Storage



SKF products are subject to the following storage conditions:

- dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: 24 months max.
- Permissible humidity: < 65% (rh)

Storage temperature:

min. - 25 °C/ max. + 70 °C

- avoid direct sun or UV exposure
- shield product from nearby sources of heat and coldness.

General notes related to storage

- The product(s) can be wrapped in plastic film to provide low-dust storage.
- Protection against ground moisture by storing on a shelf or wooden pallet.

6. Installation

6.1 General information

Only qualified technical personnel may install, operate, maintain, and repair the products described in these Instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product, into which the described product shall be integrated.

Such persons are familiar with the relevant standards, rules, accident prevention regulations, and operating conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid any potential hazards.

Before assembling the product, the packaging material as well as possible transport locking devices must be removed.

Keep the packaging material until any discrepancies are resolved.



NOTE

Technical data (see chapter 4).

6.2 Attachment

Protect the product against humidity and vibration and install it in an easily accessible position to ensure all other installations can be carried out without any problem. For indications on the maximum admissible ambient temperature see the technical data. During assembly and particularly during any drilling work always pay attention to the following:

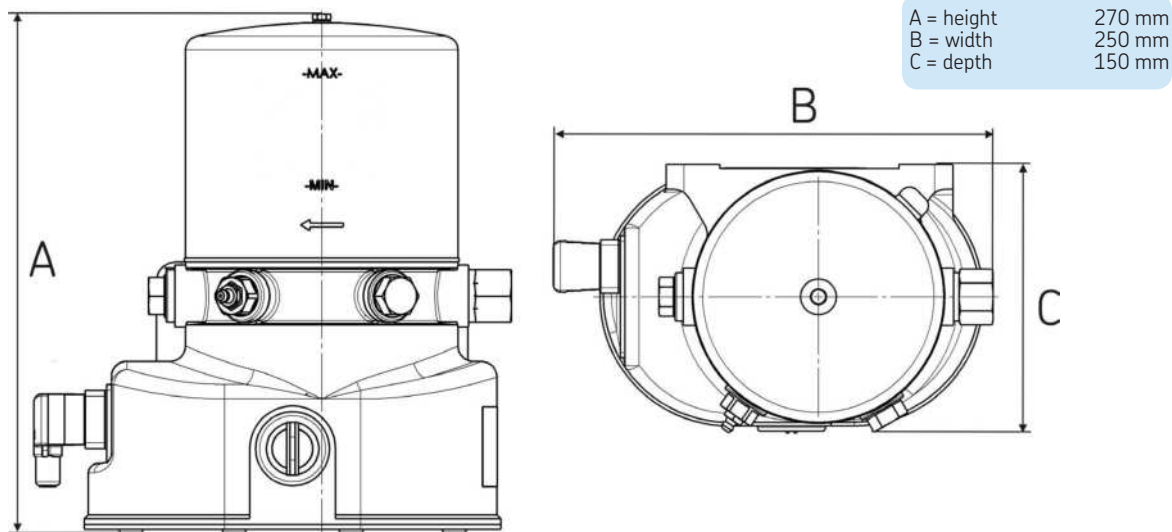
- Other units must not be damaged by the assembly.
- The product must not be installed within the range of moving parts.
- The product must be installed at an adequate distance from sources of heat and coldness.
- Adhere to safety distances and legal prescriptions on assembly and prevention of accidents.

| | |
|---|---|
|  |  CAUTION |
| | <p>Electric shock Make sure to disconnect the product from the power supply before carrying out works on any part of it. Connection of the pump must be provided by a safe galvanic isolation (PELV) always.</p> |

6.3 Minimum assembly dimensions

Ensure sufficient space for maintenance work or for a possible disassembly of the product by leaving a free space of at least 50 mm into each direction in addition to the stated dimensions.

Minimum assembly dimensions Fig. 10



6.4 Connecting dimensions

The pump is fastened on the two mounting bores (27). Fastening is done by means of the fastening material included in the scope of delivery.

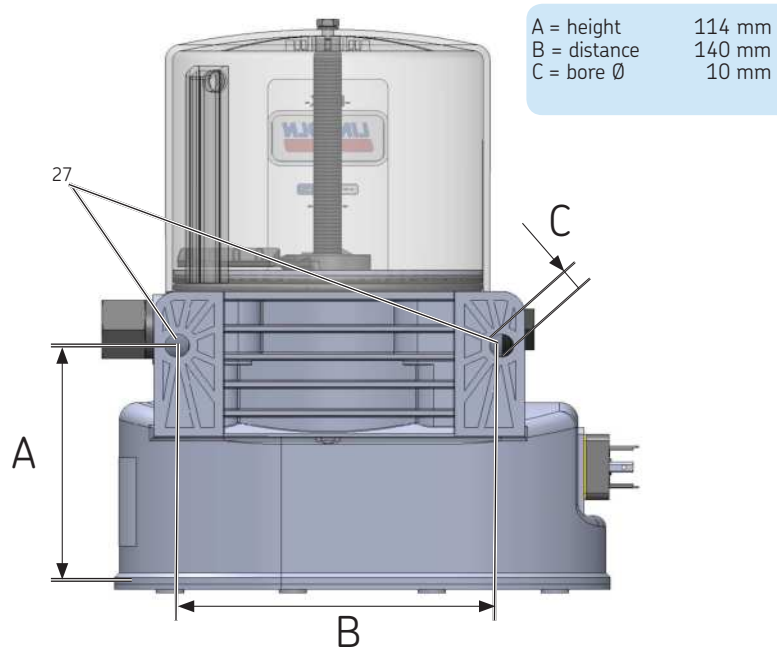
2 x M8 screw

2 x M8 nut (self-locking)

2 x washer

Tightening torque = 18 Nm

Connecting dimensions Fig. 11



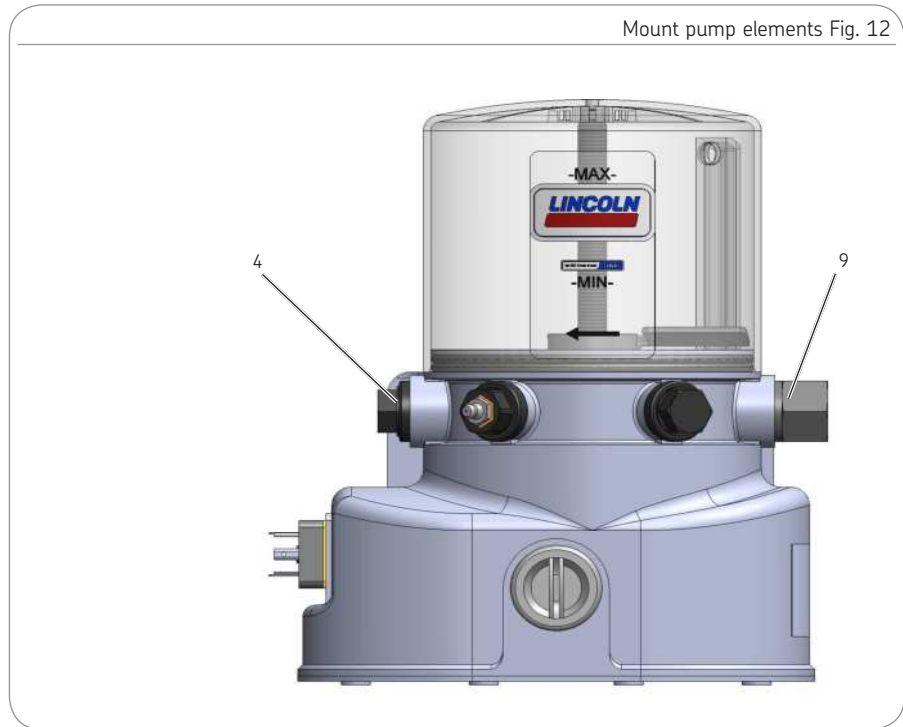
6.5 Installing the pump elements

- Remove closure screw (4).
- Screw in pump element (9) with new sealing ring.

Tightening torque = 20 Nm

- Repeat procedure for each pump element.

Mount pump elements Fig. 12

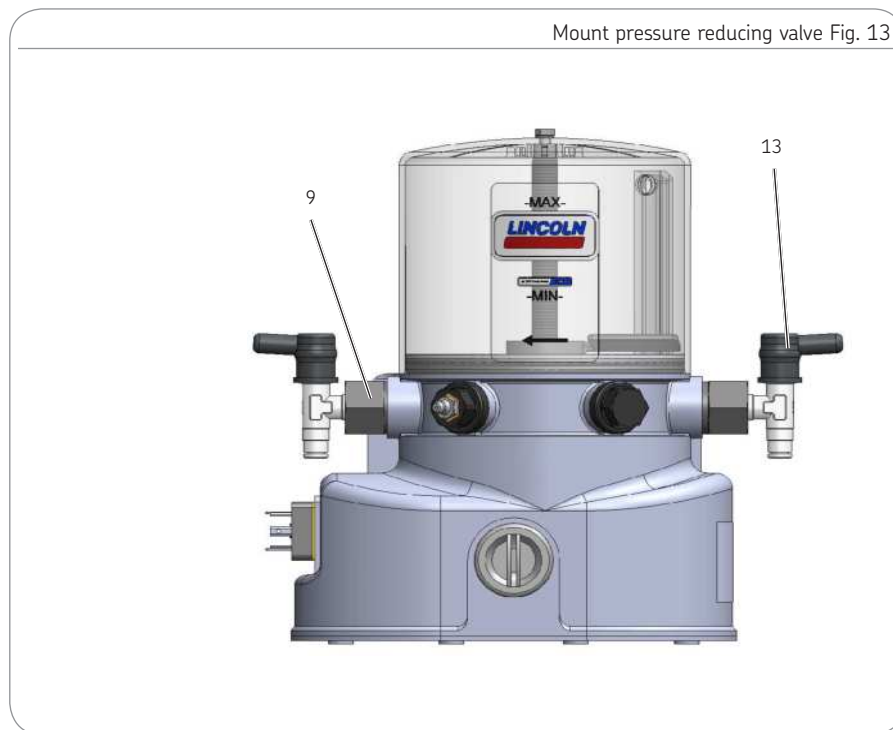


6.6 Installing the pressure reducing valves

- Choose pressure reducing valve (13) in accordance with the max. operating pressure.
- Remove blind plug from pump element (9).
- Screw pressure reducing valve (13) into pump element (9).

Tightening torque = 8 Nm

- Repeat procedure for each pump element.



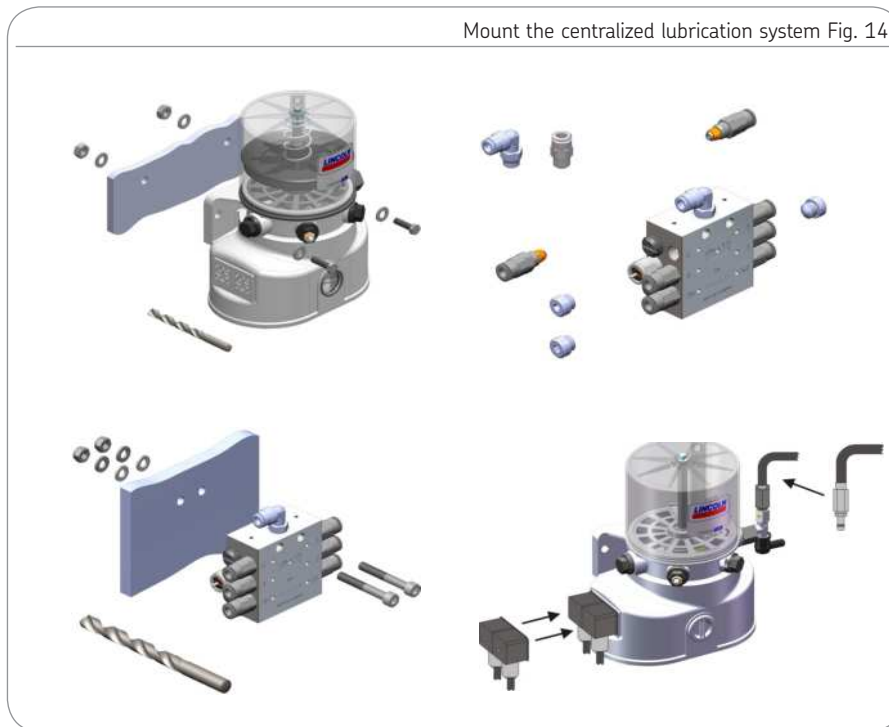
6.7 Installing the centralized lubrication system

- Fasten the pump. Observe connecting dimensions (see chapter 6.4).

Tightening torque = 18 Nm

- Make up the divider.
- Fasten the divider.
- Make up the lines and attach them to the pump and, if applicable, to the superior machine.

Mount the centralized lubrication system Fig. 14



6.8 Electrical connection

Electrical connections must be done in such way that no forces are transferred to the product (tension-free connection). For electrical connection proceed as follows:

Square plug

- Use adequate cable to configure square plug without cable. For connection of the cable, see wiring diagram on square plug or corresponding wiring diagram in these Instructions (see chapter 12).
- Remove protective caps from the electrical connections of the pump.
- Place plugs with sealing onto connections and fasten it with the screw of the square plug.

Bayonet plug

- Use adequate cable to configure bayonet plug without cable. For connection see corresponding wiring diagram in these Instructions (see chapter 12).
- Remove protective caps from the electrical connections of the pump.
- Place plugs onto connections and fasten them by turning them.

M12 plug

- Use adequate cable to configure M12 plug without cable. For connection see corresponding wiring diagram in these Instructions (see chapter 12).
- Remove protective caps from the electrical connections of the pump.
- Place M12 plugs onto connections and fasten them by turning them.

NOTE

Electrical characteristics
see chapter 4, Technical data.

6.9 Priming without follower plate

The pump is supplied with partial filling ex works. If specified by the customer the pump can also be supplied without priming. In this case it has to be primed according to the following instructions.

NOTICE

Damage to the pump

Make sure that no dirt enters the reservoir during the filling procedure.

Overfilling of the reservoir

Consider lubricant expansion by increased temperature (important, e.g. for storage or transport of the pump) or by pressure relief after the filling procedure (reservoir vent clogged by lubricant).

Filling via filler fitting

Place filling connection of the filler pump onto filler fitting R1/4 (5).

- Switch on filler pump and fill reservoir with lubricant until shortly below the MAX marking.
- Switch off filler pump and remove filling connection.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.

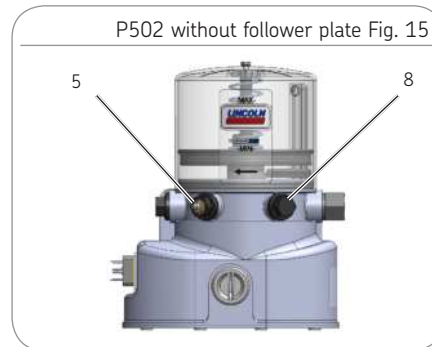
Filling via filling connection

- Unscrew closure screw from filling connection (8).
- Screw in cartridge.
- Fill reservoir with lubricant until shortly below the MAX marking.
- Remove cartridge and screw closure screw into the filling connection.

Tightening torque = 10 Nm

- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.

P502 without follower plate Fig. 15



6.10 Priming with follower plate

NOTICE

Avoid air pockets under the follower plate. These result in poor or lacking pump output.

Make sure that no dirt enters the reservoir during the filling procedure. Switch pump on only after having removed the cable straps.

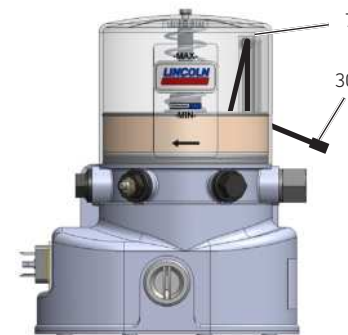
Consider lubricant expansion by increased temperature (important, e.g. for storage or transport of the pump) or by pressure relief after the filling procedure (reservoir vent clogged/ contamination of the transport packaging by lubricant).

Filling via filler fitting

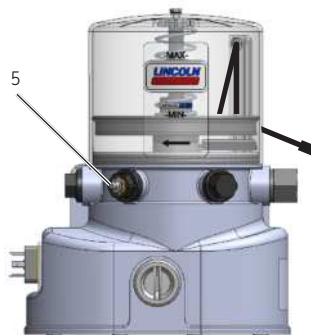
- Ensure that pump stands upright with the cable strap (30) fixed at the uppermost position.
- Place filling connection of the filler pump onto filler fitting R1/4 (5).

- Switch on filler pump and completely fill space below the follower plate with lubricant (see Fig. 17). The space is fully filled as soon as the follower plate starts lifting.
- Switch off filler pump.

Vented space under the follower plate Fig. 17



Empty pump with cable strap Fig. 16



Filled pump without cable strap Fig. 18



- Slowly pull cable strap (30) out of reservoir vent (7) to vent the space below the follower plate.
- Use filler pump to fill reservoir with lubricant until shortly below the MAX marking.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.

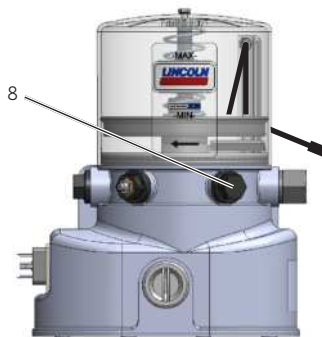
Filling via filling connection

- Ensure that pump stands upright with the cable strap (30) fixed at the uppermost position.
- Unscrew closure screw from filling connection (8).
- Screw in cartridge.
- Fill space below the follower plate with lubricant completely (see Fig. 20). The space is fully filled as soon as the follower plate starts lifting.

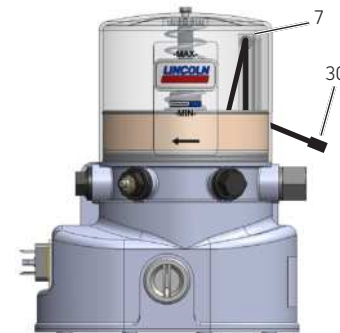
- Slowly pull cable strap (30) out of reservoir vent (7) to vent the space below the follower plate.
- Now fill reservoir with lubricant until shortly below the MAX marking.
- Remove cartridge and screw closure screw into the filling connection.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.

Tightening torque = 10 Nm

Empty pump with cable strap Fig. 19



Vented space under the follower plate Fig. 20



Filled pump without cable strap Fig. 21



6.11 Setting of lubrication and pause times

6.11.1 Pumps without control pcb

Setting or modification of the lubrication and pause times is effected via the external control unit to be provided by the owner. When doing so adhere to the values for the lubrication and pause times stated in chapter 4.5.

NOTICE

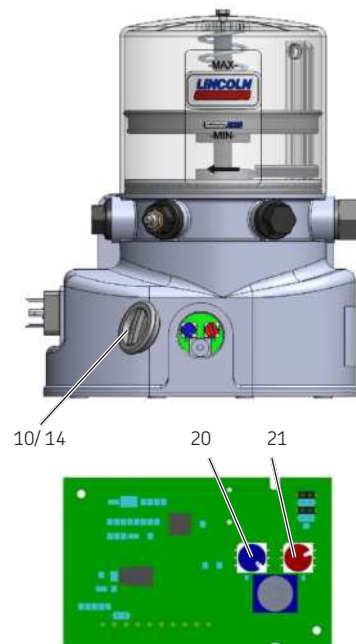
Damage to the pump

Adhere to the values for the admissible lubrication and pause times stated in chapter 4.4 for pumps without control unit.

6.11.2 Pumps with control pcb

- Setting or modification of the lubrication and pause times is effected via the internal control pcb.
- Setting of the parameters is done via the two rotary switches of the control pcb. (Values, see chapter 4.5).
- Remove closure cap (10) and sealing ring (14).
- Set the pause time by turning the left blue rotary switch (20).
- Set the lubrication time by turning the right red rotary switch (21). (Values, see chapter 4.5).
- Mount closure cap (10) and sealing ring (14).

Setting of lubrication and pause times Fig. 22



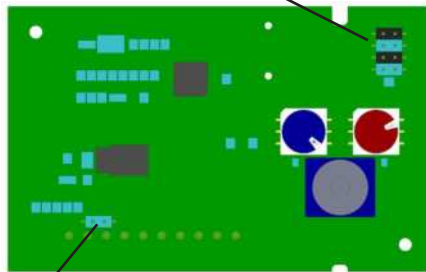
6.11.3 Jumper settings

NOTICE


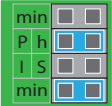
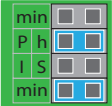

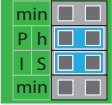
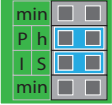

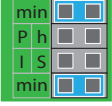
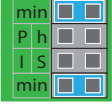




Damage to the pump

The positions of the jumpers on the control pcb should never be changed. Changed jumper positions cannot be easily recognized by other persons and may therefore result in wrong settings of the lubrication and pause times by means of the rotary switches of the control pcb.

Pause time and lubrication time



Terminal 15/30

| Jumper position on the control pcb | | | | | | |
|---|---|-------------|----------|------------------|----------|---|
| Jumper position for bridge Terminal 15/30 | Control PCB | Pause time | | Lubrication time | | Jumper position Pause and lubrication time |
| | | 4 - 60 min. | 1 / 15 h | 8-120 sec | 2-30 min | |
|  | V10 | | | | |  |
| not bridged | V20 | | X | | X |  |
|  | V11 | | | | |  |
| not bridged | V21 | | X | X | |  |
|  | V12 | | | | |  |
| not bridged | V22 | X | | | X |  |
|  | V13 | | | | |  |
| not bridged | V23 | X | | X | |  |
| |  = Jumper positioned | | | | | |

* If terminal 15 (machine contact/drive switch) is bridged with terminal 30 (+) and if voltage is present at terminal 30, then the pump can work without the superior machine/vehicle having to run. Without bridge the pump works only, if also the superior machine/vehicle runs.

7. Start-up

7.1 General information

Start-up of the fully and correctly mounted pump is effected via the machine contact or the driving switch.

The pump starts with a pause time. Therefore, after connecting the pump and setting the required lubrication and pause times, first of all, a lubrication cycle should be triggered to verify correct pump connection. In case of pumps without control unit a lubrication cycle is triggered by the PLC of the superior machine.

7.2 Inspections prior to initial start-up

To ensure optimal performance and safety, check certain parts of the centralized lubrication system at regular intervals. Report any detected deficiencies immediately to your superior and remedy them. Deficiencies may be remedied by an authorized and qualified specialist only. Check the following points prior to initial commissioning.

- No loose or missing parts.
- No damages, deformations, or cracks.
- No burnt and smoky points.
- No discolourations, contamination, and/or corrosion.
- Leakages of lubricant at connections and from lines.

7.3 Triggering and additional lubrication cycle

- Remove closure cap (10) and sealing ring (14).
- Press the pushbutton (12) on the control pcb (> 2 seconds) to trigger an additional lubrication.

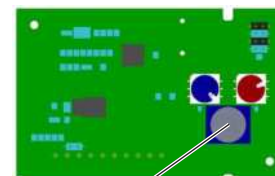
The pump starts a lubrication cycle. The duration of the lubrication cycle corresponds to the values adjusted on the control pcb (see chapter 4.5).

- Mount closure cap (10) and sealing ring (14) again.

Setting of lubrication and pause times Fig. 23



10/14



12

6

7

8. Operation, shutdown and disposal

8.1 General information

After correct electrical connection and filling with lubricant the pump is ready for operation. Start-up respectively shutdown is effected by switching the superior machine or vehicle on or off.

8.2 Filling the reservoir during operation

NOTICE

Damage to the pump

Make sure that no dirt enters the reservoir during the filling procedure. Do not overfill the reservoir. Consider lubricant expansion by increased temperature.

Filling via filler fitting

- Connect the filling adapter to the filler fitting (5) and fill reservoir with lubricant until shortly below MAX marking.

Filling via filler fitting

- Unscrew closure screw from filling connection (8).
- Screw in cartridge.
- Fill reservoir until shortly below the MAX marking.
- Remove cartridge and screw closure screw into the filling connection.

Tightening torque = 10 Nm

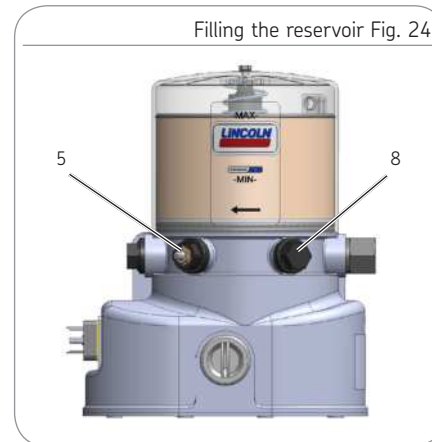
8.3 Temporary shutdown

Temporarily shut the system down by disconnecting it from the power supply.

8.4 Shutdown and disposal

In case of final shutdown follow the applicable rules and regulations on disposal. The product can also be returned to the manufacturer for proper disposal, in which case the customer is responsible for reimbursing the costs incurred.

Filling the reservoir Fig. 24



Disposal Fig. 25



9. Maintenance, cleaning and repair

9.1 General information

Liability is excluded for any damage or faults arising from inappropriate maintenance, repair or cleaning.

9.2 Cleaning

- Thorough cleaning of all outer surfaces. Do not use any aggressive or flammable cleaning agents. Interior cleaning is required only in case of accidental use of contaminated lubricant.

9.3 Maintenance

- The pump is mainly maintenance-free. However, pressure relief valves, check valves, and pump elements should be inspected at regular intervals and, if necessary, be replaced by new parts.

9.4 Replacement of pressure relief valves and pump elements

- Switch the pump off and disconnect it from the electrical grid.
- Remove the pressure relief valve (13). If necessary, loosen the feed lines first.
- Turn pressure relief valve (13) out of pump element.
- Mount new pump element (9) and new sealing ring.

Tightening torque = 20 Nm



- Mount pressure relief valve.

Tightening torque = 8 Nm

Replacement of pump element and pressure relief valve Fig. 26



9.5 Replacement of the control pcb

| | |
|---|--|
|  |  CAUTION |
| | <p>Electric shock Make sure to disconnect the pump from the power supply before carrying out works on electrical parts.</p> |

NOTICE

Damage to the pump

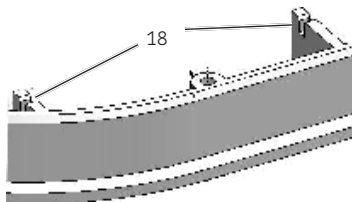
Mark loosened plugs of the control pcb against being mixed up or twisted.

- Switch the pump off and disconnect it from the electrical grid.
- Unscrew the screws (19) from the housing cover.
- Remove housing cover (16) and sealing.
- Remove the two plugs (17) and take out the old pcb (11).

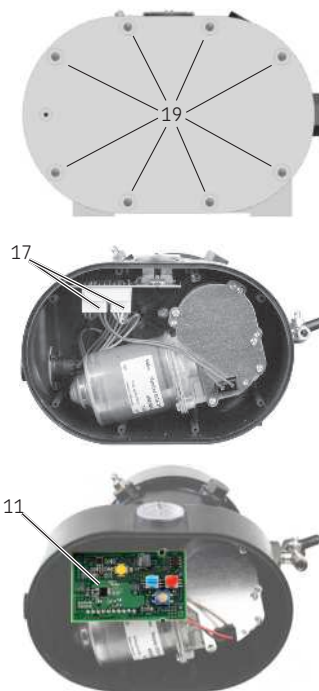
- Verify the lubrication and pause times of the new control pcb and adjust, if necessary (see chapter 4.5).
- Check the jumper positions of the new control pcb and, if necessary, adapt the jumper positions to the control pcb to be replaced.
- Connect the pump to the two plugs (17).
- Insert control pcb into the two fixations (18) of the housing cover (16).
- Mount housing cover and sealing.
- Screw in the screws (19) of the housing cover.

Tightening torque = 0.8 Nm

Fixation of the control pcb Fig. 27



Replacement of the control pcb Fig. 28



9.6 Tests after replacement of the control pcb

After replacement of the control pcb carry out an electrical test according to DIN EN 60204-1 in the following order:

Visual check

- Housing cover mounted properly. No visible damages to the pump.

Electrical safety test

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

- Testing the protective conductor system with regard to conductivity.

Electrical functionality test

- Carry out the electrical functionality test following these Instructions.

Filing

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

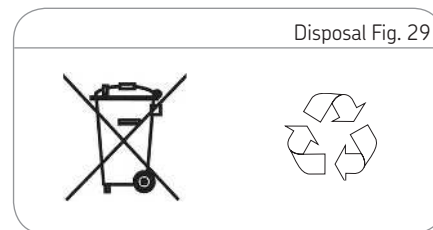
9.7 Disposal of disassembled parts

Electrical components:

Dispose of or recycle electrical components following WEEE directive 2002/96/EC.

Other components:

can be disposed of with commercial waste.

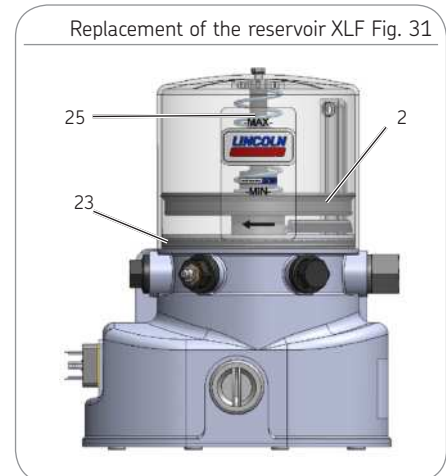
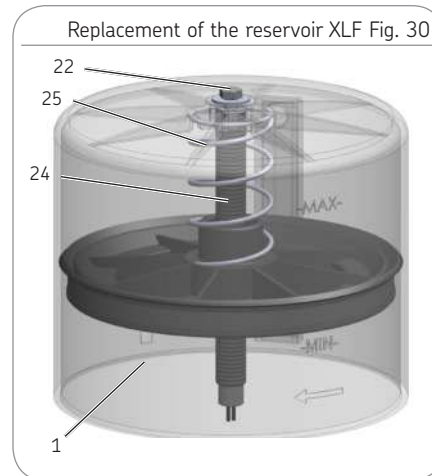


9.8 Replacement of reservoir with follower plate

- Switch the pump off and disconnect it from the electrical grid. If necessary, disassemble it and transport it to workshop.
- Completely unscrew screw (22).
- Remove the reservoir from the pump by pulling it upwards.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.
- Disengage spring (25) on top of the reservoir and keep it for further use.
- Check follower plate (2) and sealing with regard to damages. In case of damage replace these parts as well (see chapter 9.9).
- Remove and dispose of the two O-rings (23) from the respective groove in the pump housing.
- Lightly oil the new O-rings (23) and mount them into the corresponding groove in the pump housing.
- Mount the spring (25) into the corresponding lug on top of the new reservoir.
- Position the new reservoir (1) on the pump. Make sure to guide the spring (25) over the reservoir axis (24) when doing so.
- Press the reservoir completely downwards over the two O-rings (23).
- Tighten reservoir (1) with new screw (22) and washer on the reservoir axis (24).

Tightening torque = 2+1 Nm

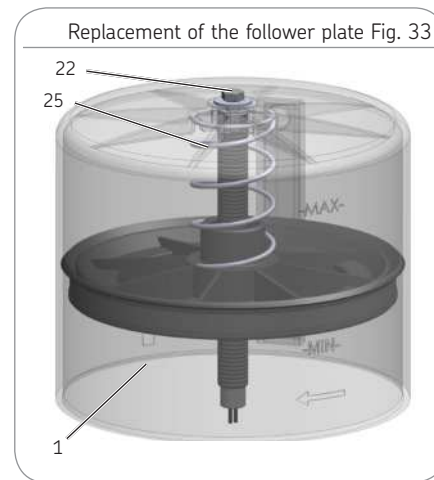
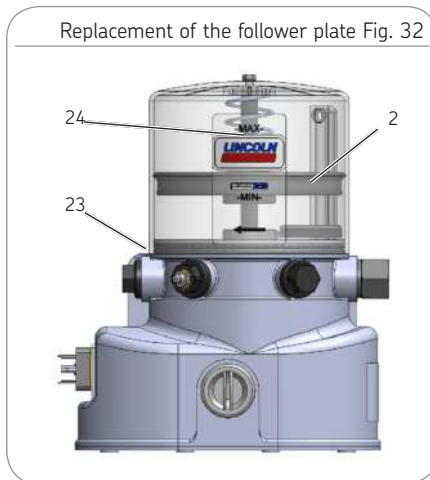
- Fill reservoir with lubricant again (see chapter 6.10).
- Install pump at place of usage again and connect it to the electrical system.



9.9 Replacement of the follower plate

- Switch the pump off and disconnect it from the electrical grid. If necessary, disassemble it and transport it to the workshop.
- Completely unscrew screw (22).
- Remove the reservoir (1) from the pump by pulling it upwards.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.
- Disengage spring (25) on top of the reservoir and keep it for further use.
- Remove and dispose of follower plate (2) in an environmentally sound manner.
- Push new follower plate over the reservoir axis.
- Mount the spring (25) into the corresponding lug on top of the reservoir.
- Position the reservoir (1) on the pump. Make sure to guide the spring (25) over the reservoir axis (24) when doing so.
- Press the reservoir completely downwards over the two O-rings (23).
- Tighten reservoir (1) with new screw (22) and washer on the reservoir axis (24).

Tightening torque = 2+1 Nm



9.10 Replacement of reservoir without follower plate

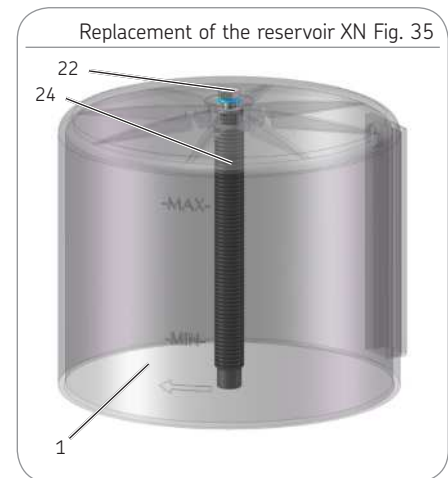
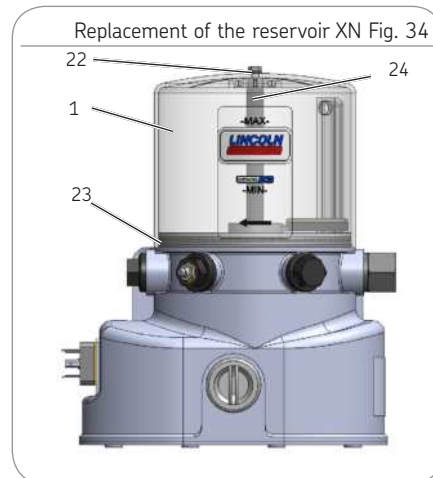
- Switch the pump off and disconnect it from the electrical grid. If necessary, disassemble it and transport it to the workshop.
- Completely unscrew screw (22).
- Remove the reservoir (1) from the pump by pulling it upwards.
- If applicable, remove leaked lubricant and dispose of in an environmentally sound manner.
- Remove and dispose of the two O-rings (23) from the respective groove in the pump housing.

- Lightly oil the new O-rings (23) and mount them into the corresponding groove in the pump housing.
- Position the new reservoir (1) on the pump.
- Press the reservoir completely downwards over the two O-rings (23).

- Tighten reservoir (1) with new screw (22) and washer on the reservoir axis (24).

Tightening torque = 2+1 Nm

- Fill reservoir with lubricant again (see chapter 6.9).
- Install pump at place of usage again and connect it to the electrical system.



10. Troubleshooting

Pumps with and without control unit (Motor of pump runs, but pump does not supply lubricant)

| Possible cause | Visible | Remedy |
|--|--|--|
| Reservoir empty | <ul style="list-style-type: none"> ○ Error code F 1 ○ Visual check | <ul style="list-style-type: none"> ○ Fill reservoir |
| Air pockets in the lubricant | <ul style="list-style-type: none"> ○ Air bubbles in the lubricant | <ul style="list-style-type: none"> ○ Vent pump (let pump run) |
| Suction bore of pump element is clogged. | <ul style="list-style-type: none"> ○ After disassembling the pump element | <ul style="list-style-type: none"> ○ Disassemble and clean the pump elements. |
| Piston of pump element is worn | <ul style="list-style-type: none"> ○ Too low pressurization | <ul style="list-style-type: none"> ○ Replace the pump element |
| Defective pressure reducing valve/ fault at the lubrication point | <ul style="list-style-type: none"> ○ Lubricant leaking from the pressure reducing valve | <ul style="list-style-type: none"> ○ Replace pressure relief valve. Check the lubrication point and remedy fault, if necessary. |
| Reservoir vent is clogged | <ul style="list-style-type: none"> ○ Visually check whether there is lubricant in the reservoir vent. | <ul style="list-style-type: none"> ○ Clean the reservoir vent and determine the cause. |
| Follower plate is stuck (pumps with follower plates) | <ul style="list-style-type: none"> ○ Visual check | <ul style="list-style-type: none"> ○ Determine cause and eliminate it. |

After remedying the fault, the pump does not start automatically, but has to be checked by triggering an additional lubrication cycle (see chapter 7.3). If the fault cannot be determined and remedied, please contact our Customer Service.

Pumps with control unit (Motor of pump does not run)

| Possible cause | Visible | Remedy |
|--|---|---|
| Fault in the superior machine or vehicle | <ul style="list-style-type: none"> ○ See description of the machine or vehicle. | <ul style="list-style-type: none"> ○ See description of the machine or vehicle. |
| Electrical fault | <ul style="list-style-type: none"> ○ Stirring paddle does not rotate ○ By error codes of the LEDs on the control pcb ○ Fault indication by external device | <ul style="list-style-type: none"> ○ Check lines, control pcb, fuses, motor, and power supply. ○ If necessary, carry out fault analysis of the machine or vehicle |
| Mechanical fault | <ul style="list-style-type: none"> ○ Stirring paddle does not rotate | <ul style="list-style-type: none"> ○ Replace defective motor |
| Rotary switch on the control pcb is in the 0 position | <ul style="list-style-type: none"> ○ By error code F2 of the LEDs on the control pcb | <ul style="list-style-type: none"> ○ Turn rotary switch to the correct position. |
| Fault signal of control pcb | <ul style="list-style-type: none"> ○ By error codes of the LEDs on the control pcb | <ul style="list-style-type: none"> ○ Check lines and replace, if necessary. |
| Short circuit on the pushbutton or on the line towards the external pushbutton | <ul style="list-style-type: none"> ○ By error code F3 of the LEDs on the control pcb | <ul style="list-style-type: none"> ○ In case of a short circuit of the control pcb's pushbutton, replace the control pcb. In case of external pushbutton: Check lines and replace, if necessary. |

After remedying the fault, the pump does not start automatically, but has to be checked by triggering an additional lubrication cycle (see chapter 7.3). If the fault cannot be determined and remedied, please contact our Customer Service.

Pumps without control unit (Motor of pump does not run)

| Possible cause | Visible | Remedy |
|--|---|---|
| The pump is in the pause time mode | <ul style="list-style-type: none"> No pump noise | <ul style="list-style-type: none"> Possible verification of the function by triggering an additional lubrication cycle |
| Fault in the superior machine, vehicle, or external control unit | <ul style="list-style-type: none"> No pump noise | <ul style="list-style-type: none"> Check the power supply lines Remedy the fault of the superior machine, vehicle, or external control unit following the respective description. |
| Electrical fault of pump | <ul style="list-style-type: none"> By error codes of the LEDs on the control pcb | <ul style="list-style-type: none"> Check and repair of the pump by an electrically skilled person |
| Mechanical fault | <ul style="list-style-type: none"> By inspecting the pump | <ul style="list-style-type: none"> Check whether after replacing a pump element, e.g. a piston remained in the pump |

After remedying the fault, the pump does not start automatically, but has to be checked by triggering an additional lubrication cycle (see chapter 7.3). If the fault cannot be determined and remedied, please contact our Customer Service.

10.1 Display of the operating states and fault conditions by means of the control pcb's LEDs

In case of pumps with control pcb the operating states and fault conditions are displayed by different display patterns of the green and red LEDs on the control pcb. A display cycle lasts 6 seconds. Then the display cycle starts from the beginning again. The following displays are possible.

No faults (green LED is permanently lit).

| | 1. second | | | | 2. second | | | | 3. second | | | | >>>>>>>> | | | | 6. second | | | |
|-------|-----------|---|---|---|-----------|---|---|---|-----------|---|---|---|----------|---|---|---|-----------|---|---|---|
| green | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| red | | | | | | | | | | | | | | | | | | | | |

>>>

Error code F1 Low level indication (green LED is permanently lit, red LED flashes every 6 seconds for 0.25 seconds)

| | 1. second | | | | 2. second | | | | 3. second | | | | >>>>>>>> | | | | 7. second | | | |
|-------|-----------|---|---|---|-----------|---|---|---|-----------|---|---|---|----------|---|---|---|-----------|---|---|---|
| green | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| red | * | | | | | | | | | | | | | | | | * | | | |

>>>

Error code F2 One or both rotary switches on the control pcb are in the 0 position. (Green LED is permanently lit, red LED flashes the first 2 seconds for 0.25 seconds, then there is a pause of 4 seconds)

| | 1. second | | | | 2. second | | | | 3. second | | | | >>>>>>>> | | | | 7. second | | | |
|-------|-----------|---|---|---|-----------|---|---|---|-----------|---|---|---|----------|---|---|---|-----------|---|---|---|
| green | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| red | * | | | | * | | | | | | | | | | | | * | | | |

>>>

Error code F3: Z key (additional lubrication) is defective, permanently pressed or having a short circuit (green LED is permanently lit, red LED flashes the first 3 seconds for 0.25 seconds, then there is a pause of 3 seconds)

| | 1. second | | | | 2. second | | | | 3. second | | | | >>>>>>>> | | | | 7. second | | | |
|-------|-----------|---|---|---|-----------|---|---|---|-----------|---|---|---|----------|---|---|---|-----------|---|---|---|
| green | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| red | * | | | | * | | | | * | | | | | | | | * | | | |



Error code F4: Undervoltage (green and red LEDs flashing every 2 seconds in 1-second intervals)

| | 1. second | | | | 2. second | | | | 3. second | | | | 4. second | | | | 5. second | | | |
|-------|-----------|---|---|---|-----------|--|--|--|-----------|---|---|---|-----------|--|--|--|-----------|---|---|---|
| green | * | * | * | * | | | | | * | * | * | * | | | | | * | * | * | * |
| red | * | * | * | * | | | | | * | * | * | * | | | | | * | * | * | * |



11. Spare parts

The spare parts may be used exclusively for replacement of identical defective parts. Modifications on existing pumps (except from the pump elements) are not allowed.

11.1 Pump elements (including sealing ring)

| Designation | Qty. | Part no. |
|-----------------|------|-------------|
| Pump element K5 | 1 | 600-26875-2 |
| Pump element K6 | 1 | 600-26876-2 |
| Pump element K7 | 1 | 600-26877-2 |
| Pump element B7 | 1 | 600-29185-1 |
| Pump element C7 | 1 | 600-28750-1 |

Pump element Fig. 36



11.2 Pressure reducing valve

| Designation | Qty. | Part no. |
|--|------|-------------|
| Pressure reducing valve (270 bar Ø 6 mm) | 1 | 624-28892-1 |

Pressure control valve Fig. 37



11.3 Adaptor with lubrication fitting

| Designation | Qty. | Part no. |
|---|------|-------------|
| Adaptor with lubrication fitting R 1/4" | 1 | 519-33955-1 |

Adaptor with lubrication fitting Fig. 38



11.4 Spare parts kit for replacement of the reservoir

| Designation | Qty. | Part no. |
|--|------|-------------|
| Spare parts kit for replacement of reservoir | 1 | 558-33908-1 |
| <u>Consisting of:</u> | | |
| Reservoir P502 | 1 | |
| Logo | 1 | |
| O-ring | 2 | |
| Sealing for reservoir screw | 1 | |
| Reservoir screw | 1 | |

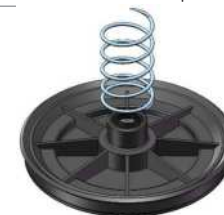
Spare parts kit of reservoir Fig. 39



11.5 Spare parts kit for replacement of the follower plate

| Designation | Qty. | Part no. |
|---|------|-------------|
| Spare parts kit for replacement of follower plate | 1 | 558-85011-1 |
| <u>Consisting of:</u> | | |
| Follower piston with sealing ring | 1 | |
| Spring | 1 | |

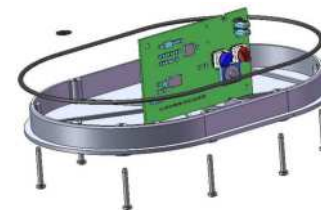
Spare parts kit of follower plate Fig. 40



11.6 Spare parts kit for replacement of the control pcb

| Designation | Qty. | Part no. |
|--|------|-------------|
| Spare parts kit for replacement of control pcb | 1 | 558-34877-5 |
| <u>Consisting of:</u> | | |
| Control pcb 12/24 V DC | 1 | |
| Housing cover | 1 | |
| Sealing for housing cover | 1 | |
| Screws for housing cover | 8 | |
| Membrane for housing vent | 1 | |

Spare parts kit of control pcb Fig. 41



11.7 Spare parts kit for replacement of the screw cap

| Designation | Qty. | Part no. |
|--|------|-------------|
| Spare parts kit for replacement of screw cap | 1 | 558-34877-6 |
| <u>Consisting of:</u> | | |
| Screw cap | 1 | |
| O-ring | 1 | |

Spare parts kit of screw cap Fig. 42



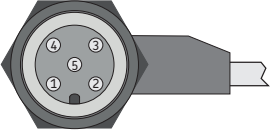
12. Circuit diagrams

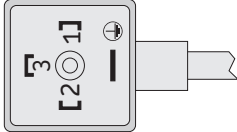
12.1 Legend

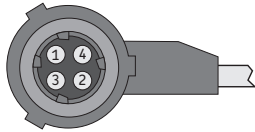
| Cable colours following IEC 60757 | | | | | | | |
|-----------------------------------|--------|--------------|--------|--------------|--------|--------------|-----------|
| Abbreviation | Colour | Abbreviation | Colour | Abbreviation | Colour | Abbreviation | Colour |
| BK | black | GN | green | WH | white | PK | pink |
| BN | brown | YE | yellow | OG | orange | TQ | turquoise |
| TQ | blue | RD | red | VT | violet | | |

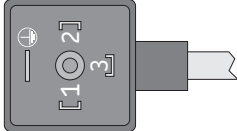
| Components | | | |
|--------------|---|--------------|---------------------------------------|
| Abbreviation | Meaning | Abbreviation | Meaning |
| X1 | Plug for connection A1 | LL | Low level indication |
| X2 | Plug for connection A2 | LLV | Low level indication with pre-warning |
| X6 | Plug for connection of low level indication | PCB | Control PCB |
| X9 | Plug for connection of low level indication | mP | Microprocessor |
| CS | Cycle switch | mKP | Display |
| L | Suppressor throttle | MC | Machine contact |
| FE | Ferrite core | IS | Drive switch/ ignition |
| PE | Protective earth | M | Motor |
| F1 | Fuse | Z | Additional lubrication cycle |
| | | | |
| | | | |

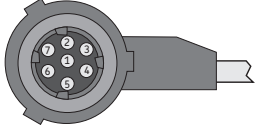
12.2 Core assignment of the connection plugs

| Core assignment of connection A1 / X1 | | | | |
|---|-------|---------|-------|-------|
| Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 |
| BN (M+) | ----- | BU (M-) | ----- | GN/YE |
| M 12 plug DIN EN 61076-2-101 | | | | |
|  | | | | |

| Core assignment of connection A2/ X2 | | | |
|---|--------|--------|-------|
| Pin 1 | Pin 2 | Pin 3 | PE |
| RD (-) | BN (Z) | BK (+) | GN/YE |
| Square plug DIN EN 175301-803 | | | |
|  | | | |

| Core assignment of connection A1 / X1 | | | |
|---|---------|---------|---------|
| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
| BK (M+) | BN (M-) | WH (LL) | YE (LL) |
| Bayonet plug 4/4-pole, ISO 15170-1 | | | |
|  | | | |

| Core assignment of connection A1 / X1 | | | |
|---|----------|----------|-------|
| Pin 1 | Pin 2 | Pin 3 | PE |
| RD (+30) | BN (-31) | BK (+15) | GN/YE |
| Square plug DIN EN 175301-803 | | | |
|  | | | |

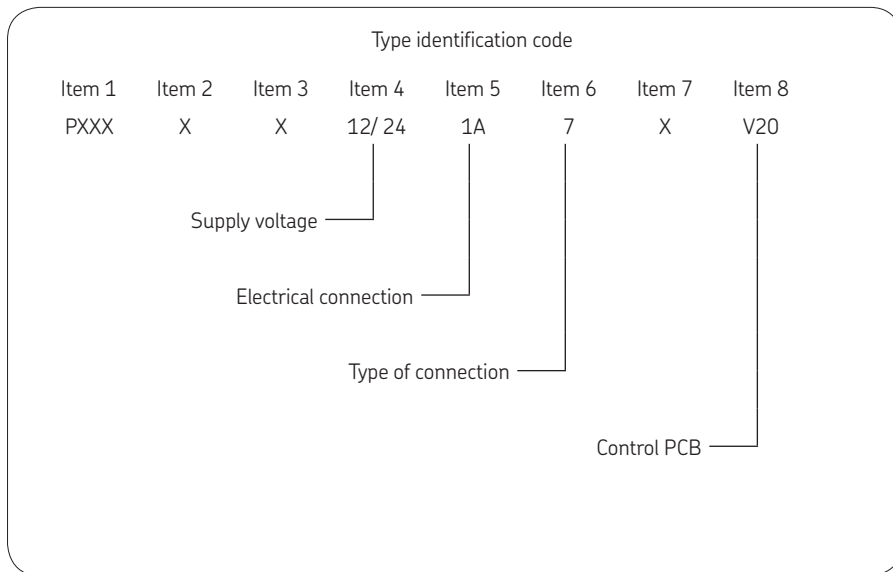
| Core assignment of connection A1 / X1 | | | |
|--|-------|-------|-------|
| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
| RD | BN | BK | WH |
| (+30) | (-31) | (+15) | (Z) |
| Pin 5 | Pin 6 | Pin 7 | |
| YE | BU | ----- | |
| Signal | (LL) | ----- | |
| Bayonet plug 7/5- and 7/6-pole, ISO 15170-1 | | | |
|  | | | |

12.3 Assignment of circuit diagrams to the pump

Assignment of the circuit diagrams to a certain pump is done via the characteristics given in the type identification code

- Item 4 Power supply
- Item 5 Electrical connection
- Item 6 Type of connection
- Item 8 Control pcb

If the indications of the type identification code correspond to those of the circuit diagram, then the circuit diagram applies.
For type identification code see type identification plate of pump-



Notes regarding positions 5 and 6

Pos. 5 defines the number of electrical connections on the pump.

The numbers and letters stand for the following: 1A = 1 connection on the pump; 2A = 2 connections on the pump.



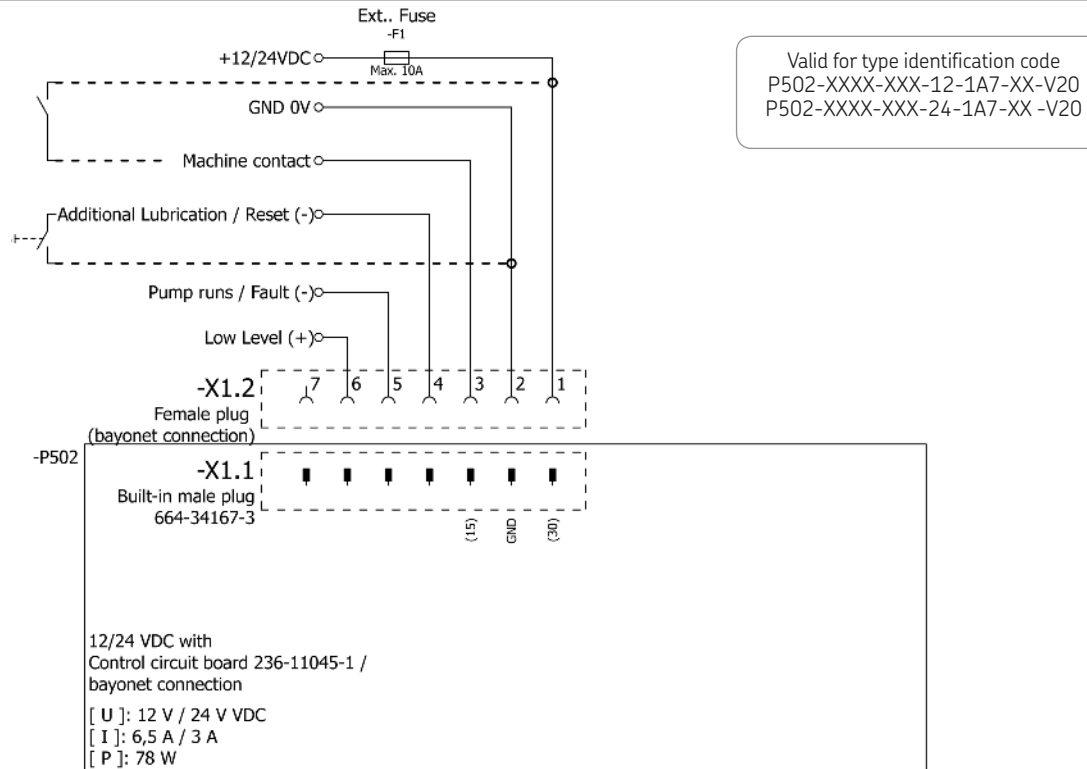
Pos. 6 defines the type of the electrical connection on the pump.

The numbers and letters stand for the following: 1 = square plug | 2 = M12 plug | 3 = not assigned | 4 = not assigned | 5 = bayonet plug 4/2 poles | 6 = not assigned | 7 = bayonet plug 7/6 poles

To keep the number of connection diagrams small, the maximum variant of electrical connections (pos. 5) per type of connection (pos. 6) is always shown. For pumps with only one electrical connection (1A), e.g. connection X2.2 in the connection diagram can be ignored.

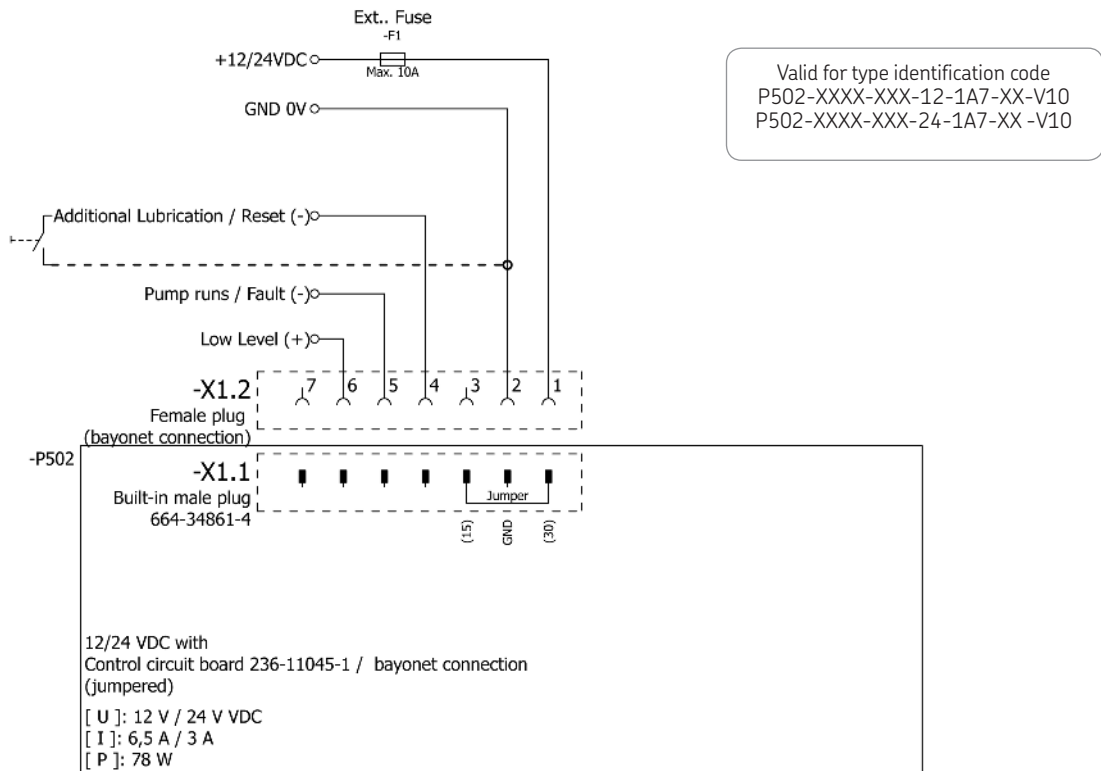
12.4 Circuit diagram 12/ 24 V DC, with bayonet plug and control pcb V20

Circuit diagram 12/ 24 V DC, with bayonet plug and control pcb V20 Fig. 41



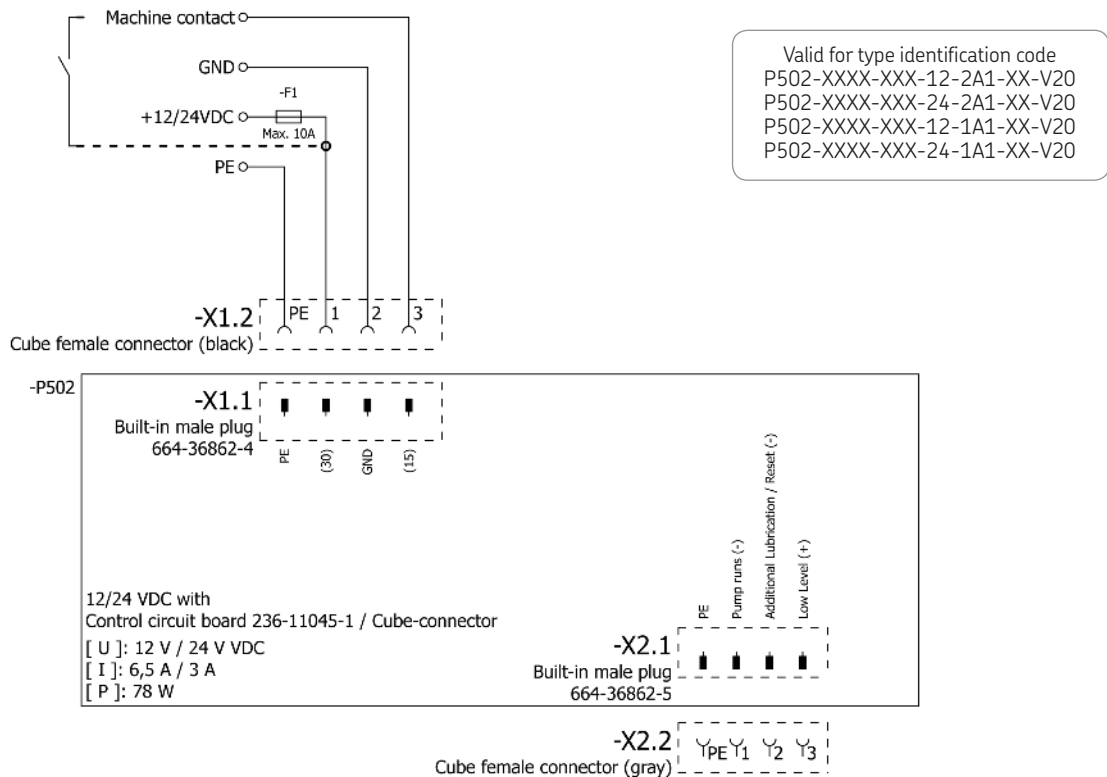
12.5 Circuit diagram 12/ 24 V DC, with bayonet plug and control pcb V10

Circuit diagram 12/ 24 V DC, with bayonet plug and control pcb V10 Fig. 42



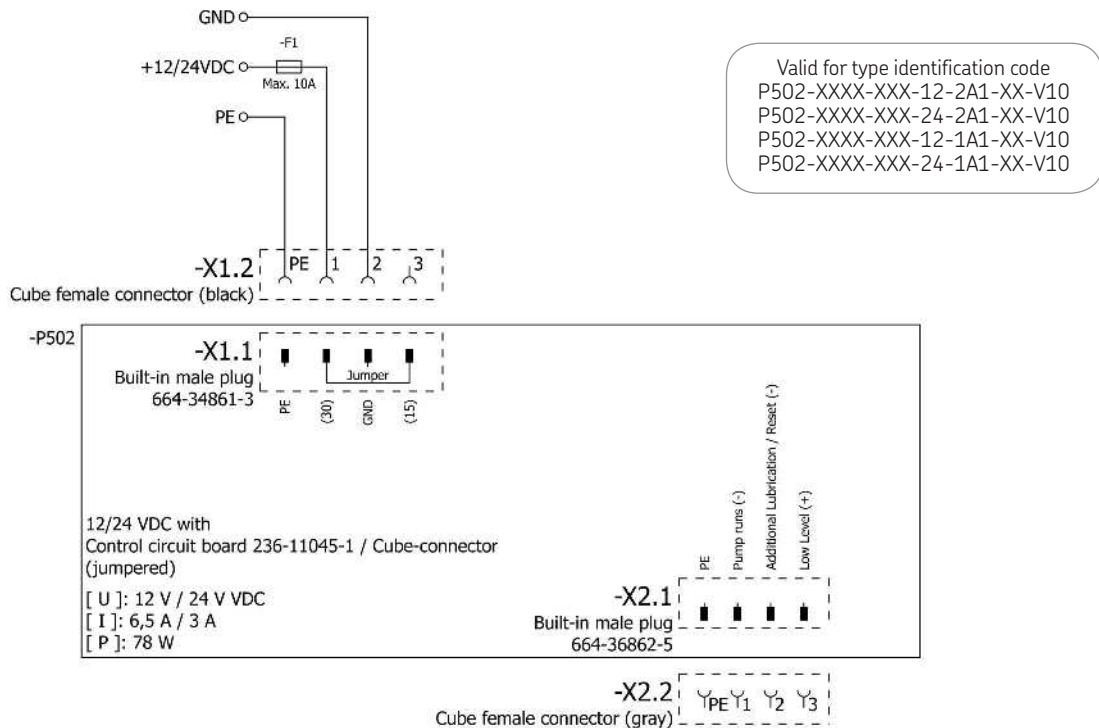
12.6 Circuit diagram 12/ 24 V DC, with square plug and control pcb V20

Circuit diagram 12/ 24 V DC, with square plug and control pcb V20 Fig. 4.3



12.7 Circuit diagram 12/ 24 V DC, with square plug and control pcb V10

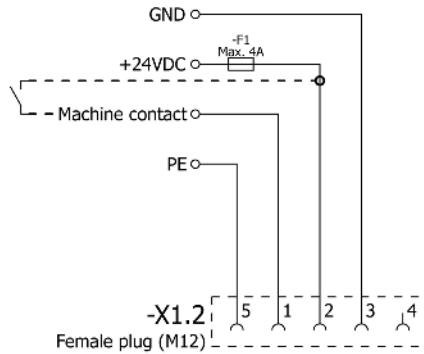
Circuit diagram 12/ 24 V DC, with square plug and control pcb V10 Fig. 44



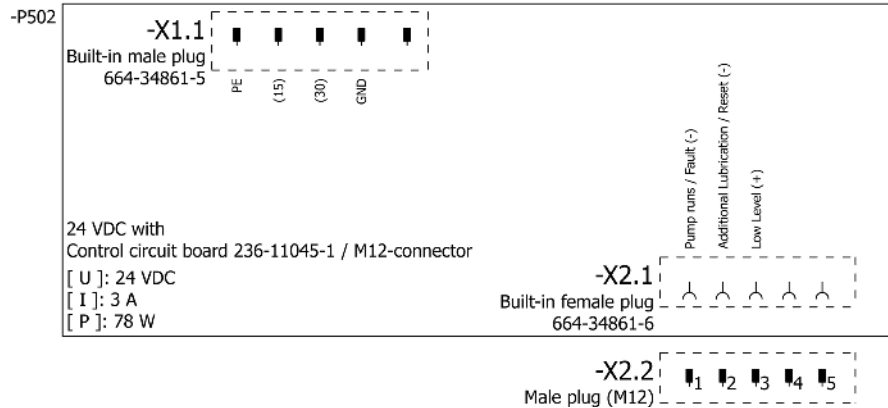
12.8 Circuit diagram 24 V DC, with M12 plug and control pcb V20

12.8

Circuit diagram 24 V DC, with M12 plug and control pcb V20 Fig. 45

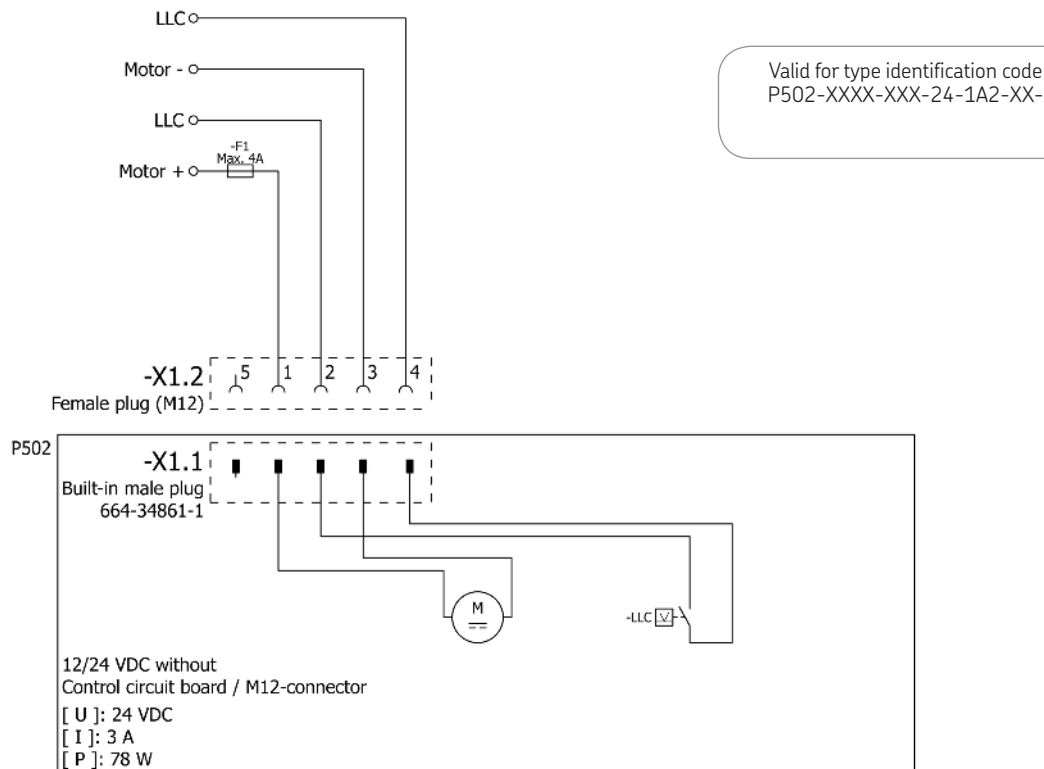


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P502-XXXX-XXX-24-2A2-XX-V20



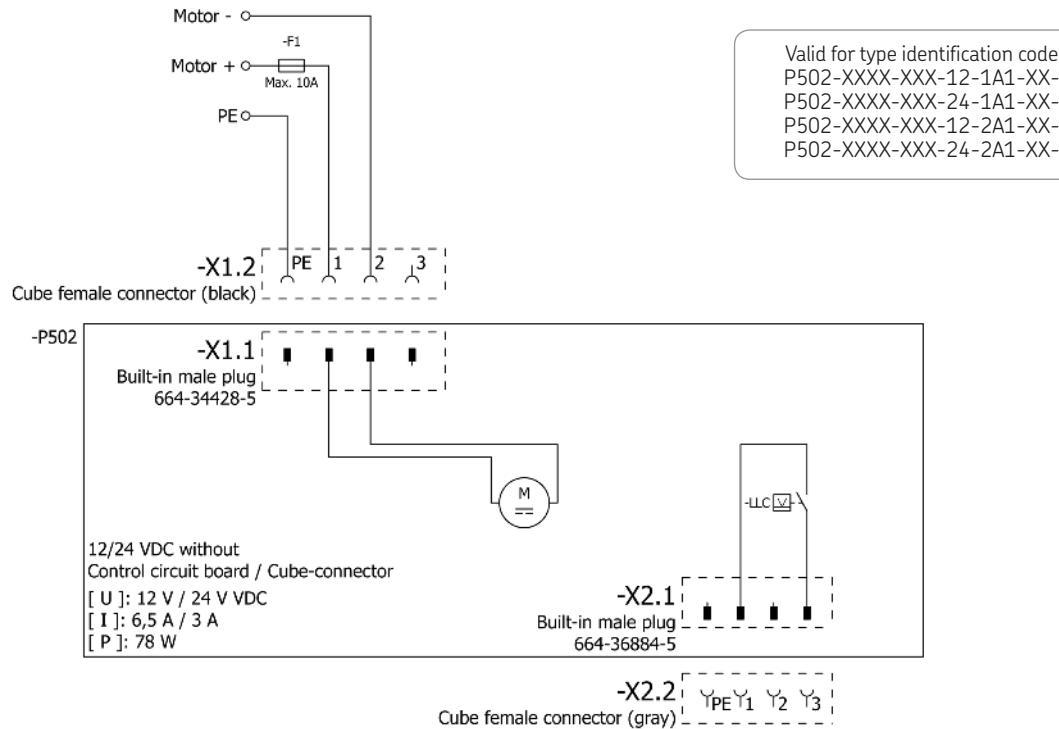
12.9 Circuit diagram 24 V DC, with M12 plug without control pcb

Circuit diagram 24 V DC, with M12 plug without control pcb Fig. 46



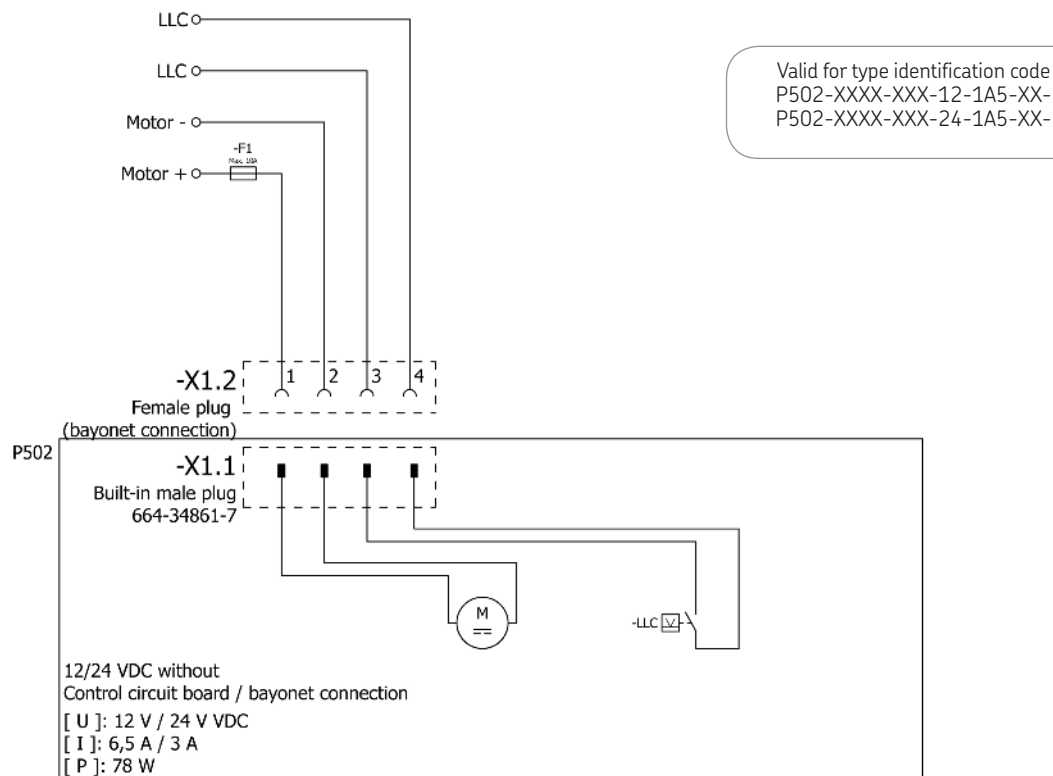
12.10 Circuit diagram 12/ 24 V DC, with square plug without control pcb

Circuit diagram 12/ 24 V DC, with square plug without control pcb Fig. 47



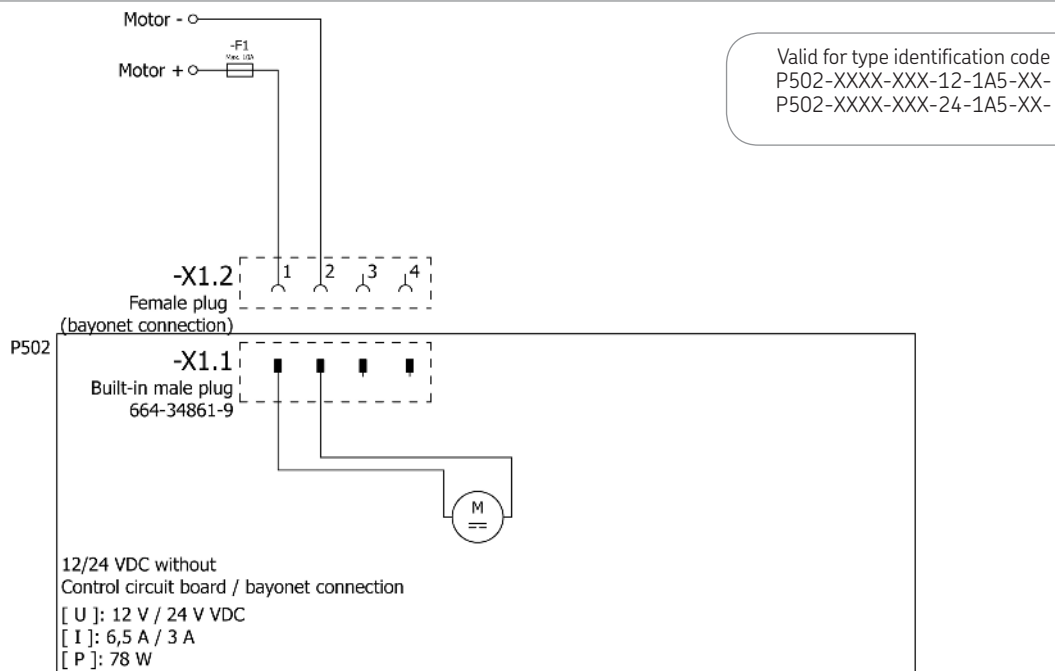
12.11 Circuit diagram 12/ 24 V DC, with bayonet plug without control pcb

Circuit diagram 12/ 24 V DC, with bayonet plug without control pcb Fig. 48



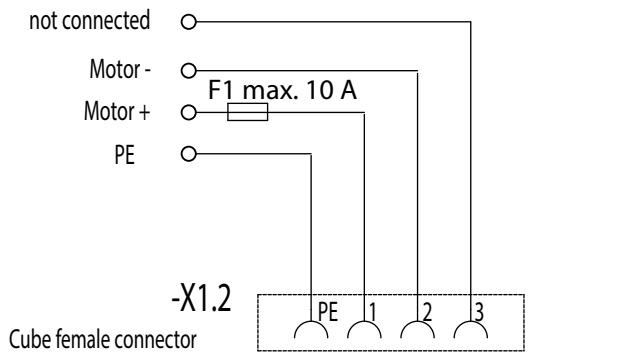
12.12 Circuit diagram 12/ 24 V DC, with bayonet plug without control pcb

Circuit diagram 12/ 24 V DC, with bayonet plug without control pcb Fig. 49

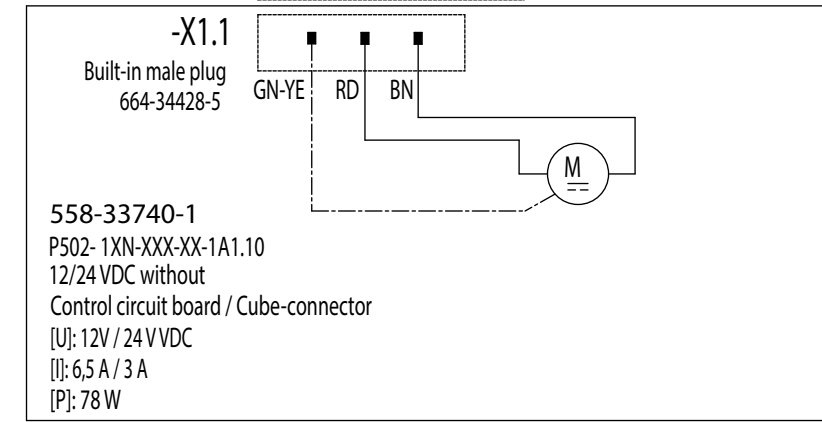


12.13 Circuit diagram 12 / 24 V DC, with square plug without control pcb and without low-level indication

Circuit diagram 12 / 24 V DC, with square plug without control pcb and without low-level indication Fig. 50



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