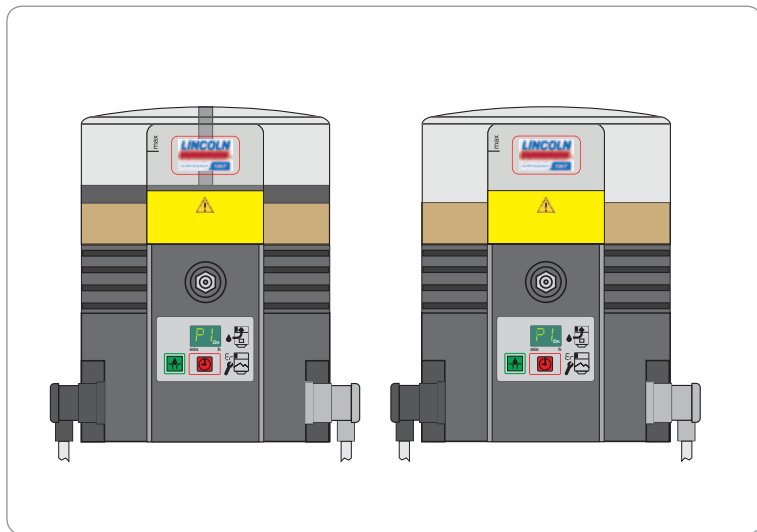


Lubrication System QLS 301 / QLS 401

Assembly instructions
following machinery directive 2006/42/EC

EN



951-171-003-EN

Version 10

07/02/2020



EC Declaration of incorporation following machinery directive 2006/42/EC, annex II, part 1 B

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: Electrically driven pump to supply lubricant during intermittent operation within a centralized lubrication system

Type: QLS 301 / QLS 401

Part number: P301XXXXXXXX / P401XXXXXXXX / 650-XXXXX-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				
ECE-R10	Electromagnetic compatibility		automotive				
Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
ISO 12100	2011	EN 50581	2013	EN 60034-1	2011	EN 61000-6-4	2011
EN 809	2012	EN 60947-5-1	2010	EN 61000-6-2	2006		
EN 60204-1	2007	EN 61131-2	2008	Amendment	2011		
Amendment	2010	Amendment	2009				

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, 28/03/2018

Jürgen Kreutzkämper
Manager R&D Germany



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Legal disclosure

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Training courses

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

Copyright

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Warranty

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

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Disclaimer

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

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

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

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Explanation of symbols, signs and abbreviations

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

	General warning		Dangerous electrical voltage		Risk of falling		Hot surfaces
	Unintentional intake		Crushing hazard		Pressure injection		Suspended load
	Electrostatically sensitive components		Potentially explosive atmosphere		Keep unauthorized persons away.		Wear personal protective equipment (protective clothes)
	Wear personal protective equipment (goggles)		Wear personal protective equipment (face shield)		Wear personal protective equipment (gloves)		Wear personal protective equipment (protective clothes)
	Wear personal protective equipment (safety shoes)		Disconnect product from mains		General obligation		Safe galvanic isolation (protection class III)
	Protective conductor (protection class)		Protection y double or reinforced insulation (protection class II)		Protection by extra low voltage (protection class III)		
	CE marking		Disposal, recycling		Disposal of waste electrical and electronic equipment		

Warning level	Consequence	Probability	Symbol	Meaning
 DANGER	Death, serious injury	imminent	●	Chronological guidelines
 WARNING	Death, serious injury	possible	○	Lists
 CAUTION	Minor injury	possible	☞	Refers to other facts, causes, or consequences
NOTICE	Property damage	possible		

Abbreviations and conversion factors

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

1. Safety instructions

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. It is prohibited to commission or operate the products prior to reading the instructions.
- These instructions must be kept for further use.
- The described products were manufactured according to the state of the art. Risks may, however, arise from a usage not according to the intended purpose 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 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
- Familiarize yourself 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
- Keep unauthorized persons away.
- Wear personal protective equipment always
- 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
- 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

1.3 Intended use

Supply of lubricants within a centralized lubrication system following the specifications, technical data and limits stated in these Instructions:

Usage is allowed exclusively for professional users in the frame of commercial and economic activities.

1.4 Foreseeable misuse

Any usage differing from the one stated in these Instructions is strictly prohibited, particularly a usage:

- outside the indicated ambient temperature range
- with non-specified means of operation
- without adequate pressure control valve
- in continuous operation
- of plastic parts in areas with high ozone levels or in areas with harmful radiation (e.g. ionising radiation)

- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) or HCS 29 CFR 1910.1200 marked with GHS01-GHS06 and GHS08 hazard pictograms
- to feed, forward, or store gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds normal atmospheric pressure of 1013 mbar by more than 0.5 bar [7.25 psi] at the maximum permissible operating temperature.
- in an explosion protection zone

1.5 Modifications of the product

Unauthorized conversions or modifications may result in unforeseeable impacts on safety. Therefore, any unauthorized conversions or modifications are expressly prohibited.

1.6 Prohibition of certain activities

Due to potential sources of faults that may not be visible or due to legal regulations the following activities may be carried out by manufacturer specialists or authorized persons only:

- Repairs or changes to the drive

1.7 Painting of plastic parts

Painting of any plastic parts or seals of the described products is expressly prohibited. Remove or tape plastic parts completely before painting the superior machine

1. Safety instructions

1.8 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).

1.9 Inspections prior to delivery

The following inspections were carried out prior to delivery:

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

1.10 Other applicable 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 of the lubricant used

Where appropriate:

- Project planning documents
- Additional information on special versions of the pump. You will find these in the special system documentation
- Any documents of other components required to set up the centralized lubrication system

1.11 ADR test certificate

Provided the use of ADR connecting material as stated in the type identification code and correctly performed electrical installation, the lubricant pumps comply with ADR requirements for use outside potentially explosive zones 0, 1 or 2 in vehicle types EX/II, EX/III, FL and AT.

Test institute:
TÜV-SÜD Auto Service GmbH

Component approval marking:
TU.EGG.054-01

1.12 Markings on the product



Hand injury warning



Rotational direction of the pump

ADR

TÜ.EGG.047-01

Pumps with ADR
approval



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

1.13 Notes related to the type identification plate

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

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

Model: _____

P. No. _____

S. No. _____

(CW/YY) _____

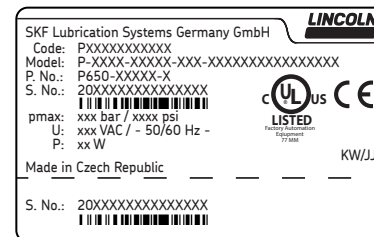
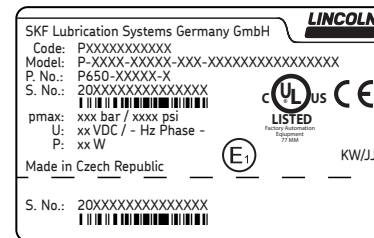
Calendar week/year of construction

1.13.1 UL approval mark

The UL approval mark confirms conformity of the product with applicable safety regulations of the USA and Canada.

1.13.2 ECE approval mark

The ECE approval mark (E1) confirms that an ECE design certification (ECE R10) was issued for the product.



1.14 Persons authorized to operate the pump

1.14.1 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.

1.14.2 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.

1.14.3 Specialist in electrics

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

1.15 Briefing of external technicians

Prior to commencing the activities, external technicians must be informed by the operator of the company safety provisions, the applicable accident prevention regulations to be maintained, and the functions of the superordinate machine and its protective devices.

1.16 Provision of personal protective equipment

The operator must provide suitable personal protective equipment for the respective location of operation and the purpose of operation.

1.17 Operation

The following must be observed during commissioning and operation:

- Any information within this manual and the information within the referenced documents.
- All laws and regulations to be complied with by the user.

1.18 Emergency stopping

In case of an emergency stop the pump station by:

- Interrupting the power supply to the pump
- Where appropriate, using measures determined by the operator, such as actuating the emergency stop switch of the superior machine

1.19 Transport, installation, maintenance, malfunctions, repair, shutdown, disposal

- All relevant persons must be informed of the activity prior to starting any work. Observe the precautionary operational measures and work instructions
- Carry out transport using suitable transport and hoisting equipment on suitable ways only
- Maintenance and repair work can be subject to restrictions at low or high temperatures (e.g. changed flow properties of the lubricant). Therefore, where possible, try to carry out maintenance and repair work at room temperature.
- Prior to performing work, the product and the machine, into which the product will be integrated, must be depressurized and secured against unauthorized activation.
- Ensure through suitable measures that movable or detached parts are immobilized during the work and that no limbs can be caught in between by inadvertent movements
- Assemble the product only outside of the operating range of moving parts, at an adequate distance from sources of heat or cold. Other units of the machine or vehicle must not be damaged or impaired in their function by the installation
- Dry or cover wet, slippery surfaces accordingly.
- Cover hot or cold surfaces accordingly.
- Work on electrical components must be carried out by electrical specialists only. Observe any waiting periods for discharging, if necessary
- Carry out works on electrical components only while the system is depressurized and use voltage isolated tools suitable for electrical works only
- Carry out electrical connections only according to the information in the valid wiring diagram and taking the relevant regulations and the local connection conditions into account
- Do not touch cables or electrical components with wet or damp hands
- Fuses must not be bypassed Replace defective fuses always by fuses of the same type
- Ensure proper connection of the protective conductor in case of products of protection class I
- Observe the stated type of protection
- Undertake drilling at non-critical, non-load bearing parts only. Use any available boreholes. Do not damage lines and cables when drilling.
- Observe possible abrasion points. Protect the parts accordingly.

- All components used must be designed according to the maximum operating pressure and the maximum respectively minimum ambient temperature
- No parts of the centralized lubrication system may be subjected to torsion, shear, or bending.
- Check all parts prior to their usage for contamination and clean, if necessary.
- Lubricant lines must be primed with lubricant prior to installation. This makes the subsequent ventilation of the system easier.
- Observe the specified tightening torques. When tightening, use a calibrated torque wrench.
- When working with heavy parts use suitable lifting tools.
- Avoid mixing up or wrong assembly of dismantled parts. Mark these parts accordingly.

1.20 Initial commissioning / daily start-up

Ensure that:

- All safety devices are completely available and functional
- All connections are correctly connected
- All parts are correctly installed
- All warning labels on the product are present completely, highly visible and undamaged
- Illegible or missing warning labels are to be replaced without delay

1.21 Cleaning

- Risk of fire and explosion when using inflammable cleaning agents. Only use non-flammable cleaning agents suitable for the purpose
- Do not use aggressive cleaning agents.
- Thoroughly remove residues of cleaning agents from the product.
- Do not use steam jet and high pressure cleaners. Electrical components may be damaged. Observe the type of protection of the pump
- Cleaning work may not be carried out on energized components.
- Mark damp areas accordingly.

1.22 Residual risks

Residual risk	Possible in life cycle										Prevention/ remedy
Personal injury/ material damage due to falling of raised parts	A	B	C				G	H	K		Keep unauthorized persons away. No people may remain under suspended loads. Lift parts with adequate lifting devices.
Personal injury/ material damage due to tilting or falling of the product because of non-observance of the stated tightening torques		B	C				G				Observe the specified tightening torques. Fix the product to components with adequate load-bearing capacities only. If no tightening torques are stated, apply tightening torques according to the screw size characteristics for 8.8 screws.
Personal injury/ material damage due to electric shock in case of damage to the connection cable		B	C	D	E	F	G	H			Check the connection cable with regard to damages before the first usage and then at regular intervals. Do not mount cable to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.
Personal injury/ damage to material due to spilled or leaked lubricant		B	C	D		F	G	H	K		Be careful when filling the reservoir and when connecting or disconnecting lubricant feed lines. Always use suitable hydraulic screw connections and lubrication lines for the stated pressures. Do not mount lubrication lines to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.
Loss of electrical protective function due to faulty installation of electrical components after repair							G				After replacement of electrical components carry out an electrical safety test according to ISO/ EN 60204-1
Reservoir with follower plate is subjected to spring load							G				Remove reservoir with follower plate only when the spring is quite released (i.e. the reservoir is empty). Provide adequate protective measure, e.g. fastening straps, when loosening the reservoir. Do not work with your head directly above the reservoir.

Life phases:

A = transport, B = installation, C = initial start-up, D = operation, E = cleaning, F = maintenance, G = fault, repair, H = shutdown, K = disposal

2. Lubricants

2.1 General information

Lubricants are used specifically for certain application purposes. In order to fulfil their tasks, lubricants must fulfil various requirements.

The most important requirements for lubricants are:

- Reduction of abrasion and wear
- Corrosion protection
- Noise minimisation
- protection against contamination or penetration of foreign objects
- Cooling (primarily with oils)
- longevity (physical/ chemical stability)
- economic and ecological aspects

2.2 Selection of lubricants

SKF considers lubricants to be an element of system design. A suitable lubricant is selected already when designing the machine and forms the basis for the planning of a centralized lubrication system.

The selection is made by the manufacturer or operator of the machine, preferably together with the lubricant supplier based on the requirement profile defined.

Should you have little or no experience with the selection of lubricants for centralized lubrication systems, please contact SKF.

If required we will be glad to support customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

You will avoid possible downtimes through damage to your machine or system or damage to the centralized lubrication system.

2.3 Material compatibility

Lubricants must generally be compatible with the following materials:

- steel, grey iron, brass, copper, aluminium
- NBR, FPM, ABS, PA, PUR

2.4 Temperature characteristics

The lubricant used must be suitable for the specific ambient temperature of the product. The viscosity required for proper operation of the product must be adhered to and must not be exceeded in case of low temperatures nor fall below specification in case of high temperatures. Specified viscosities, see chapter Technical data.

2.5 Ageing of lubricants

After a prolonged downtime of the machine, the lubricant must be inspected prior to re-commissioning as to whether it is still suitable for use due to chemical or physical ageing. We recommend that you undertake this inspection already after a machine downtime of 1 week.

If doubts arise as to a further suitability of the lubricant, please replace it prior to re-commissioning and, if necessary, undertake initial lubrication by hand.

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").

Please contact SKF. If you have further questions regarding lubricants.

You may request an overview of the lubricants tested by SKF.



Only lubricants specified for the product (see chapter Technical data) may be used. Unsuitable lubricants may lead to a failure of the product.



Do not mix lubricants. This may have unforeseeable effects on the usability and therefore on the function of the centralized lubrication system.



When handling lubricants the relevant safety data sheets and hazard designations, if any, on the packaging have to be observed.



Due to the multitude of possible additives, individual lubricants, which according to the manufacturer's data sheets fulfil the necessary specification, may not, in fact, be suitable for use in centralized lubrication systems (e. g. incompatibility between synthetic lubricants and materials). In order to avoid this, always use lubricants tested by SKF.

3. Overview, functional description

3.1 Described variants of the QLS system

Described variants of the QLS system Fig. 1

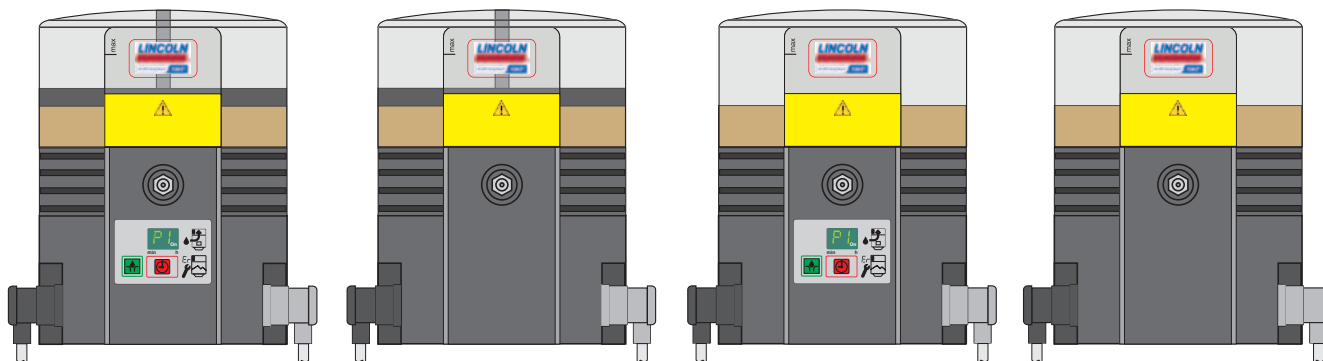
3

QLS 301 with controller

QLS 301 without controller

QLS 401 with controller

QLS 401 without controller



- with follower plate
- with or without controller
- with 12 V DC or 24 V DC
- with 120 V AC or 230 V AC
- with SSV metering device attached to the rear or bottom
- with external SSV metering device

- with or without controller
- with 12 V DC or 24 V DC
- with 120 V AC or 230 V AC
- with SSV metering device attached to the rear or bottom
- with external SSV metering device
- with SSVDV metering device attached to the rear

1 Reservoir

The lubricant is stored in the reservoir. Depending on the pump version there are different types of reservoirs and reservoir sizes.

2 Filler fitting

Serves to fill the reservoir with suitable clean lubricant.

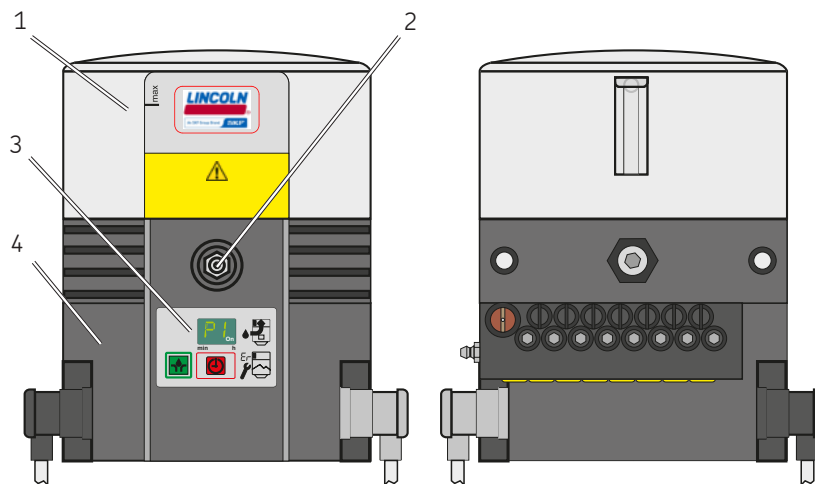
3 Membrane keypad

The membrane keypad serves to display operation and fault messages and to change parameters (programming) in the case of pumps with control unit.

4 Pump housing

Comprises the motor and, corresponding to the pump version, different control PCBs and different connection options (square or bayonet plug).

Overview, functional description of pumps without follower plate Fig. 2



5 Power supply

Serves to connect the pump to an external power supply.

6 Signal line

Serves to connect the pump to an external control or signal device.

7 Metering devices

Serve to meter and distribute lubricant as well as to switch off the pump by means of an indicator pin and proximity switch after reaching the preset number of operating cycles. Different SSV and SSVDV metering devices are available for different kinds of applications.

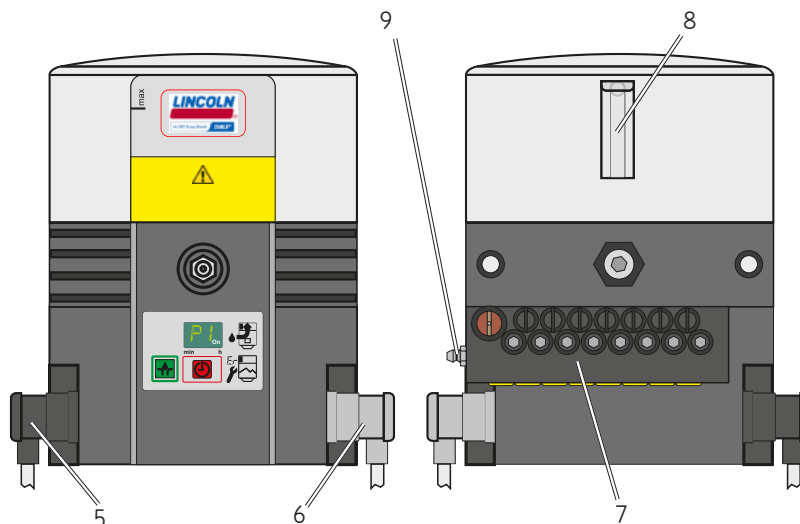
8 Reservoir venting device

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

9 Emergency lubrication fitting

Serves to provide the connected lubrication points with lubricant, e.g. in case of a defect of the pump.

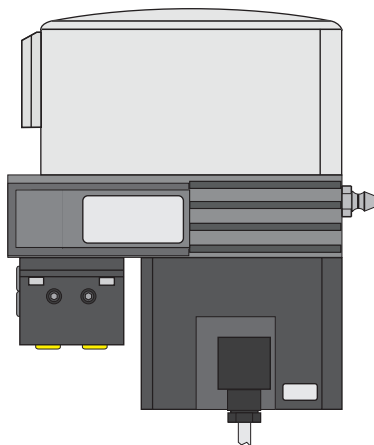
Overview, functional description of pumps without follower plate Fig. 3



3.2 Mounting positions of the metering devices

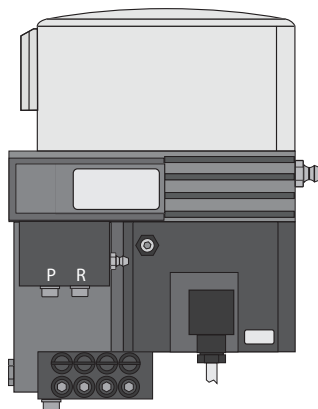
Mounting positions of the metering devices Fig. 4

Rear-mounted metering device



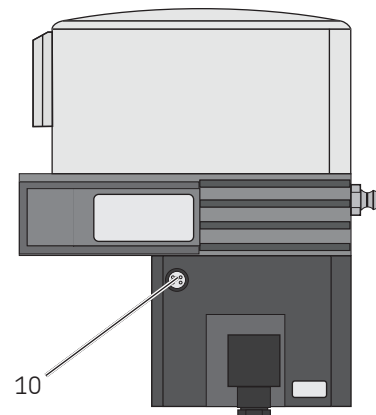
- with internal return of lubricant via outlet "2" of the metering device
- connection of the feed lines with pressure plastic tube or steel tube lines ($\varnothing 6 \times 1.5$ mm)
- vertical metering device outlets (V)

Bottom-mounted metering device



- with external return of lubricant via return line connection "R" of the connection block
- connection of the feed lines with pressure plastic tube or steel tube lines ($\varnothing 6 \times 1.5$ mm)
- horizontal metering device outlets (H)

Pump for external metering device



- The port (10) for the proximity switch of the external SSV metering device is located on the pump housing. External SSV metering devices are supplied with a corresponding plug and 2 m connection cable.

3.3 Changing the output volume of the SSV metering devices

About 0.2 cc of lubricant are supplied per stroke and outlet. Closing unneeded outlets with closure screws (11) increases the output of the next lower open outlet on the same side by the lubricant volume of the upper closed outlets. Maximum number of outlets that can be crossported internally:

SSV 6 = 3 SSV 12 = 6 SSV 18 = 9

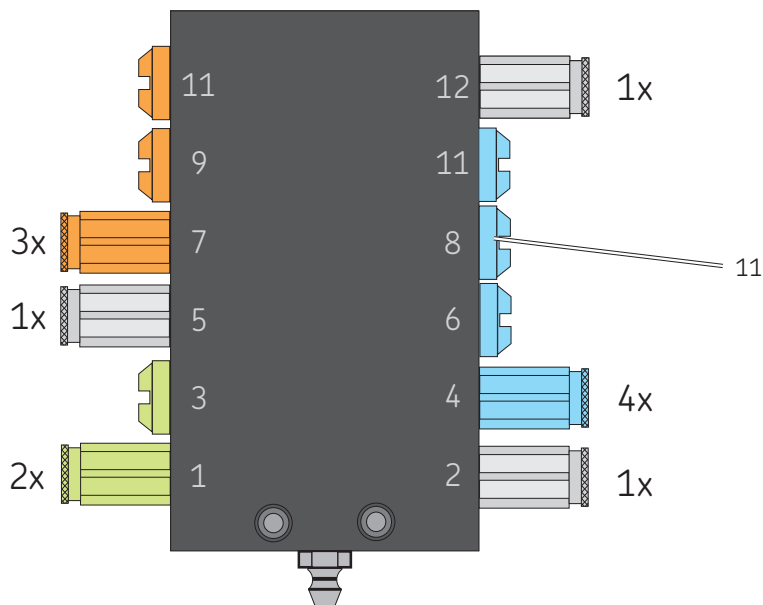
SSV 8 = 4 SSV 14 = 7

SSV 10 = 5 SSV 16 = 8



Further cross-porting of the output volume is possible externally only by means of a tee piece.

Changing the output volume of an SSV metering device Fig. 5



3.4 Changing the output volume of an SSV DV metering device

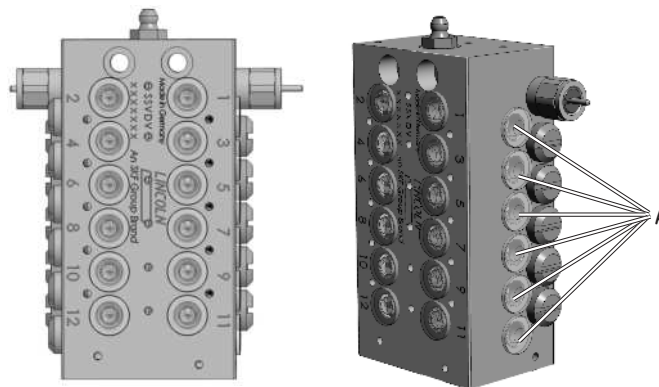
Adjust the output volume by screwing the required metering screw into the corresponding outlet of the metering piston level (A). Additionally the output can be adapted by closing unneeded outlets. (see SSV metering device)

Maximum number of outlets that can be crossported internally:

SSVDV 6 = 3 SSV DV 12 = 6

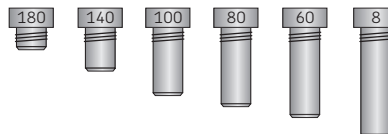
SSVDV 10 = 4 SSV DV 16 = 7

Changing the output volume of an SSV DV metering device Fig. 6



Metering screws SSV DV

1.8 1.4 1.0 0.8 0.6 0.08 cc



3.5 Return of unneeded lubricant

3.5.1 Rear-mounted metering device

Return is realized internally:

for even numbers of outlets

- by closing outlet 2

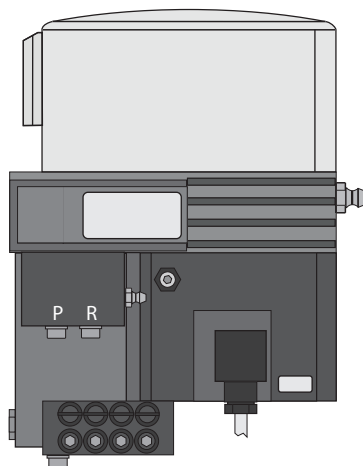
for odd numbers of outlets

- by closing outlets 2 and 1

Lubrication lines are connected to the outlets with the highest numbers. The outlets with the lowest numbers are used for returning the lubricant.

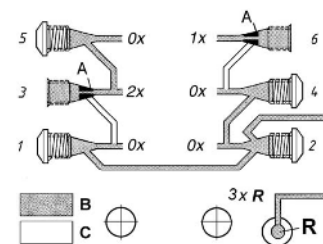
3.5.2 Bottom-mounted metering device and external metering device

Return is realized externally via return line "R" of the connection block. Outlets 1 and 2 must never be closed as otherwise there may occur a blockade in the metering device.



Return of unneeded lubricant Fig. 7

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



B Lubricant supply
C Lubricant included

3.6 Membrane keypad

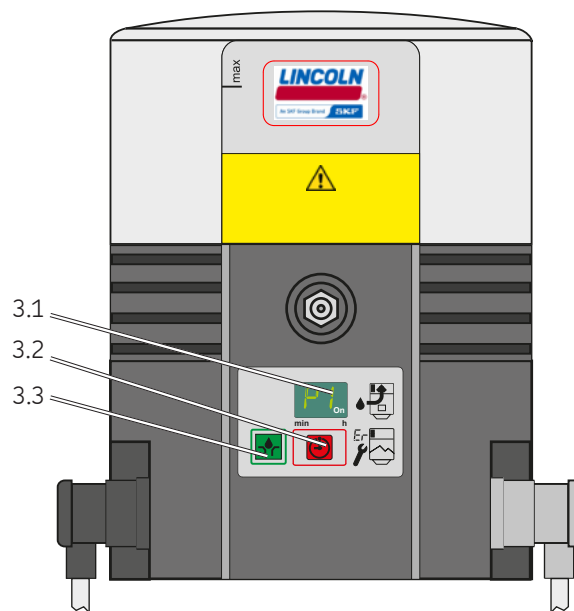
In case of pumps with controller the membrane keypad with display serves to:

- display operation states, error codes
- trigger an additional lubrication
- display and change parameters (programming)

All functions - except from the display of error codes - are available during the pump's pause time only.

Pump adjustments are made via the green adjustment key (3.3) and the red switch key (3.2) and are shown on the display (3.1).

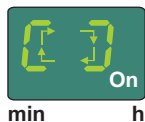
Membrane keypad with display Fig. 8



3.7 Displays in the display mode S4 control PCB

**Ready for operation**

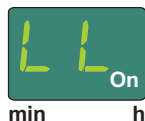
The pump is in the pause mode. There are no fault indications pending.

**Pump is on**

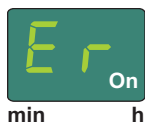
The pump is in the operating mode. There are no fault indications pending.

**Pre-low-level signal**

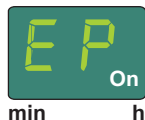
The pump is in the operating mode. There is little lubricant available. The display alternates with "pump is on".

**Low level indication**

Lubricant lacks. The pump terminates the current lubrication cycle. It can be restarted only after refilling the reservoir.

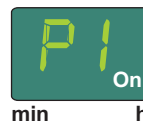
**Fault signal Er**

Too high back pressure
Control PCB defective
An unspecified error occurred during the monitoring time.

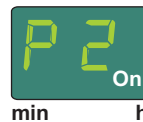
**Fault signal EP**

A fault of the membrane keypad is pending.

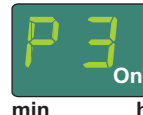
3.8 Displays in the programming mode S4 control PCB

**Programming step P1**

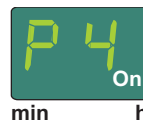
In this programming step the hourly value of the pause time is set..

**Programming step P2**

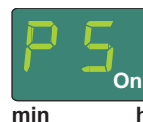
In this step the minute value of the pause time is set.

**Programming step P3**

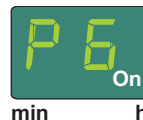
In this step the number of metering device cycles per operating cycle is set.

**Programming step P4**

In this step the type of output signal is set.
nc = normally closed contact
no = normally open contact

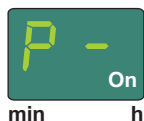
**Programming step P5**

In this step it is determined whether a differentiation is made between a fault signal or a low-level signal.

**Programming step P6**

In this step it is set how the pump will start when being switched on.
SP = Start with pause time
SO = Start with lubrication time

3.9 Displays in the display mode S4 control PCB



End of programming
Programming has been completed. To adopt the values set the programming has to be confirmed with the green key 3.3 (see Fig. 13) within 30 seconds.



Normally closed contact
Output signal is preset as normally closed contact. Programming step P4



Normally open contact
Output signal is preset as normally closed contact. Programming step P4



Fault - low-level signal
No differentiation between fault and low-level signal. Programming step P5

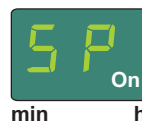


Output signal programmed as normally open contact
Intermittent low-level signal, functional faults as permanent signal (ON). Programming step P5

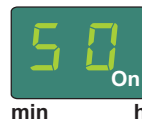


Output signal programmed as normally closed contact
Intermittent low-level signal, functional faults as permanent signal (OFF). Programming step P5

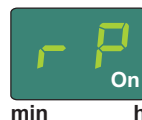
3.10 Displays in the programming mode S4 control PCB



Start phase SP
When being switched on the pump starts with a pause time. Programming step P6



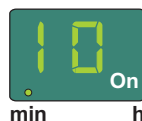
Start stage S0
When being switched on the pump starts with the lubrication time. Programming step P6



Remaining pause time
Consists of 3 consecutive displays that change in a two second interval.
Display 1



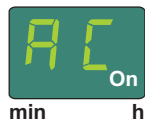
Display 2
Shows the remaining pause time in hours.



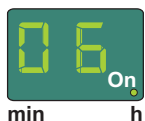
Display 3
Shows the remaining pause time in minutes.

Example: 0110. Remaining pause time
1 hour and 10 minutes.

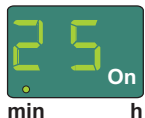
3.11 Displays in the display mode S4 control PCB

AC (Display 1)

Shows the number of automatically triggered operating cycles. Counter value 0-9999 (continuous). The display consists of 3 subsequent displays alternating in a two second interval.

Display 2

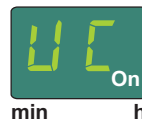
Shows the values in thousands and hundreds.

Display 3

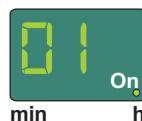
Shows the values in tens and units.

Example: 0625 = 625 automatically triggered operating cycles.

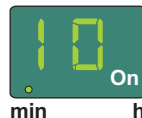
3.12 Displays in the programming mode S4 control PCB

UC (Display 1)

Shows the number of manually triggered additional lubrication cycles. Counter value 0-9999 (continuous). The display consists of 3 subsequent displays alternating in a two second interval.

Display 2

Shows the values in thousands and hundreds.

Display 3

Shows the values in tens and units.

Example: 0110 = 110 manually triggered additional lubrication cycles.

3.13 Displays in the display mode S5/S6 control PCB



min h

Ready for operation

The pump is in the pause mode. There are no fault indications pending.



min h

Pump is on

The pump is in the operating mode. There are no fault indications pending.



min h

Fault signal Er

Too high back pressure

Control PCB defective

An unspecified error occurred during the monitoring time.



min h

Fault signal EP

A fault of the membrane keypad is pending.

3.14 Displays in the programming mode S5/S6 control PCB



min h

Programming step P1 / P2

In this programming step the hourly value of the pause time is set..



min h



min h

Programming step P3

In this step the number of metering device cycles per operating cycle is set.



min h

End of programming

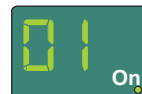
Programming has been completed. To adopt the values set the programming has to be confirmed with the green key 3.3 (see Fig. 13) within 30 seconds.



min h

Remaining pause time

Consists of 3 consecutive displays that change in a two second interval.

Display 1

min h

Display 2

Shows the remaining pause time in hours (displayed value x 100).



min h

Display 2

Shows the remaining pause time in hours (displayed value x 1).

Example: 0110. Remaining pause time = 110 hours.

4. Technical data

4.1 General technical data

Pump variant	12 V DC		24 V DC	120 V AC 60 Hz	230 V AC 50 Hz
Admissible operating temperature	-25 °C to 70 °C				
Operating pressure	205 bar max.				
Installation position	QLS 301 any ¹⁾ QLS 401 vertical (max. deviation± 5 °)				
Lubrication points	max. 18				
sound pressure level	< 70 dB (A)				
Reservoir size	QLS 301	1 litre			
	QLS 401	1 litre or 2 litres			
Filling	via hydraulic lubrication fitting R 1/4				
Weight of empty pump with SSV 12 metering device	approx. 6 kg				
Lubricants ³⁾	Lubricating greases NLGI II and NLGI III ²⁾ / fluid greases NLGI 00, 000				
Output ²⁾	approx. 0.12 ccm (per stroke)			approx. 1.0 ccm (per minute)	
Maximum pump run time	25 minutes (V AC) 15 minutes (V DC)				

¹⁾ also rotating installation, like e.g. in wind turbine generators. Maximum speed and maximum distance to the hub on request.

²⁾ NLGI III lubricants may be supplied under certain operating conditions only. Therefore the lubricant's supply characteristics have to be clarified with SKF in advance.

	Temperature [°C]:	-25 °C	-20 °C	+25 °C
012 V DC	Speed [rpm]	5.0	6.0 - 7.5	7.1 - 8.4
024 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, 6	6.5 - 6.8	6.9 - 7.1

The stated speed depends on the back pressure and the temperature. Basically the following applies: the higher the back pressure and the lower the temperature, the lower is the speed.

4.2 Electrics:

Pump variant	12 V DC	24 V DC	120 V AC (60 Hz)	230 V AC (50 Hz)
IP protection class of bayonet plug	6K9K	6K9K	65	65
Power supply with square plug (left side)	yes	yes	yes	yes
Tolerance of input voltage	-20 / + 30 %	-20 / + 30 %	±10 %	±10 %
Current input (maximum)	≤ 2 A	≤ 1 A	≤ 1 A	≤ 0.5 A
Types of protection	PELV			
Inputs	protected against reverse polarity, short circuit proof, non-isolated			
Power supply with bayonet plug (left side)	yes	yes	no	no
Power supply and fault signal with bayonet plug (left side)	yes	yes	no	no
Fault signals with square plug (right side)	yes	yes	yes	yes
Protective and disconnecting device required for isolation	yes	yes	yes	yes
Switching voltage	48 V AC / DC	48 V AC / DC	48 V AC / DC	48 V AC / DC
IP protection class of bayonet plug	65 / 67#	65 / 67#	65 / 67#	65/67#
AC fault relay for low level signal and fault signals	230 V AC	230 V AC	230 V AC	230 V AC
maximum switched current	5 A	5 A	5 A	5 A
DC fault relay for low level signal and fault signals	24 V DC	24 V DC	24 V DC	24 V DC
maximum switched current	5 A	5 A	5 A	5 A
Residual ripple (DIN 41755)	±5 %	±5 %	±5 %	±5 %
# IP 67 only for square plugs with prefabricated cable				

4.3 Factory settings of pumps with S4 control PCB

Programming step/ value	Factory setting	Setting range
P1 Pause time in hours	6 hours	0-59 hours
P2 Pause time in minutes	0 minutes	0-59 minutes
P3 Metering device cycles per operating cycle	1 cycle	V DC pumps 1-5 cycles V AC pumps 1-3 cycles [#]
P4 Signal output fault relay	no	N0 contact / NC contact
P5 Differentiation of low-level signal and fault signal	--	-- (no differentiation) -U (output signal as nc contact) -Π (output signal as no contact)
P6 Start stage	SP	[SP] Pump starts with pause time [SO] Pump starts with lubrication time
Maximum runtime	see chapter 4.1.	not modifiable
Maximum adjustable pause time = 59 hours 59 minutes Minimum adjustable pause time V DC pump = 4 minutes Minimum adjustable pause time V AC pump = 20 minutes [#] For the V AC versions adhere to the following values in order to avoid pump failure due to exceeding the max. runtime: - in case of SSV 6 + 8 max. 3 cycles - in case of SSV 10 to SSV 18 max. 1 cycle		

4.4 Factory settings of pumps with S5/ S6 control PCB

Programming step/ value	Factory setting	Setting range
P1/ P2 Pause time in hours	1600 h (P1=16; P=00)	2-9998 h
P3 Metering device cycles per lubrication cycle*	60 cycles (P3 = 60)	1-99 cycles
Signal output	S5 NC normally closed contact S6 NO normally open contact	not modifiable
Differentiation of low-level signal and fault signal	no differentiation	not modifiable
Start stage	The pump starts with a pause time.	not modifiable
Maximum runtime	15 minutes	not modifiable

Maximum adjustable pause time between the lubrication cycles = 9998 hours; minimum adjustable pause time V DC and V AC pumps = 2 hours
Increment of pause time setting: P1 = 100 hours (example: 100 h, 200 h, 300 h); P2 = 2 hours (example: 2 h, 4 h, 6 h, 8 h)

* A lubrication cycle is completed as soon as the preset number of metering device cycles (P3) has been completed successfully. Between the individual metering device cycles there is a fixed interval pause of 4 minutes. During the interval pause the display shows the metering device cycles of the current lubrication cycle still to be carried out. During the interval pause no additional lubrication can be triggered, nor can parameters be changed or displayed. If during the interval pause the power supply to the pump is interrupted, the interval pause will start from the beginning. In case of frequent interruptions during the interval pause this can result in the fact that no metering device cycle will be started anymore and thus the lubrication cycle cannot be completed. Reset the S5/S6 printed circuit board to the factory settings.

Switch off the power supply. Press the green and red keys simultaneously. Switch on power supply again. In the display there appears the fault low-level signal (see page 27) Release the green and red keys, Switch the power supply off and on again.

4.5 Functioning principle of the intermittent low-level indication

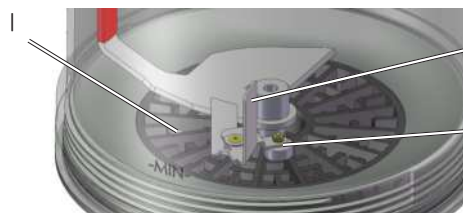
The intermittent low-level indication operates free of contact. Its main components are the following:

- o firmly positioned magnetic switch (I) inside of the reservoir bottom
- o flexible guide plate (II) connected to the stirring paddle with a magnet (III) and a control cam (IV)

If the reservoir is filled with a lubrication grease suitable for the intermittent low-level indication and the pump is operating, then the guide plate (II) is deflected by the resistance of the lubrication grease. As a consequence the magnet (III) connected to the guide plate (II) is moved on its inner circuit and cannot trigger a pulse at the magnetic switch (I) with its magnetic field. A control cam (IV) positively guides the magnet together with the pivoted guide plate towards the outside during each revolution. As soon as the guide plate leaves the control cam, the lubricant's resistance pushes the guide plate together with the magnet to the inside again.

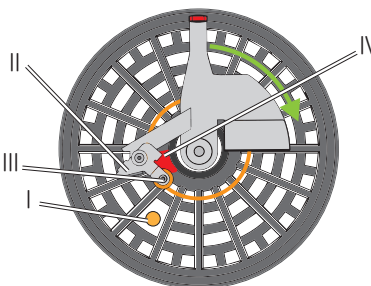
As soon as the lubricant inside the reservoir has fallen to that level that the lubricant's resistance is no more sufficient to further deflect the guide plate (II), the magnet (III) remains on the outer circuit and triggers a pulse each time it slides across the magnetic switch (I). If during an operating cycle the magnet (III) slides across the magnetic switch (I) six times, a low-level signal is sent by the control printed circuit board of the pump. For programming of the external control of the pump, see corresponding chapter in these instructions.

Perspective representation

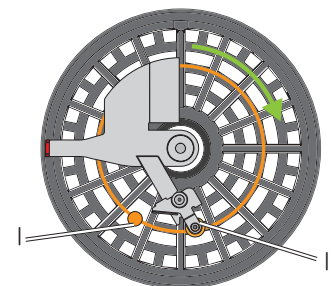


Schematic representation

Magnet on inner circuit



Magnet on outer circuit

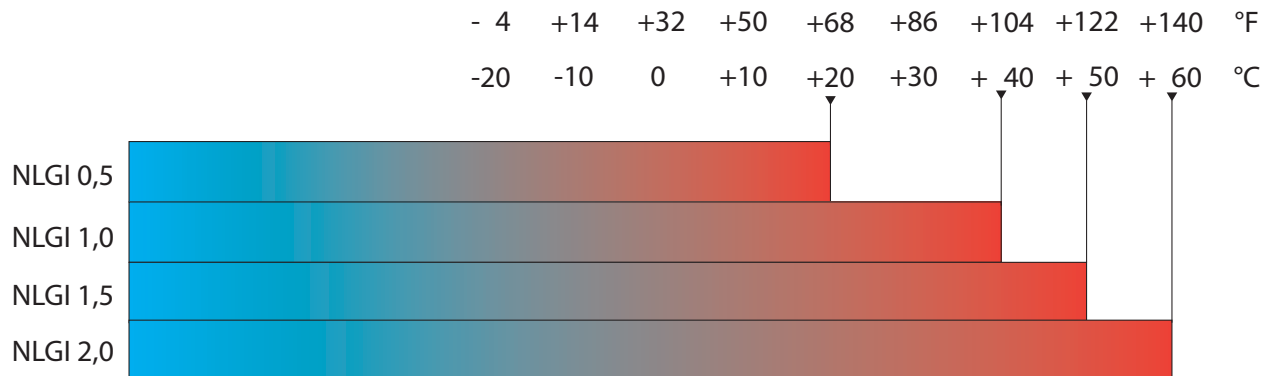


4.6 Limits of use of the intermittent low-level indication

The following lubricant consistencies have to be complied with in order to ensure the correct functioning of the intermittent low-level indication. Above the stated range of temperature a correct functioning of the intermittent low-level indication cannot be ensured. The inferior temperature ranges require the suitability of the lubricant for the respective temperature range. Otherwise the too high consistency of the lubricant may result in malfunctions, e.g. interruption of the lubricant supply, or in damages to the pump (e. g. bending of the stirring paddle).



The intermittent low-level indication is not appropriate for lubricants of NLGI class ≤ 0 .



4.7 Processing of the low-level signals in case of external controller and monitoring of the pump

The statements apply for pumps without control pcb with external control and monitoring by the operator.

To avoid early low-level indication (e.g. caused by air inclusions or wave formation in the lubricant) in case of external controller or monitoring the following conditions have to be fulfilled by programming the external controller accordingly.

- After each operating cycle the pulses of the intermittent low-level indications have to be deleted.



Pulses must never be added up over several operating cycles. This will result in an early low-level indication.

Operating cycle ≥ 32 seconds:

- 'Each operating cycle requires at least 6 signals by the magnetic switch .

Operating cycle ≥ 24 seconds ≤ 32 seconds:

- 'Each operating cycle requires at least 4 signals by the magnetic switch .

Operating cycle ≤ 24 seconds:

- The number of required magnetic switch signals has to be adapted to the operating conditions to be expected.
To do so, contact our Customer Service.

4.7.1 Visualization of a low-level indication

The low-level signal is visualized via an external control light as shown in the connection diagram.

4.7.2 Remaining run time of pump in case of a low-level indication

Pump with external controller

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

4.8 Tightening torques

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

Pump with base plate, machine, or vehicle	18 Nm \pm 1 Nm
Metering device with QLS pump	9 Nm \pm 1 Nm
Pump element with pump housing	25 Nm \pm 2 Nm
Outlet fitting on metering device	
screw-in type	17 Nm \pm 1 Nm
plug-in type	12 Nm \pm 1 Nm
Indicator pin fitting	18 Nm \pm 1 Nm
Closure screw (outlet)	15 Nm \pm 1 Nm
Closure screw (piston)	18 Nm \pm 1 Nm
Coupling nut on outlet fitting	
Plastic tube	10 Nm \pm 1 Nm
Steel tube	11 Nm \pm 1 Nm
Cover of pump housing	1.6 Nm + 0.8 Nm
Reservoir with pump housing	1.6 Nm \pm 0.1 Nm

4.9 Useable reservoir volume

The useable reservoir volume mainly depends on the NGLI consistency class and the operating temperature of the lubricant to be used. In case of high consistency and low operating temperature normally more lubricant sticks to the inner surfaces of the reservoir/ pump and is thus no more available for being dispensed.

	Useable reservoir volume 1-litre reservoir without low level indication (XN)	Useable reservoir volume 2-litre reservoir without low level indication (XN)
Lubricants with relatively high consistency ⁴⁾	approx. 0.5 litres	approx. 1.6 litres
Lubricants with relatively low consistency ⁵⁾	approx. 1.0 litres	approx. 2.0 litres
	Useable reservoir volume 1-litre reservoir with low level indication (XL)	Useable reservoir volume 2-litre reservoir with low level indication (XL)
Lubricants with relatively high consistency ⁴⁾	approx. 0.5 to 0.8 litres	approx. 1.6 to 1.9 litres
Lubricants with relatively low consistency ⁵⁾	approx. 0.6 to 0.9 litres	approx. 1.7 to 2.0 litres

⁴⁾ Lubricant consistencies of NLGI 2 lubricants at + 20 °C up to the maximum admissible lubricant consistency.

⁵⁾ Lubricant consistencies of NLGI-000 lubricants at + 70 °C up to lubricant consistencies of NLGI-1.5 lubricants at + 20 °C.

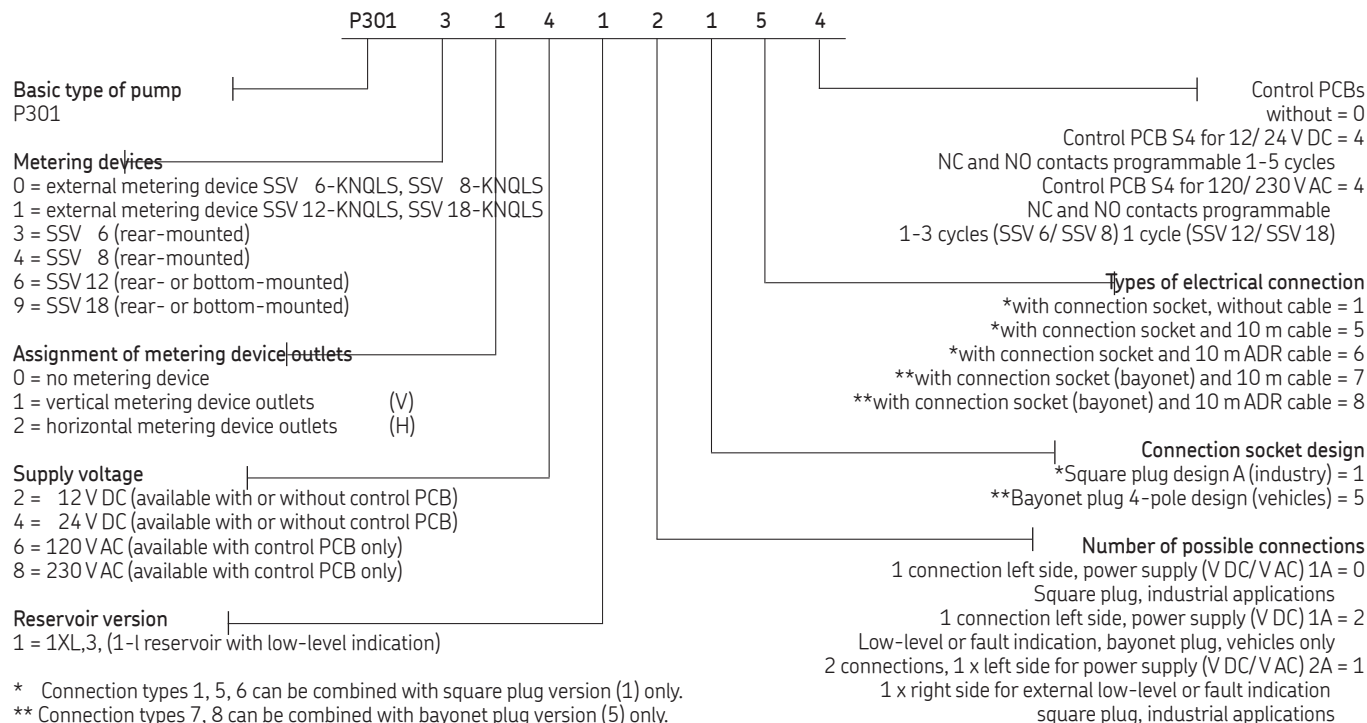
4.10 Lubricant requirement for priming of an empty pump

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

Reservoir size	Quantity	When using lubricants of a relatively low consistency in pumps subjected to strong vibrations or tilting motions (e.g. construction and agricultural machinery), make sure to maintain a level that is about 25 mm below the MAX marking of the reservoir. This prevents lubricant from entering the reservoir vent. In case of very strong vibrations this value must be increased, for low vibrations it can be reduced. Changing the filling level by 10 mm corresponds to a volume change of about 0.2 litres.
1 litre	1.75 litres ± 0.15	
2 litres	3.0 litres ± 0.10	

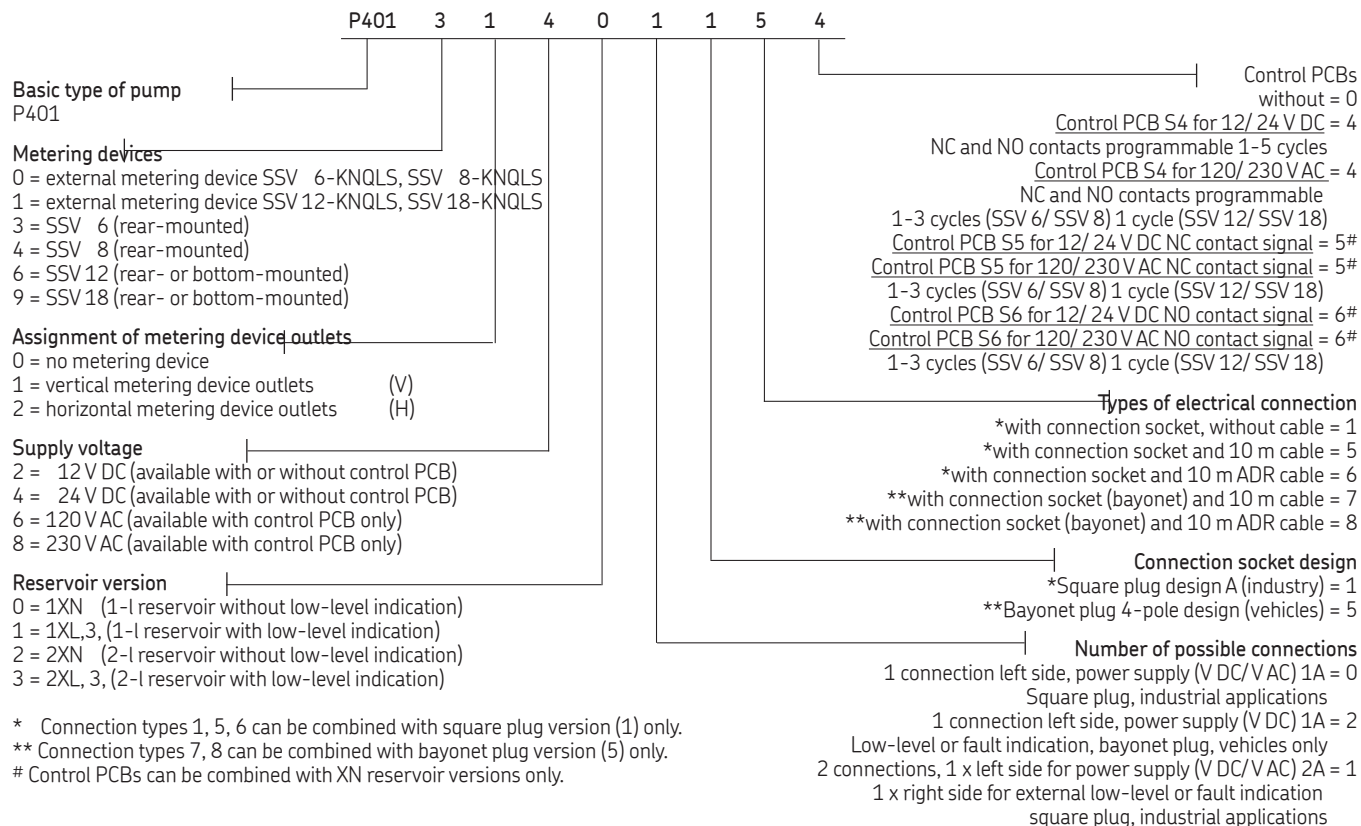
4.11 Type identification code QLS 301

Identification code



4.12 Type identification code QLS 401

Identification code

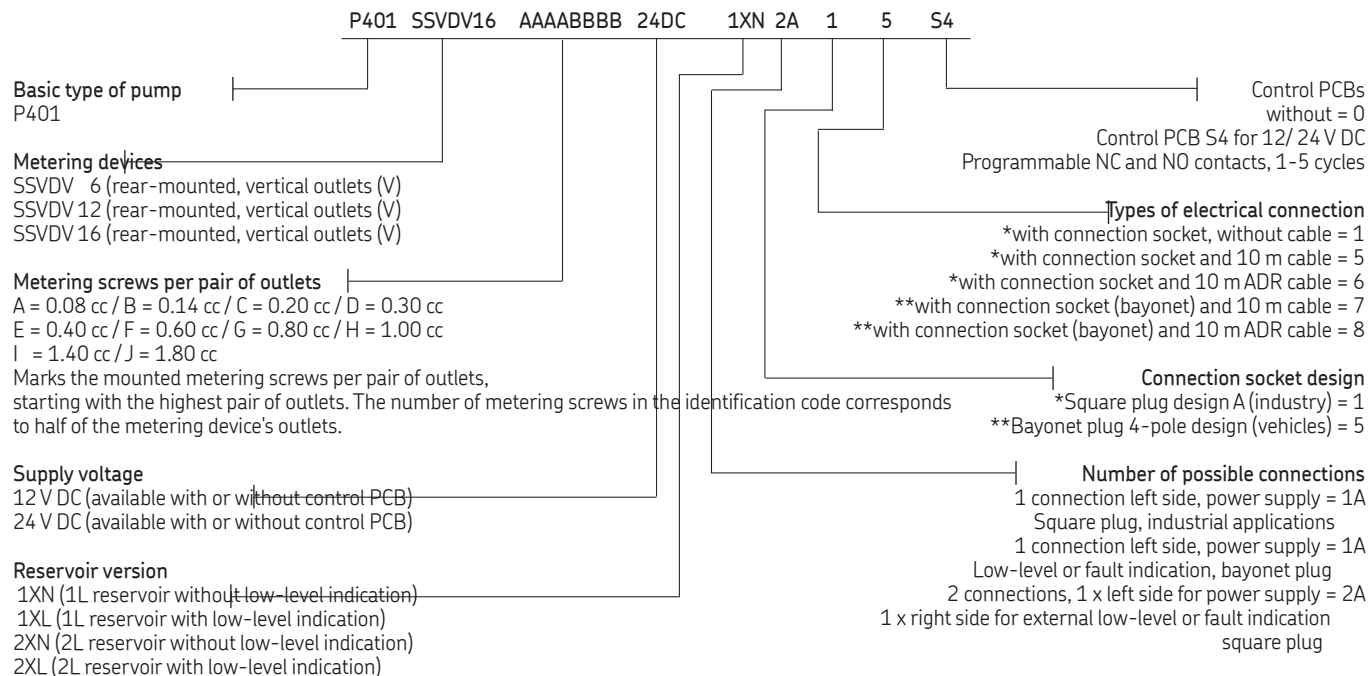


* Connection types 1, 5, 6 can be combined with square plug version (1) only.

** Connection types 7, 8 can be combined with bayonet plug version (5) only.

Control PCBs can be combined with XN reservoir versions only.

4.13 Type identification code QLS 401 SSV DV Identification code



This pump type allows for V DC variants only.

* Connection types 1, 5, 6 can be combined with square plug version (1) only.

** Connection types 7, 8 can be combined with bayonet plug version (5) only.

5. Delivery, returns, and storage

5.1 Delivery

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

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

5.2 Returns

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

Protect the product against mechanical influences such as impacts. 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, dust- and vibration-free in closed premises
- no corrosive, aggressive materials at the place of storage (e. g. UV rays, ozone)
- protected against pests and animals (insects, rodents, etc.)
- possibly in the original product packaging
- shielded from nearby sources of heat and coldness
- in case of high temperature fluctuations or high humidity take adequate measures (e. g. heater) to prevent the formation of condensation water



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

5.4 Storage temperature range

- In case of parts not filled with lubricant the admissible storage temperature corresponds to that of the admissible ambient temperature of the pump (see Technical data)
- In case of parts filled with lubricant the admissible storage temperature range is:

min. + 5 °C [+41 °F]

max. + 35 °C [+95 °F]



If the storage temperature range is not adhered to, the following work steps for replacing the lubricant may not in all cases lead to the desired result.

5.5 Storage conditions for parts filled with lubricant

The conditions mentioned in the following will have to be adhered to when storing products filled with lubricant,

5.5.1 Storage period of up to 6 months

The filled products can be used without having to take further measures.

5.5.2 Storage period from 6 to 18 months

Pump

- Connect the pump electrically
- Switch the pump on and let it run, e.g. by triggering an additional lubrication, until about 4 cc of lubricant will leak from each pump element
- Switch the pump off and disconnect it from the electrical grid
- Remove and dispose of leaked lubricant

Metering devices

- Remove all connection lines and closure screws, if any
- Connect the pump primed with new lubrication grease suitable for the application purpose to the divider bar in such way that the opposite port of the divider bar remains open
- Let the pump run until new lubricant leaks from the divider bar
- Remove leaked lubricant
- Reinstall closure screws and connection lines

Lines

- Dismantle preassembled lines
- Ensure that both line ends remain open
- Prime lines with new lubricant

5.5.3 Storage period exceeding 18 months

To avoid dysfunctions consult the manufacturer before commissioning. The general procedure to remove the old grease filling corresponds to that of a storage period from 6 to 18 months.

6. Installation

6.1 General information

Only qualified technical personnel may install the products described in these Instructions.

During assembly 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
- Observe the product's IP degree of protection
- Adhere to safety distances and legal prescriptions on assembly and prevention of accidents
- Possibly existing visual monitoring devices, e.g. pressure gauges, MIN/MAX markings or piston detectors, must be clearly visible
- Observe prescriptions in chapter Technical data regarding the installation position

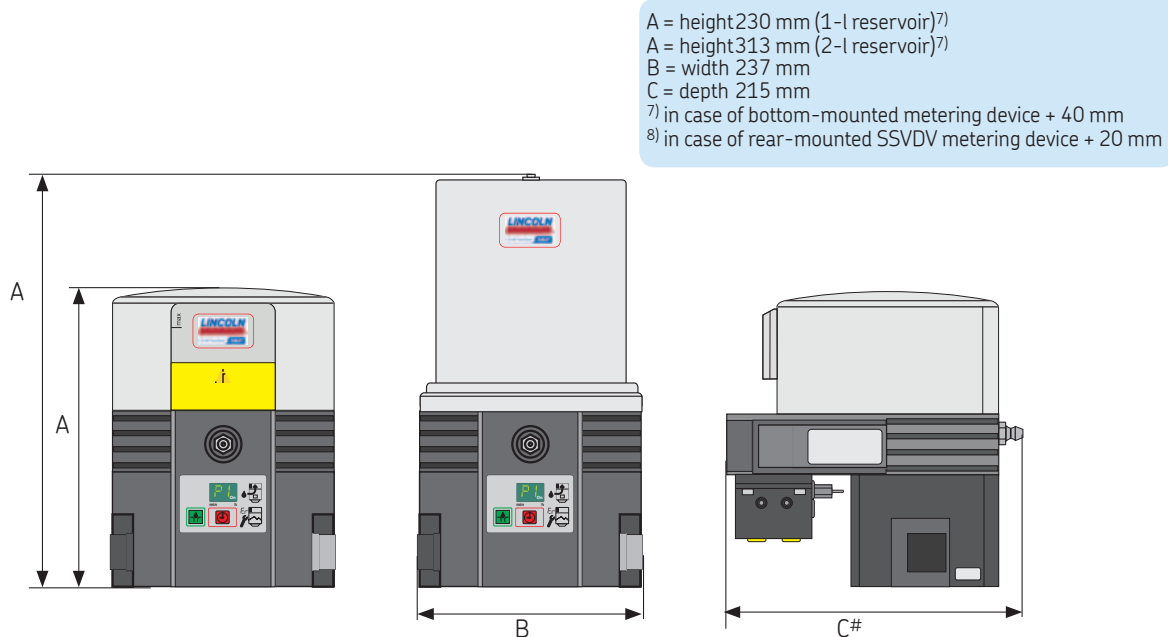
6.2 Place of installation

Protect the product against humidity, dust and vibrations and install it in an easily accessible position to facilitate other installation and maintenance works.

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. 9



6.4 Connection dimensions

The pump is fastened on the two mounting bores. 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

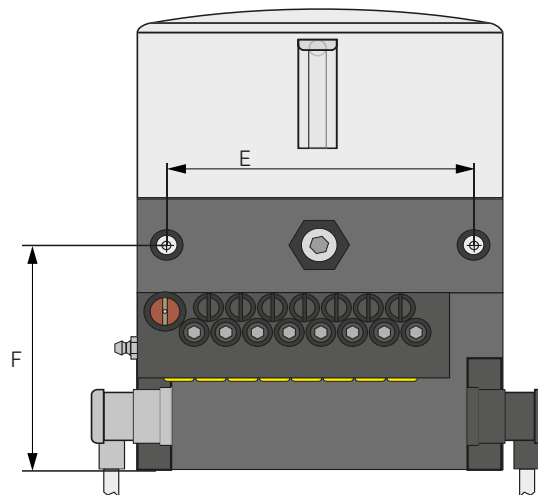
Tightening torque = 18 Nm \pm 1 Nm

Connecting dimensions Fig. 10

Connection dimensions

E = hole distance 146 mm

F = height 110 mm



6.5 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 them by means of a screw.

Bayonet plug

- Remove protective caps from the electrical connections of the pump.
- Place plugs onto connections and fasten them by turning them.
- In case of the bayonet plugs prefabricated by the operator, pin assignment is done in accordance with the wiring diagram in these Instructions (see chapter 12).

NOTE

Observe the electrical characteristics (see chapter 4).

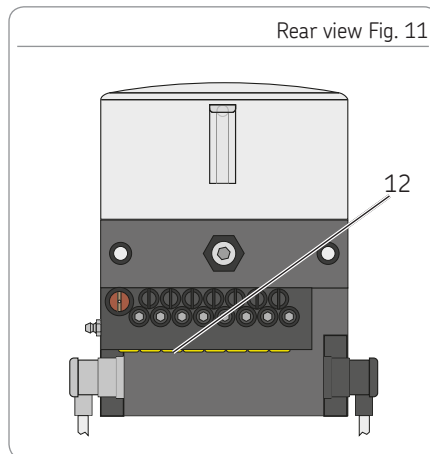
6.6 Priming of pumps without follower plate

To prime the pump proceed as follows:

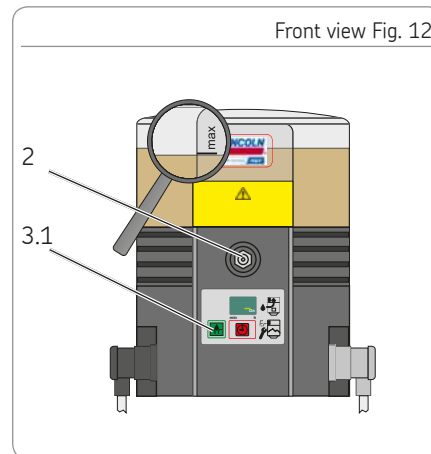
- Position bin below the pump to collect leaking lubricant.
- Screw out the yellow transport locks (12) from the metering device outlets.
- Close unneeded outlets of the metering device with closure screws.
- Place filling connection of grease gun or transfer pump onto filler fitting (2).
- Fill reservoir with lubricant until the MAX marking (Fig. 20). To do so, observe the notes contained in chapter 4.8.
- Press key (3.1) to let the pump run until lubricant leaks from the open outlets of the metering device.
- Switch the pump off.
- Remove lubricant collecting bin and dispose of leaked lubricant in an ecologically sound manner.

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

Rear view Fig. 11



Front view Fig. 12



6.7 Priming of the QLS 301 with follower plate

NOTICE

Risk of damage to the superior machine due to wrong priming. Avoid air pockets in the lubricant and under the follower plate. This may affect the pump's suction behaviour and result in a poor or lacking output performance.

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

To prime an empty QLS 301 proceed as follows:

- Unscrew Allen key M5 (1.2) out of the reservoir axis and keep it for further usage together with the below sealing ring.
- Remove reservoir (1) upwards. If necessary, slightly loosen reservoir on the side close to the reservoir centering device (1.1) by means of a blunt tool.
- Remove the spring (1.3).

Reservoir centering device Fig. 14



Remove screw Fig. 13



Reservoir and spring removed Fig. 15



- Position grease gun on filler fitting (2).
- Press follower plate (13) downward onto the pump housing.
- Fill pump until follower plate (1.1) starts lifting and some lubricant leaks out from the side (see Fig. 25).
- Slightly grease sealing lip (13.1) of follower plate with the leaking lubricant.
- Position spring (1.3) on reservoir axis again.
- Manually press reservoir over the O-ring completely downwards. Ensure that the reservoir centering device (see Fig. 22) is firmly seated in the corresponding recess of the pump housing.
- Use Allen key M5 (1.4) to screw reservoir together with washer onto the reservoir axis again.

Tightening torque = $1.6 \text{ Nm} \pm 0.1 \text{ Nm}$

- Fill reservoir until shortly below the MAX marking.
- Remove possible contaminations from the reservoir outside.

Fill space under the reservoir Fig. 16



Reservoir mounted again Fig. 18



Lateral lubricant leakage Fig. 17



Filling the reservoir Fig. 19



6.8 Programming of control PCB S4

To program QLS pumps with control pcb S4 proceed according to the following programming scheme.

Simultaneously press key 3.2 and key 3.3 for about 4 seconds to access the first programming step P1. After releasing the keys the adjusted value will be displayed. Change the value of the programming step by pressing key 3.3.

Confirm adjusted value within 30 seconds by pressing key 3.2. Otherwise the value will be lost.

Programming is continued with programming step P2. After confirming the last step P6 the programming is completed.

Programming steps

P1/ P2 Setting of the pause time in hours

P1/ P2 Setting of the pause time in minutes

P3 Setting of the metering device cycles

P4 Setting of the output signal on the monitoring relay

P5 Setting of the differentiation between fault and low-level signal

P6 Setting of the start stage

A = Programming step

B = Possible value

C = Change value by pressing the key

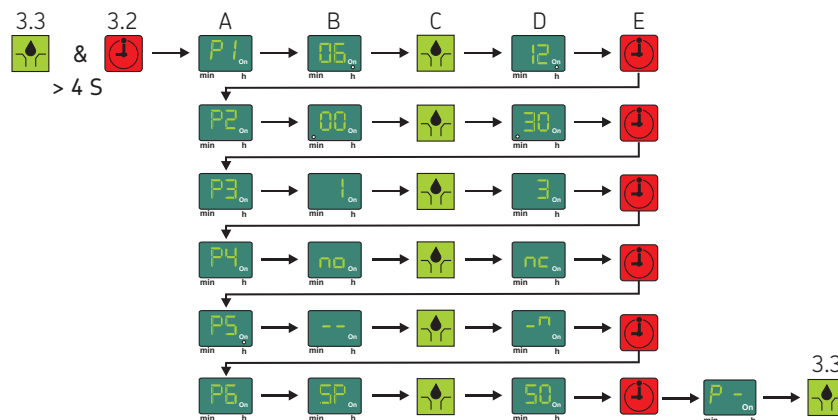
D = Possible new value

E = Confirm adjusted value within 30 seconds by pressing key 3.2 and continue with the next programming step. Confirm and finish the programming by pressing key 3.3 after the last programming step.

Notes related to the programming

Settings can be done in one direction only (+)
Fast forward by holding down key 3.3.

Programming scheme of control printed circuit board S4 Fig. 20



6.9 Programming of control PCBs S5 and S6

To program QLS pumps with control PCB S5/S6 proceed according to the following programming scheme.

- Simultaneously press key 3.2 and key 3.3 to access the first programming step P1. After releasing the keys the adjusted value will be displayed.
- Change the value of the programming step by pressing key 3.3.
- Confirm the changed value.

Programming is continued with programming step P2.

- Change the value of the programming step by pressing key 3.3.
- Confirm the changed value.

Programming is continued with programming step P3.

- Change the value of the programming step by pressing key 3.3.
- Confirm the changed value.

After confirming this step the programming is completed.

Programming steps

P1 Setting of the pause time in steps of 100 hours (display x 100)

P2 Setting of the pause time in steps of 2 hours (display x 2)

P3 Setting of the metering device cycles per operating cycle

A = Programming step

B = Possible value

C = Change value by pressing the key

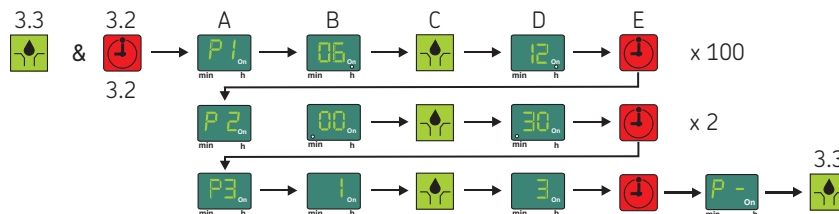
D = Possible new value

E = Confirm adjusted value within 30 seconds by pressing key 3.2 and continue with the next programming step. Confirm and finish the programming by pressing key 3.3 after the last programming step.



Notes related to the programming

Settings can be done in one direction only (+)
Fast forward by holding down key 3.3.

Programming scheme of control printed circuit board S5/S6 Fig. 21



6.10 Feed lines

	 CAUTION
	Risk of falling Exercise care when dealing with lubricants. Bind and remove spilled or leaked lubricants immediately.



Connect lubrication lines in such way that no forces are transferred to the product (tension-free connection).

All components of the centralized lubrication system must be laid out for:

- the maximum arising operating pressure
- the admissible ambient temperature
- the output volume and the lubricant to be supplied.

Observe the following installation instructions for safe and smooth operation.

- Use clean components and filled lubrication lines only.
- The main lubrication line should be laid preferably rising with a possibility to vent it at its highest point. Lubrication lines shall generally be laid in such way that there can never be created air pockets at any point.
- Possibly mount the lubricant metering devices at the end of the main lubrication line in such way that the outlets of the lubricant metering devices show upwards
- If lubricant metering devices have to be mounted below the main lubrication line, then this should not be done at the end of the main lubrication line.
- The lubricant flow should not be impeded by the installation of sharp elbows, angle valves, gaskets protruding to the inside, or cross-section changes (big to small). Provide unavoidable changes of the cross sections in the lubrication lines with as smooth transitions as possible.

6.11 Connection of the lubrication lines

To connect the lubrication lines the following lubrication lines and push-in type fittings should be used.

- Check valve with knurled standard collet
- Pressure plastic tube

As an option also the following parts can be used for the high-pressure range.

- Check valve with reinforced smooth collet
- High-pressure hose

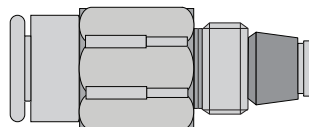


The inlet and outlet fittings of the main metering device belong to the high-pressure range. All other lubrication lines and fittings on secondary metering devices belong to the low-pressure range.

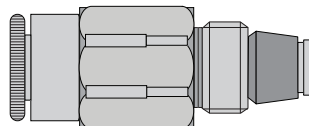


In construction and agricultural machinery all lubrication lines and fittings belong to the high-pressure range.

Check valve high-pressure range Fig. 22



Check valve low-pressure range Fig. 23



6.12 Maximum length of lubrication lines

The maximum lengths of the lubrication lines depends on the back pressure in the system and is restricted by the nominal pressure of the pressure control valve in the pump.

The back pressure is influenced mainly by the following factors:

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

6.13 Mounting of screw sleeves and hose studs

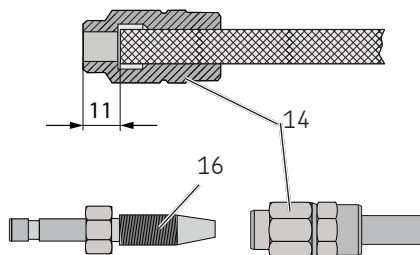


Check valves with reinforced collet may be connected only to high-pressure hoses with screw sleeves and hose studs.

To carry out the assembly proceed as follows:

- Turn screw sleeve (14) anticlockwise onto the high-pressure hose until measure 11 mm is reached.
- Oil screw sleeve and inside of high-pressure hose.
- Screw hose stud (16) into screw sleeve (12).

Mounting of screw sleeves and hose studs Fig. 24



7. Start-up

7.1 General information

Start-up of the fully and correctly mounted QLS pump is effected via the machine contact or the driving switch. If "EP", "Er" is displayed after switching the pump on, a fault is pending.

NOTE

S4 control printed circuit board:

If the power supply is interrupted within 1 minute from switching the pump on, after switching the pump on again the pause time starts from the beginning.

If the power supply is interrupted after 1 minute from switching the pump on, after switching the pump on again the pause time will continue from where it had been interrupted.

S5/S6 control printed circuit board:

In case of an interruption of the power supply only the full hour values will be stored as pause time.

The minutes values will be lost (max. loss = 59 minutes per interruption of the power supply). In case of frequent interruptions of the power supply, the actual pause time may differ significantly from the preset pause time.

7.2 Triggering an additional lubrication cycle

To trigger an additional lubrication cycle proceed as follows:

- Press the reset key (3.3) for > 2 seconds.
- The pump starts a lubrication cycle. At the same time the pause time already lapsed is reset.
- In the display there appears the symbol "Pump on".

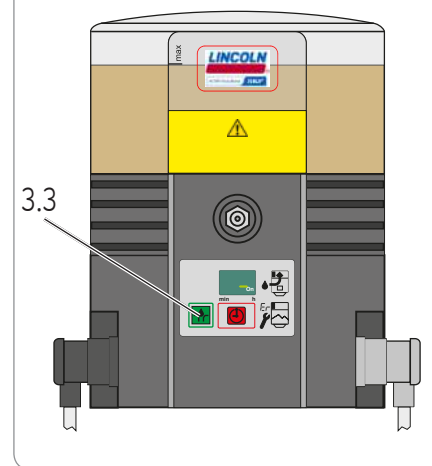
NOTE

S4 control PCB: The duration of the additional lubrication corresponds to the preset number of metering device cycles per lubrication cycle.

S5/S6 control PCB:

The duration of the additional lubrication corresponds to one metering device cycle.

Trigger an additional lubrication Fig. 25



In order to warrant safety and function, a person assigned by the operator must carry out the following inspections. Immediately eliminate detected deficiencies. Deficiencies may be remedied by an authorized and qualified specialist only.

	Start-up check list	
7.3 Inspections prior to initial start-up	YES	NO
Electrical connection carried out correctly.	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical connections carried out correctly	<input type="checkbox"/>	<input type="checkbox"/>
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data	<input type="checkbox"/>	<input type="checkbox"/>
All components, such as lubrication lines and metering devices, have been correctly installed	<input type="checkbox"/>	<input type="checkbox"/>
Product protected with adequate pressure control valve	<input type="checkbox"/>	<input type="checkbox"/>
No visible damage, contamination and corrosion	<input type="checkbox"/>	<input type="checkbox"/>
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function	<input type="checkbox"/>	<input type="checkbox"/>
All warning labels on the product are available and in proper condition	<input type="checkbox"/>	<input type="checkbox"/>
The lubrication and pause times adjusted on the control PCB correspond to the planned lubrication and pause times	<input type="checkbox"/>	<input type="checkbox"/>
7.4 Inspections during initial start-up		
No unusual noises, vibrations, accumulation of moisture, or odours present	<input type="checkbox"/>	<input type="checkbox"/>
No unwanted escape of lubricant (leakages) from connections	<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is supplied free from bubbles	<input type="checkbox"/>	<input type="checkbox"/>
Bearings and friction points are provided with the planned amount of lubricant	<input type="checkbox"/>	<input type="checkbox"/>

8. Operation

SKF products operate automatically to the greatest possible extent.

Basically, activities during standard operation are limited to the control of the filling level of pumps without low-level indication and the timely refilling of lubricant.

8.1 Refill lubricant

See chapter Filling with lubricant

9. Cleaning



WARNING



Electric shock

Carry out cleaning works only on depressurized products that have been disconnected from the power supply. Do not touch cables or electrical components with wet or damp hands.

Use steam-jet cleaners or high-pressure cleaners only in accordance with the degree of protection of the pump. Otherwise electrical components may be damaged.

Performance of cleaning, required personal protective equipment, cleaning agents and devices following the valid operational regulations of the operator.

9.1 Cleaning agents

Cleaning agents compatible with the material may be used only. (Materials, see chapter 2.3).



Thoroughly remove residues of cleaning agents from the product and rinse off with clear water.

9.2 Exterior cleaning

- Mark and secure wet areas.
- Keep unauthorized persons away.
- Thorough cleaning of all outer surfaces with a damp cloth.



Make sure to keep the reservoir closed during the cleaning procedure.

9.3 Interior cleaning

Normally, interior cleaning is not required.

Should incorrect or contaminated lubricant have been filled, inside cleaning of the product will be required.

To do so, contact the SKF Customer Service.

10. Maintenance

Regular and appropriate maintenance is a prerequisite to detect and clear faults in time. The specific timelines have to be determined, verified at regular intervals and adapted, if necessary, by the operator based on the operating conditions. If needed, copy the table for regular maintenance activities.

Maintenance check list		
Activity to be done	YES	NO
Electrical connection carried out correctly.	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical connections carried out correctly	<input type="checkbox"/>	<input type="checkbox"/>
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data	<input type="checkbox"/>	<input type="checkbox"/>
All components, such as lubrication lines and metering devices, have been correctly installed	<input type="checkbox"/>	<input type="checkbox"/>
Product protected with adequate pressure control valve	<input type="checkbox"/>	<input type="checkbox"/>
No visible damage, contamination and corrosion	<input type="checkbox"/>	<input type="checkbox"/>
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function	<input type="checkbox"/>	<input type="checkbox"/>
All warning labels on the product are available and in proper condition	<input type="checkbox"/>	<input type="checkbox"/>
No unusual noises, vibrations, accumulation of moisture, or odours present	<input type="checkbox"/>	<input type="checkbox"/>
No unwanted escape of lubricant (leakages) from connections	<input type="checkbox"/>	<input type="checkbox"/>
Lubricant is supplied free from bubbles	<input type="checkbox"/>	<input type="checkbox"/>
Bearings and friction points are provided with the planned amount of lubricant	<input type="checkbox"/>	<input type="checkbox"/>

11. Troubleshooting

Fault messages in case of pumps with controller

Fault message on the display	Meaning	Remedy
Fault signal LI	<ul style="list-style-type: none"> Pre-warning empty There is little lubricant available. The display alternates with "pump is on". 	<ul style="list-style-type: none"> Fill reservoir
Fault signal LL	<ul style="list-style-type: none"> Low-level indication No lubricant available any more. The pump still completes the current lubrication cycle. A restart can take place only after refilling the reservoir. 	<ul style="list-style-type: none"> Fill reservoir
Fault signal EP	<ul style="list-style-type: none"> Fault of the membrane keypad or fault of the display 	<ul style="list-style-type: none"> Replace membrane keypad Replace control printed circuit board
Fault signal Er	<ul style="list-style-type: none"> Too high back pressure Control PCB defective An unspecified error occurred during the monitoring time. 	<ul style="list-style-type: none"> If possible, use a more suitable lubrication grease and reduce line length Replace control PCB Let an electrician check the pump and replace pump, if necessary
If the fault cannot be determined and remedied, please contact our Service department.		

Mechanical faults on pumps with and without controller

Fault	Possible cause/ recognizability of fault	Remedy
Air pockets in the lubricant or lubrication system	<ul style="list-style-type: none"> Visual check for bubbles in the lubricant 	<ul style="list-style-type: none"> Vent lubricant (if required, trigger several additional lubrication cycles)
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"> Remove lubricant from the reservoir venting device
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 Defective check valve in the pump element	<ul style="list-style-type: none"> Too low pressurization 	<ul style="list-style-type: none"> Replace the pump element
Defective pressure relief valve Blockade on a lubrication point or in the SSV metering device	<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 the SSV metering device and remedy fault, if necessary.
Follower plate is stuck (pumps with follower plates)	<ul style="list-style-type: none"> Pump runs, but does not supply lubricant 	<ul style="list-style-type: none"> Determine cause and eliminate it.
If the fault cannot be determined and remedied, please contact our Service department.		

Mechanical faults on pumps with and without controller

Fault	Possible cause/ recognizability of fault	Remedy
Lubricant volume on one or more lubrication points deviates from projected values	<ul style="list-style-type: none"> ○ Wrong setting of pause time or number of metering device cycles ○ Wrong cross-porting of outlets on the SSV metering device ○ Wrongly adjusted SSVDV metering device 	<ul style="list-style-type: none"> ○ Check and, if necessary, correct pause time settings and metering device cycles ○ Check and, if necessary, correct cross-porting of outlets ○ Check metering screws and replace them, if necessary
Pump is permanently on/ Pump does not switch off	<ul style="list-style-type: none"> ○ Indicator pin on metering device does not move within switching distance of proximity switch or indicator pin is not positioned centrally in front of proximity switch 	<ul style="list-style-type: none"> ○ Check position and distance of indicator pin (distance < 0.5 mm) and correct, if necessary
If the fault cannot be determined and remedied, please contact our Service department.		

Electrical faults in case of pumps with controller

Fault	Possible cause/ recognizability of fault	Remedy
Power supply to pump interrupted	<ul style="list-style-type: none"> Recognizable – pump display is off. Fault in the superior machine/vehicle. External fuse defective Plug (A1) of power supply not mounted to pump correctly 	<ul style="list-style-type: none"> See documentation of the superior machine or vehicle Check the external fuse and replace, if necessary. Check correct fastening of plug (A1) and correct, if necessary.
Power supply interrupted from control PCB to motor	<ul style="list-style-type: none"> Pump display is off 	<ul style="list-style-type: none"> Check power supply from the control PCB to the motor and correct, if necessary.
Motor does not run despite circulating segmented display	<ul style="list-style-type: none"> Defective motor connection 	<ul style="list-style-type: none"> Check motor connection following the corresponding circuit diagram.
Motor defective	<ul style="list-style-type: none"> After triggering an additional lubrication pump does not run despite external power supply and control PCB 	<ul style="list-style-type: none"> Replace pump
If the fault cannot be determined and remedied, please contact our Service department.		

Electrical faults in case of pumps without controller

Fault	Possible cause/ recognizability of fault	Remedy
Power supply to pump interrupted	<ul style="list-style-type: none"> ○ After triggering an additional lubrication via an external controller pump does not run ○ Fault of the superior machine or vehicle. ○ External fuse defective ○ Plug (A1) of power supply not mounted to pump correctly 	<ul style="list-style-type: none"> ○ See documentation of the superior machine or vehicle ○ Check the external fuse and replace, if necessary. ○ Check correct fastening of plug (A1) and correct, if necessary.
Pump runs, but does not supply lubricant	<ul style="list-style-type: none"> ○ Fault in one or several downstream lubrication circuits or bearing points ○ Metering device blocked 	<ul style="list-style-type: none"> ○ Loosen lubrication feed lines on the metering device one after the other to determine the location of the blockade. The blockade is located behind the outlet from which lubricant leaks. ○ Replace metering device by a new one.
Deviating amount of lubricant at the lubrication point	<ul style="list-style-type: none"> ○ Wrong cross-porting of outlets of the metering device ○ Use of wrong metering screws with the SSSDV metering devices 	<ul style="list-style-type: none"> ○ Check metering device and correct, if necessary. ○ Check metering device and correct, if necessary.
Motor defective	<ul style="list-style-type: none"> ○ After triggering an additional lubrication pump does not run despite existing power supply 	<ul style="list-style-type: none"> ○ Replace pump, if necessary.

If the fault cannot be determined and remedied, please contact our Service department.

12. Repairs



WARNING



Risk of injury

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



- Keep unauthorized persons away.

- Mark and secure work area.

- De-pressurize the product.



- Disconnect the product from the power supply and secure it against being switched on.

- Verify that no power is being applied

- Earth and short-circuit the product.

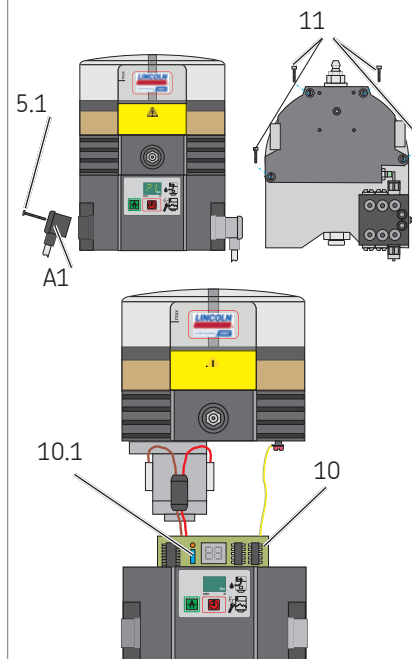
- Where needed, cover neighbouring units that are live.

12.1 Replacement of the membrane keypad

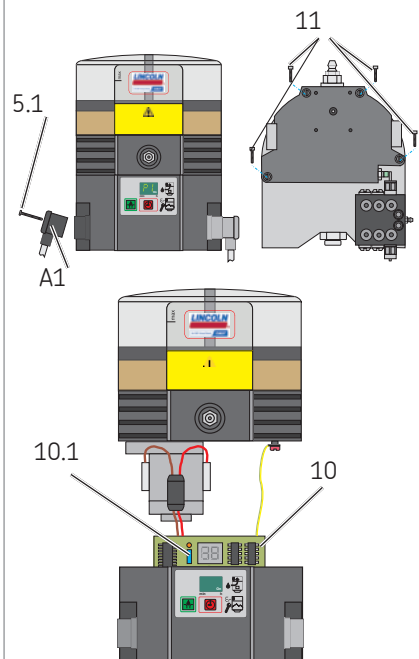
To replace the membrane keypad proceed as follows:

- Switch the pump off and disconnect it from the electrical grid. Loosen fitting (5.1) on plug (A1) and remove plug.
- Unscrew the cover of the pump housing on the four screws (11) and carefully remove the cover downwards.
- Carefully lift the control printed circuit board (10) from bottom to top out of the bracket in the cover until the blue plug (10.1) of the control printed circuit board is easily accessible.
- Remove blue plug from the control printed circuit board.
- Carefully loosen the adhesive membrane keypad from the housing and remove it together with the connection cable.

Replacement of membrane keypad Fig. 26



Replacement of membrane keypad Fig. 27



- Guide the connection cable of the new membrane keypad from the front through the opening for the membrane keypad in the housing and plug it onto the corresponding port of the control printed circuit board. Ensure that the plug is oriented correctly.
- Carefully insert control printed circuit board in the bracket.
- Stick new membrane keypad onto housing.
- Mount cover of pump housing with four new microencapsulated screws (11).

Tightening torque = 1.6 Nm + 0.8 Nm

- Remount plug A1 to connect the pump to the power grid.

12.2 Tests after replacement of the control PCB



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

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.

13. Shutdown and disposal

13.1 Temporary shutdown

Temporarily shut the system down by:

- Switching off the superior machine.
- Disconnecting the product from the power supply.

13.2 Final shutdown and disassembly

The final shutdown and disassembly of the product must be planned and carried out by the operator in a professional manner and in compliance with all regulations to be observed.

13.3 Disposal

Countries within the European Union

Disposal should be avoided or minimized wherever possible. Disposal of products contaminated with lubricant must be effected via licensed waste disposal contractor in accordance with environmental requirements and waste disposal regulations as well as local authority requirements.



The specific classification of the waste is in the waste producer's responsibility, as the European Waste Catalogue provides different waste disposal codes for the same type of waste but of different origin.

Electrical components

have to be disposed of or recycled following WEEE directive 2012/19/EU.

Plastic or metal parts can be disposed of with the commercial waste.

Countries outside the European Union

The disposal has to be done according to the valid national regulations and laws of the country where the product is used.

14. Spare parts

The spare parts of the QLS system may be used exclusively for replacement of identical defective parts. Modifications (except from metering screws) with spare parts on existing products are not allowed.

14.1 SSV metering devices

Designation	Qty.	Part number
<u>Use of QLS 301/ QLS 401</u>		
SSV metering device 8 K bottom-mounted*	1	619-37586-1
SSV metering device 10 K bottom-mounted*	1	619-37776-6
SSV metering device 12 K bottom-mounted*	1	619-37587-1
SSV metering device 14 K bottom-mounted*	1	619-37776-7
SSV metering device 16 K bottom-mounted*	1	619-37776-8
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 08 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 06 KN QLS external connection#	1	619-28945-1
SSV 08 KN QLS external connection#	1	619-28946-1
SSV 10 KN QLS external connection#	1	619-28949-1
SSV 12 KN QLS external connection#	1	619-28950-1
SSV 14 KN QLS external connection#	1	619-28951-1
SSV 16 KN QLS external connection#	1	619-28952-1
SSV 18 KN QLS external connection#	1	619-28953-1
SSV 22 KN QLS external connection#	1	619-77131-1

* including indicator pin
including indicator pin and sensor

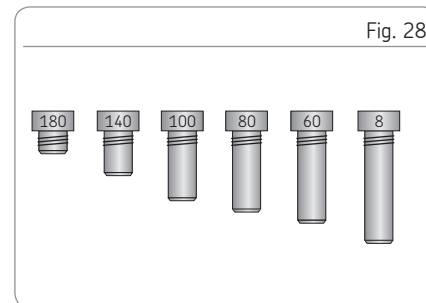
14.2 SSVDV metering device

Designation	Qty.	Part number
<u>Use of QLS 401</u>		
SSVDV metering device 6 rear-mounted*	1	649-77599-1
SSVDV metering device 10 rear-mounted*	1	649-77600-1
SSVDV metering device 12 rear-mounted*	1	649-77601-1
SSVDV metering device 16 rear-mounted*	1	649-77602-1

14.3 Metering screws for SSVDV metering devices

Code	Length	Metered volume	Qty.	Part number
008 / A	46.7 mm	0.08 cc/ stroke	12	549-34254-1
014 / B	45.9 mm	0.14 cc/ stroke	12	549-34254-2
020 / C	44.7 mm	0.20 cc/ stroke	12	549-34254-3
030 / D	42.7 mm	0.30 cc/ stroke	12	549-34254-4
040 / E	40.7 mm	0.40 cc/ stroke	12	549-34254-5
060 / F	36.7 mm	0.60 cc/ stroke	12	549-34254-6
080 / G	32.7 mm	0.80 cc/ stroke	12	549-34254-7
100 / H	28.7 mm	1.00 cc/ stroke	12	549-34254-8
140 / I	20.8 mm	1.40 cc/ stroke	12	549-34254-9
180 / J	12.8 mm	1.80 cc/ stroke	12	549-34255-1

Set of respectively 2 metering screws of all sizes 20 549-34255-2



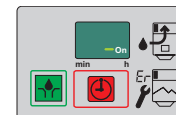
14.4 Kit of seals

Designation	Qty.	Part number
Gasket set for QLS 301 (without figure)	1	550-36979-8
Gasket set for QLS 401 (without figure)	1	550-34178-1

14.5 Membrane keypad

Designation	Qty.	Part number
<u>Use of QLS 301/ QLS 401 with controller</u>		
Adhesive membrane keypad	1	236-14340-8

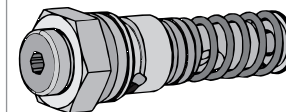
Fig. 29



14.6 Pump element

Designation	Qty.	Part number
Pump element D6	1	650-28856-1

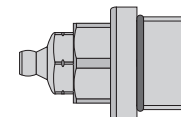
Fig. 30



14.7 Adapter M22 x 1.5

Designation	Qty.	Part number
Adapter M22 x 1.5 with lubrication fitting	1	519-33959-1

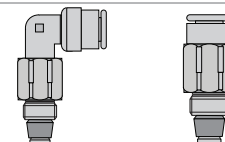
Fig. 31



14.8 Push-in type fittings with check valve

Designation	Qty.	Part number
Push-in type fitting RVM 6510-6 M10x1-S	1	226-10337-3
Push-in type fitting RVM 6511-6 M10x1-S01	1	226-14091-4
Push-in type fitting WRVM 6521-6 M10x1-S01	1	226-14091-8

Fig. 32



14.9 reservoir

Designation	Qty.	Part number
<u>Use of QLS 301</u>		
Transparent 1-l reservoir with sealing and labels (QLS 301)	1	550-36979-2
<u>Use of QLS 401</u>		
Transparent 1-l reservoir with sealing and labels (QLS 401)	1	550-34179-1
<u>Use of QLS 401</u>		
Transparent 2-l reservoir with sealing and labels (QLS 401)	1	550-34179-4

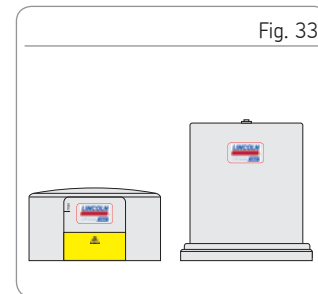


Fig. 33

14.10 Housing cover replacement kit

Designation	Qty.	Part number
<u>Use of QLS 301/ QLS 401</u>		
Type of connection 1A1 V DC/ square plug/ bottom-mounted metering device	1	550-34178-5
Type of connection 2A1 V DC/ square plug/ bottom-mounted metering device	1	550-34178-4
Type of connection 1A1 V AC/ square plug/ bottom-mounted metering device	1	550-34178-3
Type of connection 2A1 V AC/ square plug/ bottom-mounted metering device	1	550-34178-2
<u>Use of QLS 301/ QLS 401</u>		
Type of connection 1A1 V DC/ bayonet plug/ bottom-mounted metering device	1	550-34179-3

A replacement kit consists of: Housing cover including membrane, membrane keypad, housing sealing, plug for feed line including protective cap, corresponding number of microencapsulated housing screws and required adhesive labels.

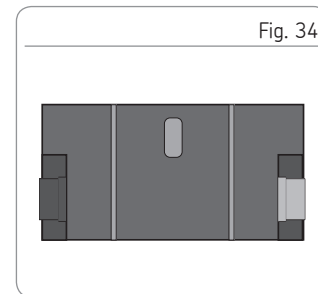


Fig. 34

14.11 V DC motors

Designation	Qty.	Part number
12 V DC pump motors with motor connection cable	1	550-36982-1
24 V DC pump motors with motor connection cable	1	550-36982-2

14.12 Electrical connections

Designation	Qty.	Part number
Square plug with connection socket (black) with 10 m cable (4-wire)	1	664-36078-7
Square plug with connection socket (grey) with 10 m cable (4-wire)	1	664-36078-9
Bayonet plug with connection socket with 10 m cable (4-wire)	1	664-34045-1

14.13 Control PCB replacement kit

Version:	voltage		Jumper	Qty.	Part number
S4	120	VAC	NO	1	550-34199-1
S4	120	VAC	YES	1	550-34199-2
S4	230	VAC	NO	1	550-34199-3
S4	230	VAC	YES	1	550-34199-4
S4	12/ 24	V DC	NO	1	550-34199-5
S5	12/ 24	V DC	NO	1	550-34199-6
S5	230	VAC	NO	1	550-34199-7
S6	12/ 24	V DC	NO	1	550-34199-8
S6	230	VAC	NO	1	550-34199-9
S6	120	VAC	YES	1	550-85207-1

A replacement kit consists of: Control PCB, housing sealing, corresponding number of microencapsulated housing screws and service instructions for replacement of control PCB.

Fig. 35

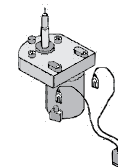


Fig. 36

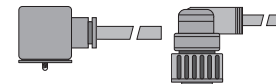
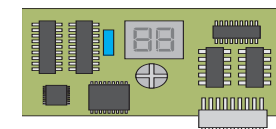


Fig. 37



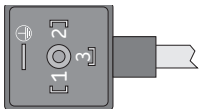
15. Circuit diagrams

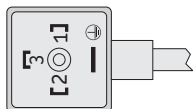
15.1 Legend

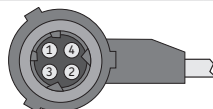
Cable colours following IEC 60757							
Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour
BK	black	GN	green	WH	white	PK	pink
BN	brown	YE	yellow	OG	orange	TQ	turquoise
BU	blue	RD	red	VT	violet		

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 F2	External fuse		

15.2 Core assignment of the connection plugs

Core assignment of connection A1 / X1			
Pin 1	Pin 2	Pin 3	PE
Y	Y	Y	Y
RD	BN	BK	GN/YE
Square plug EN 175301-803 / DIN 43650 / A			
			

Core assignment of connection A2 / X2			
Pin 1	Pin 2	Pin 3	PE
Y	Y	Y	Y
RD	BN	BK	GN/YE
Square plug EN 175301-803 / DIN 43650 / A			
			

Core assignment of connection A1 / X1			
Pin 1	Pin 2	Pin 3	Pin 4
Y	Y	Y	Y
BK	BN	WH	YE
Bayonet plug ISO 15170-1			
			

15.3 Assignment of circuit diagrams to the pump

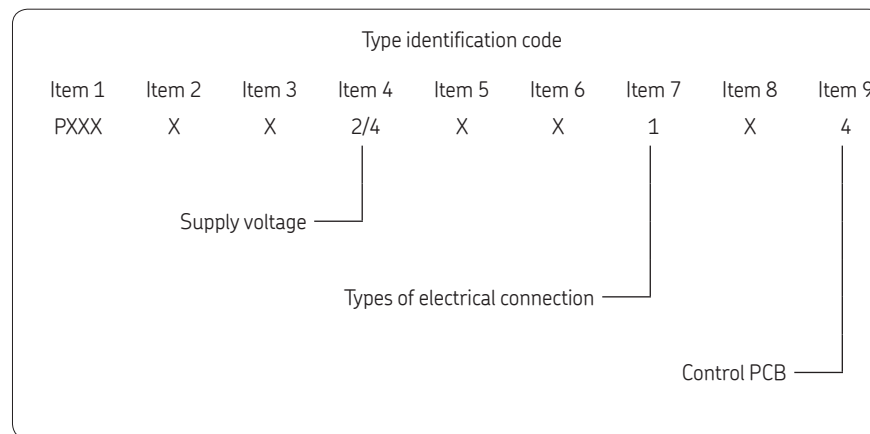
Assignment of the circuit diagrams to a certain pump is done via the characteristics given in the type identification code

Item 4 Power supply

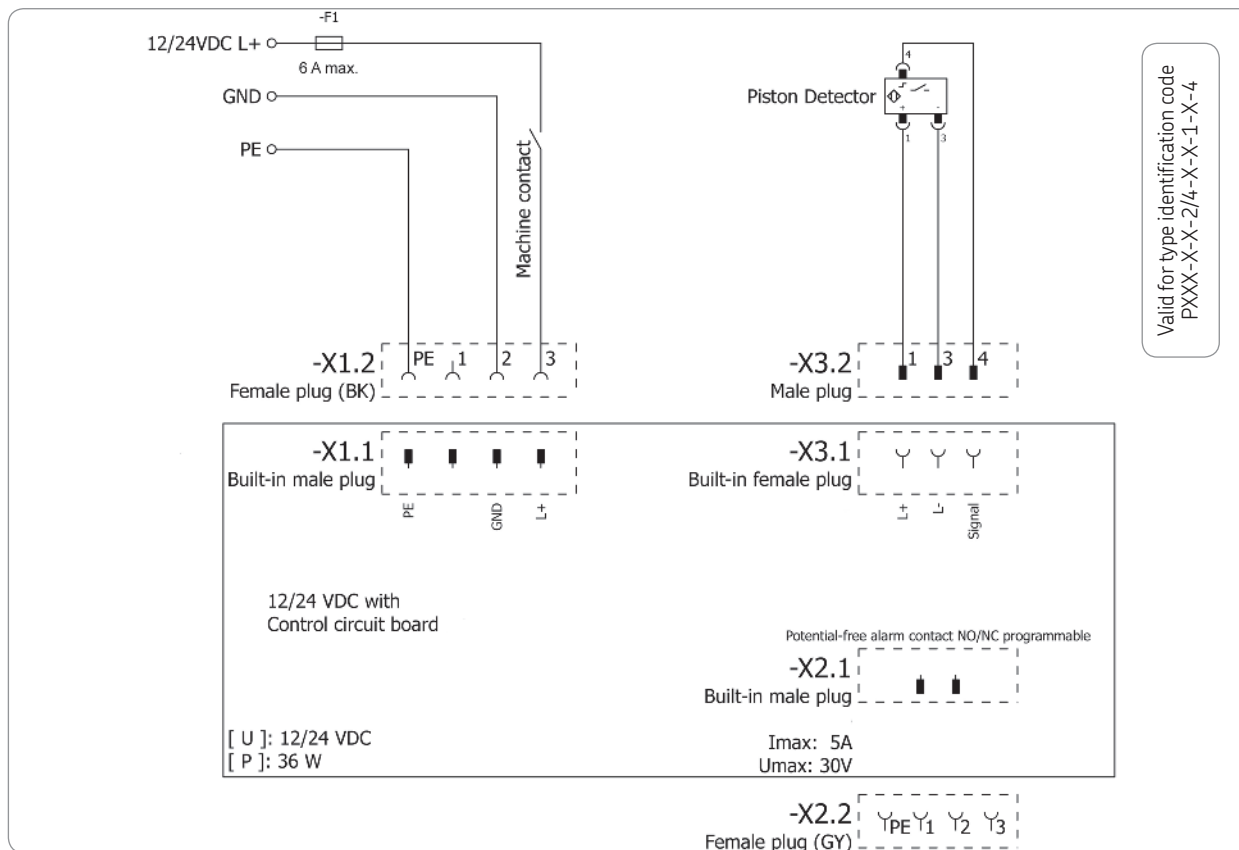
Item 7 Connecting socket version

Item 9 Control pcb

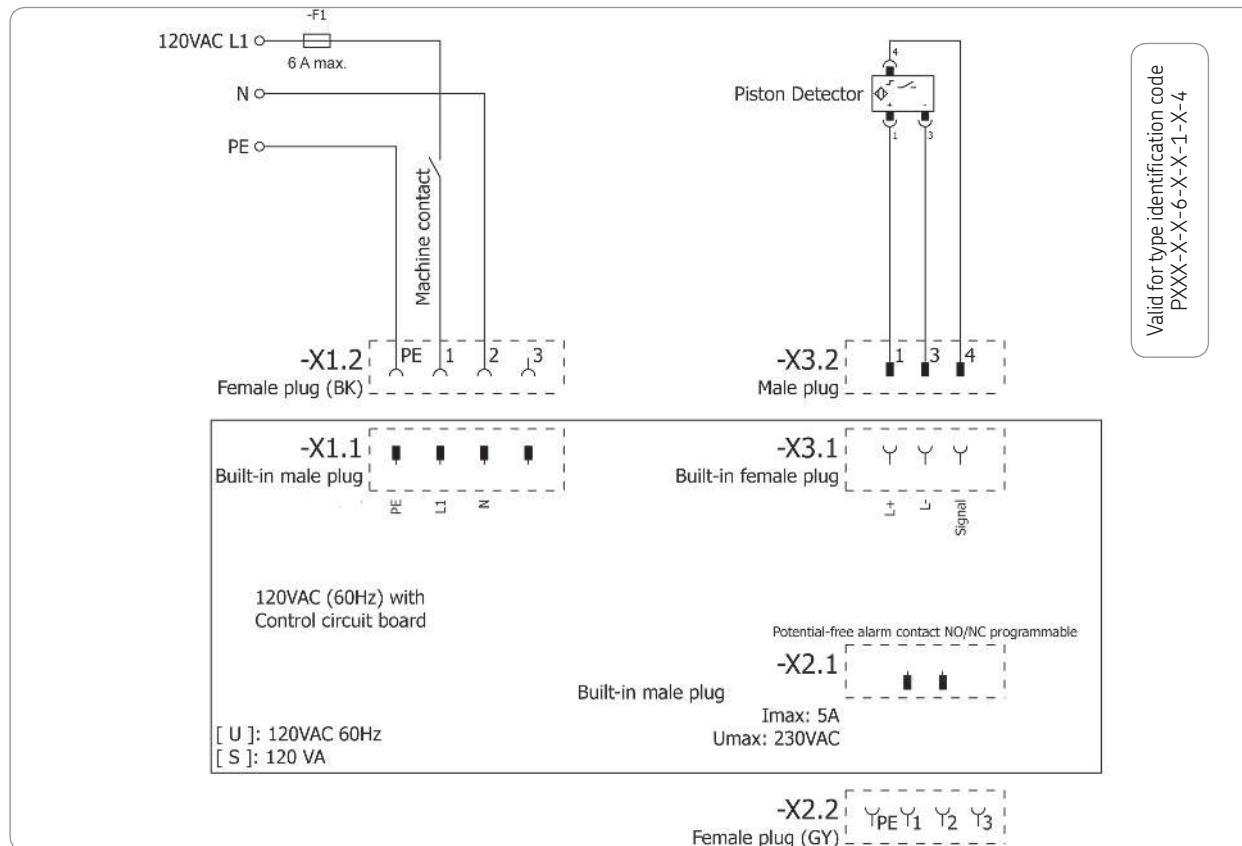
If the indications of the type identification code correspond to those of the circuit diagram, then the circuit diagram applies. For type identification code see the pump's type identification plate.



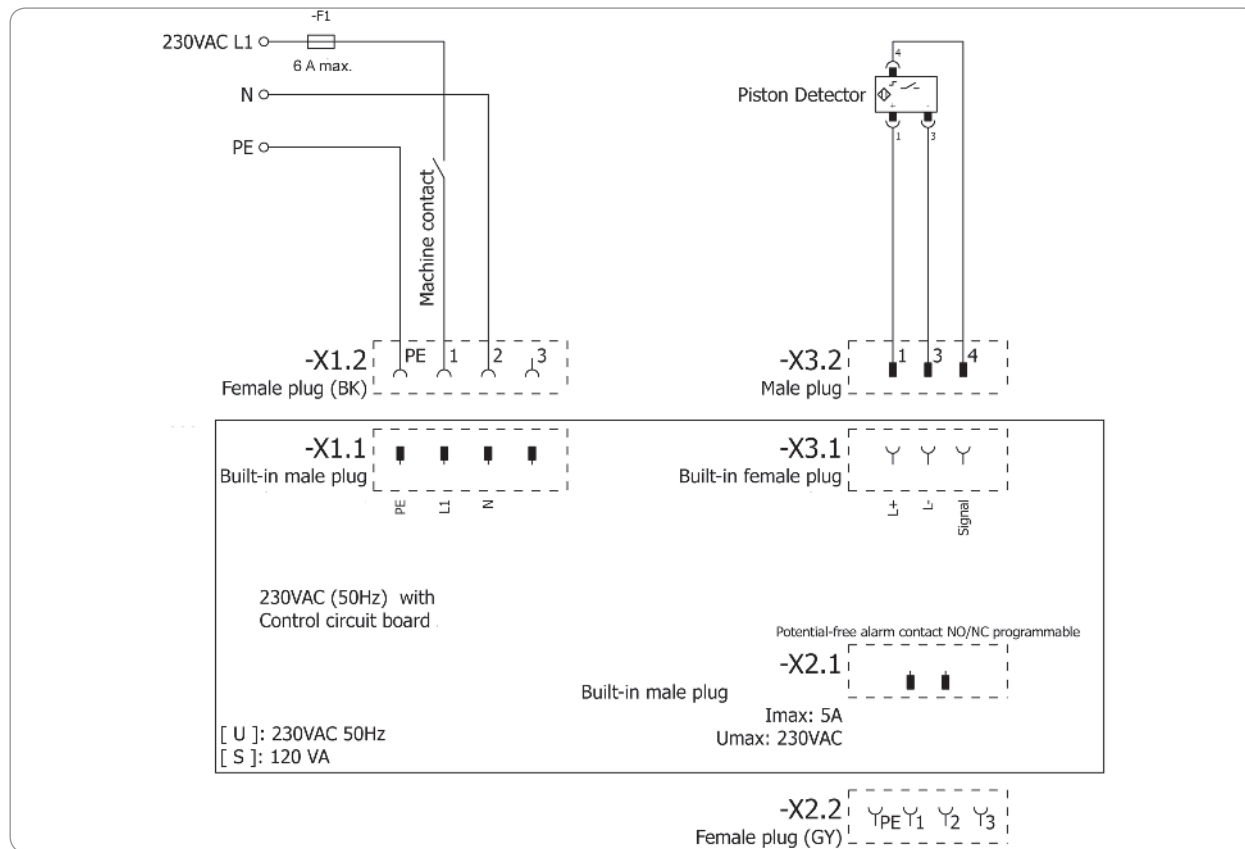
15.4 Circuit diagram 12/ 24 V DC, with square plug and control PCB S4



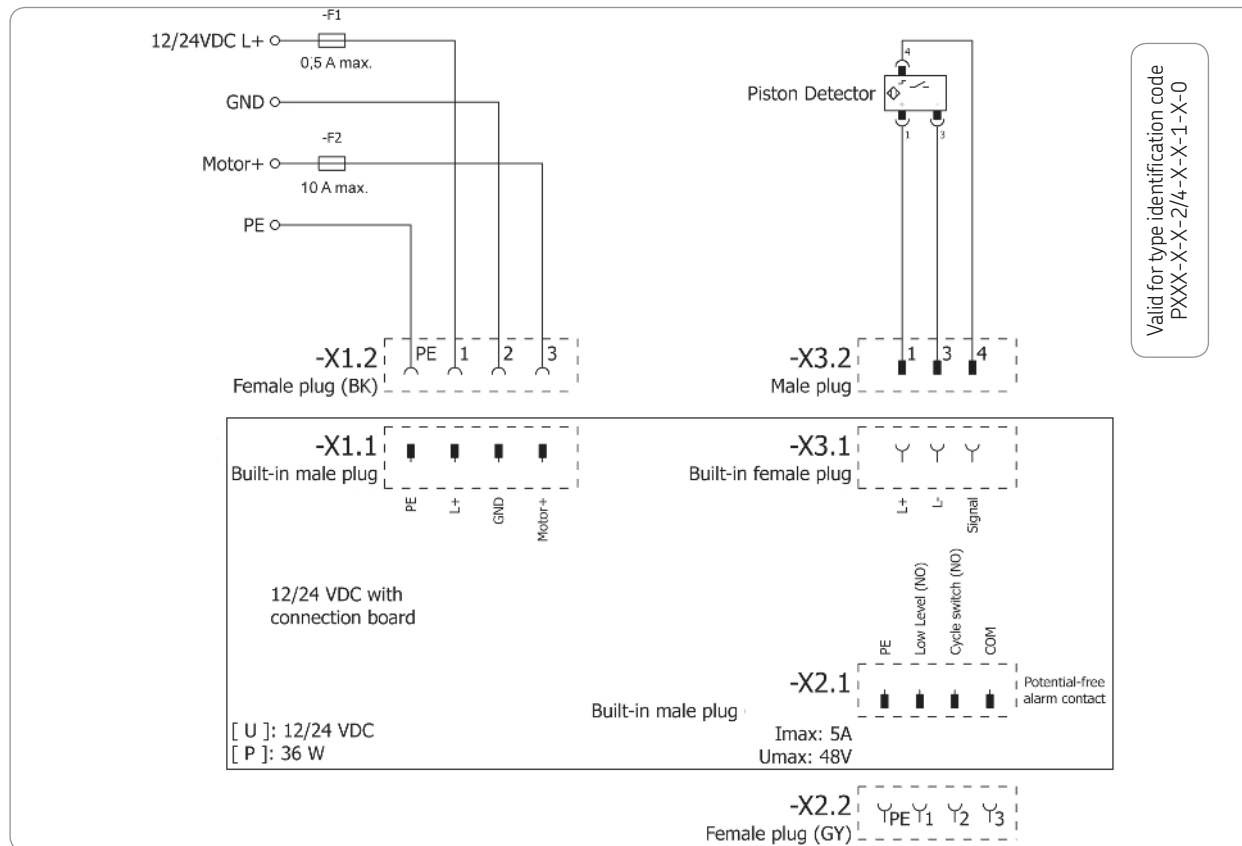
15.5 Circuit diagram 120 V AC, with square plug and control PCB S4



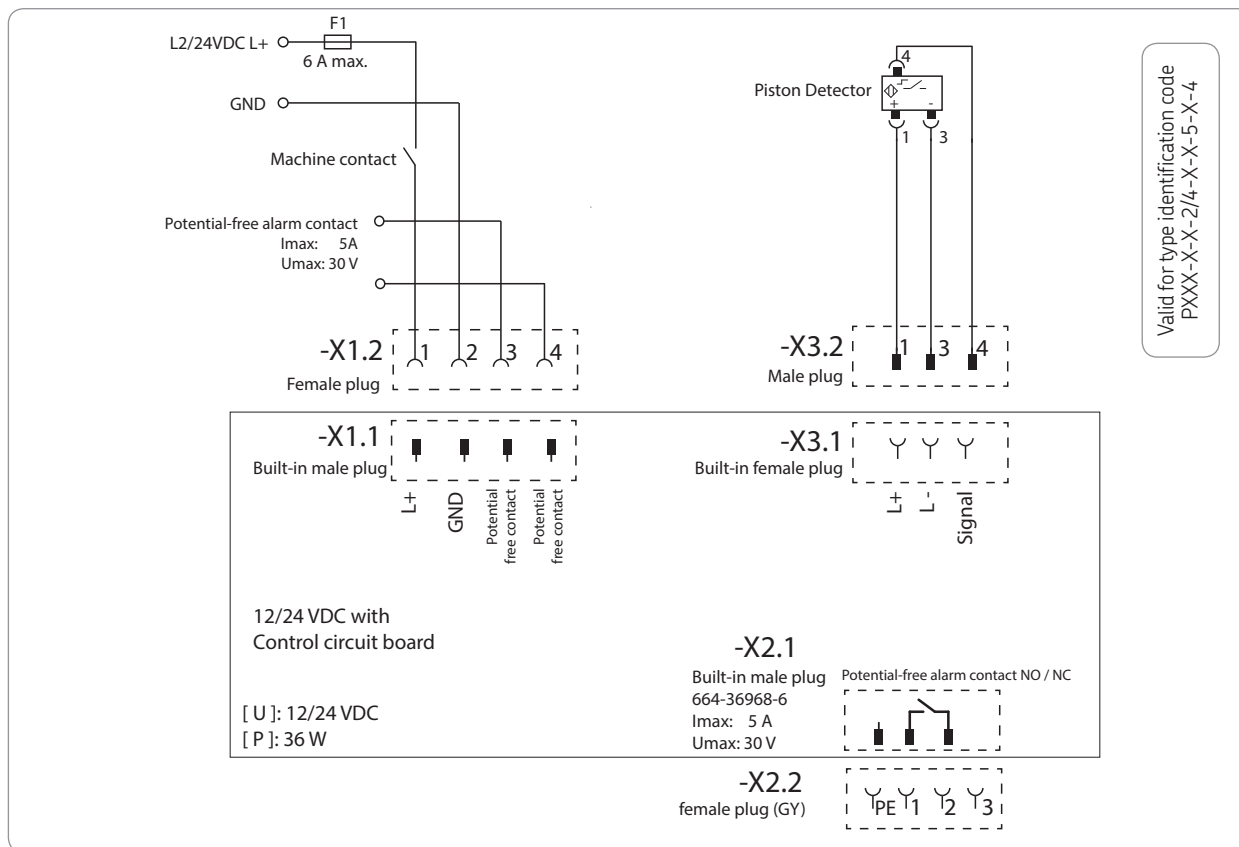
15.6 Circuit diagram 230 V AC, with square plug and control PCB S4



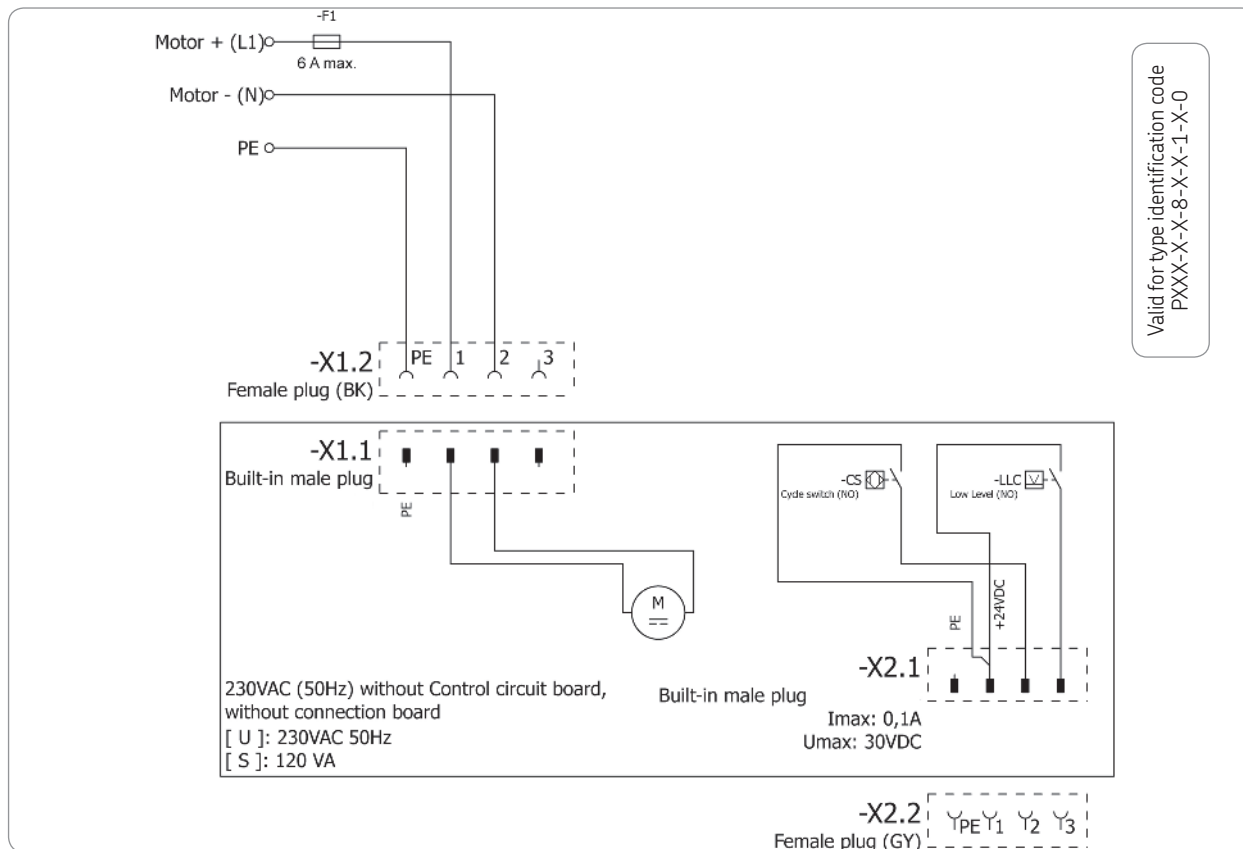
15.7 Circuit diagram 12/ 24 V DC, with square plug with control PCB



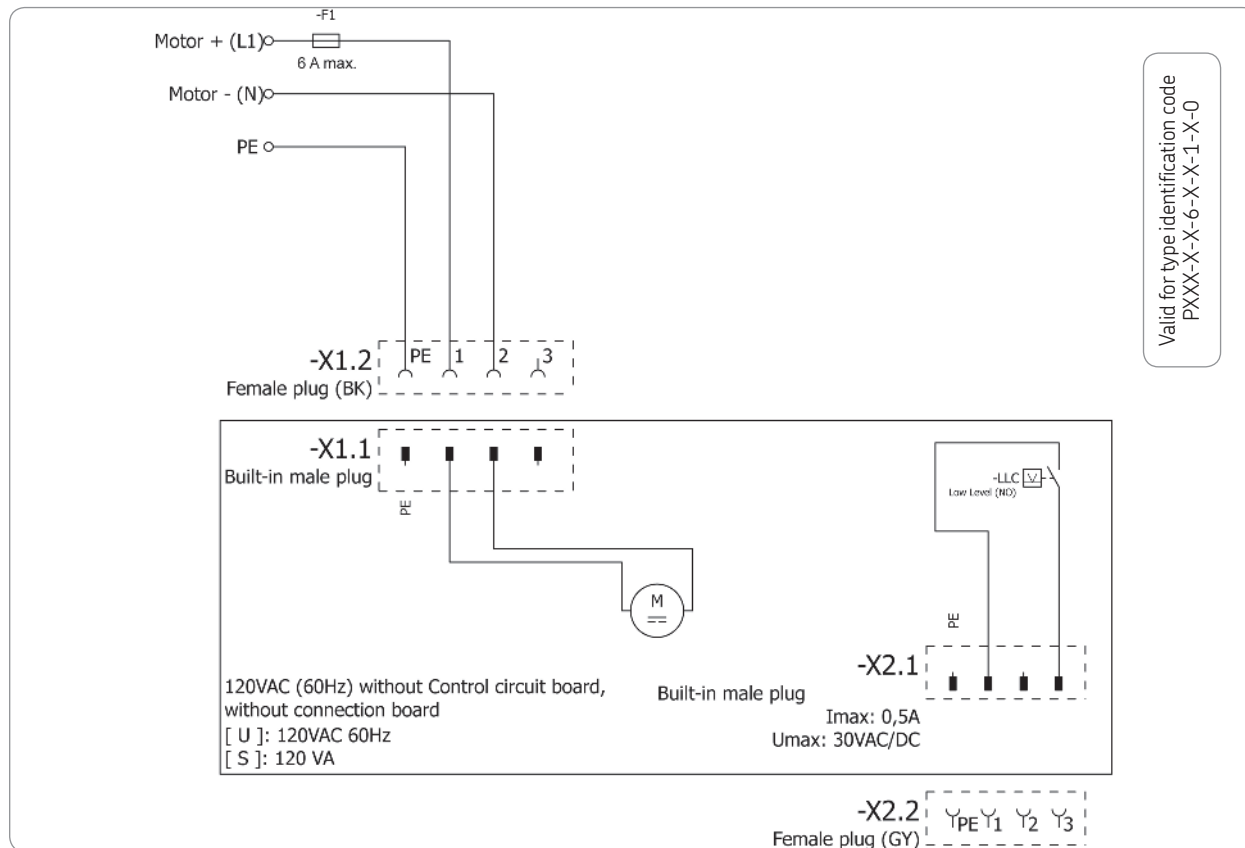
15.8 Circuit diagram 12/ 24 V DC, with bayonet plug and control PCB S4



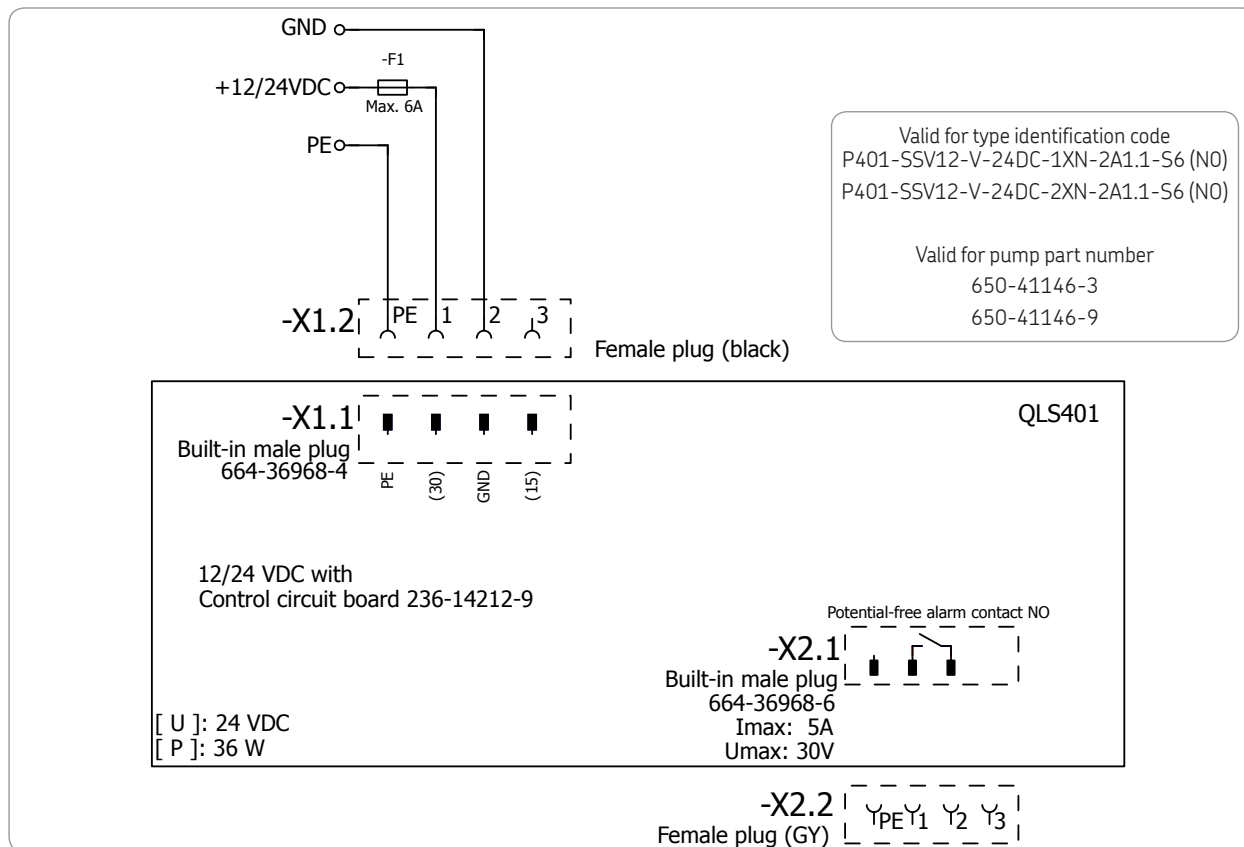
15.9 Circuit diagram 230 V AC, with square plug and cycle switch without control PCB



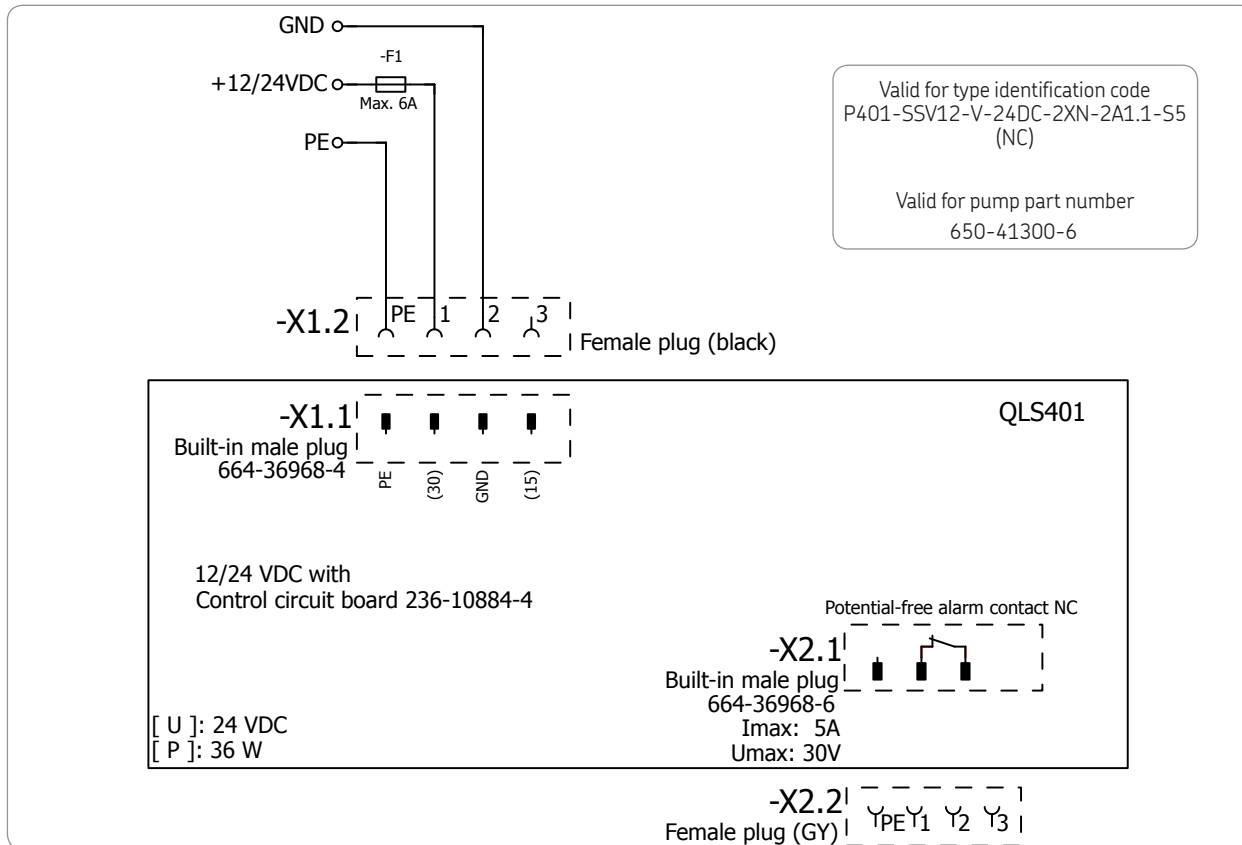
15.10 Circuit diagram 120 V AC, with square plug without control PCB



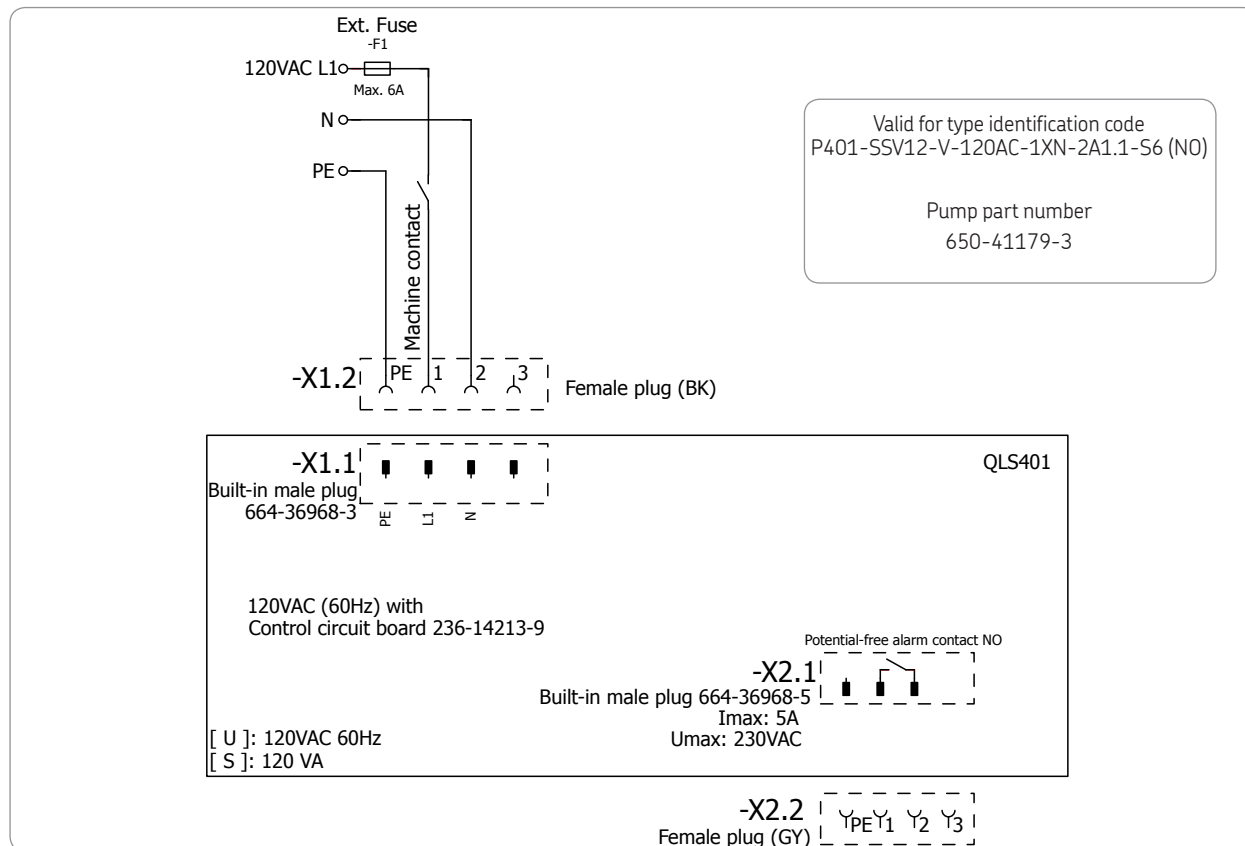
15.11 Circuit diagram 12/ 24 V DC, with square plug and control PCB S6 (N0)



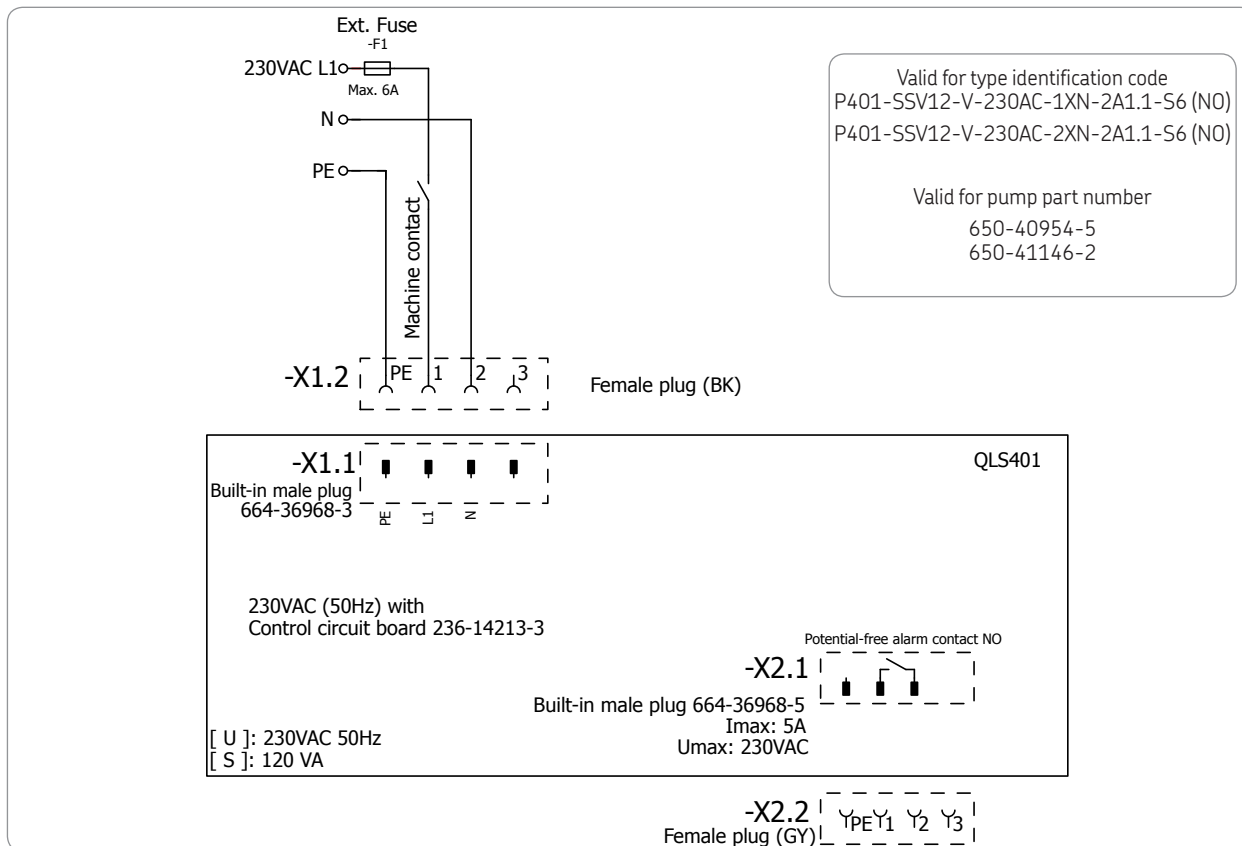
15.12 Circuit diagram 12/ 24 V DC, with square plug and control PCB S5 (NC)



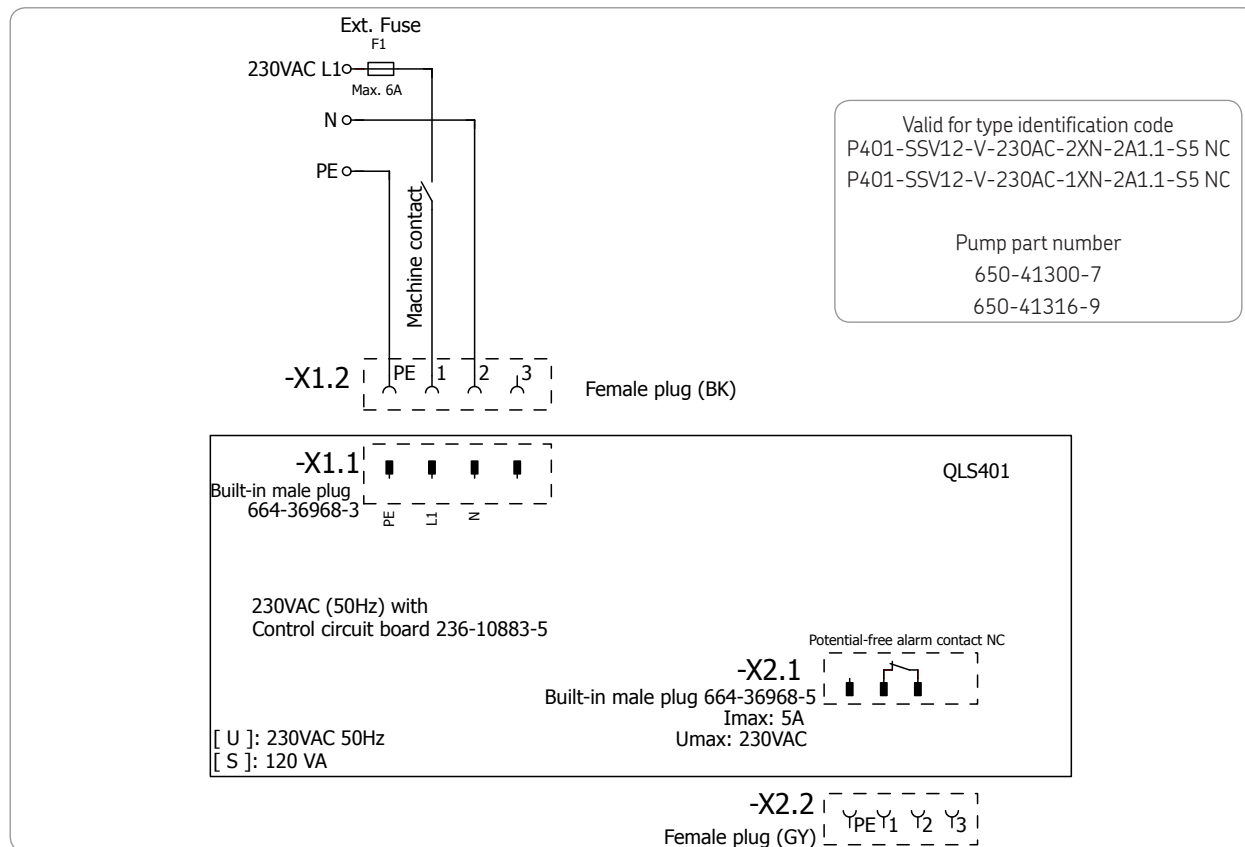
15.13 Circuit diagram 120 V AC (60 Hz), with square plug and control PCB S6 (N0)



15.14 Circuit diagram 230 V AC, with square plug and control PCB S6 (NO)



15.15 Circuit diagram 230 V AC, with square plug and control PCB S5 (NC)



This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, dark gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid covers the entire area of the page.

A full-page view of a blank sheet of graph paper. The grid consists of thin, light gray horizontal and vertical lines forming small squares across the entire page. There are no margins, text, or other markings on the paper.

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