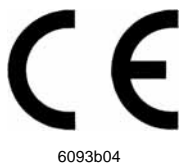


# Lubrication System QLS 401



6141b03



U.S. Patent-No. 6,244,387, German Registration Design No. 29923765.6

Subject to modifications

810-55374-1

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## Introduction

### Explanation of Symbols Used




The following description standards are used in this manual:

#### Safety Instructions

Structure of safety instructions:

- Pictogram
- Signal word
- Danger text
  - Danger note
  - How to avoid danger

The following pictograms are used in this manual and are combined with the corresponding signal words:

 1013A94	 4273a00	 6001a02
<p><b>ATTENTION</b></p> <p><b>CAUTION</b></p> <p><b>WARNING</b></p>	<p><b>ATTENTION</b></p> <p><b>CAUTION</b></p> <p><b>WARNING</b></p>	<p><b>NOTE</b></p> <p><b>IMPORTANT</b></p>

The signal words give the seriousness of danger if the following text is not observed:

<b>ATTENTION</b>	refers to faults or damages on machines.
<b>CAUTION</b>	refers to bad damages and possible injuries.
<b>WARNING</b>	refers to possible dangerous injuries.
<b>NOTE</b>	refers to improvements in handling of systems.
<b>IMPORTANT</b>	refers to considerable disadvantages in handling of systems.

#### Example:



#### ATTENTION!

*When making use of other than the original spare parts, serious damage may affect your device.*

*Therefore, for the operation of your device always use original spare parts made by Lincoln GmbH & Co. KG.*

Furthermore, you will find the following text symbols in this manual:

- Listing of applicable statements
  - Subpoint of applicable statements
- 1. Determination of the number or sequence of contents
- Procedural instruction

### User's Responsibility

To ensure the safe operation of the unit, the user is responsible for the following:

1. The pump / system shall be operated only for the intended use (see next chapter "Safety Instructions") and its design shall neither be modified nor transformed.
2. The pump / system shall be operated only if it is in a proper functioning condition and if it is operated in accordance with the maintenance requirements.
3. The operating personnel must be familiar with this Owner Manual and the safety instructions mentioned within and observe these carefully.

The correct installation and connection of tubes and hoses, if not specified by Lincoln GmbH & Co. KG, is the user's responsibility. Lincoln GmbH & Co. KG will gladly assist you with any questions pertaining to the installation.

### Environmental Protection

Waste (e.g. used oil, detergents, lubricants) must be disposed of in accordance with relevant environmental regulations.

### Service

The personnel responsible for the handling of the pump / system must be suitably qualified. If required, Lincoln GmbH & Co. KG offers you full service in the form of advice, on-site installation assistance, training, etc. We will be pleased to inform you about our possibilities to support you purposefully. In the event of inquiries pertaining to maintenance, repairs and spare parts, we require model specific data to enable us to clearly identify the components of your pump / system. Therefore, always indicate the part, model and series number of your pump / system.

## Safety Instructions

### Appropriate Use

The lubrication system QLS 401 has been designed for initial and retrofit installation. It has been designed for:

- the automatic lubrication of machines and systems
- the automatic lubrication of commercial vehicles and construction machines
- the automatic lubrication of hydraulically driven units and devices.

The lubrication system QLS 401 is able to deliver greases up to NLGI - class 2 or fluid greases of NLGI - class 000 or 00.

- Use the QLS 401 exclusively to supply lubricants.
- The QLS 401 is adequate for intermittent operation only.
- The QLS 401 is adequate for feeding max. 18 lube points per lube cycle.
- Do not use QLS 401 with SSV divider block in bottom mounting position for mobile applications. Do not install the system with machines exposed to shock.

### Misuse

Any use of the QLS 401 that is not expressly mentioned in this Owner Manual will be regarded as misuse. If the QLS 401 is used or operated in a different manner other than specified, any claim for warranty or liability will be null and void.



6001a02

#### NOTE

*If personal injury or material damage occurs as a result of inappropriate operation, e.g. if the safety instructions are ignored or resulting from an incorrect installation of the QLS 401, no claims or legal actions may be taken against Lincoln GmbH & Co. KG.*

### Regulations for Prevention of Accidents

To prevent accidents, observe all city, state and federal safety regulation of the country in which the product will be used.

### General Safety Instructions

- Lubrication systems QLS 401
  - are designed state-of-the-art.
  - can be assembled for safe operation.
  - must be filled regularly without air inclusions with clean lubricant recommended by the manufacturer (see page 40 ff).

### General Safety Instructions, continuation

- Incorrect use may result in bearing damage caused by poor or over-lubrication.
- Do not over-pressurize reservoir when filling the pump. Refill QLS 401 pump with clean lubricant.
- Each outlet needed must be equipped with an appropriate check valve.



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#### IMPORTANT

*Do not paint the pump. Before painting a machine or commercial vehicle, remove or cover the pump completely.*

- Unauthorized modifications or changes to an installed system are not recommended and will void warranty. Any modifications must be subject to prior consultation with the manufacturer of the QLS 401.

### Operation, Repair and Maintenance



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#### ATTENTION!

*Malfunction because of dirt! When executing any maintenance or repair works on the QLS 401, ensure absolute cleanliness.*



4273a00

#### CAUTION!

*For pumps with 120 VAC and 230 VAC, switch off the power supply before beginning maintenance or repair work.*

### Repair

Repairs should only be performed by authorized personnel who are familiar with the instructions.

### Operation with bayonet plug



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#### CAUTION!

*If the protective-conductor terminal is not connected or interrupted, dangerous touch voltages may occur on the equipment!*

Protective measures to be applied for the appropriate operation with bayonet plugs:

"Functional extra-low voltage with safe isolation" / "Protective Extra-Low Voltage" (PELV)

Standards: EN60204 Part1:1992 / IEC 204-1:1992, modified DIN VDE 0100 Part (see page 39 and 40)

## Safety Instructions, continuation

### Operation, Repair and Maintenance, continuation

#### Operation/Maintenance

Lubrication systems QLS 401

- must operate with mounted pressure relief valve, only.
- must operate only with mounted or connected SSV divider blocks.
- must be filled regularly without air inclusions with clean lubricant recommended by the manufacturer.
- operates automatically. However, a regular check (according to the fixed lubrication intervals) should be made to ensure that lubricant is being dispensed from all lubrication points.

#### Repair

Repairs should only be performed by authorized personnel who are familiar with the instructions.

#### Disposal

Dispose of used or contaminated lubricants as well as of parts that were in touch with lubricant according to the legal regulations pertaining to environmental protection. Make sure to observe the safety data sheets of the lubricants used.

#### Exclusion of Liability

The manufacturer of the centralized lubrication system QLS 401 will not accept any liability for damages:

- caused by insufficient lubricant and irregular refilling of pump.
- due to the use of greases which are not or are only conditionally pumpable in centralized lubrication systems.
- caused by the use of contaminated lubricants.
- caused by an environmentally inadequate disposal of used or contaminated lubricants or parts that were in touch with lubricants.
- caused by unauthorized modification of system components.
- caused by the use of unapproved parts (voids the pump warranty).

### Installation



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#### IMPORTANT

*Do not remove, modify or alter any safety equipment already installed on the machine.*

- *If necessary, these devices may be removed temporarily during the installation of the pump.*
- *The devices must be properly put back in place after the installation of the pump.*

### Installation, continuation

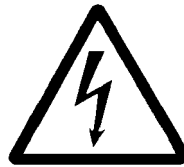
- Use only original spare parts or spare parts authorized by Lincoln.
- Keep the centralized lubrication system QLS 401 away from sources of heat. Observe the operating temperatures (see page 35, chapter "Technical Data").
- Provide access to fill, clean and visually monitor the pump operation.



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#### IMPORTANT

*Follow installation instructions of the OEM regarding minimum distances between the drilled holes and welding procedures.*

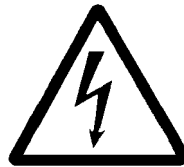


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#### WARNING!

*Failure to observe the safety instructions, e. g. touching electrically charged parts when the system is opened, or improper handling of the QLS 401 may cause serious injury or death.*

*If the values specified in the Technical Data are exceeded, the device may overheat. It may damage the QLS 401 and thus impair the electric safety.*



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#### CAUTION!

*The QLS 401 may only be installed by qualified personnel. The connection (N/L/PE) of the supply voltage must be made according to VDE 0100 and VDE 0160.*

*Install a protective and lock out device for isolating and disconnecting the QLS 401. Before beginning the installation work, disconnect the electrical supply.*



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#### ATTENTION!

*Consider residual ripple of max.  $\pm 5\%$  to connect pumps with direct current version (in relation to the operating voltage acc. to DIN 41755).*

## Installation Instructions

### Pump

Use drilling template to mark and drill mounting holes of the QLS 401. Drilling template and mounting bolts are included in the package.

### SSV Divider Block

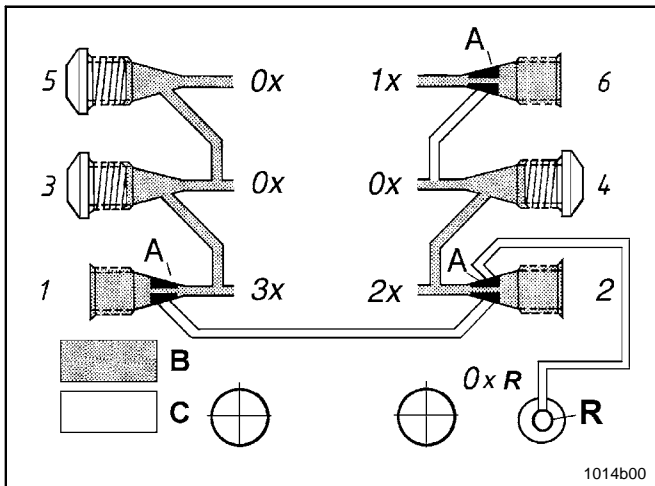


Fig. 1 Single double and triple lubricant output, on rear side mounted divider blocks

- 0x-3x Outlet quantity (single, double, etc.)
- 1-6 Outlet numbers
- A Clamping ring (brass)
- B Grease supply
- C Enclosed grease
- R Return to reservoir



Fig. 2 Closure plug, also provided in the accessory kits

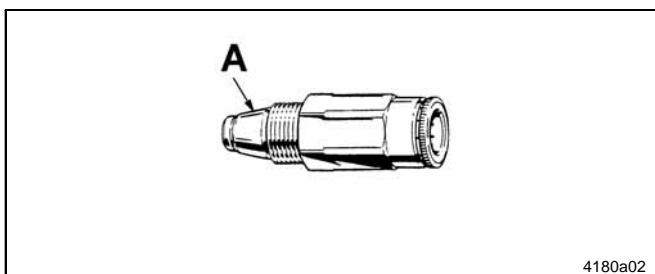


Fig. 3 Check valve, push-in type  
A Clamping ring (brass)

### Crossporting of the SSV Divider Blocks

#### Single Output

A single output is the lubricant quantity fed to the lube point by a piston per stroke and outlet port. **It amounts to approximately 0.2 cm<sup>3</sup>**, see outlet 6, fig. 1.

#### Double or Multiple Outputs

- Outputs can be increased by simply plugging the unused outlet ports with closure plugs (fig. 2, provided in the accessory kit).
- Lubricant from a plugged outlet is redirected to the next outlet on the same side of the SSV divider block in descending numerical order (see fig. 1).
- Example, see fig. 1:  
By closing
  - of outlet 4, outlet 2 receives the double quantity.
  - of outlets 5 and 3, outlet 1 receives the triple amount of lubricant. The connecting conduit from outlet line 1 to outlet line 2 and to the return line (R) is closed by clamping rings (A) of the check valve.
- Unused lubricant can be internally fed back to the reservoir, see paragraph "direct internal feed back feature".



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#### NOTE

**Do not plug outlets number 1 and 2** (horizontally positioned outlets) on bottom-mounted lubricant divider blocks SSV 8, 12 and 18.

**Do not plug outlets number 1 or 2** on externally mounted divider blocks.

#### Closure plug

- Install a closure plug in each outlet port hole which is not required, see fig. 1 or 4.
- Closure are used in fig. 1 and 4 as follows:
  - Fig. 1 outlets 3, 4 and 5
  - Fig. 4 (page 8) outlets 1, 2, 4 and 5

#### Check valve

- For the connection to pressure plastic tubes and high-pressure hoses see page 11, fig. 11.
- Install a check valve in each outlet port hole which is required (observe paragraph "Direct (internal) feedback feature" on page 8).

## Installation Instructions, continuation

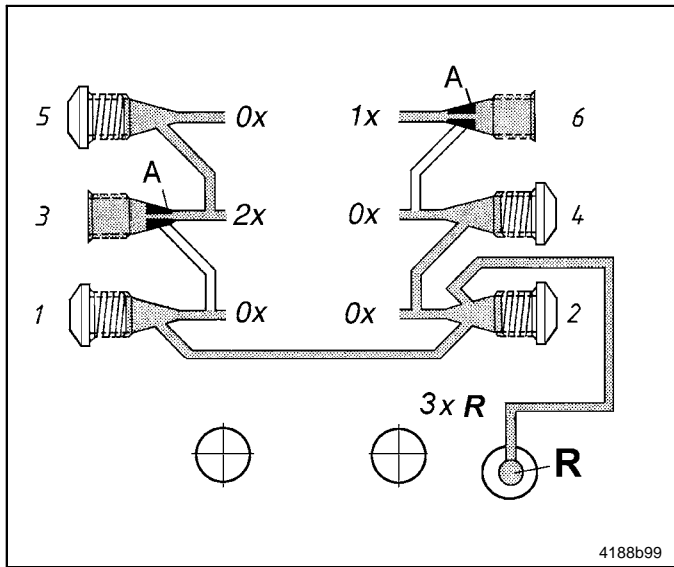


Fig. 4 Internal feedback of supplied lubricant, only on rear-side mounted SSV divider blocks

- 0x-2x Outlet quantity (single, double, etc.)
- 1-6 Outlet numbers
- A Clamping ring (brass)
- B Grease supply
- C Enclosed grease
- R Return line bore hole



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### NOTE

Maximum **internal** combination of outlets:

SSV 6 = 3

SSV 12 = 6

SSV 18 = 9

Further combinations are possible outside the divider valve by means of a tee-piece only.

### Direct (internal) feedback feature

- All pumps with **back-mounted SSV divider block** have the capability to feed back unused lubricant internally from closed outlets directly to the reservoir (see R fig. 1, 4).
- This procedure will start automatically, if **outlet port 2** is plugged with a closure plug. All pumps have capability to feed back the lubricant directly to the reservoir **from even and odd outlets** via the channel from outlet 1 to outlet 2.
- Start from the smallest outlet number when closing the outlets, for instance 2, 4, 6 on even side or 1, 3, 5 on odd side plus outlet 2. In fig. 4 the quantities of outlets 1, 2 and 4 (3xR) are fed back to the reservoir.
- The remaining outlets are to be used for the connection to the lube point or for increasing the lubricant quantity (double or triple), see fig.1.



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### CAUTION!

To change the outlet 2 for bearing lubrication, replace closure plug with check valve (Fig. 3), **then never close outlet** (see page 7, fig. 1, pos. 1).



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### NOTE

To feed back unneeded lubricant quantities from **bottom-mounted** divider blocks to the reservoir, connect unneeded outlet via the feedline to plug 5 (page 13, fig. 15, 16) for external return line.



## Installation Instructions, continuation

### Lubrication Points

#### Installing Quicklinc fittings into lube points

Remove hydraulic lube fittings from lube points and install appropriate Quicklinc fittings into the bore holes of the lube points.

#### Installing Zerk-Locks onto Grease Fittings

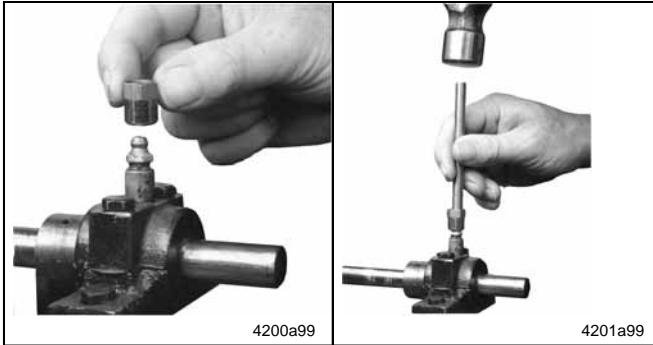


Fig. 5 Place the Zerk-Lock body over the grease fitting

Fig. 6 Installation of Zerk-Locks with staking tool

The Zerk-Lock fitting consists of the Zerk-Lock body, insert and a Quicklinc fitting.

- Place the Zerk-Lock body over the grease fitting and place the staking tool firmly against the Zerk-Lock insert.
- Strike the tool sharply with a hammer until the Zerk-Lock insert partially crimps onto the grease fitting (only with US version necessarily).

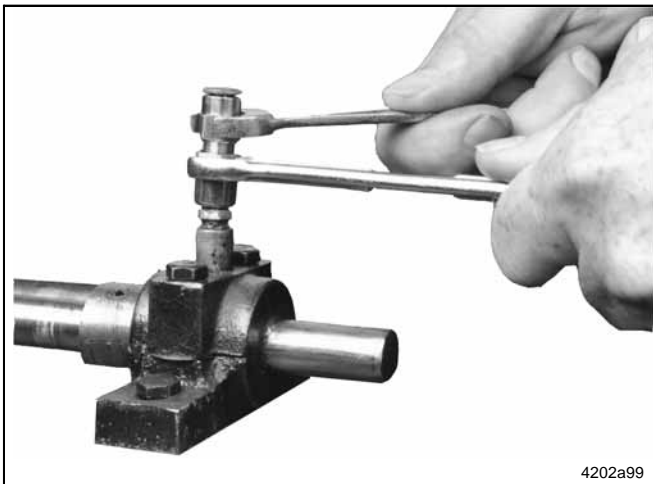


Fig. 7 Screwing Quicklinc fitting into the Zerk-Lock body

- Screw the Quicklinc fitting into the Zerk-Lock body and tighten until parts resist further tightening (about 1-1/2 turns).



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#### NOTE

Quicklinc hex. is 12 mm. Zerk-Lock body hex is 1/2".

- Move the Zerk-Lock and tube fitting from side to side on the grease fitting to insure the Zerk-Lock is firmly seated.

## Installation Instructions, continuation

### Connection of Feed Lines



Fig. 8 Feed line installed in the Quicklinc fitting

- Measure, cut and route the feed lines included in the kit.



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#### NOTE

*Avoid sharp bends of the plastic tubing and the moving parts of the machine that could damage the lubrication lines. Minimum bending radius is 50 mm (2 in).*

- Secure the lubrication lines to the machine using nylon ties, clamps or straps provided in the accessory kit.
- If the feed lines are not primed, prime all lubrication feed lines before connecting them to the lube point (see page 29, paragraph "First Filling of a lubrication system").
- Connect the feed lines directly to the check valves of the divider block and to the Quicklinc fittings of the lube point.



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#### NOTE

*Push the ends of the feed lines firmly into the Quicklinc fittings until they are fully seated in the body of the fitting. The primed feed lines are marked with white lines (fig. 9) to facilitate installation.*

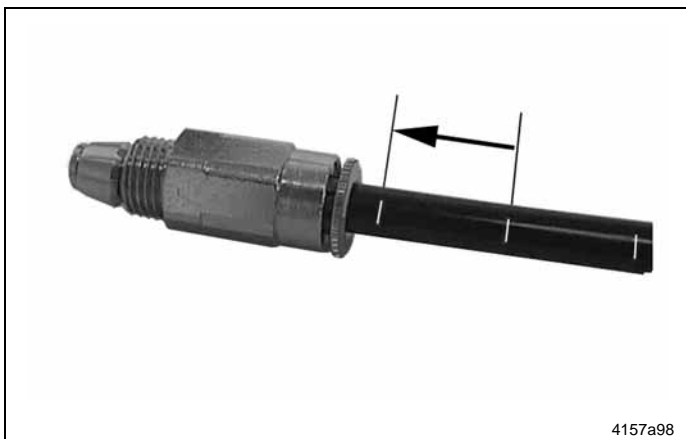


Fig. 9 Feed line insert into the fitting up to the next white mark

- Cut off the pressure plastic tube uprightly at one of the white lines before it is mounted.
- Then insert the plastic pressure tube into the fitting up to the next white mark. This will ensure a correct installation of the pressure plastic tube in the threaded tube fitting.

### Filling of reservoir

- Fill the reservoir with suitable clean lubricant (see page 29).



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#### CAUTION!

*Observe safety instructions on page 29, chapter "To fill reservoir"!*

### Electrical connection

- Connect the electrical wires according to the following electrical connecting diagrams (see page 37 to 40).



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#### CAUTION!

*Observe safety instructions on page 37, chapter "Electrical connection"!*



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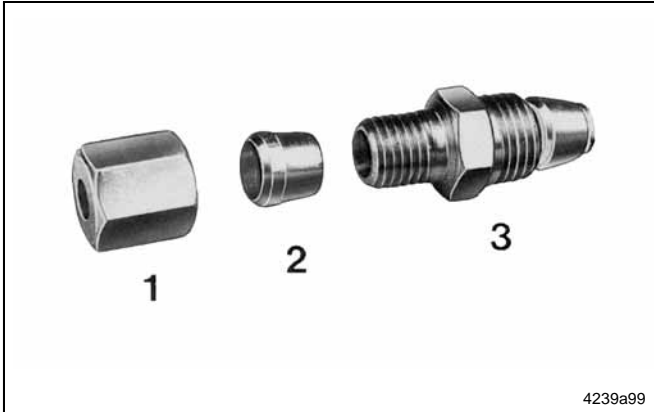
#### ATTENTION!

*Consider residual ripple of max.  $\pm 5\%$  to connect pumps with direct current version (in relation to the operating voltage acc. to DIN 41755).*

## Installation Instructions, continuation

### Option for metric fittings (to order separately)

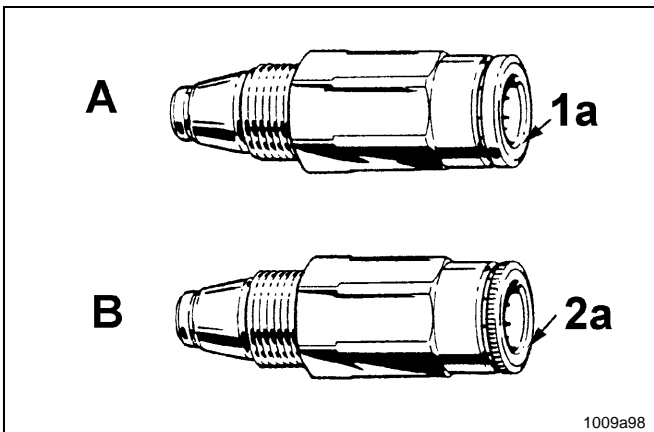
#### SSV Connecting tube fitting, screw-type and push-in type



- 1 Ferrule nut
- 2 Cutting ring
- 3 Valve body with sealing and ferrule

Fig. 10 Screw-type check valve

#### Connection of pressure plastic tubes and high-pressure hoses



- For high-pressure hose (NW 4.1 x 2.3 mm) use check valve A, fig. 11, with reinforced collets 1a and smooth flange (part no. 226-14091-4)
- For pressure plastic tube (dia. 6 x 1.5 mm) use check valve B, fig. 11, with standard pliers 2a and knurled flange (part no. 226-14091-2)

- A Check valve with reinforced collets
- B Check valve with standard collets
- 1a Smooth flange
- 2a Knurled flange

Fig. 11 Different types of check valves



Fig. 12 Check valve with reinforced pliers and high-pressure hose



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#### NOTE

*On construction machines or agricultural machines use high-pressure hoses as feedlines. In such cases, the check valves of the sub-divider blocks must have reinforced collets and a smooth flange.*



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#### IMPORTANT

*Connect only high-pressure hoses (NW 4.1 x 2.3 mm) with threaded sleeve and hose stud to the check valves with reinforced pliers.*

## Installation Instructions, continuation

### Option for metric fittings, continuation (to order separately)

#### Mounting of the threaded sleeves and hose studs onto the high-pressure hose

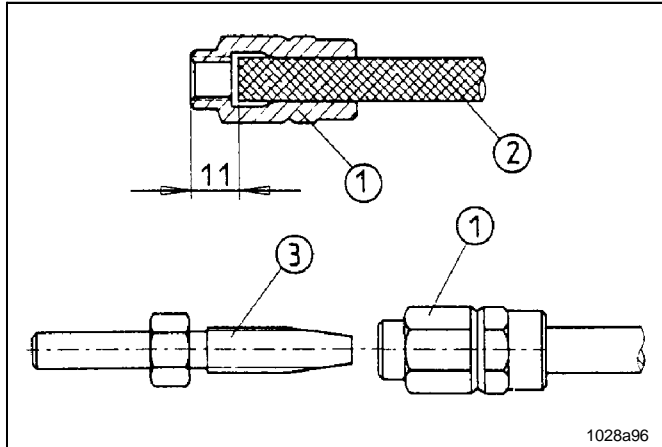


Fig. 13 Pre-assembly of the threaded sleeves and hose studs onto the main line

- Screw threaded sleeve (1, fig. 13) counterclockwise onto the high-pressure hose (2) until the illustrated dimension of 11mm is reached. Then screw the hose stud (3) into the threaded sleeve (1).



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#### IMPORTANT

*Oil parts 1 and 3 well before screwing them together.*

- 1 Threaded sleeve
- 2 High-pressure hose (main line)
- 3 Hose stud

## Description

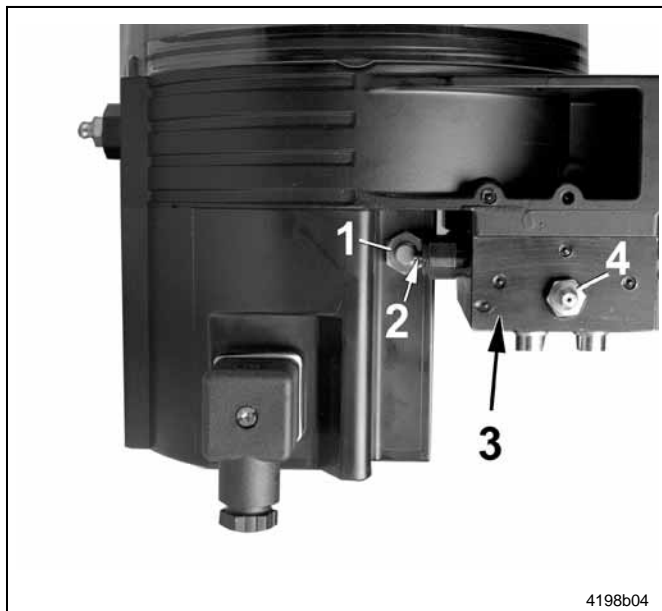


Fig. 14 QLS 401 with back position of the SSV divider block

- 1 Proximity switch
- 2 Control pin
- 3 SSV divider block
- 4 Nipple for external manual lubrication (1/8")

- The QLS 401 is a complete compact lubrication system for a **maximum of 18 lubrication points per cycle**.
- The pump has three basic configurations:
  - SSV divider block mounted on the back (see Fig. 14)
  - SSV divider block mounted on the bottom (see Fig. 15)
  - Pump without the SSV divider block attached respectively with external divider block SSV KNQLS (see fig. 16)
- Standard lubrication lines are high-pressure hoses for pumps with the SSV divider block attached.
- The pump with the SSV divider block mounted on the bottom has the capability of using also steel tubing as lubrication lines if necessary.



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#### NOTE

*The function of the pump is independent of the SSV divider block's mounting position.*

## Description, continuation

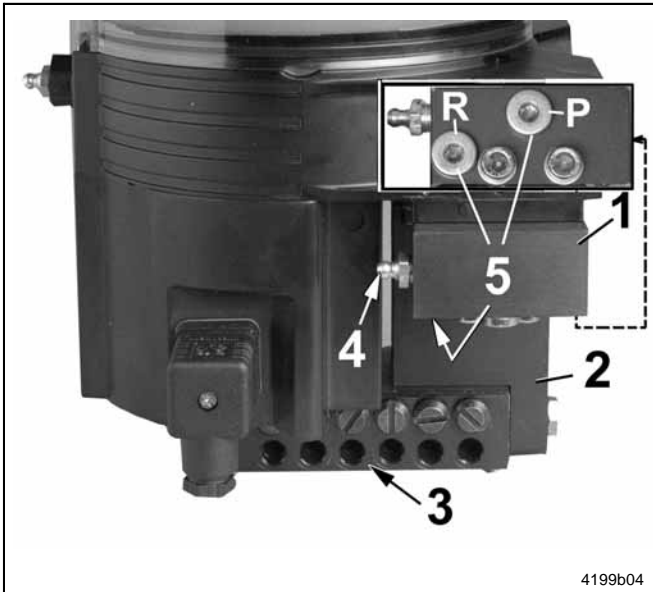


Fig. 15 QLS 401 with bottom position of the SSV divider block

- A signal from the pump timer starts the electric motor and the pumping element starts pumping the lubricant to the SSV divider block.
- When all lubrication points have received lubricant, an internal proximity switch 1 Fig. 14 turns the motor off, completing one lubrication cycle.
- If the pump does not complete the cycle within 15 minutes of operation, the alarm indication "Er" will be displayed as a flashing light in the keypad window, see page 17 fig. 21.

- |   |   |
|---|---|
| 1 | Connecting block                              |
| 2 | Manifold                                      |
| 3 | SSV divider block                             |
| 4 | Nipple for external manual lubrication (1/8") |
| 5 | Plug (1/8") for                               |
|   | P external pressure line                      |
|   | R external return line                        |

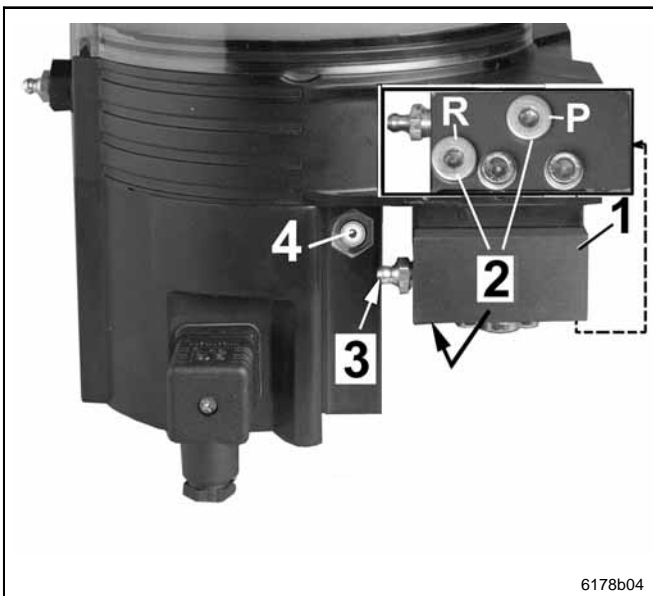


Fig. 16 QLS 401 without mounted SSV divider valve with connection for external SSV divider valve KN QLS

- |   |  |
|---|--|
| 1 | Connecting block                         |
| 2 | Closure plug                             |
| 3 | Nipple for emergency lubrication, R 1/8" |
| 4 | Connecting socket for SSV KN QLS         |
| P | For feedline to external SSV KN QLS      |
| R | Relief line connection                   |

- An externally connected lubricant divider valve SSV KN QLS is equipped with the same proximity switch as the normal QLS 401.
- The proximity switch is provided with a connecting cable of 2 m lengths and a connecting plug which must be connected to the socket (pos. 4) of the QLS 401.
- The socket is integrated in the housing instead of the proximity switch and is connected to the control p.c.b.



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### NOTE

The function of the QLS 401 is independent of the mounting position of the proximity switch.

There are available the following externally connectable divider valves SSV KN QLS:

- |                 |             |
|-----------------|-------------|
| - SSV 6 KN QLS  | 619-28945-1 |
| - SSV 8 KN QLS  | 619-28946-1 |
| - SSV 10 KN QLS | 619-28949-1 |
| - SSV 12 KN QLS | 619-28950-1 |
| - SSV 14 KN QLS | 619-28951-1 |
| - SSV 16 KN QLS | 619-28952-1 |
| - SSV 18 KN QLS | 619-28953-1 |

## Selection Guide VDC

		P401	6	2	4	0	0	1	5	3
<b>Pump models</b>		P40100400113								
<b>Examples of part numbers</b>		P40162400153								
<b>Pump 401 for grease</b> .....	P401									
<b>SSV Divider Block</b>										
External, SSV 6, SSV 8 <sup>2)</sup> (or SSV 12 and 18 without control p.c.b.)	0									
External, SSV 12, SSV 18 <sup>2)</sup> .....	1									
SSV 6 (back) .....	3									
SSV 8 (bottom) .....	4									
SSV 12 .....	6									
SSV 18 .....	9									
<i><sup>2)</sup> Hinweis: Für externe Verteileranwendung nur die dafür vorgesehenen SSV...KNQLS Verteiler verwenden. Für Pumpen ohne Verteiler ist eine Abschaltung des Systems nur durch eine externe Steuerung oder SPS möglich.</i>										
<b>SSV Divider Block Position</b>										
External divider block.....	0									
Back (vertical order) .....	1									
Bottom <sup>3)</sup> (horizontal order) .....	2									
<i><sup>3)</sup> Note: Do not use QLS 401 with SSV block in bottom-mounting position for mobile applications. Do not install the pump in areas exposed to shock.</i>										
<b>Operating Voltage</b>										
12 VDC <sup>1)</sup> .....	2									
24 VDC <sup>1)</sup> .....	4									
<i><sup>1)</sup> Note: Standard 12 and 24 VDC pump models for mobile applications can be supplied with 10-meter (30') electrical cable.</i>										
<b>Reservoir with an without Low-level control</b>										
1 L reservoir without low level control .....	0									
<b>Number of Possible Connections</b>										
- 1A = connection left-side (square-type), supply voltage	0									
- 2A = 2 connections (square-type)										
1 connection left-side, supply voltage	1									
1 connection right-side, low-level control or fault indication										
1A = 1 connection (quarter-turn type) supply voltage;										
low-level control or fault indication .....	2									
<b>Type of Plug Connector</b>										
* Square-type, acc. to DIN 43650 type of construction A (industrial application) .....	1									
** Quarter-turn type plug, DIN 72585-1, 4-pole (mobile application) .....	5									
<b>Electrical Connectors</b>										
With socket, without cable * .....	1									
With socket, with cable 10 m * .....	5									
With socket, with cable 10 m, ADR * .....	6									
With socket, with cable 10 m ** .....	7									
With socket, with cable 10 m, ADR ** .....	8									
<b>Control p. c. b.</b>										
p. c. b. without time control .....	0									
p. c. b. S3:										
Normally closed or normally open contact (programmable), monitored: 1 to 5 cycles.....	3									

(Accessory kits, see chapter "Technical Data")

Subject to modifications

## Selection Guide VAC

<b>Pump models</b>		<b>P40100800113</b>									
<b>Examples of part numbers</b>		<b>P40162400153</b>									
		<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;"><b>P401</b></td> <td style="padding: 2px 5px;"><b>6</b></td> <td style="padding: 2px 5px;"><b>2</b></td> <td style="padding: 2px 5px;"><b>4</b></td> <td style="padding: 2px 5px;"><b>0</b></td> <td style="padding: 2px 5px;"><b>0</b></td> <td style="padding: 2px 5px;"><b>1</b></td> <td style="padding: 2px 5px;"><b>5</b></td> <td style="padding: 2px 5px;"><b>3</b></td> </tr> </table>	<b>P401</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>3</b>
<b>P401</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>3</b>			
<b>Pump 401 for grease</b> .....	P401										
<b>SSV Divider Block</b>											
External, SSV 6, SSV 8 <sup>2)</sup> (or SSV 12 and 18 without control p.c.b.)	0										
External, SSV 12, SSV 18 <sup>2)</sup> .....	1										
SSV 6 (back) .....	3										
SSV 8 (bottom) .....	4										
SSV 12 .....	6										
SSV 18 .....	9										
<sup>2)</sup> Note: For external divider block application only use the specific divider blocks SSV ... KNQLS.											
<b>SSV Divider Block Position</b>											
External divider block .....	0										
Back (vertical order) .....	1										
Bottom <sup>3)</sup> (horizontal order) .....	2										
<sup>3)</sup> Note: Do not use QLS 401 with SSV block in bottom-mounting position for mobile applications. Do not install the pump in areas exposed to shock.											
<b>Operating Voltage</b>											
120 VAC <sup>1)</sup> (with control p.c.b. only) .....	6										
230 VAC <sup>1)</sup> (with control p.c.b. only) .....	8										
<sup>1)</sup> Note: Standard 120 and 230 VAC pump models for industry are supplied without electrical cable.											
<b>Reservoir with an without Low-level control</b>											
1 L reservoir without low level control .....	0										
<b>Number of Possible Connections</b>											
- 1A = 1 connection left-side, supply voltage .....	0										
- 2A = 2 connections (square-type)											
1 connection left-side, supply voltage											
1 connection right-side, low-level control or fault indication	1										
<b>Type of Plug Connector</b>											
* Square-type, acc. to DIN 43650 type of construction A.....	1										
<b>Electrical Connectors</b>											
With socket, without cable* .....	1										
With socket, with cable 10 m* .....	5										
<b>Control p. c. b.</b>											
p. c. b. S3:											
Normally open or normally closed contact (programmable), monitored											
- 1 cycle with SSV 12, SSV 18											
- 1 to 3 cycles with SSV 6, SSV 8 .....	3										

(Accessory kits, see chapter "Technical Data")

## Operation

### Pump

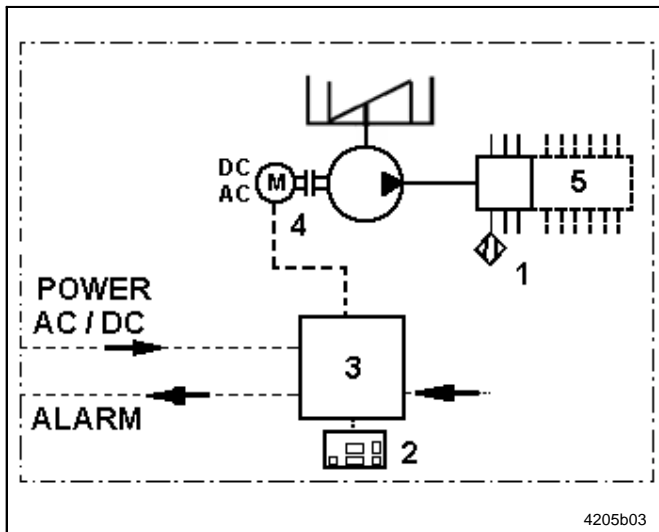


Fig. 17 QLS 401 unit

- The QLS 401 operates according to lube cycles (pause and operating times).
- With standard setting the pause time begins the cycle, then the operating time occurs. This can be changed by reprogramming the start stage (see page 27).
- A division of the lube points (**option**) via sub-divider blocks and one main divider block (SSV 6, SSV 8) is possible only up to **max. 18 points per cycle**. In this case, the number of the cycles of the main divider block must be set (see P3 on page 24).

- 1 Proximity switch
- 2 Keypad with display
- 3 Control unit
- 4 Pump unit
- 5 SSV 6, 8, 12, 18

### Pressure Relief Valve

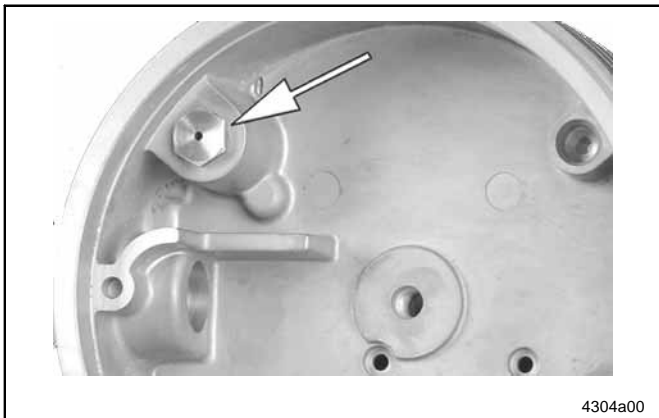


Fig. 18 Pressure relief valve (cartridge) in housing

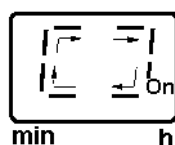
- The QLS 401 is protected with a pressure relief valve (cartridge).
- The pressure relief valve limits the pressure build-up in the QLS 401. It opens at an overpressure of 205 bar (3000 psi).
- If the pressure relief valve is actuated, this indicates that the system is malfunctioning. The lubricant flows back into the reservoir (hardly visible).
- Upon expiration of the monitoring time of 15 minutes (VAC models) or 25 minutes (VDC models), the pump switches off. The fault indication "Er" is displayed on the keypad of the pump. See "Display mode" under "Control unit".

### Pump Display Window



4208a04

Fig. 19 Green decimal point (pause time)



4209a99

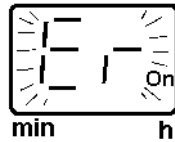
Fig. 20 Green display (operating time)

- Pump "On" is indicated on the display by an **illuminated rung on the right** (pause time is running).
- Pump "running" is indicated on the display by a rotating light movement of the green display (operating time).
- If the voltage supply is interrupted during the operating time, the times already expired are stored. When the power supply is switched on again, the operating time continues operating from the point where it had been interrupted.



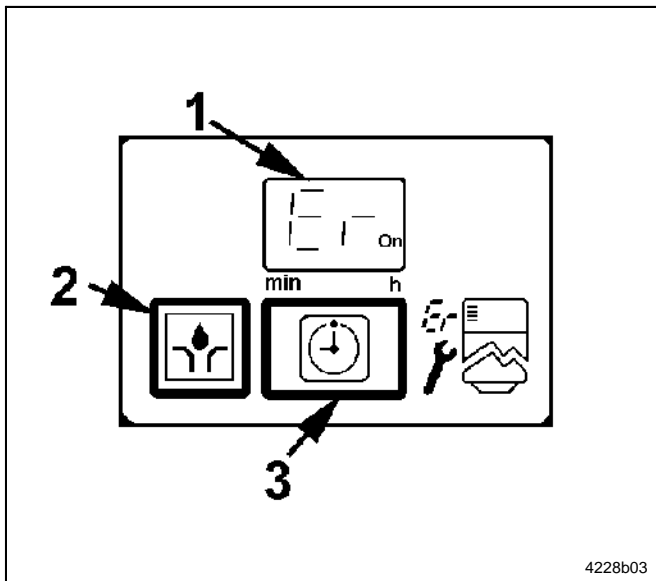
## Operation, continuation

### Monitoring time/ malfunction



4210a99

Fig. 21 Display of a fault indication



4228b03

Fig. 22 Keypad with showing a malfunction

- 1 Display window
- 2 Operator key
  - operating mode: trigger additional lubrication
  - programming mode: setting of times and divider cycles – terminate programming
- 3 Operator key
  - display mode: acknowledge receipt of flashing functional fault
  - operating mode: display of the set pause time and residual pause time
  - programming mode: change to the different programming levels

- If the cycle is not complete within **15 minutes** (monitoring time) after expiration of the pause time, the pump immediately switches off. The fault indication "Er" (error) is displayed as a flashing light (see page 12, fig. 14, pos. 1). At the same time, a potential free contact is available for the external fault indication (option), either as malfunction or as "Reservoir empty".



6001a02

#### IMPORTANT

*If a **malfunction** is present, the pump **no longer switches on automatically**.*

- Acknowledge the malfunction (pos. 3). The flashing display changes into permanent light.
- Only in this case, switch on the pump by pressing the button for additional lube cycle (pos. 2).
- When a malfunction is present, it can only be cancelled by initiating an additional lube cycle and if a proper lube cycle has been executed afterward.
- If the fault is still present after an additional lube cycle has been initiated, the fault indication "Er" is displayed again.
- The monitoring time starts at the same time as the operating time. It is a fixed time of 15 minutes.
- If the voltage supply is interrupted during the monitoring phase (operating time), the monitoring time starts from the beginning after the pump is switched on again.

## Operation, continuation

### Reservoir empty

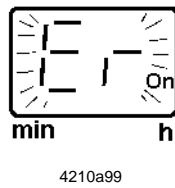


Fig. 23 Display of a low-level control

- When the reservoir is nearly empty the pump display shows "Er" (see Fig 23).



6001a02

#### IMPORTANT

*If the reservoir is empty, the pump element does not supply any lubricant. As a consequence the proximity switch is not actuated and the fault indication \*ER\* is triggered.*

- ➔ Fill reservoir (see page 28).
- ➔ Trigger additional lubrication cycles until lubricant leaks out. The indicator pin (see page 12, fig. 14, pos. 2) moves across the proximity switch (pos. 1).

### Operator keys of the keypad

#### Operator keys of the keypad in the operating mode

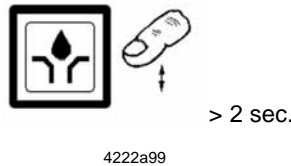


Fig. 24 Pushbutton for additional lubrication cycle

- **Additional lube cycle**
- ➔ is triggered via the button (Fig. 24). Press the button for **2 seconds**.
- ➔ can be initiated at any time, provided that the power supply is applied.
- If a fault signal (malfunction) is present, it will be cancelled as soon as the system is operating properly, again.



6001a02

#### NOTE

*If a malfunction is present (flashing display), first acknowledge this malfunction, see Fig. 26. This is not urgently needed.*

#### Operator keys of the keypad in the programming mode

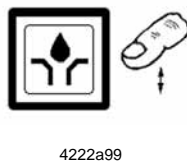


Fig. 25 Key for resetting the pause time and terminating the programming mode

- **Reset of the pause time and termination of the programming mode**
- ➔ Setting of the pause time by
  - single key activation for one hour/minute
  - permanent activation for quick run
- **Settings of the monitoring relay**  
Setting of the metering device cycles:
- The monitoring relay signalizes a fault on an external lamp via the optional connection "X2" (see connecting wiring diagrams).  
In case of a standard setting "normally open contact" the fault is indicated by a lamp with permanent light.  
In case of a standard setting "normally closed contact" the fault is indicated by a lamp that does not burn any more.
- ➔ For VDC version ..... 1 to 5 cycles  
For VAC version
  - SSV 6 / SSV 8 ..... 1 to 3 cycles
  - SSV 12 / SSV 18 ..... 1 cycle
- **Start setting**
- ➔ Setting: SP (Start with pause time)  
SO (Start with operating time)
- **Termination of the programming mode**
- ➔ Termination of the programming mode

## Operation, continuation

### Operator keys of the keypad, continuation

#### Operator keys of the keypad in the display mode



4214a99

Fig. 26 Acknowledging receipt of a flashing fault indication

- **Acknowledging receipt of a malfunction**

- ➔ By pressing the key (Fig. 26) the flashing \*Er\* changes into a permanent light.

#### Operator keys of the keypad in the operating mode



4214a99

Fig. 27 Information regarding the set pause time and residual pause time

- **Display of information regarding the set pause time and residual pause time**

- ➔ Press key > 2 seconds.

#### Operator keys of the keypad in the programming mode



4222a99



4214a99



4214a99

Fig. 28 Changing to the different programming levels

- **Changing to the different programming levels**

- ➔ Press key to change into the programming mode.

- ➔ Setting:
 

hours .....	P1
minutes .....	P2
Output external fault contact .....	
External indication of a failure regarding the normally open or normally closed contact function .....	P5
Starting with pause time or operating time.....	P6
- ➔ Termination of programming

### Monitoring relay

- The monitoring relay signalizes a malfunction (only in combination with optional connector X2, see electrical connection diagrams).
- In the first case the relay picks up (normally open contact).
- In the second case the relay releases (normally closed contact, broken-wire interlock).
- The signal is available via a potential free contact.
- The monitoring relay is released upon acknowledgement of the fault.

## Setting and Operation

### General



6001a02

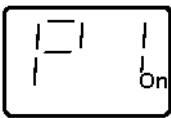
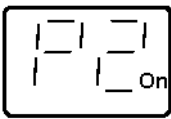
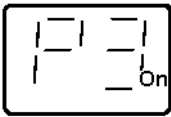

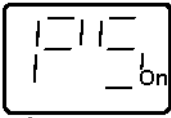
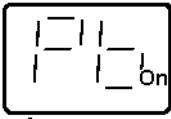
#### NOTE QLS 401

Depending on the version, the QLS 401 is factory-fit with the corresponding printed circuit board:



- for 12/24 VDC ... 236-14212-7
- for 120 VAC ..... 236-10298-6
- for 230 VAC ..... 236-10298-1

However, the QLS 401 does not yet possess a function for a low-level indication (LL). The indication is effected as a fault indication (Er).

### Factory Settings

Programming steps	Factory Setting	Description	Page
 min h 4215a99	6 h	6 hours      Pause time	25
 min h 4217a99	0 min	0 minutes      Pause time	25
 min h 4218a99	1 cycle	Lubrication cycles: 1 cycle      (metering device cycle)	26
 min h 6252b04	no	Signal output of the fault relay: no (normally open) Signalizing during the failure, e. g. low-level indication	26
 min h 6255b04	--	Differentiation fault indication (ER) / low-Level control (LL): --      Permanent signal (no differentiation between ER and LL)	27
 min h 4299a00	SP	Start phase: SP      Start with pause time	28

### Operator Keys

Key	Function	Key	Function
 4222a99	Key for modifying the parameters in the programming step	 4214a99	Key for switching to the next programming step

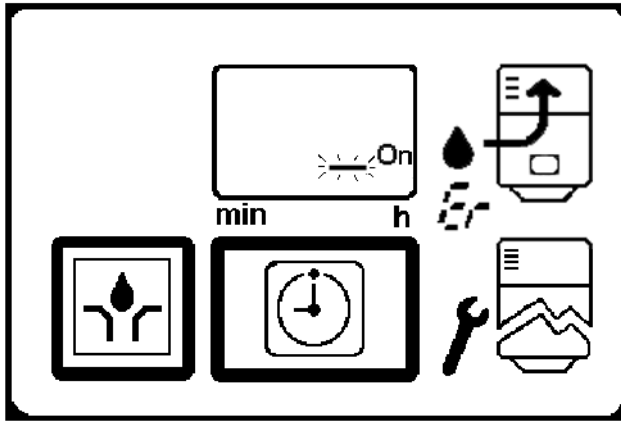
Subject to modifications

## Setting and Operation, continuation

Three possible modes of operation and settings can be selected on the keypad:

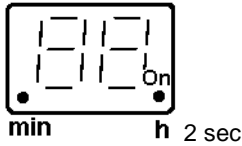
- **Display mode**
- **Operating mode**
- **Programming mode**

### Display Mode

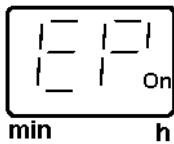


4206b04

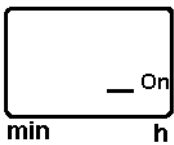
Display press



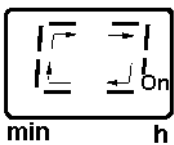
4207a99



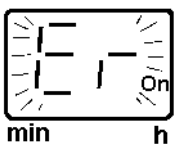
4227a99



4208a04



4209a99



4210a99

- **In the display mode** the user receives information on functions and malfunctions.
- As soon as voltage is applied to the pump, the keypad is automatically in **display mode**. The **rung** is illuminated on the display.
- Normally, the display is dark. Only the functions (rung, rotating segment display) or malfunctions (\* Er \*) are displayed.

- A test display is made when the voltage is applied, all segments and decimal points are illuminated for 2 seconds.



6001a02

#### NOTE

If \*EP\* is displayed after the display test, this indicates that the button or the keypad is defective.

- The right-hand rung (On) indicates the available voltage supply during the pause time. As soon as another message is displayed, the rung turns off.

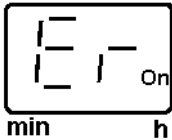
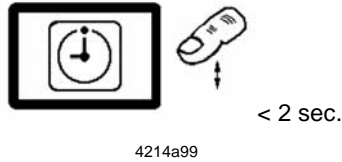
- The operating time is displayed as a rotating segment.

- \* Er \* is shown to indicate a malfunction.

Fig. 29 Display Mode (continuation next page)

## Setting and Operation, continuation

### Display Mode, continuation



4212a99

Fig. 29 Display Mode

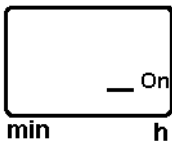
#### To acknowledge malfunctions

- The flashing display is changed into a continuous light by pressing the button (**acknowledging**). To **acknowledge**, press the button only briefly (< 2 sec.).
- Messages which have been acknowledged but have not yet been remedied flash again after the pump is switched off and on again.

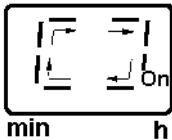
### Operating Mode

Display

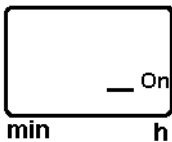
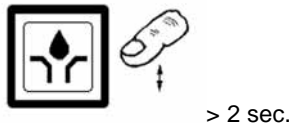
press



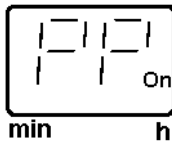
4208a04



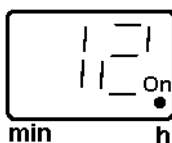
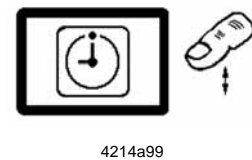
4209a99



4208a04



4123a99



4216a99

after two sec.



6001a02

#### IMPORTANT

The operating mode is accessible only during the pause time, and cannot be operated during the running time (pump operating time).

- Precondition: When the voltage supply is applied, the rung (On) is lit.

#### Operating option: Initiating an additional lube cycle

- ➔ Press the button (> 2 sec.). The elapsed pause time is reset. The operating time starts. A rotating segment is visible on the display during the whole operating time.

#### Operating option: Calling up of set parameters and data determined

- ➔ Press the button.

PP (set pause time)



6001a02

#### NOTE

The following display sequence is shown **twice** and is cancelled after 40 seconds. The change of display occurs every two seconds. Example:

PP = 12h 30 min  
rP = 5h 10 min

12 . (hours)

Fig. 30 Operating Mode (continuation next page)

## Setting and Operation, continuation

### Operating Mode, continuation

<p>min h</p>	after two sec.	. 30 (minutes)
4220a99		
<p>min h</p>	after two sec.	rP (remain pause time)
4224a99		
<p>min h</p>	after two sec.	5 . (hours)
4225a99		
<p>min h</p>	after two sec.	. 10 (minutes)
4226a99		
<p>min h</p>	after two sec.	<b>AC</b> number of the automatically triggered lube cycles, countable up to 9999 cycles. Then counting starts from the beginning again.
4277a00		Example <b>0625</b> cycles:
<p>min h</p>	after two sec.	<b>06.</b> Display for thousands and hundreds 06 as 600
4281a00		
<p>min h</p>	after two sec.	<b>.25</b> Display for tens and ones
4280a00		
<p>min h</p>	after two sec.	<b>UC</b> Number of the manually triggered (by the user) additional lube cycles, countable up to 9999 cycles. Then counting starts from the beginning again.
4278a00		Example <b>0110</b> cycles:

Fig. 30 Operating Mode (continuation next page)

Subject to modifications

## Setting and Operation, continuation

	after two sec.	<b>01.</b> Display for thousands and hundreds 01 as 100
	after two sec.	<b>.10</b> Display for tens and ones
	after two sec.	<b>P3:</b> <u>Number of metering device cycles</u>
	after two sec.	Display of the metering device cycles
	after two sec.	<b>P4:</b> <u>Programming of the output signal</u>
	after two sec.	Display of the output signal "normally closed" (nc) or "normally open" (no)
	after two sec.	<b>P5:</b> <u>Differentiation between low-level indication and fault indication</u>
	after two sec.	Differentiation inactive
	after two sec.	<b>P6:</b> <u>Programming of the start phase</u>
	after two sec.	Display of the start phase with "start operating time" (SO) or "start pause time" (SP)
	after approx. 40 sec.	Termination of the operating mode

Fig. 30 Operating Mode



## Setting and Operation, continuation

### Programming Mode

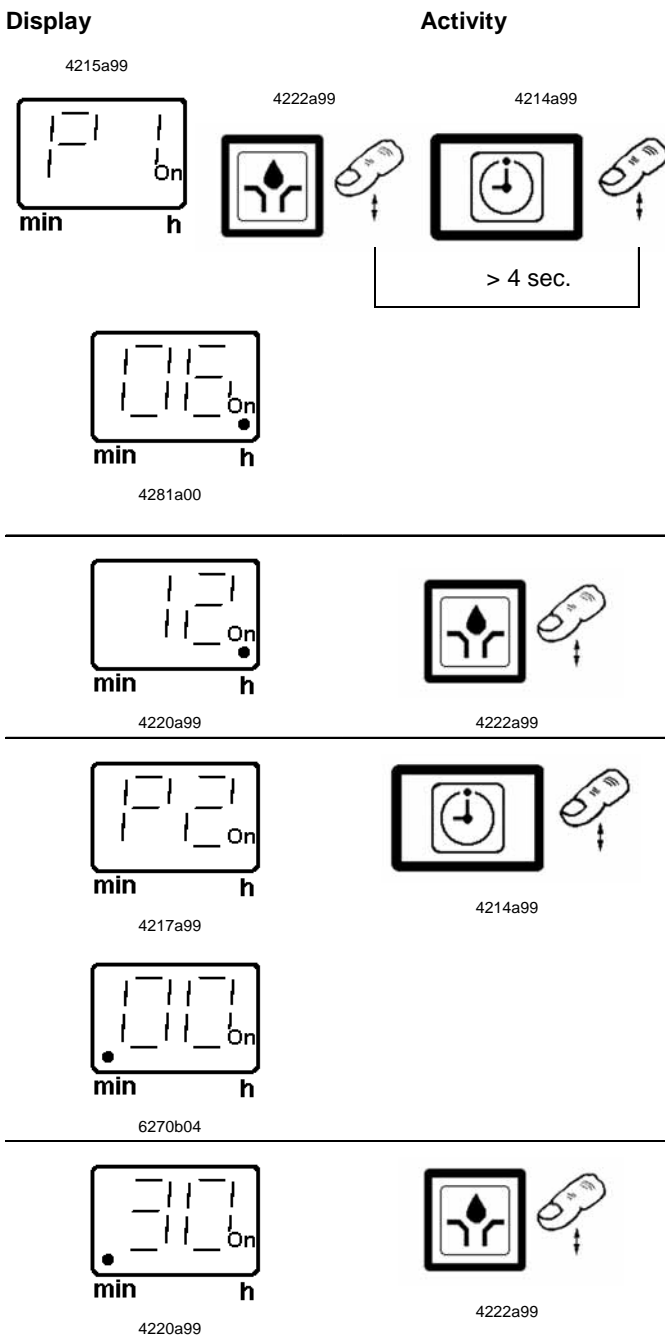


Fig. 31 Programming Mode (continuation next page)

#### Setting Pause Time P1 and P2

➤ To access to the programming mode, **press both buttons** at the same time **> 4 seconds**, so that "P1" appears in the display.

Programming options:	Pause time:
P1	0 - 59 hours
P2	0 - 59 minutes
Min. pause time DC	4 minutes
Min. pause time AC	20 minutes
Max. pause time DC/AC	59 hours 59 minutes

#### P1: Setting hours

When releasing the two buttons, the currently set value appears (here the factory-set value: 6 hours). The field "hour" is indicated by a **decimal point on the right-hand**.

- Press button.
- Settings are made in one direction: 0, 1, 2, 3, ..., 59 h  
Button pressed once ..... increases by 1 hour  
Button pressed continuously ..... quick sequence

#### P2: Setting minutes

➤ Press button, so that "P2" appears in the display.

When releasing the button, the currently set value appears (her the factory-set value: 0 minutes). The field "minute" is indicated by a **decimal point on the left-hand**.

- Press button.
- Settings are made in one direction: 0, 1, 2, 3, 4, ..., 59 min  
Button pressed once ..... increases by 1 minute  
Button pressed continuously ..... quick sequence



6001a02

#### NOTE

The minimum pause time is 4 respectively 20 minutes. For settings < 4 respectively < 20 minutes (without input of hours) there automatically appears ".04" respectively ".20" in the display provided the programming sequence has been carried out completely.

## Setting and Operation, continuation

### Programming Mode, continuation

#### P3: Setting number of cycles

If lube points are divided via sub-divider valves (SSV 6) and a main divider valve (SSV 6, SSV 8), a **maximum of 18 (24) lube points must not be exceeded.**

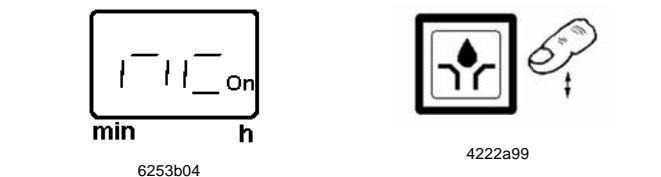
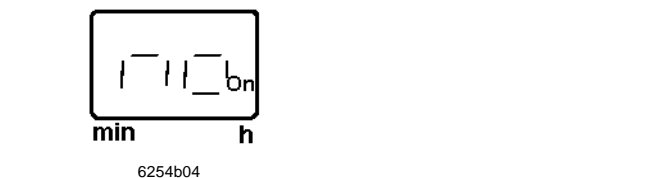
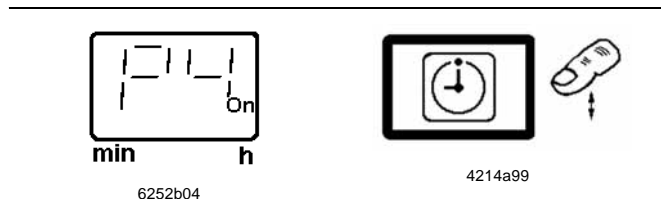
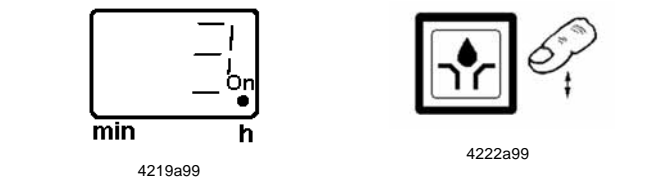
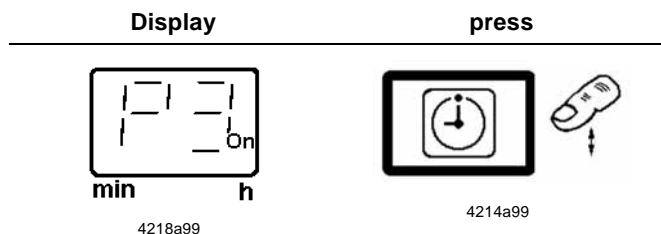


Fig. 31 Programming Mode (continuation next page)



6001a02

#### IMPORTANT

Settings are only possible in connection with progressive divider block SSV 6 or SSV 8 KNQLS (connected as a main divider block) and a Jumper attached at the p.c.b

➔ Press button, so that "P3" appears in the display.

Max. cycle time VDC ..... 1 to 5  
Max. cycle time VAC ..... 1 to 3

When releasing the button, the currently set value appears (here the factory-set value: 1 cycle)

➔ Press button.

➔ Settings are made in one direction: 1, 2, 3, 4, 5



6001a02

#### NOTE

For the VDC version all metering device cycle numbers are possible with SSV 6, SSV 8, SSV 12 and SSV 18.

For the VAC version depending on the type of SSV metering device the following cycle numbers are possible:

- with SSV 6 and SSV 8 ..... 1 to 3
- with SSV 12 and SSV 18 ..... 1

#### P4: Programming of the output signal on the monitoring relay for external fault indication (external fault contact)

➔ Press button, so that "P4" appears in the display.

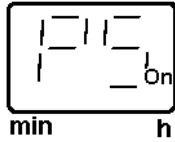
When releasing the button, the currently set value appears in the display (here the factory-set value "no", normally open contact).

➔ Press button.

The external fault contact is modified by programming it as an "nc" normally closed contact.

## Setting and Operation, continuation

### Programming Mode, continuation



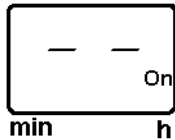
6255b04



4214a99

#### P5: Program external display for fault indications

➡ Press button, so that "P5" appears in the display.



6256b04

factory setting

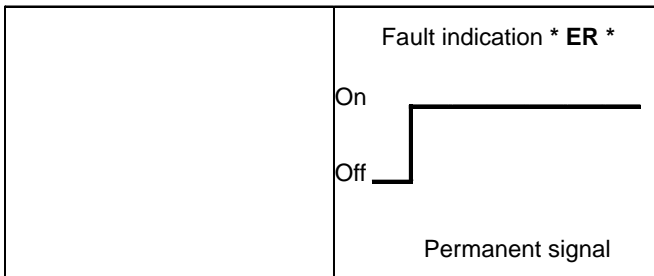
When releasing the button, the display symbol " - - " for permanent signal appears in the display.



6001a02

#### NOTE

*In this setting, a differentiation between low-level indication and fault indication is not possible.*



The output signal on the monitoring relay for the external fault indication "P4" is set as a normally open contact (**no**) (see page 26).

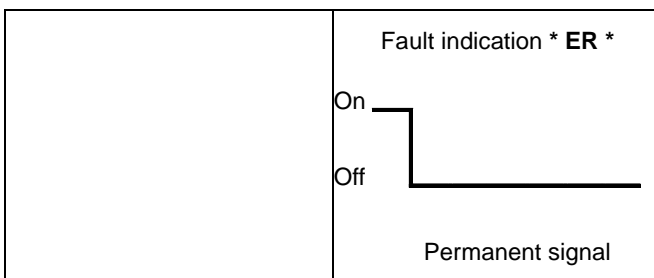


6001a02

#### NOTE

*For the setting of P5 the factory-set value is maintained as presently no low-level indication is integrated.*

Then, fault indications have priority as a permanent signal **On**.



The output signal on the monitoring relay for the external fault indication "P4" is set as a normally closed contact (**nc**) (see page 26).



6001a02

#### NOTE

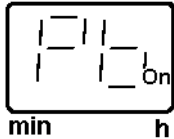
*For the setting of P5 the factory-set value is maintained as presently no low-level indication is integrated.*

Then, fault indications have priority as a permanent signal **Off**.

Fig. 31 Programming Mode (continuation next page)

## Setting and Operation, continuation

### Programming Mode, continuation



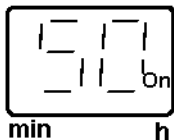
4299a00



4214a99



6259b04



6260b04



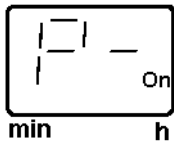
4222a99

#### P6: Program start phase

- ➔ Press button, so that "P6" appears in the display.

The pump is set as a standard with starting pause time **SP (Start Pause time)**.

- ➔ Press button.  
The pump then starts after each switching on with the operating time **SO (Start Operating time)**. After the first operating time the preset pause time is valid.



4221a99



4214a99



4222a99

#### Completing the programming

- ➔ Press button. „P -“ is displayed.



6001a02

#### IMPORTANT

*In order to avoid a wrong program, make sure to always carry out the programming order completely, i. e. setting of P1 (hours), P2 (minutes), P3 (number of cycles), P4 (external contact), P5 (external display), P6 (start phase) and P- (Programming end).*

- Press this key (additional lubrication) to complete the programming and to save the entered parameters.



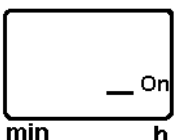
6001a02

#### NOTE

*If the button "additional lubrication" is not pressed within 30 seconds, the changed parameters are not saved and the previous programming remains valid.*

#### IMPORTANT

*After completion of the programming, check the parameter settings in the operating mode once again (see pages 22 ff).*



4208a99

Abb. 31 Programming Mode

## Maintenance, Repair and Tests

### Maintenance

- Maintenance is essentially limited to refilling the reservoir with clean lubricant as necessary. However, check regularly whether the lubricant is being dispensed to all the lubrication points.
- Also check the feed lines for damage and replace them, if necessary.

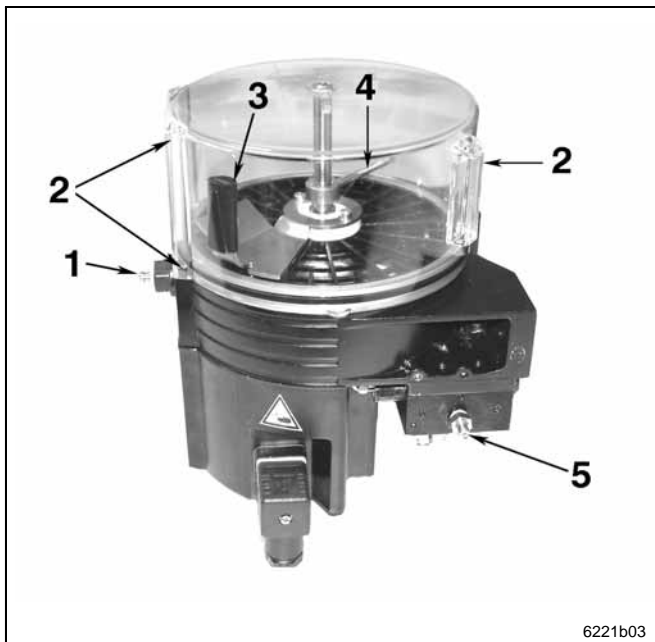


4273a00

#### CAUTION!

Turn off the voltage supply for pumps 120 VAC and 230 VAC before servicing the pump.

#### To fill reservoir



6221b03

Fig. 32 Filling nipple for filling reservoir

- |   |                                     |
|---|-------------------------------------|
| 1 | Filling nipple                      |
| 2 | Vent hole                           |
| 3 | Stirring paddle                     |
| 4 | Fix paddle                          |
| 5 | Metering device lubrication fitting |



6001a02

#### NOTE

Whenever work is performed on the centralized lubrication system, special attention should be paid to cleanliness. Dirt will cause failure of the system.

#### IMPORTANT

To clean the system use petroleum spirit or petroleum. Do not use Tri, Per or similar solvents or polar or organic solvents such as alcohol, methanol, acetone, etc.

- Fill the reservoir up to the "Max." mark via the filling nipple, see Fig. 32.
- Avoid cavities in the lubricant when filling.



6001a02

#### IMPORTANT

The grease must be free from impurities and must not be liable to change its consistency over the course of time.

#### NOTE

If the reservoir has been completely emptied, the pump may require priming and a longer running time to reach the full lubricant output. Therefore, if the occasion arise trigger additional lube cycles manually (see page 18).

## Maintenance, Repair and Tests, continuation

### Maintenance, continuation

#### First filling of a lubrication system



1013A94

#### CAUTION!

**Risk of bursting if the reservoir is over-filled!**

When filling the reservoir by means of pumps with a large delivery volume do not exceed the max. filling mark.



1013A94

#### ATTENTION!

When filling the reservoir, make sure that the air can escape through the venting bores (see fig. 32, pos. 2).

- ➔ If necessary, fill the lubrication lines via the lubrication fitting of the metering device (pos. 5) by means of an external pump.
- ➔ Let the QLS 401 run and fill the empty reservoir through the filler fitting (pos. 1) until lubricant leaks from the metering device outlets.



6001a02

#### IMPORTANT

Remove the lubrication fitting (pos. 5) for a short time to check the lubricant supply.

- ➔ Follow the instructions given on page 28, chapter "To Fill reservoir".

### Repair



4273a00

#### CAUTION!

Switch off the voltage supply for pumps 120 VAC and 230 VAC before servicing the pump.

- For repair work on the QLS 401 use only original **Lincoln** spare parts.
- Using non-**Lincoln** parts voids the pump warranty.



1013A94

#### CAUTION!

By operating the drive motor without the reservoir installed, there is a **risk of injury** by the eccentric gear. Never use the Lubrication System QLS 401 without the installed reservoir!

### Functional Test



> 2 sec.

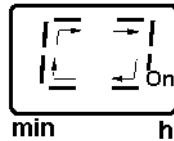
4222a99

- ➔ Press pushbutton > 2 sec. to trigger a lubrication cycle.

Fig. 33 Pushbutton for additional lubrication cycle

## Troubleshooting

### Pump of the QLS 401 system



4209a99

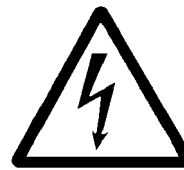
- The green rotating display indicates that the pump operates properly.

#### Fault: Pump motor doesn't run

##### Cause:

- Power supply interrupted. Green decimal point On/h on display is not lit.
- Power supply from printed circuit board to motor interrupted. Electric motor defective.
- Printed circuit board defective
- Keypad or button is defective. "EP" display at the keypad flashes.

##### Remedy:



4273a00

##### WARNING!

*In case of pumps with 120 VAC and 230 VAC, disconnect the power supply before starting any maintenance or repair works.*

- Check the voltage supply to the pump/fuses. If necessary, eliminate the fault or replace the fuses.
- Check the feedline from the fuses to the plug of the pump and then to the printed circuit board.
- Trigger an additional lube cycle. Check voltage supply from the printed circuit board to the motor.
- Replace printed circuit board.
- Replace housing with keypad.

#### Fault: Pump does not deliver lubricant

##### Cause:

- Reservoir is almost empty. "Er" display at the keypad is flashing.
- Pump lost prime and "Er" display at the keypad is flashing.
- Air pockets in lubricant.
- Improper lubricant has been used.
- Suction hole of pump element clogged.
- Pump piston is worn.
- Check valve in pump element defective or clogged.

##### Remedy:

- Fill up the reservoir with clean grease. Let the pump run (initiate an additional lube cycle, see page 18) until lubricant shows at all lube points.



6001a02

##### NOTE

*Dependent on the ambient temperature and/or sort of lubricant output. Therefore, trigger several additional lube cycles.*

- Trigger an additional lubrication cycle. Lubricant must dispense without air bubbles.
- Change the lubricant, see page 39.
- Remove pump element. Check suction hole for foreign particles. If there are any, remove them.
- Replace pump element.
- Replace pump element.

## Troubleshooting, continuation

**Fault: Pump either does not switch off at all or only after the monitoring time of 15 min.**

**Cause:**

- Proximity switch is not dampened, i.e. the control pin does not move within the switching range of the proximity switch, or the distance between the control pin and the proximity switch surface is more than 0.5 mm (0.02 in.).

**Remedy:**

- Trigger additional lubrication (see page 18). Check whether the control pin moves centrally over the switching surface of the initiator. In case the adjustments do not correspond to the indications, the fixing position of the metering device has to be corrected.
- Check the distance.
  - Between the control pin and the switching surface of the initiator (max. 0.5 mm; 0.02 in.)
 In case the adjustments do not correspond to the indications, the fixing position of the proximity switch has to be corrected.
  - Distances between the switching surface of the initiator and the upper edge of the fixing nut:
    - When the divider block is mounted at the back: 16+ / -0,2 mm (0.62+/-0.08 in.)
    - When the divider block is mounted at the bottom: 12,7 +/-0,1 mm (0.5 +/-0.004 in.).
- Tightening torque of the nut: 1,5 NM (1.10 ft-lb.).

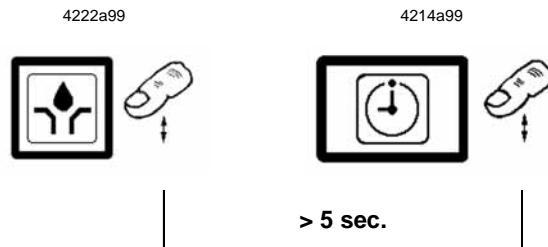
**Fault: Pump runs continuously**

**Cause:**

- Programming of pause time in step P1 was set to "00". Programming of further steps P2, P3 and P- was not carried out. Pump starts running immediately. The proximity switch switches off the cycle for two minutes. Then, pump runs continuously.

**Remedy:**

- Switch off pump (power supply) by removing left-hand socket from plug.
- Press both buttons of keypad:



- Switch on pump (power supply) by replugging left-hand socket.
- Release both pushbuttons after five seconds.
- The factory-set pause time of 6 hours is automatically reset.
- Afterwards new setting of pause time is possible.



## Troubleshooting, continuation

### SSV divider block

**Fault: Blockage in the downstream progressive system**

**Cause:**

- Bearings, lines or divider block clogged
  - Mounting position of divider block : bottom
    - In the case of the divider block SSV 8,12 and 18 the outlet ports 1 and/or 2 are closed.
  - Mounting position of divider block : back-side
    - In the case of the divider block SSV 6, 12 and SSV 18 the outlet 1 is closed and outlet 2 is feed to a lube point.
- The fault can be identified as follows:
- a) Fault indication "Er" flashing on the keypad display.
  - b) Fault indication "Er" flashing on the keypad piston does not move.

**Remedy:**

- Determine the cause of the blockage as described in the following example and eliminate it.
- Let the pump run (refer to "trigger an additional lube cycle", see page 18).
- Disconnect all feedlines (fig. 34, pos. D) of the divider block one after the other. If grease shows under pressure (i. e. at outlet 3) the blockage is located in the line of outlet 3 or in the connected bearing point.
- Pump through the blocked line or bearing point using a hand pump.

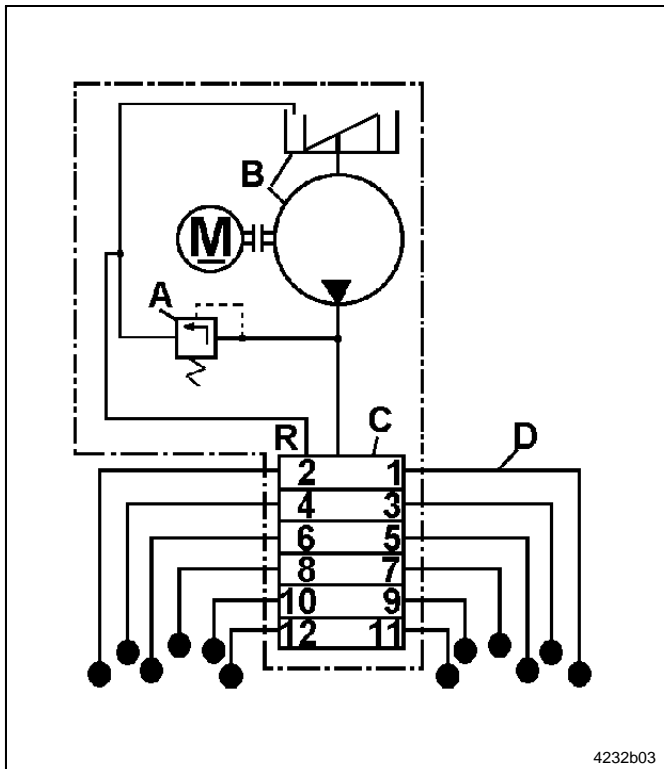


6001a02

**NOTE**

*To check the individual outlets, leave all outlets disconnected for a while, since only one piston stroke is executed with each motor revolution. Several strokes are required for a full cycle of all divider blocks.*

- Check pressure relief valve (page 15, fig. 18). Replace it, if necessary.



4232b03

Fig. 34 Example of a QLS 401

- A pressure relief valve
- B pump
- C SSV 12 divider block
- D feedlines
- R return line

## Troubleshooting, continuation

### Fault: Blockage in the downstream progressive system, continuation

**Cause:**

- Divider valve is blocked

**Remedy:**

- ➔ Replace the divider block or clean it as follows:
  - Remove all threaded tube fittings.
  - Unscrew the piston closure plugs.
  - Remove the piston, if possible, with a soft mandrel (smaller than  $\varnothing$  6 mm, 0.24 in).



6001a02

**IMPORTANT**

*The pistons are individually fit in the bores of the divider block. After removing the pistons, mark them in order to reinstall them in the right direction and position. They may not be interchanged.*

- Thoroughly clean the divider block body in a grease-desolving detergent and dry it with compressed air.
- Clean through the material passages ( $\varnothing$  1.5 mm, 0.59 in) at the thread ends of the piston bores using a pin.
- Clean the divider block once more and dry it thoroughly.
- Reassemble the divider block.

### Fault: Differing lubricant amounts at the lubrication point

**Cause:**

- Lubricant metering not correct.
- Setting of the pause time incorrect.

**Remedy:**

- ➔ Check the lubricant metering acc. to the lubrication chart.
- ➔ Check time setting.

## Technical Data

### QLS 401, GENERAL

Operating temperature ..... -25° C to 70° C (-10° F to 160° F)  
 Maximum operating pressure of pump model without divider block ..... 205 bar (3,000 psig)  
 Number of outlets ..... 6, 8, 12, 18  
 Output per outlet and cycle ..... ca. 0,2 cm<sup>2</sup>  
 Reservoir capacity ..... 1 l  
 Lubricant ..... up to NLGI 2 Grease  
 Weight (average) ..... 5.7 kg. (12.5 lbs.)  
 Protection ..... IP6K 9K acc. to DIN 40050 T9  
 Reverse polarity protection:  
 The operating voltage inlets are protected against reverse polarity.

### ELECTRICAL DATA AC (ALTERNATE CURRENT)

Operating voltage ..... 120 VAC/60 Hz +/- 10 %  
 Operating current ..... 1,0 A  
 Operating voltage ..... 230 VAC; 50/60 Hz +/- 10 %  
 Operating current ..... 0,5 A

### ELECTRICAL DATA DC (DIRECT CURRENT)

Operating voltage ..... 12 V, - 20%/+ 30 %  
 Operating current ..... 2,0 A  
 Operating voltage ..... 24 V, - 20%/+ 30 %  
 Operating current ..... 1,0 A  
 Residual ripple in relation to the operating voltage ..... ± 5% acc. to DIN41755



6001a02

#### NOTE

*The pump motor is suitable for intermittent operation only.*

- In addition to the EMV directive, the **DC systems** also comply with the following guidelines and standards:
  - the vehicle guideline 95/245/EC
  - EMV regulation for on-road vehicles acc. EN 40839 parts 1, 3 and 4

### TIME SETTING

Factory setting  
 Pause time ..... 6 hours/cycle  
 Lubrication cycle time ..... 20 minutes to 100 hours, ..... increment 1 minute  
 Numbers of cycles, general ..... 1 cycle  
 with SSV 6, SSV 8 ..... 1, 2 or 3 cycles are possible  
 Timer memory ..... indefinite over EEPROM

### RELAY FOR MALFUNCTION AC

Potential-free outlet for malfunction  
 Switching voltage ..... max. 230 VAC/ 125 VDC  
 Switching current ..... max. (resistive) 2 A  
 Switching capacity ..... max. 100 VA/80 W

### RELAY FOR MALFUNCTION DC

Potential-free outlet for malfunction  
 Switching voltage ..... max. 48 VAC/ VDC  
 Switching current ..... max. (resistive) 2 A  
 Switching capacity ..... max. 100 VA/80 W



6001a02

#### NOTE

*All data depends on operating voltage, ambient temperature and max. operating pressure.*

### LINES

#### Plastic tube (ø 6x1,5 mm; 1/4 in.)

Min. bending radius ..... 50 cm (2 in.)  
 Bursting pressure at 20° C ( 70°F) ..... approx. 210 bar (3050 psi )  
 Min. temperature ..... -25° C (-10°F)

### TIGHTENING TORQUES

#### Pump

Electric motor to housing ..... 3 NM (2.5 lb.-ft)  
 Pump element in housing ..... 25 NM ( 19.0 lb.-ft)

#### Divider block, accessories

Closure plug (piston) in divider block ..... 18 NM (13.5 lb.-ft)  
 Closure plug (outlets) in divider block ..... 15 NM (11.0 lb.-ft)  
 Outlet fitting in divider block
 

- screw-type ..... 17 NM (12.5 lb.-ft)
- push-in type ..... 12 NM (9.0 lb.-ft)

 Compression nut onto outlet fitting, screw-type:
 

- plastic tube ..... 10 NM (7.5 lb.-ft)
- steel tube ..... 11 NM (8.0 lb.-ft)

 Indicator pin in divider block ..... 18 NM (13.5 lb.-ft)  
 Mounting of the divider block ..... 10 NM (8.0 lb.-ft)

### ACCESSORY KITS

#### Inch- Size Kits:

SSV 6/8 part no. 550-36971-1  
 SSV 12 part no. 550-36971-2  
 SSV 18 part no. 550-36971-3

#### Metric Size Kits:

SSV 6/8 part no. 550-36970-1\*\*\*  
 SSV 12 part no. 550-36970-2\*\*\*  
 SSV 18 part no. 550-36970-3\*\*\*

\*\*\* Lube fittings must be ordered separately

## Technical Data, continuation

### Dimensions

#### Pump

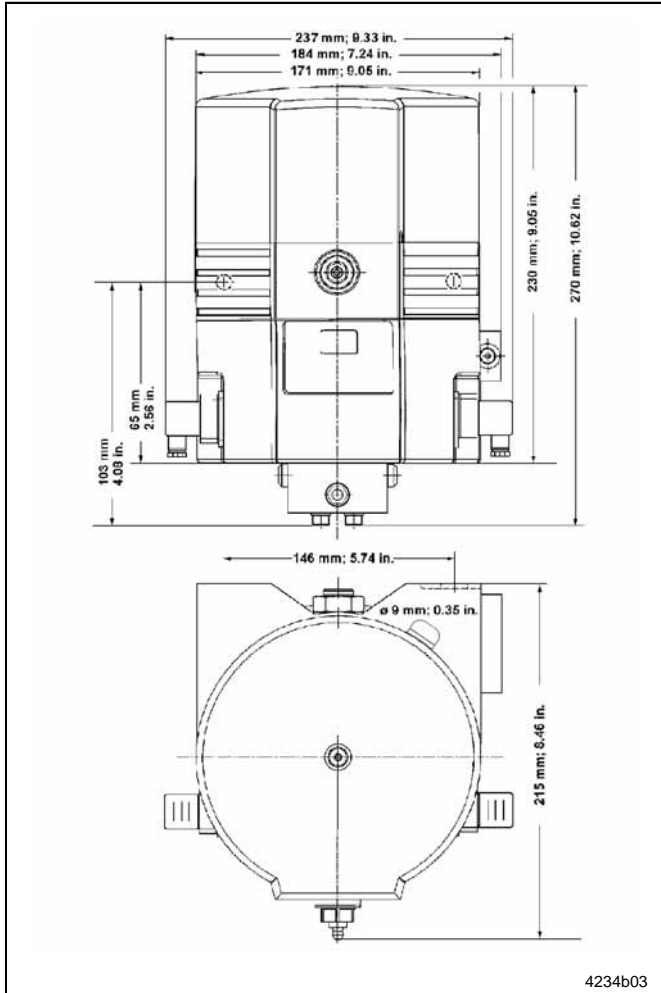


Fig. 35 Dimensions of QLS 401

Number of outlets	Dimensions A in mm (in.)
8	90 (3.54)
12	105 (4.13)
18	150 (5.90)

#### SSV divider blocks

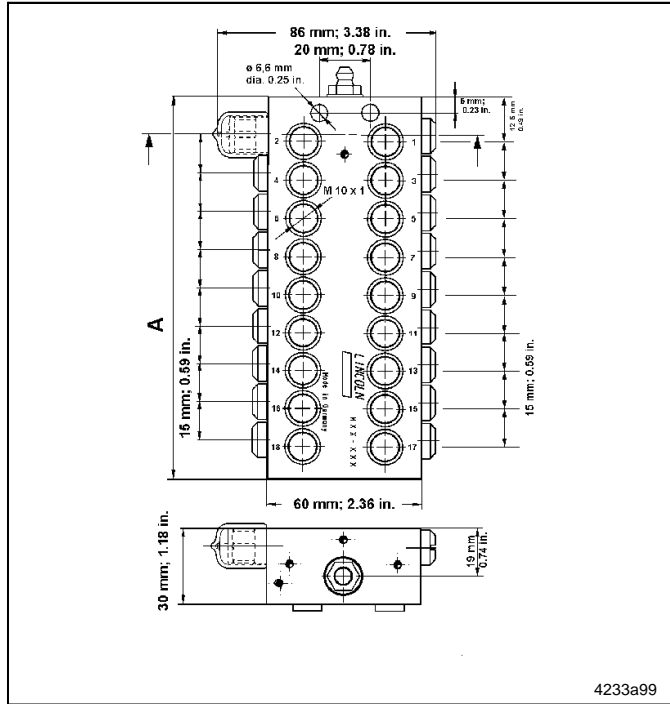


Fig. 36 Dimensions of back mounted SSV divider blocks

Number of outlets	Dimensions A in mm (in.)
6	60 (2.36)
12	105 (4.13)
18	150 (5.90)

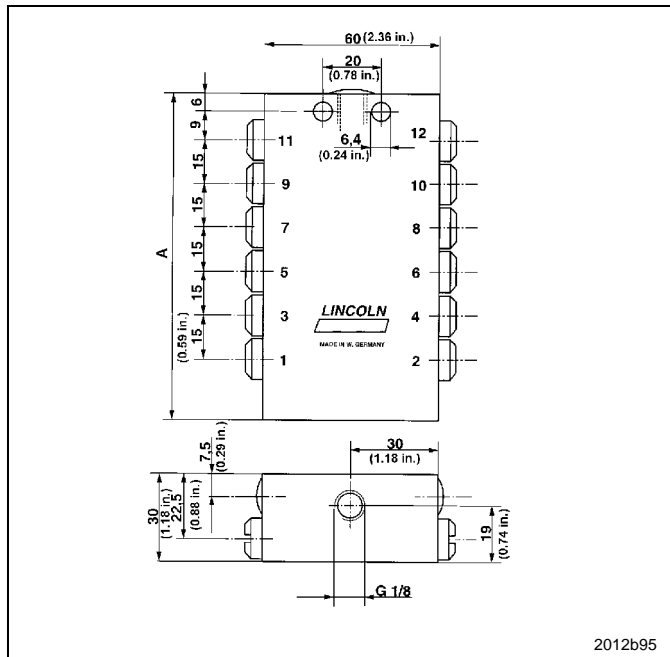


Fig. 37 Dimensions of bottom mounted SSV divider blocks

Subject to modifications

## Technical Data, continuation

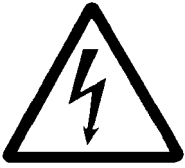
### Electrical connection



4273a00

#### CAUTION!

Before starting, make sure that the electrical supply is off. The device may not be connected or disconnected when the power is on. The protective conductor must always be connected. Take care that this line section is undamaged and conforms to standards and the contacts are safe.



4273a00

#### ATTENTION!

Consider residual ripple of max.  $\pm 5\%$  to connect pumps with direct current version (in relation to the operating voltage acc. to DIN 41755).



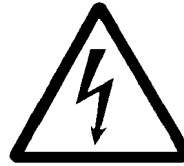
6001a02

#### NOTE

The protection IP6K9K is guaranteed when the socket (x1, x2) is tightened on housing cover with flat packing.

- Make sure of the connection and the type of construction of your QLS 401.
- Connect the electrical wires according to the following electrical connecting diagrams (see page 36 to 40).

### Operation with quarter-turn type plug



4273a00

#### CAUTION!

If the protective-conductor terminal is not connected or interrupted, dangerous touch voltages may occur on the equipment!

Protective measures to be applied for the appropriate operation with bayonet plugs:  
"Functional extra-low voltage with safe isolation" /  
"Protective Extra-Low Voltage" (PELV)  
Standards: EN60204 Part1:1992 / IEC 204-1:1992, modified  
DIN VDE 0100 Part 410 / IEC 364-4-41:1992  
(see page 39 and 40).

### Direct current (DC), square-type plug

with integrated p.c.b. and attached divider block, alarm contact as normally open or normally closed contact (programmable):

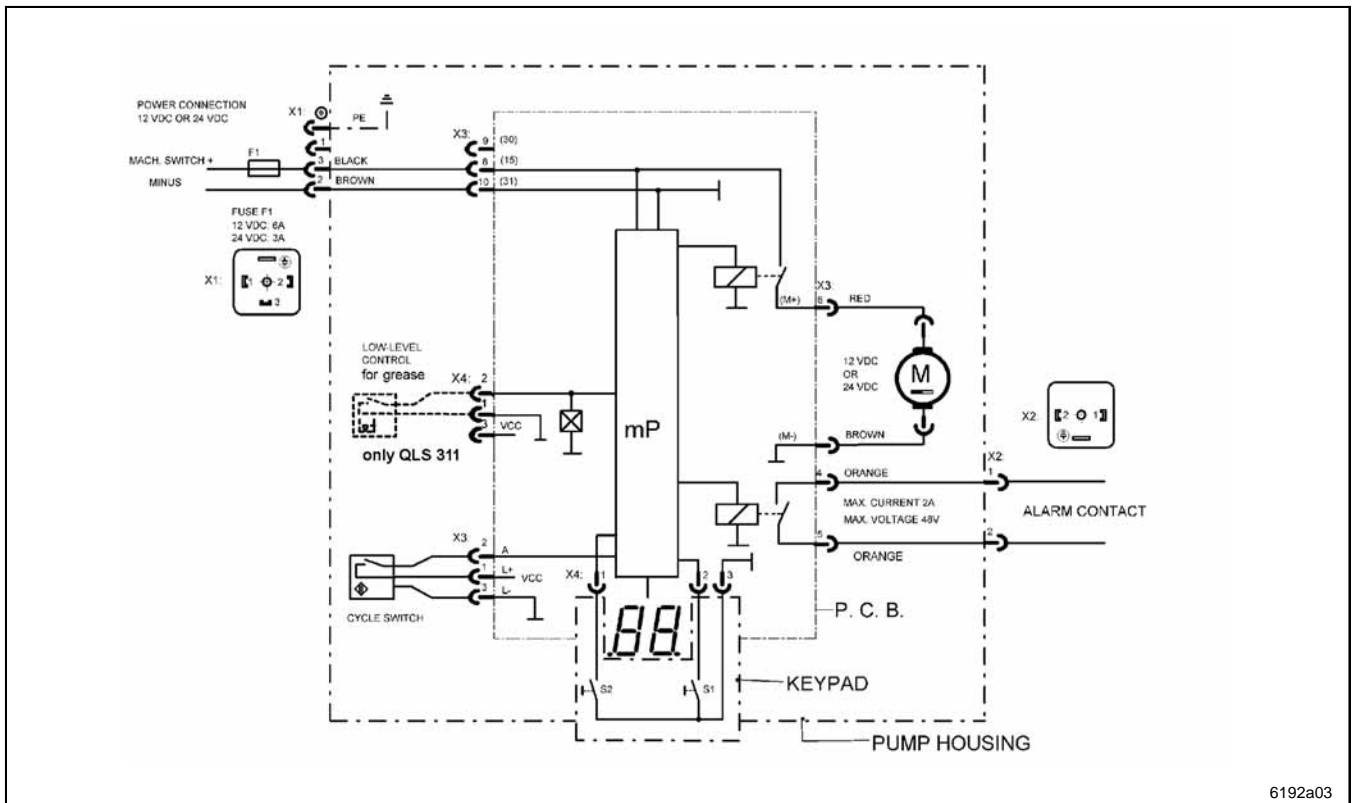


Fig. 38 Electrical Connecting Diagram DC with square-type plug

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## Technical Data, continuation

### Electrical connection, continuation

#### Direct current (DC), square-type plug

with integrated p.c.b. and **external** divider block, alarm contact as normally open or normally closed contact (programmable):

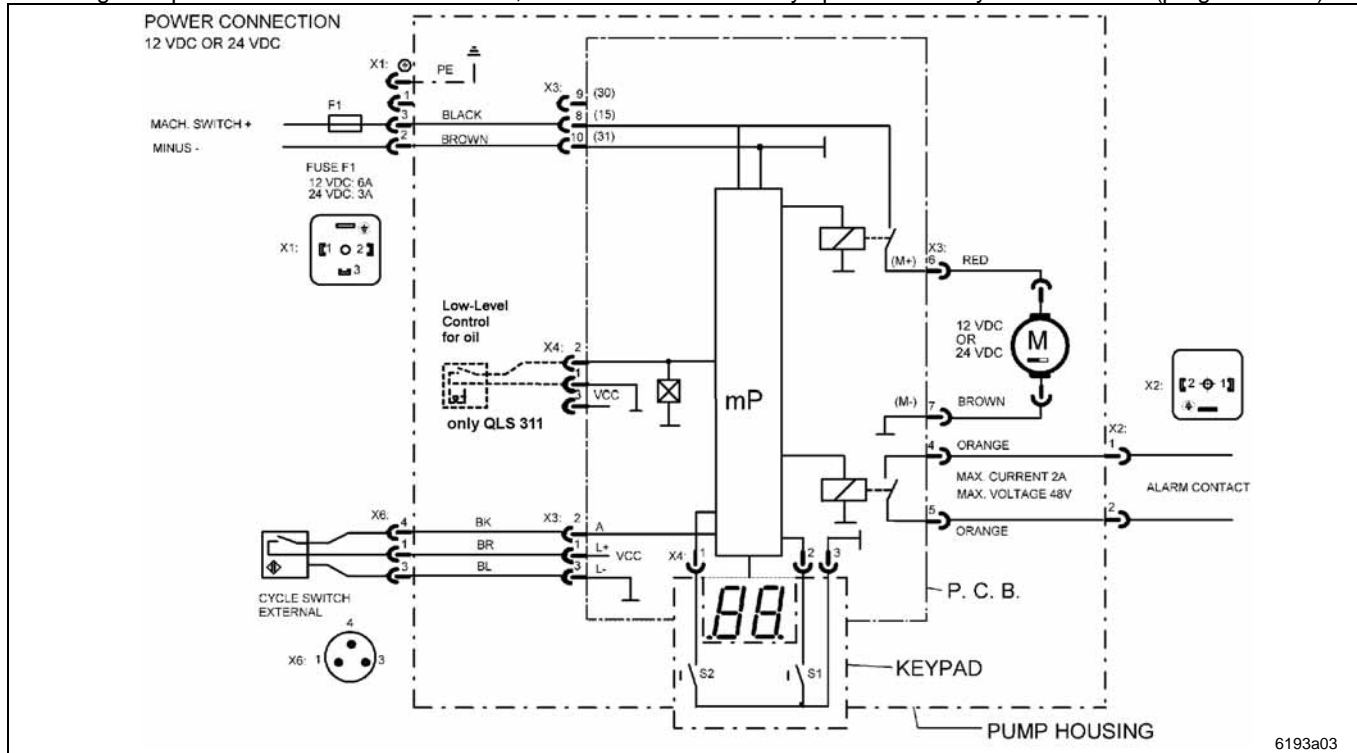


Fig. 39 Electrical Connecting Diagram DC with square-type plug

#### Alternate current (AC), square-type plug

with integrated p.c.b. and **attached** divider block, alarm contact as normally open or normally closed contact (programmable):

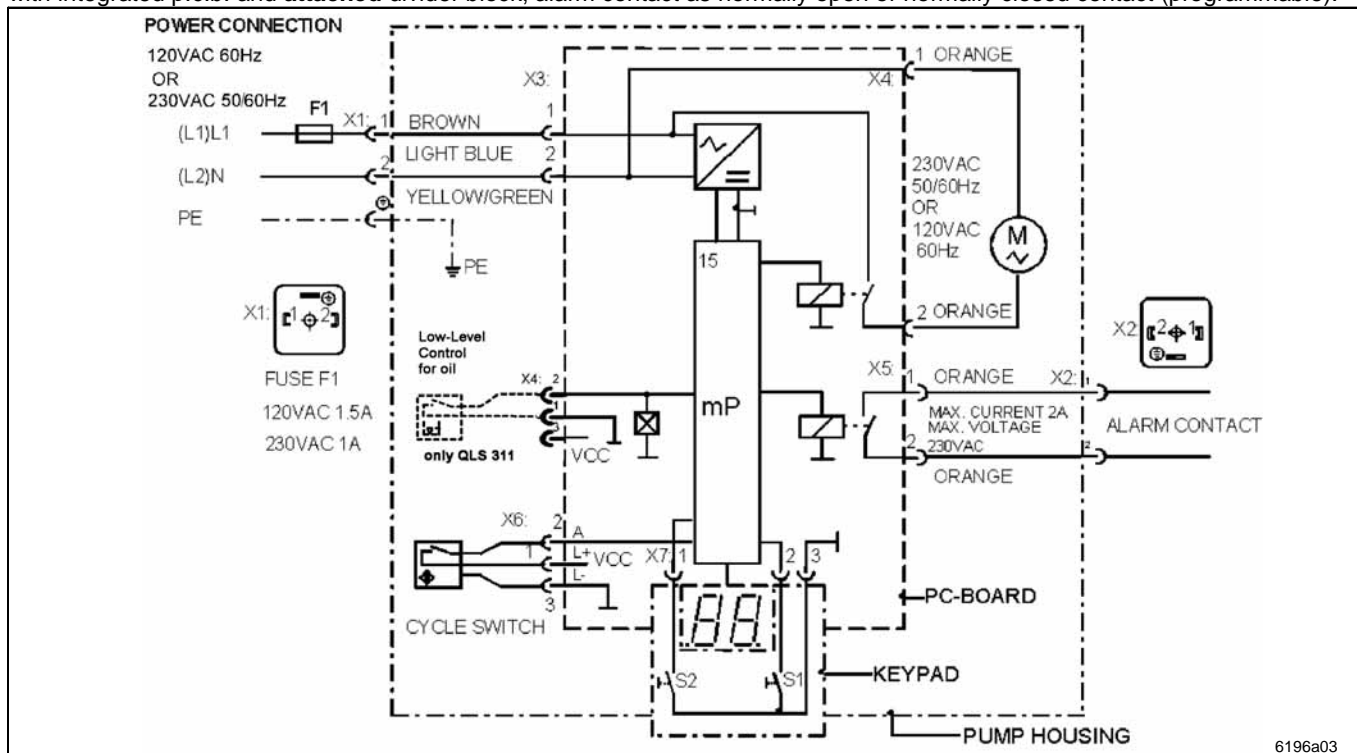


Fig. 40 Electrical Connecting Diagram AC with square-type plug

Subject to modifications

## Technical Data, continuation

### Electrical connection, continuation

#### Alternate current (AC), square-type plug

with integrated p.c.b. and **external** divider block, alarm contact as normally open or normally closed contact (programmable):

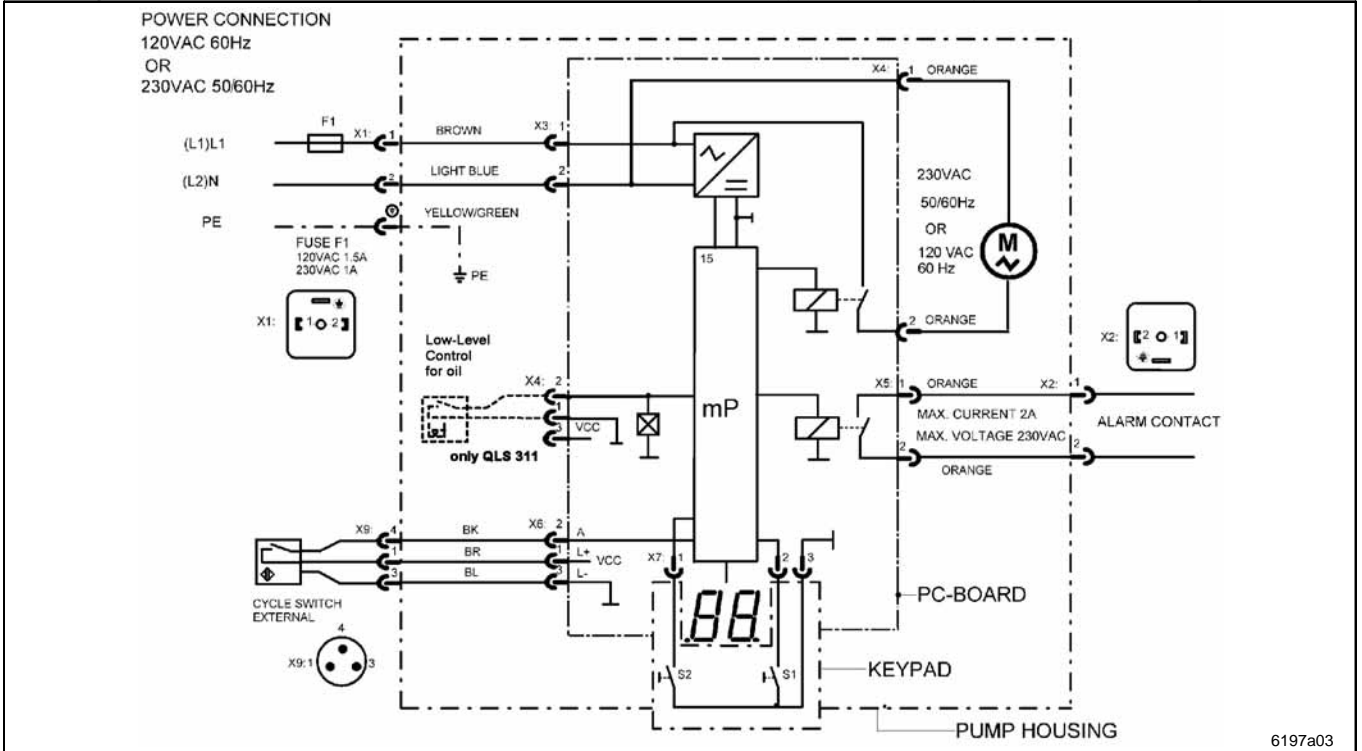


Fig. 41 Electrical Connecting Diagram AC with square-type plug

#### Direct current (DC), quarter-turn type plug

with integrated p.c.b. and **attached** divider block, alarm contact as normally open or normally closed contact (programmable):

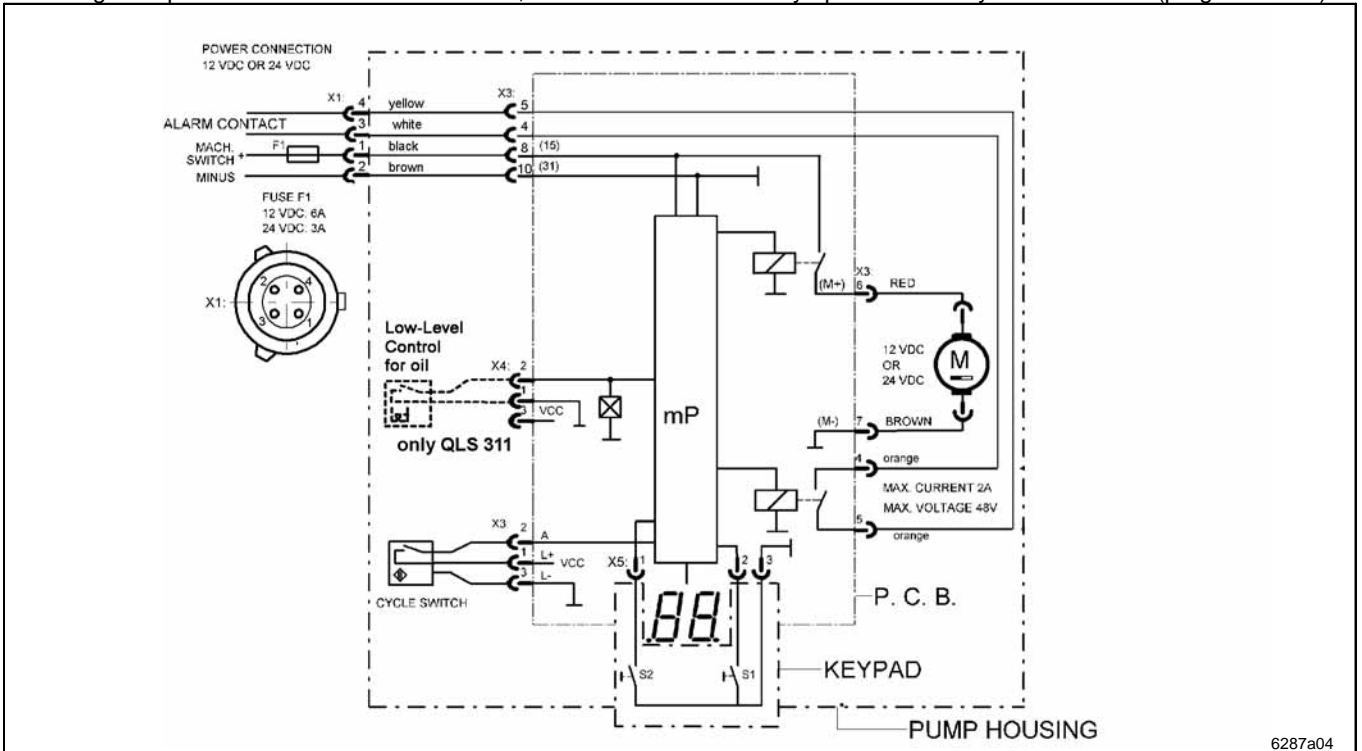


Fig. 42 Electrical Connecting Diagram DC with quarter-turn type plug

## Technical Data, continuation

### Electrical connection, continuation

#### Direct current (DC), quarter-turn type plug

with integrated p.c.b. and external divider block, alarm contact as normally open or normally closed contact (programmable):

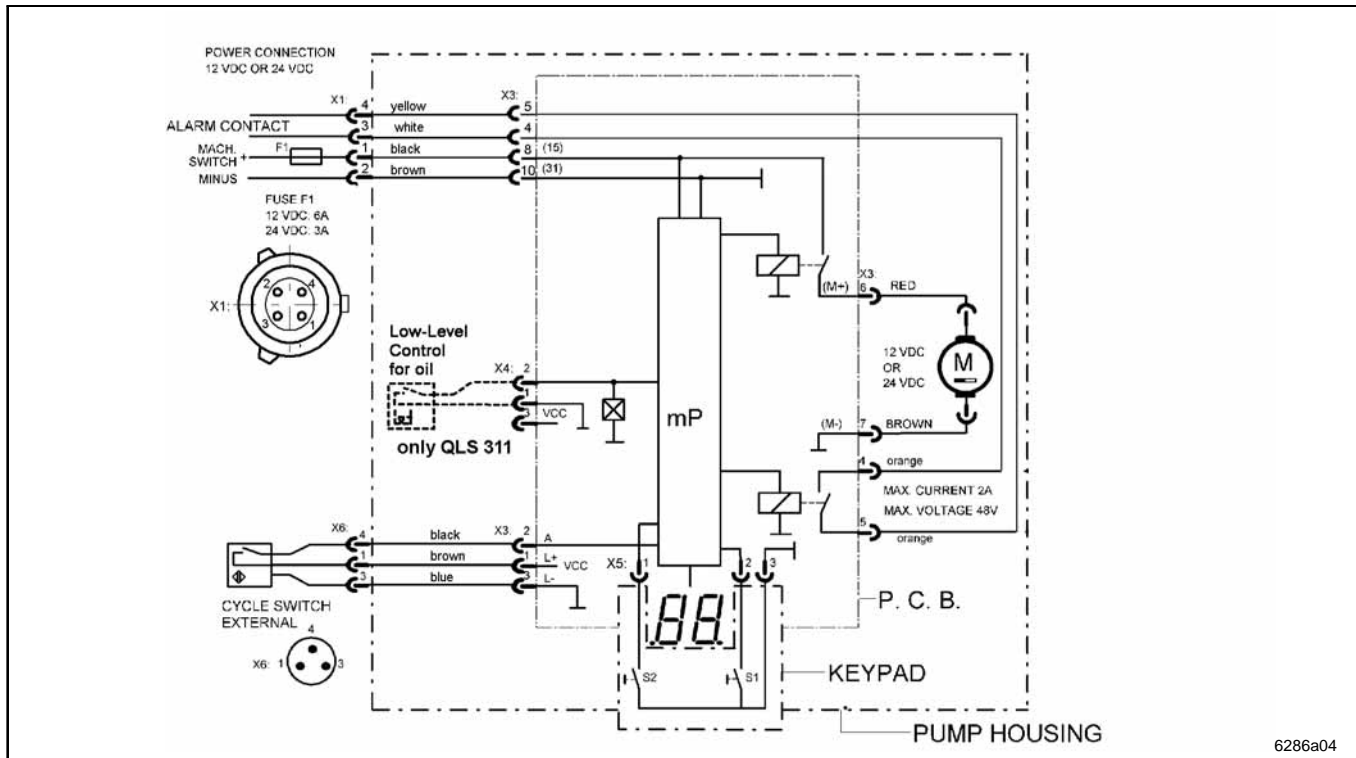


Fig. 41 Electrical Connecting Diagram DC with quarter-turn type plug

### Lubricants



6001a02

#### IMPORTANT

*Absolute cleanliness is essential when handling Lubricants. Impurities will remain suspended in the lubricant and cannot settle. This will result in damage to the lubrication system and thus to the bearing.*

The pump QuickLub 203 can dispense commercial greases up to NLGI grade 2 or mineral oils of at least 40 mm/s (cST) at 40 °C.

Lubricant recipes may change. In case of doubts, send your request for more information to the manufacturer of the centralized lubrication system. This refers in particular to lubricants with more than 3% graphite portion. These are only conditionally in lubrication plants promo table. The lubricants released by us have not been tested with regard to their long-term behaviour.

The lubricants tested did not cause any damage due to incompatibility on the material used by us. The composition of the lubricants, their behaviour during the transport and their compatibility with other material are not known to us.



6001a02

#### IMPORTANT

*The manufacturer of the centralized lubrication system can accept no liability for:*

- damages due to the use of greases that are not or only conditionally transportable in centralized lubrication systems.
- damages on parts of the centralized lubrication system caused by chemical or biological changes of the lubricant used.
- damages due to the incompatibility with other materials.

*The liability is only limited to transportable lubricants in central lubrication systems.*



## Technical Data, continuation

### Lubricants, continuation



6001a02

**IMPORTANT**

*Use Lubricants with solid matter additives only after having consulted the manufacture system!*

#### Lubricating greases for QuickLub systems

Manufacturer	Designation	Base soap	min. delivery temperature
AGIP	F1 Grease 24	Ca	
ARAL	Graisse multi-usages ZS 1/2	Ca/Li	-20 °C
AUTOL	Top 2000	Ca	-10 °C
AUTOL	Top 8000 W	Ca	-20 °C
BP	Graisse lubrifiante	Ca	
BP	C1 Graisse lubrifiante	Ca	-20 °C
CASTROL	CLS - Grease	Li/Ca	-20 °C
ESSO	Cazar K2	Ca	
ESSO	Graisse haute pression	Ca	
FIAT LUBRIFICANTI	Comar 2	Li	-25 °C
FINA	CERAN LT	Ca	-20 °C
FINA	CERAN WR2	Ca	
FUCHS	FN 745	Ca	-25 °C
FUCHS	Renocal FN3	Ca	-20 °C
FUCHS	Renolit HLT 2	Li	-25 °C
KLÜBER	Centoplex 2EP	Li	
MOBIL	Mobilgrease 28	Li	-30 °C
MOLYKOTE	TTF 52	anorg thickener	-30 °C
OPTIMOL	Longtime PD 2	Li	-20 °C
OPTIMOL	OLIT CLS	Li/Ca	-15 °C
SHELL	Retinax C	Ca	
WESTFALEN	Gresalit ZSA 2	Li	-15 °C
ZELLER & GMELIN	ZG 450	Li	
ZELLER & GMELIN	ZG 736	Li	

#### Bio-degradable greases

Manufacturer	Designation	Base soap	Min. delivery temperature
ARAL	BAB EP 2	Li/Ca	
AUTOL	Top Bio 2000	Ca	-25 °C
AVIA	Biogrease 1	Li	up to 0 °C
DEA	Dolon E 2	Li	-15 °C
FUCHS	Plantogel S2	Li/Ca	
KLÜBER	Klüberbio M32-82	Ca	-20 °C

Subject to modifications

### Service Parts

Explosion view with bottom mounted SSV divider block (horizontal outlets)  
 with square-type plug

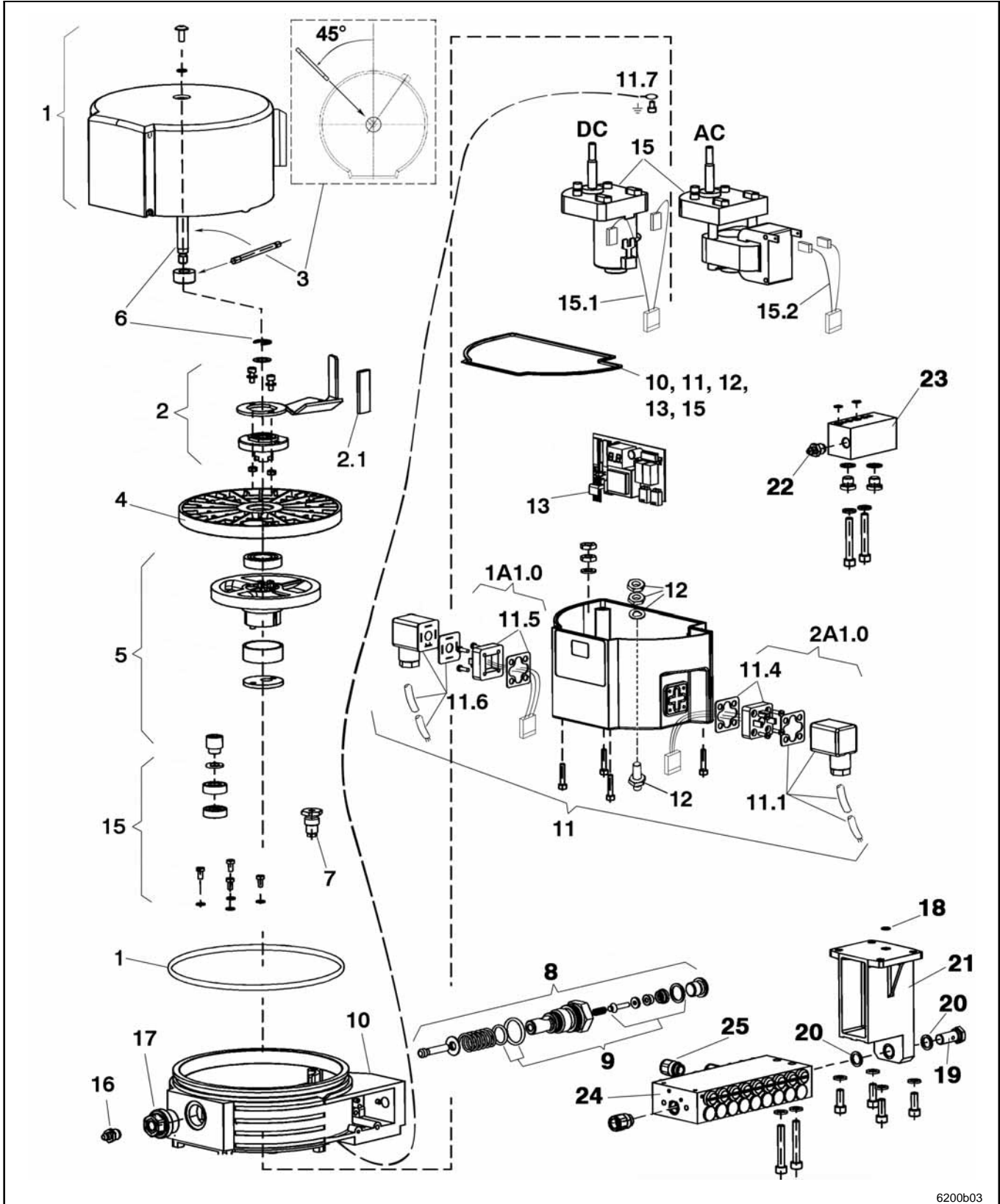


Fig. 44 QLS 401 with bottom mounted SSV divider block and square-type plug (parts list see page 43)

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Subject to modifications

## Service Parts, continuation

### Parts list with bottom mounted SSV divider block (horizontal outlets)

Pos.	Designation	Kit	Single Part	Qty	Part no.
1	Reservoir	x		1	550-34179-1
2	Stirring paddle with stripper	x		1	550-34178-9
2.1	Stripping rubber		x		450-70430-1
3	Pin (fix paddle)		x	1	450-70404-1
4	Intermediate bottom	x		1	450-24749-1
5	Eccentric gear	x		1	550-34178-8
6	Shaft	x		1	550-34178-7
7	Pressure relief valve, cartridge		x	1	235-14343-1
8	Pump element, assy. dia. 6 mm		x	1	650-28856-1
9	Sealing parts for pump element	x		1	550-36979-5
10	Housing	x		1	550-34179-2

#### Square-type plug (see page 42, fig. 44)

11	Housing cover for direct current VDC, plug 1A1.0	x		1	550-34178-5
	for direct current VDC, plug 2A1.0	x		1	550-34178-4
	for alternate current VAC, plug 1A1.0	x		1	550-34178-3
	for alternate current VAC, plug1+2 A1.0	x		1	550-34178-2
11.1	Socket 2 with 10 m cable, for remote control	x		1	664-36078-9
11.4	Appliance plug 2, for remote control, VDC		x	1	664-36968-6
	Appliance plug 2, for remote control, VAC		x	1	664-36968-5
11.5	Appliance plug 1, for power supply, VDC		x	1	664-36968-4
	Appliance plug 1, for power supply, VAC		x	1	664-36968-3
11.6	Socket 1 with 10 m cable, for power supply		x	1	664-36078-7
11.7	Screw with washer assy.		X	1	201-14434-1

Pos.	Designation	Kit	Single Part	Qty	Part no.
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#### Quarter-turn type plug (see page 45, fig. 46)

11	Housing cover for VDC, plug 1A1.0	x		1	550-36984-1
11.1	Socket with 6 m cable for Quarter-turn type plug or	x		1	664-34016-1
	for Quarter-turn type plug ADR		x	1	664-34016-3
11.2	Quarter-turn type plug		x	1	664-34016-2

12	Proximity switch	x		1	550-36980-1
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13	Printed circuit board				
	For 1 and 2-5 cycles - 12/24 VDC		x	1	236-14212-7
	For 1 and 2-3 cycles - 120 VAC		x	1	236-40298-6
	- 230 VAC		x	1	236-40298-1

15	Motor, 12 VDC	x		1	550-36982-1
	Motor, 24 VDC	x		1	550-36982-2
	Motor, 120 VAC	x		1	550-36982-3
	Motor, 230 VAC	x		1	550-36982-4

15.1	Motor connection VDC		x	1	664-36968-7
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15.2	Motor connection VAC		x	1	664-36968-1
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16	Hydraulic lube fitting, A2 AR 1/8		x	1	251-14109-2
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17	Adapter M 22x1,5 (a) x G 1/8 in.(i)		x	1	304-19619-1
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18	O-Ring dia 5 x1, 5 mm		x	3	219-12222-2
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19	Banjo bold		x	1	226-13777-2
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20	Sealing ring aluminum		x	2	226-13780-1
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21	Manifold	x		1	550-36979-6
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22	Hydraulic lube fitting RV A2 AR 1/8		x	1	251-14073-9
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23	Connecting block	x		1	550-36979-7
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24	SSV divider block				
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	SSV 8 - K	x		1	619-37586-1
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	SSV 12 - K	x		1	619-37587-1
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	SSV 18 - K	x		1	619-37588-1
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25	Piston plug with sealing for control pin		x	1	519-32123-1
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	Sealing kit for QLS 401		x	1	550-34178-1
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### Service Parts, continuation

Explosion view with bottom mounted SSV divider block (horizontal outlets)  
 with quarter-turn type plug

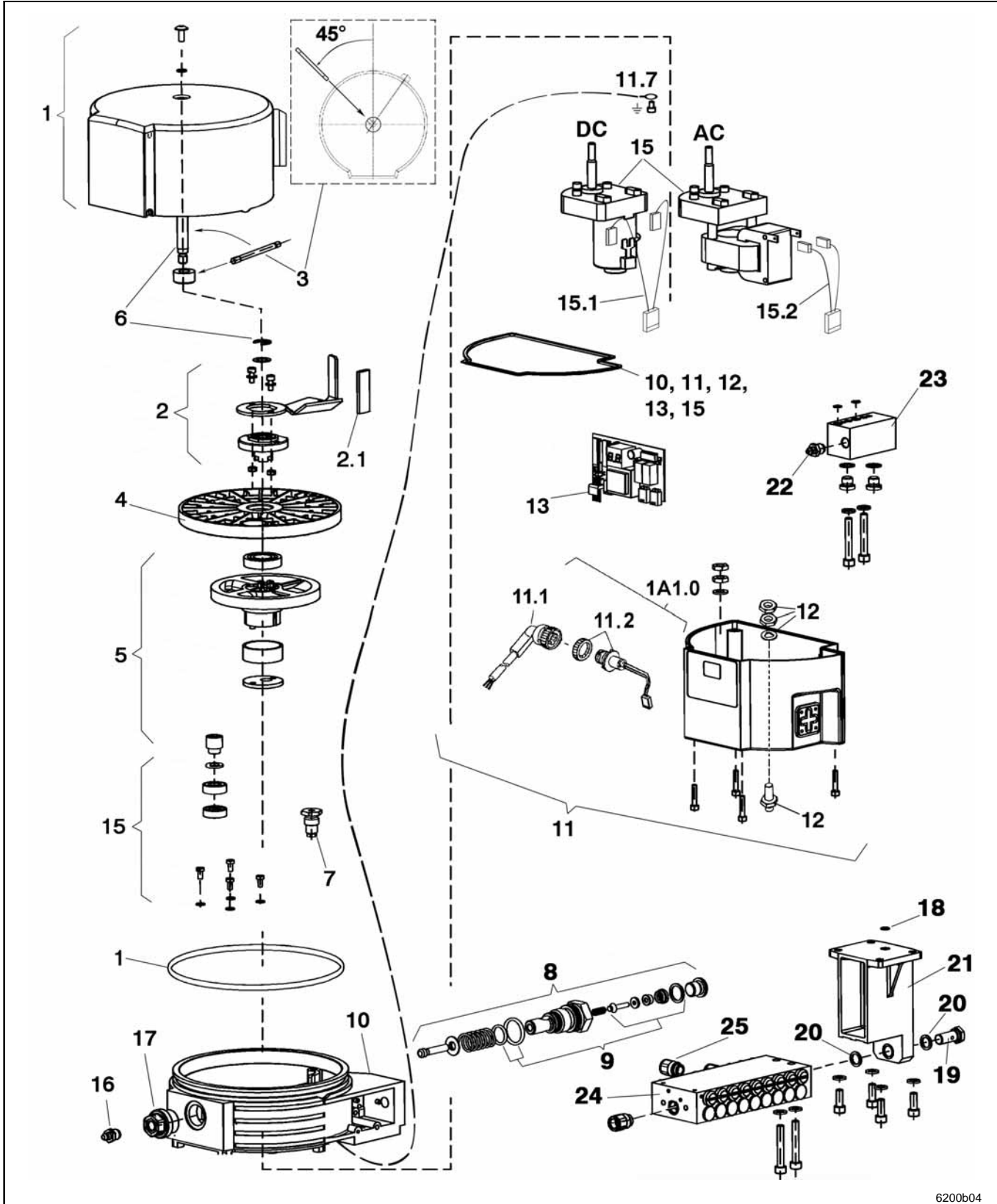


Fig. 45 QLS 401 with bottom mounted SSV divider block and quarter-turn type plug (parts list see page 43)

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Subject to modifications

### Service Parts, continuation

Explosion view with back mounted SSV divider block (vertical outlets)  
 with quarter-turn type plug

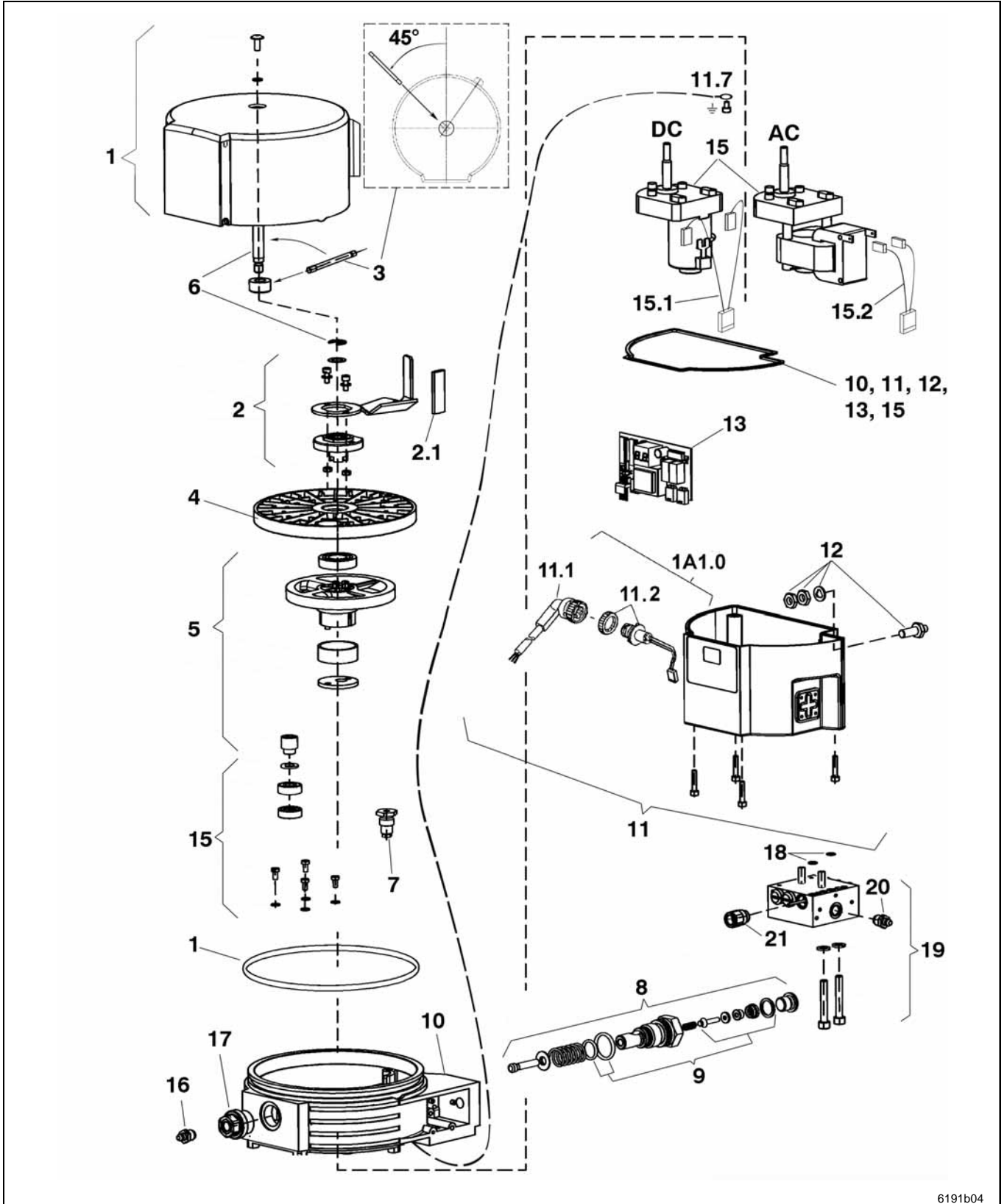


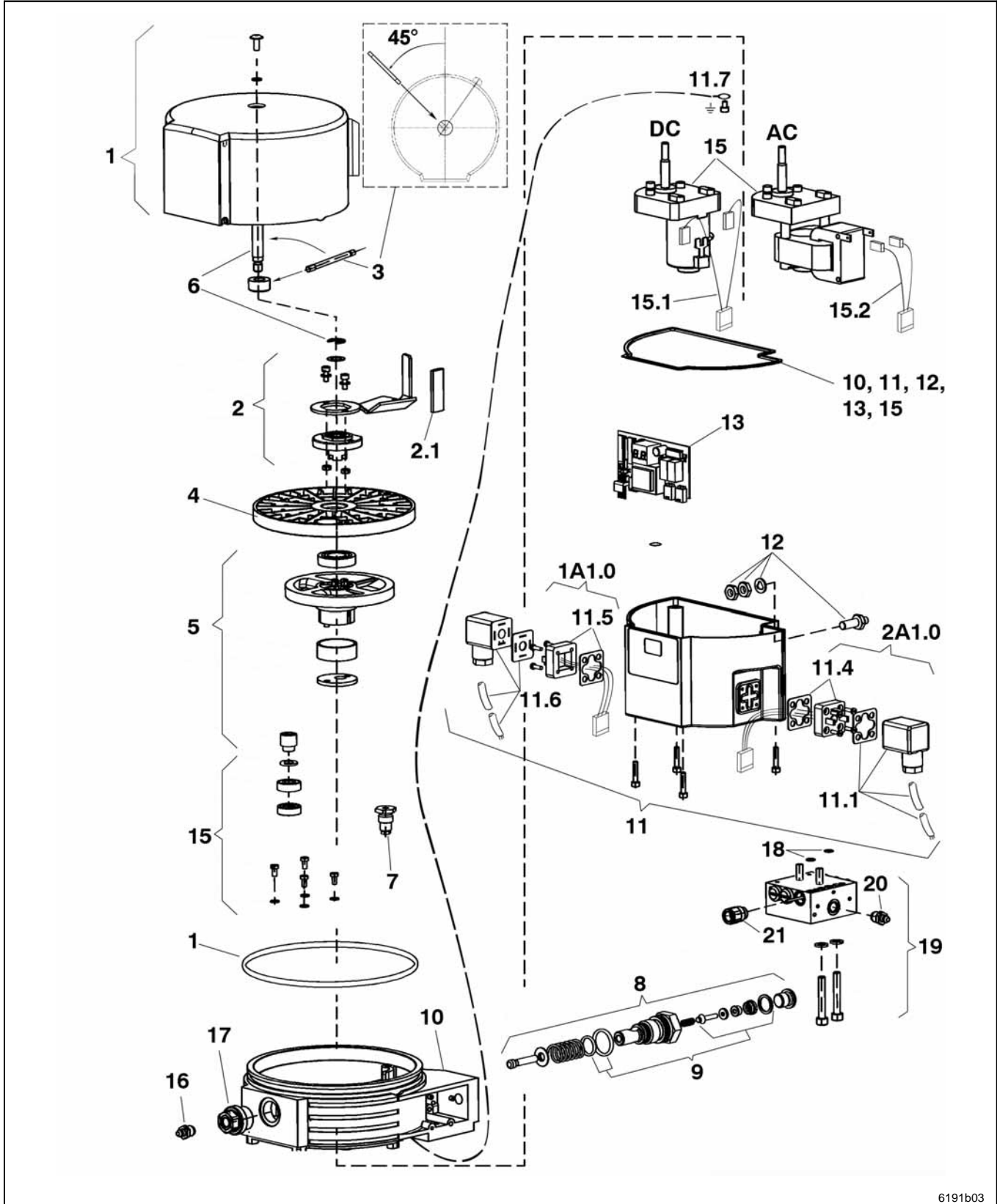
Fig. 46 QLS 401 with back mounted SSV divider block and quarter-turn type plug (parts list see page 47)

6191b04

Subject to modifications

### Service Parts, continuation

Explosion view with back mounted SSV divider block (vertical outlets)  
 with square-type plug



6191b03

Fig. 47 QLS 401 with back mounted SSV divider block and square-type plug (parts list see page 47)

Subject to modifications

## Service Parts, continuation

### Parts List with back mounted SSV divider block (vertical outlets)

Pos.	Designation	Kit	Single Part	Qty	Part N°.
1	Reservoir	x		1	550-34179-1
2	Stirring paddle with stripper		x	1	550-34178-9
2.1	Stripping rubber		x		450-70430-1
3	Pin (fix paddle)	x		1	450-70404-1
4	Intermediate bottom	x		1	450-70405-1
5	Eccentric gear	x		1	550-34178-8
6	Shaft	x		1	550-34178-7
7	Pressure relief valve, cartridge		x	1	235-14343-1
8	Pump element, assy dia. 6 mm		x	1	650-28856-1
9	Sealing parts for pump element	x		1	550-36979-5
10	Housing	x		1	550-34178-6

### Square-type plug (see page 46, fig. 47)

11	Housing cover XN				
	for direct current VDC, plug 1A1.0	x		1	550-34178-5
	for direct current VDC, plug 2A1.0	x		1	550-34178-4
	for alternate current VAC, plug 1A1.0	x		1	550-34178-3
	for alternate current VAC, plug 1+2 A1.0	x		1	550-34178-2
11.1	Socket 2 with 10 m cable, for remote control	x		1	664-36078-9
11.4	Appliance plug 2, for remote control, VDC		x	1	664-36968-6
	Appliance plug 2, for remote control, VAC		x	1	664-36968-5
11.5	Appliance plug 1, for power supply, VDC		x	1	664-36968-4
	Appliance plug 1, for power supply, VAC		x	1	664-36968-3
11.6	Socket 1 with 10 m cable, for power supply		x	1	664-36078-7
11.7	Screw with washer assy.		x	1	201-14434-1

Pos.	Description	Kit	Single Part	Qty	Part N°.
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### Quarter-turn type plug (see page 44, fig. 45)

11	Housing cover for VDC, plug 1A1.0	x		1	550-36984-1
11.1	Socket with 6 m cable for Quarter-turn type plug or for Quarter-turn type plug ADR	x		1	664-34016-1
			x	1	664-34016-3
11.2	Quarter-turn type plug		x	1	664-34016-2

12	Proximity switch	x		1	550-36980-1
13	Printed circuit board for 1 cycle				
	For 1 and 2-5 cycles - 12/24 VDC	x		1	236-14212-7
	For 1 and 2-3 cycles - 120 VAC	x		1	236-10298-6
	- 230 VAC	x		1	236-10298-1
15	Motor, 12 VDC	x		1	550-36982-1
	Motor, 24 VDC	x		1	550-36982-2
	Motor, 120 VAC	x		1	550-36982-3
	Motor, 230 VAC	x		1	550-36982-4
15.1	Motor connection VDC		x	1	664-36968-7
15.2	Motor connection VAC		x	1	664-36968-1
16	Hydraulic lube fitting A2 AR 1/8		x	1	251-14109-2
17	Adapter M 22x1,5 (a) x G 1/8 in.(i)		x	1	304-19619-1
18	O-Ring dia 5 x1, 5 mm		x	2	219-12222-2
19	SSV divider block				
	SSV 6 - K	x		1	619-37589-1
	SSV 12 - K	x		1	619-37590-1
	SSV 18 - K	x		1	619-37591-1
20	Hydraulic lube fitting RV, A2 AR 1/8		x	1	251-14073-9
21	Piston plug with sealing for control pin		x	1	519-32123-1
	Sealing kit for QLS 401-XN			1	550-34178-1