

# Electric operated Centro-Matic pumps P653S

24 V DC or 120/230 V AC, 50-60 Hz.





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# Safety

Read and carefully observe installation instructions before installing/operating/ troubleshooting assembly. Assembly must be installed, maintained and repaired exclusively by persons familiar with instructions.

Install assembly only after safety instructions and guide have been read and are completely understood.

Adequate personal protection must be used to prevent splashing of material on skin or in eyes.

Always disconnect power source (electricity, air or hydraulic) from pump when not being used.

Equipment generates very high grease pressure. Extreme caution should be used when operating equipment as leaking material from loose or ruptured components can inject fluid through skin and into body. If any fluid appears to penetrate skin, seek attention from doctor immediately.

Do not treat injury as a simple cut. Tell attending doctor exactly what type of fluid was injected.

Any other use not in accordance with instructions will result in loss of claim for warranty or liability.

- Do not misuse, over-pressurize, modify parts, use incompatible chemicals, fluids, or use worn and/or damaged parts.
- Do not exceed stated maximum working pressure of pump or of lowest rated component in system.
- Always read and follow fluid manufacturer's recommendations regarding fluid compatibility, and use of protective clothing and equipment.
- Failure to comply may result in personal injury and/or damage to equipment.

# Explanation of signal words for safety

## NOTE

Emphasizes useful hints and recommendations as well as information for efficient and trouble-free operation.

#### **▲** CAUTION

Indicates a dangerous situation that can lead to light personal injury or property damage if precautionary measures are ignored.

#### ▲ WARNING

Indicates a dangerous situation that could lead to death or serious injury if precautionary measures are ignored.

#### 🛆 DANGER

Indicates a dangerous situation that will lead to death or serious injury if precautionary measures are ignored.

# User's responsibility

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

- **1** Pump/system shall be operated only for intended use and design shall not be modified or transformed.
- **2** Pump/system shall be operated only if it is in proper functioning condition and if operated in accordance with maintenance requirements.
- **3** Operating personnel must be familiar with owners manual and safety instructions mentioned within, and observe instructions carefully.

Correct installation and connection of tubes and hoses, if not specified by Lincoln Industrial, is user's responsibility. Lincoln industrial technical services will gladly assist you with any questions pertaining to installation.

# Environmental protection

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

# Service

Personnel responsible for handling of pump/ system must be qualified. If required, Lincoln Industrial offers you full service in form of advice, on-site installation assistance, training, etc. Please contact technical service department for assistance.

In event of inquiries pertaining to maintenance, repairs and spare parts, model specific data to enable technical services to clearly identify components of your pump/ system is required; **therefore, always indicate part, model and series number.** 

## NOTE

When using parts other than spare parts that have been tested, serious damage may occur. For operation of device always use original parts made by Lincoln Industrial.

# Safety instructions

## Appropriate use

Electric Centro-Matic pump P653S has been designed for automatic lubrication of commercial vehicles, industrial, construction and agricultural machines and wind power plants.

P653S pump has been designed for intermittent operation and is not suitable for continuous operation. Pump is capable of supplying lubricants up to NLGI 2 grade. (**> pages 36 – 38** for list of recommended greases).

## Misuse

Any use of P653S pump that is not mentioned in user manual will be regarded as misuse. If P653S pump is used or operated in a manner other than specified, any claim for warranty or liability will be null and void.

## **▲** CAUTION

If personal injury or material damage occurs as a result of inappropriate operation, (e.g. if safety instructions are ignored or resulting from an incorrect installation of P653S pump), no claims or legal actions may be taken against Lincoln Industrial.

# Exclusion of liability

Manufacturer of P653S pump will not accept any liability for damages caused by:

- lack of lubricant due to an irregular refilling of pump
- use of contaminated lubricants
- use of greases not pumpable or only conditionally pumpable by P653S pump
- inadequate disposal of used or contaminated lubricants as well as of components that have been in touch with lubricant
- unauthorized modification of system components
- use of unapproved parts
- operation without adhering to minimum pause time and respectively maximum lubrication time

# Regulation for prevention of accidents

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

# General safety instructions

- Pump P653S is designed for safe operation.
- Incorrect use may result in bearing damage caused by poor or excessive lubrication.
- P653S pump with follower can be mounted vertically, horizontally or upside down.
- Pump without follower should be mounted vertically upright only.
- Unauthorized modifications or changes to an installed system are not admissible.
   Any modification of pump must be subject to prior authorization by manufacturer.
- Install components of P653S pump in such way that operator can always see low-level position of pump reservoir.
- Each time reservoir has been refilled, make sure no air has been trapped under follower and pump is pumping lubricant.

# Operation, maintenance and repair

### ▲ WARNING

Before carrying out any maintenance or repair on the P653S pump, make sure that all lubrication lines of the carrier unit are depressurized.

Failure to comply may result in death or serious injury.

## Repair

Repair should only be performed by authorized and instructed personnel familiar with instructions.

## Operation/maintenance

Pumps P653S:

- Must be refilled at regular intervals with clean lubricant recommended by manufacturer without air entrapments under follower plate.
- Operate automatically. Regular check (approximately every 2 days) should be made to ensure lubricant is pumped to all lubrication points.

## Disposal

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

## ▲ WARNING

Pump P653S must be installed by qualified personnel. Connection of 120 V AC must be done according to National Electrical code. Before installing or working on pump, disconnect and lock out incoming power. Failure to comply may result in death or serious injury.

#### ▲ WARNING

Failure to observe safety instructions, (e. g. touching electrically charged parts when pump is opened, or improper handling of pump P653S) may cause serious injury or death. If values specified in technical data are exceeded, device may overheat. It may damage pump P653S and impair electric safety.

Failure to comply may result in death or serious injury.

• Defective printed circuit boards should be appropriately packed and returned to factory.

#### **▲** CAUTION

Electric voltage present. In case of pumps where grease is filled from top, power supply must be switched off before lubricant is filled in.

Failure to comply may result in personal injury or damage to equipment.

## **▲** CAUTION

Never put your hand into open reservoir while pump is running. Injury may occur if pump is being filled from reservoir top. Failure to comply may result in personal injury or damage to equipment.

#### **△** CAUTION

Do not use pump in potentially explosive applications.

Failure to comply may result in personal injury or damage to equipment.

# Installation

- Any safety equipment already installed on vehicle:
  - should not be modified or made ineffective.
  - should only be removed for purpose of installing system and must be replaced afterwards.

### NOTE

Adhere to:

- installation instructions of vehicle manufacturer with regard to all drilling and welding procedures.
- specified minimum distance between holes and upper/lower rim of frame or between two holes.

## NOTE

Route supply lines professionally. Firmly bolt together any components subject to pressure.

#### NOTE

Do not exceed maximum filling mark when filling reservoir by means of pumps with large delivery volume. Risk of burst if reservoir is over-filled.

# Installation and maintenance of hydraulic hoses

#### NOTE

Operational safety of P653S pump can only be ensured in case of professional installation and maintenance of hose lines.

## Lubrication hose lines

- must never be subjected to torsion
- must be installed twist-free
- must not rub against metal components or edges
- are to undergo regular visual checks and must be exchanged in the case of wear (at latest 2 years after installation)

Pay attention to non-linear installations to allow for larger bending radius as possible. Avoid kinks. In constricted installation conditions, use pipe elbow unions to avoid danger of kinking behind hose socket. Use high pressure hydraulic hose for lubrication lines.





# Description

P653S pump is designed for single line parallel Centro-Matic type lubrication systems. Pumps integrated design includes all necessary components to support Centro-Matic lubrication systems:

- controller to program and monitor lubrication cycle
- choice of internal pressure switch or internal pressure transducer
- internal vent valve
- three pumping elements connected together
- external pressure relief valve
- reservoir low-level control
- end of lubrication line pressure switch or pressure transducer choice
- contacts for remote monitoring
- 24 V DC or 120/230 V AC power supply option, etc.

Pump can supply adequate lubricant to bearings using SL-V, SL-V XL, SL-1, SL-32 and SL-33 injectors. Number of injectors should be based on output of the pump being 1.5 in<sup>3</sup>/minute (24,5 cm<sup>3</sup>/minute).

Pump for 120/230 VAC power supply can be installed in any stationary industrial type of applications requiring lubrication for the same number of medium size bearings.

Pump basic model can be supplied with follower plate or without follower plate. Follower plate is recommended in stationary industrial type applications with heavy consistency greases (NLGI 1 and 2) and for pumps used at low temperatures applications in all installations.

## NOTE

Installations using SL-32 and SL-33 Lincoln injectors can lubricate more than 35 bearings.

Typical Centro-Matic system schematic is shown on **page 35**.

#### **△** CAUTION

Use only supply line hose and fittings that are appropriate for programmed/set system pressure.

# Pump P653S

- pumps greases up to NLGI 2 (per approved list) at temperatures from -40 to 158 °F (-40 to 70 °C)
- develop maximum pressure up to 3 500 psi (240 bar) with pressure switch and up 4 600 psi (317 bar) with pressure transducer.

## **Reservoir sizes**

- 4 l transparent plastic reservoir
- 8 l transparent plastic reservoir
- 15 l transparent plastic reservoir
- 20 l transparent plastic reservoir

## **Electrical connection**

- For industrial 120/230 VAC applications P653S pumps are provided with 4-pole square type connector. Electric cable is provided by installer.
- For mobile applications P653S pumps are equipped with an electric cable 32 ft (10 m) and 7-pole bayonet type connector.

Code example	P653S	-	4	- )	< -	L	-	F	-	24	- 2	2A -	AS06
Pump mode, basic													
Reservoir size and configuration 4 = 4 l, transparent plastic 8 = 8 l, transparent plastic 15 = 15 l, transparent plastic 20 = 20 l, transparent plastic	[												
X = grease pump													
L = low level control													
B0 = without follower F = with follower													
Power supply 24 = 24 V DC AC = 110 - 240 V AC, 50 - 60 Hz.													
Electrical cord and connections 1A DC: - 33 ft. (10 m) cord, 7 conductors 2A DC: - 33 ft. (10 m) cord, 7 conductors - 33 ft. (10 m) cord, 7 conductors with bayonet plugs for external pressure switch or transducer 2A AC - 33 ft. (10 m) cord, 7 conductors - 4-pole square plug 2A1 = AC - 33 ft. (10 m) cord, 7 conductors - 4-pole square plug - 33 ft. (10 m) cord, 4 conductors with bayonet plugs for external pressure switch or transducer													
Pressure control, PCB setting. AS01 – S08 - pressure switch (→ Jumper setting table) AS09 – AS16 = pressure transducer (→ Jumper setting table) Example: P653S-4XLF-24-2A-AS06: Pump consists of the following: 24 V DC grease pump with follower Four liter reservoir Low-level control													

#### Jumper setting combinations – Centro-Matic pumps

Pump combir	ations		Application: Industrial (s) -o: Mobil (m) -x	Time (TC) or count control (CC): TC: - o; CC - x	Number of pressure switches or transducers o = 1; x = 2	Low level control NO - o; NC - x	F1 fault relay; ( <b>31</b> ) switch to ground - x	F2 fault relay: ( <b>31</b> ) switch to ground - x
Pressure switch	AS01 AS02 AS03 AS04 AS05 AS06 AS07 AS08	Industrial (AC) (S) Mobile (DC) (M)	0 0 0 X X X X X	0 0 0 0 0 0 0	0 X 0 X 0 X 0 X	x o o x x o o	x x x x x x x x x	x x x x x x x x
Pressure transducer	AS09 AS10 AS11 AS12 AS13 AS14 AS15 AS16	Industrial (AC) (S) Mobile (DC) (M)	0 0 0 X X X X X	0 0 0 0 0 0 0	0 X 0 X 0 X 0 X	x o o x x o o	× × × × × × × ×	
Jumper setting (plu External pressure s of external pressur device to pump.	Jumper setting (plugged = x, unplugged = o) External pressure switch or external pressure transducer is included with pumps that have feature of external pressure monitoring. Also included is a 33 ft. ( <i>10m</i> ) cord to connect external monitoring device to pump.							





# Description of operation

## Pump operation

## Drive

- Pump housing consists of the following components: gear motor, final gear drive, three pumping elements connected together by internal passages and vent valve. Pump can be configured with internal pressure switch or transducer.
- Gear motor shaft is connected to final stage gear drive. Final gear has incorporated eccentric and cam to drive pumping elements and to control internal vent valve (→ Fig. 4).
- Vent valve is a two way normally closed spring biased valve.
- Pressure switch is not adjustable and preset to 3 500 psi (240 bar).
- Pressure transducer is adjustable. Factory setting is 3 500 psi (240 bar). Pressure setting of pressure transducer can be adjusted from 1 400 to 4 600 psi (96 to 317 bar) in 100 psi (6,9 bar) increments.

## Lube cycle/pressurization

• Motor turns cam (7) clockwise to start lubrication cycle. As soon as pump starts to operate, display rotating segment is turning clockwise also

(→ Fig. 20, page 20). Maximum time to build preset pressure is 12 minutes. If pump does not build preset pressure, fault signal E1 or E2 will appear on display.

- Vent valve (1) is normally closed and stays closed during lubrication cycle, preventing lubricant flow back to reservoir (→ Fig. 4).
- Output of three pump elements (4)
   (→ Fig. 3) is combined by internal passages.
- Eccentric drives pump elements to pump lubricant from reservoir and build line pressure.
- Cam (7) will keep vent valve (1) closed.
- Supply line can be connected to any one of the pump element outlets. Remaining two pump elements outlets should be plugged.





Fig. 8 Rotating segmented display during venting (counter-clockwise)

## Pump element operation

Pump element ( $\rightarrow$  Fig. 13 and 14, pages 16 and 17) is a single stroke spring-based pump. Motor drives eccentric (1). Eccentric is in constant contact with plunger (2).

Compression spring (3) is pushing plunger (2) to open lubricant passage to create vacuum to prime pump with lubricant from reservoir. Check valve (4) is closed to isolate supply lines of system.

Eccentric (1) is pushing plunger (2) in opposite direction to pump lubricant, developing operating pressure. Check valve (4) is open to pass lubricant to supply lines.

Body of pump element has a lateral outlet (5) ( $\rightarrow$  Fig. 12) for lubricant crossporting to internal material passages to combine outlet of all three pump elements.

Any one of the three elements can be used as a pump outlet. Remaining two elements should be closed with plug (A) (> Fig. 12).

## NOTE

Use only pump elements designed for operation in P653S pump. No other pump elements should be used. See parts listing for correct pump element part number.

![](_page_11_Figure_8.jpeg)

![](_page_11_Figure_9.jpeg)

![](_page_11_Figure_10.jpeg)

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# Pressure control/hold Pump with internal time/vent cycle

# Pump with internal pressure switch only

Internal pressure switch will close at 3 500 psi (240 bar) and open at 2 600 psi (179 bar).

After pump starts a lubrication cycle, motor stops when pressure at pump reaches preset pressure of 3 500 psi (240 bar). Pump will go through two holding periods, H1 and H2.

# Holding time (H1)

• Internal pressure switch must stay closed for 15 consecutive seconds before going to H2. If internal pressure switch opens during 15 seconds, pump will restart and run until internal pressure switch closes.

## Holding time (H2) – will last for 30 seconds

- At end of 30 seconds, if internal pressure switch is closed, pump will begin a vent cycle.
- If at the end of 30 seconds internal pressure switch is open, pump will restart and run until internal pressure switch closes. When it closes a vent cycle will take place.
- If at the end of 30 seconds internal pressure switch is closed, but during H1 hold time internal pressure switch did open, pump will restart and pump for 2 seconds before vent cycle begins.

# **Possible faults**

- E1 Fault a failure to build pressure at pump within allotted 12 minutes of pumping time.
- E3 Fault a failure to vent at pump. Internal pressure switch has 10 seconds to open when motor reverses to locate vent position.

# and external pressure switch

Internal pressure switch will close at 3 500 psi (240 bar) and open at 2 600 psi (179 bar. External pressure switch will close at 2 500 psi (172 bar) and open at 1900 psi (131 bar).

After pump starts lubrication cycle, motor stops when pressure at pump reaches preset pressure of 3 500 psi (240 bar). Pump can go through three holding periods, H1, H2 and H3.

# Holding time (H1)

Internal pressure switch must stay closed for 15 consecutive seconds before going to H2. If internal pressure switch opens during 15 seconds, pump will restart and run until internal pressure switch closes.

## Holding time (H2) - will last for 30 seconds

- At the end of H2, if internal pressure switch is closed and external pressure switch is closed, pump will begin vent cvcle.
- At the end of H2, if internal pressure switch is open or both internal and external pressure switches are open, an H3 will appear on the display. Pump will turn on again and pump until internal pressure switch is closed. When both internal and external pressure switches are closed vent cycle will take place.
- If at the end of H2 internal pressure switch is closed but external pressure switch is open, pump will turn on for 2 seconds and then stop and wait until external pressure switch closes. H3 will appear on display. When both internal and external pressure switches are closed, vent cycle will take place.

# Holding time (H3)

• Holding time H3 will remain until both internal and external pressure switches are closed and then vent cycle will take place. If both pressure switches do not close within allotted pumping time of 12 minutes, alarm will occur. If internal pressure switch opens during H3, it will repump until internal pressure switch closes.

# **Possible faults**

- E1 Fault a failure to build pressure at pump within allotted 12 minutes of pumping time.
- E2 Fault a failure to build pressure at the end of the supply line.
- E3 Fault a failure to vent at pump. Internal pressure switch has 10 seconds to open when motor reverses to locate vent position.
- E4 Fault a failure to vent at the end of the supply line. External pressure switch must be open before next lube cycle takes place.

# Pump with internal pressure transducer only

Internal pressure transducer is factory set to close at 3 500 psi (240 bar). Internal transducer can be adjusted from 1 400 to 4 600 psi (96 to 317 bar) using key pad on pump. Adjustment is in 100 psi (6,9 bar) increments. Internal pressure transducer is set to open at 900 psi (62 bar) below point where it closed.

After pump starts lubrication cycle, motor stops when pressure at pump reaches preset pressure. Pump will go through two holding periods, H1 and H2. The following will use factory setting of 3 500 psi (240 bar) and opening pressure of 2 600 psi (179 bar).

# Holding time (H1)

Internal pressure transducer must reach 3 500 psi (240 bar) and stay above 2 600 psi (179 bar) for 15 consecutive seconds before going to H2. If internal pressure transducer drops below 2 600 psi (179 bar) during 15 seconds, pump will restart and run until internal pressure transducer reaches 3 500 psi (240 bar).

## Holding time (H2) – will last for 30 seconds

- At the end of 30 seconds, if internal pressure transducer is above 2 600 psi (*179 bar*), pump will begin a vent cycle.
- If at the end of the 30 seconds internal pressure transducer is below
   2 600 psi (179 bar), pump will restart and run until internal pressure transducer reaches 3 500 psi (240 bar). When this happens vent cycle will take place.
- If at the end of 30 seconds the internal pressure transducer is above
   2 600 psi (*179 bar*), but during the H1 hold time internal pressure transducer dropped below 2 600 psi (*179 bar*), pump will restart and pump for 2 seconds before vent cycle begins.

# Possible faults

- E1 Fault a failure to build pressure at pump within allotted 12 minutes of pumping time.
- E3 Fault a failure to vent at pump. Internal pressure switch has 10 seconds to open when motor reverses to locate vent position.
- E3 Fault a failure to vent at pump. If at the end of the pause time pressure of internal pressure transducer has not dropped below 900 psi (62 bar), an E3 fault will occur.

# Pump with internal and external pressure transducer

Internal pressure transducer is factory set to close at 3 500 psi (240 bar). Internal transducer can be adjusted from 1 400 to 4 600 psi (96 to 317 bar) using key pad on controller. Adjustment is in 100 psi (6,9 bar) increments. Internal pressure transducer is set to open at 900 psi (62 bar) below point where it closed.

External pressure transducer is set to close at 2 500 psi (*172 bar*). Opening point of external pressure transducer is adjustable from 200 to 1000 psi (*14 to 69 bar*). It is factory set to open at 900 psi (*62 bar*).

After pump starts a lubrication cycle, motor will stop when pressure at pump reaches preset pressure of 3 500 psi (*240 bar*). Pump can go through three holding periods, H1, H2 and H3.

The following will use factory settings for P7 and P8.

# Holding time (H1)

 Internal pressure transducer must reach 3 500 psi (240 bar) and stay above 2 600 psi (179 bar) for 15 consecutive seconds before going to H2. If internal pressure transducer drops below 2 600 psi (179 bar) during 15 seconds, pump will restart and run until internal pressure transducer reaches 3 500 psi (240 bar).

# Holding time (H2) – will last for 30 seconds

- At the end of H2, if internal pressure transducer is above 2 600 psi (*179 bar*) and external pressure transducer has reached 2 500 psi (*172 bar*), pump will begin vent cycle.
- At the end of H2, if internal pressure transducer is below 2 600 psi (*179 bar*), or both internal pressure transducer is below 2 600 psi (*179 bar*) and external pressure transducer has not reached
  2 500 psi (*172 bar*), an H3 will appear on display. Pump will turn on again and pump until internal pressure transducer has reached 3 500 psi (*240 bar*).
  When internal pressure transducer is above 2 600 psi (*179 bar*) and external pressure transducer has reached
  2 500 psi (*172 bar*), vent cycle will take place.
- If at the end of H2 internal pressure transducer is above 2 600 psi (*179 bar*) but external pressure transducer has not reached 2 500 psi (*172 bar*), pump will turn on for 2 seconds and then stop and wait until external pressure transducer reaches 2 500 psi (*172 bar*). H3 will appear on display. When internal pressure transducer is above 2 600 psi (*179 bar*) and external pressure transducer has reached 2 500 psi (*172 bar*) vent cycle will take place.

# Holding time (H3)

• Holding time H3 will remain until internal pressure transducer is above 2 600 psi (179 bar) and external pressure transducer has reached 2 500 psi (172 bar), and then vent cycle will take place. If both pressure transducers do not reach preset settings within allotted pumping time of 12 minutes, an alarm will occur. If internal pressure transducer drops below 2 600 psi (179 bar) during H3 it will repump until internal pressure transducer reaches 3 500 psi (240 bar).

# Possible faults

• E1 Fault – a failure to build pressure at pump within allotted 12 minutes of pumping time.

- E2 Fault a failure to build pressure at the end of the supply line.
- E3 Fault a failure to vent at pump. Internal pressure transducer has 10 seconds to drop below 2 600 psi (179 bar) (when motor reverses to locate vent position).
- E4 Fault a failure to vent at the end of the supply line. External pressure transducer has to drop below 900 psi (62 bar) before next lube cycle takes place.

## Vent cycle

- After pump completes preset hold time and pump maintains specified pressure, controller will initiate a vent cycle. Vent cycle will last for ten seconds.
- Motor will turn counterclockwise to engage and open internal vent valve. Display's rotating segment is turning counter clockwise.
- Motor will stop in a position to hold vent valve open. **Hr** will be displayed for remainder of 10 seconds.
- Cam (7) (→ Fig. 6, page 11) engages vent lever (6) depressing vent valve plunger (8)
   (→ Fig. 10, page 12). This opens valve passage of the supply line to the reservoir.
- Lubricant is flowing back to reservoir venting pressure from system. Valve stays open during pause time.

# Fill reservoir with grease

Use grease fitting (9) ( $\rightarrow$  Fig. 1, page 6) to fill reservoir. Filling reservoir for first time is critical to proper pump operation. Make sure no air is trapped under follower plate. Grease should be in full contact with surface of follower. It's recommended to run motor by initiating lubrication cycle during first reservoir fill. Stirring paddle of running motor will help to evenly spread grease under follower minimizing air pockets.

## Air expel procedures for pumps with follower

Disconnect plug (8) (→ Fig. 1, page 6) and unscrew top lid (1) of reservoir. Remove lid

and spring from pump. Start filling pump. As soon as grease level starts lifting follower, stop filling and check for air trapped under follower. Use plastic wire tie to expel air: push plastic tie between follower seal and wall of reservoir and push follower with hand until it completely contacts grease. Replace lid and connect low-level electric plug. Finish filling of reservoir.

# Stirring paddle

Stirring paddle (3) (→ Fig. 2, page 6) is attached to motor and rotates during lubrication cycle. Paddle is working grease in reservoir to make it more pumpable and at same time pushing grease down into housing and pumping elements to prevent cavitation.

# Low-level control

Pump model P653S is equipped with a low-level grease control as a standard feature.

# Pump with follower plate

Low-level control electromagnetic reed switch is located in central rod of reservoir. Switch is sealed and does not have any contact with grease. Follower plate bushing has a magnet. As soon as follower reaches preset position at bottom of reservoir, magnetic field will close switch to indicate low-level of grease. Control panel display LL will be on. Pump can be operational for some time since there is a small amount of grease left under follower in reservoir and pump housing. Pump should be refilled as soon as possible. Always refill pump to maximum of reservoir capacity. LL display should be off as soon as pump is refilled.

### **△** CAUTION

Make sure there is no air trapped under follower plate. Grease should be in full contact with surface of follower. Use air expelling procedures if necessary. Failure to comply may result in personal

Failure to comply may result in persona injury or damage to equipment

## ▲ WARNING

Follower spring is completely compressed if reservoir is full of grease. Exercise extreme caution removing top of pump. Failure to comply may result in death or serious injury.

![](_page_15_Figure_0.jpeg)

- 1 Pivot bracket with round magnet
- ${\bf 3} \ \ {\rm Control} \ {\rm cam}$
- A Inner orbit of round magnet
   B Position of pivot bracket (LL not activated)

# Grease reservoir full of grease

- Magnet and low-level switch (2)
   (> Fig. 14, page 17) are not aligned and switch can not be activated.
- Stirring paddle rotates clockwise during lubrication cycle (→ Fig. 13).
- Pivot bracket of stirring paddle (**B**) is completely submerged into grease and grease resistance to paddle rotation guides bracket with round magnet 1 inward to orbit (**A**).
- Control cam (3) guides pivot bracket with magnet and outwards, in direction of reservoir wall. Since reservoir is full, grease resistance guides pivot bracket inward to orbit (A) as soon as bracket passes cam (3).

## NOTE

Above mentioned switching parts (1 to 3) (→ Fig. 13 and 16, page 19) must not be used with fluid grease or oil. In this case, use float magnetic switch.

![](_page_16_Figure_0.jpeg)

- C Outer orbit of round magnet
   D Position of pivot bracket (LL activated)

# Grease reservoir empty

- Control cam (3) guides pivot bracket with magnet (1) outward. Since there is no grease resistance, bracket with magnet (1) will stay outward in orbit C.
- Magnet (1) will align with low-level switch and activate **LL** indicator on pump display.

# Keypad and display

# Membrane keypad

![](_page_17_Picture_2.jpeg)

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# Test display of membrane keypad

![](_page_18_Figure_1.jpeg)

# Operating mode

- If there is only one segment on in lower right-hand corner, this indicates that ignition switch is open. If ignition switch is open and right segment is flashing, this indicates a fault condition. Closing ignition switch display will indicate what type of fault has occurred.
- If ignition switch opens during lubricating time, lube cycle will be completed.
- When switching on ignition switch, left-hand segment in display window lights up (→ Fig. 17).
- During lubricating time of pump, circulating illuminated segment appears in display window of membrane key pad (→ Fig. 18).
- If power supply is interrupted during pause time, pause time continues at point of interruption after switching power on again.
- If power supply is interrupted during lubricating time operating time will start at beginning after switching power on again.

Display of a low-level indication

![](_page_18_Picture_10.jpeg)

Fig. 19

## NOTE

If low-level signal occurs during lubricating time, current operating cycle will still be completed; however pump does not switch on automatically any more. It can only be switched on again by manual lube cycle.

Furthermore, it is not possible to change to programming mode while there is a low-level signal.

![](_page_18_Figure_14.jpeg)

![](_page_19_Figure_0.jpeg)

Display is indicating holding times when pump reaches preset pressure.

## Malfunctions

 If there is no feedback from pressure switch or pressure transducer within 12 minutes of pumping time, pump switches off immediately. One of the fault signals E1 to E4 (→ Error, Fig. 21 to 26, page 21) will be shown flashing in display of membrane keypad.

## NOTE

If malfunction is present, **E1**, **E2**, **E3** or **E4** will be flashing. Pump does not switch on automatically any longer. It can only be triggered via an additional lubrication cycle. Furthermore, a change to programming mode is not possible while in alarm. Display of malfunction E1, failure to build pressure at pump.

Fig. 21

Fig. 22

![](_page_19_Picture_7.jpeg)

**E1** fault is a failure to build pressure at pump.

• If either pressure switch or pressure transducer fails to actuate within 12 minutes of pumping, this fault will occur.

Display of malfunction E2, failure to build pressure at end of line.

![](_page_19_Picture_11.jpeg)

**E2** fault is a failure to build pressure at the end of the supply line. You must use an external pressure switch or pressure transducer to detect this.

 If either external pressure switch or pressure transducer fails to reach 2 500 psi (*172 bar*) within 12 minutes of pumping, this fault will occur. Fig. 23 Display of malfunction E3, failure to vent at pump.

E3 fault is failure to vent at pump.

- Failure of internal pressure switch to open during 10 seconds that pump motor reverses to locate the vent position.
- Failure of internal pressure transducer to drop 900 psi (62 bar) below P7 parameter (P7 minus 900 psi (62 bar)) during 10 seconds that pump motor reverses to locate vent position.
- If at the end of the pause time internal pressure transducer has not dropped below 900 psi (62 bar), an E3 fault will occur.

![](_page_19_Picture_19.jpeg)

**E4** fault is failure to vent at the end of the supply line. Must use external pressure switch or pressure transducer to detect this.

- If at the end of the pause time external pressure switch has not opened, an **E4** fault will occur.
- If at the end of the pause time external pressure transducer has not dropped below **P8** parameter, **E4** fault will occur.

![](_page_20_Picture_0.jpeg)

To trigger additional lubrication cycle via pushbutton, press button for 2 seconds.

![](_page_20_Figure_2.jpeg)

Existing fault signals (→ Fig. 19 to 26, page 19) must be acknowledged before triggering an additional lubrication cycle.

To trigger additional lubrication cycles externally

- Press pushbutton to trigger additional lubrication cycles externally.
   Press pushbutton for 2 seconds.
  - Mobile pump w/ ignition switch open
  - up to two times
  - Industrial pump w/machine switch open
     unlimited

Factory settings for parameters							
Programming steps	Factory setting	Description					
	P1	Pause time – 0 to 59 hours					
$\begin{bmatrix} I \\ -I \\$	00	Pause time – 0 to 59 minutes					
$\begin{bmatrix} 1 \\ - \\ 1 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$	NO	Output of both fault relays NO (normally open) NC (normally closed)					
$ \begin{array}{c}     I = I \\     I = 0 \\     min & h \end{array} $	02	Two options for signalling a fault <b>o1 (Option 1)</b> F1 relay contact a) Low-level fault will cause F1 contact to repeatedly open and close. b) Pressure fault will cause F1 contact to close and stay closed. F2 relay contact Low-level fault or pressure fault will cause F2 contact to close and stay closed. <b>o2 (Option 2)</b> F1 fault relay's contact will close on a low-level fault F2 fault relay's contact will close on a pressure fault					
	SP	Both contacts can be used for remote signalling. Option to have pump start with pause time or lube cycle. <b>SP – Pump starts with a pause time</b> SO – Pump starts with a lube cycle					
$\begin{bmatrix} I \\ I \end{bmatrix} \begin{bmatrix} I \\ I \end{bmatrix} \begin{bmatrix} I \\ I \end{bmatrix}$	35	<b>P7</b> programming step will only appear on pump with internal pressure transducer. (Reading x 100) 35 x 100 = 3 500 psi. 3 500 psi ( <i>241 bar</i> ) is maximum pressure that pump will build. Adjustable from 1 400 to 4 600 psi ( <i>96 to 317 bar</i> ) in 100 psi ( <i>6,9 bar</i> ) increments.					
_  _      on min h	09	<b>P8</b> programming step will only appear on pump with external pressure transducer. (Reading x 100) 09 x 100 = 900 psi. 900 psi (62 bar) is where = external pressure transducer will open (vent) adjustable from 200 to 1 000 psi (13 to 69 bar) in 100 psi (6,9 bar) increments.					

# Acknowledge fault

![](_page_22_Figure_1.jpeg)

## To acknowledge malfunction

- Flashing display changes into continuous light by pressing button (acknowledging). By acknowledging fault signal, flashing **E1**, **E2**, **E3**, **E4** or **LL** changes into permanent light.
- Messages that have been acknowledged but not yet remedied will flash again after pump is switched off and on again.
- After fault has been acknowledged, no more lube cycles will take place until successful manual lube cycle has taken place.

# Program pump

# Programming mode: Pump with pressure switch

![](_page_23_Picture_2.jpeg)

NOTE

programming.

Pump power must be on to start

# Setting of pause time P1 (hours) and P2 (minutes)

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

Pause time: 0 – 59 hours

0-59

4 minutes

59 hours 59

Programming options:
P1
P2
minutes
Min. pause time
Max. pause time
minutes

![](_page_23_Picture_7.jpeg)

## P1: Setting of hours

When releasing two buttons, currently set value appears. Example: factory-set value: 1 hour. Hour is indicated by **dot** on **right-hand side.** 

## Press button.

Settings are made in one direction:

#### 0, 1, 2, 3,.... 59 hours

Button pressed once: increase by 1 hour Button pressed continuously: quick

## sequence

Example: 12 hours

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![](_page_24_Figure_0.jpeg)

P2: Setting minutes

Press button, so that **P2** appears in display.

When releasing button, currently set value appears (here factory-set value: 0 minutes).

Minute is indicated by **dot** on the left-hand side.

Press button.

Settings are made in one direction: 0, 1, 2, 3, 4, 5, .... 59 min

Button pressed once: increase by 1 minute

Button pressed continuously: quick sequence. Example: 30 minutes

![](_page_24_Figure_9.jpeg)

**P4:** Programming of output signal for both alarm relays. Default setting on printed circuit board for alarm contacts is switching to battery minus.

Press button so that **P4** appears in display. When releasing button, currently set value appears in display (here factory-set value NO, normally open contact). On fault condition alarm contact will close.

Press button.

External fault contact is modified by programming it as NC normally closed contact. On a fault condition alarm contact will open.

#### NOTE

If hours are set to **00**, display will show minimum pause time of 4 minutes.

![](_page_25_Figure_0.jpeg)

P5: Two options for signalling a fault condition with alarm relays **F1** and **F2**.

Press button so that **P5** appears in display. o1 (Option 1) P4 is set to default of

F1 relay contact

a) Low-level fault will cause F1 contact to repeatedly open and close.

b) Pressure fault will cause F1

contact to close and stay closed. F2 relay contact

Low-level fault or pressure fault will cause

o2 (Option 2) P4 is set to default of Normally Open.

F1 fault relay's contact will close on low-level fault and stay closed.

F2 fault relay's contact will close on pressure fault and stay closed.

Both contacts can be used for remote

Press pushbutton to change to option 1.

![](_page_25_Figure_13.jpeg)

**P6**: Upon applying power to pump, program whether it starts with pause time SP or starts with lube cycle SO.

Press button, so that P6 appears in display.

Currently set values appear as to whether cycle is to start with pause time or lubricating time.

Default setting for pump is set to start with pause time SP (start pause time). Press button.

Each time pump is switched on, it will start with lubricating time SO (start operation). After first lubricating time preset pause time will be valid.

![](_page_26_Picture_0.jpeg)

# Complete programming

Press button. **P** - is displayed.

## NOTE

Always carry out programming completely in order to save new values.

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

## NOTE

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

# Programming mode: Pump with pressure transducer

Complete steps 1 through 6 of pump with pressure switch

	Step 7
Display	
min h Press	
Display	

P7: Programs setting of where internal pressure transducer will close. This is the maximum pressure that pump can reach. Factory setting is 3 500 psi (240 bar).

Press button to change value. Reading x 100 = Transducer setting in psi  $35 \times 100 = 3500 \text{ psi} (240 \text{ bar}).$ This setting is adjustable from 1400 to 4600 psi (96 to 317 bar) in 100 psi (6,9 bar) increments.

## NOTE

min

Press

**P7** programming will only appear if pump has internal pressure transducer.

Programming of pump with pressure switch is complete.

After completion of programming, check

parameter settings in operating mode once

again.

![](_page_27_Picture_0.jpeg)

pump has external pressure transducer connected.

**P8**: Programs setting of where external pressure transducer will open. Opening point (vent pressure) is adjustable from 200 to 1000 psi (13,8 to 69 bar) in 100 psi (6,9 bar) increments. Factory set opening point (vent pressure) is 900 psi (62 bar). Closing point of external pressure transducer is fixed in software at 2 500 psi (172 bar).

Press button to change value. Reading x 100 = Transducer setting in psi 9 x 100 = 900 psi (62 bar).

![](_page_27_Figure_4.jpeg)

## **Complete programming**

Press button. **P** - is displayed.

## NOTE

Step 8

Always carry out programming completely in order to save new values.

• Press additional lubrication to complete programming and to save entered parameters.

## NOTE

If button additional lubrication is not pressed within 30 seconds, changed parameters will not be saved and previous programming remains valid.

## NOTE

After completion of programming, check parameter settings in review mode.

Programming of pump with pressure transducer is complete.

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# Review of pump parameters

![](_page_28_Figure_1.jpeg)

Display	
<b>min</b> after one sec.	Display NO - Both relay contacts are normally open
Display . 30 - (minutes) min h after one sec.	min    h    after one sec.
Display	o2 - Option 2 - How F1 and F2 will signal a fault.
after one sec.	SP - Pump starts with a pause time after one sec.
Display	Display Will only appear if pump has an internal pressure transducer. Maximum pressure pump will build.
min h after one sec.	hindicates that internal pressure transducer will close at 3 500 psi (240 bar). after one sec.

Operating mode

Display

min

Pause Time

h

![](_page_29_Figure_0.jpeg)

Will only appear if pump has internal and external pressure transducer. Setting where external transducer will open.

![](_page_29_Figure_2.jpeg)

![](_page_29_Figure_3.jpeg)

#### Specifications

Electrical data for DC pump Incoming voltage Maximum current External fuse Reverse polarity protection Current draw with ignition switch open*	24 V DC -20%/+30% 10 A 10 A (time delay) Yes 25 mA
Electrical data for AC pump Incoming voltage Maximum current Frequency Output from power supply External Fuse	100 to 240 VAC 1.7A 47 to 63 hz 24 V DC at 5 A 3 A (time delay)
Common electrical data for DC and AC pump Minimum pause time Maximum pause time Pause time increments Maximum pumping time Enclosure rating	s 4 min. 59 hours 59 min. 1 min. or 1 hour 12 min. IP 6K9K (NEMA 4X)
Rating for fault relay contact: Switching voltage	Max. 230 V AC/120 V AC/ 24 V DC
Switching current Minimum switching current	Max. 1 A inductive 0.1 mA
Pump P653S Operating pressure with: -pressure switch -pressure transducer	3 500 psi (240 bar) 3 500 psi (240 bar) (transducer can be adjusted from 1 400 to 4 600 psi (96 to 317 bar)
End of line pressure switch setting	2 500 psi (172 bar) (not adjustable)
End of line pressure transducer setting	2 500 psi ( <i>172 bar</i> ) not adjustable
End of the line transducer vent pressure is fa 900 psi (62 bar). Pressure can be adjusted fr 200 to 1 000 psi (14 to 70 bar) in 100 psi (7 b	ctory preset at om oar) increments.
Maximum distance using shielded wire for pressure transducer*	98 ft (30 m)
Operating temperature range for DC pumps	-40 to 158 °F <sup>1)</sup> (-40 to 70 °C) <sup>1)</sup>
Operating temperature range for AC pumps	32 to 122 °F <sup>1)</sup> (0 to 50 °C) <sup>1)</sup>
Number of outlets (see instructions) Lubricant Output	1 up to NLGI grade 2 <sup>1)</sup> 1.5 in <sup>3</sup> /min <sup>2)</sup> (24.6 cm <sup>3</sup> /min)
Reservoir sizes, L Lubricant line connection size	4, 8, 15 and 20 G 1/4 in

Piston diameter 7 mm Number of pumping elements 3 (connected together) **Tightening torques** 13.3 ft.lbf (18 Nm) 8.8 ft.lbf (12 Nm) Install pump Electric motor on housing 14.57 ft.lbf (20 Nm) Pump element in housing 8.8 ft.lbf (12 Nm) 8.8 ft.lbf (12 Nm) Closure plug in housing Return line connector on housing Tie rods for 15 and 20 l reservoir 7.4 ft.lbf (10 Nm) Weights 15 l reservoir with 3 pump elements K7, without pressure relief valve, empty Pump P653S without connecting cable 21.1 lb (9,6 kg) 23.3 lb (10,6 kg) 24.6 lb (11,2 kg) Pump P653S version 1A Pump P653S version 3A 8 l reservoir, standard Pump P653S without connecting cable 19.8 lb (9,0 kg) Pump P653S version 1A 21.1 lb (9,6 kg) Pump P653S version 3A 24.6 lb (11,2 kg) 4 l reservoir, standard Pump P653S without connecting cable 19.8 lb (9,0 kg) Pump P653S version 1A 21.3 lb (9,7 kg) Pump P653S version 3A 23.1 lb (10,5 kg) Weights above include the following equipment: Pump kit with three pump elements, pressure relief valve, grease filling (1,5 kg) Packing (cardboard box) Attaching parts **Operating Instructions** Installation Use only high pressure 5 000 psi (344 bar) minimum hydraulic hose for

Pump elements K7

Use only high pressure 5 000 psi (344 bar) minimum hydraulic hose for supply lines. Use only hose connection fittings that are appropriate for programmed/preset system pressure.

See list of approved and recommended lubricants. Contact Lincoln if lubricant is not in list.
 Lubricant output is measured at + 70 °F (21 °C) and backpressure 1 450 psi (100 bar). Different pressures, temperature and grease can change output results.

\* Indicates change.

![](_page_31_Figure_0.jpeg)

![](_page_32_Figure_0.jpeg)

#### Jumper settings for 653 pump PCB

![](_page_33_Figure_2.jpeg)

![](_page_34_Figure_0.jpeg)

- **1** Pumping housing (3 pump elements)
- 2 Motor
- 3 Controller, key board with display
- 4 Internal pressure switch (P.S.) or pressure transducer (P.T.)
- 5 Internal vent valve
- **6** Reservoir with low-level control
- 7 Pressure relief, 5 000 psi (350 bar) external
- 8 High pressure supply line
- 9 Injectors, SL-V, SL-1, or SL-32, SL-33, and SL-V XL injectors
- **10** Pressure switch (P.S.) or pressure transducer (P.T.), external, optional.
- A Power supply (24 V DC or 120 V AC, optional)

#### NOTE

For proper operation of Centro-Matic systems, vent pressure before next lubrication cycle at end of line should be:

- Below 900 psi (62 bar) for SL-V and SL-V XL type of injectors.
- Below 600 psi (41 bar) for SL-1 type of injectors.
- Below 200 psi (13,8 bar) for SL-32/33 type of injectors.

# List of lubricants

## NOTE

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

Centro-Matic pump can dispense commercial greases up to NLGI 2 at specified operating temperature range.

Proven lubricants (see following tables) have been tested by Lincoln with regard to pumpability and venting behavior. Lincoln recommends lubricants for an application up to indicated **minimum delivery temperature** in Centro-Matic lubrication systems. During tests, lubricants did not cause any damage due to incompatibility with material used by Lincoln. Lubricants Lincoln recommends on basis of manufacturer's data sheet (see following tables) can be used in Lincoln's lubrication systems up to indicated minimum delivery temperature.

Grease pumpability and venting behavior depend on ambient temperature range of application, and may be different for same NLGI grade of grease. This refers in particular to greases with more than 3% graphite. Lincoln can test grease and develop recommendations for specific applications.

## NOTE

Consult Lincoln or Lincoln distributor representative before using lubricants with solid additives.

## NOTE

Manufacturer of centralized lubrication system can accept no liability for:

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

Liability is limited to pumpable lubricants in centralized lubrication systems.

Proven lubricants			
Manufacturer	Designation	Thickener	Minimum operating temerature
Caterpillar Caterpillar Caterpillar	Moly Ultra 5 NLGI 1 Arctic Platinum NLGI 0 Auto–Lube NLGI 1	Ca-complex Ca-complex Synthetic Base Oil Ca-complex	10 °F (-12 °C) -40 °F (-40 °C) 10 °F (-12 °C)
Fuchs-Lubritech	Stabil Eco EP2	Li/Ca	–13 °F (–25 °C)
Fuchs Fuchs Fuchs	Gleitmo 585 Renocal FN 745 Renoral FN3	Li Ca-12-0H-stearat Ca	–40 °F (−40 °C) –13 °F (−25 °C) –4 °F (−20 °C)
Fuchs Fuchs	Renolit LZR 2 t l Renolit HLT 2	Li Li	–4 °F (–20 °C) –13 °F (–25 °C)
Mobil	Mobilith SHC 100	Li-complex	–13 °F (–25 °C)
Shell Shell	Retinax EPL 2 Retinax CSZ	Li-12-0H-stearat Li/Ca	14 °F ( <i>−10 °C)</i> −31 °F ( <i>−35 °C</i> )

Proven lubricants (continued)						
Lubricant recommenda	ations based on manufacturer's data	a sheet	Minimum operating temerature			
Manufacturer	Designation	Thickener				
Agip	F1 grease 24	Ca	5 °F (–15 °C)			
Aral	Multipurpose grease	Li-12-0H-stearat	5 °F (–15 °C )			
Aral	Multipurpose grease ZS 1/2	Li/Ca	–4 °F (–20 °C)			
Ava	Avialith 2 EP	Li-12-0H-stearat	5°F(-15°C)			
BP	Energrease LC 2	Li-complex	5 to 14 °F (-15 to -10 °C)			
BP	Energrease MP–MG2	Ca-complex				
Castrol/Tribol	Molub Alloy 6780	Li-12-0H-stearat	23 °F (−5 °C )			
Castrol	CLS – grease	Li/Ca	–22 to –13 °F (−30 to −25 °C)			
Castrol	Oliete Longtime 2	Li	−4 °F (−20 °C)			
Castrol	Optimol Olit 2 EP	Li	−4 °F (−20 °C)			
DEA	Glissandro 20	Li-12-0H-stearat	5 to 14 °F (-15 to -10 °C)			
Esso	Ronex Extra Duty 2	Li-complex	41 °F (5 °C)			
Esso	Ronex MP2	Li-complex	23 °F (−5 °C)			
Esso	Beacon EP2	Li	23 °F (−5 °C)			
Esso	Cazar K2	Ca	5 °F (−15 °C)			
Fiat Lubrificanti	Comar 2	Li	–13 °F (–25 °C)			
Kluber	Centoplex 1 DL	Li/Ca	-4 °F (-20 °C)			
Kluber	Isoflex NBU 15	Ba	-13 °F (-25 °C)			
Kluber	Kluberplex BEM 34–132	Ca-complex	-4 °F (-20 °C)			
Kluber	Kluberplex BEM 41–141	Li-complex	-13 °F (-25 °C)			
Kluber	Petamo GHY 133 N	Polycaramide	5 °F (-15 °C)			
Mobil	Mobilgrease XHP 221	Li-complex	5 °F (15 °C)			
Mobil	Mobilgrease XHP 401	Li-complex	14 °F (10 °C)			
Mobil	Mobilgrease XHP 222	Li-complex	14 °F (10 °C)			
Mobil	Mobilith SHC 220	Li-complex	23 °F (5 °C)			
Shell Shell Shell Shell	Alvania EP (LF) 1 Alvania EP (LF) 2 Alvania RL2 Malleus GL	Li-12-0H-stearat Li-12-0H-stearat Li-12-0H-stearat Gel	5 to 14 °F (-15 to -10 °C) -14 °F ± 41 °F (-10 °C ± 5 °C) 5 ± 41 °F (-15 ± 5 °C) GL205 14 °F (-10 °C), GL2300 14 °F (-10 °C), GL 400 32 °F (0 °C), GL 500 (41 °F (5 °C))			
Shell	Retinax CS	Li	-4 °F (-20 °C)			
Shell	Retinax LX 2	Li	23 °F ± 41 °F (-5 °C ± 5 °C)			
Shell	Retinax HDX 2	Li/Ca	-14 °F ± 41 °F (-10 °C ± 5 °C)			
Texaco	Premium RB	Li	−20 °C (−4 °F)			
Total	Ceran AD	Ca-complex	5 °F (15 °C )			
Total	Ceran LT	Ca-complex	-4 °F (20 °C)			
Total	Ceran WR2	Ca-complex	14 °F (10 °C)			
Zeller and Gmelin	Divinol Lithogrease G 421	Li-complex	5 °F (-15 °C )			

#### NOTE

Consult Lincoln or Lincoln distributor/ representative before using lubricants with solid additives.

Proven lubricants (continued)			
<b>Biodegradable lubricants</b> Proven lubricants Manufacturer	Designation	Thickener	Minimum operating temerature
Aral	Aralub BEB EP 2	Li/Ca	13 °F (25 °C)
BP	Biogrease EP 2	Li/Ca	13 °F (25 °C)
Fuch-Lubritech	Stabyl ECO EP 2	Li/Ca	13 °F (25 °C)
Lubricant recommendations base	ed on manufacturer's data she	et	Minimum operating temperature
Manufacturer	Designation	Thickener	
Autol	Top Bio 2000	Ca	-13 °F (-25 °C)
Avia	Biogrease 1	Li	up to 32 °F (0 °C)
DEA	Dolon E2	Li	5 °F (-15 °C)
Fuchs	Pantogel 25	Li/Ca	5 °F (-15 °C)
Kluber	Kluverbio M72-82	Polycarbamide	-4 °F (-20 °C)
Lubricants for food and beverage Lubricant recommendations based Manufacturer	on manufacturer's data sheet Designation	Thickener	Minimum operating temperature
Aral Eural	Grease EPF 2	Al-complex	23 °F (−5 °C )
Bremer and Leguil	Rivolta F. L.G. 4 - 2	Al-complex	−4 °F (−20 °C)
Elkalub	GLS 394	organic thickener	14 °F ( <i>−10 °C</i> )
Elkalub	GLS 367/N2	inorganic thickener	23 °F ( <i>−5 °C</i> )
Elkalub	GLS 380/N1	Al-complex	14 °F ( <i>−10 °C</i> )
Elkalub	GLS 380/N2	Al-complex	23 °F ( <i>−5 °C</i> )
Fuchs	Renolit G7-G1	Bentonite	23 °F (−5 °C )
Fuch-Lubritech	Gleitmo 585 M (KTW – drinkir	ngLi	14 °F (−10 °C)
Interflon	Fin food grease EP	Al-complex	23 °F (-5 °C )
Kluber	Paraliq GA 343	Al-complex	14 °F (−10 °C)
Kluber	Klubersuntha UH1 14-151	Al-complex	−4 °F (−20 °C)
Mobil	Mobilgrease FM 462	Al-complex	5 °F (−15 °C)
Nordischer Maschinenbau Baader	Special grease GLS 380/N3	Al-complex	14 °F (−10 °C)
OKS	470	Li-12-0H-stearat	5 °F (−15 °C)
Optimol	Obeen UF 1	Al-complex	5 °F (–15 °C)
Optimol	Obeen UF 2	Al-complex	14 °F (–10 °C)
Rhenus Norplex	AFD 2	Al-complex	23 °F (−5 °C)
Rhenus Norplex	AFP 2	Al-complex	23 °F (−5 °C)
Rhenus Norplex	AFS 2	Al-complex	−13 °F (−25 °C)
Rhenus Norplex	AFW 2	Al-complex	23 °F (−5 °C)
Shell	Cassida Grease ELS 1	Al-complex	5 °F ( <i>-15 °C</i> )
Shell	Cassida Grease ELS 2	Al-complex	14 °F ( <i>-10 °C</i> )
Total	Lubriplate FGL 2	Al-complex	23 °F ( <i>-5 °C</i> )
Tribol Molub-Alloy	FoodProof 823-2FM	Al-complex	5 °F (−15 °C)
Tribol Molub-Alloy	9830 high-temperature greas	se PTFE	32 °F (0 °C)

#### NOTE

Consult Lincoln or Lincoln distributor/ representative before using lubricants with solid additives.

![](_page_38_Figure_0.jpeg)

![](_page_39_Figure_0.jpeg)

![](_page_40_Figure_0.jpeg)

![](_page_40_Figure_1.jpeg)

![](_page_41_Figure_0.jpeg)

# Refill and maintenance

#### **△** CAUTION

First time filling of reservoir with grease is very critical for proper pump operation. Pump may be shipped with small amount of Fuchs Renocal FN 745/Lincoln grease used for final testing and inspection. Grease thickener is Ca-12-OH-stearat. Check compatibility of Renocal FN 745/ Lincoln with grease and remove test grease if necessary.

Failure to comply may result in personal injury or damage to equipment.

#### **▲** CAUTION

Do not exceed maximum fill mark when filling reservoir with large output fill or refill pump. Risk of reservoir bursting if overfilled. Failure to comply may result in personal injury or damage to equipment.

## Pump cleaning

Use petroleum or benzene based cleaning solutions. Do not use tri-, perchloroethylene or similar solvents. Do not use polar organics such as alcohol, methyl alcohol, acetone or similar solvents.

## Pump with follower plate

Use grease fitting (9) ( $\rightarrow$  Fig. 1, page 6) to fill or refill reservoir. Make sure no air is trapped under follower plate. Grease should be in full contact with surface of follower. It is recommended to run motor by initiating lube cycle during first fill of reservoir. Stirring paddle of running motor will help to evenly distribute grease under follower minimizing air pockets. Reservoir has a vent hole (**11**). Fill grease to maximum follower position until follower seal will slightly cross vent hole. If air is still trapped under follower, add some more grease to expel air through vent hole.

## Pump without follower plate

Use same grease fitting (9) to fill or refill reservoir. It is recommended to run motor by initiating lube cycle during first fill of reservoir. Stirring paddle of running motor will help to evenly distribute grease in reservoir minimizing air pockets.

To speed up filling or refilling of pump, grease fitting can be replaced with 1/8 in (3,175 mm) (swivel connection to attach hose from larger output filling pump).

![](_page_43_Figure_0.jpeg)

#### Troubleshooting Mode of failure Solution Pump motor does not run. No green right corner segment lit on Check power supply and fuses. display (→ Fig. 16, page 19). Pump does not deliver lubricant but runs if manual lube Connect ignition or machine switch per electrical schematic on switch (3) is pushed (→ Fig. 15, page 18). No green left corner pages 28 and 29. segment lit on display ( $\rightarrow$ Fig. 17, page 19). LL display is flashing. Reservoir is almost empty. Pump with follower - refill reservoir. Pump without follower - refill reservoir and push switch (3) ( $\rightarrow$ Fig. 15) to initiate manual lube cycle. E1 display is flashing. Pump failed to develop internal Push switch (2) (→ Fig. 15) to acknowledge fault. Initiate manual pressure in 12 minutes. lube cycle. Investigate and correct possible causes - air pockets, broken line, connections leakage, worn pumping element, failed internal pressure switch or pressure transducer. Initiate manual lube cycle. E2 display is flashing. Pump failed to develop pressure at Push switch (2) ( $\rightarrow$ Fig. 15) to acknowledge fault. Initiate manual lube the end of the line (pump with external pressure switch cycle. Investigate and correct possible causes – air pockets in lubrication line, connections leakage, grease consistency changed with low temperaor pressure transducer). tures, failed end of line pressure switch or pressure transducer. Push switch (2) ( $\rightarrow$ Fig. 15) to acknowledge fault. Initiate manual E3 display is flashing. Pump failed to vent at pump. lube cycle. Investigate and correct possible causes - pump eccentric did not stop in a proper position, vent valve failed. E4 display is flashing. Pump failed to vent at the end of the line Push switch (2) (→ Fig. 15) to acknowledge fault. Initiate manual (pump with external pressure switch or pressure transducer). lube cycle. Investigate and correct possible causes - restriction in lubrication line, grease consistency changed with low temperature, failed end of line pressure transducer or pressure switch. Grease is coming out of pressure relief valve (6) ( $\rightarrow$ Fig. 1, page 6). Check and adjust setting of pressure transducer or failed

pressure switch.

![](_page_45_Figure_0.jpeg)

## Pump with follower

![](_page_46_Figure_2.jpeg)

#### P653S Pump with follower (housing and reservoir - Parts list)

ltem	Description	Part no.	Qty.	ltem	Description	Part no.	Qty.
1 2 3	Housing Motor, drive 24 V DC Intermediate bottom	316-16443-1 275702 445-71524-1	1 1 1	46	Reservoir, 4 l w/ vent tube and labels Reservoir, 8 l w/ vent tube and labels Reservoir, 15 l w/ vent tube and labels Reservoir, 20 l w/ vent tube and labels	545-33045-1 545-33044-1 545-33041-1 545-33043-1	1 1 1
4 5	Pinion gear, drive Threaded sleeve	275557 445-71527-1	1 1	47	Spring, follower, for 4 l and 8 l	300-19860-1	1
7	Bearing D12/24 x 6	250-10683-1	1		reservoir Spring, follower, for 15 l and 20 l reservoir	300-16288-1	1
8 9 10	Pump element, z7 service kit Bearing D10/26 x 8 Seal, radial BA 75FKM 10 x 22 x 7	645-77196-1 250-14009-7 220-12231-3	3 1 1	48 49 50	U-ring /2NBR 180.00 x 4.00 Insert, reservoir Screw, hex, 88 M6 x 20c	219-10684-6 445-71532-1 200-13022-7	1 1 4
11 12 13	Gear, eccentric Bearing D12/32 x 10 Shaft D drive with retaining ring and key	275558 250-14064-6 445-71266-1	1 1 1	51 52 53	Screw, socket hex, 8.8 M6 x 16C Cover, reservoir Contact rod, 4 l reservoir	201-12019-9 444-70113-1 234-10693-6	2 1 1
14 17 18	Washer st 12 C -200HV Bearing D 8/22 x 7 Cam, relief unit	209-13011-9 250-14064-7 545-33367-1*	1 1 1		Contact rod, 8 l reservoir Contact rod, 15 l reservoir Contact rod, 20 l reservoir	234-10693-7 234-10693-8 234-10693-9	1 1 1
20	Press ring	444-24439-1	1	54 55	Nut, cap with washer 209-13011-5 Pressure transducer with seal ring	207-12247-2 234-10663-6	2 1
21 22	Screw, sock,hex. 8.8 M 5 x 20c 0-ring 72NBR 180.00 x 4.00	201-12016-8 219-10684-6	6 1	56	External pressure transducer	234-10825-3	1
23	0-ring 72NBR 195,00 x 3,00	219-10390-3	1	57 58	Cable assy, 10m. 4/4 pole Connector for external pressure	664-34741-7* 664-34550-6	1 1
24 25	Rocker arm, assembly, relief unit	545-32906-1	1	59	switch/transducer Cable assy, 10m, 7/7 pole (shielded)	664-34428-3	1
LJ	Notuseu			60	Connector for signal cable 7 poles (AC pump)	664-34569-1	1
26	Not used				Connector for signal cable 7 poles (DC pump)	664-34303-7	1
27 28	Cover, housing for AC pumps Housing fr. cover w/sealed keyboard	278671 545-33602-1	1 1	61	AC power cable plug	236-13277-9	1
29	Profile packing	545-33596-1 <sup>1)</sup>	1	02	(4 l reservoir) Low level control switch cable	664-34517-7	1
30	Printed circuit board <sup>1)</sup>	236-10655-35	1		(8 l reservoir) Low level control switch cable	664-34517-5	1
31	Cover, housing for DC motors	275666	1		(15 l reservoir) Low level control switch cable (20 l reservoir)	664-34517-8	1
32 33 35	Screw, sock, hex. 8.8 M 5 x 16C Relief element Screw,6.0 x 40 with seal 220-14101-1	201-12016-6 545-33042-1 206-13710-6	4 1 3	63 64 65	Plug, 7 pole jumper Power supply Motor connector	664-34741-7 <sup>1)</sup> 275906 664-34428-1	1 1 1
37	Pressure switch with seal ring	234-10723-8	1	66	Internal cable for AC pump	664-34569-2	1
39 40	Screw w/ washer Adapter M22 x 1.5 w/ grease fitting 251-14045-9	206-13796-9 304-16543-1	4 1	67 68	External pressure switch Bag w/ attach. material res. 15, 20L	234-10825-4 545-34361-4	1 1
41	Stirring paddle assembly	545-33031-1	1	69	Valve SVTE - 400 - r 1/4 + nip. S2520	624-77150-1	1
42 43	Bushing Follower plate assembly	445-71267-1 544-33307-1	1 1		Horizontal mounting bracket Adapter S2520-1/4-1/4-25	271249 226-14105-5	1 1
44 45	Screw, hex, 8.8 M6 x 40C Support sleeve, 4 l reservoir Support sleeve, 8 l reservoir Support sleeve, 15 l reservoir Support sleeve, 20 l reservoir	200-12000-3 445-71543-1 445-71542-1 445-71528-1 445-71536-1	4 4 4 4				

When replacing printed circuit board 236-10655-3S, special attention must be given to jumper settings. Replacement printed circuit boards are shipped with standard factory setting. For your pump to work properly, replacement printed circuit board jumper settings must duplicate original printed circuit board.
 Indicates change.

![](_page_48_Figure_0.jpeg)

Pump without follower

![](_page_49_Figure_2.jpeg)

#### P653S Pump without follower (housing and reservoir - Parts list)

ltem	Description	Part number	Qty.	ltem	De
1 2 3	Housing Motor, drive 24 V DC Intermediate bottom	316-16495-1* 275702 445-71524-1	1 1 1	41 42 43	Pr St Sc
4 5 7	Pinion gear, drive Threaded sleeve Bearing D12/24 x 6	275557 445-71527-1 250-10683-1	1 1 1	44	Su Su Su
8 9 10	Pump element, Z7 service kit Bearing D10/26 x 8 Seal, radial ba 75 fkm 10 x 22 x 7	645-77196-1 250-14009-7 220-12231-3	3 1 1	45	Re Re Re
11	Gear, eccentric	275558	1		lat Re
12 13	Bearing D12/32 x 10 Shaft f. drive with retaining ring and key	250-14064-6 445-71266-1	1 1	46	lar 0-
14 17 18	Washer st 12 c -200 hv Bearing D 8/22 x 7 Cam, relief unit	209-13011-9 250-14064-7 545-33367-1*	1 1 1	47 48 49	Ins Sc Fix
20 21 22	Press ring Screw, sock,hex. 8.8 M 5 x 20c O-ring 72NBR 180,00 x 4,00	444-24439-1 201-12016-8 219-10684-6	1 1 1	50 55 56	Lo Pr Ex
23	0-ring 72NBR 195,00 x 3,00	219-10390-3	1	57 58	Ca Co
24 25	Rocker arm, assembly, relief unit Not used	545-32906-1	1 1	59 60	sw Ca Co
26	Not used		1		(A) Co
27 28	Cover, housing for AC pumps Housing fr. cover w/ sealed keyboard	278671 545-33602-1	1 1	61	(D AC
29 30	Profile packing Printed circuit board 24 V <sup>1)</sup>	545-33596-1 236-10655-3S	1	63 64	Plı Po
31	Cover, housing for DC pumps	2/5666	1	66 67	Int Ex
33 35	Relief element Screw,6.0 x 40 with seal 220-14101-1	545-33042-1 206-13710-6	4 1 3	69	Va
37	Pressure switch with seal ring	234-10723-8	1		Hc Ad
39 40	Screw w/ washer Adapter m22 x 1.5 w/ grease fitting 251-14045-9	206-13796-9 304-16543-1 <sup>1)</sup>	4 1		

When replacing printed circuit board 236-10655-33©, special attention must be given to jumper settings. Replacement printed circuit boards are shipped with a standard factory setting. For pump to work properly, replacement printed circuit board jumper settings must duplicate original printed circuit board.
 Components available in kit to convert 4 and 8 liter to 15 liter – 276764.
 Components available in kit to convert 4 and 8 liter to 20 liter – 276765.
 Indicates change.

ltem	Description	Part number	Qty.
41 42 43	Proximity switch Stirring paddle assembly Screw, hex, 8.8 M6 x 40c	234-10423-6 545-33093-1 200-12000-3	1 1 4
44	Support sleeve, 4 l reservoir Support sleeve, 8 l reservoir Support sleeve, 15 l reservoir <sup>2)</sup> Support sleeve, 20 l reservoir <sup>2)</sup>	445-71543-1 445-71542-1 445-71528-1 445-71536-1	4 4 4
45	Reservoir, 4 l w/ vent tube and labels Reservoir, 8 l w/ vent tube and labels Reservoir, 15 l w/ vent tube and labels <sup>3</sup> Reservoir, 20 l w/ vent tube and	545-33045-1 545-33044-1 545-33041-1 545-33043-1	1 1 1
46	labels <sup>3)</sup> O-ring 72nbr 180.000 X 4.00	219-10684-6	1
47 48	Insert, reservoir Screw, hex, 8.8 M6x20c	445-71532-1 200-13022-7	4 1
49 50 55	Fixed paddle Cover, reservoir Pressure transducer with seal ring	444-70490-1 444-70641-1 234-10663-6	1 1 1
56 57 58	External pressure transducer Cable assy, 10 m. 4/4 pole (shielded) Connector for external pressure switch/transducer	234-10825-3 664-34741-7* 664-34550-6	1 1 1
59 60	Cable assy, 10 m, 7/7 pole Connector for signal cable 7 poles (AC pump) Connector for signal cable 7 poles (DC pump)	664-34428-3 664-34569-1 664-34303-7	1 1 1
61	AC power cable plug	236-13277-9	1
63 64	Plug, 7 pole jumper Power supply	664-3474 <u>1</u> -7 <sup>1)</sup> 275906	1 1
66 67 68	Internal cable for ac pump External pressure switch Protect. washer w/ access. F. P. P603/653	664-34569-2 234-10825-4 545-34361-6	1 1 1
69  	Valve SVTE – $400 - R1/4 + NIP.$ S2520 – $1/4$ in bag Horizontal mounting bracket Adapter s2520 – $1/4 - 1/4 - 25$	624-77150-1 271249 226-14105-5	1 1 1

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

The manufacturer Lincoln Industrial, 5148 North Hanley Road, St. Louis, MO 63134 USA hereby declares that machine

Designation: Electrically driven pump to supply lubricant during intermittent operation within a centralized lubrication system Type: P653S

Model number: 24 V DC or 120/230 V AC, 50-60 Hz.

Year of construction: See type identification plate

complies with all basic requirements of the following directives at the time when first being launched in the market.

 $1.1.2 \cdot 1.1.3 \cdot 1.3.2 \cdot 1.3.4 \cdot 1.5.1 \cdot 1.5.6 \cdot 1.5.8 \cdot 1.5.9 \cdot 1.6.1 \cdot 1.7.1 \cdot 1.7.3 \cdot 1.7.4$ 

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

Furthermore, the following directives and standards were applied:

2011/65/EU	RoHS II
2014/30/EU	Electromagnetic compatibility   Industry

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

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

EC-Representative SKF Lubrication Systems Germany GmbH Heinrich-Hertz-Str. 2-8 DE - 69190 Walldorf

Robert Hoefler, Director Product Development/ Product Engineering November 8th, 2017

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## Warranty

The instructions do not contain any information on the warranty. This can be found in the General Conditions of Sales, available at: www.lincolnindustrial.com/technicalservice or www.skf.com/lubrication.

skf.com | lincolnindustrial.com

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