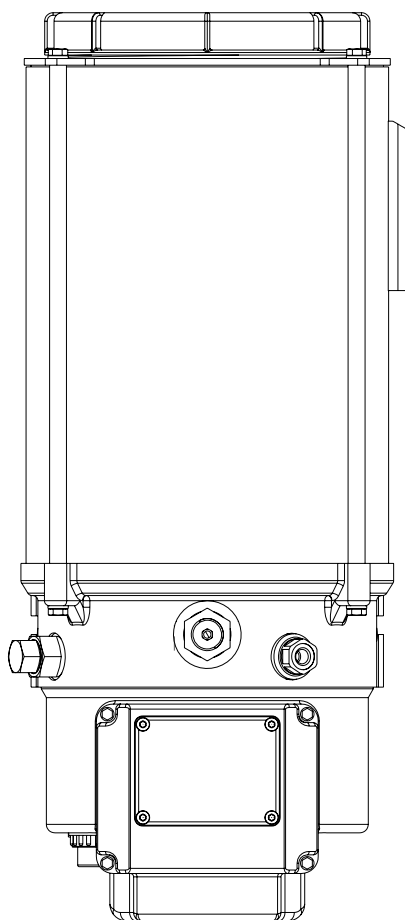


Electric operated Centro–Matic pump P653S

Models 396-0946 (CAT branded) and 80129, 24 V 



Date of issue	August 2024
Form number	404408
Version	7

Contents

Declaration of Incorporation	3	Malfunctions	23
U.K. Declaration of Incorporation	4	Display of malfunction E1 fault: Failure to	
Explanation of signal words for safety	5	build pressure at pump.	23
Safety	5	Display of malfunction E2 fault: Failure to build	
Exclusion of liability	5	pressure at end of line	23
Regulations for prevention of accidents	5	Display of malfunction E3 fault: Failure to vent at pump	23
Operation, maintenance and repair	6	Display of malfunction E4 fault: Failure to	
Repair	6	vent at end of supply line	23
Operation/maintenance	6	Operator key to trigger additional lubrication cycle	23
Disposal	6	Operator key to acknowledge a fault	23
Installation	7	Factory settings	24
Installation and maintenance of hydraulic hoses	7	Acknowledge fault signal	25
Description	8	P1: Setting for counts – thousands, hundreds	26
Appropriate use	8	P2: Setting for counts – tens, units	26
Specifications	9	Program pump	26
Specifications (continued)	10	Program mode: Pump with pressure switch	26
System operation	11	Program mode: Pump with pressure transducer	28
Overview	11	Refill and maintenance	29
Pump P653S	11	Pump cleaning	29
Reservoir sizes	11	Pump mounting template	30
Electrical connection	11	Review of pump parameters	31
Single-line pump P653S	11	Operating mode	32
Identification code P653S pump	12	Wiring connections for 24 V  P653S pump	33
Jumper setting combinations – Centro-Matic pumps	13	Wiring connections for 110–230 V AC 50/60 Hz 653 pump	34
Disassembled pump housing (view from bottom)	14	Jumper settings for P653S pump PCB	35
Idle run of switch joint on venting element	14	Centro-Matic system schematic with P653S pump	36
Activated vent cycle diagram	14	Lincoln list of lubricants	37
Operation	14	Proven lubricants	37
Pump	14	Lubricant recommendations based on	
Display during braking application of pump motor	15	manufacturer's data sheet	38
Display during change of moving direction of pump motor	15	Biodegradable lubricants, proven lubricants	39
Rotating segmented display during venting (counter-clockwise)	15	Dimensions P653S	40
Venting in vent valve	15	Illustrated parts breakdown	41
Pump element Z7 for internal lubricant crossporting	16	Pump housing	41
Pump element	16	Pump reservoir	42
Pressure control/hold time/vent cycle	17	Service parts	43
Pump with internal pressure switch only	17	Troubleshooting	44
Pump with internal and external pressure switch	17	Warranty	48
Pump with internal pressure transducer only	18		
Pump with internal and external pressure transducer	18		
Vent cycle	19		
Fill reservoir with grease	19		
Stirring paddle	19		
Low-level control	19		
Switching parts of low-level control for grease (reservoir filled)	20		
Keypad and display	21		
Operating mode	21		
P653S membrane keypad	21		
Green segment right, power supply on	21		
Green segment left on, 24 V DC pulse on black wire	21		
Green circulating illuminated segment, lubricating			
time, pump is running	21		
Display of holding time	22		
Display of low-level indication	22		

	Declaration of Incorporation	DOCUMENT NUMBER 404408.Dol
Manufacturer name/address: Lincoln Industrial Corporation 5148 N. Hanley Road St. Louis, MO 63134 U.S.A. TEL: +1 (314) 679-4200 FAX: +1 (314) 679-4367 Authorized to compile the technical file: SKF Lubrication Systems Germany GmbH Heinrich-Hertz-Straße 2-8 69190 Walldorf, Germany TEL: +49 (0) 6227-330 EMAIL: robert.collins@skf.com WEBSITE: www.skf.com		

This Declaration of Incorporation is issued under sole responsibility of the manufacturer. Lincoln Industrial Corporation hereby declares that the partly completed machinery stated below:

Name: P653S
Model number(s): 80129, 396-0946 (CAT)
Description: Centro-Matic (24 V)
Year of CE: 2022

in its intended use, is in conformity with the relevant union harmonization legislation:

Machinery Directive 2006/42/EC
(Article 13 Partly Completed Machinery)

and conforms to the following harmonized standards:

EN ISO 4413: 2010
Hydraulic fluid power - general rules and safety requirements for systems and their components

EN ISO 12100: 2011
Safety of machinery. General principles for design. Risk assessment and risk reduction

DIN EN ISO 809:2012
Pumps and pump units for liquids - common safety requirements

EN 1216:2001+A1:2009
Liquid pumps. Safety requirements. Procedure for hydrostatic testing

The following EHSR (Essential Health and Safety Requirements) have been applied:

1.1.2a – 1.1.2b – 1.1.2c – 1.1.3 – 1.1.5 –
1.2.5 – 1.3.2 – 1.3.3 – 1.3.4 – 1.3.6 – 1.3.7
– 1.3.8 – 1.5.3 – 1.5.4 – 1.5.13 – 1.7 – 1.7.1
– 1.7.1.1 – 1.7.3 – 1.7.4

The manufacturer maintains a technical file summary sheet containing test reports and product documentation:

Technical file summary sheet number:
RA404408

The partly completed machinery shown above should not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive, where appropriate.

I, the undersigned of Lincoln Industrial Corporation, do hereby declare that the equipment specified above, in its intended use, conforms to the requirements of the above EC Directive(s).



Robert Collins
Technical Compliance Manager
St. Louis, MO, U.S.A.
2022/08/31

	U.K. Declaration of Incorporation	DOCUMENT NUMBER UK404408CA
Manufacturer name/address: Lincoln Industrial Corporation 5148 N. Hanley Road St. Louis, MO 63134 U.S.A. TEL: +1 (314) 679-4200 FAX: +1 (314) 679-4367 Authorized to compile the technical file: SKF (U.K.) Limited 2 Canada Close Banbury, Oxfordshire, OX16 2RT, GBR EMAIL: robert.collins@skf.com WEBSITE: www.skf.com		

This U.K. Declaration of Incorporation is issued under sole responsibility of the manufacturer. Lincoln Industrial Corporation hereby declares that the partly completed machinery stated below:

Name: P653S
Model number(s): 80129, 396-0946 (CAT)
Description: Centro-Matic (24V)
Year of CE: 2022

in its intended use, is in conformity with the relevant union harmonization legislation:

Supply of Machinery (Safety) Regulations 2008 (S.I. 2008:1597)

along with the following Directive(s) that were also applied with the above legislation:

EN ISO 4413: 2010
Hydraulic fluid power – general rules and safety requirements for systems and their components

EN ISO 12100: 2011
Safety of machinery. General principles for design. Risk assessment and risk reduction

DIN EN ISO 809:2012
Pumps and pump units for liquids – common safety requirements

EN 1216:2001+A1:2009
Liquid pumps. Safety requirements. Procedure for hydrostatic testing

The following EHSR (Essential Health and Safety Requirements) have been applied:

1.1.2a – 1.1.2b – 1.1.2c – 1.1.3 – 1.1.5 –
1.2.5 – 1.3.2 – 1.3.3 – 1.3.4 – 1.3.6 – 1.3.7 –
1.3.8 – 1.5.3 – 1.5.4 – 1.5.13 – 1.7 – 1.7.1 –
1.7.1.1 – 1.7.3 – 1.7.4

The manufacturer maintains a technical file summary sheet containing test reports and product documentation:

Technical file summary sheet number:
RA404408

The partly completed machinery shown above should not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive, where appropriate.

I, the undersigned of Lincoln Industrial Corporation, hereby declare that the equipment specified above, in its intended use, conforms with the Essential Health and Safety Requirements of U.K. legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I, Declaration of Incorporation by the time of placing it on the market.



Robert Collins
Technical Compliance Manager
St. Louis, MO, U.S.A.
2022/08/31

Safety

The assembly must be installed, maintained and repaired exclusively by persons familiar with the instructions.

Always disconnect power source (electricity, air or hydraulic) from the equipment when it is not being used.

This equipment generates high pressure. Extreme caution should be used when operating this equipment as material leaks from loose or ruptured components can inject fluid through the skin and into the body. If any fluid appears to penetrate the skin, seek attention from a 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 the stated maximum working pressure of the equipment or of the lowest rated component in your system.
- Always read and follow the manufacturer's recommendations regarding fluid compatibility, and the 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 to prevent property damage and ensure efficient trouble-free operation.

CAUTION

Indicates a dangerous situation that can lead to light personal injury 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.

WARNING

Do not operate equipment without reading and fully understanding safety warnings and instructions.



Failure to follow warnings and instructions may result in serious injury.

NOTE

Do not operate equipment without wearing personal protective gear.

Wear eye protection. Protective equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.



WARNING



Do not allow any body part to be trapped by equipment. Body parts can be crushed by subassemblies during

operation.

Failure to comply may result in death or serious physical injury.

WARNING



Do not allow fluid to leak onto floor when operating equipment. If spill occurs, clean any fluid on floor before continuing operation.

Failure to comply may result in death or serious personal injury.

WARNING

Do not use this equipment to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) or HCS 29 CFR 1910.1200 marked with GHS01, GHS06 and GHS08 hazard pictograms shown:



Exclusion of liability

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

- Lack of lubricant due to irregular refilling of pump.
- Use of contaminated lubricants.
- Use of greases that are not or only conditionally pumpable by P653S pump.
- Inadequate disposal of used or contaminated lubricants and 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 (→ **Table 1, page 9**).

Regulations for prevention of accidents

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

Operation, maintenance and repair

⚠ WARNING

Depressurize all lubrication lines of carrier unit before performing maintenance or repair.

Failure to comply may result in death or serious personal injury.

Repair

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

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

Operation/maintenance

Pump P653S:

- Must be refilled at regular intervals with clean lubricant recommended by manufacturer.
- Operate automatically; however, check every two days to ensure lubricant is pumped to all lubrication points.

Disposal

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

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

⚠ WARNING

Pump P653S must be installed by qualified personnel. Connection of 120 VAC must be done according to National Electrical code.

Disconnect and lock out incoming power before installation or service of pump.

Failure to comply may result in death or serious personal injury.

⚠ WARNING

Do not exceed maximum specification ratings (→ **Table 1**). Failure to comply may result in damage to component.

Failure to observe safety instructions, (e. g. touching electrically charged parts when pump is opened, or improper handling of P653S pump) may cause death or serious personal injury.

⚠ CAUTION

Turn off power supply before filling pump with lubricant on pumps that fill from top.

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

⚠ CAUTION

Never put hand into open reservoir while pump is running. Risk of injury exists with pumps being filled from reservoir top.

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

⚠ CAUTION

Do not over fill reservoir. Extreme pressure can cause reservoir to explode.
Failure to comply may result in personal injury or damage to component.

⚠ CAUTION

Do not use pump in potentially explosive applications.
Failure to comply may result in personal injury or damage to component.

Installation and maintenance of hydraulic hoses

⚠ CAUTION

Hose lines must be installed and maintained by persons familiar with instructions to ensure operational safety of P653S pump.
Failure to comply may result in personal injury or damage to component.

⚠ CAUTION

Always use supply line hose and fittings appropriate for programmed/set system pressure.
Failure to comply may result in personal injury or damage to system components.

Installation

- Any safety equipment already installed on vehicle:
 - should not be modified or made ineffective
 - should only be removed for purpose of installing system
 - must be replaced after removal
- Use only original Lincoln spare parts or parts approved by Lincoln.

Lubrication hose lines:

- Do not subject to torsion.
- Do not install twisted.
- Do not allow lines to rub against metal components or edges.
- Always perform regular visual checks and replace if worn and/or damaged (at the 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.

NOTE

Follow vehicle manufacturer installation instructions regarding all drilling and welding procedures (i.e. specified minimum distances 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.

Description

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

P653S pump is designed for single line (S) 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 connected pumping elements
- External pressure relief valve
- Reservoir low–level control
- End of lubrication line pressure switch or pressure transducer choice
- Contacts for remote monitoring
- 24 V  or 120/230 V AC power supply

Pump can supply adequate lubricant to bearings using SL–V, SL–VXL, SL–1, SL–32 and SL–33 injectors. Number of injectors should be based on output of pump being 1.5 in³/minute.

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

Appropriate use

- P653S pump is designed for intermittent operation and is not suitable for continuous operation.
- Pump is capable of supplying lubricants up to NLGI 2. Refer to **Lincoln list of lubricants, page 37** for list of recommended greases.
- Any other use not in accordance with instructions will result in loss of claims for warranty and liability.

⚠ CAUTION

Do not operate pump in a way not in accordance with instructions.

Do not operate with pump installed incorrectly.

Failure to comply may result in personal injury or damage to system components.

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 36**.

Table 1

Specifications

Electrical data for V pump

Incoming voltage	24 V  -20%/+30%
Maximum current	10 A
External fuse	10 A (time delay)
Reverse polarity protection	Yes
Current draw with pump off	30 mA

Electrical data for VAC pump

Incoming voltage	100 to 240 V AC
Maximum current	1.7 A
Frequency	47 to 63 hz
Output from power supply	24 V  at 5 A
External Fuse	3 A (time delay)

Common electrical data for V and VAC pump

Minimum count	1 count
Maximum count	9,999
Pause count increments	1 count
Maximum pumping time	12 minutes
Enclosure rating	IP 6K9K (NEMA 4X)
Rating for fault relay contact:	
Switching voltage	Maximum 230 V AC/120 V AC/24 V 
Switching current	Maximum 1 A inductive
Minimum switching current	0.1 mA

Pump P653S

Operating pressure with:	
–pressure switch	3 500 psi (240 bar)
–pressure transducer	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 (172 bar) (not adjustable)
End of line transducer vent pressure is factory preset at 900 psi (62 bar). Pressure can be adjusted from 200 to 1 000 psi (14 to 70 bar) in 100 psi (6,9 bar) increments.	
Maximum distance using shielded wire for pressure transducer	98 ft (30 m)
Operating temperature range for DC pumps	–40 to +158 °F ¹⁾ (–40 to +70 °C) ¹⁾
Operating temperature range for AC pumps	32 to 122 °F ¹⁾ (0 to 50 °C) ¹⁾
Number of outlets (see instructions)	1
Lubricant	Up to NLGI grade 2 ¹⁾
Output	1.5 in ³ /min ²⁾ (24.6 cm ³ /min) ²⁾
Reservoir sizes, L	4, 8, 15 and 20
Lubricant line connection size	G 1/4 in

Pump elements K7

Piston diameter	1/4 in (7 mm)
Number of pumping elements (connected together)	3
Tightening torques:	
Install pump	13.3 lbf-ft (18 Nm)
Electric motor on housing	8.8 lbf-ft (12 Nm)
Pump element in housing	14.57 lbf-ft (20 Nm)
Closure plug in housing	8.8 lbf-ft (12 Nm)
Return line connector on housing	8.8 lbf-ft (12 Nm)
Tie rods for 15 and 20 l reservoir	7.4 lbf-ft (10 Nm)

¹⁾ See list of approved and recommended lubricants (→ page 37). Contact Lincoln if lubricant is not in list.

²⁾ 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.

Specifications (continued)**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)
Pump P653S version 1A	23.3 lb (10.6 kg)
Pump P653S version 3A	24.6 lb (11.2 kg)

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	19.1 lb (8.7 kg)
Pump P653S version 1A	21.3 lb (9.7 kg)
Pump P653S version 3A	23.1 lb (10.5 kg)

Weights above include following equipment:

Pump kit with three pump elements, pressure relief valve, grease filling 3.3 lbs (1.5 kg)

Packing (cardboard box)

Attaching parts

Operating instructions

Installation

Use only high pressure 5 000 psi (345 bar) minimum hydraulic hose for supply lines.

Use only hose connection fittings that are appropriate for programmed/pre-set system.

System operation

Overview

Only difference between models 396-0946 and 80129 is model 396-0946 comes with reservoir one third full of NLGI 1 grease. This manual will describe model 396-0946.

Model 396-0946 initiates lube cycle on a count pulse instead of time between lube cycles. Model 396-0946 is set for one count to start a lube cycle. This one count feature allows customers machine controller to initiate lube cycles. This one count is a 24 V  pulse lasting from 3 to 5 seconds. Pump operates on 24 V .

Alarm contacts are set to open position. When power is applied, alarm contacts will close. If alarm condition occurs, alarm contact will open.

Changing of programming parameters, via keypad, is prohibited due to setting of internal jumper pin. Refer to **Jumper settings for P653S pump PCB, page 35.**

On power up model will wait for 24 V  pulse before initiating lube cycle. If pump was in lube cycle when power was turned off it will start with lube cycle upon power up.

Pump P653S

- Pump 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 to 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 V AC 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 electric cable 32 ft (10 m) and 7-pole bayonet type connector.

⚠ CAUTION

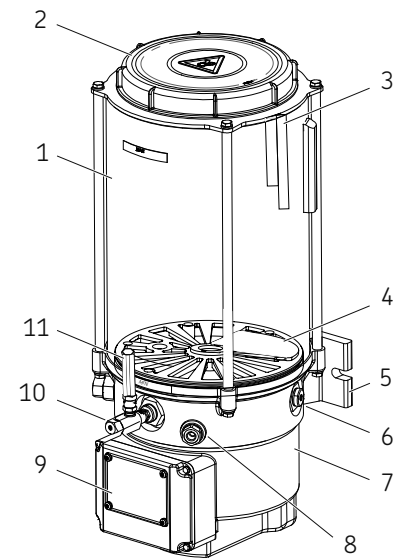
Always use supply line hose and fittings appropriate for programmed/set system pressure.

Failure to comply may result in personal injury or damage to system components.

Fig. 1

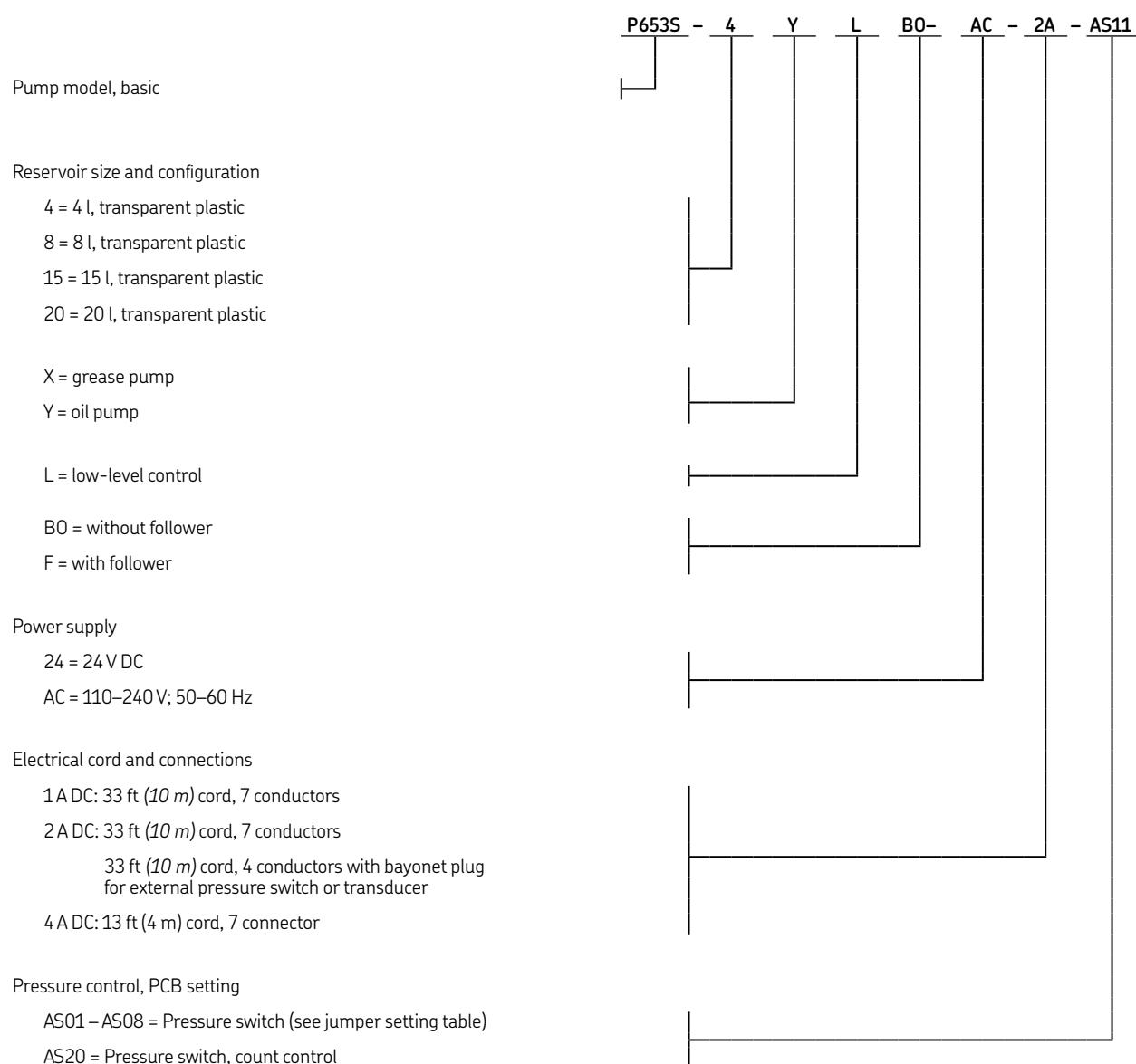
Single-line pump P653S

Note: Low-level control
(→ Fig. 12 and Fig. 13, page 20)



Item	Description
1	Reservoir
2	Top lid
3	Stationary paddle
4	Stirring paddle
5	Mounting plate
6	Pump elements
7	Pump housing
8	Refill grease fitting
9	Keypad
10	Pump outlet
11	Relief valve

Identification code P653S pump



Example:

P653S-4YLB0-AC-2A-AS11 pump consists of the following:

- Four liter reservoir
- Low-level control
- Internal pressure transducer
- 33 ft (10 m) power cord

Table 2

Jumper setting combinations – Centro–Matic pumps

Pump combinations	Application: Industrial (S) – o; Mobil (M) – x	Time (TC) or count control (cc); TC – o; CC – x	Number of pressure switches or transducers. o – one x – two	Low-level control; NO – o; NC – x ¹⁾	F1 fault relay; (31) switch to ground – x	F2 fault relay; (31) switch to ground – x
	Jumper setting (plugged –x, unplugged – o)					
AS01	o	o	o	x	x	x
AS02	o	o	x	x	x	x
AS03	o	o	o	o	x	x
AS04	o	o	x	o	x	x
AS05	x	o	o	x	x	x
AS06	x	o	x	x	x	x
Pressure switch						
AS07	x	o	o	o	x	x
AS08	x	o	x	o	x	x
AS17	o	x	o	o	x	x
AS21	x	x	o	x	x	x
AS24	x	x	o	o	x	x
Pressure transducer						
AS09	o	o	o	x	x	x
AS10	o	o	x	x	x	x
AS11	o	o	o	o	x	x
AS12	o	o	x	o	x	x
AS13	x	o	o	x	x	x
AS14	x	o	x	x	x	x
AS15	x	o	o	o	x	x
AS16	x	o	x	o	x	x
AS18	x	x	x	o	x	x
AS19	o	x	x	o	x	x
AS20	x	x	o	o	x	x
AS22	x	x	o	x	x	x
AS23	o	x	x	x	x	x

¹⁾ These pumps have a follower plate (for lubricating grease) or a float switch (for lubricating oil).

Operation

Pump

Drive

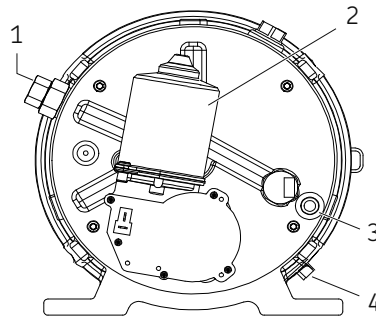
- Pump housing consists of following components:
 - gear motor
 - final gear drive
 - three pumping elements connected together by internal passages
 - vent valve
- Pump can be configured with internal pressure switch or transducer.
- Gear motor shaft is connected to final stage gear drive. Final gear has incorporated eccentric and cam to drive pumping elements and to control internal vent valve (→ Fig. 3).
- 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.

Lubrication 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 21). 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. 3).
- Output of three pump elements (4) (→ Fig. 2) 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 pump element outlets. Remaining two pump element outlets should be plugged.

Fig. 2

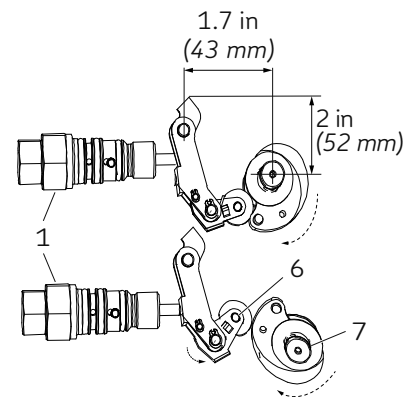
Disassembled pump housing
(view from bottom)



Item	Description
1	Venting element
2	Motor
3	Integrated pressure switch
4	Pump elements with integrated lubrication lines

Fig. 3

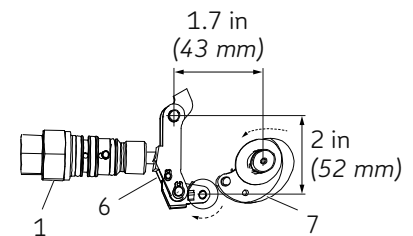
Idle run of switch joint on venting element



Item	Description
1	Inactive venting element
6	Switch joint
7	Cam (driven clockwise by the motor)

Fig. 4

Activated vent cycle diagram



Item	Description
1	Activated venting element
6	Activated vent lever
7	Cam (driven counter-clockwise by motor)

Fig. 5

Display during braking application of pump motor

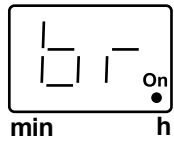


Fig. 6

Display during change of moving direction of pump motor

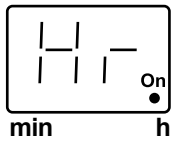


Fig. 7

Rotating segmented display during venting (counter-clockwise)

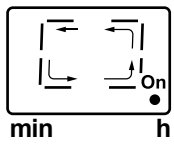
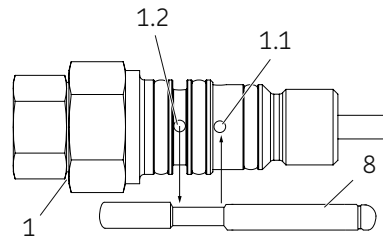


Fig. 8

Venting in vent valve



Item	Description
1	Venting element
1.1	Inlet hole
1.2	Outlet hole
8	Plunger, venting

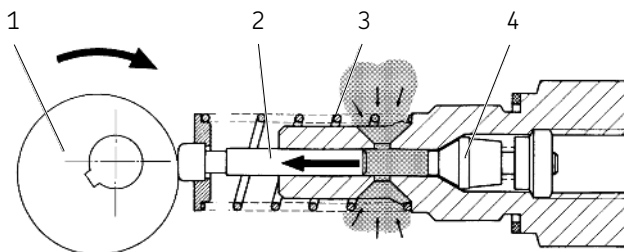
Pump element

- Pump element (→ Fig. 9 and Fig. 10) is a single stroke spring biased 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 lateral outlet (5) (→ Fig. 11) for lubricant crossporting to internal material passages to combine outlet of all three pump elements.
- Any of the three elements can be used as pump outlet. Remaining two elements should be closed with plug (A) (→ Fig. 11).

NOTE

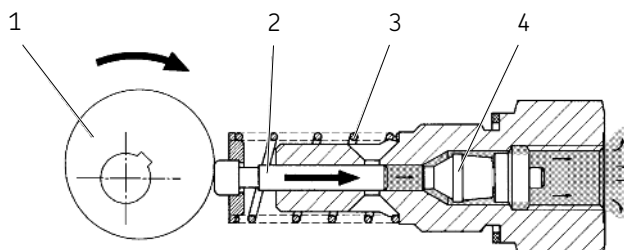
Use only pump elements designed for operation in P653S pump. No other pump elements should be used. See **Service parts, page 43** for correct pump element part number.

Fig. 9



Item	Description
1	Eccentric
2	Plunger
3	Compression spring
4	Check valve

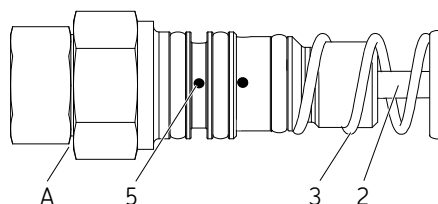
Fig. 10



Item	Description
1	Eccentric
2	Plunger
3	Compression spring
4	Check valve

Fig. 11

Pump element Z7 for internal lubricant crossporting



Item	Description
A	Closure plug (connection G 1/4 in. for main line)
2	Piston
3	Spring
5	Lateral outlet for lubricant crossporting

Pressure control/ hold time/vent cycle

Pump with internal pressure switch only

Internal pressure switch closes at 3 500 psi (240 bar) and opens 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 goes 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 the 15 seconds, pump restarts and runs 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 begins vent cycle.
- If at end of 30 seconds internal pressure switch is open, pump restarts and runs until internal pressure switch closes. When it closes, vent cycle takes place.
- If at end of 30 seconds internal pressure switch is closed, but during **H1** hold time internal pressure switch did open, pump restarts and pumps for 2 seconds before vent cycle begins.

Possible faults

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

Pump with internal and external pressure switch

Internal pressure switch closes at 3 500 psi (240 bar) and opens at 2 600 psi (179 bar). External pressure switch closes at 2 500 psi (172 bar) and opens at 1 900 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 restarts and runs until internal pressure switch closes.

Holding time (H2) – lasts for 30 seconds

- At end of **H2**, if internal pressure switch is closed and external pressure switch is closed, pump begins vent cycle.
- At end of **H2**, if internal pressure switch is open or both internal and external pressure switches are open, **H3** appears on display. Pump turns on again and pumps until internal pressure switch is closed. When both internal and external pressure switches are closed, vent cycle takes place.
- If at end of **H2** internal pressure switch is closed but external pressure switch is open, pump turns on for 2 seconds and then stops and waits until external pressure switch closes. **H3** appears on display. When both internal and external pressure switches are closed, vent cycle takes place.

Holding time (H3)

- Holding time **H3** remains until both internal and external pressure switches are closed and then vent cycle takes place. If both pressure switches do not close within allotted pumping time of 12 minutes, alarm occurs. If internal pressure switch opens during **H3**, it repumps until internal pressure switch closes.

Possible faults

- **E1** Fault – failure to build pressure at pump within allotted 12 minutes of pumping time.
- **E2** Fault – failure to build pressure at end of supply line.
- **E3** Fault – failure to vent at pump. Internal pressure switch has 10 seconds to open when motor reverses to locate vent position.
- **E4** Fault – failure to vent at end of 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 keypad 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 closed.

After pump starts lubrication cycle, motor stops when pressure at pump reaches preset pressure. Pump goes through two holding periods: **H1** and **H2**. The following uses 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 restarts and runs until internal pressure transducer reaches 3 500 psi (240 bar).

Holding time (H2) – lasts for 30 seconds

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

Possible faults

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

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 keypad 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 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 1 000 psi (14 to 69 bar). It is factory set to open at 900 psi (62 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**.

The following uses 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 restarts and runs until internal pressure transducer reaches 3 500 psi (240 bar).

Holding time (H2) – lasts for 30 seconds

- At 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 begins vent cycle.
- At 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 turns on again and pumps 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 takes place.
- If at 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 turns on for 2 seconds and then stops and waits until external pressure transducer reaches 2 500 psi (172 bar). **H3** appears 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 takes place.

Holding time (H3)

- Holding time **H3** remains 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 takes place. If both pressure transducers do not reach preset settings within allotted pumping time of 12 minutes, alarm will occur. If internal pressure transducer drops below 2 600 psi (179 bar) during **H3**, it repumps until internal pressure transducer reaches 3 500 psi (240 bar).

Possible faults

- **E1** Fault – failure to build pressure at pump within allotted 12 minutes of pumping time.
- **E2** Fault – failure to build pressure at end of supply line.
- **E3** Fault – 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 – failure to vent at end of 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 initiates vent cycle. Vent cycle lasts for ten seconds.
- Motor turns counter-clockwise to engage and open internal vent valve. Displays rotating segment is turning counter-clockwise.
- Motor stops in position to hold vent valve open. **Hr** will be displayed for remainder of 10 seconds.
- Cam (7) (→ Fig. 4, page 14) engages vent lever (6) depressing vent valve plunger (8) (→ Fig. 8, page 15). This opens valve passage of supply line to reservoir.
- Lubricant is flowing back to reservoir venting pressure from system. Valve stays open during pause time.

Fill reservoir with grease

Use grease fitting (8) (→ Fig. 1, page 11) to fill reservoir. Filling reservoir for first time is critical to proper pump operation. It is recommended to run motor by initiating lubrication cycle during first reservoir fill. Stirring paddle (3) of running motor will help to evenly spread grease, minimizing air pockets.

Stirring paddle

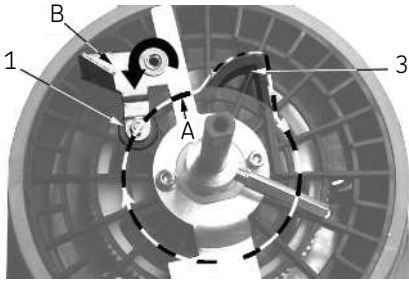
Stirring paddle (3) (→ Fig. 2, page 14) is attached to motor and rotates during lubrication cycle. Paddle works grease in reservoir to make it more pumpable and at same time pushes grease down into housing and pumping elements to prevent cavitation.

Low-level control

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

Fig. 12

Switching parts of low-level control for grease (reservoir filled)



Item Description

1	Pivot bracket with round magnet
3	Control cam
A	Inner orbit of round magnet
B	Position of pivot bracket (LL not activated)

Reservoir full of grease

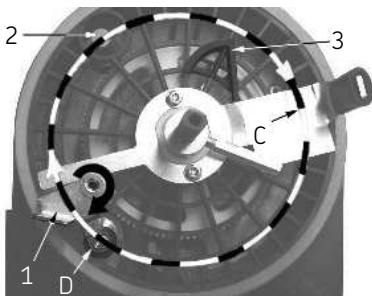
- Stirring paddle rotates clockwise during lubrication cycle.
- Pivot bracket of stirring paddle (B) (→ Fig. 12) is completely submerged into grease and grease resistance to paddle rotation guides bracket with round magnet (1) inward to orbit (A).
- Control cam (3) guides pivot bracket with magnet and 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).
- Magnet and low-level switch (2) (→ Fig. 13) are not aligned and switch cannot be activated.

NOTE

Do not use switching parts 1 to 3 (→ Fig. 12 and Fig. 13) with fluid grease or oil. Use float magnetic switch with fluid grease or oil.

Fig. 13

Switching parts of low-level control for grease (reservoir empty)



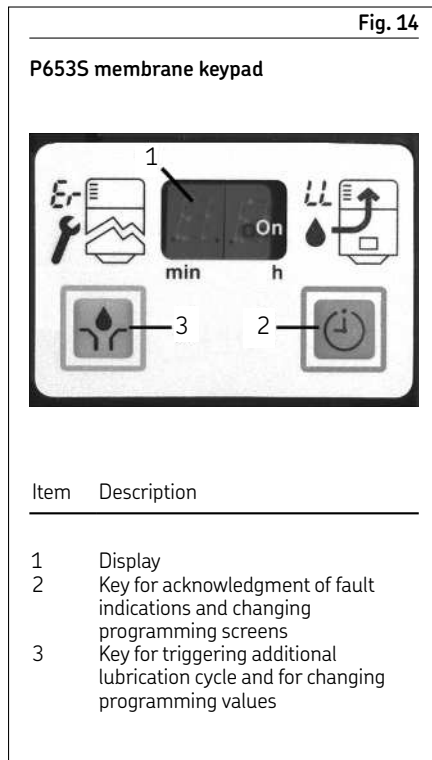
Item Description

1	Pivot bracket with round magnet
2	Low-level switch
3	Control cam
C	Outer orbit of the round magnet
D	Position of pivot bracket (LL activated)

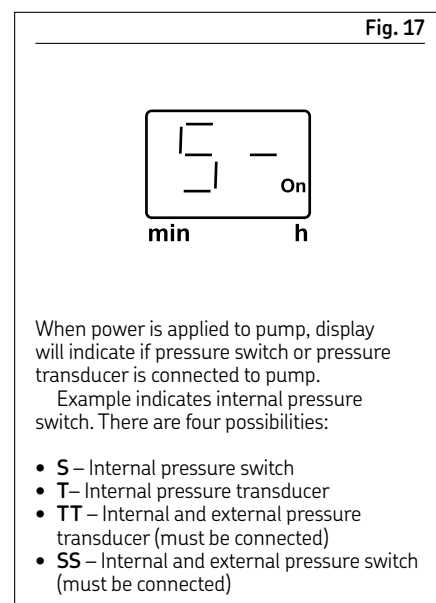
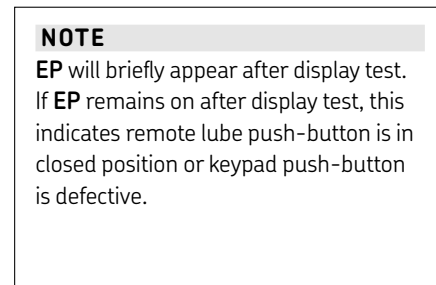
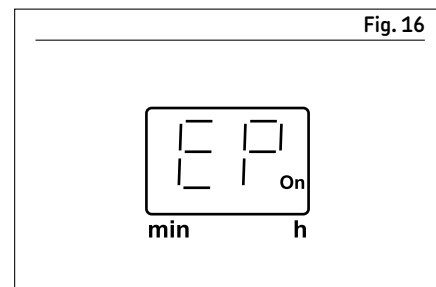
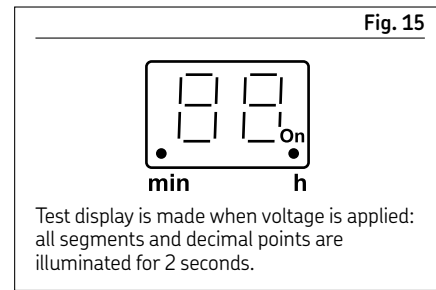
Reservoir empty of grease

- Control cam (3) (→ Fig. 13) guides pivot bracket with magnet (1) outward. Since there is no grease resistance, bracket with magnet (1) stays outward in orbit (C).
- Magnet (1) aligns with low-level switch and activates LL indicator on pump display.

Keypad and display



Test display of membrane keypad



Operating mode

- Lower right-hand segment indicates 24 V going to red wire in 7 conductor cable (→ Fig. 18).
- When there is a 24 V pulse on black wire, lower left-hand segment is on (→ Fig. 19).
- During lubricating time of pump, circulating illuminated segment appears in display window of membrane keypad (→ Fig. 20).
- If power supply is interrupted during lubricating time, operating time will start at beginning after switching power on again.

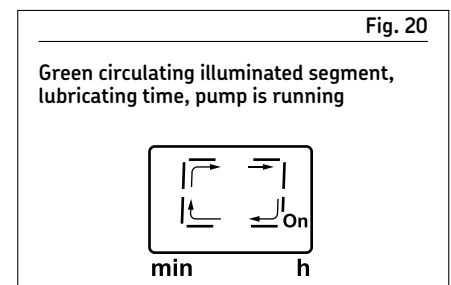
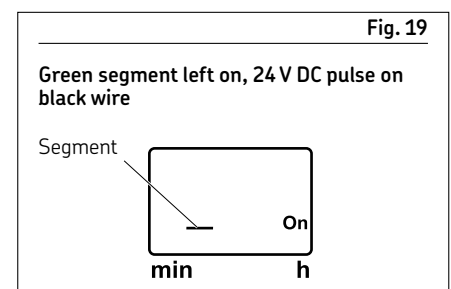
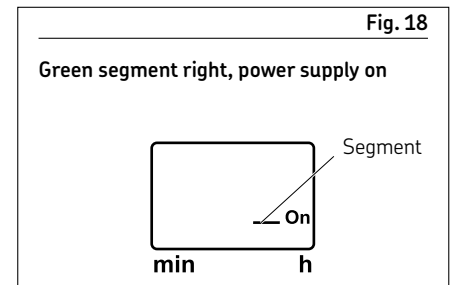
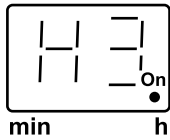
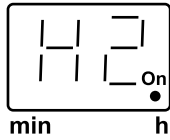
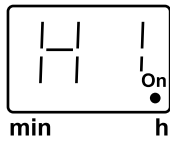


Fig. 21

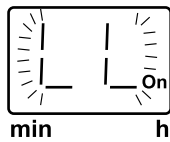
Display of holding time



Display indicates holding times when pump reaches preset pressure.

Fig. 22

Display of low-level indication



Low-level control

Display flashes LL in event of low-level signal.

NOTE

Current operating cycle will complete if low-level signal occurs during lubricating time. Pump will no longer switch on automatically. It must be switched on again by manual lube cycle.

Programming mode cannot be changed while there is a low-level signal.

Malfunctions

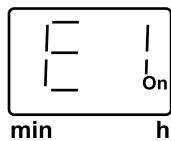
- Pump switches off immediately if there is no feedback from pressure switch or pressure transducer within 12 minutes of pumping time. One of the fault signals **E1** to **E4** (→ Fig. 23 to Fig. 26) will be shown flashing in display of membrane keypad.

NOTE

E1, E2, E3 or **E4** will flash if malfunction is present. Pump does not switch on automatically any longer. It can only be triggered via an additional lubrication cycle. Programming mode cannot be changed while there is an alarm.

Fig. 23

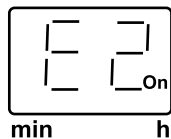
Display of malfunction E1 fault:
Failure to build pressure at pump



- Occurs if either pressure switch or pressure transducer fails to actuate within 12 minutes of pumping.

Fig. 24

Display of malfunction E2 fault:
Failure to build pressure at end of line

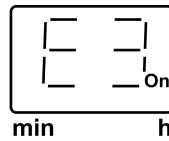


Must use external pressure switch or pressure transducer to detect.

- Occurs if either external pressure switch or pressure transducer fails to reach 2 500 psi (172 bar) within 12 minutes of pumping.

Fig. 25

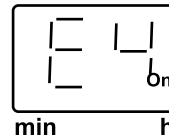
Display of malfunction E3 fault:
Failure to vent at pump



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

Fig. 26

Display of malfunction E4 fault:
Failure to vent at end of supply line

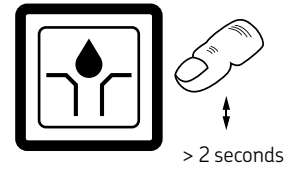


Must use external pressure switch or pressure transducer to detect.

- E4** fault occurs if at end of pause time external pressure switch has not opened.
- E4** fault occurs if at end of pause time external pressure transducer has not dropped below **P8** parameter.

Fig. 27

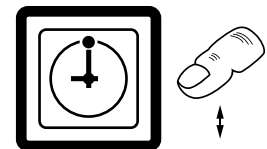
Operator key to trigger additional lubrication cycle



Press button for 2 seconds to trigger additional lubrication cycle.

Fig. 28

Operator key to acknowledge a fault



To trigger additional lubrication cycles externally:

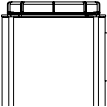
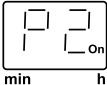
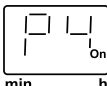
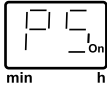
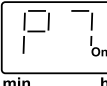
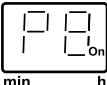
- Press push-button to trigger additional lubrication cycle externally. Press push-button for 2 seconds.
 - Mobile pump with ignition switch open up to two times.
 - Industrial pump with machine switch open... unlimited.

NOTE

Existing fault signals (→ Fig. 22 to Fig. 26, page 22 and page 23) must be acknowledged before triggering an additional lubrication cycle.

Table 3

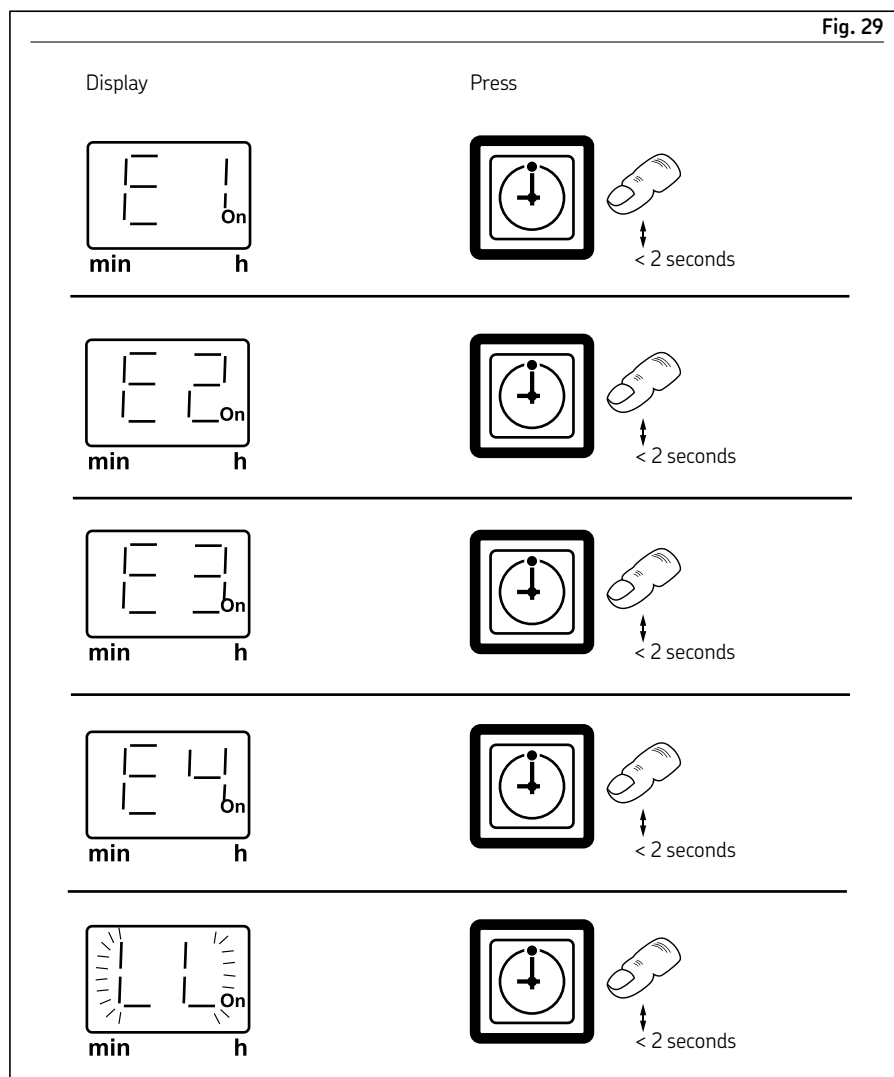
Factory settings

Programming steps	Factory setting	Description
	00	Count Thousands, hundreds
	01	Count Tens, unit
	NO	Output of both fault relays no (normally open) nc (normally closed)
	o2	Two options for signaling a fault o1 (Option 1) 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 A low-level fault or a pressure fault will cause the F2 contact to close and stay closed. o2 (Option 2) F1 fault relay's contact will close on a low-level fault F2 fault relay's contact will close on a pressure fault Both of these contacts can be used for remote signaling.
	35	The P7 programming step will only appear if you have a pump that uses an internal pressure transducer. (Reading x 100) 35 x 100 = 3 500 psi (241 bar). 3 500 psi (241 bar) is the maximum pressure that the pump will build. Adjustable from 1 400 to 4 600 psi (96 to 317 bar) in 100 psi (6.9 bar) increments.
	09	The P8 programming step will only appear if you have a pump that uses an external pressure transducer. (Reading x 100) 09 x 100 = 900 psi. (62 bar) 900 psi. (62 bar) is where the external pressure transducer will open (vent) adjustable from 200 to 1 000 psi (13.7 to 68.9 bar) in 100 psi (6.9 bar) increments.

Acknowledge fault signal

- 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 have not yet been 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.

Fig. 29



Program pump

Program mode: Pump with pressure switch

Model 396-0946 does not allow changing of programming parameters due to setting of internal keypad lockout pin.

Fig. 30

Key	Function
	Key for modifying parameters in programming step
	Key for switching to next programming step

NOTE

Pump power must be on to start programming.

Step 1

Display

Press

> 4 seconds

Display

Setting of P1 and P2 counts

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

Programming options:
P1: Thousands, hundreds
P2: Tens, units

Step 2

P1: Setting for counts – thousands, hundreds

Display

Press

Step 3

P2: Setting for counts – tens, units

Display

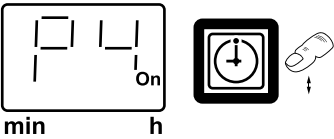
Press

Display

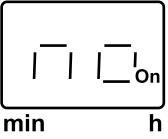
Press

Step 4

Display **Press**

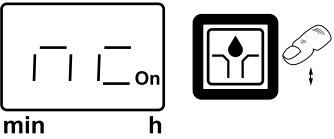


min h



min h

Display **Press**



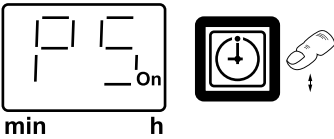
min h

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

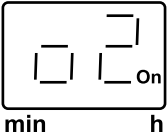
- Press button so **P4** appears in display.
 - When releasing button, currently set value appears in display (factory-set value **NO**, normally open contact, shown). On fault condition alarm contact close.
- Press button.
 - External fault contact is modified by programming it as **NC**, normally closed, contact. On fault condition alarm contact open.

Step 5

Display **Press**



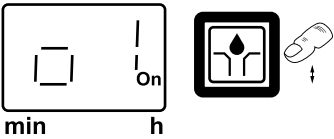
min h



min h

Factory Setting

Display **Press**



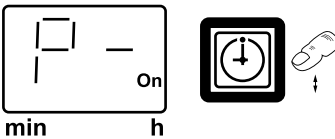
min h

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

- Press button so **P5** appears in display.
- **o1** (Option 1) **P4** is set to default of normally open.
 - F1** relay contact
 - Low-level fault causes **F1** contact to repeatedly open and close.
 - Pressure fault causes **F1** contact to close and stay closed.
 - F2** relay contact
 - Low-level fault or pressure fault causes **F2** contact to close and stay closed.
- **o2** (Option 2) **P4** is set to default of normally open.
 - **F1** fault relay contact closes on low-level fault.
 - **F2** fault relay contact closes on pressure fault.
 - Both contacts can be used for remote signaling.
- Press pushbutton to change to option 1.

Step 6

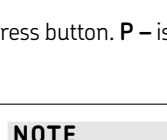
Display **Press**



min h



min h



min h

Complete program

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

NOTE

Program must be completed to save new values.

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

NOTE

Press key **additional lubrication** within 30 seconds to save changed parameters. After 30 seconds, program reverts to previous settings.

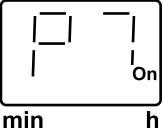
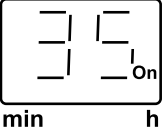
Important: Recheck parameter settings in operating mode after programming is complete.

Program mode of pump with pressure switch is complete.

Program mode: Pump with pressure transducer

Complete Step 1 through Step 5 (page 26 and page 27) of pump with pressure switch.

Step 7

Display	Press
	
	

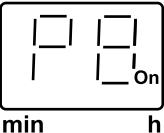
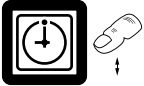
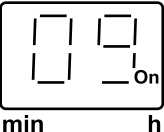
NOTE

P7 only appears if pump has internal pressure transducer.

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 (241 bar).

- Press button to change value
Reading x 100 = Transducer setting in psi
35 x 100 = 3 500 psi
Setting is adjustable from
1 400 to 4 600 psi (97 to 317 bar) in
100 psi (7 bar) increments.

Step 8

Display	Press
	
	

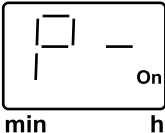
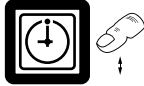
NOTE

P8 only appears if 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 1 000 psi (14 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)

Step 9

Display	Press
	
	

Complete program

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

NOTE

Program must be completed to save new values.

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

NOTE

Press key **additional lubrication** within 30 seconds to save changed parameters. After 30 seconds, program reverts to previous settings.

Important: Recheck parameter settings in operating mode after programming is complete.

Program mode of pump with pressure transducer is complete.

Refill and maintenance

⚠ CAUTION

Pump was tested and shipped with small amount of grease.

Flush pump before connecting it to system to prevent possible contamination of pumped grease.

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

Use same grease fitting (8) to fill or refill reservoir (→ Fig. 1, page 11). During first fill of reservoir, initiate a lubrication cycle to run motor. Stirring paddle of running motor helps 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 mm) swivel connection to attach hose from larger output filling pump.

⚠ CAUTION

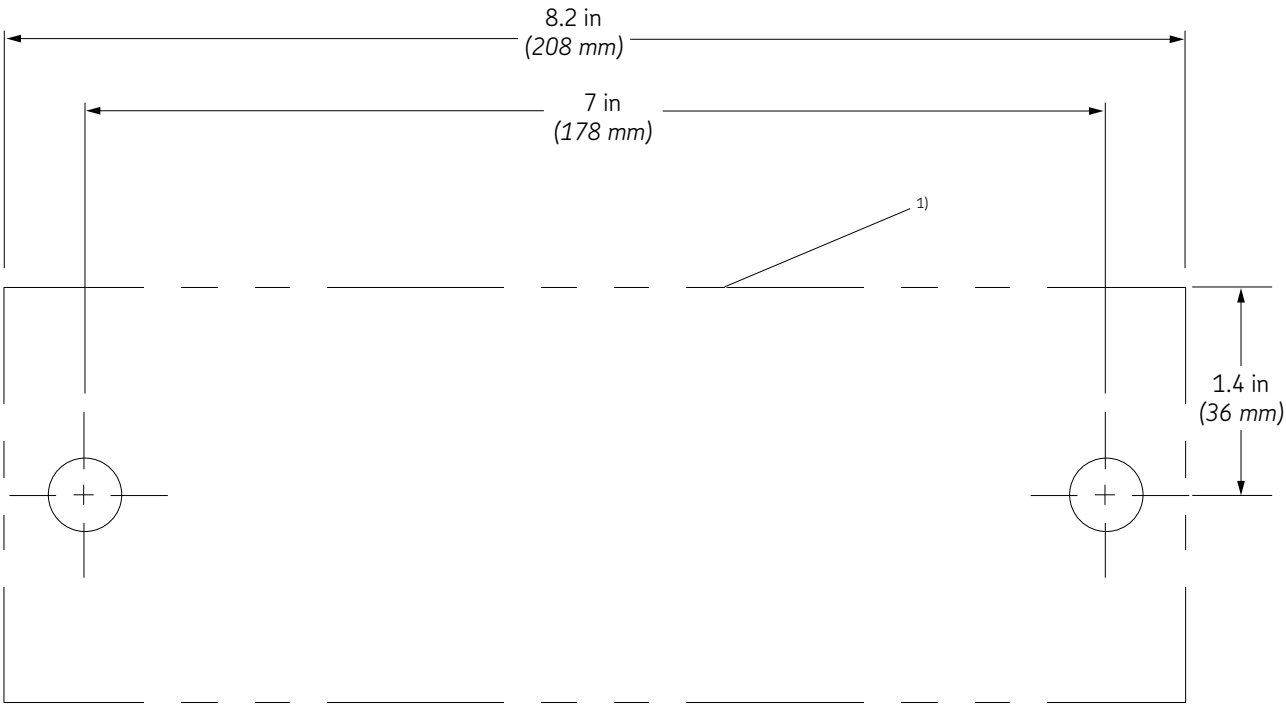
Do not over fill reservoir. Extreme pressure can cause reservoir to explode.

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

Pump cleaning

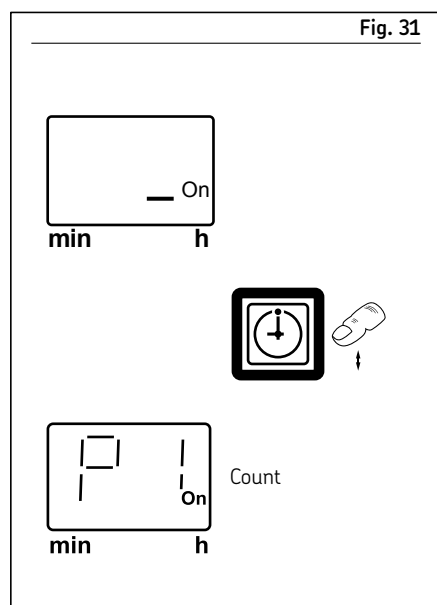
Use petroleum or benzene based cleaning solutions. Do not use tri-, perchloroethylene or similar solvents. Do not use polar organics such as alcohol, methyl alcohol, acetone or similar solvents.

Pump mounting template

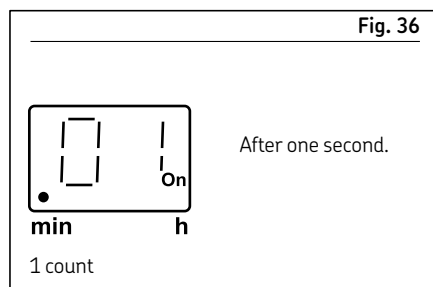
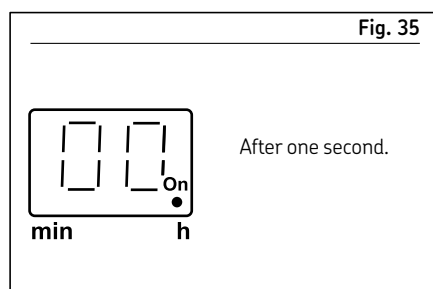
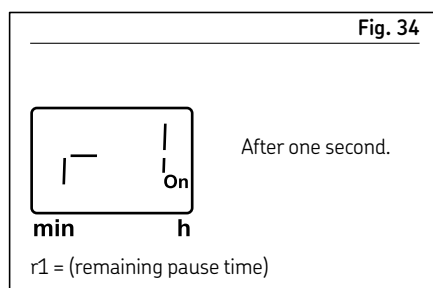
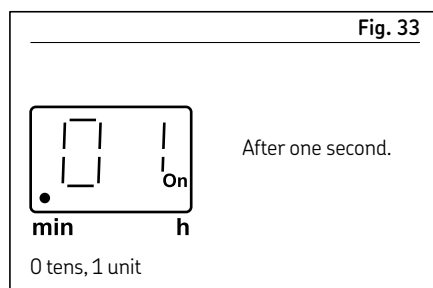
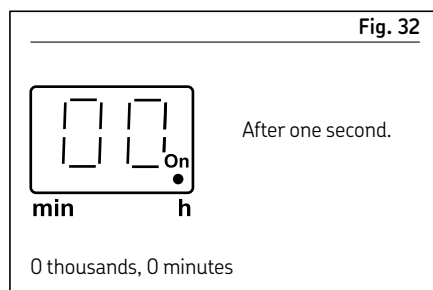


1) Upper edge of pump

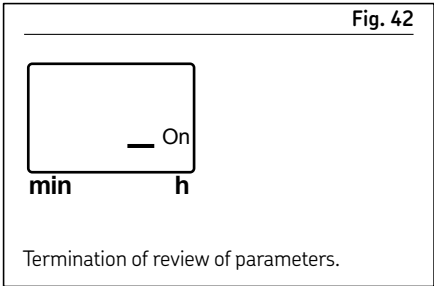
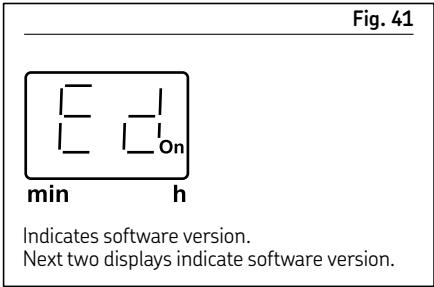
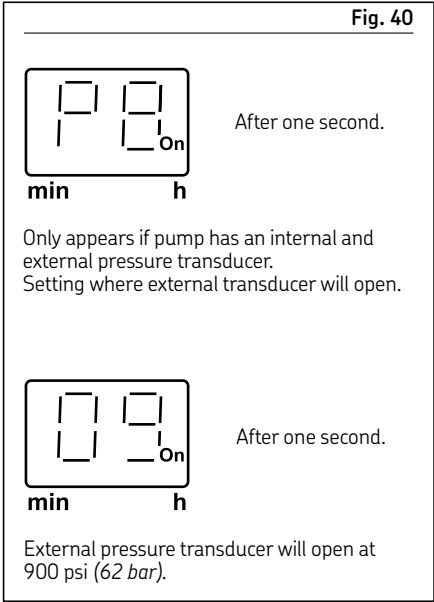
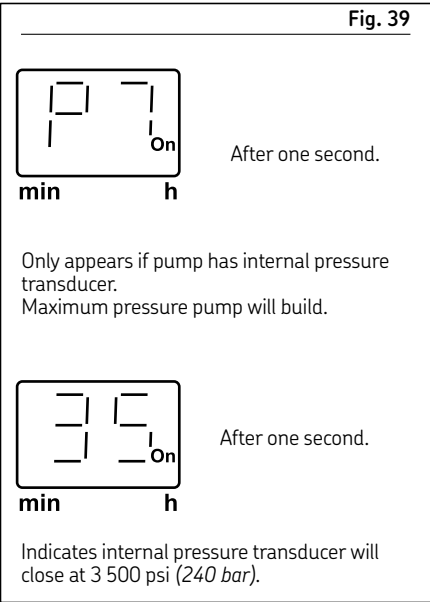
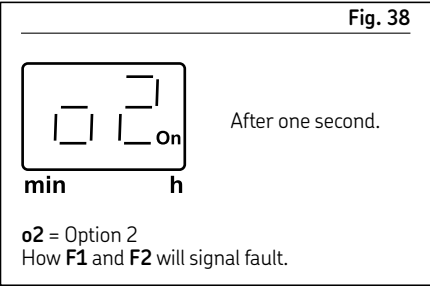
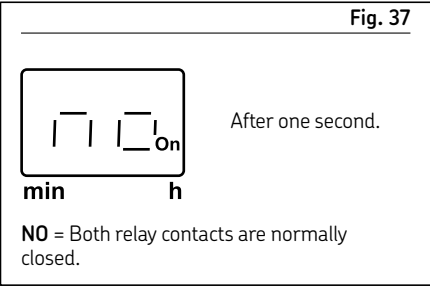
Review of pump parameters



Press button > 2 seconds.

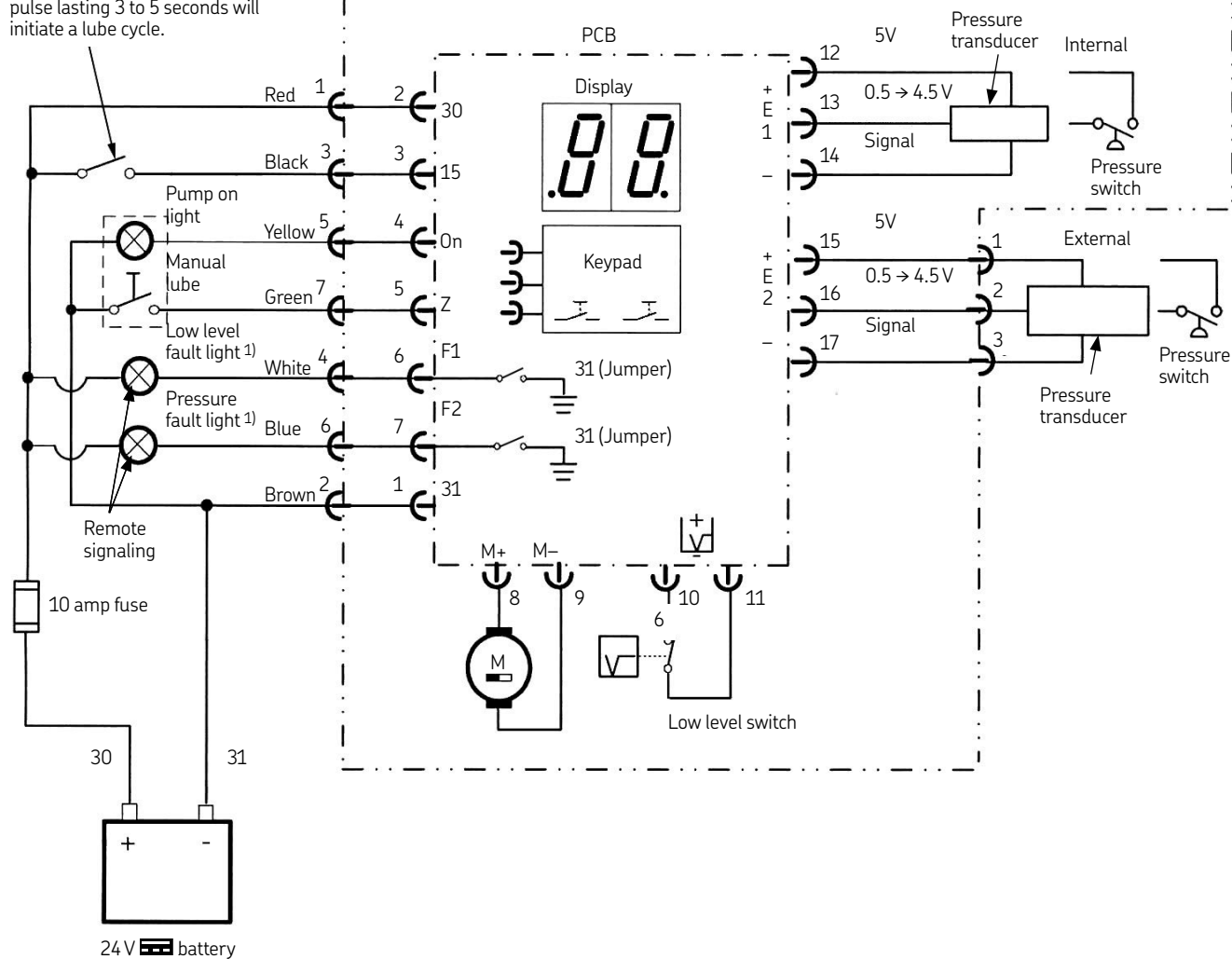


Operating mode



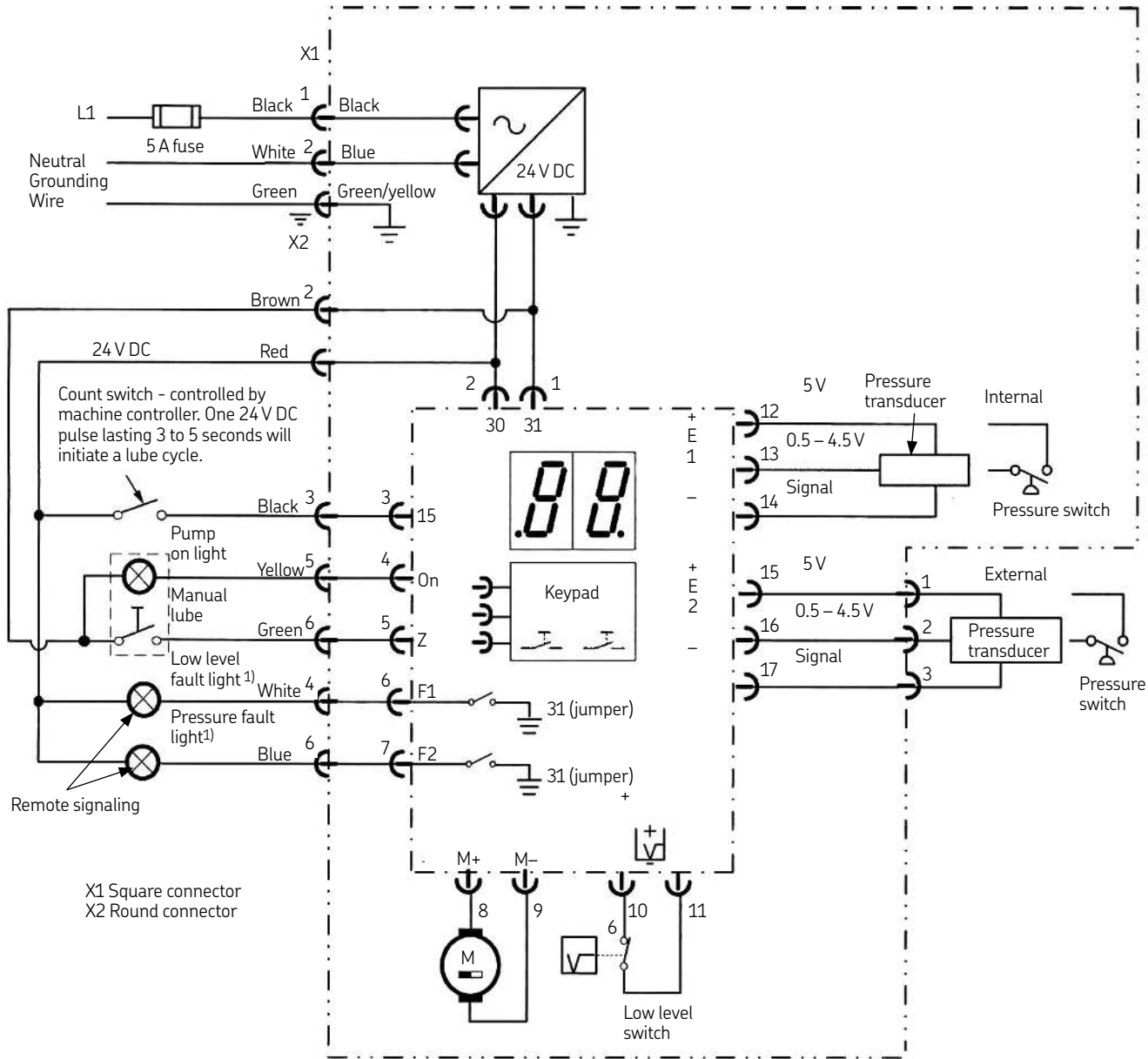
Wiring connections for 24 V P653S pump

Count switch – controlled by machine controller. One 24 V  pulse lasting 3 to 5 seconds will initiate a lube cycle.



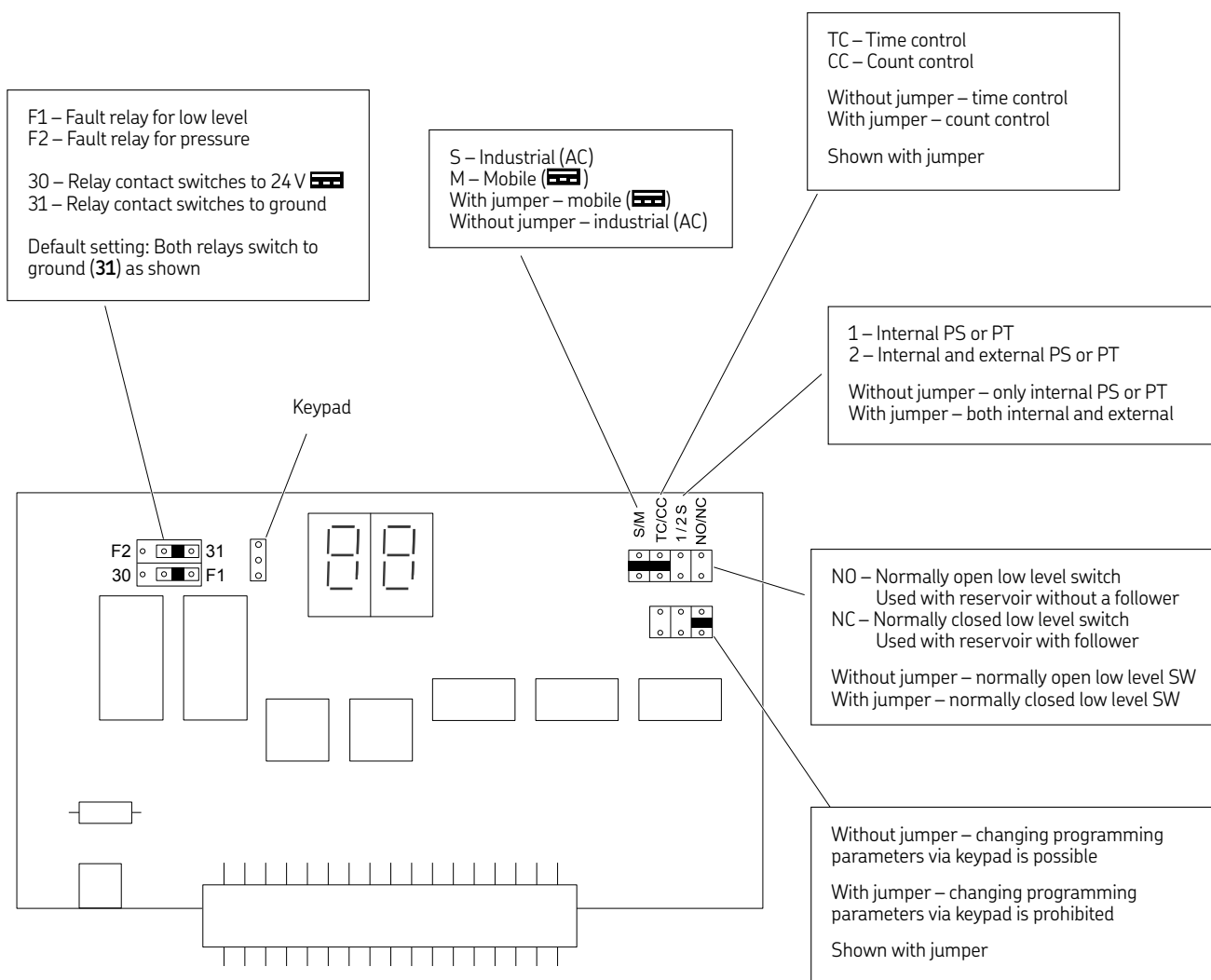
¹⁾ P4 programming parameter set to NC. P5 programming set to option 2.

Wiring connections for 110–230 V AC 50/60 Hz 653 pump

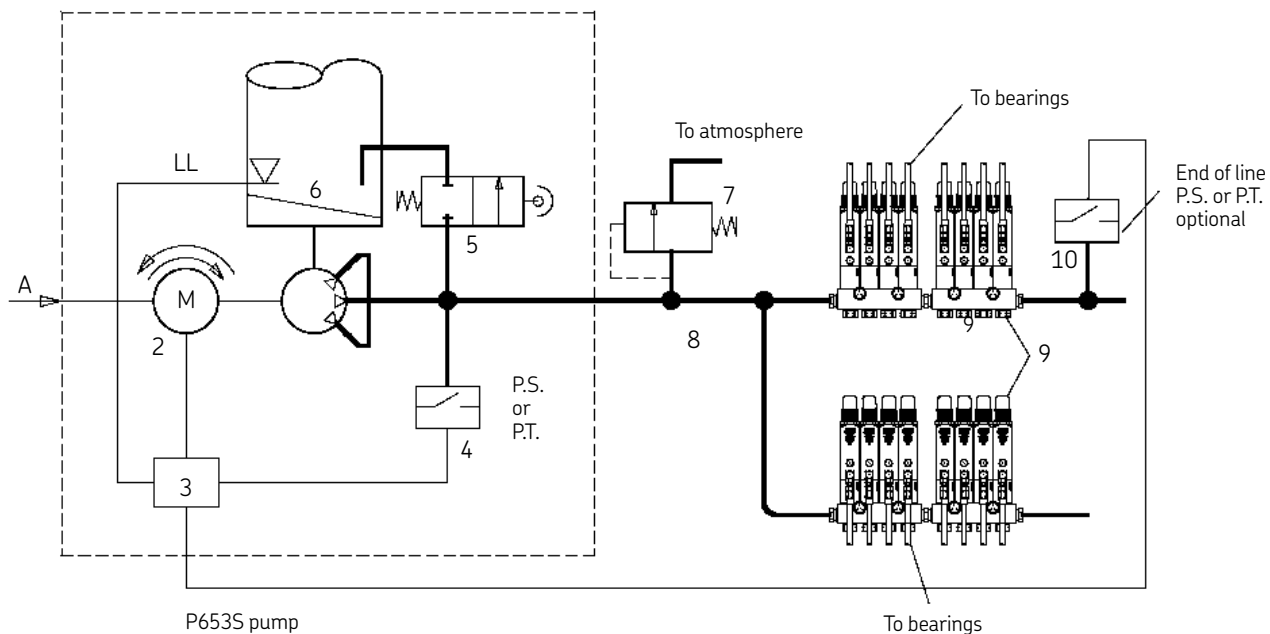


1) P4 programming parameter set to N.C. P5 programming set to option 2.

Jumper settings for P653S pump PCB



Centro-Matic system schematic with P653S pump



Item	Description
1	Pump 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 (345 bar) external
8	High pressure supply line
9	Injectors, SL-V, SL-1 or SL-32, SL-33 and SL-VXL injectors
10	Pressure switch (P.S.) or pressure transducer (P.T.) external optional
A	Power supply (24 V  OR 120 VAC, optional)

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

- below 900 psi (62 bar) for SL-V and SL-VXL type injectors
- below 600 psi (41 bar) for SL-1 type injectors
- below 200 psi (13.8 bar) for SL-32/33 type injectors

Lincoln list of lubricants

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

Proven lubricants (→ **Table 4, Table 5, page 38, and Table 6, page 39**) have been tested by Lincoln with regard to pumpability and venting behavior. Lincoln can recommend them for application up to indicated minimum operating temperature in Centro–Matic lubrication systems. During tests these lubricants did not cause any damage due to incompatibility with material used by Lincoln.

Lubricants Lincoln recommends on basis of manufacturer's data sheet (→ **Table 5, page 38 and Table 6, page 39**) can be used in Lincoln's lubrication systems up to indicated *minimum operating 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

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.

NOTE

Manufacturer of centralized lubrication system is not responsible 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.

NOTE

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

Table 4

Proven lubricants

Manufacturer	Designation	Thickener	Minimum operating temperature	
			°F	°C
Caterpillar	Moly Ultra 5 NLGI 1	Ca–Complex	+10	–12
Caterpillar	Arctic Platinum NLGI 0	Ca–Complex synthetic base oil	–40	–40
Caterpillar	Auto–Lube NLGI 1	Ca–Complex	+10	–12
Fuchs–Lubritech	Stabil Eco EP2	Li/Ca	–13	–25
Fuchs	Gleitmo 585	Li	–40	–40
Fuchs	Renocal FN 745	Ca–12–OH–stearat	–13	–25
Fuchs	Renoral FN3	Ca	–4	–20
Fuchs	Renolit LZR 2 t l	Li	–4	–20
Fuchs	Renolit HLT 2	Li	–13	–25
Mobil	Mobilith SHC100	Li–complex	–13	–25
Shell	Retinax EPL 2	Li–12–OH–stearat	+14	–10
Shell	Retinax CSZ	Li/Ca	–31	–35

Table 5

Lubricant recommendations based on manufacturer's data sheet

Manufacturer	Designation	Thickener	Minimum operating temperature	
			°F	°C
Agip	F1 grease 24	Ca	+5	-15
Aral	Multipurpose grease	Li-12-OH-stearat	+14	-10
Aral	Multipurpose grease ZS 1/2	Li/Ca	-4	-20
Avia	Avialith 2 EP	Li-12-OH-stearat	+5	-15
BP	Energrease LC 2	Li-complex	-49 to +14	-45 to -10
BP	Energrease MP-MG 2	Ca-complex	+23	-5
Castrol/Tribol	MOB Alloy 6780	Li-12-OH-stearat	-22 to -13	-30 to -25
Castrol	CLS – Grease	Li/Ca	-13	-25
Castrol	Olista Longtime 2	Li	-4	-20
Castrol	Optimal Olit 2 EP	Li	-4	-20
DEA	Glissando 20	Li-12-OH-stearat	+5 to +14	-15 to -10
Esso	Ronex Extra Duty 2	Li-complex	+41	+5
Esso	Ronex W2	Li-complex	+23	-5
Esso	Beacon EP2	Li	+23	-5
Esso	Cazar K2	Ca	+5	-15
Fiat Lubrificanti	Comar 2	Li	-13	-25
Klüber	Centoplex 1 DL	Li/Ca	-4	-20
Klüber	Isonex NBU 15	Ba	-13	-25
Klüber	Klüberplex BEM 34-132	Ca-complex	-4	-20
Klüber	Klüberplex BEM 41-141	Li-complex	-13	-25
Klüber	Petamo GHY 133 N	Polycarbamide	+5	-15
Mobil	Mobilgrease XHP 221	Li-complex	+14	-10
Mobil	Mobilgrease XHP 461	Li-complex	+14	-10
Mobil	Mobilgrease XHP 222	Li-complex	+23	-5
Mobil	Mobilith SHC 220	Li-complex	-4	-20
Shell	Alvania EP(LF) I	Li-12-OH-stearat	+5 +/- +9	-15 +/- +5
Shell	Alvania EP(LF) 2	Li-12-OH-stearat	+14 +/- +9	-10 +/- +5
Shell	Alvania RL2	Li-12-OH-stearat	+5 +/- +9	-15 +/- +5
Shell	Melleus GL	Gel	GL205: -4	-20
Shell	Melleus GL	Gel	GL300: +14	-10
Shell	Melleus GL	Gel	GL400: +32	0
Shell	Melleus GL	Gel	G500: +41	+5
Shell	Retinax CS	Li	-4	-20
Shell	Retinax LX 2	Li	23 °F +/- +9	-5 +/- +5
Shell	Retinax HDX2	Li/Ca	+14 +/- +9	-10 +/- +5
Texaco	Premium RB	Li	-4	-20
Total	Ceran AD	Ca-complex	+5	-15
Total	Ceran LT	Ca-complex	-4	-20
Total	Ceran WR2	Ca-complex	+14	-10
Zeller and Gmelin	Divinol Lithogrease G 421	Li-complex	+5	-15

NOTE

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

Table 6

Biodegradable lubricants, proven lubricants**Proven lubricants**

Manufacturer	Designation	Thickener	Minimum operating temperature	
			°F	°C
Aral	Aralub BAB EP 2	Li/Ca	-13	-25
BP	Biogrease EP2	Li/Ca	-13	-25
Fuch-Lubritech	Stabyl ECO EP 2	Li/CA	-13	-25

Lubricant recommendations based on the manufacturer's data sheet

Autol	Top Bio 2000	Ca	-13	-25
Avia	Biogrease 1	Li	Up to +32	Up to 0
DEA	Dolon E 2	Li	+5	-15
Fuchs	Plantogel 2 S	Li/Ca	+5	-15
Klüber	Klüberbio	Polycarbamide	-4	-20

Lubricants for the food and beverage industry

Lubricant recommendations based on the manufacturer's data sheet: Manufacturer designation

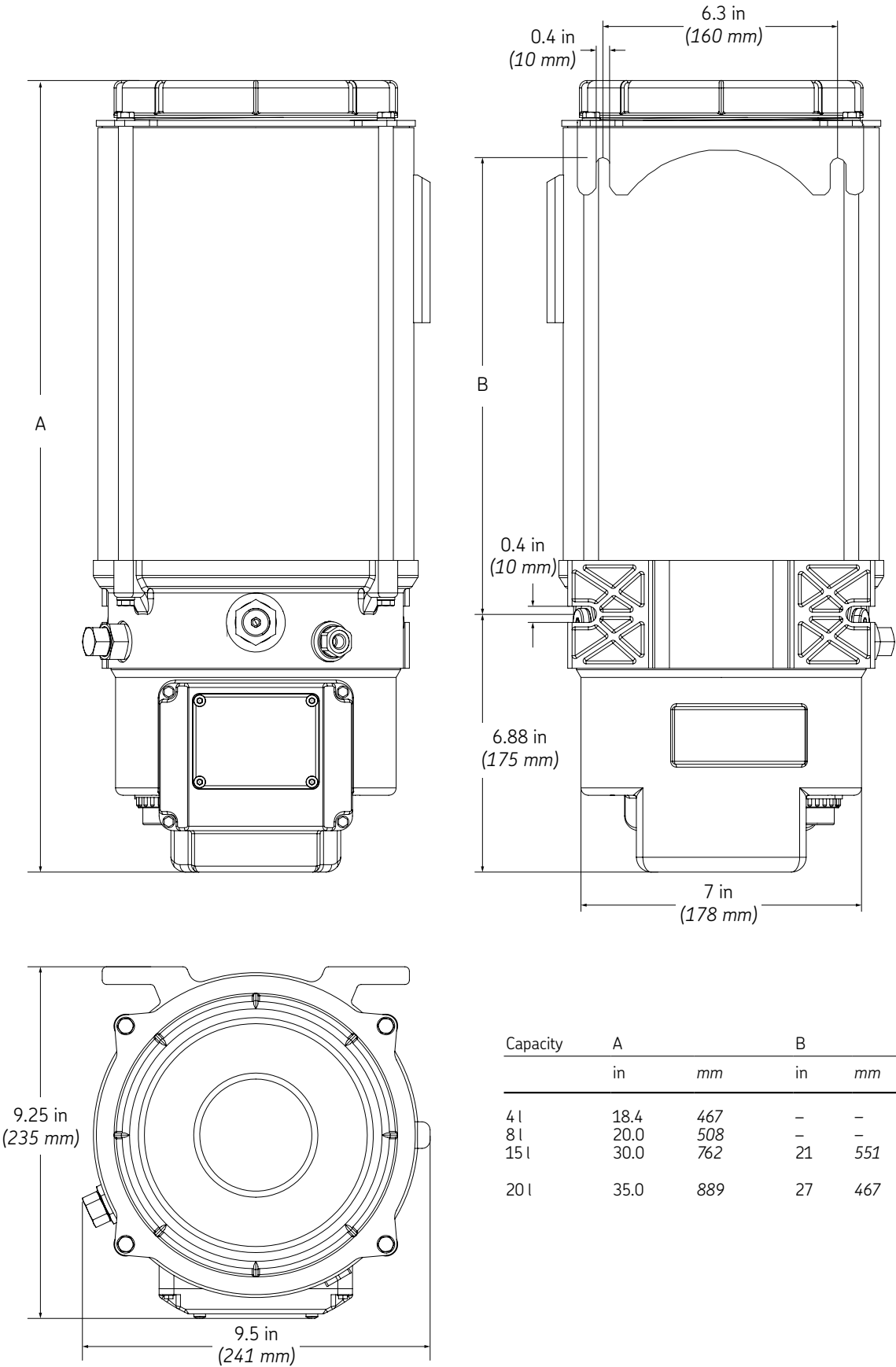
Aral Eural	Grease EPF 2	Al-complex	+5	-15
Bremer and Leguil	Rivolta F.L.G 4-2	Al-complex	-4	-20
Elkalub	GLS 364	Organic thickener	+14	-10
Elkalub	GLS 367/N2	Inorganic thickener	+5	-15
Elkalub	GLS 380/N1	Al-complex	+14	-10
Elkalub	GLS 380/N2	Al-complex	+5	-15
Fuchs	Renolit G 7 FG 1	Bentontie	+5	-15
Fuchs-Lubritech	Gleitmo 585 M (KTW-drinking water release)	Li	+14	-10
Interflon	Fin Food Grease EP	Al-complex	+5	-15
Klüber	Paraliq GA 343	Al-complex	+14	-10
Klüber	Klübersynth UH1 14-151	Al-complex	-4	-20
Mobil	Mobilgrease FM 462	Al-complex	+5	-15
Nordischer Maschinenbau Baader	Special grease GLS 380/N3	Al-complex	+5	-15
Oks	470	Li-12-OH-stearat	+5	-15
Optimol	Obeen UF 1	Al-complex	+5	-15
Optimol	Obeen UF 2	Al-complex	+14	-10
Rhenus Norplex	AFD 2	Al-complex	+5	-15
Rhenus Norplex	AFP 2	Al-complex	+5	-15
Rhenus Norplex	AFS 2	Al-complex	-13	-25
Rhenus Norplex	AFW 2	Al-complex	+5	-15
Shell	Cassida grease EPS 1	Al-complex	+5	-15
Shell	Cassida grease EPS 2	Al-complex	+14	-10
Total	Lubriplate FGL 2	Al-complex	+5	-15
Tribol Molub-Alloy	FoodProof 823-2 FM	Al-complex	+5	-15
Tribol Molub-Alloy	9830 high-temperatures grease	PTFE	+32	0

NOTE

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

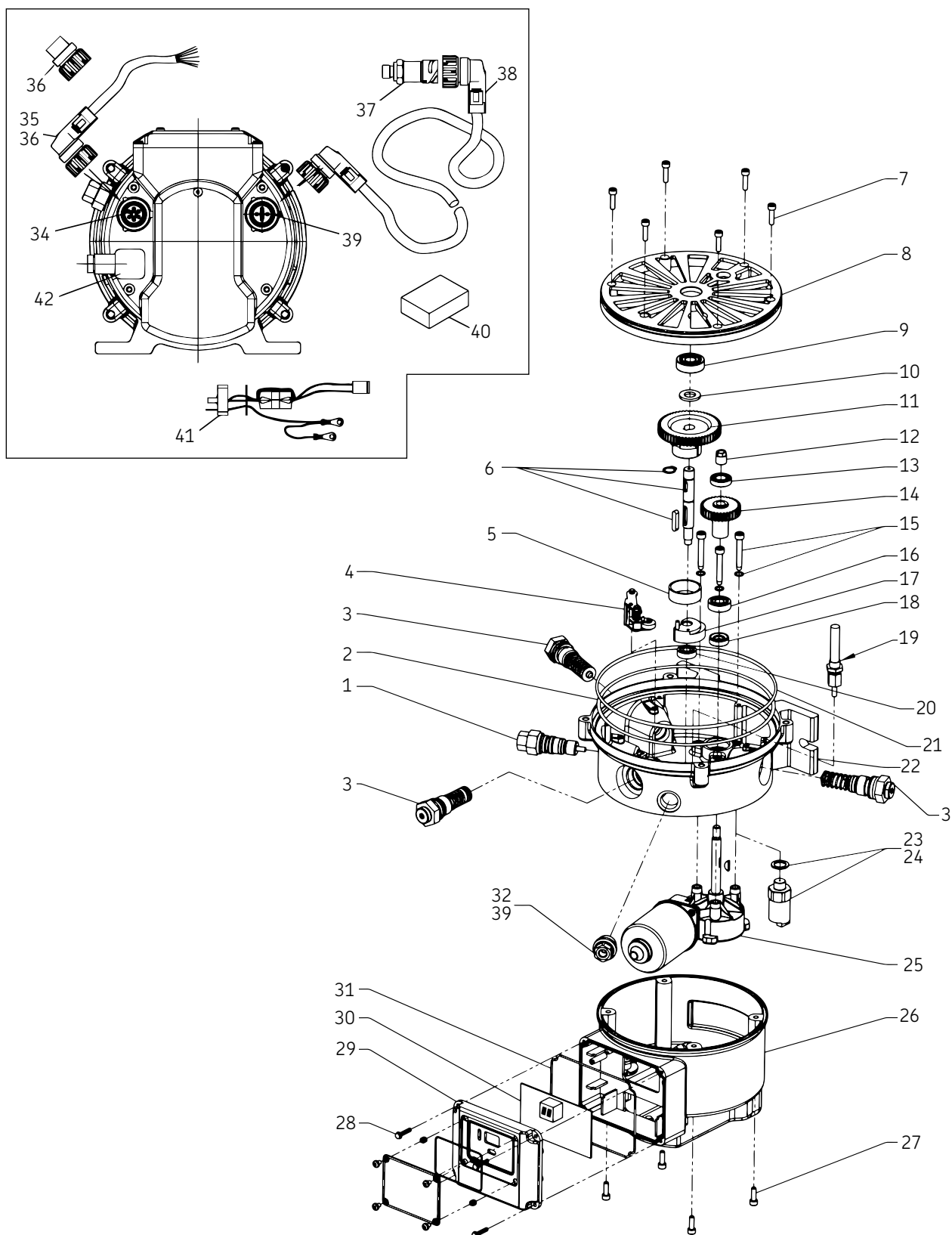
Fig. 43

Dimensions P653S

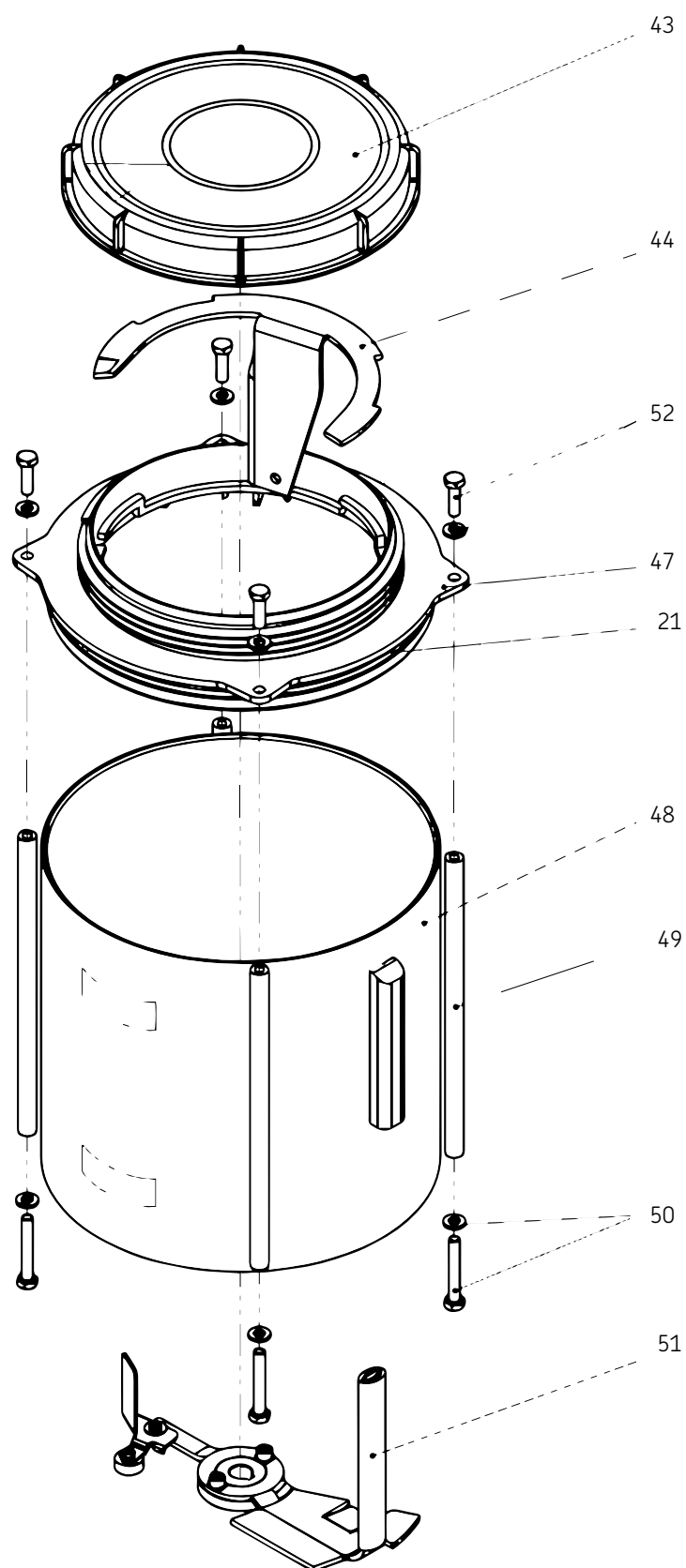


Capacity	A		B	
	in	mm	in	mm
4 l	18.4	467	–	–
8 l	20.0	508	–	–
15 l	30.0	762	21	551
20 l	35.0	889	27	467

Pump housing



Pump reservoir



Service parts

Item	Description	Part number	Qty.	Item	Description	Part number	Qty.
1	Relief element	545-33042-1	1	42	AC power cable plug	236-13277-9	1
2	O-ring, 72 nbr 195.00 × 3.00	219-10390-3	1	43	Cover, reservoir	544-33452-1	1
3	Pump element, Z7 service kit	645-77196-1	3	44	Fixed paddle	444-70490-1	1
4	Rocker arm, assembly, relief unit	545-32906-1	1	45	Support bracket ⁴⁾	445-71531-1	1
5	Press ring	444-24439-1	1	46	Screw, hex, 8.8 M6 × 20C	200-13022-7	4
6	Shaft F drive with retaining ring and key	445-71266-1	1	47	Insert, reservoir	445-71532-1	1
7	Screw, sock, hex. 8.8 M 5 × 20C	201-12016-8	6	48	Reservoir, 4 l w/vent tube and labels	545-33045-1	1
8	Intermediate bottom	545-33355-1*	1		Reservoir, 8 l w/vent tube and labels	545-33044-1	1
9	Bearing D 12/24 × 6	250-10683-1	1		Reservoir, 15 l w/vent tube and labels ³⁾	545-33041-1	1
10	Washer st 12 C -200HV	209-13011-9	1		Reservoir, 20 l w/vent tube and labels ³⁾	545-33043-1	1
11	Gear, eccentric	275558	1	49	Support sleeve, 4 l reservoir	445-71543-1	4
12	Threaded sleeve	445-71527-1	1		Support sleeve, 8 l reservoir	445-71542-1	4
13	Bearing, D 12/32 × 10	250-14064-6	1		Support sleeve, 15 l reservoir ²⁾	445-71528-1	4
14	Pinion gear, drive	275557	1		Support sleeve, 20 l reservoir ²⁾	445-71536-1	4
15	Screw, 6.0 × 40 z with seal 220-14101-1	206-13710-6	3	50	Screw, hex, 8.8 M6 × 40C	200-12000-3	4
16	Bearing D 10/26 × 8	250-14009-7	1	51	Stirring paddle assembly	545-33093-1	1
17	Cam, relief unit	545-33367-1	1	52	Screw, hex, 8.8 M6 × 20C	200-13022-7	1
18	Seal, radial BA 75FKM 10 × 22 × 7	220-12231-3	1		Protective cover kit ⁴⁾	545-34361-6	1
19	Proximity switch	234-10423-6	1		Valve svt-400-R 1/4 + nip. S2520-1/4 l bag ⁴⁾	624-77150-1	1
20	Bearing D 8/22 × 7	250-14064-7	1		Horizontal mounting bracket ⁴⁾	271249	1
21	O-ring 72 nbr 180.00 × 4.00	219-10684-6	1		Adapter S2520-1/4-1/4-25 ⁴⁾	226-14105-5	1
22	Housing	316-16343-1*	1				
23	Pressure switch with seal ring	234-10723-8	1				
	Sealing ring	209-12158-6	1				
24	Pressure transducer w/seal ring	234-10663-6	1				
25	Motor, drive 24 V 	2450-00000007*	1				
26	Cover, housing	275666	1				
27	Screw, sock, hex. 8.8 M 5 × 16C	201-12016-6	4				
28	Screw with washer	206-13796-9	4				
29	Housing front cover with sealed keyboard	545-33602-1	1				
30	Printed circuit board 24 V  ¹⁾	236-10655-6	1				
31	Profile packing	545-33596-1	1				
32	Adapter	278093	1				
33	Plastic plug	278317	1				
34	Connector for signal cable 7 poles (AC pump)	664-34569-1	1				
	Connector for signal cable 7 poles ( pump)	664-34303-7	1				
35	Cable assembly, 13.1 ft (4 m), 7/7 pole	664-34841-1	1				
36	Plug, 7 pole jumper	664-34550-1	1				
37	External pressure switch	234-10825-4	1				
38	Cable assembly, 33 ft (10 m) 4/4 pole (shielded)	664-34741-7	1				
39	Connector for external pressure switch/ transducer	664-34550-6	1				
40	Power supply	275906	1				
41	Internal cable for AC pump	664-34569-2	1				

¹⁾ When replacing printed circuit board 236-10655-6, pay attention 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.

²⁾ Components available in kit to convert 4 and 8 liter to 15 liter – part number 276764.

³⁾ Components available in kit to convert 4 and 8 liter to 20 liter – part number 276765.

⁴⁾ Not shown.

* Indicates change.

Troubleshooting

Mode of failure	Solution
Pump motor does not run. No green right corner segment lit on display (→ Fig. 18, page 21).	Check power supply and fuses.
Pump does not deliver lubricant but runs if manual lube switch (3) (→ Fig. 14, page 21) is pushed. No green left corner segment lit on display (→ Fig. 19, page 21).	Check count switch for 24 V  pulse.
LL display is flashing. Reservoir is almost empty.	Refill reservoir and push switch (3) (→ Fig. 14, page 21) to initiate manual lube cycle.
E1 display is flashing. Pump failed to develop internal pressure in 12 minutes.	Push switch (2) (→ Fig. 14, page 21) to acknowledge fault. Initiate manual 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 end of line (pump with external pressure switch or pressure transducer).	Push switch (2) (→ Fig. 14, page 21) to acknowledge fault. Initiate manual lube cycle. Investigate and correct possible causes – air pockets in lubrication line, connections leakage, grease consistency changed with low temperatures, failed end of line pressure switch or pressure transducer.
E3 display is flashing. Pump failed to vent at pump.	Push switch (2) (→ Fig. 14, page 21) to acknowledge fault. Initiate manual lube cycle. Investigate and correct possible causes – pump eccentric did not stop in proper position, vent valve failed.
E4 display is flashing. Pump failed to vent at end of the line (pump with external pressure switch or pressure transducer).	Push switch (2) (→ Fig. 14, page 21) to acknowledge fault. Initiate manual 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 (11) (→ Fig. 1, page 11).	Check and adjust setting of pressure transducer or failed pressure switch.

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

® SKF, Lincoln and Centro-Matic are registered trademarks of the SKF Group.

© SKF Group 2024
The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless prior written permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.
August 2024 · Form 404408 Version 7