

Lubrication pump P653M for multi-line lubrication systems

Installation instructions
following machinery directive 2006/42/EC

EN



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2019/04/24



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

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

Designation: Electrically driven pump to supply lubricant during intermittent operation within a centralized lubrication system
 Type: P653M
 Part number: 645-xxxxx-x
 Year of construction: See type identification plate

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

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

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

Furthermore, the following directives and standards were applied:

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

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

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

Walldorf, February 24, 2016

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Training courses

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

Copyright

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Warranty

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

Disclaimer

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

- non appropriate use
faulty assembly, operation, setting, maintenance, repair, negligence or accidents
- use of inappropriate lubricants
- improper or late response to malfunctions
- unauthorized modifications of the product
- the use of non-original
SKF spare parts

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

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Explanation of symbols, signs and abbreviations

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

	General warning		Dangerous electrical voltage		Risk of falling		Hot surfaces
	Unintentional intake		Crushing hazard		Pressure injection		Suspended load
	Electrostatically sensitive components						
	Wear personal protective equipment (goggles)		Wear personal protective equipment (face shield)		Wear personal protective equipment (gloves)		Wear personal protective equipment (protective clothes)
	Wear personal protective equipment (safety shoes)		Release the product.		General obligation		
	Keep unauthorized persons away.		Protective earth		Safety extra-low voltage (SELV)		Safe galvanic isolation (SELV)
	CE marking		Disposal, recycling		Disposal of waste electrical and electronic equipment		

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

Abbreviations and conversion factors

re.	regarding	°C	degrees Celsius	°F	degrees Fahrenheit
approx.	approximately	K	Kelvin	Oz.	Ounce
i.e.	that is	N	Newton	fl. oz.	fluid ounce
etc.	et cetera	h	hour	in.	inch
poss.	possibly	s	second	psi	pounds per square inch
if appl.	if applicable	d	day	sq.in.	square inch
a.a.r.	as a rule	Nm	Newtonmeter	cu. in.	cubic inch
incl.	including	ml	millilitre	mph	miles per hour
min.	minimum	ml/d	millilitre per day	rpm	revolutions per minute
max.	maximum	cc	cubic centimetre	gal.	gallon
min.	minute	mm	millimetre	lb.	pound
etc.	et cetera	l	litre	hp	horse power
e.g.	for example	dB (A)	Sound pressure level	kp	kilopound
kW	kilowatt	>	greater than	fpsec	feet per second
U	Voltage	<	less than	Conversion factors	
R	resistance	±	plus/minus	Length	1 mm = 0.03937 in.
I	current	∅	diameter	Area	1 cm ² = 0.155 sq.in
V	volt	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
W	watt	rh	relative humidity		1 l = 2.11416 pints (US)
AC	alternating current	≈	about	Mass	1 kg = 2.205 lbs
DC	direct current	=	equal to		1 g = 0.03527 oz.
A	ampere	%	per cent	Density	1 kg/cc = 8.3454 lb./gal(US)
Ah	Ampere hour	‰	per mille		1 kg/cc = 0.03613 lb./cu.in.
Hz	Frequency [Hertz]	≥	greater than	Force	1 N = 0.10197 kp
nc	normally closed	≤	less than	Pressure	1 bar = 14.5 psi
no	normally open contact	mm ²	square millimetre	Temperature	°C = (°F-32) x 5/9
OR	logical OR	rpm ⁻¹	revolutions per minute	Output	1 kW = 1.34109 hp
&	logical AND			Acceleration	1 m/s ² = 3.28084 ft./s ²
				Speed	1 m/s = 3.28084 fpsec.
					1 m/s = 2.23694 mph

1. Safety instructions

1.1 General safety instructions

- The owner must ensure that safety information has been read by any persons entrusted with works on the product or by those persons who supervise or instruct the before-mentioned group of persons. In addition, the owner must also ensure that the relevant personnel are fully familiar with and have understood the contents of the Instructions. It is prohibited to commission or operate the product prior to reading the Instructions.
- These Instructions must be kept for further use.
- The described products were manufactured according to the state of the art. Risks may, however, arise from a usage not according to the intended purpose and may result in harm to persons or damage to material assets.
- Any malfunctions which may affect safety must be remedied immediately. In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.

1.2 General behaviour when handling the product

- The product may be used only in awareness of the potential dangers, in proper technical condition, and according to the information in these instructions.
- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/ operation must be clarified. Operation is prohibited until issues have been clarified.
- Unauthorized persons must be kept away.
- Precautionary operational measures and instructions for the respective work must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Safety-related protective and emergency devices must not be removed, modified or affected otherwise in their function and are to be checked at regular intervals for completeness and function.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Remedy occurring faults in the frame of responsibilities. Immediately inform your superior in the case of faults beyond your competence.
- Wear personal protective equipment.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

1.3 Intended use

Supply of lubricants within the specifications, technical data and limits stated in these Instructions:

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

1.4 Foreseeable misuse

Any usage differing from the one stated in these Instructions is strictly prohibited. It is expressly forbidden to be used:

- outside the indicated operating temperature range
 - with non-specified means of operation
 - without adequate pressure relief valve
 - in continuous operation
 - in areas with aggressive or corrosive materials (e.g. high ozone pollution). These may affect seals and painting.
 - in areas with harmful radiation (e. g. ionising radiation)
- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) and marked with GHS01 - GHS06 and GHS08 hazard pictograms.
 - to feed, forward, or store gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at the maximum permissible operating temperature.
 - in an explosion protection zone.

1.5 Painting of plastic parts

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

1.6 Notes related to the CE marking

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

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

Reference on Low Voltage Directive 2014/35/EU

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

Reference on Pressure Equipment Directive 2014/68/EU

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

1.7 Modifications of the product

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

1.8 Prohibition of certain activities

Due to potential sources of faults that may not be visible the following activities may be carried out by trained and authorized specialists only:

- Repairs or changes to the drive and to the power supply board
- Replacement of or changes on the pistons of the pump elements

1.9 Inspections prior to delivery

The following inspections were carried out prior to delivery:

- Safety and functional tests
- Electrical inspections following DIN EN 60204-1:2007 / VDE 0113-1:2007 (for electrically driven products).

1.10 Other applicable documents

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

- Operational instructions and approval rules
- Safety data sheet of the lubricant used

Where appropriate:

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

1.11 Markings on the product



Warning of unintended intake by the stirring paddle with the reservoir lid being open

1.12 Notes related to the type identification plate

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

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

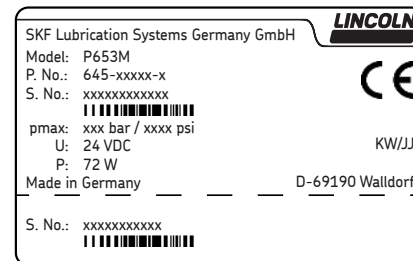
Model:

P. No.

S. No. _____

(CW/YY)

Calendar week/year of construction



1.13 Persons authorized to operate the pump

1.13.1 Operator

A person who is qualified by training, knowledge and experience to carry out the functions and activities related to normal operation. This includes avoiding possible hazards that may arise during operation.

1.13.2 Specialist in mechanics

Person with appropriate professional education, knowledge and experience to detect and avoid the hazards that may arise during transport, installation, start-up, operation, maintenance, repair and disassembly.

1.13.3 Specialist in electrics

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

1.14 Briefing of external technicians

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

1.15 Provision of personal protective equipment

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

1.16 Operation

The following must be observed during commissioning and operation.

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

1.17 Emergency stopping of the pump station

In case of an emergency stop the pump station by:

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

1.18 Transport, installation, maintenance, malfunctions, repair, shutdown, disposal.

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

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

1.19 Initial commissioning, daily start-up

Ensure that:

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

1.20 Cleaning

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

1.21 Residual risks

Residual risk	Possible in life cycle							Prevention/ remedy		
Personal injury/ material damage due to falling of raised parts	A	B	C			G	H	K	Keep unauthorized persons away. No people may remain under suspended loads. Lift parts with adequate lifting devices.	
Personal injury/ material damage due to tilting or falling of the product because of non-observance of the stated tightening torques		B	C			G			Observe the specified tightening torques. Fix the product only to components with sufficient load capacity. If no tightening torques are stated, apply tightening torques according to the screw size characteristics for 8.8 screws.	
Personal injury/ material damage due to electric shock in case of damage to the connection cable		B	C	D	E	F	G	H	Check the connection cable with regard to damages before the first usage and then at regular intervals. Do not mount cable to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.	
Personal injury/ damage to material due to spilled or leaked lubricant		B	C	D		F	G	H	K	Be careful when filling the reservoir and when connecting or disconnecting lubricant feed lines. Always use suitable hydraulic screw connections and lubrication lines for the stated pressures. Do not mount lubrication lines to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.
Life cycles: A = transport, B = installation, C = initial start-up, D = operation, E = cleaning, F = maintenance, G = fault, repair, H = shutdown, K = Disposal										

2. Lubricants

2.1 General information

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

The most important requirements for lubricants are:

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

2.2 Selection of lubricants

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

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

Should you have little or no experience with the selection of lubricants for centralized lubrication systems, please contact SKF. If required we will be glad to support customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

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

2.3 Material compatibility

Lubricants must generally be compatible with the following materials:

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

2.4 Temperature characteristics

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

2.5 Ageing of lubricants

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

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

It is possible for lubricants to be tested in the company's laboratory for their suitability for being pumped in centralized lubrication systems (e.g. "bleeding").

Please contact SKF if you have further questions regarding lubricants.

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



Only lubricants specified for the product may be used. Unsuitable lubricants may lead to a failure of the product.



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



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



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

3. Overview, functional description

1 reservoir

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

1.1 Reservoir venting device

It provides air for the reservoir while the pump is operating and supplying lubricant. It vents the reservoir while the pump is filled via the filler fitting.

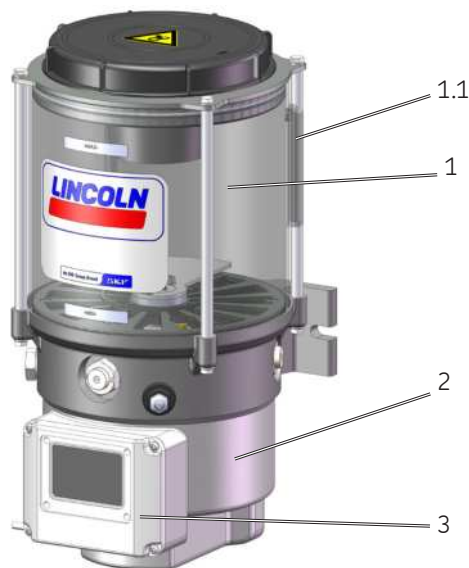
2. Pump housing

The pump housing accommodates the motor, the electrical connections, the pump elements and the return line connection.

3. Housing front cover

If service is required, the housing front cover provides access to the inside electrical components.

Overview Fig. 1



4. Pump elements

The pump can be operated with up to 3 pump elements,

5. Filler fitting

It serves to fill the reservoir via a suitable filler pump with a corresponding connection.

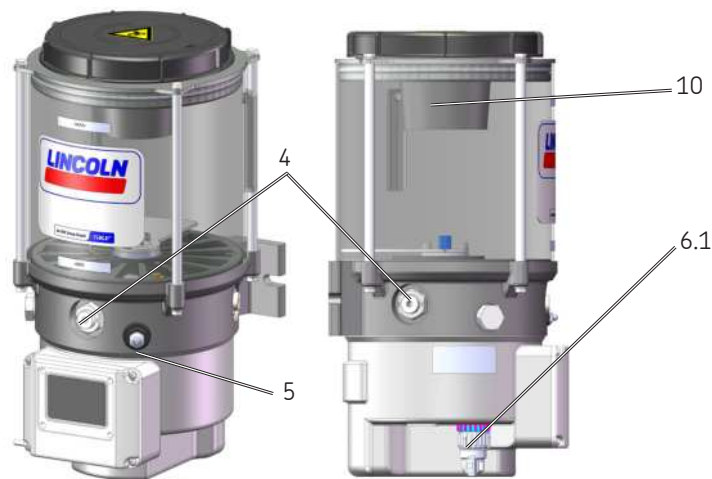
6. Electrical connection

It serves for (6.1) signal connection and for power supply connection.

10 Strainer

The strainer insert in the reservoir prevents larger dirt particles from entering the reservoir when filling with lubricant.

Overview Fig. 2



4. Technical data

4.1 Mechanics

P653M

Admissible operating temperature range of the pump

-40 °C to +70 °C



The indicated operating temperature range of the pump presupposes the suitability of the lubricant used for the respective actually existing operating temperature. Using an unsuitable lubricant may result in malfunctions and even in a downtime of the lubrication system. Failure caused by lubricant may occur temporarily, e. g. if the application temperature stated for the lubricant for lubrication systems is exceeded or is not reached.

Lubricants

Lubrication oils of at least 40 mm²/s (cST) at operating temperature

Admissible operating pressure

300 bar max.

Installation position

vertical, i. e. reservoir on top, deviation max 5 °

Filling

reservoir lid, filler fitting or filling connection (optional)

Number of pump elements

max. 3

Number of outlets (R1/4")

1

Sound pressure level

< 70 dB (A)

Weight of the empty pump

8 kg

Reservoir size (nominal volume)

4 l

4.2 Protection classes and IP types of protection

Type of plug

Bayonet plug

Specified protection class min.

Protection class 3 

Plug and mounted cable

IP6K9K

Plug with moulded cable

IP6K9K

4.3 Nominal output volumes

Pump element	Z7
Nominal output	24,6 cm ³ /min

4.4 Tightening torques

The stated tightening torques must be adhered to.

Pump with supporting construction provided by the customer	25 Nm ± 1.0 Nm
Pump element with pump housing	40 Nm ± 2.0 Nm
Pressure control valve with pump element	08 Nm + 0.8 Nm
Housing front cover with pump housing	2.5 Nm + 0.1 Nm

4.5 Electrics:

Input

Rated voltage/ operating voltage range	24 V DC
Current consumption	2.4 A maximum
Leakage current	< 1 mA
Specified back-up fuse	max. 6 A characteristic B

Output

Output voltage	24 V DC $\pm$ 2 % (PELV)
Output current limit	4 A

4.5.1 Motor

Operating voltage	24 V DC
Max. admissible run time	30 min (with subsequent minimum pause time of 1 hour)

4.5.2 Magnetic float switch

Switching voltage	max. 24 V DC
Switching current	max. 100 mA
Switching capacity	max. 2.4 W

4.6 Processing of the low-level signal in case of external controller and monitoring of the pump

4.6.1 Visualization of a low-level indication

The low-level signal is visualized as shown in the connection diagram in chapter 13. Electrical connections / wiring diagram

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

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

5. Delivery, returns, and storage

5.1 Delivery

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

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

5.2 Returns

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

Protect the product against mechanical influences such as impacts. There are no restrictions for land, sea or air transport. Mark returns on the packaging as follows.



5.3 Storage

SKF products are subject to the following storage conditions:

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



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

5.4 Storage temperature range

- In case of parts not primed with lubricant the admissible storage temperature range corresponds to that of the operating temperature of the pump (see Technical data).

6. Installation

6.1 General information

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

During assembly pay attention to the following:

- Other units must not be damaged by the assembly.
- The product must not be installed within the range of moving parts.
- The product must be installed at an adequate distance from sources of heat and coldness.
- Observe the product's IP type of protection.
- Adhere to safety distances and legal prescriptions on assembly and prevention of accidents.
- Possibly existing visual monitoring devices, e.g. pressure gauges, MIN/MAX markings or piston detectors, must be clearly visible.
- Observe prescriptions in the Technical data (chapter 4) regarding the installation position.

6.2 Place of installation

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

6.3 Mechanical connection

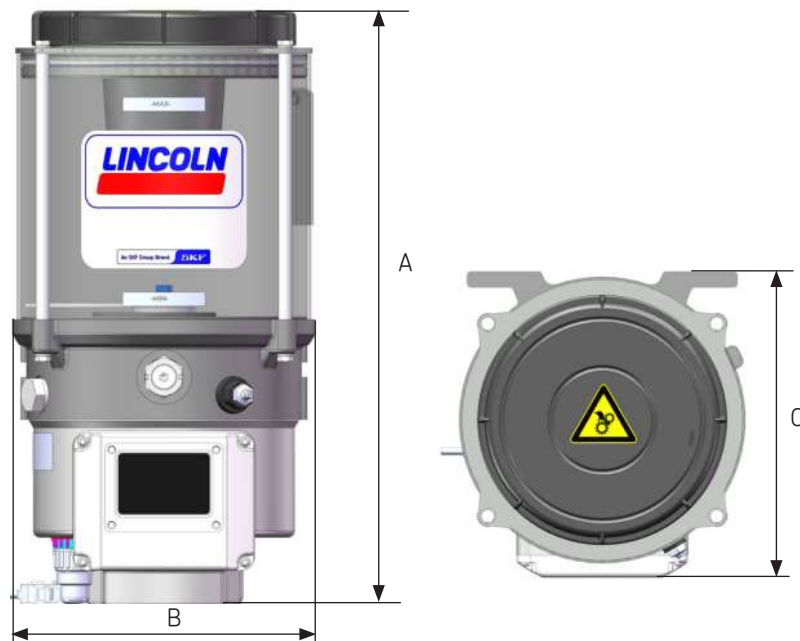
6.3.1 Minimum assembly dimensions

Ensure sufficient space for maintenance or repair work or for assembly of further components of the centralized lubrication system by leaving a free space of at least 100 mm into each direction in addition to the stated dimensions.

Minimum installation dimensions in mm

	4 l				
A	439				
B	220				
C	278				

Minimum assembly dimensions Fig. 3



6.3.2 Installation bores

Pumps with 4 l reservoirs:

Are fastened at the two mounting points (14).

NOTICE

Risk of damage to the superior machine and to the pump

Drill the mounting bores on non-load-bearing parts of the superior machine only.

Fastening must not be done on two parts moving against one another (e. g. machine bed and machine assembly).

Mounting bores in mm					
	4 l				
A	11				
B	180				
C	177.5				

Fastening is done by means of:

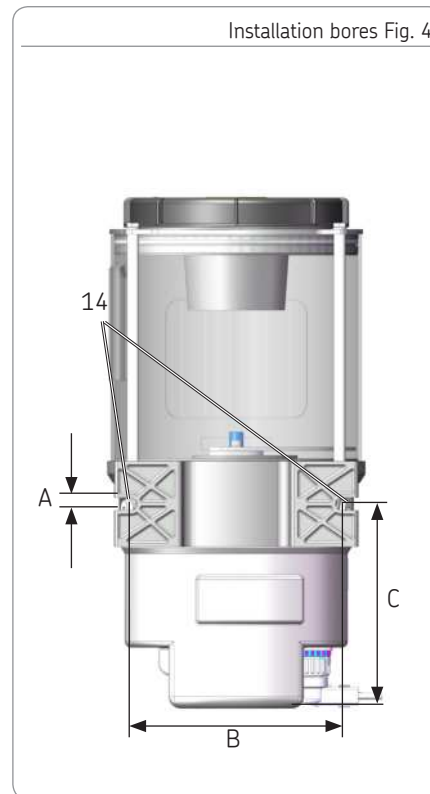
2 screws M10 (8.8)

2 hexagon nuts M10 (8.8)

2 washers 10C

Tightening torque = 25 Nm $\pm$ 1 Nm

Installation bores Fig. 4



6.4 Electrical connection



WARNING



Electric shock

Make sure to disconnect the product from the power supply before carrying out any works on electrical components.

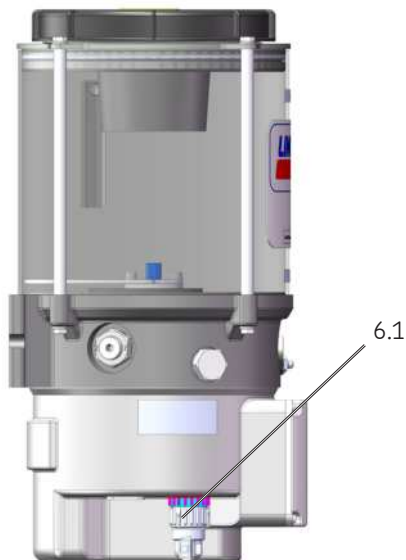


Connect the cables in such way that no mechanical forces are transferred to the product.

For connection proceed as follows:

- Connect the plug (6.1) for the voltage supply and the signal connection.

Electrical connection, Fig. 5



6.5 Lubrication line connection

	 CAUTION Risk of falling Exercise care when dealing with lubricants. Immediately absorb and remove any leaked lubricant.
---	---



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

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

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



Protect the centralized lubrication system against too high pressure by means of a suitable pressure relief valve.

Observe the following installation instructions for safe and smooth operation.

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

6.5.1 Filling via filler fitting

- Place filling connection of the filler pump onto filler fitting R1/4 (5).
- Switch on filler pump and fill reservoir with lubricant until shortly below the MAX marking.
- Switch the filler pump off and remove it from the filler fitting (5) of the pump.

Filling via filler fitting Fig. 6



6.5.2 Filling via the reservoir lid



WARNING



Crushing hazard
on the rotating stirring paddle. Filling via the reservoir lid is allowed only after disconnecting the pump from the power supply by removing it from the connection (6.2).

- Unscrew the reservoir lid (1.2) anticlockwise from the reservoir. Deposit the reservoir lid at a clean place. The reservoir lid and the strainer must not be contaminated. Remove possible contaminations.
- Fill the reservoir from the top up to the MAX marking.
- Reinstall the reservoir lid (1.2) clockwise.

Filling via the reservoir lid Fig. 7



7. Initial start-up

In order to warrant safety and function, a person assigned by the operator must carry out the following inspections. Remedy detected defects before the initial start-up. Deficiencies may be remedied by an authorized and qualified specialist only.

Start-up check list		
7.1 Inspections prior to initial start-up	YES	NO
Electrical connection carried out correctly.	☐	☐
Mechanical connections carried out correctly	☐	☐
Pump filled with the planned lubricant	☐	☐
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data.	☐	☐
All components, such as lubrication lines and metering devices, have been correctly installed.	☐	☐
Product protected with adequate pressure relief valve	☐	☐
No visible damage, contamination and corrosion	☐	☐
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function	☐	☐
Earth strap fully present, properly connected and electrically conductive	☐	☐
7.2 Inspections during initial start-up		
No unusual noises, vibrations, accumulation of moisture, or odours present	☐	☐
No unwanted escape of lubricant from connections	☐	☐
Bearings and friction points to be lubricated are provided with the planned amount of lubricant.	☐	☐

8. Operation

SKF products operate automatically to the greatest possible extent.

Basically, activities during standard operation are limited to the control of the filling level and the timely refilling of lubricant as well as the outside cleaning of the product in case of contamination.

Furthermore it is possible to query the adjusted parameters in the query mode.

8.1 Refill lubricant

Description see corresponding chapter.

9. Cleaning

	 WARNING
	Electric shock Carry out cleaning works only on depressurized products that have been disconnected from the power supply. Do not touch cables or electrical components with wet or damp hands. Use steam-jet cleaners or high-pressure cleaners only in accordance with the IP protection class of the pump. Otherwise electrical components may be damaged. Cleaning execution, required personal protective equipment, cleaning agents and devices following the valid operational regulations of the operator.

9.1 Cleaning agents

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



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

9.2 Exterior cleaning



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

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

9.3 Interior cleaning

Normally, interior cleaning is not required. Should incorrect or contaminated lubricant have been filled, inside cleaning of the product will be required. To do so, contact the SKF Customer Service.

10. Repairs



WARNING



Risk of injury

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



- Keep unauthorized persons away.

- Mark and secure work area.

- Depressurize the product.



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

- Verify that no power is being applied

- Earth and short-circuit the product.

- Where needed, cover neighbouring units that are live.



The work described should possibly be done at room temperature. At low temperatures the work may be subject to restrictions.

10.1 Replace pump element and pressure control valve



The characteristics of the new pump element must correspond to the characteristics of the pump element to be replaced (see spare parts).

To replace the pump element, proceed as follows:

- Unscrew the defective pump element (4) at its hexagon out of the pump housing together with the pressure control valve (11).
- Screw the new pump element (4) into the pump housing together with a new gasket.

Tightening torque = 40 Nm $\pm$ 2.0 Nm

- Then screw a new pressure relief valve (9) into the pump element.

Tightening torque = 8 Nm + 0.8 Nm

Replace pump element Fig. 8



11. Shutdown and disposal

11.1 Temporary shutdown

Temporarily shut the system down by:

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

11.2 Final shutdown and disassembly

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

11.3 Disposal

Countries within the European Union

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



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

Dispose of or recycle electrical components following WEEE directive 2012/19/EU.



Parts made of plastic or metal can be disposed of with the commercial waste.



Countries outside the European Union

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

12. Spare parts

The spare parts assemblies may be used exclusively for replacement of identical defective parts. Modifications with spare parts on existing products are not allowed.

12.1 Housing front cover, assy.

Designation	Qty.	Part number
Consisting of:	1	545-60167-1
1 x housing front cover		
1 x profile seal		
4 x screw with washer		
1 x black foil		

Fig. 9



12.2 Pump element Z7

Designation	Qty.	Part number
Pump element Z7 including sealing ring	1	645-29818-1

Fig. 10



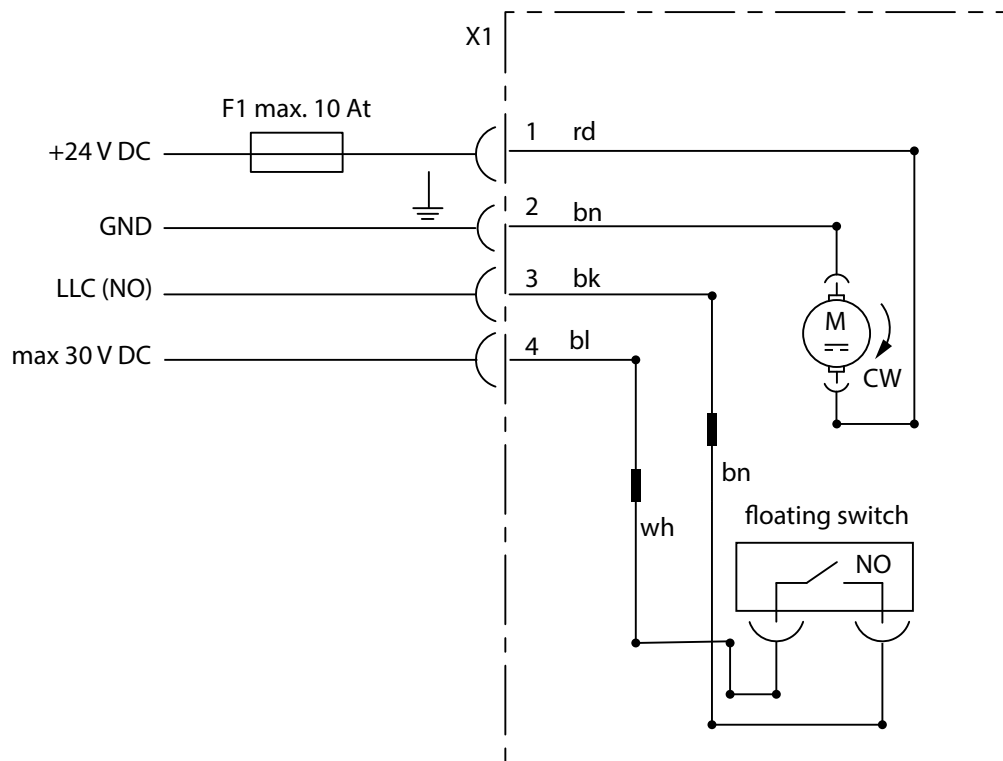
13. Electrical connections

13.1 Cable colours following IEC60757

Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour
BK	black	GN	green	WH	white	PK	pink
BN	brown	YE	yellow	OG	orange	TQ	turquoise
TQ	blue	RD	red	VT	violet		

13.2 Connection diagram

Connection diagram Fig. 11



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