Installation Instructions

Pump P 215

P 215

810-55192-1
Rev. 012
2018/11/30

LINCOLN
An SKF Group Brand SKF

Declaration of Incorporation

(Following Machinery Directive 2006/42/EC, Appendix II, Part 1 B)

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

Designation:	Multi-line pump for supplying lubricants within a centralized lubrication system
Type:	P 215
Part numbers	660- XXXXX-X
Year of construction	See type identification plate

Complies with the basic safety and health requirements stated in the following and laid down in the Machinery Directive 2006/42/EC when first being launched in the market.

1.1.2 ○ 1.1.3 ○ 1.3.2 ○ 1.3.4 ○ 1.3.7 ○ 1.5.8 ○ 1.5.9 ○ 1.7.1 ○ 1.7.3○ 1.7.4

The special technical documents following Machinery Directive 2006/42/EC Appendix VII Part B were prepared. We undertake to send this in electronic form to the respective national authorities upon justifiable request. Authorized representative of the technical documentation is the head of standardization. For address, see Manufacturer.

Furthermore the following harmonized and other standards were applied in the respective areas:

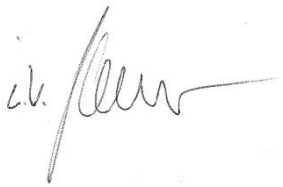
Directive:

2014/30/EU	EMC Directive
2011/65/EU	RoHS Directive

Harmonized and other standards:

DIN EN ISO 12100:2011	DIN EN 61000-2	DIN EN 50581:2013
DIN EN 809-1:2011	DIN EN 60204-1	
DIN 40050-9:1993-5	DIN EN 55011	

The partly completed machine 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 the EC Machinery Directive 2006/42/EC and all other directives to be applied.



Walldorf
2014/04/30

Jürgen Kreutzkämper
Manager R&D Germany
SKF Lubrication Business Unit

Declaration of Incorporation

Contents

1. Guidelines

As you read these instructions, you will notice a number of depictions and symbols which are to facilitate the navigation and understanding of these instructions. For reasons of better legibility, in these instructions we mainly use the male form for general references. Of course, the female form is also always intended. In the following the different meanings are explained.

Text representations	Meaning
Bold print	Highlighting of particularly important words / passages
• List 1	Marks lists
○ List 2	Marks lists
(parenthesis)	Item numbers
➢ Instructions	Instructions to personnel. These always appear in chronological order.

1.1 Warnings

Activities which generate actual hazards (to life and limb or possible damage of the machine) are marked by warnings. Definitely observe the instructions given in the warnings. The following warnings are possible:

Warning stage		Effect	Probability
⚠	**DANGER**	Death / severe injury	imminent
⚠	**WARNING**	Serious injury	possible
⚠	**CAUTION**	Minor injury	possible
	ATTENTION	Damage to property	possible

1.2 Illustrations

The illustrations used refer to a specific product. In the case of other products they may have a schematic character only. The basic functions, however, do not change.

1.3 Copyright

1.4 Abbreviations

The following abbreviations may be used within these instructions.

max.	maximum		Nm	Newton metre
min.	minimum		incl.	including
min.	minutes		i.e.	this means
s.	seconds		approx.	approximately
e.g.	for example		Ø	diametre
ml	millilitres		®	registered trademark
ccm	cubic cm		©	copyright
mm	millimetres		TM	trademark
°C	degree Celsius		%	per cent
°F	degree Fahrenheit		dB (A)	sound pressure level
K	Kelvin		>	greater than
inch	inch		<	less than
etc.	et cetera		±	plus minus
kg	kilogramme		AF	across flat
l	litre		ESD	electrostatic discharge
mbar	millibar		N/A	not applicable
no.	number			

1.5 Manufacturer and Service addresses

Manufacturer	Customer Service
SKF Lubrication Systems Germany GmbH Heinrich-Hertz-Str. 2-8 D - 69190 Walldorf	SKF Lubrication Systems Germany GmbH Central Customer Service Dept. P.O. Box 1263 D - 69183 Walldorf

1.6 Warranty

The instructions make no statement regarding warranty. To learn more about our warranty, see our General Terms and Conditions.

1.7 Disclaimer

Observation of these instructions is the prerequisite for safe operation and the achievement of product characteristics and performance levels. The manufacturer shall bear no liability for damages - of any kind - resulting from the non-observance of these instructions.

2. Safety information

Safety information is to be read and observed by any persons entrusted with works on the machine or by those persons who supervise or instruct the before-mentioned group of persons. It is prohibited to commission or operate the machine prior to reading the Instructions. These Instructions must be kept at an accessible location for further use.

2.1. Emergency stopping of pump

In case of an emergency, the pump can be shut down by:
Switching off the machine or vehicle in which the pump is integrated.

2.2. Intended use

Supply of lubricants within a centralized lubrication system following the specifications made in these instructions.

2.3. Pump operation

Operation is permitted only, if in compliance with:

- All indications given in these instructions or stated in the applicable documents.
- Laws and regulations to be complied with by the user.

2.4. Foreseeable misuse

Any other use and purpose of the machine than the ones described before are strictly prohibited. The use is expressly forbidden:

- In any explosion protection zone.
- Outside the indicated operating temperature range.
- For the supply / transport / stockpiling of hazard group I fluids following Directive 67/548/EC.
- For the supply / transport / stockpiling of gases, liquefied gases, dissolved gases, vapours and fluids that reach a steam pressure of more than 0.5 bar above the normal atmospheric pressure (1013 mbar) at the maximum admissible operating temperature.

2.5. Prohibition of certain activities

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

- Replacement or changes to the pistons of the pump elements.

2.6. Conversions / modifications

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

2.7. Inspections

The following inspections were carried out prior to delivery:

- Electrical inspections following EN 60204-1.
- Safety and functional tests.

2.8. Warning label on the pump

	**Warning against hand injuries** During operation of the pump, never remove the lid and reach into the reservoir. Risk of trapping or shearing off hands and fingers!

2.9. Other applicable documents

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

- Operating instructions / release provisions by the operator.
- Instructions of the components for set-up of the centralized lubrication system.
- Safety data sheet of the lubricant used.

Where appropriate:

- System documentation.
- Other relevant documents for the integration of the pump into the machine.

The owner must supplement these documents by the respective valid national or regional regulations laid down by the country in which the product is to be used. If the machine is sold or transferred, any associated documents must be passed on to the subsequent operator as well.

2.10. Sources of hazard

The pump has been designed, built and tested using state-of-the-art technology. It will have left our company only after having passed stringent safety and reliability tests. Like for all complex machines, also for this pump there may still be involved potential sources of hazard, for example:

2.11. Moving, rotating parts

- Drive, stirring paddles

2.12. Energies

- Electricity
- Temperature (hot/cold surfaces)
- Position energy (raised components)
- Parts subject to (operating) pressure
- Parts subject to spring tension

2.13. Lubricants

- Greases
- Oils

2.14. Existing residual risks

Residual risk	Remedy
Transport lifecycle	
Tilting / falling of parts during transport, e.g. over inclines.	Secure parts against tilting / falling during transport (e.g. using tapes, belts, ropes etc.).
Installation lifecycle	
Dropping of lifted parts/ tools.	No people may remain under suspended loads. Keep unauthorized people away. Secure suspended loads using suitable hoisting equipment (e.g. tapes, belts, ropes etc.).
Falling of parts due to insufficient fixing to the machine.	Fix parts only to machine parts with a sufficient load capacity. Observe the weight. Observe the stated tightening torques. If no tightening torques are stated, the tightening torques are to be applied according to the screw size for 8.8 screws.
Electric shock when connecting the pump.	Prior to connection of the pump, de-energize all affected electrical components. If necessary, please observe discharge times. The electrical connection may be carried out by commissioned and qualified electricians only and in accordance with the connection diagram.

Residual risk	Remedy
Installation lifecycle	
People falling due to contamination of floors with spilled lubricant.	Take care when filling. Bind / remove spilled lubricant immediately with a suitable agent. Observe the legal / company regulations on dealing with oils / greases and contaminated parts.
Ripping out / damage to lines when assembling movable machine parts (e.g. pivot arm).	If possible, do not mount onto movable parts. Should this not be possible, use flexible hose lines of sufficient lengths.
Deviating installation position: - Foreign objects falling into the motor air intake. - Borehole for drainage of condensation water is no longer at the lowest point of the motor.	Installation of a suitable protective roof over the air intake. Deviating installation position only if the formation of condensation water has been completed.
Commissioning / operation / maintenance lifecycle	
Lubricant spraying out due to incorrect screw connection of components / connection of lines.	Tighten all parts with appropriate tightening torques. Use suitable hydraulic screw connections and lines for the stated pressures. Check these prior to commissioning for correct connection and damage.
Contact with the stirring paddles when filling from the top during operation of the pump.	Fill preferably via the filling connection. Fill only from the top when the pump is not moving. When filling, do not reach into the reservoir.
Residual risk	**Remedy**
Commissioning / operation / maintenance lifecycle	
Electric shock through reduced insulation resistance.	Check the formation of condensation water in the motor regularly. If applicable, drain off condensation water at the drain plug. Check the insulation resistance regularly.
Electric shock when connecting the pump.	Prior to connection of the pump, de-energize all affected electrical components. If necessary, please observe discharge times. The electrical connection may only be carried out by commissioned and qualified electricians in accordance with the connection diagram.
Fault lifecycle	
Severe heat-up / defect on motor through blockage.	Switch off the pump. Allow the parts to cool down and remove the cause of the fault.
Disposal lifecycle	
Environmental contamination with lubricants and moistened parts.	Dispose of the parts in accordance with the valid legal / company regulations.

2.15. Persons authorized to operate the pump

Operator

A person who is qualified by training and experience to carry out the functions and activities related to normal operation, including the avoidance of possible hazards that may arise during machine operation.

Person qualified for maintenance and repair works

A professionally trained and experienced person that is capable of recognizing risks and possible hazards when carrying out installation, maintenance, or repair works on the pump, and eliminating these by initiating adequate measures.

2.16. Protection of special groups of persons

The respective legal employment restrictions do apply.

2.17. Safety recommendations to be complied with

2.18. General behaviour when handling the machine

- Only operate the machine if it is in perfect technical condition, according to its intended use, in awareness of safety and risks and in adherence to these Instructions.
- Familiarize yourself with the functions and working methods required. Always keep to the order of the indicated assembly and operating steps.
- If there are uncertainties regarding the proper condition or the correct assembly / operation, ensure clarification. The machine / pump must not be put into service until all uncertainties will have been clarified.
- Keep unauthorized people away from the machine.
- All relevant safety provisions and in-house operational instructions applicable to the respective activity must be adhered to.
- Responsibilities for different activities must be clearly defined and adhered to. Ambiguities greatly endanger safety.
- During operation, 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.
- Occurring faults are to be remedied in the frame of the responsibilities. Inform your superior in the case of faults beyond your competence.
- Do not open the reservoir lid during operation. Do not reach into the reservoir.
- Wear personal protective equipment always.
- When handling lubricants etc., adhere to the respective safety data sheets.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

2.19. Transport / installation / maintenance / repairs / servicing

- All relevant persons (e. g. operating personnel, superiors) must be informed prior to carrying out any maintenance or repair works. Observe the company precautionary measures and work instructions.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Ensure through suitable measures that movable / loosened parts are blocked during the work and that no limbs can be trapped through inadvertent movements.
- Only carry out transport using suitable hoisting equipment.
- If the motor is transported separately (e.g. repairs), this should be lifted by the transport lugs / eyebolts. Check that the transport lugs / eyebolts are fixed tightly prior to lifting. Do not lift any other loads on the transport lugs / eyebolts. Motors may not be transported on the ventilator cover.
- All the parts to be mounted onto the shaft end of the motor are to be dynamically balanced according to the balancing system. With a direct coupling, please ensure that the parts align precisely (observe the manufacturer's guidelines).
- Assemble the pump only outside the working area of moving parts with sufficiently large distance to sources of heat or cold.
- Dry wet, slippery surfaces.
- Cover hot or cold surfaces accordingly.
- Prior to carrying out the work, de-energize and depressurize the pump and secure it against unauthorized switch-on. Work on electrical components must be carried out by electrical specialists only. Observe any waiting periods for discharging if necessary.
- 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.
- Maintenance and repair work can be subject to restrictions in low or high temperatures (e.g. changed flow properties of the lubricant). Therefore try to carry out maintenance and repair work at room temperature if possible.
- Carry out all work on electrical components only using voltage insulated tools.
- Fuses must not be bypassed. Always replace fuses by such of the same type.
- Ensure correct earthing of the electrical system.

- Only undertake drilling at non-critical, non-supporting parts. Use any available boreholes. Do not damage lines and cables when drilling.
- Observe possible abrasion points. Protect the parts accordingly.
- Other aggregates of the machine / vehicle must not be adversely affected or damaged in function by the installation of the central lubrication system.
- All components used must be designed for:
    - maximum operating pressure
    - maximum / minimum ambient temperature
    - lubricant to be conveyed
    - operating / ambient conditions at the location of use
- Parts of the centralized lubrication system must never be subjected to torsion, shearing or bending.
- Check all parts prior to use for contamination and clean if necessary. Lubricant lines should be filled with lubricant prior to installation to make the subsequent ventilation of the system easier.
- Maintain the specified tightening torques. When tightening, use a calibrated torque wrench.
- When working with heavy parts, use suitable lifting tools.
- Avoid confusion / incorrect installation of dismantled parts. Mark these parts accordingly.

2.20. Initial commissioning / daily start-up

Ensure that:

- All safety devices are completely available and functional.
- All connections are correctly connected.
- All parts are correctly installed.
- All warning labels on the machine are completely available, highly visible and undamaged.
- Unreadable or missing warning labels must be replaced without delay.

2.21. Cleaning

- Risk of fire and explosion when using inflammable cleaning agents. Only use non-flammable cleaning agents suitable for the purpose.
- Do not use aggressive cleaning agents.
- Do not use steam jet or high pressure cleaners. Electrical components may be damaged. Observe the IP protection class.
- Cleaning work on energized components may be carried out by specialists only.
- Do not touch cables or electrical components with wet or damp hands.
- Mark damp areas accordingly.

Operator's obligations

2.22. Determination of hazards

The operator must determine all hazards resulting from the integration of the pump into the superordinate machine and the hazards at the location of operation of the machine, and carry out the measures necessary to ensure safety and health protection.

2.23. Provision of necessary information

The operator must make the instructions required for the respective activity accessible to all people commissioned with operation, maintenance and repairs. He must ensure that these people have read the necessary instructions and have understood them.
The same applies for all relevant safety data sheets, company instructions, accident prevention regulations, instructions for purchased parts and lubricant suppliers. Depending on the business organization, the relevant instructions may have to be made accessible to other people / departments.

2.24. Inspection for correct use

The operator must check at regular intervals through suitable measures that the machine is being used according to its intended purpose, that no conversions or manipulations have been made to the machine and that all parts are fully functional.

2.25. 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.

2.26. Provision of personal protective equipment

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

2.27. 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. Please contact SKF Customer Services for information.

2.28. Inspection of the delivery

The delivery must be inspected for completeness based on the delivery papers. Transport damages must be reported to the forwarder immediately. The packaging material should be stored until any inconsistencies have been clarified.

2.29. Returns

All parts must be cleaned and correctly packed prior to being returned. Returned goods are to be marked as follows on the packaging:

	Do not apply any load / This side up
	Protect against moisture
	Handle with care! Fragile, do not throw!

2.30. Disposal

At the end of its service lifetime, the pump must be dismantled correctly and disposed of according to the respective valid provisions.
It is forbidden to use parts of a pump which is to be disposed of or to assemble these parts to make a new pump.

3. Lubricant

Lubricants are used specifically for certain application purposes. In order to fulfil their tasks, lubricants must fulfil various requirements to varying extents:
The most important requirements for lubricants are:

- Reduction of abrasion and wear
- Corrosion protection
- Noise minimisation
- Protection against contamination / penetration of foreign objects
- Cooling (primarily with oils)
- Longevity (physical / chemical stability)
- Compatibility with as large a number of materials as possible.
- Economic and ecological aspects

3.1. Selection of lubricants

A suitable lubricant is selected already during design of the machine and forms the basis for the planning of the centralized lubrication system.
The selection is made by the manufacturer / operator of the machine, preferably together with the lubricant supplier based on the requirement profile defined through the specific application purpose. Should you have little or no experience with the selection of lubricants for centralized lubrication systems, please contact SKF. You will avoid possible costly downtimes through damage to your machine / system or damage to the centralized lubrication system.

3.2. Specification

Lubricants of the following consistency can in principle be conveyed using SKF centralized lubrication systems.

- Lubricating greases up to NLGI 2
- Solids content up to max. 5 %
- Mineral oils with a viscosity of min. 40mm^2/s at +40 °C

Lubricants must be compatible with the following materials:

- Steel / brass / copper / aluminium
- NBR / FBM / Polyurethane

ATTENTION

Risk of damage to machine / system

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

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

Please contact the Service Department for an overview of lubricants tested by SKF.

3.3. Ageing of lubricants

After a prolonged downtime, the lubricant must be inspected prior to recommissioning as to whether it is still suitable for use due to chemical / physical ageing. We recommend that you undertake this inspection already after a machine downtime of 1 week. If doubts arise as to the suitability of the lubricant, please replace it prior to recommissioning and if necessary undertake initial lubrication manually.

4. Technical Data

4.1. Operating temperature

min.	max.
-25 °C	+70 °C

4.2. Operating pressure

Max. 350 bar

All system parts must be designed for the maximum operating pressure. Each pump element is to be secured against higher pressures using a suitable pressure limiting valve.

4.3. Installation position

Vertical, i.e. reservoir at top.

4.4. Sound pressure level

< 70 dB (A)

4.5. Weight

The weight of the empty pump lies between approx. 19 kg and approx. 35 kg depending on the equipment variation (e.g. number of pump elements, reservoir size, coupling, motor, and gear variations). The weight of the baseplate, the weight of the lubricant in the reservoir and the coupling may also have to be added.

4.6. Electrical connection

The electrical connection is carried out in accordance with the general valid installation prescriptions for electrical systems:
Tolerance voltage ± 5 %
Tolerance frequency± 2 %
The waveform and mains symmetry must be maintained.

4.7. IP protection classes

Motor:
For IP protection class, see motor type plate.
Ultrasonic sensor:
IP 65

4.8. Reservoir variants

Size		Material	Variants	
4	L	Plastic	XYBU	XYN
8	L	Plastic	XYBU	XYN
10	L	Steel plate	XYBU	XYN
30	L	Steel plate	XYBU	XYN
100	L	Steel plate	XYBU	XYN

4.9. Low-level signal / High-level signal

The low-level signal and high-level signals are realized by means of an Ultrasonic sensor

4.10. Tightening torques

Component	Tightening torques	
Pump element to housing	24	Nm
Pressure relief valve to pump element	6	Nm
Screw plug to housing	14	Nm
Filling connection / return line	10	Nm
Lubricating nipple / adapter for lubricating nipple	10	Nm
Reservoir to pump housing	25	Nm
Ultrasonic sensor to lid	1,5 ±0,2	Nm
If no tightening torques are stated for screw connections, the tightening torques are to be applied according to the screw size for 8.8 screws.		

4.11. Flow rate

Flow rate per pump element		
K6	Piston Ø 6 mm	approx. 0.16 ccm / stroke
K7	Piston Ø 7 mm	approx. 0.23 ccm / stroke

This information applies to greases in NLGI class 2 at +20 °C and 100 bar counterpressure. Deviating conditions such as different NLGI class, temperature and counterpressure may lead to a deviation in the flow rate. This should be taken into account when designing the lubrication points.

4.12. *Connections / outlets*

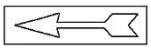
- 15 x outlet (pump element)
- G1/4“ for lubrication lines

When using less than 15 pump elements, one outlet can be used as a filling connection.
The following adapters are available as accessories.
Filling adapter G ¼“
Filling adapter G ½

4.13. *Filling possibilities*

- Via filling adapter
- Via reservoir lid

4.14. *Rotational direction of the pump*

	The rotational direction is always clockwise (CW). Observe the arrow on the reservoir. If the rotational direction deviates: switch off the pump immediately and check the electrical connection.

4.15. *Permitted speeds*

Lubricants	Minimum speed	Maximum speed
Grease	2.5 rpm.	20 rpm.
Oil	2.5 rpm.	35 rpm.

When supplying the pump without motor and gear, speeds must be maintained by selecting a suitable motor and gear.

4.16. *Storage until first use*

- In the original packaging
- In dry rooms with little dust
- Without direct sun or UV radiation
- Without aggressive, corrosive substances at the place of storage
- Without vibrations
- Protected against pests (insects, rodents etc.)

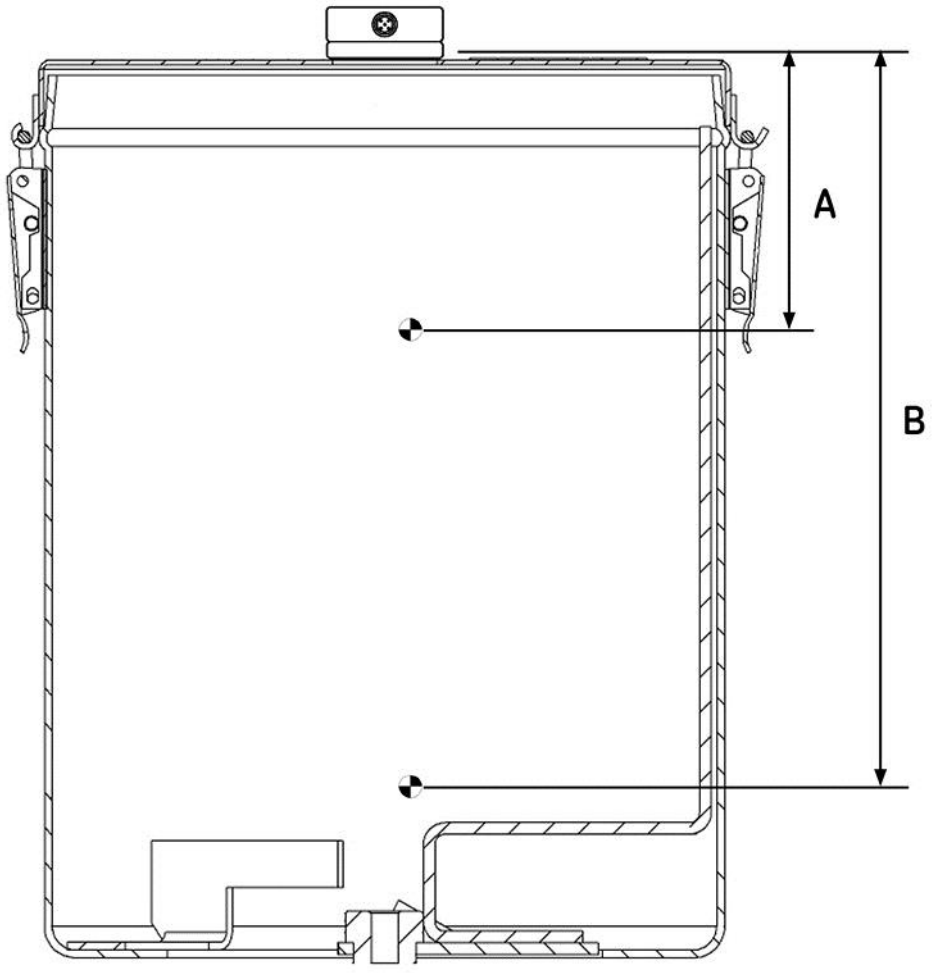
Temperature range:	minimum	- 20 °C
	maximum	+ 40 °C
Air humidity (relative):	maximum	90 % relative humidity
Storage time	maximum	24 months

ATTENTION

Risk of damage to machine
Prior to initial use or after the storage time ends, prefilled components must be inspected and replaced, if necessary, in case the lubricant quality has changed, or filled with lubricant suitable for the application purpose.

5. Technical data of the ultrasonic sensor

High-level signal / low-level signal / minimum switching distance



Reservoir		Switch point: high-level signal A	Switch point: low-level signal B
4	XYBU	approx. 65 mm	approx. 180 mm
8	XYBU	approx. 65 mm	approx. 245 mm
10	XYBU	approx. 65 mm	approx. 210 mm
30	XYBU	approx. 65 mm	approx. 420 mm
100	XYBU	approx. 220 mm	approx. 670 mm

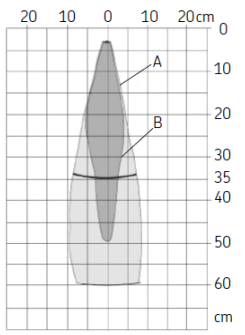
The minimum distance between the lubricant and the ultrasonic sensor totals 60 mm. If this distance is underrun, incorrect measurement results may occur due to undefined ultrasonic sensor switching conditions.

Ultrasonic Sensor 664-853xx-x

Blind zone	0 - 65 mm
Scanning range limit	600 mm
Ultrasonic frequency	approx. 400 kHz
Switching frequency	3.7 Hz
Resolution	0.18 mm
Accuracy	±1 %
Repeatability	±0.15 %
Operating voltage U_B	9 - 30 V DC (polarized)
Residual ripple	±10 %
No-load supply current	≤ 60 mA
Type of connection	M12 x 1 plug; 5-pole
Response delay	272 ms
Readiness delay	< 300 ms
Type of protection following EN 60529	IP 65
Range of operating temperatures	-40 °C to + 70 °C
Switch points	High-level indication D1 = 65 mm; low-level indication D2 corresponding to the reservoir size; pre-low-level indication D3 programmable on customer request
Compliance with standards	EN 60947-5-2
Current output 4 - 20 mA	RL ≤ 100 Ω at 9 V ≤ UB ≤ 15 V RL ≤ 500 Ω at UB ≥ 15 V
Display elements	1 x LED yellow / 1 x LED green Switching output set / not set
Housing material	PBT, polyester, ultrasonic transducer, PUR, epoxy resin with glass contents
Switching output	3x pnp; UB-2V; Lmax = 3x 200 mA; selectable NO contact/ NC contact, short-circuit resistant

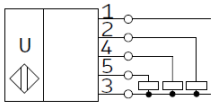
Regulatory notes

Electrical equipment according to directive 2014/30/EU
No safety component acc. To directive 2006/42/EC
Enclosure type 1 for use in industrial machinery NFPA 79 applications only

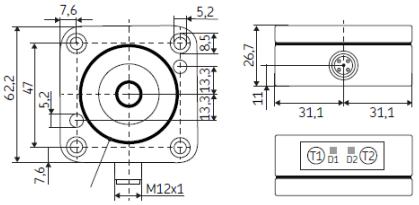


Detection zone in centimetres
The dark grey areas indicate the zone in which the standard reflector (pipe) is reliably detected. This is the typical operating range of the sensors, The light grey areas indicate the zone in which a big reflector – like, e.g. a plate – is still detected – provided it is optimally positioned to the sensor. Outside the light grey area an evaluation is not possible any more.
A = aligned plate, B = pipe

1	+ U_B	brown
3	- U_B	blue
4	D2	black
2	D1	white
5	D3/Com	grey



Dimensions



6. Technical data of motors

Pump model	215-M100-M490		215-M049		215-M100-M490		215-M049		Unit
Motor type	DIC 63B4		DIC 63L4		DIC 63B4		DIC 63L4		
	Multi-range				Single-range				
Frequency	50	60	50	60	50		50		[Hz]
Rated power	0,18	0,21	0,25	0,28	0,18		0,25		[kW]
Rated speed	1370	1640	1350	1680	1370		1336		[min^{-1}]
Rated current									
at 220 - 240 V	1,38		2,40						[A]
at 380 - 420 V	0,80		1,40						[A]
at 250 - 275 V		1,38		2,80					[A]
at 440 - 480 V		0,80		1,60					[A]
at 290 V					1,11		1,66		[A]
at 500 V					0,64		0,96		[A]
Run-in current	3		3,6		2,5		2,6		Factor
Performance factor	0,67		0,69		0,7		0,7		[cos φ]
Degree of effectivity	61		65		47		43		[η %]
Type of protection	IP 55		IP 55		IP 55		IP 55		
Insulation class	F		F		F		F		
Construction size	63		63		63		63		
Construction type	B14		B14		B14		B14		
Weight	4,4		5,0		4,4		5,0		[kg]
Flange	Ø 90		Ø 90		Ø 90		Ø 90		[mm]
Shaft end	Ø 11 x 23		Ø 11 x 23		Ø 11 x 23		Ø 11 x 23		[mm]

The above mentioned motors can be operated in the following power networks.

Voltage		Frequency	Tolerance
230/380	V	50 Hz	± 5 %
230/400	V	50 Hz	± 10 %
240/415	V	50 Hz	± 5 %
254/440	V	60 Hz	± 5 %
265/460	V	60 Hz	± 5 %
480	V	60 Hz	± 5 %
290/500	V	50 Hz	± 10 %

Motors for other power networks (special versions) on request

Condensation drain holes
In case of operation at high humidity and significant temperature variations, the motors should be provided with condensation drain holes and space heaters.

7. Brief description of the pump

DANGER

Electric shock
Disconnect the pump from the mains prior to all work on electrical parts.

Pump P 215 consists of the following main components:

(1) Reservoir lid

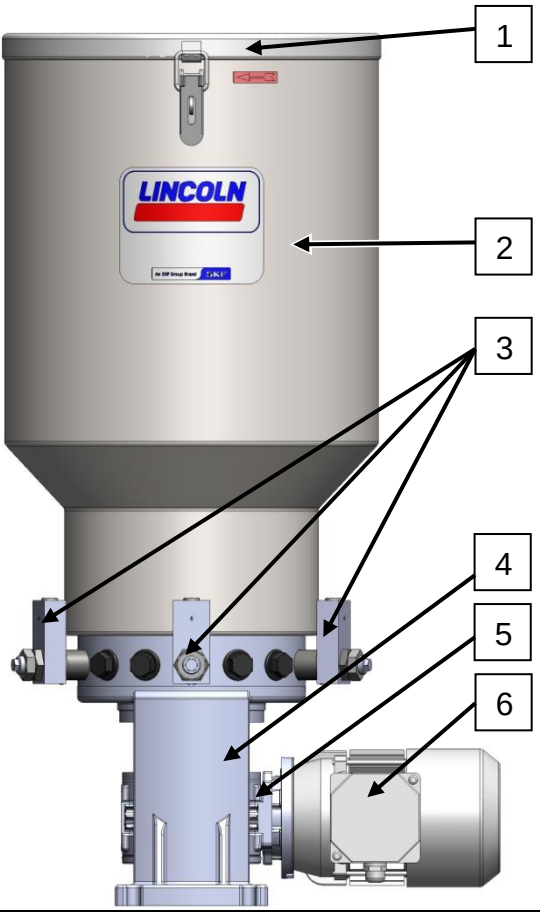
(2) Reservoir with stirring paddle

(3) Pump elements (1-15)

(4) Pump housing

(5) Gear

(6) Motor



Working method:
The gear (5) reduces the motor speed (6) to the necessary speed of the eccentric shaft (7).

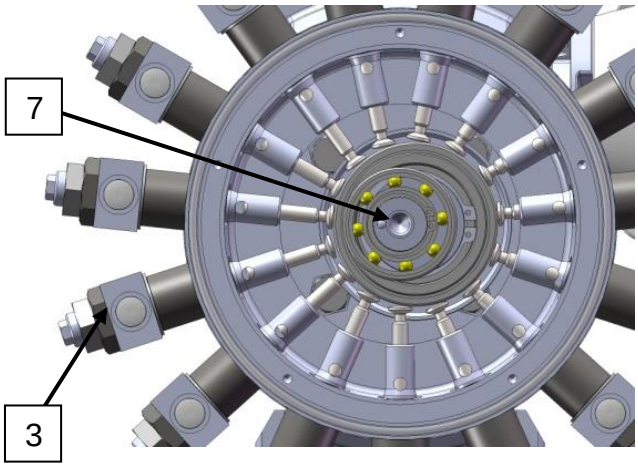
The eccentric shaft (7) drives the pump elements (3) and the stirring paddle.

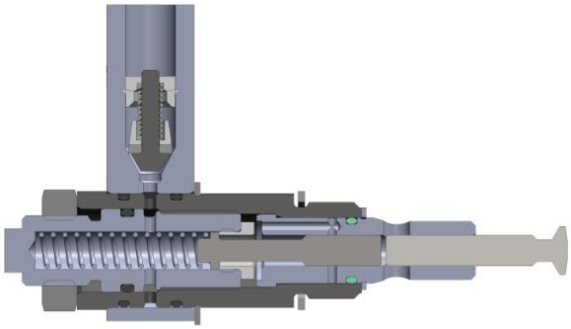
The stirring paddle homogenizes and ventilates the lubricant and pushes it in the direction of the suction boreholes of the pump elements (3).

The pump elements (3) convey the lubricant by the movement of the pistons.

It is distinguished between the suction phase (suction of lubricant out of the reservoir) and the pressure phase (supply of lubricant into the lubrication line).

If necessary, a sensor determines the reservoir filling-level (high-level or low-level signal).





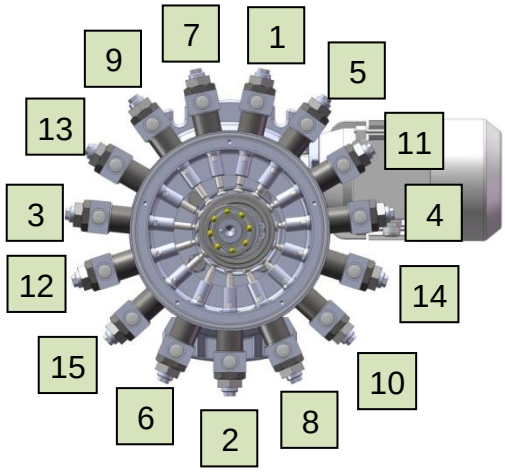
8. Installation and commissioning

8.1. Important note on the installation of the pump elements

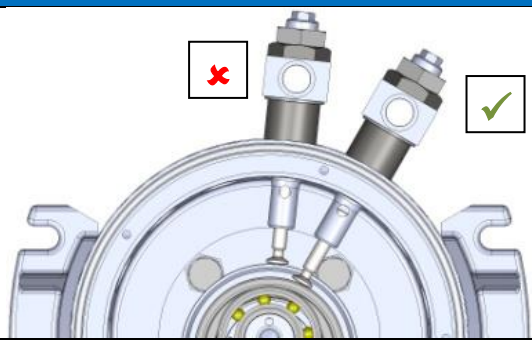
Pump elements are factory-set to minimum flow rate in order to improve the suction behaviour (minimum space of air in the pump element).

After commissioning, the pump elements must be set to the required flow rate.

For installation of the individual pump elements, see schematic on the right.

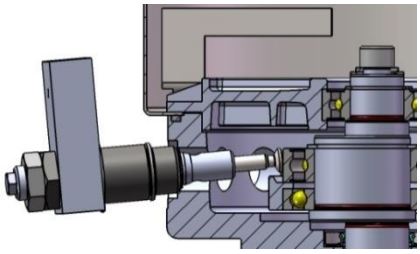


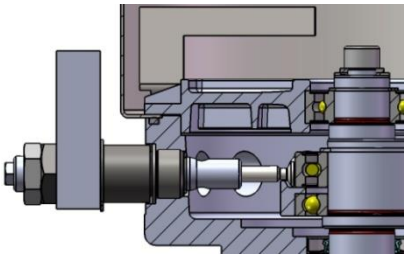
8.2. Assembly of the pump elements (grease)

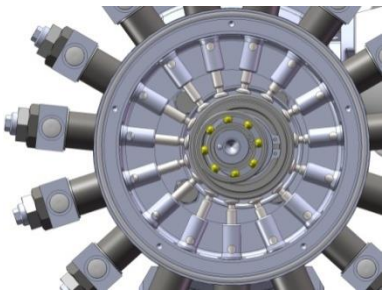
ATTENTION	
Damages to the pump are possible. Make sure that each pump element is seated correctly in the notch of the catch ring.	

- Remove closure screw.
- In the case of the reservoir being full, use adequate tool, e.g. screw driver, to open a channel up to the catch ring.
- Pull piston about 30 mm out of the pump element.
- Insert pump elements slantwise and hang them straight into the catch ring.
- Tighten pump elements with torque wrench.

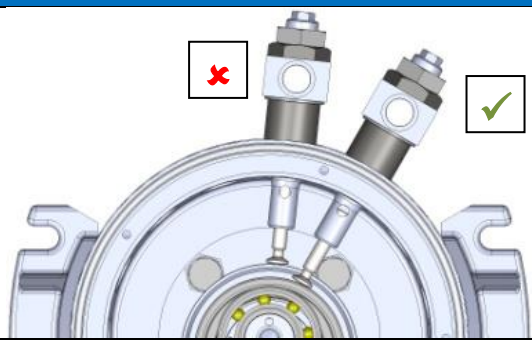
  Tightening torque = 35 Nm
- In the case of the reservoir being empty, additionally check the position of the pump element in the notch of the catch ring.
- Switch on pump.
- Verify correct functioning of the pump elements.
- Switch off pump.





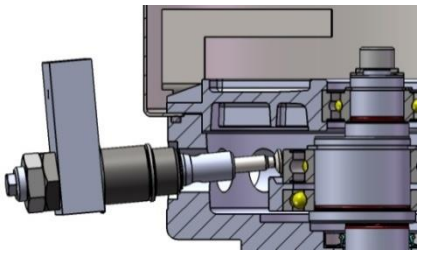


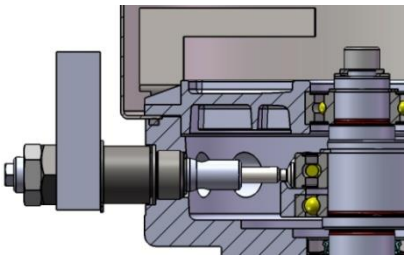
8.3. Assembly of the pump elements (oil)

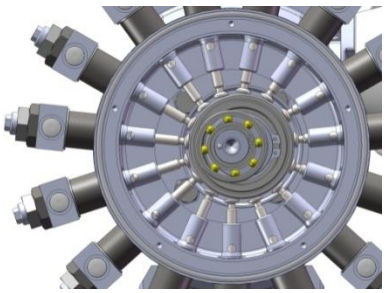
ATTENTION	
Damages to the pump are possible. Make sure that each pump element is seated correctly in the notch of the catch ring.	

- In the case of the reservoir being full: Empty the reservoir down below the level of the pump elements.
- Remove closure screw.
- Pull piston about 30 mm out of the pump element.
- Insert pump elements slantwise and hang them straight into the catch ring.
- Tighten pump elements with torque wrench.

  Tightening torque = 35 Nm
- Verify from the top the position of the pump element in the notch of the catch ring.
- Fill the reservoir.
- Switch on pump.
- Check correct functioning of the pump elements.
- Switch off pump.







8.4. Adjustment of the pump elements

NOTE:
The output of the pump elements can be modified also during operation:

- Loosen counternut (1).
- In order to adjust the flow rate, turn the spindle (2).

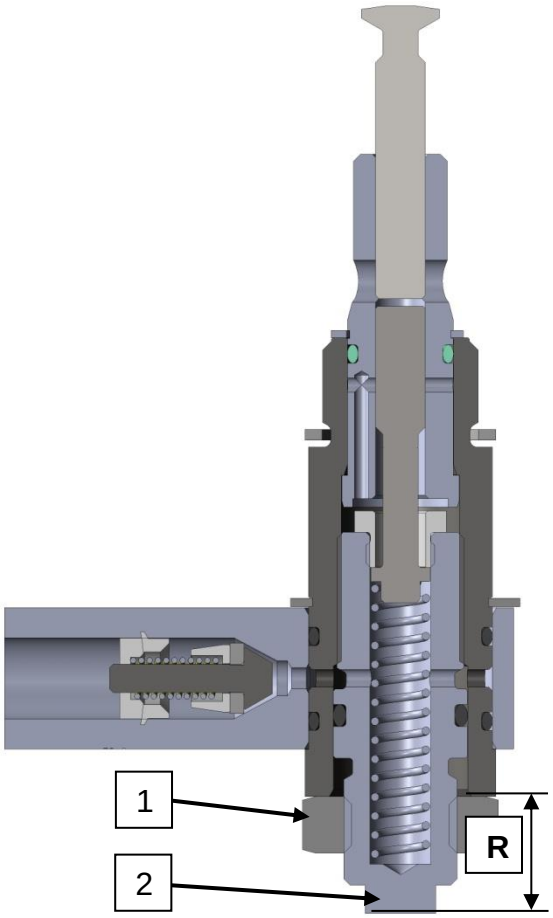
↻	= lower flow rate
↺	= higher flow rate

The measure R states the approximate flow rate.

R = 22.0 mm	Full supply
R = 20.5 mm	¾ supply
R = 19.0 mm	½ supply
R = 17.5 mm	¼ supply

- After adjusting the flow rate, retighten the counternut (1).

Tightening torque = 15 Nm – 1 Nm



8.5. Filling the reservoir

WARNING

Risk of hand injuries caused by the stirring paddle
Fill lubricant via the lid only when the pump is not moving. Never reach into the reservoir while the pump is running.

ATTENTION

Risk of central lubrication system faults

- When filling, ensure that no contamination enters the reservoir.
- The ultrasonic sensor must not come into contact with the lubricant.
- The distance between the lubricant and the ultrasonic sensor should total at least 60 mm.

Filling via the reservoir lid

- Switch off the pump.
- Open the reservoir lid (1).
- Fill in lubricant.
- Close the reservoir lid (1).
- Switch on the pump.

Filling via the filling adapter

Automatic filling:
The filling pump is controlled by the high-level or low-level signal on the pump.
Manual filling:

Have the filling procedure observed by a second person.

- Switch on the filling pump.
- Fill the reservoir.
- Switch off the filling pump.

8.6. *Inadvertent filling with incorrect lubricant*

Should incorrect lubricant have been filled, please proceed as follows.

- Switch off the pump and secure it against being switched on.
- Remove lubricant.
- Clean the reservoir, pump housing and, if applicable, the tubing system.
- Fill in lubricant of correct specification.
- Switch on pump.
- Inform your superior to ensure that the error does not occur again.

8.7. Inspections prior to initial commissioning

ATTENTION

Risk of damage to the machine

Fill the feed lines with lubricant and lubricate the lubrication points manually. Otherwise the bearing points may become damaged due to a lack of lubricant.

Check the entire system for accordance with the intended purpose and the planning documentation.

Ensure that all parameters and lubricants have been correctly adjusted or are present.

If deviations are detected, they must be remedied without delay.

In order to warrant safety and function, a person assigned by the operator must inspect certain areas of the central lubrication system prior to initial commissioning. Detected defects must be reported without delay to a superior and remedied. The repair of defects must be carried out by a specialist only.
The following points must be inspected prior to initial commissioning:

Electrics:

- Electrical connections carried out correctly.
- Cable entries sealed correctly.
- The voltage and frequency of the power network correspond to the information on the type identification plate of the motor.
- Monitoring devices and additional equipment (e.g. motor circuit breaker) are correctly connected and adjusted.
- All parts such as lines, cables, metering devices, etc. have been correctly installed and are undamaged.

Mechanics:

- No loose or missing parts remaining (e.g. pressure relief valves, feed lines).
- No damages, deformations or cracks.
- No smoke or smouldering spots.
- No discolorations, contamination and/or corrosion.
- No unusual humidity accumulations, odours, vibrations, or sounds.
- No leakage of lubricant at connections and from lines.

8.8. Activation of the pump

The pump is activated on:

- Installation into a machine
  - by switching on the machine contact.
  - by a control provided by the customer.

9. Standard operation

9.1. Daily start-up

Below find the activities to be carried out in case of standard operation.

9.2. Inspections

With regard to “Inspections prior to initial commissioning”, the operator has to define suitable inspection intervals depending on the actual operating conditions.

9.3. Filling the reservoir during operation

Fill the reservoir as described in Chapter “Installation and commissioning”.

9.4. Cleaning

For cleaning, required protective clothes, cleaning agents and devices, observe valid operation guidelines provided by the operator.

DANGER

Danger to life
Risk of fire and explosion when using inflammable cleaning agents.
Do not use steam or high-pressure cleaners. Electrical components may be damaged.

Do not touch cables or electrical components with wet or damp hands.
Cleaning work on energized components may be carried out by electrical specialists only.
Wear personal protective equipment.




Exterior cleaning

- Thorough cleaning of all surfaces.
- Mark and secure wet areas.

Interior cleaning

- Normally, interior cleaning is not required.

ATTENTION

Possible damage to the machine
When using solvents for cleaning purposes, ensure their compatibility with plastic parts and lacquers. Do not use polar organic solvents like e. g. alcohol, methanol or acetone.

10. Maintenance

DANGER

Electric shock
Disconnect the pump from the mains electrically prior to all work on electrical parts.

10.1. Pump maintenance

The pump is mainly maintenance-free.
However, the following parts should be inspected and, if necessary, replaced by new parts at regular intervals:

- Pressure relief valves
- Check valves
- Pump elements.

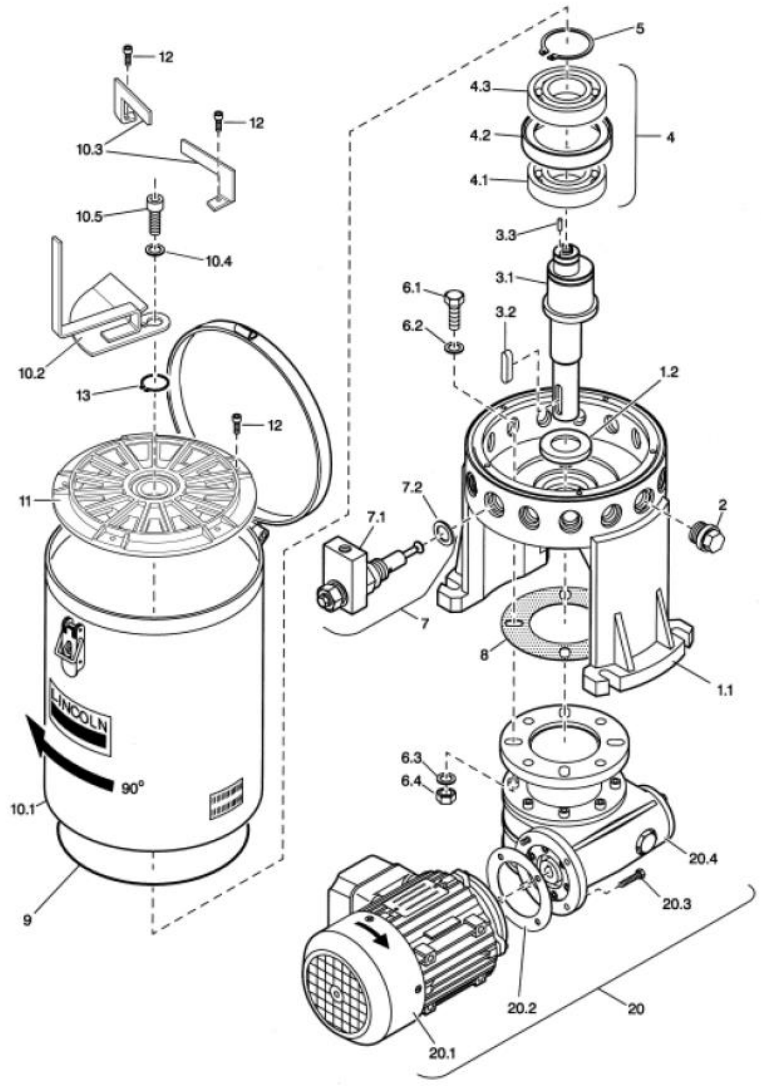
Pressure relief valve tolerance + 5% / - 10 %
Should this tolerance be exceeded, the pressure relief valves must be replaced.

11. Troubleshooting

Pump motor does not run		
Possible cause	Observation	Remedy
Fault with superior machine / with the external control. Motor circuit breaker released.	No pump sound.	Check power lines / external control / motor circuit breaker.
Motor runs, but pump does not function		
Possible cause	Observation	Possible cause
Reservoir empty.	Visual check	Refill pump or refill reservoir of filling pump
Air in the lubricant.	Bubbles in the lubricant.	Vent the pump
Suction borehole of pump element blocked.	After disassembling the pump element	Disassemble and clean pump element
Check valve defective or contaminated.	After disassembling the check valve	Replace check valve
Pump element worn	Low pressurization	Replace pump element
Defective pressure relief valve / fault at the lubrication point.	Grease leaking from the pressure relief valve	Determine cause Replace pressure relief valve
Blockage in the downstream lubrication system.	Grease leaking from the pressure-relief valve	Determine and remedy cause
If the fault cannot be found / corrected in this way, please get in touch with our Customer Service Department.		

12. Spare parts

12.1. Pump P 215

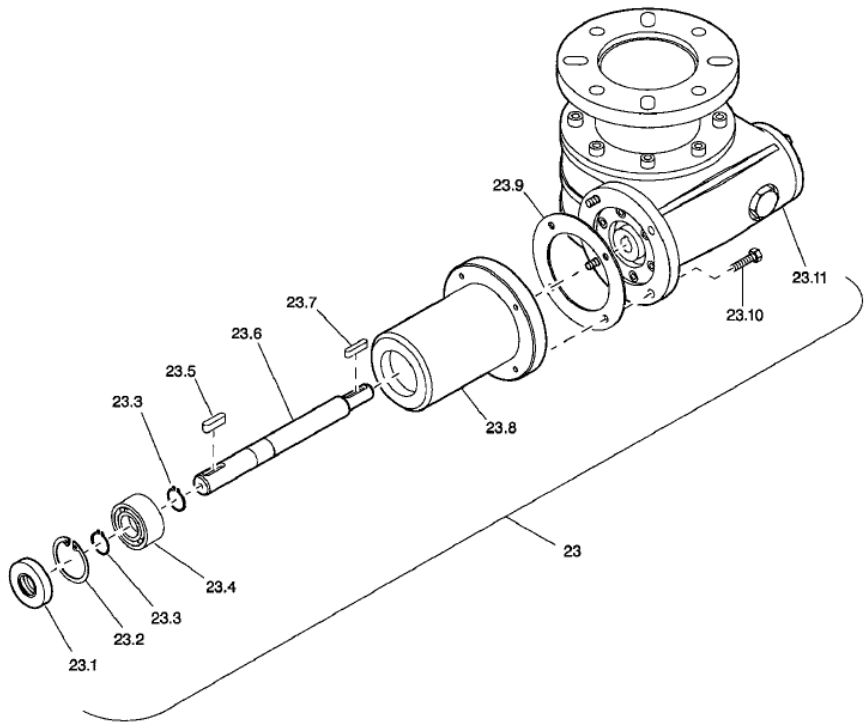


Item	Name	Qty.	Part no.
1.1	Housing assy.	1	560-60144-1
1.2	Rotary shaft seal 30x50x7	1	220-12231-4
2	Closure screw M22x1,5	/	303-19285-1
3.1	Eccentric shaft	1	460-24302-2
3.2	Key A 8x7x32	1	214-12176-3
3.3	Grooved dowel pin D4x10	1	206-12498-3
4	Catch ring assy.	1	560-36903-3
4.1	Grooved ball bearing D45/75x10	1	250-14064-3
4.2	Catch ring	1	460-24301-1

4.3	Grooved ball bearing D45/75x16	1	250-14064-4
5	Retaining ring A45x1,75	1	211-12164-9

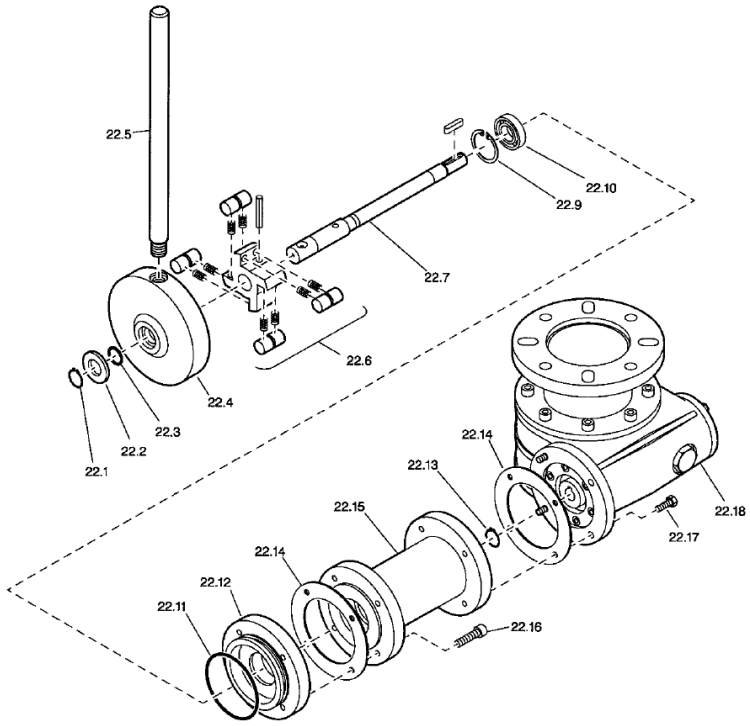
Item	Name	Qty.	Part no.
6.1	Hexagonal screw M 10x35C	4	200-12008-6
6.2	Sealing M 10	4	220-13653-7
6.3	Washer A 10,5C	4	209-13077-2
6.4	Hexagonal nut M 10C	4	207-12136-1
7	Pump element with piston Ø 6 mm	/	600-25046-3
7	Pump element with piston Ø 7 mm	/	600-25047-3
7.1	Outlet stud with check valve	/	560-32115-1
7.2	Gasket Ø 22,2 x Ø 27 x 1,5	/	306-17813-1
8	Gasket Ø 70x126x0,5	1	306-19640-1
9	O-ring Ø 186 x 3,5	1	219-12226-8
10	10 l reservoir with lid	1	560-32012-1
10	30 l reservoir with lid	1	560-32010-1
10	4 l reservoir	1	444-24673-1
10	8 l reservoir	1	444-24674-1
10	Lid for 4 / 8 L reservoir	1	444-24234-1
10.2	Stirring paddle assy. for 4/8/10 L reservoir	1	560-32128-1
10.2	Stirring paddle assy. for 30 L reservoir	1	560-32129-1
10.2	Stirring paddle assy. for100 L reservoir	1	560-32798-1
10.3	Fixed paddle	1	460-24566-1
10.4	Washer A 10,5C	1	209-13077-2
10.5	Hexagonal socket head screw M 10 x 25C	1	201-12027-6
11	Intermediate bottom for plastic reservoir		460-24567-1
11	Intermediate bottom for steel reservoir		460-24568-1
12	Hexagonal socket head screw M 5x20C		201-13668-4
13	Retaining ring A25		211-12164-6
20	Drive assy with multi-range motor(s) ... gear 100:1 0,18 / 0,21 kW		245-13915-1
20	Drive assy with multi-range motor(s) ... gear 49:1 0,25 / 0,29 kW		245-13916-1
20	Drive assy with single-range motor(s) . gear 100:1 0,18 kW		245-13921-1
20	Drive assy with single-range motor(s) . gear 49:1 0,25 kW		245-13922-1
20.1	Multi-range motors 50/60 Hz 380-420 V / 440-480 V AC flange motor Gear 100:1 0,18 / 0,21 kW		245-13913-1
20.1	Multi-range motors 50/60 Hz 380-420 V / 440-480 V AC flange motors Gear 49:1 0,25 / 0,29 kW		245-13914-1
20.1	Single-range motors 50 Hz 290-500 V / 440-480 V AC flange motor Gear 100:1 0,18 kW		245-13919-1
20.1	Single-range motors 50 Hz 290-500 V / 440-480 V AC flange motor Gear 49:1 0,25 kW		245-13920-1
20.2	Gasket 60x90x0,5		306-19415-1
20.3	Hexagonal screw M 5 x 16C		200-13017-9
20.4	Gear i = 100:1 I = 49:1		246-14145-1 246-14145-2
With-out	Sealing kit consisting of items 1.2, 6.2, 8, 9, 20.2		560-36919-2
With-out	Sealing kit for pump element consisting of: 1 x Outlet stud with check valve, 2 x O-rings 22 x 2, 1 x O-ring 15,3 x 24 1 x Gasket 22,2 x 27 x 1,5	1	560-36903-4

12.2. Free shaft end



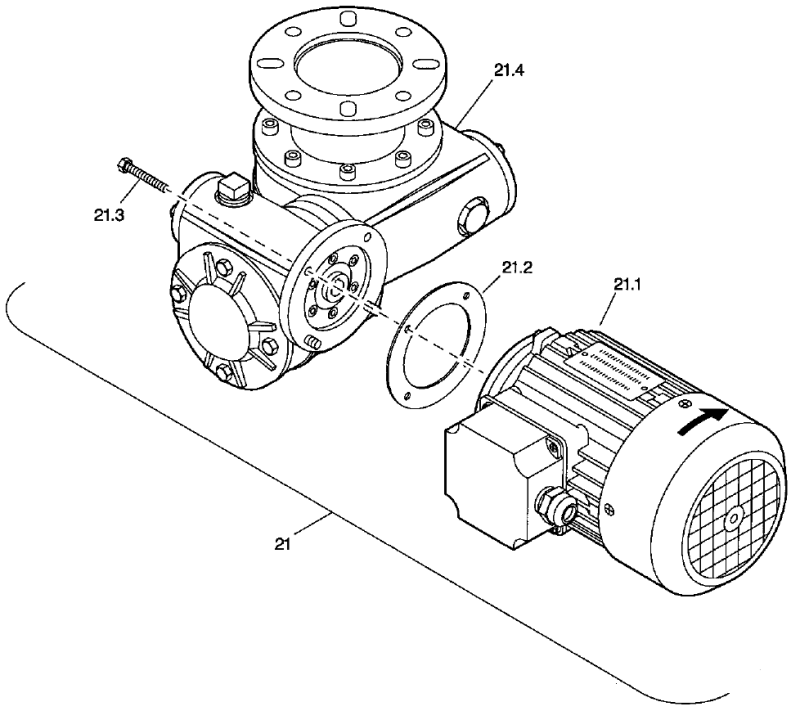
Item	Name	Qty.	Part no.
23	Drive for free shaft end with:		
	Gear i = 7:1	1	660-28645-1
	Gear i = 49:1	1	660-28573-1
	Gear i = 100:1	1	660-28574-1
	Gear i = 490:1	1	660-28572-1
23.1	Rotary shaft seal Ø 15x 35 x 7	1	220-13087-2
23.2	Retaining ring J 35 x 1,5	1	211-12166-6
23.3	Retaining ring A 15 x 1,0	2	211-12164-4
23.4	Angular ball bearing D 15/35 x 15,9	1	250-14003-1
23.5	Feather key A 5 x 5 x 20	1	214-12174-2
23.6	Drive shaft	1	460-24320-1
23.7	Feather key A 4 x 4 x 25	1	214-12173-5
23.8	Bearing flange	1	460-24319-1
23.9	Gasket 60 x 90 x 0,5	1	306-19415-1
23.10	Hexagonal screw M 5 x 16C	4	200-13017-9
23.11	Gear		
	i = 7:1	1	246-14145-4
	i = 49:1	1	246-14145-2
	i = 100:1	1	246-14145-1
	i = 490:1	1	246-14146-1
	Sealing kit consisting of items: 1.2, 6.2; 8, 9, 23.2, 23.9	1	560-36919-1

12.3. Oscillating drive



Item	Name	Qty.	Part no.:
22	Oscillating drive assy.	1	660-28575-1
22.1	Retaining ring A15 x 1,0	1	211-12164-4
22.2	Washer	1	318-19101-1
22.3	O-ring Ø15 x 3	1	219-13045-6
22.4	Ratchet gear housing	1	400-22817-2
22.5	Lever rod	1	402-20129-1
22.6	Ratchet wheel assy.	1	560-36903-2
22.7	Shaft	1	460-24321-1
22.9	Retaining ring J 30 x 1,2	1	211-12165-2
22.10	Grooved ball bearing D12 x 30 x 8	1	250-14000-3
22.11	O-ring Ø 59 x 3	1	219-13045-5
22.12	Brake ring	1	400-22819-2
22.13	Retaining ring A 12 x 1,0	1	211-12164-2
22.14	Gasket 60 x 90 x 0,5	1	306-19415-1
22.15	Bearing flange	1	460-24322-1
22.16	Hexagonal screw M 6 x 20 C	4	200-13022-7
22.17	Hexagonal screw M 5 x 16 C	4	200-13017-9
22.18	Gear 7:1	1	246-14145-4
	Sealing kit consisting of items: 1.2, 6.2, 8, 9, 22.3, 22.11, 22.14	1	560-36919-3

12.4. Double gear M 490:1

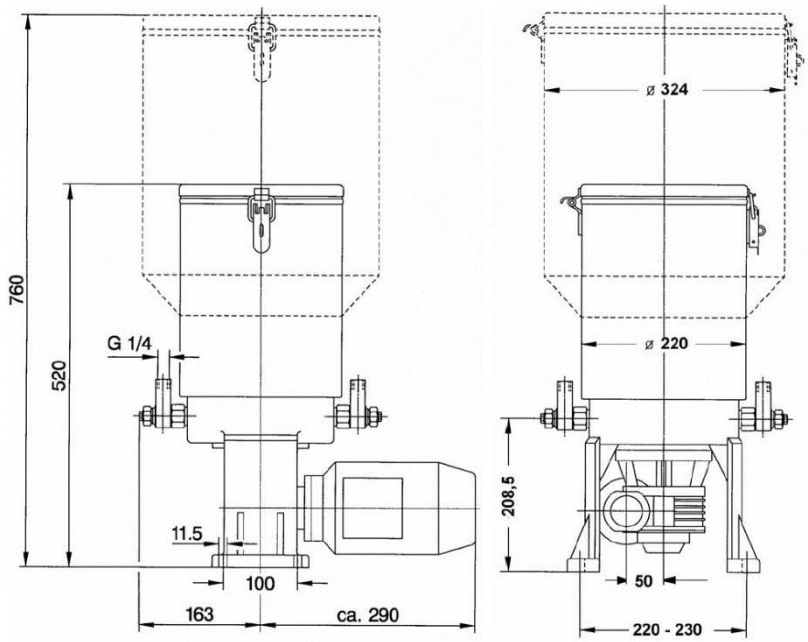


Item	Name	Qty.	Part no.
21	Gear assy.		
	Gear 490:1 motor 0,18 / 0,21 kW 380-420 / 440 – 480 V	1	245-13918-1
	Gear 490:1 motor 0,18 kW 290 / 500 V	1	245-13923-1
21.1	Three-phase flange motor		
	380-420 / 440-480 V, 0,18/0,21 KW, 1500/1800 rpm	1	245-13913-1
	290/500 V, 0,18 KW, 1500 rpm	1	245-13919-1
21.2	Gasket 60 x 90 x 0,5	1	306-19415-1
21.3	Hexagonal screw M 5 x 16 C	4	200-13017-9
21.4	Gear M 490 : 1	1	246-14146-1
	Sealing kit consisting of items: 1.2, 6.2, 8, 9, 20.2	1	560-36919-2

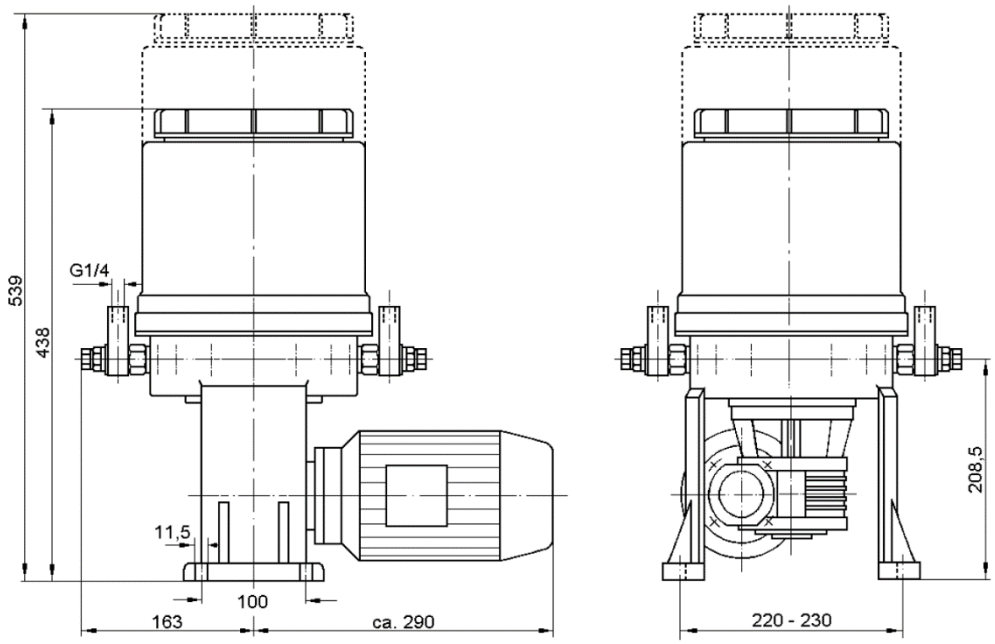
Part numbers – ultrasonic sensor		
Reservoir	4 L	664-85314-1
Reservoir	8 L	664-85314-2
Reservoir	10 L	664-85313-8
Reservoir	30 L	664-85313-9
Reservoir	100 L	664-85315-8

13. Dimensional drawings

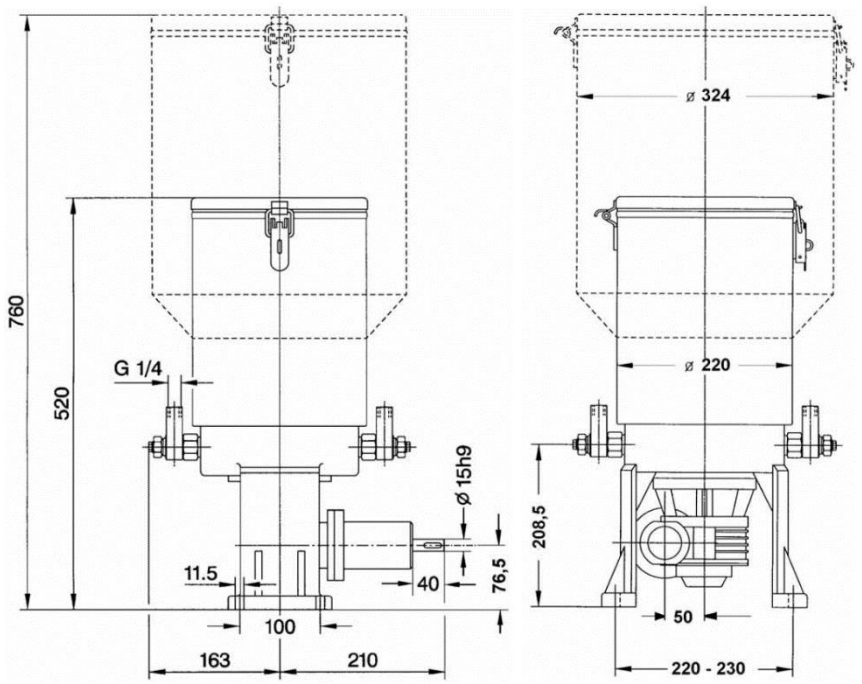
M100 / M049 - 10XN / 10YN / 30XN / 30YN



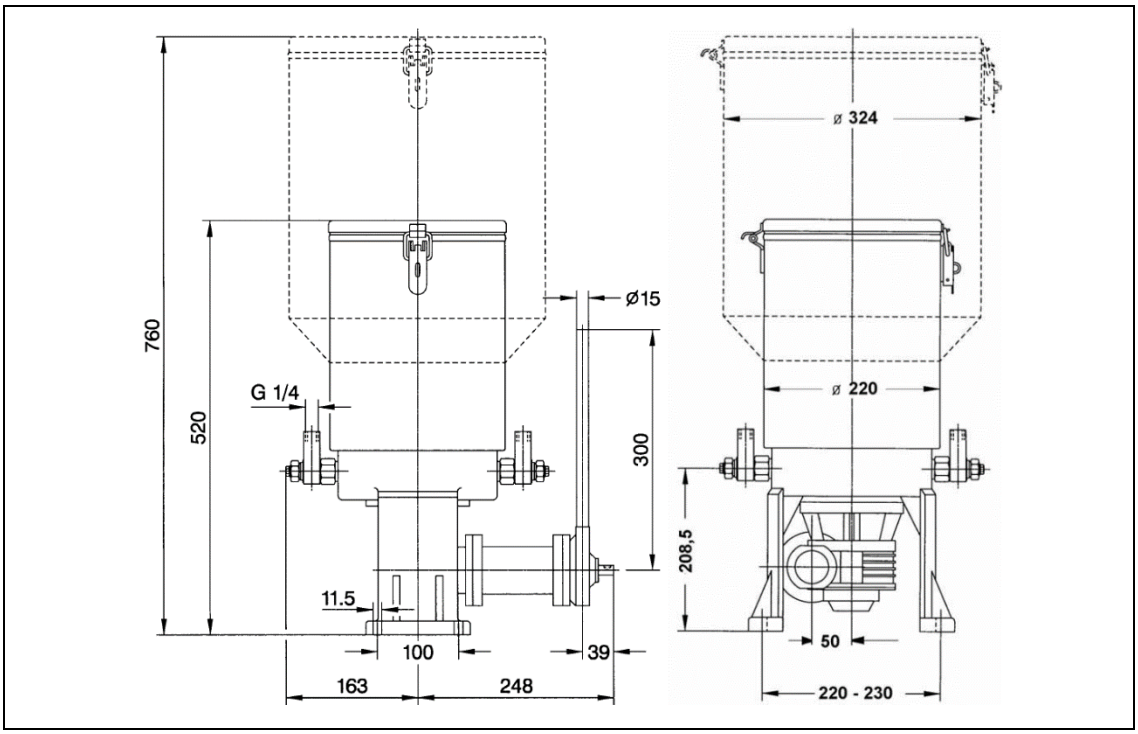
M100 / M049 - 4XN / 8XN



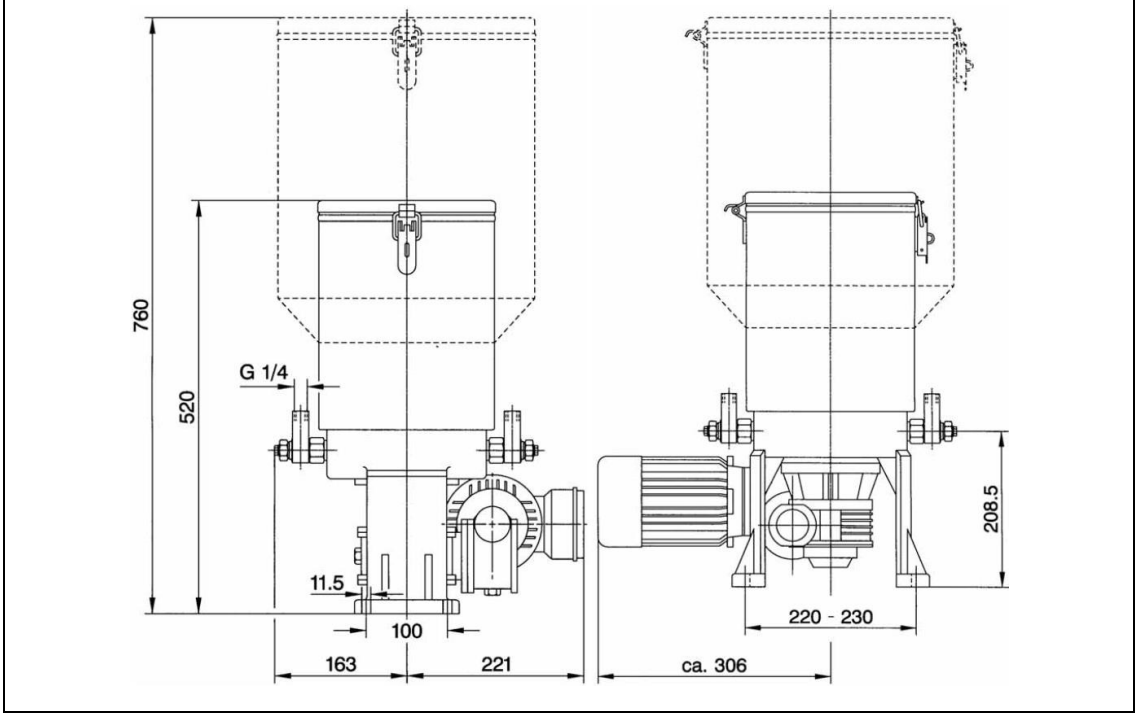
F100 / F049 - 10XN / 10YN / 30XN / 30YN – with free shaft end



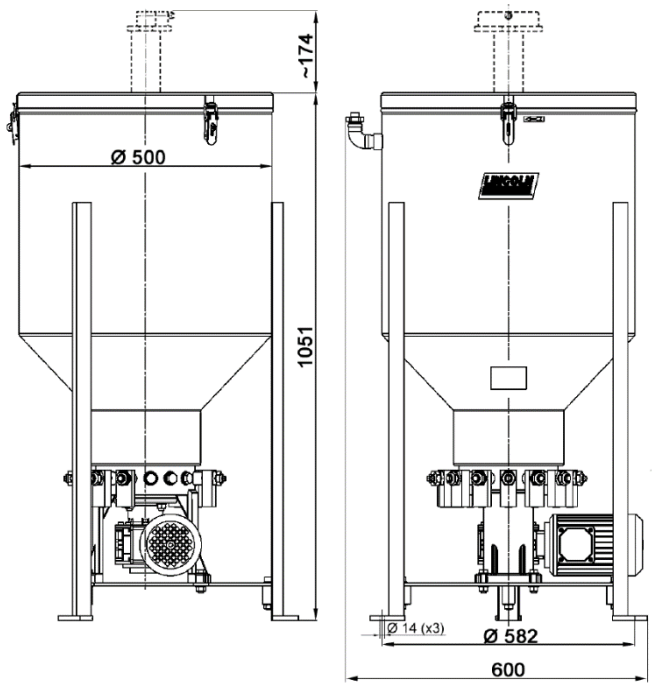
10XN / 10YN / 30XN / 30YN - ... with oscillating drive



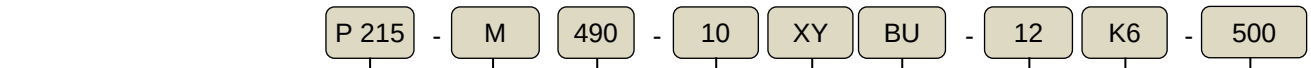
M 490- 10XN / 10YN / 30XN / 30YN - ... with double gear and motor



M100 / M049 – 100XY…



14. Type identification code



Basic pump type

P 215

Drive assy.

M	Three-phase flange motor Additional designations for voltage and frequency are added to the end of the type identification code.
F	Free shaft end
P	Oscillating drive

Gear ratio i

490	i = 490 : 1
100	i = 100 : 1
049	i = 049 : 1
007	i = 007 : 1 (for **P** and **F** drive assemblies only)

Reservoir variations

4	Plastic	4	L
8	Plastic	8	L
10	Steel plate	10	L
30	Steel plate	30	L
100	Steel plate	100	L

XY	Reservoir for grease and oil
N	Reservoir without filling-level monitoring
BU	Reservoir with filling-level monitoring (ultrasonic sensor)

Pump elements

1-15	Number of pump elements
K6 or K7	Piston diameter in mm

Addition to motor designation

380-420	Multi-range motor for power networks380 -420 V / 50 Hz and
440-480	440-480 V / 60 Hz for connections via star connection
500	Single-range motor for power networks 500 V / 50 Hz
000	Pump without motor but with connection flange

SKF Lubrication Systems Germany GmbH
Walldorf Facilities
Heinrich-Hertz-Str. 2-8
DE - 69190 Walldorf
Phone: +49 (0) 6227 33-0
Fax: +49 (0) 6227 33-259
E-mail: Lubrication-germany@skf.com
www.skf.com/lubrication