

Gerotor pumps and pump units of series 143

for SKF CircOil centralized lubrication systems



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Read these instructions before installation or start-up of the product and keep them readily available for later consultation!

Original EC Declaration of Incorporation in accordance with Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer hereby declares at its sole responsibility that the partly completed machinery conforms to the essential health and safety requirements of the Machinery Directive 2006/42/EC, Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.

The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is the manufacturer.

Designation: Gerotor pumps and pump unit for SKF CircOil centralized lubrication systems

Type / item number: 143

Year of manufacture: See type plate

Furthermore, the following directives and standards were applied in the respective applicable areas:

2006/42/EC: Machinery Directive

2011/65/EU: RoHS II

2014/30/EU: Electromagnetic Compatibility

EN ISO 12100:2010

EN IEC 63000:2018

EN 809:1998+A1:2009+AC:2010

EN 60034-1:2010

EN 60204-1:2018

The partly completed machinery must not be put into service until it has been established that the machinery into which it is to be incorporated is in compliance with the provisions of the Machinery Directive 2006/42/EC and all other applicable Directives.

Berlin, 16.03.2023

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Manufacturer: SKF Lubrication Systems Germany GmbH, Motzener Strasse 35/37, 12277 Berlin, Germany

Original UK Declaration of incorporation according to the Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex II

The manufacturer hereby declares under sole responsibility that the partly completed machinery complies with the essential health and safety requirements of UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.

The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR.

Designation: Gerotor pumps and pump unit for SKF CircOil centralized lubrication systems

Type / item number: 143

Year of manufacture: See type plate

Furthermore, the following regulations and standards were applied in the respective applicable areas:

Supply of Machinery (Safety) Regulations 2008 No. 1597

Electromagnetic Compatibility Ordinance 2016 No. 1091

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032

EN ISO 12100:2010

EN IEC 63000:2018

EN 809:1998+A1:2009+AC:2010

EN 60034-1:2010

EN 60204-1:2018

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Appendix to Declaration of Incorporation in accordance with 2006/42/EC, Annex II, No. 1 B

Description of the essential health and safety requirements according to 2006/42/EC, Annex I, which have been applied and fulfilled:

Table 1			
Appendix to Declaration of Incorporation			
No.:	Essential health and safety requirement	Applicable:	Fulfilled:
1.1	Principles		
1.1.2	Principles of safety integration	Yes	Yes
1.1.3	Materials and products	Yes	Not completely fulfilled ¹⁾
1.1.5	Design of machinery to facilitate its handling	Yes	Yes
1.1.6	Ergonomics	Yes	Not completely fulfilled ²⁾
1.2	Control systems		
1.2.1	Safety and reliability of control systems	Yes	Yes
1.2.3	Starting	Yes	Yes
1.2.6	Failure of the power supply	Yes	Yes
1.3	Protection against mechanical hazards		
1.3.1	Risk of loss of stability	Yes	Yes
1.3.2	Risk of break-up during operation	Yes	Not completely fulfilled ³⁾
1.3.4	Risks due to surfaces, edges or angles	Yes	Yes
1.3.7	Risks related to moving parts	Yes	Yes
1.3.9	Risks of uncontrolled movements	Yes	Yes
1.5	Risks due to other hazards		
1.5.1	Electricity supply	Yes	Yes
1.5.6	Fire	Yes	Yes
1.5.8	Noise	Yes	Yes
1.5.13	Emissions of hazardous materials and substances	Yes	Yes
1.5.15	Risk of slipping, tripping, or falling	Yes	Not completely fulfilled ²⁾
1.6	Servicing		
1.6.1	Machinery maintenance	Yes	Yes
1.6.2	Access to operating positions and servicing points	Yes	Not completely fulfilled ²⁾
1.6.4	Operator interventions	Yes	Yes
1.7	Information		
1.7.1	Information and warnings on the machinery	Yes	Yes
1.7.1.1	Information and information devices	Yes	Yes
1.7.2	Warning of residual risks	Yes	Yes
1.7.3	Marking of machinery	Yes	Yes
1.7.4	Operating instructions/assembly instructions	Yes	Yes
1.7.4.1	General principles for the drafting of operating instructions/assembly instructions	Yes	Yes
1.7.4.2	Contents of the operating instructions/assembly instructions	Yes	Yes
1.7.4.3	Sales literature	Yes	Yes

¹⁾ The product is designed for operation with non-hazardous media. The owner-operator must check whether the lubricant used has certain hazardous effects (such as sensitization). The installation of a drip pan could be required.

²⁾ The integrator must ensure that the pump is integrated into the system in such a way that it can be filled and operated ergonomically.

³⁾ The operator must protect the system against excessive pressure. For this purpose, the system must be provided with a pressure limiting valve with suitable opening pressure.

Masthead

Manufacturer

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MO. 63134 USA

- South America -
SKF Argentina Pte. Roca 4145,
CP 2001 Rosario, Santa Fe

Warranty

The instructions contain no statements regarding the warranty or liability for defects. That information can be found in our General Terms of Payment and Delivery.

Training

We conduct detailed training in order to enable maximum safety and efficiency. We recommend taking advantage of this training. For further information, contact your authorized SKF dealer or the manufacturer.

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Safety alerts, visual presentation, and layout

While reading these instructions, you will encounter various symbols, illustrations, and text layouts intended to help you navigate and understand the instructions. Their meaning is explained below.

Safety alerts:

Activities that present specific hazards (to life and limb or possible damage to property) are indicated by safety alerts. Always be sure to follow the instructions given in the safety alerts.

DANGER

These safety alerts indicate an imminent danger. Ignoring them will result in death or serious injury

WARNING

These safety alerts indicate potentially imminent danger. Ignoring them could result in death or serious injury

CAUTION

These safety alerts indicate potentially imminent danger. Ignoring them could result in minor injury

NOTICE

These safety alerts indicate a potentially harmful situation. Ignoring them could result in damage to property or malfunctions

Illustrations:

The illustrations used depict a specific product. For other products, they may have the function of a diagram only. This does not alter the basic workings and operation of the product.

Text layout:

- **First-order bulleted lists:** Items on a bulleted list start with a solid black dot and an indent.
 - **Second-order bulleted lists:** If there is a further listing of subitems, the second-order bulleted list is used.
- 1 **Legend:** A legend explains the numbered contents of an illustration, presented as a numbered list. Items in a legend start with a number (with no dot) and an indent.
 - **Second-order legend:** In some cases, the numbered contents of an image represent more than just one object. A second-order legend is then used.

1. Instruction steps: These indicate a chronological sequence of instruction steps. The numbers of the steps are in bold and are followed by a period. If a new activity follows, the numbering starts again at “1.”

- **Second-order instruction steps:** In some cases, it is necessary to divide up a step into a few substeps. A sequence of second-order instruction steps is then used.

1. Safety instructions

1.1 General safety instructions

- Putting the products into operation or operating them without having read the instructions is prohibited. The operator must ensure that the instructions are read and understood by all persons tasked with working on the product or who supervise or instruct such persons. Retain the instructions for further use.
- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Any faults that could affect safety must be remedied according to responsibility. The supervisor must be notified immediately in case of malfunctions outside one's individual scope of responsibility.
- Unauthorized modifications and changes can have an unpredictable effect on safety and operation. Unauthorized modifications and changes are therefore prohibited. Only original SKF spare parts and SKF accessories may be used.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- The components used must be suitable for the intended use and the applicable operating conditions, e.g. max. operating pressure and ambient temperature range, and must not be subjected to torsion, shear, or bending.

1.2 General electrical safety instructions

- Electrical devices must be kept in proper condition. This must be ensured by periodic inspections in accordance with the relevant applicable standards and technical rules. The type, frequency, and scope of the inspections must be determined in accordance with the risk assessment to be carried out by the operator. Work on electrical components may be performed only by qualified electricians. Connect the electrical power only in accordance with the valid terminal diagram and in observance of the relevant regulations and the local electrical supply conditions.
- Work on electrical components may be performed only in a voltage-free state and using tools suitable for electrical work. Do not touch cables or electrical components with wet or moist hands.
- Fuses must not be bridged. Always replace defective fuses with fuses of the same type.
- Ensure proper connection of the protective conductor for products with protection class I. Observe the specified enclosure rating.
- The operator must implement appropriate measures to protect vulnerable electrical devices from the effects of lightning during use. The electrical device is not furnished with a grounding system for the dissipation of the respective electric charge and does not have the voltage strength necessary to withstand the effects of lightning.

1.3 General behaviour when handling the product

- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Keep unauthorized persons away.
- Wear personal protective equipment always.
- Precautionary operational measures and instructions for the respective work must be observed.
- In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.
- Precautionary operational measures and instructions for the respective work must be observed. Uncertainty seriously endangers safety.
- Safety-related protective and safety equipment must not be removed, modified or affected otherwise in its function and is 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.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

1.4 Intended use

Supply of lubricants.

Spare parts should only be used to replace faulty components of identical construction.

The product is intended solely for installation in another machine.

Use is only permitted within the scope of commercial or economic activity by professional users, in compliance with the specifications, technical data, and limits specified in this manual.

1.5 Persons authorized to use the product

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.

Specialist in electrics

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

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.

1.6 Foreseeable misuse

Any usage of the product other than as specified in this manual is strictly prohibited. Particularly prohibited are:

- Use of non-specified consumables, contaminated lubricants, or lubricants with air inclusions.
- Use of C3 versions in areas with aggressive, corrosive substances (e.g., high salt load).
- Use of plastic parts in areas with high exposure to ozone, UV light, or ionizing radiation.
- Use to supply, convey, or store hazardous substances and mixtures as defined in the CLP Regulation (EC 1272/2008) or GHS with acute oral, dermal, or inhalation toxicity or substances and mixtures that are marked with hazard pictograms GHS01-GHS06 and GHS08.
- Use to supply, convey, or store Group 1 fluids classified as hazards as defined in the Pressure Equipment Directive (2014/68/EU) Article 13 (1) a).
- Use to supply, convey, or store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature.
- Use in an explosion protection zone.
- Use without proper securing against excessively high pressures, in the case of pressurized products.
- Use outside of the technical data and limits specified in this manual.

1.7 Referenced documents

In addition to this manual, the following documents must be observed by the respective target group:

- Company instructions and approval rules

If applicable:

- Safety data sheet of the lubricant used
- Project planning documents
- Supplementary information regarding special designs of the pump. This you will find in the special system documentation.
- Instructions for other components for setting up the centralized lubrication system.

1.8 Prohibition of certain activities

- Replacement of or modifications to the pistons of the pump elements
- Repairs or modifications to the drive
- Alterations to the control circuit board beyond adjustment of lubrication times and interval times or replacement in case of defect
- Alterations to the power supply board beyond replacement in case of defect

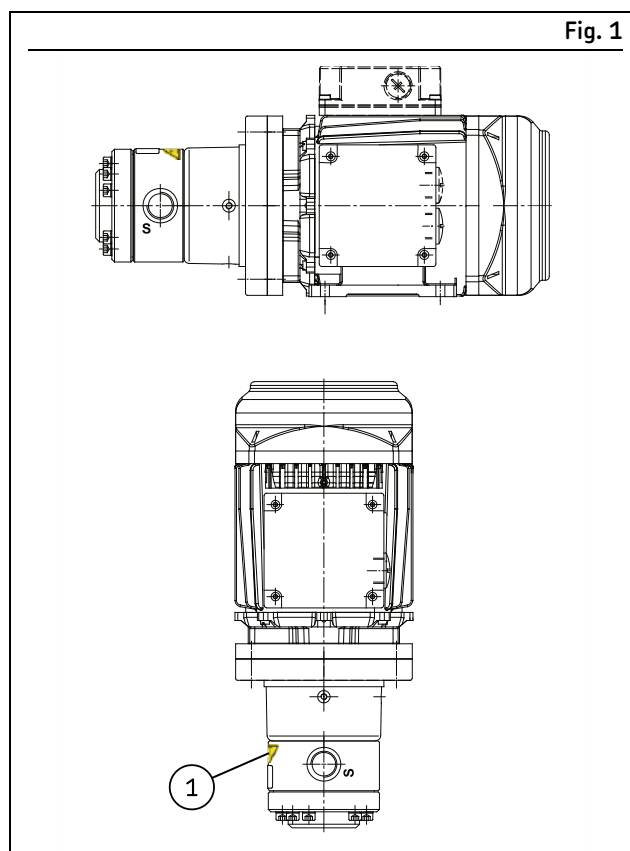
1.9 Painting plastic components and seals

The painting of any plastic components and seals of the products described is prohibited. Completely mask or remove plastic components before painting the main machine.

1.10 Safety markings on the product

A rotation arrow is affixed on the product. On larger pump types (30, 40, 50 l/min), there is also a "Hot surface" sign. Before commissioning, check that these are present and intact.

Immediately replace warning labels if damaged or missing. The product must not be operated until then.



Positioning of the rotation arrow

Table 2		
Safety markings on the product		
No.	Warning label	Designation
1		Hot surface Only on gerotor pumps of the type: • 143-1...R... • 143-1...T... • 143-1...V... Order No.: 951-111-035

No safety markings on the product

NOTE

In accordance with the results of the workstation risk assessment, additional labels (e.g., warnings, safety signs, prohibition signs, or labels in accordance with CLP/GHS) are to be attached by the operator if necessary.

1.11 Note on the type plate

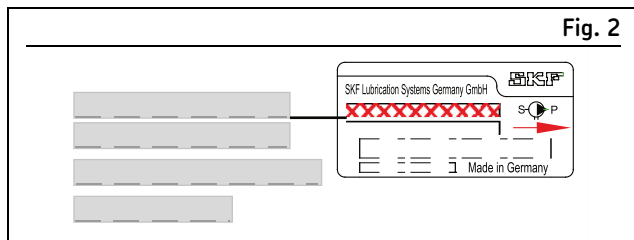
NOTICE

Damage from incorrect direction of rotation

During installation and commissioning, check the direction of gerotor pump rotation based on the rotation arrow (see type plate).

The type plate provides important data such as the type designation, order number, barcode, and serial number. To avoid loss of this data in case the type plate becomes illegible, these characteristics should be entered in the following table.

- Enter key data from type plate in the following table:



Key data from type plate

1.12 Notes on CE marking



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

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

1.13 Note on Low Voltage Directive

The protection objectives of the Low Voltage Directive 2014/35/EU are met in accordance with Annex I, No. 1.5.1 of the Machinery Directive 2006/42/EC.

1.14 Note on UKCA marking



The UKCA conformity marking confirms the product's conformity with the applicable legal provisions of Great Britain.

1.15 Note on EAC marking



The EAC conformity marking confirms the product's conformity with the applicable legal provisions of the Eurasian customs union.

1.16 Note on China RoHS mark



The China RoHS mark confirms that there is no danger to persons or the environment from the regulated substances contained within for the intended period of use (year number shown in the circle).

1.17 Emergency shutdown

This is done by a course of action to be defined by the operator.

1.18 Assembly, maintenance, fault, repair

Prior to the start of this work, all relevant persons must be notified of it. At a minimum, the following safety measures must be taken before any work is done:

- Unauthorized persons must be kept away
- Mark and secure the work area
- Cover adjacent live parts
- Dry any wet, slippery surfaces or cover them appropriately
- Cover hot or cold surfaces appropriately

Where applicable:

- Depressurize
- Isolate, lock and tag out
- Check to ensure live voltage is no longer present
- Ground and short-circuit

The product should be protected as much as possible from humidity, dust, and vibration, and should be installed so that it is easily accessible. Ensure an adequate distance from sources of heat or cold. Any visual monitoring devices present, such as pressure gauges, min./max. markings, or oil level gauges must be clearly visible. Observe the mounting position requirements.

Drill required holes only on non-critical, non-load-bearing parts of the operator's infrastructure. Use existing holes where possible. Avoid chafe points. Immobilize any moving or detached parts during the work. Adhere to the specified torques.

If guards or safety devices need to be removed, they must be reinstalled immediately following conclusion of work and then checked for proper function.

Check new parts for compliance with the intended use before using them.

Avoid mixing up or incorrectly assembling disassembled parts. Label parts. Clean any dirty parts.

1.19 First start-up, daily start-up

Ensure that:

- All safety devices are fully present and functional
- All connections are properly connected
- All parts are correctly installed

- All warning labels on the product are fully present, visible, and undamaged

- Illegible or missing warning labels are immediately replaced

1.20 Residual risks

Residual risks			Table 3
Residual risk	Possible in lifecycle	Avoidance / Remedy	
Electric shock due to defective power lead/mains plug	B C D F G	Before starting up gerotor pump units of SKF series 143, check the power lead/mains plug for damage	
People slipping due to floor contamination with spilled/leaked lubricant	B C D F G H K	• Exercise caution when undoing or connecting the gerotor pump unit's hydraulic connections • Promptly apply suitable binding agents and remove the leaked/spilled lubricant • Follow operational instructions for handling lubricants and contaminated parts	
Tearing/damage to lines when installed on moving machine components	B	If possible, do not perform installation on moving parts. If this cannot be avoided, use flexible hose lines	
Lubrication oil spraying out due to faulty component fitting / faulty line connection	C D	Securely tighten all components with a suitable tool or using the specified torques. Use hydraulic screw unions and lines suitable for the indicated pressures. These must be checked for proper connection and for damage prior to commissioning.	
Electric shock from open electric motor or active energized components	F G	• Disconnect the mains plug (cut power) before performing any work on electrical components • Exercise caution when winding and unwinding the power lead and when operating the gerotor pump unit	
Strong heating of the electric motor due to a motor jam or continuous duty	F G	Turn off the pump motor and let it cool down. Remedy the cause	
Environmental contamination by lubricants and wetted parts.	H K	Dispose of contaminated parts according to the applicable legal/company rules	

Lifecycle phases: A = Transport, B = Assembly, C = First start-up, D = Operation, E = Cleaning, F = Maintenance, G = Malfunction, repair, H = Shutdown, K = Disposal

2. Lubricants

2.1 General information

Lubricants are selected specifically for the relevant application. The manufacturer or operator of the machine should ideally make the selection in consultation with the supplier of the lubricant. If you have no or little experience in selecting lubricants for lubrication systems, please contact us. We would be happy to assist you in selecting suitable lubricants and components to build a lubrication system optimized for your particular application. Consider the following points when selecting/using lubricants. This will spare you potential downtime and damage to the machine or lubrication system.

2.2 Material compatibility

The lubricants must generally be compatible with the following materials:

- Plastics: ABS, CR, FPM, NBR, NR, PA, PET, PMMA, POM, PP, PS, PTFE, PU, PUR
- Metals: steel, gray cast iron, brass, copper, aluminum

2.3 Temperature properties

The lubricant used must be suitable for the specific ambient temperature of the product. The viscosity approved for proper functioning must neither be exceeded at low temperatures nor fall too low at high temperatures. For the approved viscosity, see the "Technical data" chapter.

2.4 Aging of lubricants

Based on past experience with the lubricant used, checks should be conducted at regular intervals defined by the operator, to determine whether the lubricant needs to be replaced due to aging processes (oil separation). In case of doubt regarding the continued suitability of the lubricant, it must be replaced before the system is started up again. If you do not yet have any experience with the lubricant used, we recommend conducting a check after just one week.

2.5 Avoidance of faults and hazards

To avoid faults and hazards, please observe the following:

- When handling lubricants, observe the relevant safety data sheet (SDS) and any hazard labeling on the packaging.
- Due to the large number of additives, some lubricants that meet the pumpability requirements specified in the manual are not suitable for use in centralized lubrication systems.
- Whenever possible, always use SKF lubrication greases. They are ideal for use in lubrication systems.
- Do not mix lubricants. This can have unpredictable effects on the properties and usability of the lubricant.
- Use lubricants containing solid lubricants only after technical consultation with SKF.

- The lubricant's ignition temperature has to be at least 50 kelvin above the maximum surface temperature of the components.

2.6 Solid lubricants

Solid lubricants may only be used after prior consultation with SKF. When solid lubricants are used in lubrication systems, the following rules generally apply:

Graphite:

- Maximum graphite content 8%
- Maximum grain size 25 µm (preferably in lamellar form)

MoS₂:

- Maximum MoS₂ content 5%
- Maximum grain size 15 µm

Copper:

- Lubricants containing copper are known to lead to coatings forming on pistons, bore holes, and mating surfaces. This can result in blockages in the centralized lubrication system.

Calcium carbonate:

- Lubricants containing calcium carbonate are known to lead to very heavy wear on pistons, bore holes, and mating surfaces.

Calcium hydroxide:

- Lubricants containing calcium hydroxide are known to harden considerably over time, which can lead to failure of the centralized lubrication system.

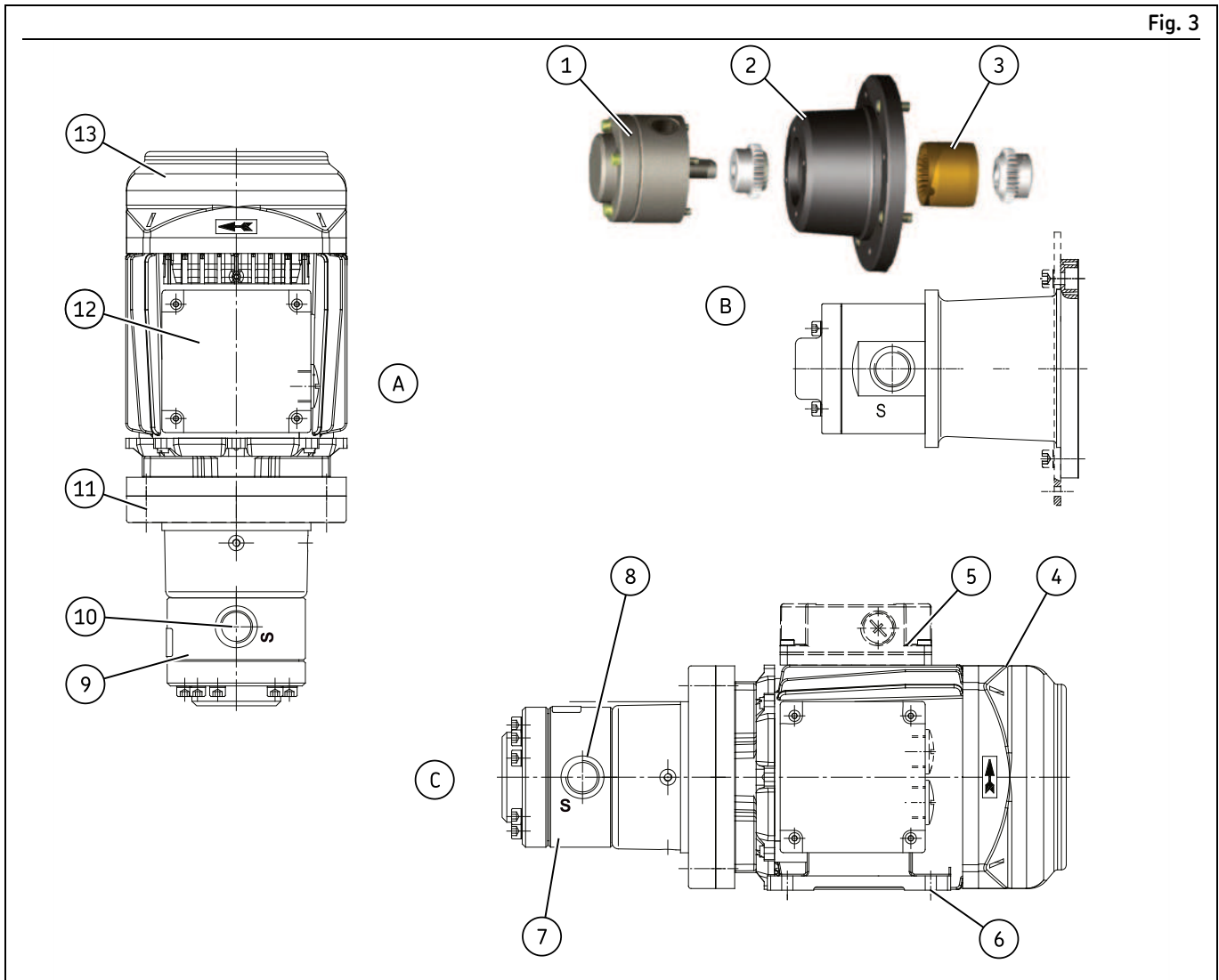
PTFE, zinc, and aluminum:

- For these solid lubricants, it is not yet possible to define any limit values for use in lubrication systems on the basis of existing knowledge and practical experience.

3. Overview, functional description

3.1 Overview

Fig. 3



Overview

Legend to Figure 3:

- 1 Gerotor pump
- 3 Shaft coupling

B Gerotor pump

- 2 Pump flange

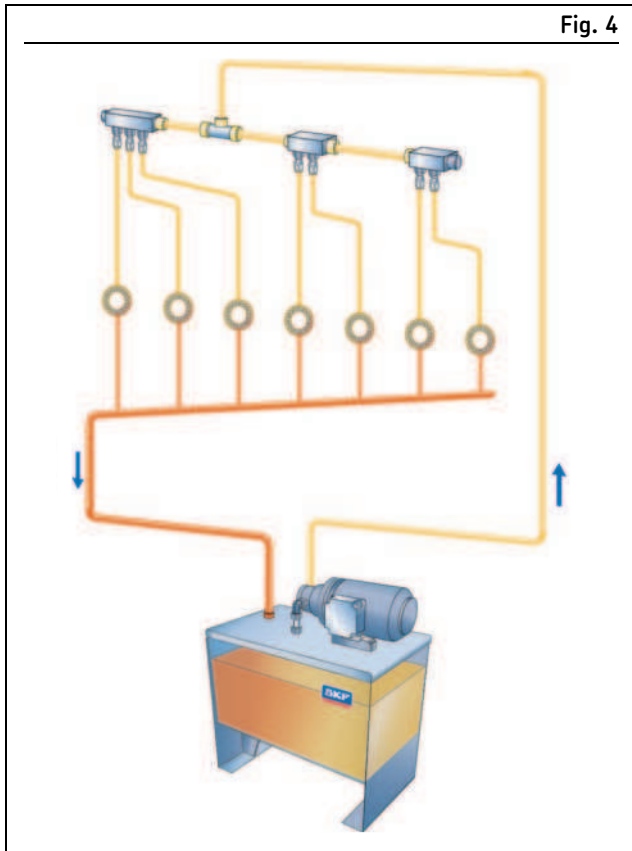
C Gerotor pump unit in foot design

- 4 Electric motor
- 5 Terminal box for electric motor
- 6 Pump foot
- 7 Gerotor pump
- 8 Inlet port (S), opposite the discharge port (P)

A Gerotor pump unit in flange design

- 9 Gerotor pump
- 10 Inlet port (S), opposite the discharge port (P)
- 11 Pump flange
- 12 Terminal box for electric motor
- 13 Electric motor

3.2 General system description



SKF CircOil centralized lubrication system

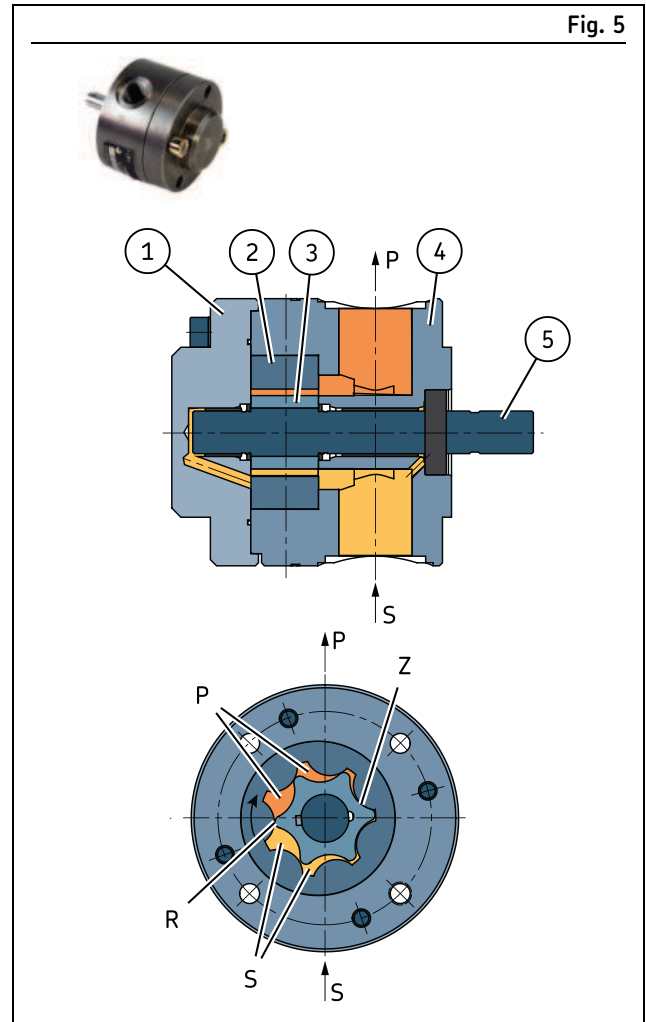
SKF gerotor pump units of product series 143 are used in circulating-oil and total-loss lubrication systems in a flow rate range of 0.85 to 50 l/min.

The standard permissible ambient temperature is between 0 and +40 °C. Higher ambient temperatures are possible, though they lead to a reduction in motor performance and thus the delivery rate. The permissible temperature of the pumped medium is between 0 and +80 °C. The gerotor pumps are available in NBR and FKM (FPM) designs.

SKF gerotor pump units feed lubricating and hydraulic oils from a reservoir and into the pipe system of a centralized lubrication system. In doing so, they increase the energy of the pumped medium (pressure increase) to overcome flow resistance in the pipelines (pressure loss), the components (filters, valves, metering devices), and the bearings and friction points.

SKF gerotor pump units of different types and performance ratings are used depending on the type and size of the centralized lubrication system and on the lubricant: see section 4. Technical data

3.3 Gerotor Pumps



Functional description of a gerotor pump

Legend to Figure 5:

- 1 Lid
- 2 Gerotor (annular gear)
- 3 Positive-displacement element: toothed rotor
- 4 Pump housing
- 5 Shaft

SKF gerotor pumps of product series 143 have a constant delivery volume and a delivery circuit.

The annular-toothed feeding element, also referred to as the gerotor, is equipped with a cycloid contour, which creates a large tooth meshing length. This yields a low volumetric flow pulsation and thus very smooth running, low noise production, and good suction characteristics.

SKF gerotor pumps consist primarily of the pump housing (Fig. 5/4), the shaft (Fig. 5/5), the positive-displacement elements—the toothed rotor (Fig. 5/3) and the annular gear (Fig. 5/2)—and the lid (Fig. 5/1).

Suction and delivery volume process

The shaft drives the centrally mounted toothed rotor in the indicated direction of rotation via a feather key. The toothed

rotor meshes with the outer, eccentrically mounted annular gear and rotates with it. The openings between teeth arising in the suction area (Fig. 5/S) draw the pumped medium in. The suction and pressure areas are separated from the tooth meshing area (Fig. 5/Z) by a radial gap (Fig. 5/R) formed by the tooth profiles of the annular gear and the toothed rotor as they slide onto one another. In the pressure area (the discharge area: Fig. 5/P), the fluid is fed to the discharge port through increasingly small chambers.

3.4 Gerotor pump units



Foot design



Flange design

The gerotor pumps installed in SKF gerotor pump units of series 143 are identical with those described in section 3.3 Gerotor Pumps. They are driven by attached IEC squirrel cage motors of frame sizes 63 to 132.

The motors are designed for a rated motor voltage of 230/400 V or 400/690 V for 50 Hz networks according to DIN IEC 60038. The normal coils used here in motors with

performance < 0.75 kW are designed for the wide voltage range. The normal coils in motors with performance ≥ 0.75 kW are tailor-made and meet the IE2 efficiency level according to EU Directive 2009/125/EC. Special voltage versions with special coils for 50 Hz and 60 Hz networks are available for order.

The standard design of the motors comes with a terminal box. Motors with UL/CSA certification are available. Further certifications are available on request.

NOTE

A detailed explanation of the motor type plates and IEC cage motors is contained in section 15.1 IEC squirrel cage motors

4. Technical data

The technical data for the gerotor pumps/units: see section 4.8 Gerotor pump unit.

The technical data for the gerotor pump units: see section 3.4 Gerotor pump units.

For connection with a frequency of 60 Hz, the speed and the volumetric flow are increased by 20 % (compared to the table specifications, basis 50 Hz).

Delivery rates and characteristic curves

The indicated nominal delivery rates refer to the nominal output multiplied by the speed 1400 or 2800 rpm. The actual delivery rate changes with operating viscosity and back pressure and can be found in the following characteristic curve diagrams. These diagrams are based on viscosity data in the range between 20 and 1000 mm²/s in increments of 20, 140, 750, and 1000 mm²/s.

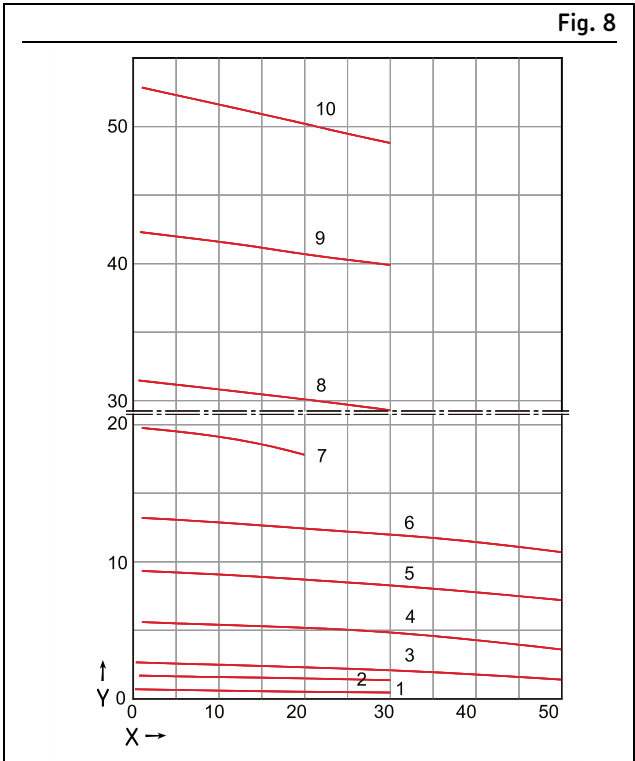
Each gerotor pump has a characteristic curve represented as a function of the delivery rate above the delivery pressure (back pressure). It is important to note that temperature influences can render lubricating and hydraulic oils extremely thin or viscous. Please consult with SKF in advance if you will use lubricating and hydraulic oils with an operating viscosity outside the specified range.

Table 4	
Technical data	
	Value
Flow rate range	0.85 to 50 l/min
Pressure, max.	50 bar
Pumped medium	Lubrication and hydraulic oils with a minimum purity class acc. to ISO 4406 (c) 20/17/14 or US standard NAS code (1638) class 8 or SAE AS 4059 class 8
Operating viscosity	20 to 1000 mm ² /s
Drive speed depending on design	1400 and 2800 rpm
Enclosure rating acc. to DIN 40050 ¹⁾	IP54
Duty type per VDE 0530 ¹⁾	S1
Ambient temperature range	0 to +40 °C
Pumped medium temperature range	0 to +80 °C
Sealing material	NBR, FKM (FPM)
Suction head, max.	1000 mm
Operating noise level	max. 60 dBA
Paint coat	RAL 7024 graphite gray, special varnish available on customer request

Table 4	
Technical data	
	Value
Materials	
Pump housing	Hydraulic cast (pressure-proof) with good wear and antifriction properties
Gerotor insert	Sintered material
Shafts	Low-deformation case-hardened steels
Bearings	SKF plain bearing

¹⁾ Technical data of a gerotor pump unit.

4.1 Dynamic viscosity, characteristics 20 mm²/s, 50 Hz



Legend to Figure 8:

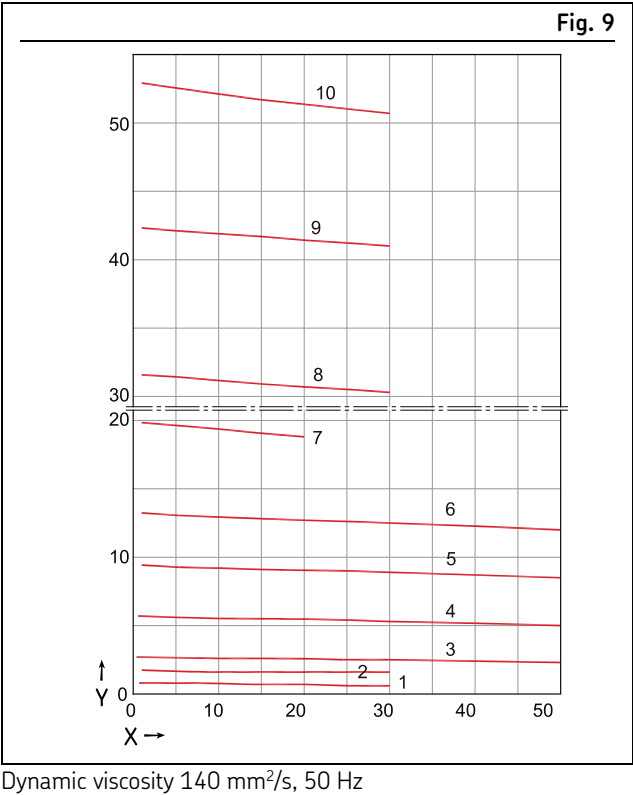
X Back pressure p [bar]
Y Delivery rate Q [l/min]

Table 5

Characteristic curve / delivery volume	
Characteri Delivery volume ¹⁾ stic curve	
1	0.85
2	1.70
3	2.50
4	5.25
5	9.00
6	12.50
7	19.00
8	30.00
9	40.00
10	50.00

¹⁾ Tolerances: VDMA 24284-II

4.2 Dynamic viscosity, characteristics 140 mm²/s, 50 Hz



Legend to Figure 8:

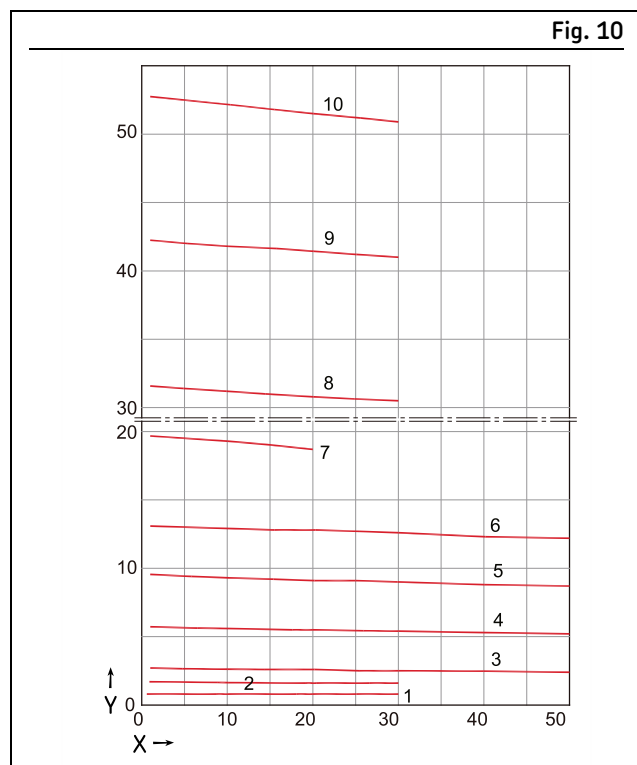
X Back pressure p [bar]
Y Delivery rate Q [l/min]

Table 6

Characteristic curve / delivery volume	
Characteri Delivery volume ¹⁾ stic curve	
1	0.85
2	1.70
3	2.50
4	5.25
5	9.00
6	12.50
7	19.00
8	30.00
9	40.00
10	50.00

¹⁾ Tolerances: VDMA 24284-II

4.3 Dynamic viscosity, characteristics 750 mm²/s, 50 Hz



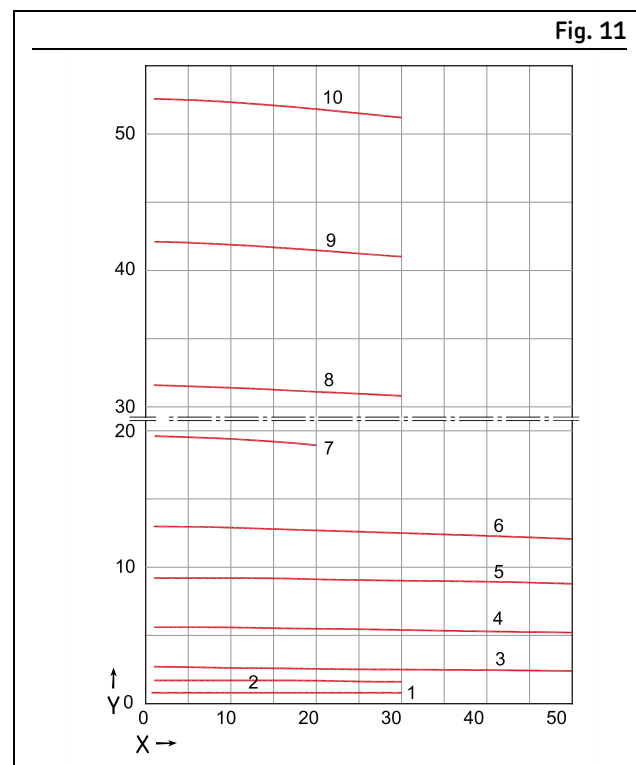
Legend to Figure 10:

X Back pressure p [bar]
Y Delivery rate Q [l/min]

Table 7	
Characteristic curve / delivery volume	
Characteri	Delivery volume ¹⁾
stic curve	
1	0.85
2	1.70
3	2.50
4	5.25
5	9.00
6	12.50
7	19.00
8	30.00
9	40.00
10	50.00

¹⁾ Tolerances: VDMA 24284-II

4.4 Dynamic viscosity, characteristics 1000 mm²/s, 50 Hz



Legend to Figure 10:

X Back pressure p [bar]
Y Delivery rate Q [l/min]

Table 8	
Characteristic curve / delivery volume	
Characteri	Delivery volume ¹⁾
stic curve	
1	0.85
2	1.70
3	2.50
4	5.25
5	9.00
6	12.50
7	19.00
8	30.00
9	40.00
10	50.00

¹⁾ Tolerances: VDMA 24284-II

4.5 Viscosity-temperature relationship of oils with different rated viscosity

NOTE

See also sections 4.6 Viscosity range from 2.6 to 50 mm²/s and 4.7 Viscosity range from 50 to 2000 mm²/s

The curves shown in both figures are based on a viscosity index (VI) of VI ~ 95, approximately corresponding to standard mineral oil.

The viscosity index describes the slope of the curve and thus the viscosity-temperature relationship at temperatures other than +40 °C.

The lines appear straight because a logarithmic scale was selected for the ordinate so that the slope of the curves can be determined easily based on 2 measuring points.

NOTE

The change in the viscosity of oils is disproportionately greater in lower temperature ranges than in higher temperature ranges. For example, an oil with a rated viscosity of 100 undergoes the following viscosity change in different temperature ranges at the same temperature difference; see Table 9.

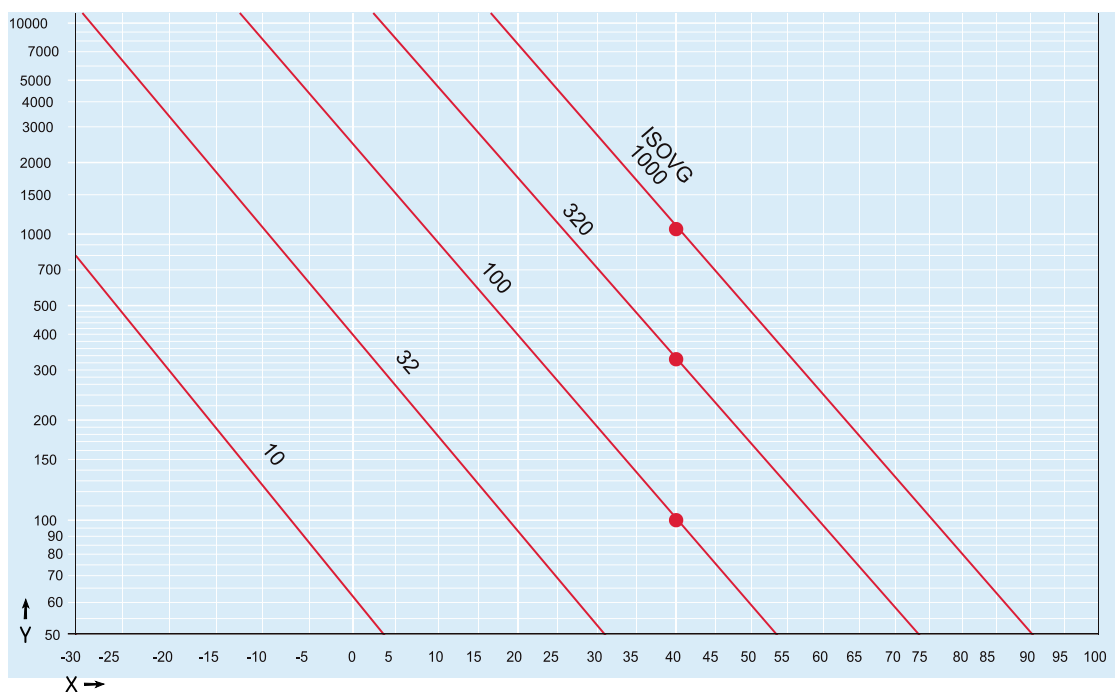
Table 9

Viscosity change:

Temperature	Viscosity change
at +80 °C	18 mm ² /s
at +100 °C	875 mm ² /s
versus:	
at +75 °C	21 mm ² /s
	change of 3 mm ² /s
at +5 °C	1450 mm ² /s
	change of 575 mm ² /s

4.6 Viscosity range from 2.6 to 50 mm²/s

Fig. 12



Viscosity range from 2.6 to 50 mm²/s

Legend to Figure 12:

X Temperature °C

Y Kinetic viscosity ISO VG

Viscosity class *)

ISO VG typically corresponds to

3, 10 Spindle oils

320 Medium-heavy machine oils

ISO VG typically corresponds to

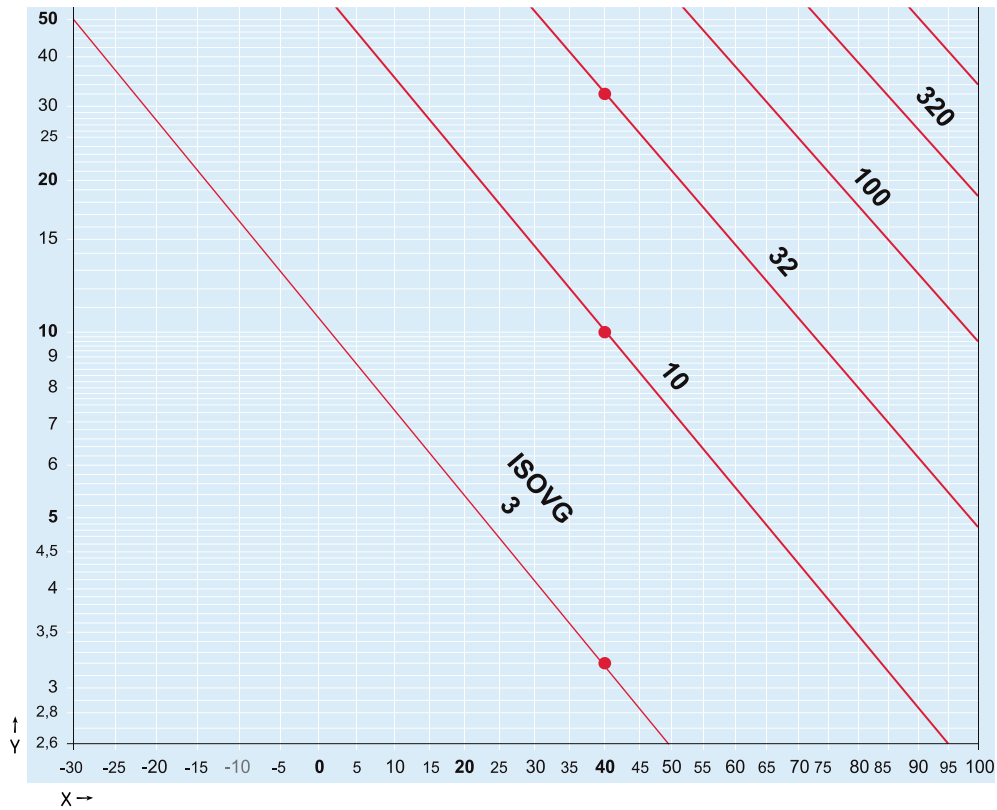
32, 100 Normal machine oils

1000 Gear oil etc.

*) The values correspond to the midpoint viscosity at 40 °C in mm²/s

4.7 Viscosity range from 50 to 2000 mm²/s

Fig. 13



Viscosity range from 50 to 2000 mm²/s

Legend to Figure 12:

X Temperature °C

Y Kinetic viscosity ISO VG

Viscosity class *)

ISO VG typically corresponds to

3, 10 Spindle oils

320 Medium-heavy machine oils

ISO VG typically corresponds to

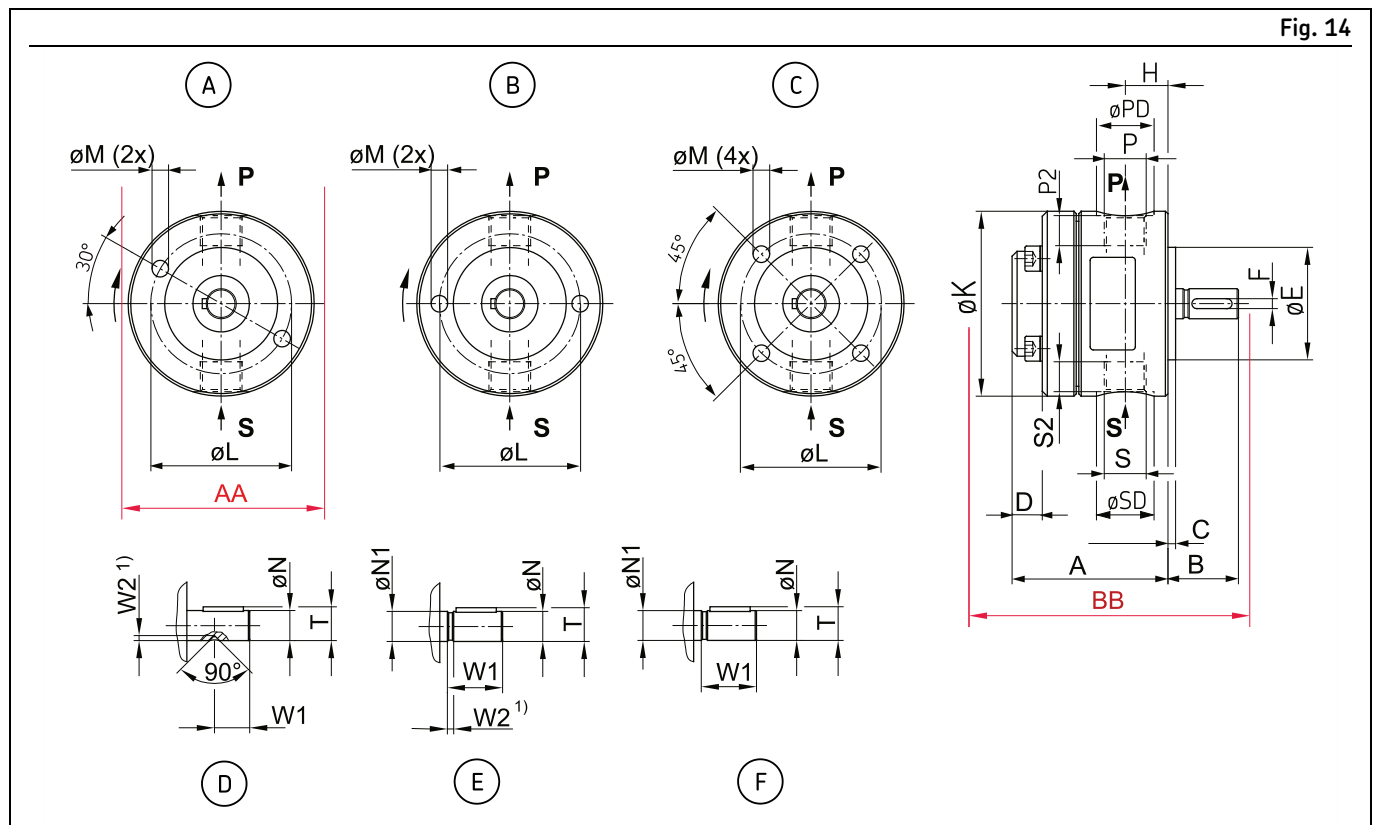
32, 100 Normal machine oils

1000 Gear oil etc.

*) The values correspond to the midpoint viscosity at 40 °C in mm²/s

4.8 Gerotor pump unit

4.8.1 Gerotor pump design, assembly holes and minimum mounting dimensions



Assembly drawing for gerotor pump

Legend to Figure 14:

A Image 1

B Image 2

C Image 3

D Image 4

E Image 5

F Image 6

↻ Direction of rotation

Minimum mounting dimensions

AA Diameter: $\varnothing K + 20 \text{ mm}$

BB Depth: $A + B + 20 \text{ mm}$

¹⁾ For securing the coupling boss in axial direction

Table 10

Technical data

Nominal delivery rate [l/min]	Back pressure max. [bar]	Permiss. operating viscosity range [mm ² /s]	Characteristic curves No.	Nominal delivery volume [cm ³ /U]	Speed [rpm]	Required power consumption [kW]	Suction port S ¹⁾	Pressure port P ¹⁾	$\varnothing PD$ $\varnothing SD$	Design N (NBR) / F (FKM) (FPM)) Order No. ⁴⁾
0.85	30	20-1000	1	0.61	1400	0.18	G1/4	G1/4	19	143-14...B03
1.7	30	20-1000	2	0.61	2800	0.37	G1/4	G1/4	19	143-14...D03
2.5	20	20-1000	3	1.79	1400	0.25	G3/8	G3/8	23	143-14...F02

Table 10

Technical data

Nominal delivery rate [l/min]	Back pressure max. [bar]	Permiss. operating viscosity range [mm²/s]	Characteristic curves No.	Nominal delivery volume [cm³/U]	Speed [rpm]	Required power consumption [kW]	Suction port S ¹⁾	Pressure port P ¹⁾	øPD øSD	Design N (NBR) / F (FKM) (FPM)) Order No. ⁴⁾
2.5	50	20-1000	3	1.79	1400	0.55	G3/8	G3/8	23	143-14...F05
5.25	20	20-1000	4	3.75	1400	0.55	G1/2	G1/2	27	143-14...H02
5.25	50	20-1000	4	3.75	1400	1.1	G1/2	G1/2	27	143-14...H05
9	20	20-1000	5	6.44	1400	0.75	G1/2	G1/2	27	143-14...K02
9	50	20-1000	5	6.44	1400	1.1	G1/2	G1/2	27	143-14...K05
12.5	20	20-1000	6	8.93	1400	0.75	G3/4	G3/4	33	143-14...M02
12.5	50	20-1000	6	8.93	1400	1.5	G3/4	G3/4	33	143-14...M05
19	20	20-1000	7	13.6	1400	1.5	G3/4	G3/4	40	143-14...P02
30	20	20-1000	8	10.74	2800	3	G1	G1	41	143-14...R02
30	30	20-750	8	10.74	2800	3	G1	G1	41	143-14...R03
30	30	20-1000	8	10.74	2800	4	G1	G1	41	143-14...R03
40	20	20-750	9	14.36	2800	3	G1	G1	41	143-14...T02
40	30	20-1000	9	14.6	2800	4	G1	G1	41	143-14...T03
50	20	20-1000	10	17.87	2800	4	G1 ^{1/4}	G1	41	143-14...V02
50	30	20-750	10	17.87	2800	4	G1 ^{1/4}	G1	41 51	143-14...V03
50	30	20-1000	10	17.87	2800	5.5	G1 ^{1/4}	G1	41 51	143-14...V03

Table 11

Technical data (continued)

Nominal delivery rate [l/min]	Dimensions [mm]																Image
	A	B	C	D	øE	F	H	øK	øL	øM	øN	øN1	P2 S2	T	W1	W2	
0.85	49	25	3	9	36 _{h7}	2	12.5	60	48	6.6	8 _{h5}	-	12	8.8	14	2	1/4
1.7	49	25	3	9	36 _{h7}	2	12.5	60	18	6.6	8 _{h5}	-	12	8.8	14	2	1/4
2.5	62	28	3	12	45 _{h7}	4	17	74	56	6.6	12 _{g5}	12 _{g5}	12	13.5	18.5	2.5	2/5
2.5	62	28	3	12	45 _{h7}	4	17	74	56	6.6	12 _{g5}	12 _{g5}	12	13.5	18.5	2.5	2/5
5.25	69	30	3	12.7	56 _{h7}		18.5	88	70	6.6	14 _{g5}	14 _{g5}	14.5	16	20.5	2.5	3/5
5.25	69	30	3	12.7	56 _{h7}	5	18.5	88	70	6.6	14 _{g5}	14 _{g5}	14.5	16	20.5	2.5	3/5
9	77	30	3	12.7	56 _{h7}	5	20	88	70	6.6	14 _{g5}	14 _{g5}	14.5	16	20.5	2.5	3/5
9	77	30	3	12.7	56 _{h7}	5	20	88	70	6.6	14 _{g5}	14 _{g5}	14.5	16	20.5	2.5	3/5
12.5	89	30	3	12.7	56 _{h7}	5	22	88	70	6.6	14 _{g5}	14 _{g5}	16	16	20.5	2.5	3/5
12.5	89	30	3	12.7	56 _{h7}	5	22	88	70	6.6	14 _{g5}	14 _{g5}	16	16	20.5	2.5	3/5
19	100	30	3	21.5	56 _{h7}	5	25	98	80	8.5	16 _{g5}	16 _{g5}	18	18	21.5	2.5	3/5
30	108	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6
30	108	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6
30	108	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6
40	108	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6

Table 11

Technical data (continued)

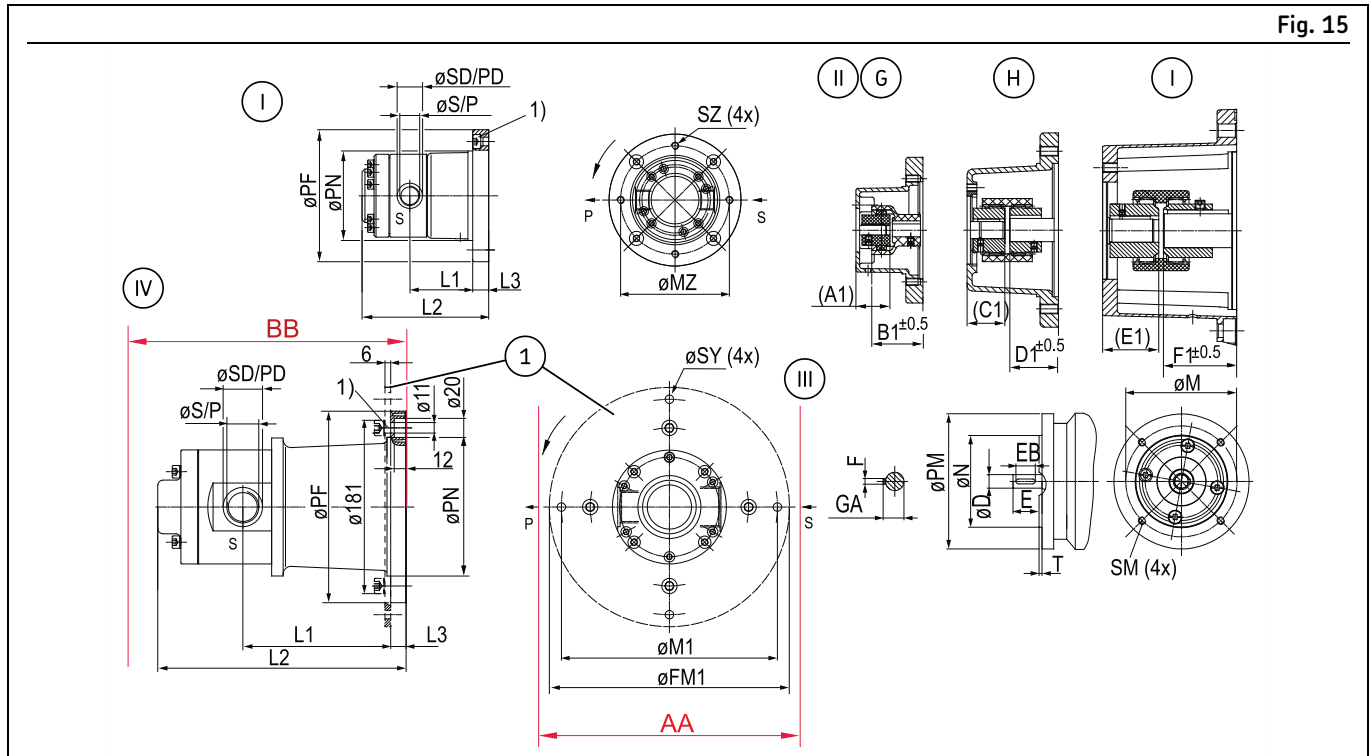
Nominal delivery rate [l/min]	Dimensions [mm]													P2		T	W1	W2	Image
	A	B	C	D	øE	F	H	øK	øL	øM	øN	øN1	S2						
40	108	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6		
50	111	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5	21.5	36.5	-	3/6		
50	111	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5 20.5	21.5	36.5	-	3/6		
50	111	42	4	23.5	80 _{h7}	6	30	119	104	8.5	19 _{g6}	22	18.5 20.5	21.5	36.5	-	3/6		

¹⁾ See P2 / S2 for thread depth for intake port S or pressure port P.

⁴⁾ Supplement the order No. with the code letter for the desired seal design. Seal design NBR (N) or FKM (FPM) (F).

4.8.2 Gerotor pump with pump flange and shaft coupling design, assembly holes and minimum mounting dimensions

Fig. 15



Assembly drawing for gerotor pump with pump flange and shaft coupling

Legend to Figure 15:

- | | | | |
|-----|-------------------------------|----|----------------------------------|
| I | Gerotor pump with pump flange | II | Coupling assembly |
| III | Motor connection | IV | Gerotor pump with mounting plate |
| G | Image 7 | H | Image 8 |
| I | Image 9 | 1 | Mounting plate ²⁾ |
- 1) Supplied detached, tightening torque for:
M6 = 10 Nm ±2,
M8 = 18 Nm ±2,
M10 = 30 Nm ±2

Minimum mounting dimensions

AA Diameter: $\varnothing FM1 + 20 \text{ mm}$ or $\varnothing PF + 20 \text{ mm}$

BB Depth: L2 + 20 mm

²⁾ Mounting plate supplied detached, only for delivery volumes of 30, 40, and 50 l/min.

Table 12

Technical data																				
Design N (NBR) / F (FKM (FPM)) Order No. ²⁾									Dimensions [mm]											
	Image G				Image H		Image I													
	SZ	(A1)	B1	(C1)	D1	(E1)	F1	Frame size	øN	T	øM	SM	øD	E	EB	GA	F			
143-13...B03C	M6	28	42	-	-	-	-	63	80	3	100	M6 _{8 deep}	11 _{j6}	23	18	12.5	4			
143-13...D03E	M8	28	42	-	-	-	-	71	95	3	115	M8 _{12 deep}	14 _{i6}	30	25	16	5			

Table 12

Technical data

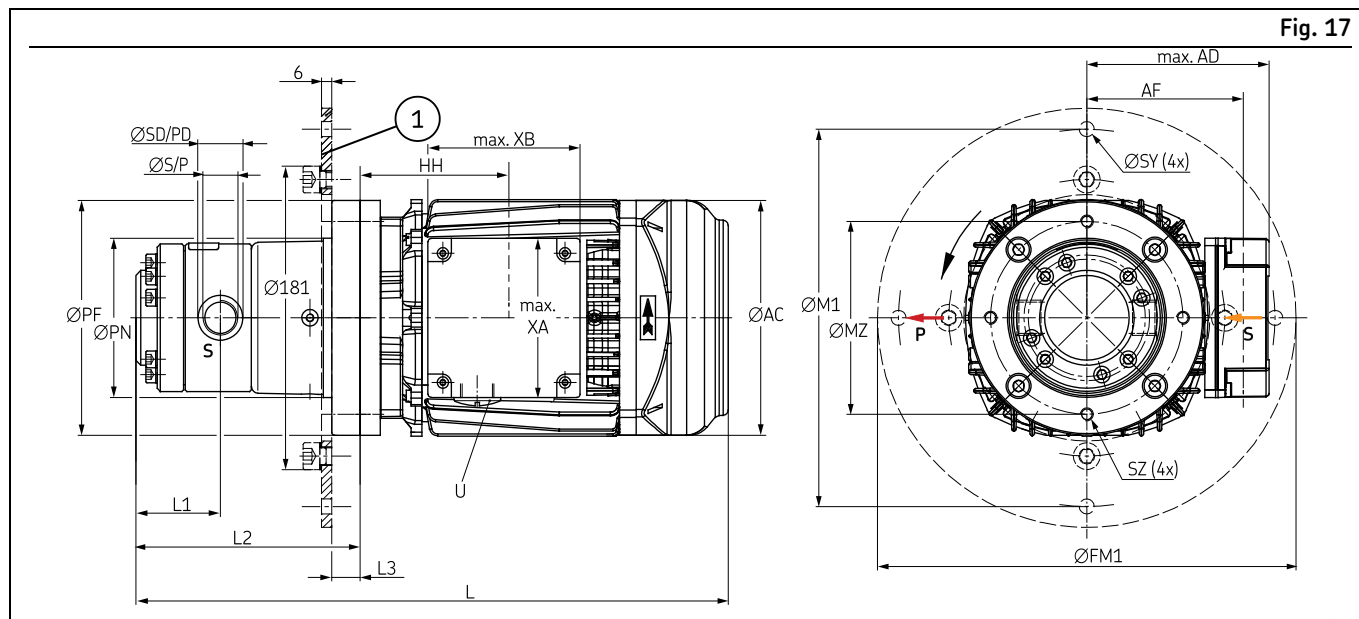
Design N (NBR) / F (FKM (FPM)) Order No. ²⁾	Dimensions [mm]																
	Image G			Image H			Image I										
	SZ	(A1)	B1	(C1)	D1	(E1)	F1	Frame size	øN	T	øM	SM	øD	E	EB	GA	F
143-13...F02D	M8	31	51	-	-	-	-	71	95	3	115	M8 _{12 deep}	14 ₆	30	25	16	5
143-13...F05F	M8	-	-	31	40	-	-	80	110	3.5	130	M8 _{12 deep}	19 ₆	40	32	21.5	6
143-13...H02F	M8	-	-	31	40	-	-	80	110	3.5	130	M8 _{12 deep}	19 ₆	40	32	21.5	6
143-13...H05J	M8	-	-	31	49	-	-	90	110	3.5	130	M8 _{13 deep}	24 ₆	50	40	27	8
143-13...K02H	M8	-	-	31	40	-	-	80	110	3.5	130	M8 _{12 deep}	19 ₆	40	32	21.5	6
143-13...K05J	M8	-	-	31	49	-	-	90	110	3.5	130	M8 _{13 deep}	24 ₆	50	40	27	8
143-13...M02H	M8	-	-	31	40	-	-	80	110	3.5	130	M8 _{12 deep}	19 ₆	40	32	21.5	6
143-13...M05K	M8	-	-	31	49	-	-	90	110	3.5	130	M8 _{13 deep}	24 ₆	50	40	27	8
143-13...P02K	M8	-	-	30	50	-	-	90	110	3.5	130	M8 _{13 deep}	24 ₆	50	40	27	8
143-13...R02M	-	-	-	-	-	46	60	100	100	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...R03M	-	-	-	-	-	46	60	100	100	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...R03N	-	-	-	-	-	46	60	100	100	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...T02M	-	-	-	-	-	46	60	100	100	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...T03N	-	-	-	-	-	46	60	100	100	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...V02N	-	-	-	-	-	46	60	112	112	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...V03N	-	-	-	-	-	46	60		112	3.5	165	M10 _{12 deep}	28 ₆	60	50	31	8
143-13...V03P	-	-	-	-	-	48	88		112	3.5	165	M10 _{12 deep}	38 ₆	80	70	41	10

Table 13

Technical data (continued)

Design N (NBR) / F (FKM (FPM)) Order No. ²⁾	Dimensions [mm]								
	øPF								
	øPM	øPN	L1	L2	L3	øFM1	øM1	øSY	øMZ
143-13...B03C	120	72	53.5	104	14	-	-	-	85
143-13...D03E	140	95	55.5	109	12	-	-	-	115
143-13...F02D	140	95	65	127	17	-	-	-	115
143-13...F05F	160	110	77	137	15	-	-	-	130
143-13...H02F	160	110	78.5	144	15	-	-	-	130
143-13...H05J	160	110	85.5	153	17	-	-	-	130
143-13...K02H	160	110	80	152	15	-	-	-	130
143-13...K05J	160	110	87	161	17	-	-	-	130
143-13...M02H	160	110	82	164	15	-	-	-	130
143-13...M05K	160	110	89	173	17	-	-	-	130
143-13...P02K	160	110	92	184	17	-	-	-	130
143-13...R02M	200	144.6	124	218	16	250	225	9	165
143-13...R03M	200	144.6	124	218	16	250	225	9	165
143-13...R03N	200	144.6	124	218	16	250	225	9	165
143-13...T02M	200	144.6	124	218	16	250	225	9	165

4.9.2 Flange design (IMB14)



Flange design (IMB14)

Legend to Figure 17:

1 Mounting plate (only for delivery rates 30, 40, and 50 l/min.)

4.9.3 Technical data

Table 14

Delivery rate	Back pressure, max.	Viscosity range	Characteristic curve No. ¹⁾	Foot design N (NBR) / F (FKM (FPM)) Order No. ²⁾³⁾	Flange design N (NBR) / F (FKM (FPM)) Order No. ²⁾³⁾
[l/min]	[bar]	[mm ² /s]			
0.85	30	20-1000	1	143-11...B03C-R...	143-12 B03C-X...
1.7	30	20-1000	2	143-11...D03E-R...	143-12...D03E-X...
2.5	20	20-1000	3	143-11...F02D-R...	143-12...F02D-X...
2.5	50	20-1000	3	143-11...F05F-R...	143-12...F05F-X...
5.25	20	20-1000	4	143-11...H02F-R...	143-12...H02F-X...
5.25	50	20-1000	4	143-11...H05J-R...	143-12...H05J-X...
9	20	20-1000	5	143-11...K02H-R...	143-12...K02H-X...
9	50	20-1000	5	143-11...K05J-R...	143-12...K05J-X...
12.5	20	20-1000	6	143-11...M02H-R...	143-12...M02H-X...
12.5	50	20-1000	6	143-11...M05K-R...	143-12...M05K-X...
19	20	20-1000	7	143-11...P02K-R...	143-12...P02K-X...
30	20	20-1000	8	143-11...R02M-R...	143-12...R02M-X...
30	30	20-750	8	143-11...R03M-R...	143-12...R03M-X...
30	30	20-1000	8	143-11...R03N-O...	143-12...R03N-X...
40	20	20-750	9	143-11...T02M-R...	143-12...T02M-X...
40	30	20-1000	9	143-11...T03N-O...	143-12...T03N-X...
50	20	20-1000	10	143-11...V02N-O...	143-12...V02N-X...
50	30	20-750	10	143-11...V03N-O...	143-12...V03N-X...
50	30	20-1000	10	143-11...V03P-R...	143-12...V03P-X...

(continued)

Table 15

Delivery rate [l/min]	Nominal delivery volume [cm ³ /U]	Suction port	Pressure port	Dimensions [mm]						
		S	P	ØPD	ØSD	ØPN	ØPF	ØFM1	ØMZ	ØM1
0.85	0.61	G1/4 12 deep	G1/4 12 deep	19	19	72	120	-	100	-
1.7	0.61	G1/4 12 deep	G1/4 12 deep	19	19	95	140	-	115	-
2.5	1.79	G3/8 12 deep	G3/8 12 deep	23	23	95	140	-	115	-
2.5	1.79	G3/8 12 deep	G3/8 12 deep	23	23	110	160	-	130	-
5.25	3.75	G1/2 14.5 deep	G1/2 14.5 deep	27	27	110	160	-	130	-
5.25	3.75	G1/2 14.5 deep	G1/2 14.5 deep	27	27	110	160	-	130	-
9	6.44	G1/2 14.5 deep	G1/2 14.5 deep	27	27	110	160	-	130	-
9	6.44	G1/2 14.5 deep	G1/2 14.5 deep	27	27	110	160	-	130	-
12.5	8.93	G3/4 16 deep	G3/4 16 deep	33	33	110	160	-	130	-
12.5	8.93	G3/4 16 deep	G3/4 16 deep	33	33	110	160	-	130	-
19	13.6	G1 18 deep	G1 18 deep	40	40	110	160	-	130	-
30	10.74	G1 18.5 deep	G1 18.5 deep	41	41	144.6	200	250	165	225
30	10.74	G1 18.5 deep	G1 18.5 deep	41	41	144.6	200	250	165	225
30	10.74	G1 18.5 deep	G1 18.5 deep	41	41	144.6	200	250	165	225
40	14.36	G1 18.5 deep	G1 18.5 deep	41	41	144.6	200	250	165	225
40	14.36	G1 18.5 deep	G1 18.5 deep	41	41	144.6	200	250	165	225
50	17.87	G11/4 20.5 deep	G1 18.5 deep	41	51	144.6	200	250	165	225
50	17.87	G11/4 20.5 deep	G1 18.5 deep	41	51	144.6	200	250	165	225
50	17.87	G11/4 20.5 deep	G1 18.5 deep	41	51	145	200	250	165	225

¹⁾ → See section 4.1 Dynamic viscosity, characteristics 20 mm²/s, 50 Hz to section 4.4 Dynamic viscosity, characteristics 1000 mm²/s, 50 Hz

²⁾ Supplement the order no. with the code letter for the desired seal design: NBR (N) or FKM (F)

³⁾ Supplement the order no. with the code letter for the desired motor certification and the voltage code: see section 15.2.1 Voltage code

4.9.4 Dimensions

Table 16

SZ	ØSY	L1	L2	L3	A	AA	AB	øAC	AD.	AF	B	BA
M6	-	36.5	104	14	100	22	120	124	107	84.5	80	-
M8	-	36.5	109	12	112	32	138	124	107	84.5	90	-
M8	-	45	127	17	112	24	135	139	115	92	90	-
M8	-	45	137	15	125	30.5	150	159	149.5	112.5	100	32
M8	-	50.5	144	15	125	30.5	150	159	149.5	112.5	100	32
M8	-	50.5	153	17	140	30.5	165	178	154.5	117.5	100	33
M8	-	57	152	15	125	30.5	150	159	149.5	112.5	100	32
M8	-	57	161	17	140	30.5	165	178	154.5	117.5	100	33
M8	-	67	164	15	125	30.5	150	159	149.5	112.5	100	32
M8	-	67	173	17	140	30.5	165	178	154.5	117.5	100	33
M8	-	75	184	17	140	30.5	165	178	154.5	117.5	100	33
Ø11	9	78	218	16	160	42	196	198	166	125.5	140	37.5
Ø11	9	78	218	16	160	42	196	198	166	125.5	140	37.5
Ø11	9	78	218	16	190	46	226	222	177	136.5	140	37.5
Ø11	9	78	218	16	160	42	196	198	166	125.5	140	37.5
Ø11	9	78	218	16	190	46	226	222	177	136.5	140	37.5

Table 16

SZ	ØSY	L1	L2	L3	A	AA	AB	øAC	AD.	AF	B	BA
Ø11	9	81	221	16	190	46	226	222	177	136.5	140	37.5
Ø11	9	81	221	16	190	46	226	222	177	136.5	140	37.5
Ø11	9	81	251	16	216	53	256	262	202	159.5	140	38

(continued)

Table 17

SZ	BB	C	H	HA	HD	HH	K	K1	U	XA	XB	L
M6	95	40	63	7.5	-	61	Ø7	-	1xM25x1.5	92	92	309.5
M8	116	45	71	11	-	61	Ø8	-	1xM25x1.5	90	90	319
M8	114	45	71	8	-	67	Ø7	-	1xM25x1.5	90	90	337
M8	118	50	80	8	229.5	73	9.5	13.5	1xM25x1.5	123	119.5	389
M8	125	50	80	8	229.5	73	9.5	13.5	1xM25x1.5	123	119.5	396
M8	143	56	90	10	244.5	78.5	10	14	1xM25x1.5	123	119.5	450
M8	118	50	80	8	229.5	73	9.5	13.5	1xM25x1.5	123	119.5	439
M8	143	56	90	10	244.5	78.5	10	14	1xM25x1.5	123	119.5	458
M8	118	50	80	8	229.5	73	9.5	13.5	1xM25x1.5	123	119.5	451
M8	143	56	90	10	244.5	78.5	10	14	1xM25x1.5	123	119.5	510
M8	143	56	90	10	244.5	78.5	10	14	1xM25x1.5	123	119.5	521
Ø11	176	63	100	12	266	96.5	12	16	2xM32x1.5	112	135	588.5
Ø11	176	63	100	12	266	96.5	12	16	2xM32x1.5	112	135	588.5
Ø11	176	70	112	12	289	96	12	16	2xM32x1.5	112	135	572
Ø11	176	63	100	12	266	96.5	12	16	2xM32x1.5	112	135	588.5
Ø11	176	70	112	12	289	96	12	16	2xM32x1.5	112	135	572
Ø11	176	70	112	12	289	96	12	16	2xM32x1.5	112	135	575
Ø11	176	70	112	12	289	96	12	16	2xM32x1.5	112	135	575
Ø11	180	89	132	15	-	115.5	12	16	2xM32x1.5	130	155	636

4.10 Product code

Product code:

Product series 143

Model design

- 1** = Motor in foot design (IMB34)
- 2** = Motor in flange design (IMB14)
- 3** = Gerotor pump + pump flange + shaft coupling (without motor)
- 4** = Only gerotor pump (without motor) ¹⁾

Seal design

- F** = FKM (FPM)
- N** = NBR

Code for pump design: see Table 18 "Code for pump design"

Terminal box position ¹⁾ as seen from shaft extension of drive side

- R** = Right (standard)
- O** = Top
- X** = On motor in flange design (**IMB14**), terminal box position on suction port side of pump

Motor certification ¹⁾ (others on request)

- A** = CE (Europe)
- B** = UL / CSA (USA / Canada)

Voltage code ²⁾

See section 15.2.1 Voltage code

¹⁾ Not applicable on designs without motor

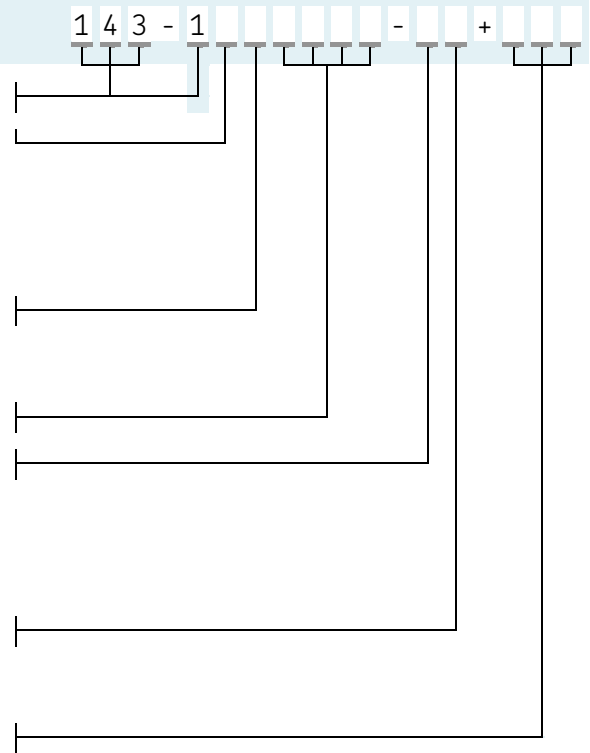


Table 18

Code for pump design

Code ¹⁾	Nominal delivery rate ²⁾	Max. back pressure	Motor drive power	Permissible dynamic viscosity	Frame size	Number of poles
	[l/min]	[bar]	[kW]	[mm ² /s]		
B03C	0.85	30	0.18	20–1000	63	4
D03E	1.70	30	0.37	20–1000	71	2
F02D	2.50	20	0.25	20–1000	71	4
F05F	2.50	50	0.55	20–1000	80	4
H02F	5.25	20	0.55	20–1000	80	4
H05J	5.25	50	1.10	20–1000	90	4
K02H	9.00	20	0.75	20–1000	80	4
K05J	9.00	50	1.10	20–1000	90	4
M02H	12.50	20	0.75	20–1000	80	4
M05K	12.50	50	1.50	20–1000	90	4
P02K	19.00	20	1.50	20–1000	90	4
R02M	30.00	20	3.00	20–1000	100	2
R03M	30.00	30	3.00	20–750	100	2
R03N	30.00	30	4.00	20–1000	112	2
T02M	40.00	20	3.00	20–750	100	2

Table 18

Code for pump design

Code ¹⁾	Nominal delivery rate ²⁾	Max. back pressure	Motor drive power	Permissible dynamic viscosity	Frame size	Number of poles
	[l/min]	[bar]	[kW]	[mm ² /s]		
T03N	40.00	30	4.00	20-1000	112	2
V02N	50.00	20	4.00	20-1000	112	2
V03N	50.00	30	4.00	20-750	112	2
V03P	50.00	30	5.50	20-1000	132	2

¹⁾ With model design 4, the fourth place is omitted, and also the following places of the code

²⁾ Nominal delivery rate at motor speed 1400/2800 rpm acc. to number of motor poles.

4.11 Order example

143-11ND03E-RA+1GD

- Gerotor pump unit of product series 143
- Motor in foot design
- Sealing NBR
- Nominal delivery rate 1.7 l/min
- Back pressure 30 bar
- Motor index 0.37 kW
- Terminal box on right
- Motor certification CE
- 230 / 400 V, 50 Hz
- 460 V, 60 Hz

For orders of gerotor pump + pump flange + shaft coupling (model design 3), there are no code letters for terminal box position, motor certification, or voltage code

Example: **143-13ND03E**

For orders of the gerotor pump (model design 4), there are no code letters for terminal box position, motor certification, or voltage code, or the fourth place of the code for the pump design

Example: **143-14ND03**

5. Delivery, returns, storage

5.1 Delivery

After receipt of the shipment, it must be inspected for any shipping damage and for completeness according to the shipping documents. Immediately inform the transport carrier of any shipping damage. The packaging material must be preserved until any discrepancies are resolved.

5.2 Return shipment

Before return shipment, all contaminated parts must be cleaned. If this is not possible or practical, e.g. if it would impede fault detection in the case of complaints, the medium used must always be specified. In the case of products contaminated with hazardous substances as defined by GHS or CLP regulations, the safety data sheet (SDS) must be sent with the product and the packaging must be labelled in accordance with GHS/CLP. There are no restrictions for land, air, or sea transport. The choice of packaging should be based on the specific product and the stresses to be expected during transport (e.g., necessary anti-corrosion measures in the case of shipment by sea). In the case of wooden packaging, the applicable import regulations and the IPPC standards must be observed. Required certificates must be included in the shipping documents. The following information, as a minimum, must be marked on the packaging of return shipments.



Marking of return shipments

5.3 Storage

The following conditions apply to storage:

- Dry, low-dust, vibration-free, in closed rooms
- No corrosive, aggressive substances at the storage location (e.g., UV rays, ozone)
- Protected against animals (insects, rodents)
- If possible, keep in the original product packaging
- Protected from nearby sources of heat or cold
- In the case of large temperature fluctuations or high humidity, take appropriate measures (e.g., heating) to prevent the condensation of water
- Before usage, check products for damage that may have occurred during storage. This applies in particular to parts made of plastic (due to embrittlement).

5.4 Storage temperature range

For parts not filled with lubricant, the permitted storage temperature is the same as the permitted ambient temperature range (see "Technical data").

5.5 Storage conditions for products filled with lubricant

For products filled with lubricant, the permitted storage temperature range is:

minimum	+ 5 °C	[+41 °F]
maximum	+ 35 °C	[+95 °F]

If the storage temperature range is not maintained, the following steps for replacing the lubricant may not lead to the desired result under certain circumstances.

5.5.1 Storage period up to 6 months

Filled products can be used without implementing additional measures.

5.5.2 Storage period between 6 and 18 months

Pump:

- Connect the pump to a power source
- Switch on the pump and run it until lubricant comes out of every outlet without air bubbles
- Disconnect the pump from the power source
- Remove and dispose of the lubricant that came out

Lines:

- Remove pre-installed lines
- Ensure that both ends of the line are open
- Fill the lines completely with fresh lubricant

Metering devices:

NOTE

Due to the large number of different metering devices, no universally valid statement can be made regarding the removal of the old lubricant and correct bleeding after filling with new lubricant. The instructions can be found in the technical documentation of the specific metering device used.

5.5.3 Storage period more than 18 months

To prevent faults, the manufacturer should be consulted before start-up. The basic procedure for removal of the old lubrication filling corresponds to that for storage periods between 6 and 18 months.

5.6 Declaration of decontamination

If the product came in contact with harmful substances, make sure to thoroughly clean the product before returning it to us. Due to statutory provisions and for the safety of our employees and operation facilities we further need a fully completed and signed "Declaration of decontamination".

6. Assembly

6.1 General

⚠ WARNING



Electric shock

Performing work on products that have not been de-energized may result in serious injury or death

Performing work on products that have not been de-energized may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

⚠ WARNING



System pressure

Injury from working on pressurized system components

Lubrication systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance, or repair work, or any system modifications or system repairs.

⚠ CAUTION



Lubricant coming out

Slipping hazard due to lubricant coming out

Centralized lubrication systems must always be free of leaks. Leaking lubricant is hazardous due to the risk of slipping and injury. Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.

NOTICE

Damage due to radial or axial forces

The gerotor pump must be installed in a stress-free position and it must be ensured it is not subject to any radial or axial forces.

Before assembling/setting up the product, remove the packaging material and any shipping braces (e.g., plugs).

The packaging material must be preserved until any discrepancies are resolved.

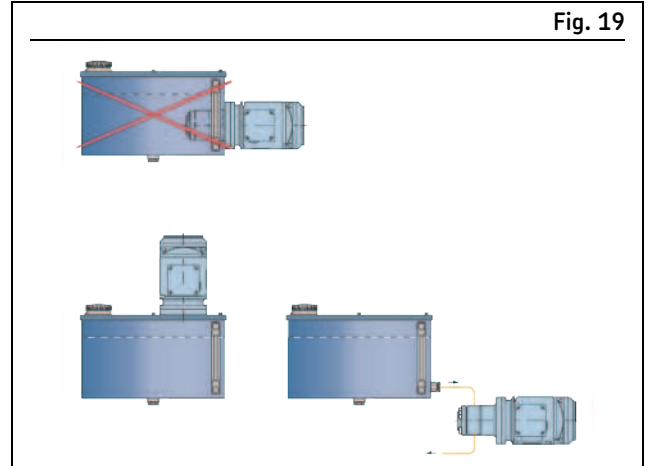
1. Check the gerotor pump/pump unit for any shipping damages and for completeness.

The following must be observed while working on the product:

- All relevant persons (e.g., operating personnel, supervisors) must be informed of the activity prior to the start of work. Precautionary operational measures / work instructions must be observed.
- Take appropriate measures to ensure that moving or detached parts are immobilized during the work and that no body parts can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold.
- Prior to performing work, the product and the machine/system in which the product will be integrated must be de-energized, depressurized and secured against unauthorized activation.
- All work on electrical components may be performed only with voltage-insulated tools.
- Fuses must not be bridged. Always replace fuses with fuses of the same type.
- Ensure proper grounding of the product.
- Drill required holes only on non-critical, non-load-bearing parts.
- Other units of the machine/the vehicle must not be damaged or impaired in their function by the installation of the centralized lubrication system.
- No parts of the centralized lubrication device may be subjected to torsion, shear, or bending.
- Use suitable lifting gear when working with heavy parts.
- Avoid mixing up/incorrectly assembling disassembled parts. Label parts.

6.2 Setup and attachment

Fig. 19



Installation examples

The product should be protected from humidity and vibration and should be mounted so that it is easily accessible, allowing all further installation work to be done without difficulty.

Make sure there is adequate air circulation to prevent the component from overheating.

For the maximum permissible ambient temperature, see chapter 4. Technical data.

The mounting position of the product is as shown in the assembly drawing.

SKF gerotor pump units of product series 143 can be installed either horizontally or vertically, depending on the design.

The gerotor pump units are available in a foot or flange design. Depending on the model, they can be mounted separately from the lubricant reservoir or flanged to a lubricant reservoir.

When set up separately, the suction port of the pump may be connected to a lubricant reservoir that is situated higher (max. 2000 mm).

To flange the gerotor pump unit to a lubricant reservoir horizontally below the oil level, use a sealed pump in a special design. Consult SKF's Service department. A customer-specific electric motor can be connected to the "pump with flange and coupling" design.

The flange allows for the installation of all IEC standard motors with flange according to DIN EN 5034, design FT (with threaded holes). See the drawings for the geometric dimensions of the flange. When installing gerotor pumps without a motor, for example as an integrated/attached pump on a machine housing, ensure that no radial or axial load is applied to its drive shaft.

The pumps can be installed in any position.

6.2.1 Installation instructions

If the pumps are used in systems lacking open delivery lines, pressure limiting valves must be provided to limit the maximum system pressure. The selected cross-section of the intake tube must be equal to or greater than the cross-section of the pump's suction port. SKF recommends the use of filters for trouble-free operation of the pump/pump unit. Effective filtration prevents malfunctions while also increasing the service life of the pump.

A pumped medium of at least the purity class 20/17/14 according to ISO 4406(c) is recommended. This corresponds to the U.S. standard NAS code (1638) class 8 and SAE AS 4059 class 8. A filter rating of approx. 5 to 10 µm meets this requirement.

The filter rating used is always based on the most sensitive component in the entire system. This is not necessarily the pump.

The following applies in general:

- Prior to beginning installation, ensure that the scope of delivery for the gerotor pump is complete and inspect for any damage or corrosion.
- The maximum permissible operating temperature (lubricant temperature) must not be exceeded. Install a heat exchanger if necessary.
- Carefully clean fittings and tubing prior to beginning installation
- Lubricant exiting from the return line must not be immediately resuctioned under any circumstances.
- The intake and return lines in the lubricant reservoir must be below the minimum lubricant level in all operating states. This prevents air and foam from being suctioned.
- It must be ensured that screw unions, connections, and connection elements are leak-free.

- SKF recommends the installation of return line or pressure filters. However, suction filters should only be used in conjunction with electric negative pressure switches or contamination indicators.
- Different lubricants must not be mixed together.
- No radial or axial forces on the pump drive shaft are allowed.
- The motor and pump shafts must be aligned exactly (see instructions from coupling manufacturer).
- Use only couplings suitable for compensating for shaft delivery volumes.
- Gerotor pump according to rotation arrow: see section 1.11 Note on the type plate and section 1.10 Safety markings on the product
- The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.
- Ensure cleanliness; components must be installed without contamination.
- Do not use any cleaning wipes containing lint.
- Existing supply lines must not be damaged by the installation work.
- Other units must not be damaged by assembly work.
- The product must not be installed within range of moving parts.
- The product must be installed at an adequate distance from sources of heat.
- Maintain safety clearances and comply with local regulations for assembly and accident prevention

6.2.2 Information on assembly holes

WARNING



Personal injury / property damage Serious injury or damage due to incorrect assembly holes

Drill assembly holes in such a way that no lines, units, or moving parts are damaged or their function impaired. Maintain safety clearances and comply with regulations for assembly and accident prevention.

NOTE

Observe the technical data: see section 4. Technical data

6.2.3 Minimum mounting dimensions

To ensure enough space for maintenance work and for any disassembly of the product, be sure to comply with the minimum mounting dimensions: see sections 4.8 Gerotor pump unit and 3.4 Gerotor pump units

6.2.4 Installation of the gerotor pump

NOTE

See also section 4.8 Gerotor pump unit

The mounting surface for the gerotor pump must be free of dust particles, machining chips, rust, and paint residue. If necessary, clean this surface prior to flanging.

NOTICE

Damage

Damage from radial or axial loading and from dry running

No radial or axial active forces may occur at the shaft extension of the gerotor pump. The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.

1. Select a flanging surface and assembly threads (M6, M8, or M10) that are suitable for the gerotor pump (see "Gerotor pump design, assembly holes and minimum mounting dimensions" in section 4.8 Gerotor pump unit A to C)
2. Select a fitting (provided by the customer) that is suitable for the coupling assembly of the gerotor pump (see "Gerotor pump design, assembly holes and minimum mounting dimensions" in section 4.8 Gerotor pump unit D to F) and the motor connection (section 6.2.6 Assembly of gerotor pump unit in foot design, type IM B34 "Electrical motor connection") and in accordance with section 15.2.2 Installation drawing and dimensions
3. Clean the flanging surface.

Fastening material in corrosion-protected design:

- Cylinder screws with hexagon socket 4x acc. to DIN EN ISO 4762, M6, M8, or M10, strength class 8.8
- Washers 4x acc. to ISO 7090, ID 6, 8, or 10 mm, strength class 200-HV

NOTE

During subsequent assembly, it must be possible to fit the shaft extension of the pump into the coupling part without difficulty.

4. If necessary, rotate the shaft extension of the gerotor pump again according to the position of the drive slot.
5. Carefully place and align the gerotor pump with pump flange on the flanging surface.
6. Insert the cylinder screws into the pump flange, apply the flange to the installation surface, and tighten gently
7. Align the pump flange and tighten the cylinder screws crosswise to the following tightening torque

M6	10 ±2 Nm
M8	18 ±2 Nm
M10	30 ±2 Nm

8. Remove protective plugs (inlet/outlet)

NOTE

Observe the torque table from the fitting manufacturer (for suction and delivery fittings)

9. Apply the suction and delivery fittings to the gerotor pump and tighten to the torques specified by the fitting manufacturer
10. Check to make sure that the gerotor pump runs smoothly by rotating the drive shaft several times (if possible, turn the drive train by hand)

6.2.5 Installation of the gerotor pump with pump flange and shaft coupling

NOTE

See "Gerotor pump with pump flange and shaft coupling design, assembly holes and minimum mounting dimensions" in section 4.8 Gerotor pump unit

The mounting surface for the gerotor pump with pump flange must be free of dust particles, machining chips, rust, and paint residue

NOTICE

Damage

Damage from radial or axial loading and from dry running

No radial or axial active forces may occur at the shaft extension of the gerotor pump. The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.

1. Select a flanging surface and assembly threads (M6, M8, or M10) that are suitable for the gerotor pump (see figure in section 4.8 Gerotor pump unit "Gerotor pump with pump flange and shaft coupling design, assembly holes and minimum mounting dimensions")
2. Select a fitting (provided by the customer) that is suitable for the coupling assembly of the gerotor pump (see "Gerotor pump with pump flange and shaft coupling design, assembly holes and minimum mounting dimensions" in section 4.8 Gerotor pump unit G to H) and the motor connection (III), and in accordance with section 15.2.2 Installation drawing and dimensions
3. Clean the flanging surface.

Fastening material in corrosion-protected design:

- Cylinder screws with hexagon socket 4x acc. to DIN EN ISO 4762, M6, M8, or M10, strength class 8.8
- Washers 4x acc. to ISO 7090, ID 6, 8, or 10 mm, strength class 200-HV

NOTE

During subsequent assembly, it must be possible to fit the shaft extension of the pump into the coupling part without difficulty.

4. If necessary, rotate the shaft extension of the gerotor pump again according to the position of the drive slot.
5. Carefully place and align the gerotor pump with pump flange on the flanging surface.
6. Insert the cylinder screws into the pump flange, apply the flange to the installation surface, and tighten gently
7. Align the pump flange and tighten the cylinder screws crosswise to the following tightening torque

M6	10 ±2 Nm
M8	18 ±2 Nm
M10	30 ±2 Nm

8. Remove protective plugs (inlet/outlet).

NOTE

Observe the torque table from the fitting manufacturer (for suction and delivery fittings)

9. Apply the suction and delivery screw union to the gerotor pump and tighten with the torque specified by the fitting manufacturer.
10. Check to make sure that the gerotor pump runs smoothly by rotating the drive shaft several times (if possible, turn the drive train by hand).

6.2.6 Assembly of gerotor pump unit in foot design, type IM B34

NOTE

See also section 4. Technical data

NOTICE

Damage

Damage from dry running

The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.

Fig. 20



Gerotor pump unit in foot design

The mounting surface for the gerotor pump unit must be free of dust particles, machining chips, rust, and paint residue. If necessary, clean this surface prior to flanging.

11. Set up the flanging surface and mounting threads (M6, M8, or 10) according to the gerotor pump unit.
12. Clean the flanging surface.

Fastening material provided by customer in corrosion-protected design:

- Hexagon head screws, 4x acc. to DIN EN ISO 4017, M6, M8, or M10, strength class 8.8
- Washers, 4x acc. to ISO 7090, ID 6, 8, or 10 mm, strength class 200-HV

13. Carefully place and align the gerotor pump unit on the flanging surface.

14. • Insert hexagon head screws into the pump feet, apply the feet to the installation surface and tighten gently.

15. Align pump unit, tighten hexagon head screws with following torque:

M6	10 ±2 Nm
M8	18 ±2 Nm
M10	30 ±2 Nm

16. Remove protective plugs (inlet/outlet).

NOTE

Observe the torque table from the fitting manufacturer (for suction and delivery fittings)

17. Apply the suction and delivery screw union to the gerotor pump and tighten with the torque specified by the fitting manufacturer.
18. Check to make sure that the gerotor pump runs smoothly.

6.2.7 Assembly of gerotor pump unit in flange design, type IM B14

NOTE

See also section 4. Technical data

NOTICE

Damage

Damage from dry running

The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.

Fig. 21



Gerotor pump unit in flange design

The mounting surface for the gerotor pump unit must be free of dust particles, machining chips, rust, and paint residue. If necessary, clean this surface prior to flanging.

1. Set up the flanging surface and mounting threads (M6, M8, or 10) according to the gerotor pump unit.
2. Clean the flanging surface.

Fastening material provided by customer in corrosion-protected design:

- Cylinder screws with hexagon socket 4x acc. to DIN EN ISO 4762, M6, M8, or M10, strength class 8.8
- Washers, 4x acc. to ISO 7090, ID 6, 8, or 10 mm, strength class 200-HV

3. Carefully place and align the gerotor pump unit on the flanging surface.
4. Insert the cylinder screws into the flange/mounting plate of the pump unit, apply it to the installation surface, and tighten gently
5. Align the gerotor pump unit and tighten the cylinder screws crosswise to the following tightening torque:

M6	10 ±2 Nm
M8	18 ±2 Nm
M10	30 ±2 Nm

6. Remove protective plugs (inlet/outlet).

NOTE

Observe the torque table from the fitting manufacturer (for suction and delivery fittings)

7. Apply the suction and delivery screw union to the gerotor pump and tighten with the torque specified by the fitting manufacturer.

8. Check to make sure that the gerotor pump runs smoothly.

6.2.8 Electrical motor connection

⚠ WARNING



Electric shock

Disconnect the product from the power supply before any work on electrical components

Electrical connections for the product may only be established by qualified personnel authorized to do so by the operator. The electrical operating conditions and local regulations (e.g., DIN, VDE) in the relevant region must be observed.

NOTICE

Electric shock

Damage to the pump motor

The available line voltage (supply voltage) must match the specifications on the rating plate of the motor or the rating plate of the electrical components. Check the fuse protection of the electrical circuit. Use only fuses with the prescribed amperage,

NOTICE

Property damage

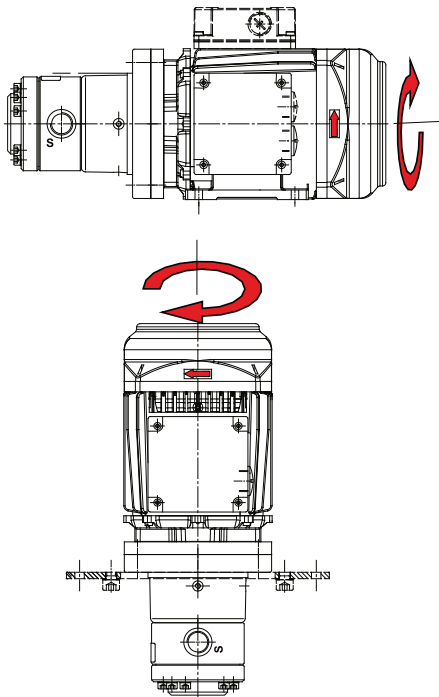
Damage to the pump motor/pump

When establishing electrical connection of the pump motor, be mindful of the correct direction of rotation. The direction of rotation must match the arrow on the motor.

NOTE

A detailed explanation of the motor type plates and IEC cage motors is contained in section 15.1 IEC squirrel cage motors

Fig. 22



Direction of motor rotation

1. Connect the pump unit motor according to the specifications on the motor type plate and the motor characteristics.
2. Connect a suitable motor circuit breaker (provided by customer).
3. Check the direction of motor rotation based on the rotation arrow and the direction of motor fan impeller rotation.

6.3 Lubrication line routing

⚠ WARNING



Environmental pollution Risk of contamination of waterways and soil

Lubrication lines must always be free of leaks. Lubricants can contaminate soil and waterways. Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

NOTICE

Follow the safety instructions!

Follow the safety instructions on the lubricant's safety data sheet

When routing the main lubricant lines and the feed lines, observe the following instructions in order to ensure that the entire centralized lubrication system functions smoothly.

The main lubricant line must be dimensioned in accordance with the maximum operating pressure occurring in the gerotor unit used and the delivery volume of that lubrication unit. If

possible, the main lubricant line should rise upward from the gerotor pump unit and be ventable at the highest point on the lubrication line system.

Lubricant metering devices at the end of the main lubricant line must be installed such that their outlets point upwards. If the system configuration requires that the lubricant metering devices be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line.

The pipes, hoses, shutoff valves and directional control valves, fittings, etc. that will be used must be designed for the maximum operating pressure of the gerotor unit, the permissible temperatures and the lubricants that will be delivered. The lubrication line system also needs to be protected from excessive pressure by means of an overpressure valve.

All components of the lubrication line system such as pipes, hoses, shut-off valves, directional control valves, fittings, etc. must be carefully cleaned before assembly. No seals in the lubrication line system should protrude inwards in a way that disrupts the flow of the lubricant and could allow contaminants to enter the lubrication line system.

Lubrication lines should always be arranged so that air inclusions cannot form anywhere. Avoid changes in the cross-section of the lubrication line from small to large cross-sections in the direction of flow of the lubricant. When the cross-section does change, the transition should be gentle.

The flow of lubricant in the lubrication lines should not be impeded by the incorporation of sharp bends, angle valves, or flap valves. Unavoidable changes in the cross-section in lubrication lines must have smooth transitions. Sudden changes of direction should be avoided if possible.

7. First start-up

NOTICE

Dry running

Damage to the pump

The gerotor pump may only be commissioned and operated with an oil supply; the gerotor pump must not run dry.

NOTICE

Contaminated lubricant

Damage to the pump

Only fill using clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions. The customer's lubricant reservoir must be filled without introducing bubbles.

NOTICE

Insufficient lubricant

Damage due to excessively low or no lubricant

The lubricant level in the lubricant reservoir should be subjected to regular visual inspection. SKF recommends the attachment of a fill level switch to the customer's system.

Inspect all electrical and hydraulic connections before commissioning the gerotor pump or gerotor pump unit.

The intake and return lines in the lubricant reservoir must be below the minimum lubricant level in all operating states.

1. Check the direction of pump rotation based on the rotation arrow.
2. Place an oil pan under the gerotor pump unit: see the operating instructions from the system manufacturer
3. Prefill the pump with filtered lubricant via the suction or pressure port.
4. Vent the pump according to the operating instructions from the system manufacturer.

If switchable or automatic venting is not available, the gerotor pump unit must be manually vented as described below.

5. Switch the centralized lubrication system to pressureless circulation mode according to the operating instructions from the system manufacturer.
6. Prefill the gerotor pump unit with oil and briefly switch the unit on and off (jogging).
7. Repeat the procedure until bubble-free lubricant discharges.
8. Firmly reattach the suction or pressure port.

The process of bleeding the air from the centralized lubrication system can be facilitated by:

9. Filling long pipe sections before connecting to the lubrication points.
10. Filling the lubricant lines

11. Allowing the gerotor pump unit to run until bubblefree and foam-free lubricant discharges at the end of the lubricant lines.

12. Switching off the gerotor pump unit, if necessary

8. Operation

NOTICE

Contaminated lubricant

Damage to the pump

Only fill using clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions. The customer's lubricant reservoir must be filled without introducing bubbles.

NOTICE

Insufficient lubricant

Damage due to excessively low or no lubricant

The lubricant level in the lubricant reservoir should be subjected to regular visual inspection. SKF recommends the attachment of a fill level switch to the customer's system.

8.1 General

The described product functions automatically. The lubricant transport in the lubrication lines should, however, be subjected to regular visual inspection.

The lubricant level in the lubricant reservoir should be subjected to regular visual inspection.

An excessively low lubricant level can lead to a low delivery rate and possible destruction of the pump. Therefore, do not let the lubricant fall below the minimum fill level.

8.2 Recommissioning after downtime

1. Disconnect the delivery line (provided by customer) and prefill the gerotor pump unit.
2. Connect the motor electrically in accordance with section 6.2.6 Assembly of gerotor pump unit in foot design, type IM B34 "Electrical motor connection"
3. Check the direction of motor rotation based on the rotation arrow.
4. Check the fill level of the lubricant.
5. Switch on the gerotor pump unit and recheck the lubricant fill level.

NOTE

A low fill level (=leakage) indicates that there is leakage below the lubricant fill level, while an elevated fill level indicates leakage above the fill level.

6. If the pump/lubrication system are intact => system approval.

9. Maintenance and repair

⚠ WARNING



Electric shock

Performing work on products that have not been de-energized may result in serious injury or death

Assembly, maintenance, and repair work may only be performed by qualified technical personnel on products that have been de-energized. The supply voltage must be switched off before opening any of the product's components.

NOTICE

Contaminated lubricant

Damage to the pump and to machine elements

Only fill using clean lubricant. The purity of the lubricants used is the decisive factor in the service life of the pump and the lubricated machinery elements.

NOTE

Dismantling of the product or individual parts of the product within the statutory warranty period is prohibited and voids any claims

NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited and nullify the statutory warranty.

9.1 General

SKF products are low-maintenance. All connections and fittings must be regularly inspected for proper seating to ensure proper function. If necessary, the product can be cleaned using mild cleaning agents that are compatible with the product's materials (non-alkaline, non-soap). For safety reasons, the product must be disconnected from the power supply. Do not allow any cleaning agent to enter the interior of the product during cleaning. The interior of the product does not need to be cleaned.

The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled into the product. Contact the SKF Service department if this occurs.

SKF shall not be held liable for damages resulting from improperly performed assembly, maintenance, or repair work on the product.

The following must be observed while working on the product:

- All relevant persons (e.g., operating personnel, supervisors) must be informed of the activity prior to the start of work.

Precautionary operational measures / work instructions must be observed.

- Take appropriate measures to ensure that moving or detached parts are immobilized during the work and that no body parts can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold.
- Prior to performing work, the product and the machine/system in which the product will be integrated must be de-energized, depressurized and secured against unauthorized activation.
- All work on electrical components may be performed only with voltage-insulated tools.
- Fuses must not be bridged. Always replace fuses with fuses of the same type.
- Ensure proper grounding of the product.
- Drill required holes only on non-critical, non-load-bearing parts.
- Other units of the machine/the vehicle must not be damaged or impaired in their function by the installation of the centralized lubrication system.
- No parts of the centralized lubrication device may be subjected to torsion, shear, or bending.
- Use suitable lifting gear when working with heavy parts.
- Avoid mixing up/incorrectly assembling disassembled parts. Label parts.

9.2 Maintenance schedule

The maintenance intervals are system-specific and affected by environmental influences such as dust and heat, among other factors.

The maintenance intervals are therefore defined by the system manufacturer.

A maintenance schedule must be drawn up for the safe operation and long service life of gerotor pumps/units. This schedule must ensure that the intended or permissible operating conditions and parameters of the gerotor pump are observed during its service life.

Changes in these parameters indicate wear, for example to the electric motor, the coupling, or the pump. The cause must be immediately determined and remedied.

SKF recommends continuous monitoring of the parameters listed in Table 19 to provide high dependability of the gerotor pump/unit.

The system/gerotor pump must be switched off in case of changes beyond normal fluctuations in the intended operating range.

Plastic components of the drive couplings must be checked according to manufacturer specifications (see the manufacturer's operating and assembly instructions) on a regular basis. Coupling parts should be replaced at least every 5 years. The manufacturer's specifications should be given priority.

Table 19

Maintenance items

Centralized lubrication system operating parameters

Lubricant purity
 Operating temperature range
 Lubricant fill level

Gerotor pump/pump unit operating parameters

Vibration
 Noise
 Pressure differential pump vs. lubricant reservoir
 Foaming in lubricant reservoir
 Leak tightness
 Contamination
 (Cooling fins on electric motor)

Replacement (every 5 years)

Plastic housing drive couplings

10. Cleaning

10.1 Basics

Cleaning should be carried out in accordance with the operator's own company rules, and cleaning agents and devices and the personal protective equipment to be used should likewise be selected in accordance with those rules. Only cleaning agents compatible with the materials may be used for cleaning. Completely remove any cleaning agent residue left on the product and rinse with clear water. Unauthorized persons must be kept away. Use signage to indicate wet areas.

10.2 Interior cleaning

The interior normally does not need to be cleaned. The interior of the product must be cleaned if incorrect or contaminated lubricant accidentally enters the product. Please contact our Service department.

10.3 Exterior cleaning

Do not allow any cleaning fluid to enter the interior of the product during cleaning.

⚠ WARNING



Risk of fatal electric shock



Cleaning work may only be performed on products that have been de-energized first. When cleaning electrical components, be mindful of the IP enclosure rating.

⚠ WARNING



Serious injury from contact with or inhalation of hazardous substances



Wear personal protective equipment. Observe the safety data sheet (SDS) of the hazardous substance. Avoid contaminating other objects or the environment during cleaning.



11. Faults, causes, and remedies

⚠ WARNING



Electric shock

Performing work on products that have not been de-energized may result in serious injury or death

Performing work on products that have not been de-energized may result in serious injury or death.

Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

⚠ WARNING



System pressure

Injury from working on pressurized system components

Lubrication systems are pressurized during operation. Lubrication systems must therefore be depressurized before starting assembly, maintenance, or repair work, or any system modifications or system repairs.

⚠ WARNING



Hot surface

Injury due to hot surfaces on a motor

The hot surface of the pump or motor may cause burns. Motor and pump surfaces may only be touched with appropriate gloves or after the motor has been shut off for an extended time.

NOTE

Dismantling of the product or individual parts of the product within the statutory warranty period is prohibited and voids any claims.

NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited.

The following must be observed while working on the product:

- All relevant persons (e.g., operating personnel, supervisors) must be informed of the activity prior to the start of work. Precautionary operational measures / work instructions must be observed.
- Take appropriate measures to ensure that moving or detached parts are immobilized during the work and that no body parts can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold.
- Prior to performing work, the product and the machine/system in which the product will be integrated must be de-energized, depressurized and secured against unauthorized activation.
- All work on electrical components may be performed only with voltage-insulated tools.
- Fuses must not be bridged. Always replace fuses with fuses of the same type.
- Ensure proper grounding of the product.
- Drill required holes only on non-critical, non-load-bearing parts.
- Other units of the machine/the vehicle must not be damaged or impaired in their function by the installation of the centralized lubrication system.
- No parts of the centralized lubrication device may be subjected to torsion, shear, or bending.
- Use suitable lifting gear when working with heavy parts.
- Avoid mixing up/incorrectly assembling disassembled parts. Label parts.

The following tables provide an overview of possible malfunctions and their causes. Contact the SKF Service department if you cannot remedy the malfunction.

11.1 Gerotor pumps and gerotor pump units

Table 20

Fault table		
Fault	Cause	Remedy
Gerotor pump / gerotor pump unit does not convey or draw lubricant	• Air inlet/lubricant below the intake manifold • Pump not vented • Non-approved lubricant • Coupling loose or defective • Incorrect direction of pump rotation	• Refill lubricant, and bleed the gerotor pump/unit accordingly: see section 7. First start-up • Vent gerotor pump/unit as described in section 6.2. • Select the lubricant in accordance with the "Technical data" section. • Check the coupling and adjust or replace if necessary. • Check direction of rotation, correct if necessary.
Gerotor pump / gerotor pump unit runs too loud	• Incorrect direction of pump rotation • Air entering through defective fittings, tubes, or seals • Vortex in the suction area of the lubricant reservoir • Lubricant temperature is below -20 °C • Incorrect viscosity range of lubricant	• Check direction of rotation, correct if necessary. • Check the centralized lubrication system and gerotor pump/unit for leaks, replace defective parts if needed, and bleed the gerotor pump/unit accordingly: see section 7. First start-up • Refill lubricant, and bleed the gerotor pump/unit accordingly: see section 7. First start-up • Establish an appropriate lubricant temperature (heat if necessary). • Use approved lubricant.
Interfaces are leaky	• Sealing face is contaminated or damaged • Defective screw union • O-ring on gerotor pump is defective	• Clean the sealing face and ensure that it is intact. • Retighten the screw union, replace if necessary. • Replace the gerotor pump/unit.
Interfaces are leaky	• Improper assembly • Incorrect mounting screws	• Remove and reinstall the gerotor pump/unit. • Check the length of assembly screws, replace with shorter screws if necessary.
Pumped medium is too hot	• Incorrect viscosity < 20 mm²/s • Aged lubricant	Use only approved lubricant; see operating instructions for viscosity tables: see section 4. Technical data and 15.1 IEC squirrel cage motors
Lubricant temperature is too low	• Incorrect viscosity > 1000 mm²/s • Refilling with different lubricants	
Volumetric or mechanical efficiency is not achieved	• Incorrect viscosity	
Gerotor pump units		
Motor circuit breaker flips	• Incorrect drive motor used • Fan slots on drive motor clogged • Gerotor pump jammed	• Replace the drive motor. • Clean the fan slots. • Replace the gerotor pump.

12. Repairs

**WARNING**



Risk of injury
At a minimum, the following safety measures must be taken before any repairs:



- Unauthorized persons must be kept away
- Mark and secure the work area
- Depressurize the product
- Isolate the product, and lock and tag it out
- Check to ensure live voltage is no longer present
- Ground and short-circuit the product
- Cover any adjacent live parts

13. Shutdown, disposal

13.1 Temporary shutdown

Temporary shutdowns should be done by a course of action to be defined by the operator.

13.2 Permanent shutdown, disassembly

Permanent shutdown and disassembly of the product must be planned properly by the operator and conducted in compliance with all applicable laws and regulations.

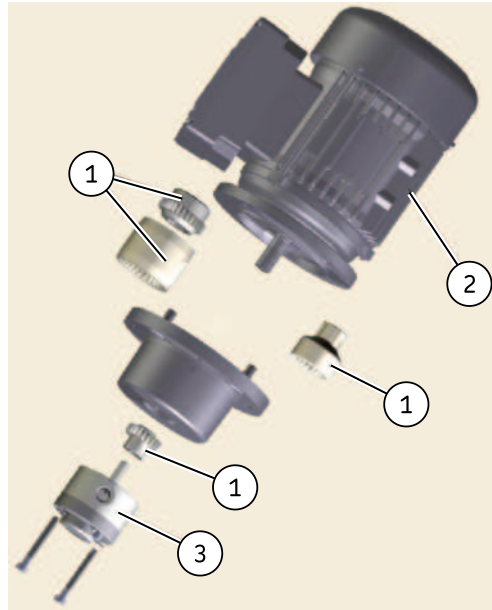
13.3 Disposal

The waste producer/operator must dispose of the various types of waste in accordance with the applicable laws and regulations of the country in question.

14. Spare parts

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

Fig. 23



Spare parts

Legend to Figure 23:

- 1 Coupling, complete
- 2 Motor
- 3 Pump

Table 21

Gerotor pump unit ¹⁾	Pump ¹⁾	Coupling, complete ²⁾	Motor
143-11...B03C-RA+1GD	143-14...B03	995-000-350	178-V12CC-M1RA+1GD
143-12...B03C-XA+1GD	143-14...B03	995-000-350	178-S22CC-M1XA+1GD
143-11...D03E-RA+1GD	143-14...D03	995-000-351	178-V12DD-M1RA+1GD
143-12...D03E-XA+1GD	143-14...D03	995-000-351	178-S21ED-M1XA+1GD
143-11...F02D-RA+1GD	143-14...F02	995-000-353	178-V12DD-M1RA+1GD
143-12...F02D-XA+1GD	143-14...F02	995-000-353	178-S22DD-M1XA+1GD
143-11...F05F-RA+1GD	143-14...F05	995-000-354	178-S12FE-M1RA+1GD
143-12...F05F-XA+1GD	143-14...F05	995-000-354	178-S22FE-M1XA+1GD
143-11...H02F-RA+1GD	143-14...H02	995-000-356	178-S12FE-M1RA+1GD
143-12...H02F-XA+1GD	143-14...H02	995-000-356	178-S22FE-M1XA+1GD
143-11...H05J-RA+1GD	143-14...H05	995-000-357	178-S12JE-M1RA+1GD
143-12...H05J-XA+1GD	143-14...H05	995-000-357	178-S22JE-M1XA+1GD
143-11...K02H-RA+1GD	143-14...K02	995-000-356	178-S12HE-M1RA+1GD
143-12...K02H-XA+1GD	143-14...K02	995-000-356	178-S22HE-M1XA+1GD
143-11...K05J-RA+1GD	143-14...K05	995-000-357	178-S12JE-M1RA+1GD

Table 21

Gerotor pump unit ¹⁾	Pump ¹⁾	Coupling, complete ²⁾	Motor
143-12...K05J-XA+1GD	143-14...K05	995-000-357	178-S22JE-M1XA+1GD
143-11...M02H-RA+1GD	143-14...M02	995-000-356	178-S12HE-M1RA+1GD
143-12...M02H-XA+1GD	143-14...M02	995-000-356	178-S22HE-M1XA+1GD
143-11...M05K-RA+1GD	143-14...M05	995-000-357	178-S12KE-M1RA+1GD
143-12...M05K-XA+1GD	143-14...M05	995-000-357	178-S22KE-M1XA+1GD
143-11...P02K-RA+1GD	143-14...P02	995-000-358	178-S12KE-M1RA+1GD
143-12...P02K-XA+1GD	143-14...P02	995-000-358	178-S22KE-M1XA+1GD
143-11...R02M-RA+1GD	143-14...R02	995-000-359	178-S11MF-M1RA+1GD
143-12...R02M-XA+1GD	143-14...R02	995-000-359	178-S21MF-M1XA+1GD
143-11...R03M-RA+1GD	143-14...R03	995-000-359	178-S11MF-M1RA+1GD
143-12...R03M-XA+1GD	143-14...R03	995-000-359	178-S21MF-M1XA+1GD
143-11...R03N-OA+1GD	143-14...R03	995-000-359	178-S11NF-M10A+1GD
143-12...R03N-XA+1GD	143-14...R03	995-000-359	178-S21NF-M1XA+1GD
143-11...T02M-RA+1GD	143-14...T02	995-000-359	178-S11MF-M1RA+1GD
143-12...T02M-XA+1GD	143-14...T02	995-000-359	178-S21MF-M1XA+1GD
143-11...T03N-OA+1GD	143-14...T03	995-000-359	178-S11NF-M10A+1GD
143-12...T03N-XA+1GD	143-14...T03	995-000-359	178-S21NF-M1XA+1GD
143-11...V02N-OA+1GD	143-14...V02	995-000-359	178-S11NF-M10A+1GD
143-12...V02N-XA+1GD	143-14...V02	995-000-359	178-S21NF-M1XA+1GD
143-11...V03N-OA+1GD	143-14...V03	995-000-359	178-S11NF-M10A+1GD
143-12...V03N-XA+1GD	143-14...V03	995-000-359	178-S21NF-M1XA+1GD
143-11...V03P-RA+1GD	143-14...V03	995-000-360	178-S11PF-M1RA+1GD
143-12...V03P-XA+1GK	143-14...V03	995-000-360	178-S21PF-M1XA+1GK

¹⁾ Supplement the order no. with the code letter for the desired seal: NBR design (N) or FKM design (F)

²⁾ It is recommended that coupling parts always be replaced completely.

Table 22

Other spare parts	
Designation	Order No.
Doc. package	951-170-251-01
Rotation arrow	760-072

15. Appendix

15.1 IEC squirrel cage motors

15.1.1 Fundamentals

General

The standard design of SKF gerotor pump units of product series 143 is driven by IEC asynchronous cage motors. The motors are used in frame sizes 63 to 132, in 2-pole and 4-pole designs. They meet the relevant IEC/EN standards both mechanically and electrically. The standard design of the motors comes with a metal terminal box. The motors bear a CE marking in accordance with Low Voltage Directive 2014/35/EU. There is no CE marking with respect to Machinery Directive 2006/42/EC and EMC Directive 2014/30/EU because asynchronous motors do not fall under the scope of these Directives.

Special provisions

The motors can be ordered in a UL- and CSA-compliant design and are approved by UL (Underwriter Laboratories). These motors have an electrical design according to NEMA MG1-12 and satisfy the required NEMA efficiency classes. The UL certification is recorded on the rating plate of the motor. Further certifications are available on request.

Types

The motors are used exclusively in the types IM B34 and IM B14.

The type is indicated according to Code I, DIN EN 60034-7 on the rating plate.

IM B34: Shaft horizontal, feet on floor

IM B14: Shaft horizontal, no feet

Rated voltage, frequency, and power

The motors are designed standard for a rated motor voltage of 230 V, 400 V, or 690 V for 50 Hz networks (normal coils) according to IEC38. Motors for other voltages and frequencies (special coils) are available at extra charge.

According to EN 60034-1, the permissible operating voltage deviation in the specified rated motor voltages and special voltages is $\pm 5\%$ for zone A (continuous duty) and $\pm 10\%$ for zone B (short-time duty). The permissible frequency deviation is $\pm 2\%$ for zone A and $-5\% / +3\%$ for zone B. The tolerances according to EN 60034-1 are maintained at supply voltages on the order of 95 % or 105 % of the rated motor voltage. Further, motor heating may exceed the permissible temperature limit by 10 K. The specified percentages for the permissible voltage and frequency deviations are not stamped on the rating plate of a motor. The presence of the CE marking and the EN 60034 standard on the rating plate of a motor indicate that the motor manufacturer observed those specifications when designing the motor.

The motors are designed for a rated motor voltage of 230/400 V or 400/690 V for 50 Hz networks according to DIN IEC 60038. The standard-compliant windings used for this purpose are tailor-made windings. Motors with output $\leq$

0.75 kW are efficiency class IE2 per EU standard 2009/125/EC and Regulation (EU) 2019/1781, and motors with output $\geq$ 0.75 kW are efficiency class IE3. Special voltage versions with special coils for 50 Hz and 60 Hz networks are available for order.

The stated performance ratings and operating values are valid for duty type S1 according to EN 60034-1 at the indicated rated frequency, rated voltage, a coolant temperature of max. 40 °C, and a site altitude of up to 1,000 m above sea level. Motors for operating conditions other than those indicated can be requested at extra charge.

Circuit

The phase belts of the motor that are laid on the terminal board can be interconnected in two different connection systems.

Star connection

In the star connection, the coil ends U2, V2, and W2 are interconnected on the terminal board, creating the neutral point. Mains power is connected on the free connection ports of the coil ends U1, V1, and W1 on the terminal board.

Delta connection

In the delta connection, the end of the phase belt is interconnected with the beginning of the next phase belt (U2 to V1, V2 to W1, W2 to U1). The line power is connected at the connection points on the terminal board.

Cooling method

The motors are designed for cooling method IC 411 (surface cooling).

Temperature class

The insulation on the motor coils is designed for temperature class 155 (F). When utilized at their rated power, the motors meet temperature class 130 (B). Given a coolant temperature of 40 °C, the power reserve is thus approx. + 10 %; when operated at their rated power, the temperature reserve is approx. + 20 K.

Enclosure rating

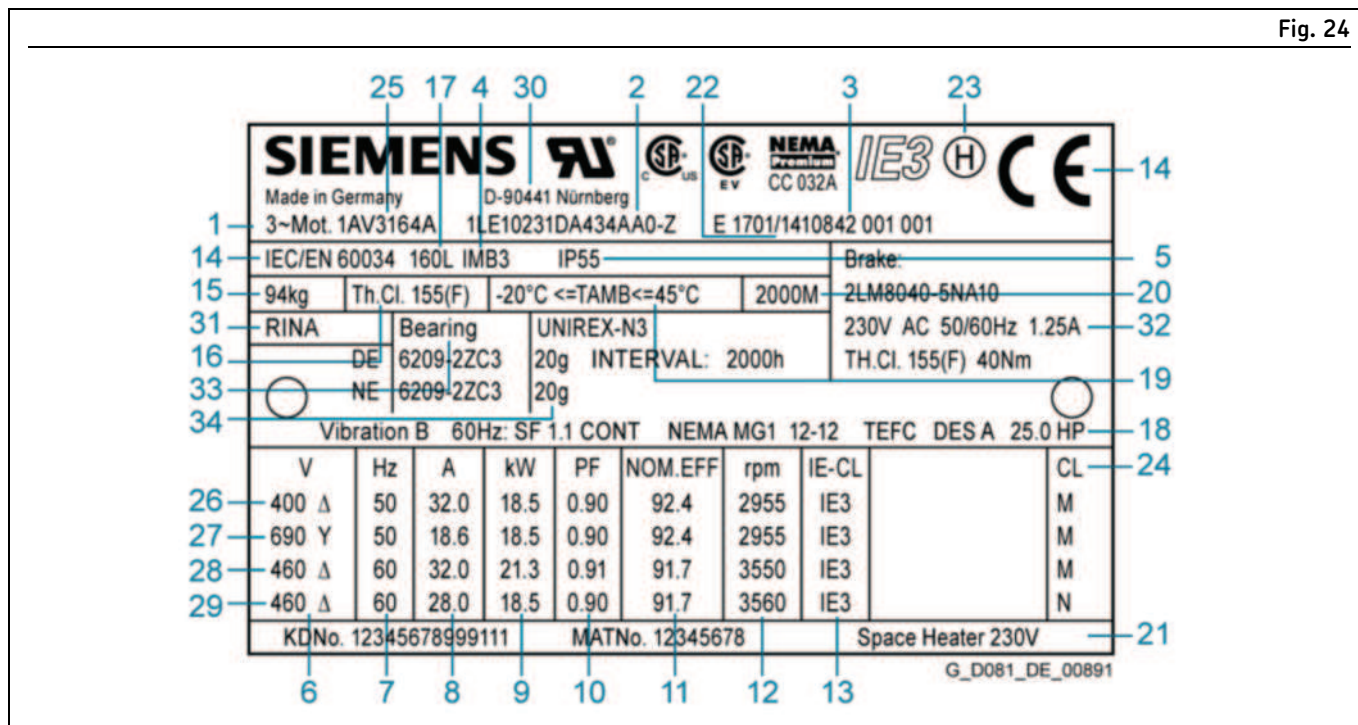
The motors are designed for enclosure rating IP55 according to DIN EN 60034-5. Touch and foreign object protection: Complete protection against contacting live components and against approaching such parts, as well as against touching moving parts within the housing. Protection against the ingress of damaging amounts of dust deposits. Water protection: A jet of water that is emanating from a nozzle and aimed at the motor from all directions has no adverse effect.

Terminal box

The terminal boxes have a protection class of IP55. The terminal box is positioned on the right when viewed from the drive side. An exception is the 2-pole motor with frame size 112 (4.0 kW), where the terminal box is installed at the top in the standard version, for design reasons. Special motors with the terminal box in a position different from the standard version are available on request. The position of the openings for cable entry can be adjusted to the available connections by turning the terminal box by 90° each time. The thread of the cable

entry is 1x metric thread M25×1.5 for frame sizes 63 to 90.
The frame sizes 100 to 132 have 2x M32×1.5. The terminal board always has a 6-pole design.

15.2 Rating plate



Rating plate

Legend to Figure 24:

- | | | | |
|----|--|----|--|
| 1 | Type of machine: Low-voltage three-phase motor | 2 | Item No. |
| 3 | Works number (ID no., serial number) | 4 | Type |
| 5 | Enclosure rating | 6 | Rated voltage [V] and winding connections |
| 7 | Frequency [Hz] | 8 | Rated current [A] |
| 9 | Rated power [KW] | 10 | Power factor (cos φ) |
| 11 | Efficiency | 12 | Rated speed [rpm] |
| 13 | IE efficiency class | 14 | Standards and regulations |
| 15 | Machine weight [kg] | 16 | Temperature class |
| 17 | Frame size | 18 | Additional specifications (optional) |
| 19 | Service temperature range | 20 | Site altitude (only if greater than 1000 m) |
| 21 | Customer data (optional) | 22 | Date of manufacture YYMM |
| 23 | Half-key balancing | 24 | Code Letter "CL" |
| 25 | Motor Type number (MT) | 26 | IEC standard series, power 50 Hz (P50 / 50 Hz) 400 A |
| 27 | IEC standard series, power 50 Hz 690 A | 28 | Equivalent power 60 Hz for same use as IEC standard series 50 Hz |
| 29 | IEC standard series, power 60 Hz (P50 / 60 Hz) | 30 | Manufacturer's address |
| 31 | Shipping certificates | 32 | Optional specifications |
| 33 | Bearing size | 34 | Standards and regulations |

15.2.1 Voltage code

Table 23

Voltages and frequencies of different countries

	Voltage	Voltage tolerance (DIN EN 60034-1)		Voltage code and certification		Country code
	V	Section A %	Section B %	CE	UL / CSA	
50 Hz	200 / 345	±5	±10	+1GF	+1GF	JP, HK
	220 / 380	±5	±10	+1GP	+1GP	CN, RU, TR, IQ, IR, ID, IN, TH, VN, AR, CL, EG, DZ, LY, AF
	230 / 400	±5	±10	+1GD	+1GD	EU, IL, PK, ZA, AE, BD, MM
	240 / 415	±5	±10	+1GQ	+1GQ	UK, IN, IQ, MY, AU, NZ, SG, KW, QA
	255 / 440	±5	±10	+MFN	+MFN	
	500	±5	±10	+1HQ	+1HQ	
	305 / 525	±5	±10	+MMP	–	ZA
	380 / 660	±5	±10	+1GH	–	CN, RU, TR, IQ, IR, ID, IN, TH, VN, AR, CL
	400 / 690	±5	±10	+1GK	–	
	415 Δ (P ≥ 5,5 kW)	±5	±10	+1GL ¹⁾	–	UK, IN, IQ, MY, AU, NZ, SG
	500 Δ (P ≥ 5,5 kW)	±5	±10	+1LL ³⁾	+1LL ³⁾	

Table 24

Voltages and frequencies of different countries

	Voltage	Voltage tolerance (DIN EN 60034-1)		Voltage code and certification		Country code
	V	Section A %	Section B %	CE	UL / CSA	
60 Hz	200 / 345	±5	±10	+1GG	+1GG	JP
	220 / 380	±5	±10	+MDP	+MDP	BR, KP, KR, PE, MX, SA, TW, VE, BO
	230 / 400	±5	±10	+1GR	+1GR	
	240 / 415	±5	±10	+1KS	+1KS	
	400 / 690	±5	±10	+585	+585	
	440 Y	±5	±10	+1GP	+1GP	MX, PA, PH
	460 Y	±5	±10	+1GP	+1GD	US, CA, MX
	480 Y	±5	±10	+GQ	+1GQ	CA
	575 Y	±5	±10	+1HQ	+1HQ	
	440 Δ	±5	±10	+1GH	–	MX, PA, PH
	460 Δ	±5	±10	+1GK	–	US, CA, MX
	460 Δ (P ≥ 5,5 kW)	±5	±10	–	+1KG ²⁾	
	480 Δ (P ≥ 5,5 kW)	±5	±10	+1GL ¹⁾	–	CA
	575 Δ (P ≥ 5,5 kW)	±5	±10	+1LL ³⁾	+1LL ³⁾	

¹⁾ P ≥ 5,5 kW not for UL/CSA

²⁾ P ≥ 5,5 kW only for UL/CSA

³⁾ P ≥ 5,5 kW

NOTE

Motors with a performance rating of ≥ 0.75 kW must be designed for efficiency class IE2 (other designs available on request).

Legend to Tables 23 and 24:**Country code**

AE	United Arab Emirates	AF	Afghanistan	AR	Argentina	AU	Australia
BO	Bolivia	BR	Brazil	CA	Canada	CL	Chile
CN	China	DZ	Algeria	EG	Egypt	EU	Europe
HK	Hong Kong	ID	Indonesia	IL	Israel	IN	India
IQ	Iraq	IR	Iran	JP	Japan	KR	Korea
KW	Kuwait	LY	Libya	MX	Mexico	MY	Malaysia
NZ	New Zealand	PA	Panama	PE	Peru	PH	Philippines
PK	Pakistan	QA	Qatar	RU	Russia	SA	Saudi Arabia
SG	Singapore	TH	Thailand	TR	Turkey	TW	Taiwan
UK	United Kingdom	US	USA	VE	Venezuela	VN	Vietnam
ZA	South Africa						

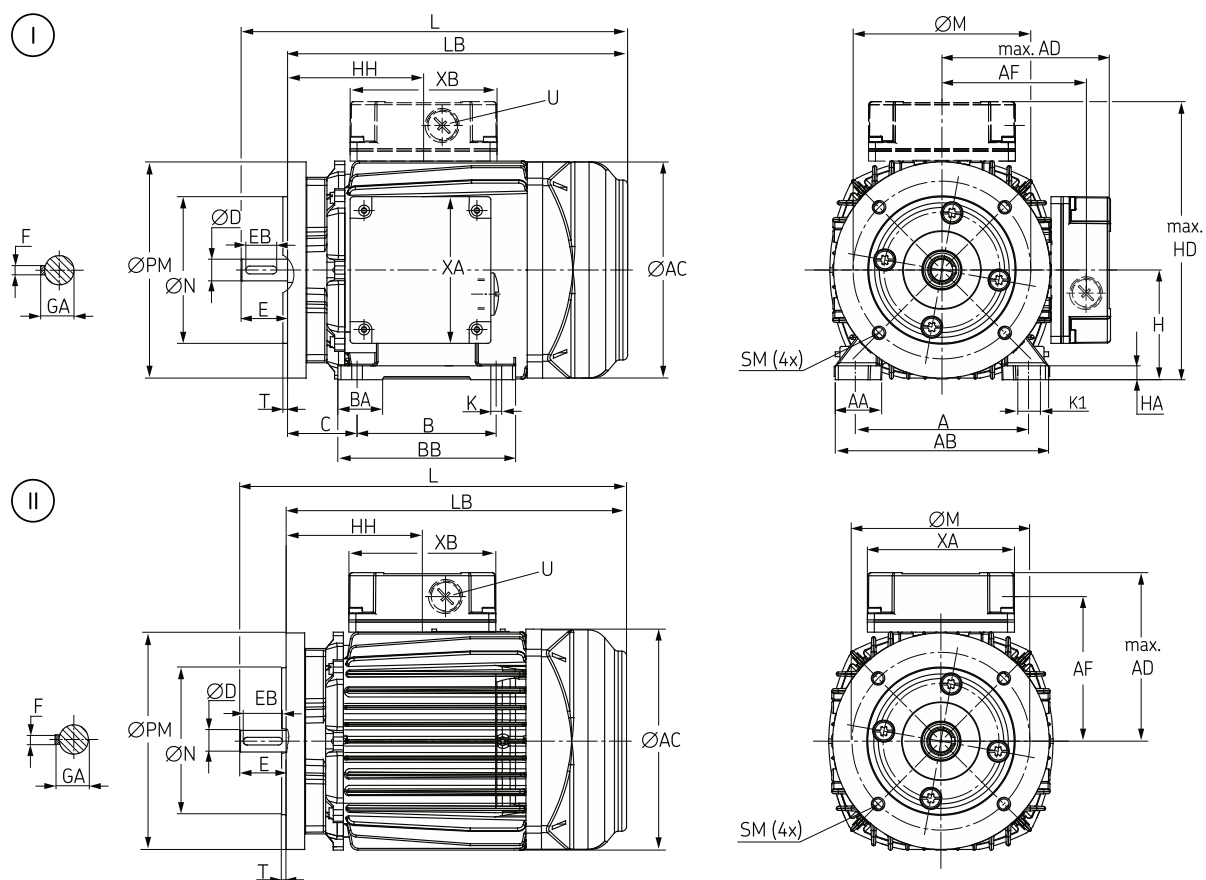
Voltage code texts

+1GD	230 / 400 V, 50 Hz; 460 V, 60 Hz	+1HQ	290 / 500 V, 50 Hz; 330 / 575 V, 60 Hz
+1GF	200 / 345 V, 50 Hz	+1KG	400 V, 50 Hz, Δ; 460 V, 60 Hz, Δ ²⁾
+1GG	200 / 345 V, 60 Hz	+1KS	240 / 415 V, 60 Hz
+1GH	380 / 660 V, 50 Hz; 440 V, 60 Hz	+1LL	500 V, 50 Hz, Δ; 575 V, 60 Hz, Δ ³⁾
+1GK	400 / 690 V, 50 Hz; 460 V, 60 Hz	+MDP	220 / 380 V, 60 Hz
+1GL	415 V, 50 Hz, Δ; 480 V, 60 Hz, Δ ¹⁾	+MFN	255 / 440 V, 50 HZ
+1GP	220 / 380 V, 50 Hz ; 440 V, 60 Hz	+MMP	305 / 525 V, 50 Hz
+1GQ	240 / 415 V, 50 Hz; 480 V, 60 Hz	+585	400 / 690 V, 60 Hz
+1GR	230 / 400 V, 60 Hz		

¹⁾ P ≥ 5,5 kW not for UL/CSA²⁾ P ≥ 5,5 kW only for UL/CSA³⁾ P ≥ 5,5 kW

15.2.2 Installation drawing and dimensions

Fig. 25



Assembly drawing for three-phase motor

Legend to Figure 25:

I Foot design (IM B34)

II Flange design (IM B14)

Table 25

Squirrel cage motor dimensions [mm]

Seria l no.	Motor	Frame size	Numbe r of poles	ØM	ØN	ØPM ¹⁾	SM	T	A	AA	AB	ØAC	AD _{max}	AF _{max}
1	178-V12CC-M1...	63	4	100	80	120	M6	3	100	22	120	124	107	85
2	178-S22CC-M1...	63	4	100	80	120	M6	3	–	–	–	124	101	77.5
3	178-V11ED-M1...	71	2	115	95	140	M8	3	112	32	138	124	107	85
4	178-S21ED-M1...	71	2	115	95	140	M8	3	–	–	–	145	111	87.5
5	178-V12DD-M1...	71	4	115	95	140	M8	3	112	24	135	139	115	93
6	178-S22DD-M1...	71	2	115	95	140	M8	3	–	–	–	145	111	87.5
7	178-V12ED-M1...	71	4	115	95	140	M8	3	112	24	135	139	115	93
8	178-S22ED-M1...	71	2	115	95	140	M8	3	–	–	–	145	111	87.5
9	178-S...	80	4	130	110	160	M8	3	125	30.5	150	159	149.5	112.5
10	178-S...	90	4	130	110	160	M8	3.5	140	30.5	165	178	154.5	117.5

Table 25

Squirrel cage motor dimensions [mm]

Seria l no.	Motor	Frame size	Numbe r of poles	ØM	ØN	ØPM ¹⁾	SM	T	A	AA	AB	ØAC	AD _{max}	AF _{max}
11	178-S...	100	2	165	130	200	M10	3.5	160	42	196	198	166	125.5
12	178-S...	112 ²⁾	2	165	130	200	M10	3.5	190	46	226	222	177	136.5
13	178-S...	132	2	165	130	200	M10	3.5	216	53	256	262	202	159.5

(continued)

Table 26

Squirrel cage motor dimensions [mm]

Seria l no.	B	B1 ³⁾	BA	BB	C	H	HA	HD _{max}	K	K1	U	XA _{max}	XB _{max}	HH	LB
1	80	-	-	95	40	63	7.5	170	Ø7	-	1xM20x1.5	92	92	63	176
2	-	-	-	-	-	-	-	-	-	-	1xM25x1.5	75	75	69.5	205.5
3	90	-	-	116	45	71	11	178	Ø8	-	1xM20x1.5	90	90	61	176
4	-	-	-	-	-	-	-	-	-	-	1xM25x1.5	75	75	63.5	210
5	90	-	-	114	45	71	8	186	Ø7	-	1xM20x1.5	90	90	67	209
6	-	-	-	-	-	-	-	-	-	-	1xM25x1.5	75	75	63.5	210
7	90	-	-	114	45	71	8	186	Ø7	-	1xM20x1.5	90	90	67	209
8	-	-	-	-	-	-	-	-	-	-	1xM25x1.5	75	75	63.5	210
9	100	-	32	118	50	80	8	229.5	9.5	13.5	1xM25x1.5	93	63	73	252
10	100	125	33	143	56	90	10	244.5	10	14	1xM25x1.5	123	123	78.5	297
11	140	-	37.5	176	63	100	12	266	12	16	2xM32x1.5	135	135	96.5	370.5
12	140	-	37.5	176	70	112	12	289	12	16	2xM32x1.5	135	135	96	354
13	140	-	38	180	89	132	15	334	12	16	2xM32x1.5	155	155	115.5	385

(continued)

Table 27

Squirrel cage motor dimensions [mm]

Seria l no.	L	ØD	E	EB	F	GA
1	199	11	23	16	4	12.5
2	228.5	11	23	16	4	12.5
3	206	14	30	22	5	16
4	240	14	30	22	5	16
5	239	14	30	22	5	16
6	240	14	30	22	5	16
7	239	14	30	22	5	16
8	240	14	30	22	5	16
9	292	19	40	32	6	21.5
10	347	24	50	40	8	27

Table 27

Squirrel cage motor dimensions [mm]

Seria l no.	L	ØD	E	EB	F	GA
11	430.5	28	60	50	8	31
12	414	28	60	50	8	31
13	465	38	80	70	10	41

¹⁾ Mounting flange acc. to DIN EN 50347

²⁾ Only standard terminal box position on top is supported, right is not possible

³⁾ Dimension for 2nd mounting hole

15.2.3 Technical data

Table 28

IEC squirrel cage motors

Type	Foot design IM B34, flange design IM B14
Enclosure rating	IP55
Temperature class	155 (F) utilized according to (130) B
Operating mode	S1
Temperature range	-20 to +40 °C
Max. site altitude	1000 m above sea level
Cooling method	IC 411 (surface cooling with fan)
Temperature monitoring	None
Terminal box material	Metal
Type	Foot design IM B34, flange design IM B14

Table 29

Code for pump design

Frame size	Number of poles	Flange design (with threaded hole) ¹⁾	Weight kg	Rated voltage		50 Hz Rated power ²⁾ Speed		Rated current	
				Δ	Y	kW	rpm	Δ	Y
				V	V			A	A
63	4	FT100 (C120)	7.1	230	400	0.18	1415	0.96	0.55
			5	230	400	0.18	1385	1.07	0.62
71	2	FT115 (C140)	7.6	230	400	0.37	2840	1.44	0.83
71	2	FT115 (C140)	6	230	400	0.37	2770	1.65	0.95
71	4	FT115 (C140)	9.9	230	400	0.25	1430	1.15	0.66
71	4	FT115 (C140)	6	230	400	0.25	1395	1.33	0.76
71	4	FT115 (C140)	9.9	230	400	0.37	1425	1.74	1.00
71	4	FT115 (C140)	7	230	400	0.37	1380	1.77	1.02
80	4	FT130 (C160)	10	230	400	0.55	1440	2.40	1.39
80	4	FT130 (C160)	11	230	400	0.55	1440	2.20	1.26
80	4	FT130 (C160)	14	230	400	0.75	1450	3.05	1.75
90	4	FT130 (C160)	16	230	400	1.10	1440	4.20	2.40
90	4	FT130 (C160)	19	230	400	1.50	1445	5.50	3.15
100	2	FT165 (C200)	25	230	400	3.00	2910	9.90	5.70
100	2	FT165 (C200)	26	230	400	3.00	2920	9.80	5.60
112	2	FT165 (C200)	32	230	400	4.00	2945	12.80	7.40

Table 29

Code for pump design

Frame size	Number of poles	Flange design (with threaded hole) ¹⁾	Weight kg	Rated voltage		50 Hz Rated power ²⁾ Speed		Rated current	
				Δ	Y	kW	rpm	Δ	Y
				V	V			A	A
132	2	FT165 (C200)	48	400	690	5.50	2945	10.10	5.90
132	2	FT165 (C200)	43	400	-	5.50	2950	9.90	-

¹⁾ Flange with threaded hole acc. to DIN EN 50347 (FT)

²⁾ Beyond a performance rating of 0.75 kW, the motors are designed for efficiency class IE3

Table 30

Code for pump design

Frame size	Number of poles	Flange design (with threaded hole) ¹⁾	Weight kg	60 Hz					
				Rated voltage		Rated power ²⁾ kW	Speed rpm	Rated current	
				Δ V	Y V			Δ A	Y A
63	4	FT100 (C120)	7.1	-	460	0.21	1725	-	0.56
			5	-	460	0.21	1685	-	0.60
71	2	FT115 (C140)	7.6	-	460	0.44	3430	-	0.83
71	2	FT115 (C140)	6	-	460	0.43	3370	-	0.93
71	4	FT115 (C140)	9.9	-	460	0.30	1725	-	0.66
71	4	FT115 (C140)	6	-	460	0.28	1695	-	0.75
71	4	FT115 (C140)	9.9	-	460	0.44	1720	-	0.98
71	4	FT115 (C140)	7	-	460	10.43	1680	-	1.04
80	4	FT130 (C160)	10	-	460	0.63	1735	-	1.42
80	4	FT130 (C160)	11	-	460	0.55	1740	-	1.25
80	4	FT130 (C160)	14	-	460	0.86	1750	-	1.72
90	4	FT130 (C160)	16	-	460	1.27	1740	-	2.40
90	4	FT130 (C160)	19	-	460	1.75	1740	-	3.15
100	2	FT165 (C200)	25	-	460	3.45	3505	-	5.60
100	2	FT165 (C200)	26	-	460	3.45	3520	-	5.50
112	2	FT165 (C200)	32	-	460	4.55	3545	-	7.30
132	2	FT165 (C200)	48	460	-	6.30	3540	10.00	-
132	2	FT165 (C200)	43	460	-	6.30	3545	9.70	-

¹⁾ Flange with threaded hole acc. to DIN EN 50347 (FT)

²⁾ Beyond a performance rating of 0.75 kW, the motors are designed for efficiency class IE3

15.3 China RoHS Table

Table 31

部件名称 (Part Name)	有毒害物质或元素 (Hazardous substances)					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0	0
本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)						
0 :	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)					
X :	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)					

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