Gerotor Pumps

Product series 143

For oil, for use in SKF CircOil centralized lubrication systems

Gerotor pumps, product series 143

SKF gerotor pump units of product series 143 are self-priming positive-displacement pumps with fixed displacement and high efficiency. They are used in SKF CircOil centralized lubrication systems for a variety of tasks and applications, especially in circulating-oil and total-loss lubrication systems.

Fields of application:

- General mechanical and plant engineering
- Shipbuilding and offshore industry
- Paper, printing, and pulp industries
- Heavy industry

Advantages:

- Flexible delivery range from 0.85 to 19 l/min at system pressures up to 50 bar
- Large viscosity range for standard mineral and synthetic lubricating and hydraulic oils from 20 to 1000 mm^2/s
- Ambient temperature of 0 to +40 °C
- Low volumetric flow pulsation and thus very smooth running
- Gerotor with a cycloid contour and thus good suction characteristics
- Low-noise
- Gerotor pumps are available in NBR and FKM designs.
- Squirrel cage motors are available in different voltage designs for 50 and 60 Hz
- Compact design for flow rates of up to 19 l/min
- Modular ordering system (order as a complete pump unit, single pump, or pump with flange and shaft coupling)

Content

Note
The technical data in this publication provide for general information. Follow the assembly instructions and any instructions on and accompanying the products when performing assembly, operating, and maintenance.
Technical data and selection and ordering data, including availability, for accessories are subject to change. .

Further information

Assembly instructions **951-170-251**

You can download the publications as PDF file from the SKF website: **skf.com/143**

Online configurable and CAD models under **skf-lubrication.partcommunity.com**

Gerotor pumps, product series 143

Illustration of designs and accessories

Gerotor pump unit in foot design

Gerotor pump unit in flange design

Gerotor

Gerotor pump

Pump flange

Shaft coupling

ICE squirrel cage motor

Gerotor pump+pump flange+ shaft coupling

Gerotor pumps, product series 143

Fundamentals

General use

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 19 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 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, distributors) 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 the lubricant.

Applications

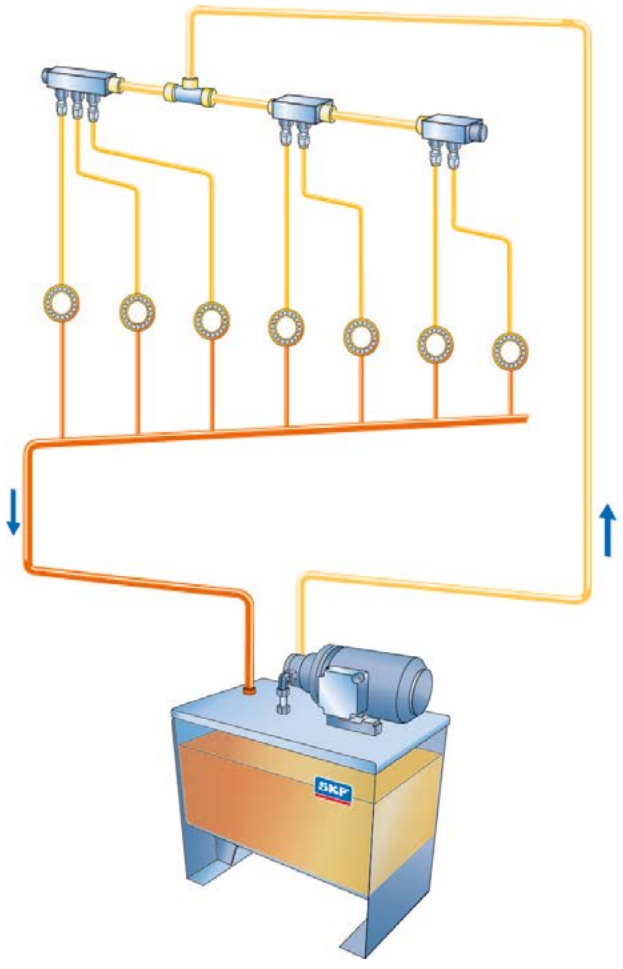
The main area of application is the broad field of circulating-oil and total-loss lubrication systems for general mechanical engineering and plant engineering applications. Here, the focus is on lubricating and cooling heavily loaded bearings and friction points for a wide range of uses. SKF gerotor pump units are used primarily as lubricating, hydraulic, hydrostatic, and cooling oil pumps. They can be set up either as single pumps or integrated into a reservoir unit. Other areas include the shipbuilding and offshore industry as well as the paper, printing, pulp, and heavy industries.

Delivery rates and characteristic curves

The nominal delivery rates indicated in the catalog refer to the nominal output multiplied by the speed of the motor. The actual delivery rate changes with operating viscosity and back pressure and can be found in the characteristic curve diagrams in the catalog (→ page 12–13). These diagrams are based on the range between 20 and 1000 mm^2/s in increments of 20, 140, 750, and 1000 mm^2/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 us in advance if you will use lubricating and hydraulic oils with an operating viscosity outside the specified range.

SKF CircOil centralized lubrication system



Gerotor pumps, product series 143

Fundamentals

Design (→ Figure 1)

SKF gerotor pump units of product series 143 have a constant displacement volume and one 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 pump housing (**1**), the shaft (**2**), the displacement elements toothed rotor (**3**) and annular gear (**4**), and the lid (**5**)..

Suction and displacement process (→ Fig. 1)

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 (**S**) draw the pumped medium in. The suction and pressure area is separated from the tooth meshing area (**Z**) by a radial gap (**R**) formed by the tooth profiles of the annular gear and the toothed rotor as they slide onto one another. In the pressurized area (**P**), the fluid is fed to the pressure port through increasingly small chambers.

Drive

SKF gerotor pump units of product series 143 are driven by IEC squirrel cage motors sized 63 to 100 in the standard design. The motors are designed for a rated motor voltage of 230/400 V or 400/690 V for 50 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 IE3 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.

Shaft coupling

The shaft couplings are designed as curved-tooth couplings. Curved-tooth couplings are flexible shaft connections for positive torque transmission. The material combination of steel hub and polyamide sleeve used for the curved-tooth couplings permits maintenance-free continuous duty with very low friction on the teeth. They, therefore, do not require any lubrication or maintenance and are nearly wear-free in operation.

Installation

SKF gerotor pump units of product series 143 can be installed both horizontally and vertically. Foot or flange versions are available for each gerotor pump unit design.

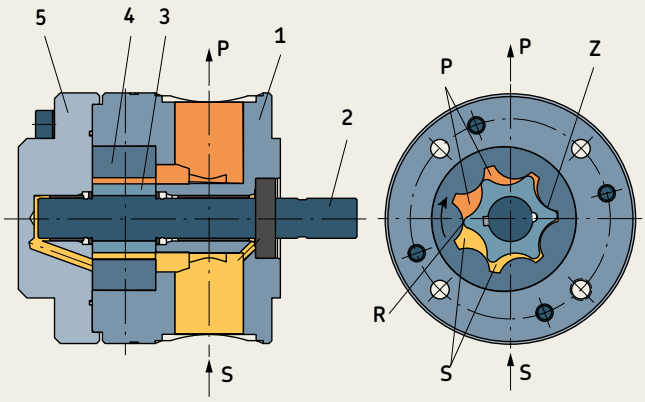
When the gerotor pump unit is set up separately from the reservoir, the suction port on the pump can be connected to a reservoir at a higher position (max. 2000 mm).

To flange the gerotor pump unit to a reservoir horizontally below the oil level, use a sealed pump in a special design. Please consult our Engineering department in advance.

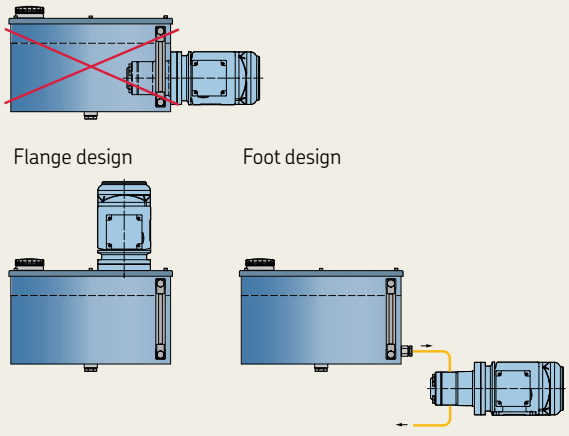
In its design as a pump with flange and coupling, various technical designs of customer-specific electrical motors can be used. The flange allows for the installation of all IEC standard motors with a flange according to DIN EN 50347, design FT (with threaded holes). See the drawings in this publication for the geometric dimensions of the flange.

If only gerotor pumps without a motor are used, for example as an integrated/attached pump on a machine housing, ensure that no radial or axial load is applied to the drive shaft. The pumps can be installed in any position.

Fig. 1



Installation



Gerotor pumps, product series 143

Technical data

Gerotor pump unit in foot design

Gerotor pump unit in flange design

Gerotor pump

Table 1

Technical data

Lubricant	standard mineral, synthetic lubricating and hydraulic oils
Operating viscosity	20–1000 mm^2/s
Flow range	0,85–19 l/min
Operating pressure	up to 50 bar
Ambient temperature range	0 to +40 °C
Medium temperature range	0 to +80 °C
Protection class acc. to DIN EN 60529	IP 54
Operating noise level	60 dBA
Drive speed depending on design	1400 min^{-1}
Suction head, max.	1000 mm
Varnishing	RAL 7024 graphite grey, special painting optional
Duty type per VDE 0530	S1
Sealing material	NBR, FKM
Mounting position	horizontal, vertical

Materials

Pump housing	hydraulic cast (pressure-proof) with good wear and antifriction properties
Gerotor insert	sintered material
Shafts	low-deformation steels, case-hardened
Bearing	SKF plain bearing

General notes on usage

During commissioning, pay attention to the pump's direction of rotation. See the rating plate and motor rotation arrow on the pump.

If using the pumps in systems without any open pressure lines, provide pressure-regulating valves to limit the maximum pressure of the system.

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 Lubrication Systems Germany GmbH recommends the use of filters for trouble-free operation of the pumps or pump units. Effective filtration prevents malfunctions while also increasing the service life of the pumps. 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 SAW AS 4059 class 8. A filter rating of approx. 5 - 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.

Gerotor pumps, product series 143

Order code 1 4 3 – 1 _ _ _ _ _ _ – _ _ + _ _ _

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)

Sealing design

F = FKM **N** = NBR

Code for pump design 1)

→ **Table 2**

Terminal box position 2) as seen from shaft extension of drive side

R = Right (default position)
O = Top
X = On motor in flange design (IMB14), Terminal box position on suction port side of pump

Motor certification 2) (others on request)

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

Voltage code 2)

→ **page 16**

2) Not applicable on designs without motor

Table 2

Code for pump design

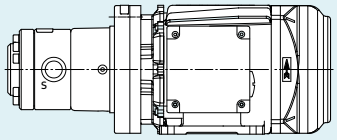
Code 1)	Nominal delivery rate 3)	Back pressure max.	Motor drive power	Permissible operating viscosity	Frame size	Number of poles
–	l/min	bar	kW	mm²/s	–	–
B03C	0.85	30	0.18	20–1000	63	4
D03E	1.70	30	0.37	20–1000	71	2
F02D	2.50	20	0.25	20–1000	71	4
F05F	2.50	50	0.55	20–1000	80	4
H02F	5.25	20	0.55	20–1000	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

1) For model design 4 delete item 4 of the code for the pump design, also the following items of the code.
3) Nominal delivery rate at motor speed 1400 min^{-1} acc. to number of motor pins.

Order example

143-11ND03E-RA+1GD

- Gerotor pump unit PS 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

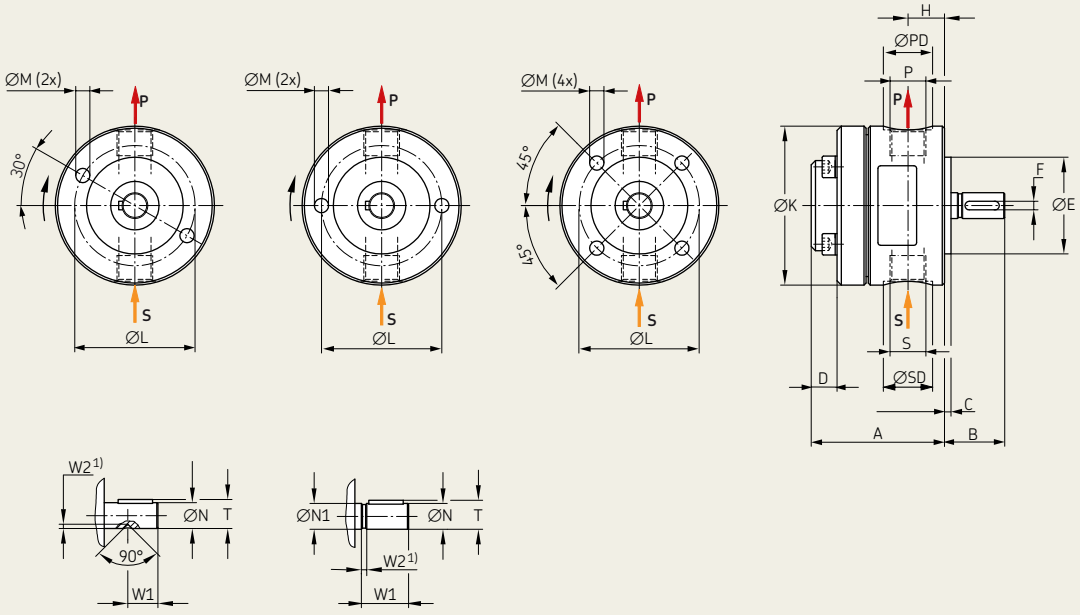


If ordering the gerotor pump+pump flange+shaft coupling (**model design 3**) the identification letters of terminal box position, motor certification and voltage code is omitted
Example: **143-13ND03E**

If ordering the gerotor pump (**model design 4**) the identification letters of terminal box position, motor certificate and voltage code is omitted, also item 4 of the code for the pump design
Example: **143-14ND03**

Gerotor pumps, product series 143

Gerotor pump design, technical data and dimensions



											Gerotor pump (→ Figure 2)																			
Niminal delivery rate [l/min]	Back pressure max. [bar]	Perm. viscosity range [mm²/s]	Char. curve No. 1)	Nominal output [cm³/rev.]	Speed [min⁻¹]	Required drive power [kW]	Suction port **S**	Pressure port **P**	ØPD/ ØSD	Design **N** (NBR) / **F** (FKM) Order No. 4)	Dimeensions [mm] A	B	C	D	ØE	F	H	ØK	ØL	ØM	ØN	ØN1	T	W1	W2	Fig.
0.85	30	20–1000	1	0.61	1400	0.18	G1/4 12 deep	G1/4 12 deep	19	143-14...B03	49	25	3	9	36_{h7}	2	12.5	60	48	6.6	8_{h5}	–	8.8	14	2	1/4
1.7	30	20–1000	2	0.61	2800	0.37	G1/4 12 deep	G1/4 12 deep	19	143-14...D03	49	25	3	9	36_{h7}	2	12.5	60	48	6.6	8_{h5}	–	8.8	14	2	1/4
2.5	20	20–1000	3	1.79	1400	0.25	G3/8 12 deep	G3/8 12 deep	23	143-14...F02	62	28	3	12	45_{h7}	4	17	74	56	6.6	12_{g5}	12_{g5}	13.5	18.5	2.5	2/5
2.5	50	20–1000	3	1.79	1400	0.55	G3/8 12 deep	G3/8 12 deep	23	143-14...F05	62	28	3	12	45_{h7}	4	17	74	56	6.6	12_{g5}	12_{g5}	13.5	18.5	2.5	2/5
5.25	20	20–1000	4	3.75	1400	0.55	G1/2 14.5 deep	G1/2 14.5 deep	27	143-14...H02	69	30	3	12.7	56_{h7}	5	18.5	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
5.25	50	20–1000	4	3.75	1400	1.1	G1/2 14.5 deep	G1/2 14.5 deep	27	143-14...H05	69	30	3	12.7	56_{h7}	5	18.5	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
9	20	20–1000	5	6.44	1400	0.75	G1/2 14.5 deep	G1/2 14.5 deep	27	143-14...K02	77	30	3	12.7	56_{h7}	5	20	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
9	50	20–1000	5	6.44	1400	1.1	G1/2 14.5 deep	G1/2 14.5 deep	27	143-14...K05	77	30	3	12.7	56_{h7}	5	20	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
12.5	20	20–1000	6	8.93	1400	0.75	G3/4 16 deep	G3/4 16 deep	33	143-14...M02	89	30	3	12.7	56_{h7}	5	22	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
12.5	50	20–1000	6	8.93	1400	1.5	G3/4 16 deep	G3/4 16 deep	33	143-14...M05	89	30	3	12.7	56_{h7}	5	22	88	70	6.6	14_{g5}	14_{g5}	16	20.5	2.5	3/5
19	20	20–1000	7	13.6	1400	1.5	G1 18 deep	G1 18 deep	40	143-14...P02	100	30	3	21.5	56_{h7}	5	25	98	80	8.5	16_{g5}	16_{g5}	18	21.5	2.5	3/5

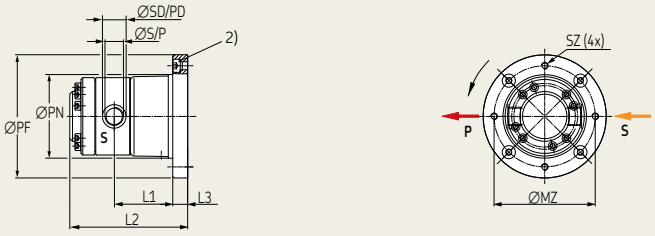
1) → see page 12

Gerotor pumps, product series 143

Gerotor pump+pump flange+shaft coupling design, technical data and dimensions

Figure 3

Gerotor pump + pump flange



2) Supplied detached, tightening torque for M6 = 10 Nm$^{\pm 2Nm}$; for M8 = 18 Nm$^{\pm 2Nm}$; for M10 = 30 Nm$^{\pm 2Nm}$

Figure 4

Coupling assembly

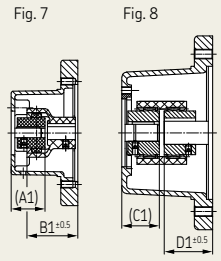


Figure 5

Motor connection

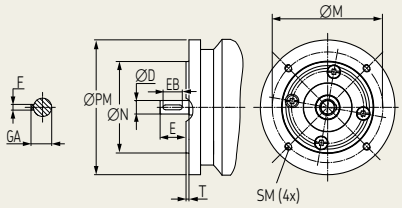


Table 3

Gerotor pump + pump flange (→ Figure 3)											Coupling assembly (→ Firgure 4)				Motor connection (→ Figure 5)								
Design **N** (NBR) / **F** (FKM) Order No. [5]	Maße [mm] ØPF ØPM	ØPN	L1	L2	L3	ØFM1	ØM1	ØSY	ØMZ	SZ	Fig. 7 (A1)	B1	Fig. 8 (C1)	D1	Frame size	ØN	T	ØM	SM	ØD	E	EB	GA	F
143-13...B03C	120	72	53.5	104	14	–	–	–	85	M6	28	42	–	–	63	80	3	100	$M6_{8\ tief}$	11_{j6}	23	18	12.5	4
143-13...D03E	140	95	55.5	109	12	–	–	–	115	M8	28	42	–	–	71	95	3	115	$M8_{12\ tief}$	14_{j6}	30	25	16	5
143-13...F02D	140	95	65	127	17	–	–	–	115	M8	31	51	–	–	71	95	3	115	$M8_{12\ tief}$	14_{j6}	30	25	16	5
143-13...F05F	160	110	77	137	15	–	–	–	130	M8	–	–	31	40	80	110	3.5	130	$M8_{12\ tief}$	19_{j6}	40	32	21.5	6
143-13...H02F	160	110	78.5	144	15	–	–	–	130	M8	–	–	31	40	80	110	3.5	130	$M8_{12\ tief}$	19_{j6}	40	32	21.5	6
143-13...H05J	160	110	85.5	153	17	–	–	–	130	M8	–	–	31	49	90	110	3.5	130	$M8_{13\ tief}$	24_{j6}	50	40	27	8
143-13...K02H	160	110	80	152	15	–	–	–	130	M8	–	–	31	40	80	110	3.5	130	$M8_{12\ tief}$	19_{j6}	40	32	21.5	6
143-13...K05J	160	110	87	161	17	–	–	–	130	M8	–	–	31	49	90	110	3.5	130	$M8_{13\ tief}$	24_{j6}	50	40	27	8
143-13...M02H	160	110	82	164	15	–	–	–	130	M8	–	–	31	40	80	110	3.5	130	$M8_{12\ tief}$	19_{j6}	40	32	21.5	6
143-13...M05K	160	110	89	173	17	–	–	–	130	M8	–	–	31	49	90	110	3.5	130	$M8_{13\ tief}$	24_{j6}	50	40	27	8
143-13...P02K	160	110	92	184	17	–	–	–	130	M8	–	–	30	50	90	110	3.5	130	$M8_{13\ tief}$	24_{j6}	50	40	27	8

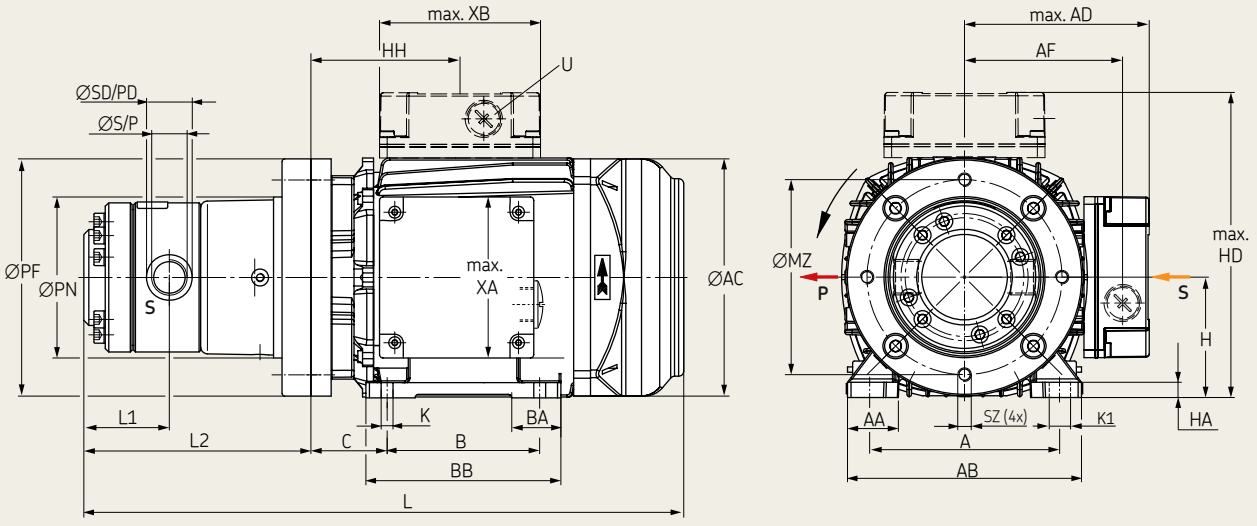
5) Supplement the order No. with the code letter for the desired seal design. Seal design NBR (**N**) or FKM (**F**).

Gerotor pumps, product series 143

Foot and flange designs, technical data and dimensions

Figure 6

Foot design (type IMB34)



Delivery rate	Back pressure max.	Viscosity range	Char. curve No. [1]	Food design **N** (NBR) / **F** (FKM) Order No. [2][3]	Flange design **N** (NBR) / **F** (FKM) Order No. [2][3]	Nominal output	Suction-port	Pressure port	Dimensions [mm] **(→ Drawing 6+7)**						
[l/min]	[bar]	[mm²/s]				[cm³/U]	S	P	ØPD	ØSD	ØPN	ØPF	ØFM1	ØMZ	ØM1
0,85	30	20–1000	1	143-11...B03C-R...	143-12...B03C-X...	0,61	G1/4 12 deep	G1/4 12 deep	19	19	72	120	–	100	–
1,7	30	20–1000	2	143-11...D03E-R...	143-12...D03E-X...	0,61	G1/4 12 deep	G1/4 12 deep	19	19	95	140	–	115	–
2,5	20	20–1000	3	143-11...F02D-R...	143-12...F02D-X...	1,79	G3/8 12 deep	G3/8 12 deep	23	23	95	140	–	115	–
2,5	50	20–1000	3	143-11...F05F-R...	143-12...F05F-X...	1,79	G3/8 12 deep	G3/8 12 deep	23	23	110	160	–	130	–
5,25	20	20–1000	4	143-11...H02F-R...	143-12...H02F-X...	3,75	G1/2 14,5 deep	G1/2 14,5 deep	27	27	110	160	–	130	–
5,25	50	20–1000	4	143-11...H05J-R...	143-12...H05J-X...	3,75	G1/2 14,5 deep	G1/2 14,5 deep	27	27	110	160	–	130	–
9	20	20–1000	5	143-11...K02H-R...	143-12...K02H-X...	6,44	G1/2 14,5 deep	G1/2 14,5 deep	27	27	110	160	–	130	–
9	50	20–1000	5	143-11...K05J-R...	143-12...K05J-X...	6,44	G1/2 14,5 deep	G1/2 14,5 deep	27	27	110	160	–	130	–
12,5	20	20–1000	6	143-11...M02H-R...	143-12...M02H-X...	8,93	G3/4 16 deep	G3/4 16 deep	33	33	110	160	–	130	–
12,5	50	20–1000	6	143-11...M05K-R...	143-12...M05K-X...	8,93	G3/4 16 deep	G3/4 16 deep	33	33	110	160	–	130	–
19	20	20–1000	7	143-11...P02K-R...	143-12...P02K-X...	13,6	G1 18 deep	G1 18 deep	40	40	110	160	–	130	–

1) → see page 12
2) Supplement the order No. with the code letter for the desired seal design. Seal design NBR (N) or FKM (F).
3) Supplement the order No. with the code letter for the desired motor certification (→ page 7) and the voltage code (→ page 16).

For associated motor data → page 17.

Gerotor pumps, product series 143

Foot and flange designs, technical data and dimensions

Figure 7

Flange design (type IMB14)

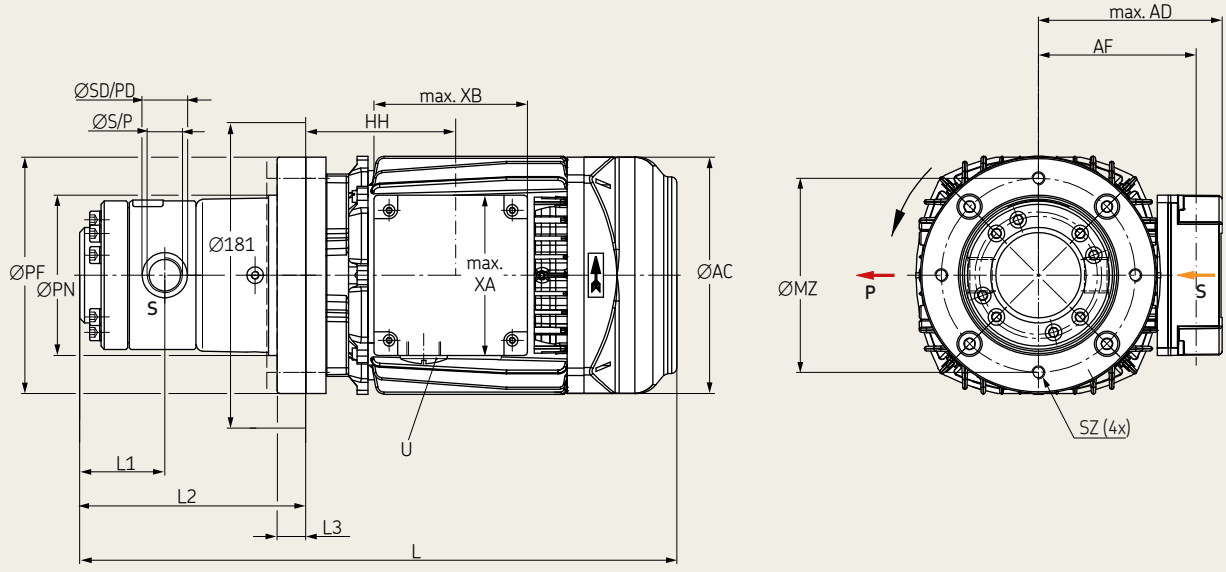


Table 4

Dimensions [mm] **(→ Drawing 6+7)**

SZ	ØSY	L1	L2	L3	A	AA	AB	ØAC	AD	AF	B	BA	BB	C	H	HA	HD	HH	K	K1	U	XA	XB	L
M6	-	36,5	104	14	100	22	120	124	107	84,5	80	-	95	40	63	7,5	-	61	Ø7	-	1xM25x1,5	92	92	309,5
M8	-	36,5	109	12	112	32	138	124	107	84,5	90	-	116	45	71	11	-	61	Ø8	-	1xM25x1,5	90	90	319
M8	-	45	127	17	112	24	135	139	115	92	90	-	114	45	71	8	-	67	Ø7	-	1xM25x1,5	90	90	337
M8	-	45	137	15	125	30,5	150	159	149,5	112,5	100	32	118	50	80	8	229,5	73	9,5	13,5	1xM25x1,5	123	119,5	389
M8	-	50,5	144	15	125	30,5	150	159	149,5	112,5	100	32	125	50	80	8	229,5	73	9,5	13,5	1xM25x1,5	123	119,5	396
M8	-	50,5	153	17	140	30,5	165	178	154,5	117,5	100	33	143	56	90	10	244,5	78,5	10	14	1xM25x1,5	123	119,5	450
M8	-	57	152	15	125	30,5	150	159	149,5	112,5	100	32	118	50	80	8	229,5	73	9,5	13,5	1xM25x1,5	123	119,5	439
M8	-	57	161	17	140	30,5	165	178	154,5	117,5	100	33	143	56	90	10	244,5	78,5	10	14	1xM25x1,5	123	119,5	458
M8	-	67	164	15	125	30,5	150	159	149,5	112,5	100	32	118	50	80	8	229,5	73	9,5	13,5	1xM25x1,5	123	119,5	451
M8	-	67	173	17	140	30,5	165	178	154,5	117,5	100	33	143	56	90	10	244,5	78,5	10	14	1xM25x1,5	123	119,5	510
M8	-	75	184	17	140	30,5	165	178	154,5	117,5	100	33	143	56	90	10	244,5	78,5	10	14	1xM25x1,5	123	119,5	521

Gerotor pumps, product series 143

Characteristic curves

Chart 1

Operating viscosity 20 mm²/s, 50 Hz

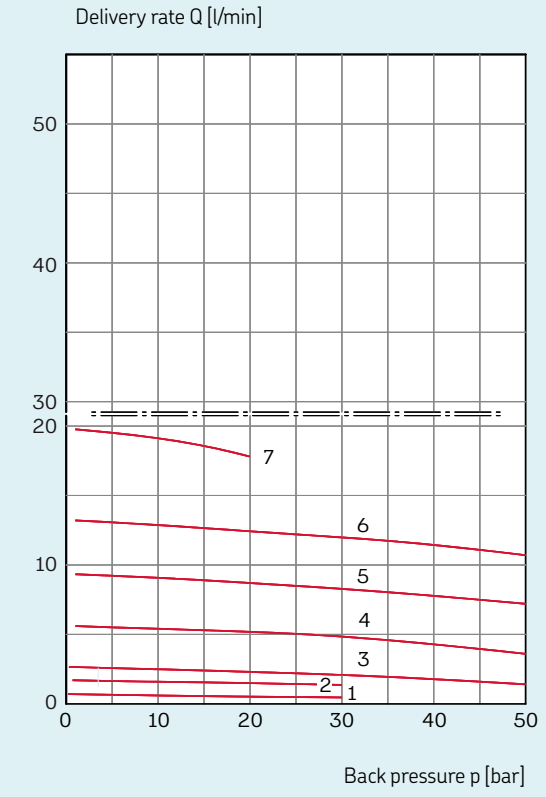
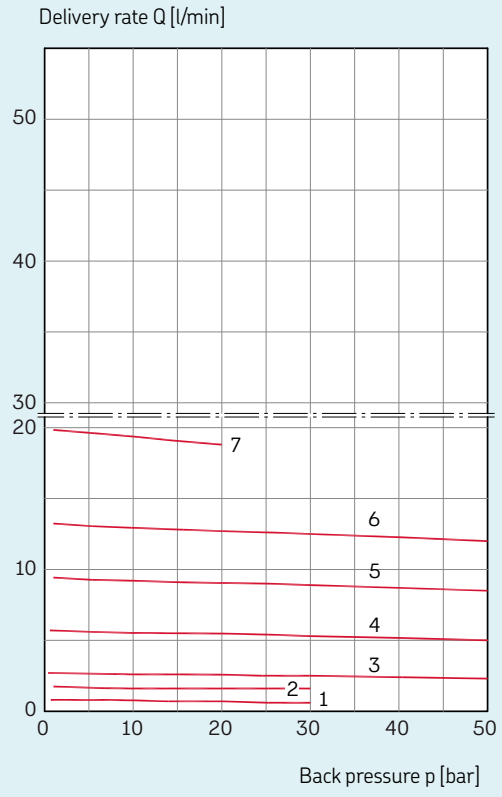


Chart 2

Operating viscosity 140 mm²/s, 50 Hz



Legend to diagrams 1–4:

Characteristic curve 1: 0.85 l/min
Characteristic curve 2: 1.7 l/min
Characteristic curve 3: 2.5 l/min
Characteristic curve 4: 5.25 l/min
Characteristic curve 5: 9 l/min
Characteristic curve 6: 12.5 l/min
Characteristic curve 7: 19 l/min

Tolerances: VDMA 24284-II

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).

Gerotor pumps, product series 143

Characteristic curves

Chart 3

Operating viscosity 750 mm²/s, 50 Hz

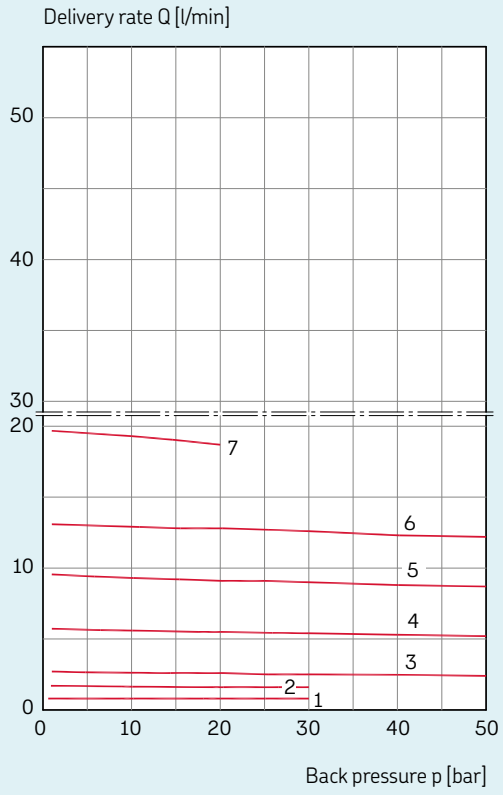
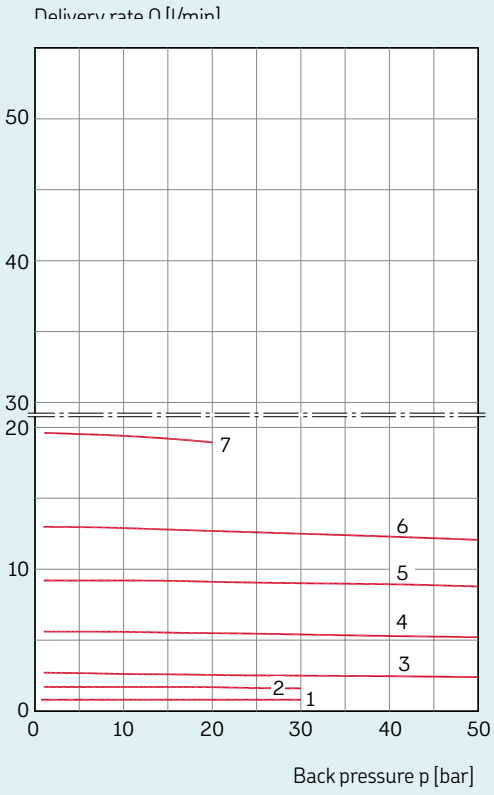


Chart 4

Operating viscosity 1000 mm²/s, 50 Hz



Legend to diagrams 1–4:

Characteristic curve 1: 0.85 l/min
Characteristic curve 2: 1.7 l/min
Characteristic curve 3: 2.5 l/min
Characteristic curve 4: 5.25 l/min
Characteristic curve 5: 9 l/min
Characteristic curve 6: 12.5 l/min
Characteristic curve 7: 19 l/min

Tolerances: VDMA 24284-II

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).

IEC squirrel cage motors

Fundamentals

General information

The standard design of SKF gerotor pump units of product series 143 is driven by IEC asynchronous motor. The motors are used in sizes 63 to 100, 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 terminal box. The motors bear a CE marking in accordance with Low Voltage Directive 2014/35/EC. There is no CE marking with respect to Machinery Directive 2006/42/EC and EMC Directive 2014/30/EC because asynchronous motors do not fall under the scope of these Directives.

Special provisions

The motors can be ordered in UL and CSA-compliant versions and are approved by UL (Underwriter Laboratories). These motors have an electrical design according to NEMA MG1-12 and meet the required NEMA efficiency classes. The UL approval is stored on the rating plate of the motor.

Other approvals 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 output

The motors are configured as standard for a rated motor voltage in accordance with IEC 38 of 230 V, 400 V or 690 V for 50 Hz networks (standard winding). Motors for other voltages and frequencies (non-standard winding) are available at additional cost.

The voltage deviation permitted in operation for the aforementioned rated motor voltages and for special voltages is ±5% for range A (continuous duty operation) and ±10% for range B (short-time duty operation), as specified in EN 60034-1. The permitted frequency deviation is ±2% for range A and -5/+3% for range B. For supply voltages that are 95% or 105% of the rated motor voltage, the tolerances described in EN 60034-1 are met. Furthermore, motor temperature is allowed to exceed the permitted temperature rise limit by 10 K. The percentile specifications for the permitted voltage and frequency deviations are not stamped onto the rating plate of the motor. The presence of the CE mark on the motor rating plate, accompanied by a reference to standard EN 60034, guarantees that these requirements have been incorporated by the motor manufacturer during configuration of 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 windings used for this are point-wound. Motors with power ≤ 0.75 kW correspond to efficiency class IE2, motors with power ≥ 0.75 kW correspond to efficiency class IE3 according to EU Directive 2009/125/EG, Regulation (EU) 2019/1781. Special voltages with abnormal windings for 50 Hz and 60 Hz networks are available to order.

The stated rated outputs and operating values apply to duty type S1 in accordance with EN 60034-1 at the stated rated frequency, rated voltage, a coolant temperature of 40°C maximum and a site installation altitude up to 1 000 metres above sea level. Enquiries for motors for operating conditions other than those mentioned are welcome, on the understanding that these will incur additional costs.

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). Mains power is connected at the connection points on the terminal board.

IEC squirrel cage motors

Fundamentals

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 performance rating, 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 performance rating, the temperature reserve is approx. +20 K.

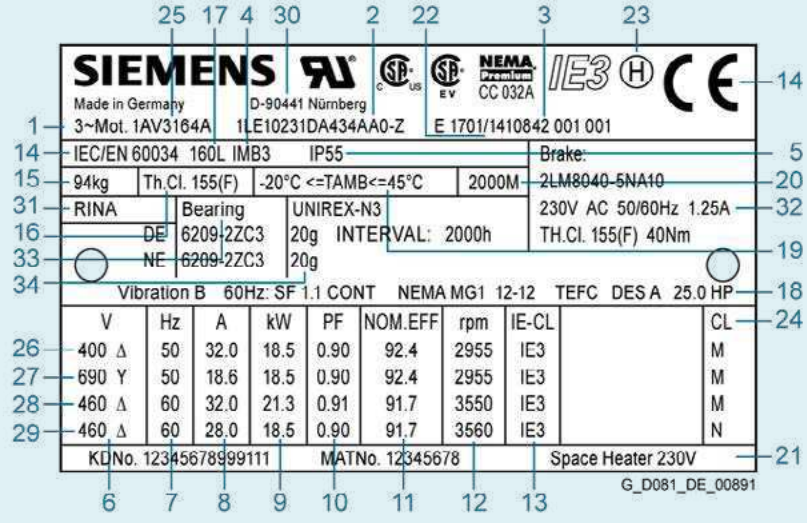
Protection class

The motors are designed for protection class IP55 according to DIN EN 60034-5.
Touch and foreign object protection: Provides complete protection against contacting or getting close to such parts, as well against touching moving parts within the housing. Provides protection against the ingress of damaging amounts of dust deposits.
Water protection: A jet of water from a nozzle and aimed at the motor from all directions has no adverse effect.

Terminal box

The degree of protection of the terminal boxes is IP55. The terminal box location of standard motors is on the right when viewed from the drive end. Special motors with different terminal box positions than standard motors are available on request. The position of the openings for the cable entry can be adjusted to the existing connection options by rotating the terminal box by 90°. The thread of the cable entry has 1x metric thread M25×1.5 for sizes 63 to 90. The clipboard is fundamental 6-pole design.

Rating plates



1 Type of machine: three-phase low-voltage motor
2 Article no.
3 factory number (ID no., serial number)
4 Design
5 Degree of protection
6 Rated voltage [V] and winding circuit
7 Frequency [Hz]
8 Rated current [A]
9 Rated power [KW]
10 Power factor (cos φ)
11 efficiency
12 Rated speed [min-1]
13 IE efficiency class
14 Standards and regulations
15 Machine weight [kg]
16 heat class
17 size
18 Additional information (optional)
19 operating temperature range
20 installation 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 Engine Type Number (MT)
26 IEC standard series Power 50Hz (P50/50Hz) 400A
27 IEC standard series Power 50Hz 690A
28 Equivalent power 60 Hz with the same utilization as IEC standard series 50 Hz
29 IEC standard series performance 60Hz (P50/60Hz)
30 manufacturer address
31 Ship Certificates
32 Information optional
33 stock size
34 Relubrication data optional

IEC squirrel cage motors

Voltage code

Table 5

Voltages and frequencies of different countries

	Voltage	Voltage tolerance (DIN EN 60034-1) Range A	Range B	Voltage key and approval		Country code
	V	%	%	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	–	
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

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 = Kuweit
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

Note: Motors with a performance rating of ≥0.75 kW must be designed for efficiency class IE3.
(others available on request)

Voltage code texts

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

IEC squirrel cage motors

Technical data

Squirrel cage motor in foot design

Table 6

Technical data

Type	Foot design IM B34, Flange design IM B14
Protection class	IP55
Temperature class	
Duty type	
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

Table 7

Code for pump design

				50 Hz						60 Hz					
Frame size	Number of poles	Flange-design (with threaded hole) [1]	Weight	Rated voltage Δ	Y	Rated power [2]	Speed	Rated current Δ	Y	Rated voltage[3] Δ	Y	Rated power [2]	Speed	Rated current Δ	Y
			kg	V	V	kW	min^{-1}	A	A	V	V	kW	min^{-1}	A	A
63	4	FT100 (C120)	7,1	230	400	0,18	1415	0,96	0,55	–	460	0,21	1725	–	0,56
			5	230	400	0,18	1385	1,07	0,62	–	460	0,21	1685	–	0,60
71	2	FT115 (C140)	7,6	230	400	0,37	2840	1,44	0,83	–	460	0,44	3430	–	0,83
71	2	FT115 (C140)	6	230	400	0,37	2770	1,65	0,95	–	460	0,43	3370	–	0,93
71	4	FT115 (C140)	9,9	230	400	0,25	1430	1,15	0,66	–	460	0,30	1725	–	0,66
71	4	FT115 (C140)	6	230	400	0,25	1395	1,33	0,76	–	460	0,28	1695	–	0,75
71	4	FT115 (C140)	9,9	230	400	0,37	1425	1,74	1,00	–	460	0,44	1720	–	0,98
71	4	FT115 (C140)	7	230	400	0,37	1380	1,77	1,02	–	460	0,43	1680	–	1,04
80	4	FT130 (C160)	10	230	400	0,55	1440	2,40	1,39	–	460	0,63	1735	–	1,42
80	4	FT130 (C160)	11	230	400	0,55	1440	2,20	1,26	–	460	0,55	1740	–	1,25
80	4	FT130 (C160)	14	230	400	0,75	1450	3,05	1,75	–	460	0,86	1750	–	1,72
90	4	FT130 (C160)	16	230	400	1,10	1440	4,20	2,40	–	460	1,27	1740	–	2,40
90	4	FT130 (C160)	19	230	400	1,50	1445	5,50	3,15	–	460	1,75	1740	–	3,15

1) Flange with threaded hole acc. to DIN EN 50347 (FT).
3) Beyond a performance rating of 0.75 kW, the motors are designed for efficiency class IE3.

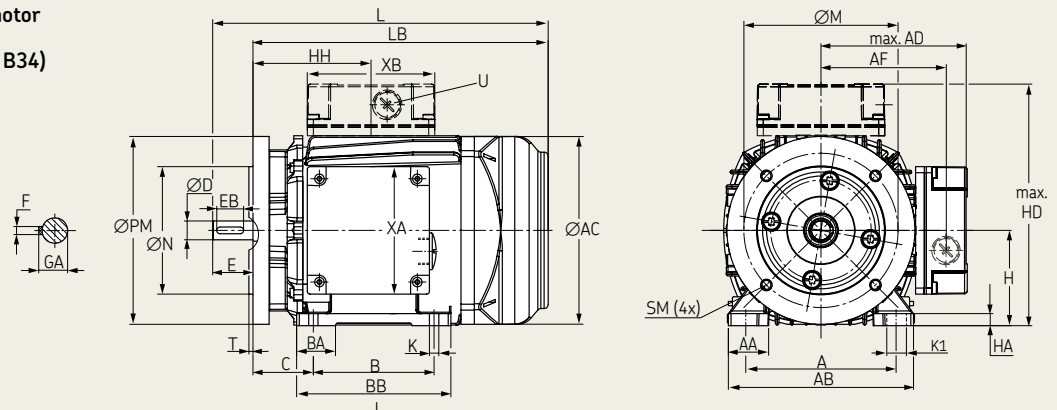
IEC squirrel cage motors

Installation drawing and dimensions

Figure 8

Squirrel cage motor

Foot design (IM B34)



Flange design (IM B14)

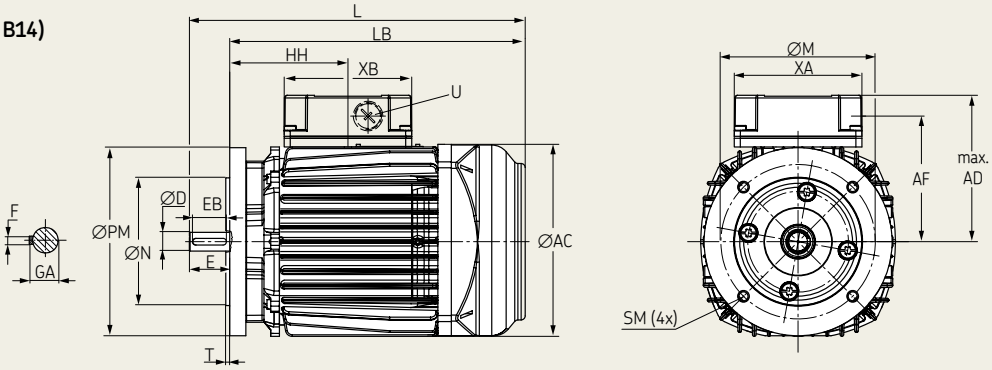


Table 8

Dimensions [mm]

Ser.No.	Motor	Frame size	Poles	ØM	ØN	ØPM [1]	SM	T	A	AA	AB	ØAC	AD_{max}	AF_{max}	B	B1	BA	BB
1	178-V12CC-M1...	63	4	100	80	120	M6	3	100	22	120	124	107	85	80	–	–	95
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	90	–	–	116
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	90	–	–	114
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	90	–	–	114
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	100	–	32	118
10	178-S...	90	4	130	110	160	M8	3.5	140	30.5	165	178	154.5	117,5	100	125	33	143

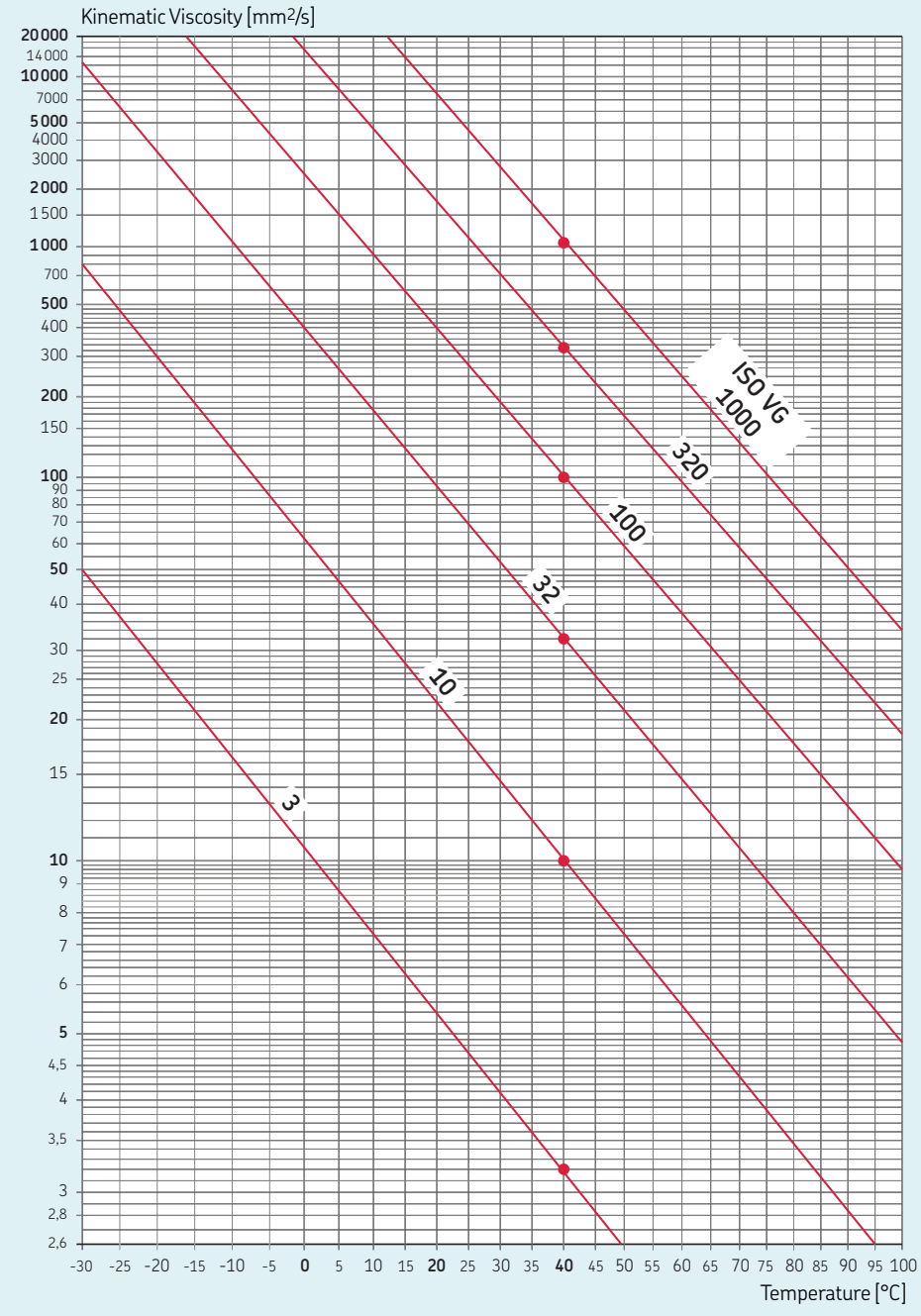
Ser.No.	C	H	HA	HD_{max}	K	K1	U	XA_{max}	XB_{max}	HH	LB	L	ØD	E	EB	F	GA
1	40	63	7.5	170	Ø7	–	1xM20x1.5	92	92	63	176	199	11	23	16	4	12.5
2	–	–	–	–	–	–	1xM25x1.5	75	75	69.5	205.5	228.5	11	23	16	4	12.5
3	45	71	11	178	Ø8	–	1xM20x1.5	90	90	61	176	206	14	30	22	5	16
4	–	–	–	–	–	–	1xM25x1.5	75	75	63.5	210	240	14	30	22	5	16
5	45	71	8	186	Ø7	–	1xM20x1.5	90	90	67	209	239	14	30	22	5	16
6	–	–	–	–	–	–	1xM25x1.5	75	75	63.5	210	240	14	30	22	5	16
7	45	71	8	186	Ø7	–	1xM20x1.5	90	90	67	209	239	14	30	22	5	16
8	–	–	–	–	–	–	1xM25x1.5	75	75	63.5	210	240	14	30	22	5	16
9	50	80	8	229.5	9.5	13.5	1xM25x1.5	93	63	73	252	292	19	40	32	6	21.5
10	56	90	10	244.5	10	14	1xM25x1.5	123	123	78.5	297	347	24	50	40	8	27

[1] Mounting flange acc. to DIN EN 50347.
[3] Dimension for 2nd mounting hole

Viscosity-temperature relationship of oils with different rated viscosity

Diagramm 5

Viscosity-temperature relationship of oils



The curves are based on a viscosity index 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 ordinates so that the slope of the curves can be determined easily based on 2 measuring points.

Viskosity class *

ISO VG	is approx.
3, 10	Spindle oils
32, 100	Normal machine oils
320	Medium-heavy machine oils
1000	Gear oil or similar

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

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 differenceg:

at +80 °C = 18 mm²/s
at +75 °C = 21 mm²/s
change of 3 mm²/s

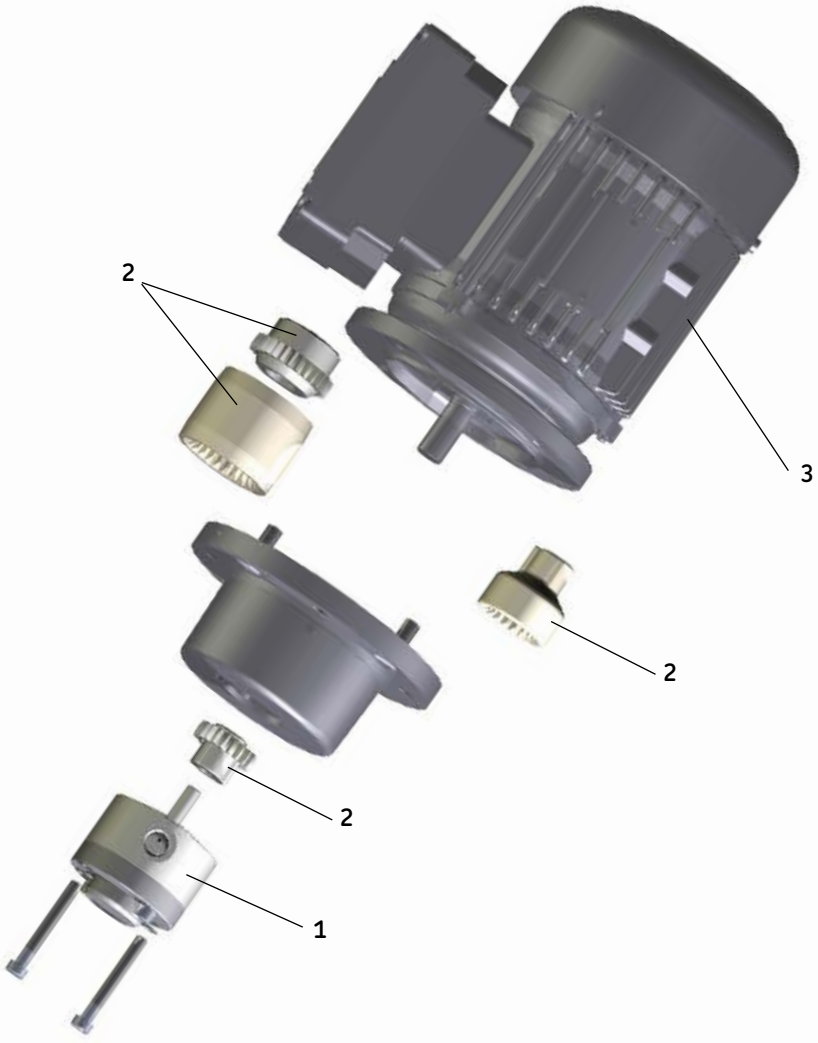
versus

at +10 °C = 875 mm²/s
at + 5 °C = 1450 mm²/s
change of 575 mm²/s

Spare parts

Exploded view

Figure 9



Position description → page 21, table 9.

Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any warranty claims..

Spare parts

Table 9

Position description (→ Figure 9)

Gerotor pump unit [1]	**Pos. 1** Pump [1]	**Pos. 2** Coupling, complete [2]	**Pos. 3** 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
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

Description	Order No.
Docu. package	951-170-251-01
Rotation arrow	760-072

1) upplement the order No. with the code letter for the desired seal. Design NBR (**N**) or FKM (**F**).
2) t is recommended that coupling parts always be replaced completely.

Gerotor pump, product series 143

Comparison of order numbers

Table 10

Comparison of old and new order Nos. for gerotor pump, product series 143

Nominal delivery rate	Back pressure max.	Permiss. viscosity range	Sealing design NBR		Sealing design FKM	
			Old	New	Old	New
l/min	bar	mm²/s	order No.	order No.	order No.	order No.
0.85	30	20–1000	**143-011-131**	**143-14NB03**	**143-011-132**	**143-14FB03**
1.70	30	20–1000	**143-011-131**	**143-14ND03**	**143-011-132**	**143-14FD03**
2.50	20	20–1000	**143-011-151** [1] **/-152** [2]	**143-14NF02** [2]	**143-011-159** [1]	**143-14FF02** [2]
2.50	50	20–1000	**143-011-151** [1] **/-152** [2]	**143-14NF05** [2]	**143-011-159** [1]	**143-14FF05** [2]
5.25	20	20–1000	**143-011-161**	**143-14NH02**	**143-011-169**	**143-14FH02**
5.25	50	20–1000	**143-011-161**	**143-14NH05**	**143-011-169**	**143-14FH05**
9.00	20	20–1000	**143-011-171**	**143-14NK02**	**143-011-173**	**143-14FK02**
9.00	50	20–1000	**143-011-171**	**143-14NK05**	**143-011-173**	**143-14FK05**
12.50	20	20–1000	**143-011-181-2**	**143-14NM02**	**143-011-187**	**143-14FM02**
12.50	50	20–1000	**143-011-181-2**	**143-14NM05**	**143-011-187**	**143-14FM05**
19.00	20	20–1000	**143-011-500**	**143-14NP02**	**143-011-508**	**143-14FP02**

1) counterclockwise
2) clockwise

Gerotor pump, product series 143

Comparison of order numbers

Table 11

Comparison of old and new order Nos. for gerotor pump unit in foot design, product series 143

Nominal delivery rate	Back pressure max.	Permiss. viscosity range	Sealing design **N** (NBR)		Sealing design **F** (FKM)	
			Old	New	Old	New
l/min	bar	mm²/s	order No.	order No.	order No.	order No.
0.85	30	20–1000	**143-012-131+...**	**143-11NB03C-RA+1GD**	–	**143-11FB03C-RA+1GD**
1.70	30	20–1000	**143-012-141+...**	**143-11ND03E-RA+1GD**	**143-012-142+...**	**143-11FD03E-RA+1GD**
2.50	20	20–1000	–	**143-11NF02D-RA+1GD**	–	**143-11FF02D-RA+1GD**
2.50	50	20–1000	–	**143-11NF05F-RA+1GD**	–	**143-11FF05F-RA+1GD**
5.25	20	20–1000	–	**143-11NH02F-RA+1GD**	–	**143-11FH02F-RA+1GD**
5.25	50	20–1000	–	**143-11NH05J-OA+1GD**	–	**143-11FH05J-OA+1GD**
9.00	20	20–1000	–	**143-11NK02H-RA+1GD**	–	**143-11FK02H-RA+1GD**
9.00	50	20–1000	**143-012-171+...**	**143-11NK05J-OA+1GD**	–	**143-11FK05J-OA+1GD**
12.50	20	20–1000	**143-012-180+...**	**143-11NM02H-RA+1GD**	–	**143-11FM02H-RA+1GD**
12.50	50	20–1000	**143-012-181+...**	**143-11NM05K-OA+1GD**	–	**143-11FM05K-OA+1GD**
19.00	20	20–1000	**143-012-501+...**	**143-11NP02K-OA+1GD**	**143-012-509+...**	**143-11FP02K-OA+1GD**

Table 12

Comparison of old and new order Nos. for gerotor pump unit in flange design, product series 143

Nominal delivery rate	Back pressure max.	Permiss. viscosity range	Sealing design **N** (NBR)		Sealing design **F** (FKM)	
			Old	New	Old	New
l/min	bar	mm²/s	order No.	order No.	order No.	order No.
0.85	30	20–1000	**143-012-231+...**	**143-12NB03C-XA+1GD**	–	**143-12FB03C-XA+1GD**
1.70	30	20–1000	**143-012-241+...**	**143-12ND03E-XA+1GD**	**143-012-242+...**	**143-12FD03E-XA+1GD**
2.50	20	20–1000	–	**143-12NF02D-XA+1GD**	–	**143-12FF02D-XA+1GD**
2.50	50	20–1000	–	**143-12NF05F-XA+1GD**	–	**143-12FF05F-XA+1GD**
5.25	20	20–1000	–	**143-12NH02F-XA+1GD**	–	**143-12FH02F-XA+1GD**
5.25	50	20–1000	–	**143-12NH05J-XA+1GD**	–	**143-12FH05J-XA+1GD**
9.00	20	20–1000	–	**143-12NK02H-XA+1GD**	–	**143-12FK02H-XA+1GD**
9.00	50	20–1000	**143-012-271+...**	**143-12NK05J-XA+1GD**	–	**143-12FK05J-XA+1GD**
12.50	20	20–1000	**143-012-280+...**	**143-12NM02H-XA+1GD**	–	**143-12FM02H-XA+1GD**
12.50	50	20–1000	**143-012-281+...**	**143-12NM05K-XA+1GD**	–	**143-12FM05K-XA+1GD**
19.00	20	20–1000	**143-012-601+...**	**143-12NP02K-XA+1GD**	–	**143-12FP02K-XA+1GD**

Important information on product usage
SKF and Lincoln lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1 013 mbar) by more than 0,5 bar at their maximum permissible temperature.

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