

**INSTRUCTION MANUAL FOR
SAMSON LIQUID RING PUMPS, TYPES:
KS500, KS510, KS625, KS725, KS910, KS1025**



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1 INTRODUCTION

1.1 Declaration of conformity



Declaration of Conformity

Annex IIA

Samson Pumps A / S
Petersmindevej 21
DK-8800 Viborg

Hereby declares that the following products:

Liquid ring pump
KS500, KS510, KS625, KS725, KS910, KS1025, KS1800

Conforms to the directive:

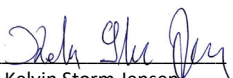
Machinery Directive 2006/42/EC

I hereby declare, that the liquid ring pumps are in conformity with the following harmonized standards:

DS/EN ISO 12100:2011	Safety of machinery - General principles for design - Risk assessment and risk reduction
DS/EN 1012-2 + A1:2009	Compressors and Pumps - Safety requirements - Part 2: Vacuum pumps

The standards above only apply to the extent that it is relevant for the purpose of the pump. The product must not be used before the complete system, which it must be incorporated in, has been conformity assessed and found to comply with all relevant health and safety requirements of 2006/42/EC and other relevant directives. The product must be included in the overall risk assessment.

Viborg, 09.03.2017


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DOC4022A

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1.2 Explanation of warning symbols

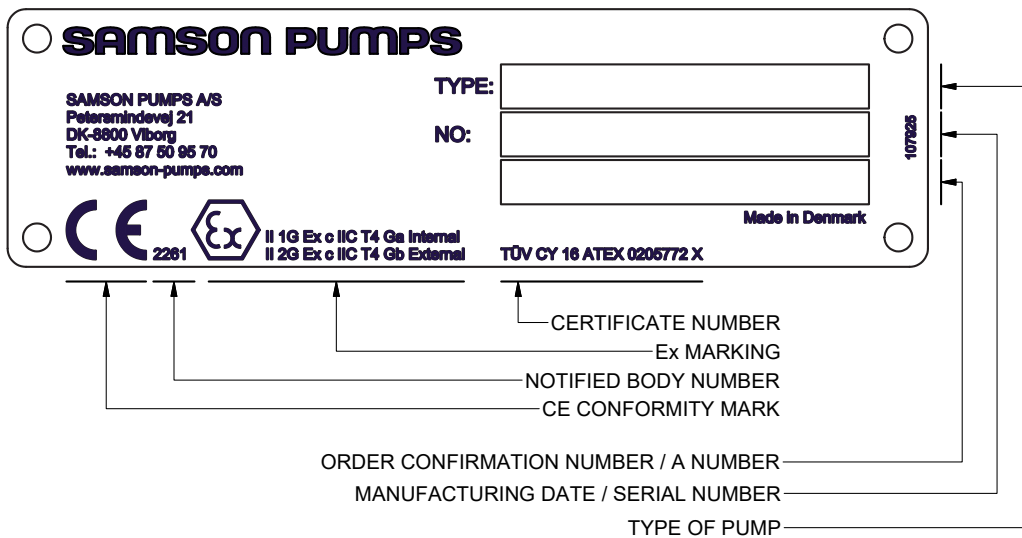
Important technical and safety instructions is showed by symbols. If instructions not performed correctly, may lead to personnel injury or incorrect function of the pump.



To be used with all safety instructions that must be followed. A failure to follow the instructions may result in injury and/or incorrect machine operation.

1.3 Marking and identification

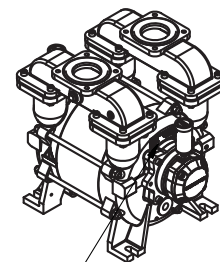
The pump is equipped with an identification plate that is shown below.



Configuration example:

KS 500 R 0 S S B 0 0 A X1

- Type: ← KS
- Model: ← 500
- Rotation: ← R
- Rotor type: ← 0
- Pump housing: ← S
- Shell: ← S
- Flow plates: ← B
- Mechanical shaft seals: ← 0
- Gaskets: ← 0
- Colour: ← A
- Documentation: ← X1



Location of ID plate

DOC107925_7

1.4 Field of application



Inlet of foreign objects can damage the pump.



The pump is designed exclusively to pump gases, including atmospheric air.



WARNING!
Do not operate the pump so that cavitation can occur! For further information see instruction manual for the Samson Pumps vacuum limiter.

It must be ensured that the inlet gas cannot react with the service liquid and create aggressive bonds that break down the pump's components.

For other operating data, see specifications.

- The pump may only be used with media that are not aggressive to the pump's materials. See section 2.6 for components and appertaining materials.

1.5 Disposal

Samson's liquid ring pump is manufactured so that most of the device can be reused/recycled.

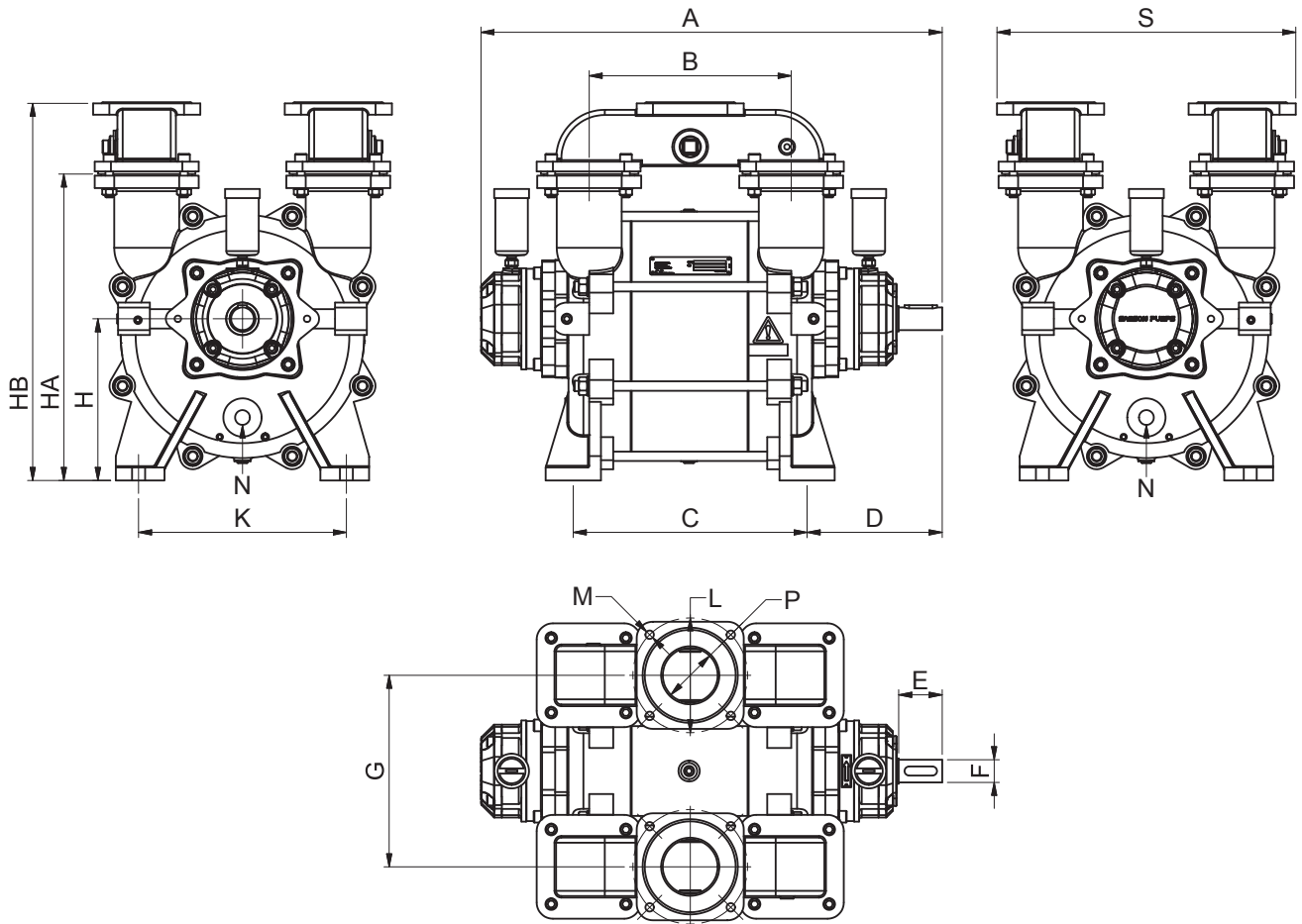
Samson Pumps thus offer users of the company's pumps the option of returning used pumps to be restored or scrapped.

For those who do not wish to take up the factory on this offer, the pump must be taken apart and sorted into its separate components. See section 2.6 for the material of which the pump is made.

These components must be disposed of in accordance with national regulations.

2 TECHNICAL DATA

2.1 Dimensions



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Pump type	Dimensions [mm]																Weight [kg]
	A	B	C	D	E	F	G	H	HA	HB	K	L	M	N	P	S	
KS500	712	313	385	196	70	Ø35/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	217
KS510	712	313	385	196	70	Ø35/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	217
KS625	782	383	455	196	70	Ø35/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	240
KS725	782	383	455	196	70	Ø35/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	240
KS910	922	523	595	196	70	Ø45/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	284
KS1025	922	523	595	196	70	Ø45/k6	295	249	472	580	320	Ø177	Ø13	3/4"	Ø85	460	284

2.2 Specifications



A failure to meet these specifications may result in damage to the pump.

Description		Minimum	Maximum
Ambient temperature, operation		-20°C	55°C
Ambient temperature, storage		-20°C	55°C
Humidity		-	80%
Intake temperature, suction side		-	120°C
Intake temperature, service liquid		-	90°C
Service liquid pipe connection, dimension		¾"	-
Service liquid pipe connection, length		-	6 m
Noise level		-	80 dB
Maximum radial load on drive shaft	KS500 / KS510	-	2450 N
	KS625 / KS725	-	2300 N
	KS910 / KS1025	-	5600 N
Revolutions		1000 rpm	1750 rpm
Pressure	KS500 / KS725 / KS1025	100 mbara	3 barg
	KS510 / KS625 / KS910	65 mbara	3 barg
Service liquid flow		3 litres/minute, self-regulating*	
Lubricating grease	Type of grease	SKF LGWA2	
	Automatic lubrication	SKF LAGD 125/WA2	

* -It is recommended to install liquid separator to ensure the pump is supplied with as much water as needed.

2.3 Power consumption and output

2.3.1 Vacuum

KS500

	Pressure	[mbara]	65	100	200	300	400	500	600	700	800
1000 [rpm]	Flow	[m ³ /h]	-	10	235	285	301	313	322	331	336
	Consumption	[kW]	-	9.5	9.5	9.3	9.1	8.7	8.3	7.8	7
1450 [rpm]	Flow	[m ³ /h]	-	200	434	479	492	500	500	493	480
	Consumption	[kW]	-	18	18.2	18.2	17.9	17.5	16.8	15.8	14.3
1750 [rpm]	Flow	[m ³ /h]	-	300	540	584	599	604	604	599	586
	Consumption	[kW]	-	21	21.3	21.3	21	20.5	19.8	18.8	17.5

KS510

1000 [rpm]	Flow	[m ³ /h]	135	145	184	220	250	274	295	311	324
	Consumption	[kW]	8.9	9	9.4	9.5	9.5	9.2	8.8	8.2	7.4
1450 [rpm]	Flow	[m ³ /h]	40	140	365	417	452	480	498	510	512
	Consumption	[kW]	14	14.5	15.9	16.9	17.4	17.5	17	16.2	14.9
1750 [rpm]	Flow	[m ³ /h]	170	280	500	547	569	587	600	609	613
	Consumption	[kW]	20	20.2	20.7	21	21	20.8	20.3	19.8	18.8

KS625

1000 [rpm]	Flow	[m ³ /h]	80	110	195	260	317	360	390	415	421
	Consumption	[kW]	9.2	9.5	10.3	11	11.3	11.2	11	10.5	9.8
1450 [rpm]	Flow	[m ³ /h]	105	180	410	509	570	608	626	626	610
	Consumption	[kW]	20.4	20.5	20.9	21	20.9	20.4	19.8	18.9	17.6
1750 [rpm]	Flow	[m ³ /h]	230	302	530	629	690	723	745	745	732
	Consumption	[kW]	28.9	29	29.4	29.6	29.4	28.9	28	27	25.5

KS725

	Pressure	[mbara]	65	100	200	300	400	500	600	700	800
1000 [rpm]	Flow	[m³/h]	-	225	290	350	390	420	440	455	455
	Consumption	[kW]	-	13.2	13	12.6	12.1	11.4	10.9	10.1	9.3
1450 [rpm]	Flow	[m³/h]	-	375	550	640	675	700	705	705	695
	Consumption	[kW]	-	21.3	21.2	21	20.6	20.1	19.4	18.6	17.7
1750 [rpm]	Flow	[m³/h]	-	495	705	790	830	845	855	855	845
	Consumption	[kW]	-	30.5	31	30	29.6	29	28.1	27	25.5

KS910

1000 [rpm]	Flow	[m³/h]	175	200	295	370	439	495	540	580	610
	Consumption	[kW]	14.5	14.9	15.9	16.4	16.9	16.6	16.1	15.2	14
1450 [rpm]	Flow	[m³/h]	560	595	680	750	808	850	880	900	910
	Consumption	[kW]	28.8	29	29.5	29.8	29.7	29.2	28.4	27.5	26.2
1750 [rpm]	Flow	[m³/h]	760	790	882	959	1112	1050	1079	1090	1088
	Consumption	[kW]	39.5	39.6	39.9	39.8	39.4	39	38	37.1	36

KS1025

1000 [rpm]	Flow	[m³/h]	-	20	362	481	550	600	630	643	643
	Consumption	[kW]	-	17.5	17.3	17.1	16.7	16.2	15.5	14.6	13.8
1450 [rpm]	Flow	[m³/h]	-	280	720	910	965	1000	1015	1025	1015
	Consumption	[kW]	-	28	29	29.8	30	30	29.4	28.3	26.5
1750 [rpm]	Flow	[m³/h]	-	520	965	1130	1180	1215	1240	1230	1200
	Consumption	[kW]	-	41	42.1	42.7	43	42.7	42	41	39,5

The data is based on the following parameters:

- Air temperature 20°C
- Service liquid temperature 15°C
- Test performed with dry air and 1,013 mbar absolute.
- Tolerance ±10%

2.3.2 Pressure

KS500

	Pressure	[barg]	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.5	2	2.5	3
1200 [rpm]	Flow	[m ³ /h]	400	382	365	345	328	305	285	264	150	50	-	-
	Consumption	[kW]	11	11.9	12.5	13	13.8	14.4	15	15.8	19	22	-	-
1450 [rpm]	Flow	[m ³ /h]	545	530	510	495	475	450	429	403	290	190	100	40
	Consumption	[kW]	16	17	17.8	18.8	19.5	20.5	21.3	22.2	28	31	36	40
1750 [rpm]	Flow	[m ³ /h]	675	670	660	650	638	622	605	590	500	405	330	300
	Consumption	[kW]	18.8	20	21	22.2	23.4	24.6	25.8	27	32	39	44	50

KS510

1200 [rpm]	Flow	[m ³ /h]	445	438	405	385	360	335	310	285	180	50	-	-
	Consumption	[kW]	9	9.3	9.9	10.1	10.6	11	11.3	11.8	14	16	-	-
1450 [rpm]	Flow	[m ³ /h]	615	605	595	580	565	550	530	510	410	300	199	115
	Consumption	[kW]	15	15.5	16	16.8	17.2	18	18.5	19	22	25	28	30
1750 [rpm]	Flow	[m ³ /h]	770	760	750	740	730	720	710	700	620	550	480	415
	Consumption	[kW]	18.2	19.2	20.2	21.2	22.2	23.2	24.2	25.2	30	35	40	45

KS625

1200 [rpm]	Flow	[m ³ /h]	495	475	450	428	403	379	350	325	180	15	-	-
	Consumption	[kW]	16.9	17.1	17.8	18	18.5	19	19.5	20	22	25	-	-
1450 [rpm]	Flow	[m ³ /h]	670	655	633	612	588	560	533	505	380	270	150	55
	Consumption	[kW]	23.5	24.1	25	25.8	26.5	27.1	28	28.8	32	37	40	43
1750 [rpm]	Flow	[m ³ /h]	842	832	820	805	785	764	738	710	590	440	320	280
	Consumption	[kW]	33	33.8	34.5	35.5	36.2	37	38	38.8	42	48	52	55

KS725

	Pressure	[barg]	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.5	2	2.5	3
1200 [rpm]	Flow	[m³/h]	560	545	525	505	480	460	440	405	245	40	-	-
	Consumption	[kW]	16	16.5	17.5	18.5	19	20	21	22	27	31	-	-
1450 [rpm]	Flow	[m³/h]	750	730	710	690	665	640	615	585	440	301	185	40
	Consumption	[kW]	21.5	23	24	25.5	26.5	28	29	30	37	42	48	54
1750 [rpm]	Flow	[m³/h]	950	935	915	895	875	855	835	815	705	595	480	345
	Consumption	[kW]	32.5	33.5	35	36.5	38	39.5	41	42.5	50	58	65	72

KS910

1200 [rpm]	Flow	[m³/h]	912	886	860	818	769	720	671	622	380	98	-	-
	Consumption	[kW]	25	26	27	28	29	30	31	32	38	42	-	-
1450 [rpm]	Flow	[m³/h]	1078	1054	1030	1020	990	960	930	900	760	605	410	180
	Consumption	[kW]	39	40	41	42.5	43.5	45	46	47	53	59	65	71
1750 [rpm]	Flow	[m³/h]	1270	1260	1240	1220	1200	1180	1160	1130	1020	880	720	560
	Consumption	[kW]	52.5	54	55.5	57	58.5	60	61.5	63	71	78	87	93

KS1025

1200 [rpm]	Flow	[m³/h]	860	830	800	760	720	675	625	570	300	60	-	-
	Consumption	[kW]	25	26.3	27.6	28.9	30.1	31.4	32.7	34	39	45	-	-
1450 [rpm]	Flow	[m³/h]	1100	1080	1060	1040	1010	980	950	920	720	515	295	65
	Consumption	[kW]	36.7	38.6	40.5	42.4	44.3	46.2	48.1	50	61	68	78	88
1750 [rpm]	Flow	[m³/h]	1310	1290	1270	1250	1230	1210	1190	1170	1035	890	720	570
	Consumption	[kW]	49.7	51.6	53.5	55.4	57.3	59.2	61.1	63	72	82	90	100

The data is based on the following parameters:

- Air temperature 20°C
- Service liquid temperature 15°C
- Test performed with dry air and 1,013 mbar absolute.
- Tolerance ±10%

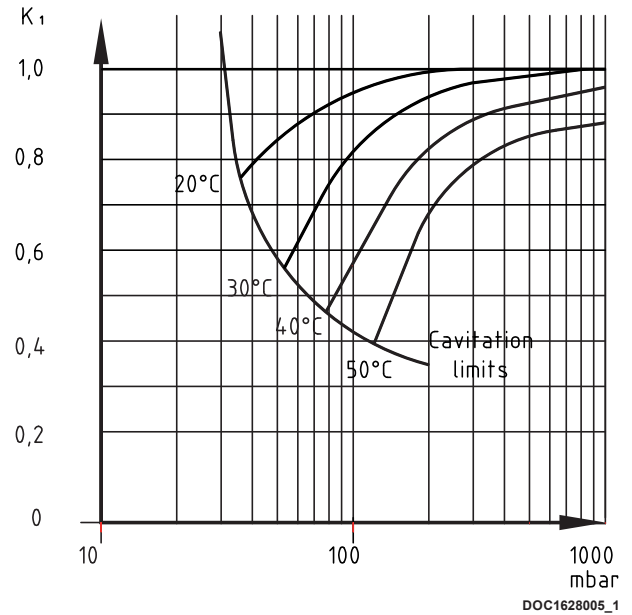
2.3.3 Correction factor

When the temperature of the service liquid exceeds 15°C, the pump's capacity will be affected with respect to the specified values.

To determine the output at a higher temperature, the correction factor can be used.

Capacity at service liquid temperature higher than 15°C :

$$Q_{>15} = Q_{15} \times K_1$$



2.4 Handling and transport



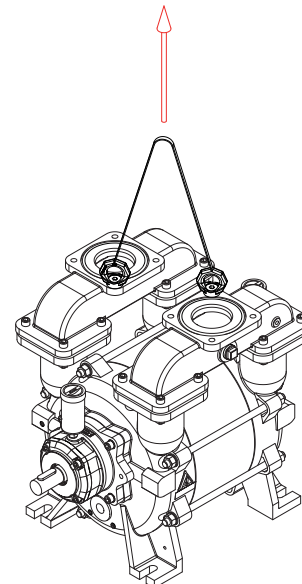
The pump may not be used if it is damaged or the identification plate is missing!

The pump must be transported in such way that is not exposed to vibrations and impacts that can overload the bearings.

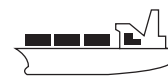
The pump must be inspected for damages upon delivery. If the pump is damaged, it may not be used and the damage must be reported to the dealer.

Ensure that the pump's identification plate is intact and that the marking of the pump corresponds to its use.

The pump may only be handled using approved lifting eyes, in accordance with nationally applicable regulations and only in a vertical motion.



The pump can be transported in the following ways:



DOC11093A

2.5 Pump storage



A failure to comply with the requirements for storing the pump may result in internal damage to the device.



If the temperature is below freezing point of the service liquid, it may damage the pump. Under these conditions the pump must be drained completely.



All plugs and protective covers must be fitted during storage.

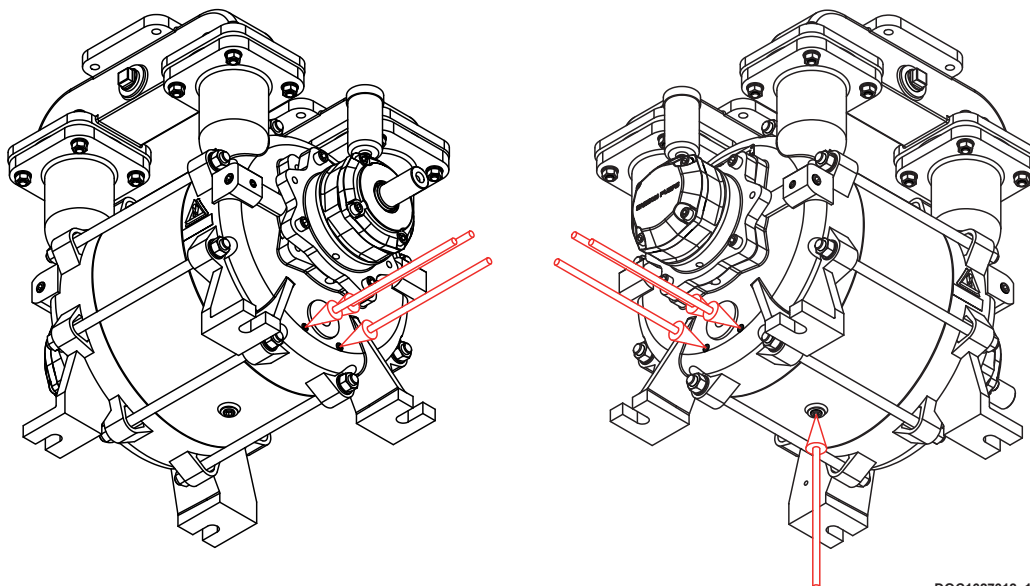
The pump's service liquid is drained on delivery, and the pump can be immediately stored in accordance with the technical specifications.

After operation, the pump can be stored for 30 days without further action.

If the pump remains out of operation for a longer period of time after use, its service liquid must be drained, and the liquid supply to the pump must be shut off.

When emptying the pump, it is important that all compartments inside the pump are emptied.

The pump can be fitted with valves in the draining connections. See below.



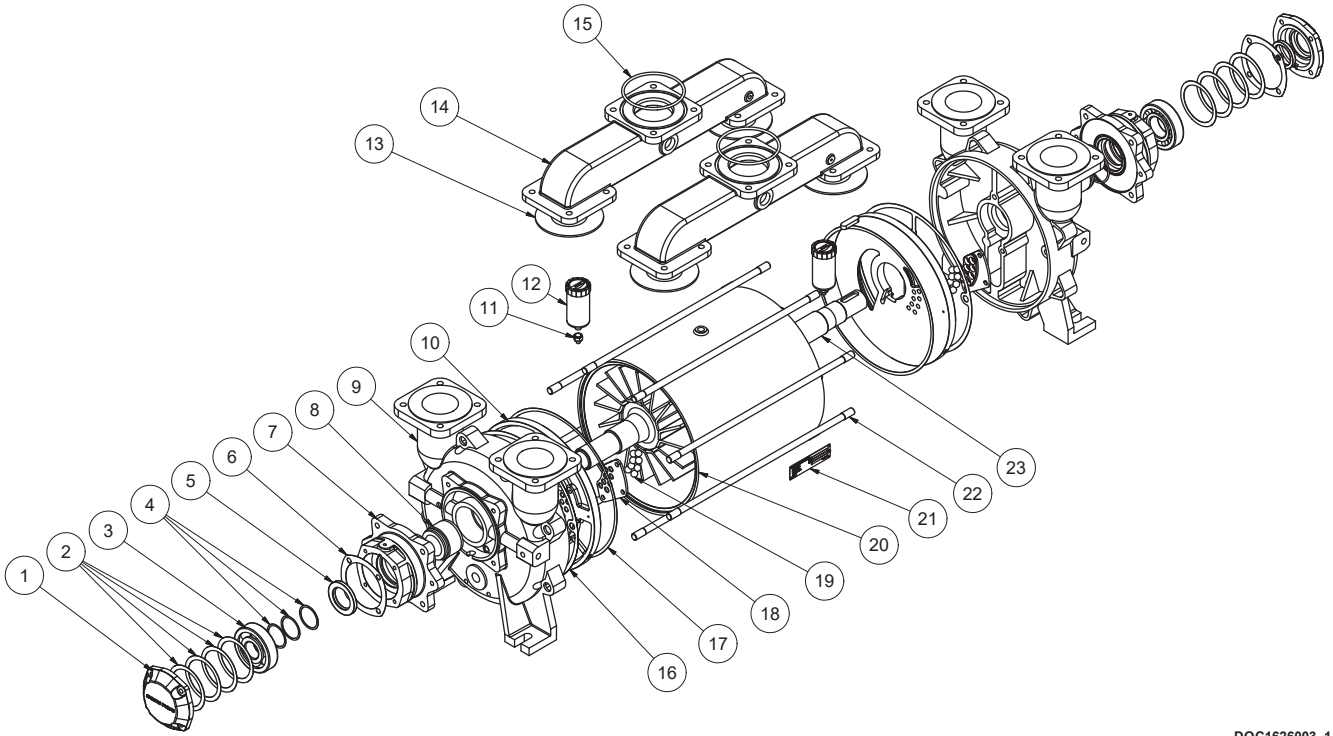
2.6 Materials

Term	Pos.	Material	Description
Bearing cover	1	Cast iron	EN-GJL-250; EN1561
Shim	2	Spring steel	-
Ball bearing	3	Chrome steel	W.Nr.1.3505
Shim	4	Spring steel	-
Radial shaft seal	5	Rubber	Type CB NBR; DIN 3760A
Paper gasket	6	Paper	Oakenstrong
Bearing housing	7	Cast iron	EN-GJL-250; EN1561
Mechanical shaft seal	8	NBR / AISI / Carbon	-
Pump housing	9	Cast iron	EN-GJL-250; EN1561
Flow plate*	10	Bronze	GC-CU Sn10 DIN 1705
		Cast iron	EN-GJL-250; EN1561
Fitting***	11	Brass	-
Automatic lubricator LAGD 125/WA2***	12	Polyamide	PA6
Rubber gasket	13	Rubber	NR 70
Branch pipe	14	Cast iron	EN-GJL-250; EN 1561
O-ring	15	Rubber	NBR 70; DIN 3771
Paper gasket	16	Paper	Oakenstrong
Paper gasket	17	Paper	Oakenstrong
Ball guide**	18	Polyethylene	PEHD 1000
Valve balls**	19	Polypropylene	PPH100NA-20M Anti-static
Shell*	20	Stainless steel	AISI 316
		Cast iron	EN-GJL-250; EN1561
Identification plate	21	Stainless steel	AISI 316
Stay Bolt	22	Carbon steel	W.Nr.1.1181
Rotor	23	Stainless steel	W.Nr.1.4418 / 1.4404

*-See section 1.3 for configuration of pump.

**-Only available on KS510, KS625 and KS910.

***-Optional. Not equipped as standard.

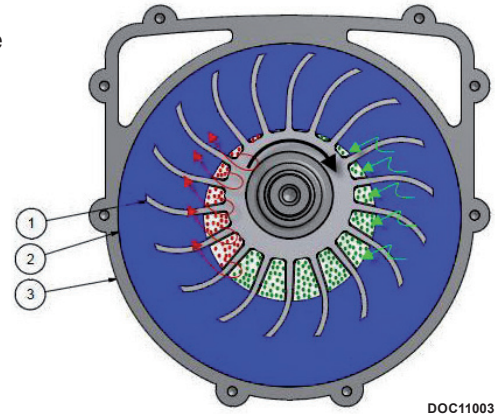


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3 DESIGN OF THE SYSTEMS

3.1 The pump's function

As the name suggests, the pump works with a liquid ring. There is no mechanical contact between the moving parts, and the liquid works like small pistons that, in principle, function as a traditional piston pump.



When the pump is started, the liquid ring will rotate at the same speed as the rotor. The rotor is positioned slightly higher than the centre point and divides the liquid ring up into cells. If one were to see the cell in the top position, it would be completely filled with liquid.

As the cell rotates, an air space is created against the hub of the rotor. The liquid moves like a piston away from the hub of the rotor and thereby creates a suction effect. As the cell reaches the bottom, the movement changes direction and causes the service liquid to be pushed in towards the hub of the rotor. The air is thus pushed out of the cell, which becomes completely filled with liquid and ready for a new suction cycle. In order to separate the suction and pressure sides of the pump, the ends of the shell are fitted with a flow plate and pump housing. Some pump types have connections at both ends, while others – known as monoblock pumps – only have a connection on one end of the liquid ring.

A certain volume of the service liquid and gas will flow out of the pump. The pump must therefore be constantly supplied with new service liquid.

In addition to replacing any lost liquid, the new liquid supply will cool the compressor gas in the pump and lubricate the mechanical shaft seals.

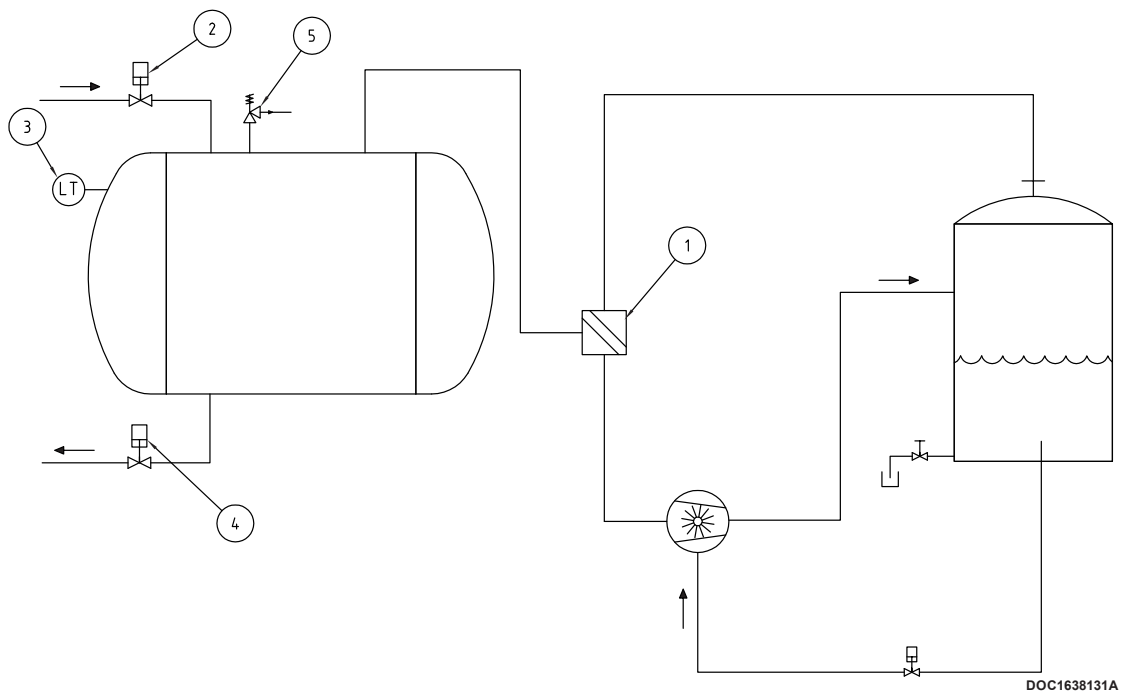
The composition and correct addition of service liquid are essential to the functioning of the pump. See section 3 on the liquid composition.

3.2 System layout example



- The product does not get sucked into the system, by installing of suitable level transmitter.
- The maximum working pressure does not exceed specifications, by installing a safety valve.

The liquid ring pump can be integrated in a system which takes advantage of both sides of the pump, vacuum and pressure. The example on illustrates the pump installed with a 4-way valve and a product tank. The 4-way valve, depending on position, will fill the tank by vacuum or empty the tank by pressure.



Pos.	Description
1	4-way valve
2	Suction valve
3	Level transmitter
4	Discharge valve
5	Safety valve

3.3 Liquid separator



Liquid separator is mounted in such way that the minimum level of service liquid is minimum 0,5 m above the pump's shaft.

To prevent calcium deposits, use a liquid separator or take necessary measures to prevent calcium in the service liquid.

The liquid separator is located in immediate proximity to the pump, so that the length of the outlet pipe from the pump is minimised.

Due to potential pressure loss, the length may not exceed 2 metres. The level of liquid in the liquid separator is recommended to be kept at 1-1.5 metres above the pump's shaft. This ensures the correct influx pressure and the correct flow of service liquid.

The liquid supply between the liquid separator and pump must be implemented with a permanent pipe connection with a dimension and length specified in specifications.

It may be advantageous to fit the liquid separator with a float valve, which automatically supplies liquid and maintains a constant level.

The liquid separator can be fitted with a drain valve at the lowest place in the tank. The valve can be operated when the separator needs to be drained to remove contaminants.

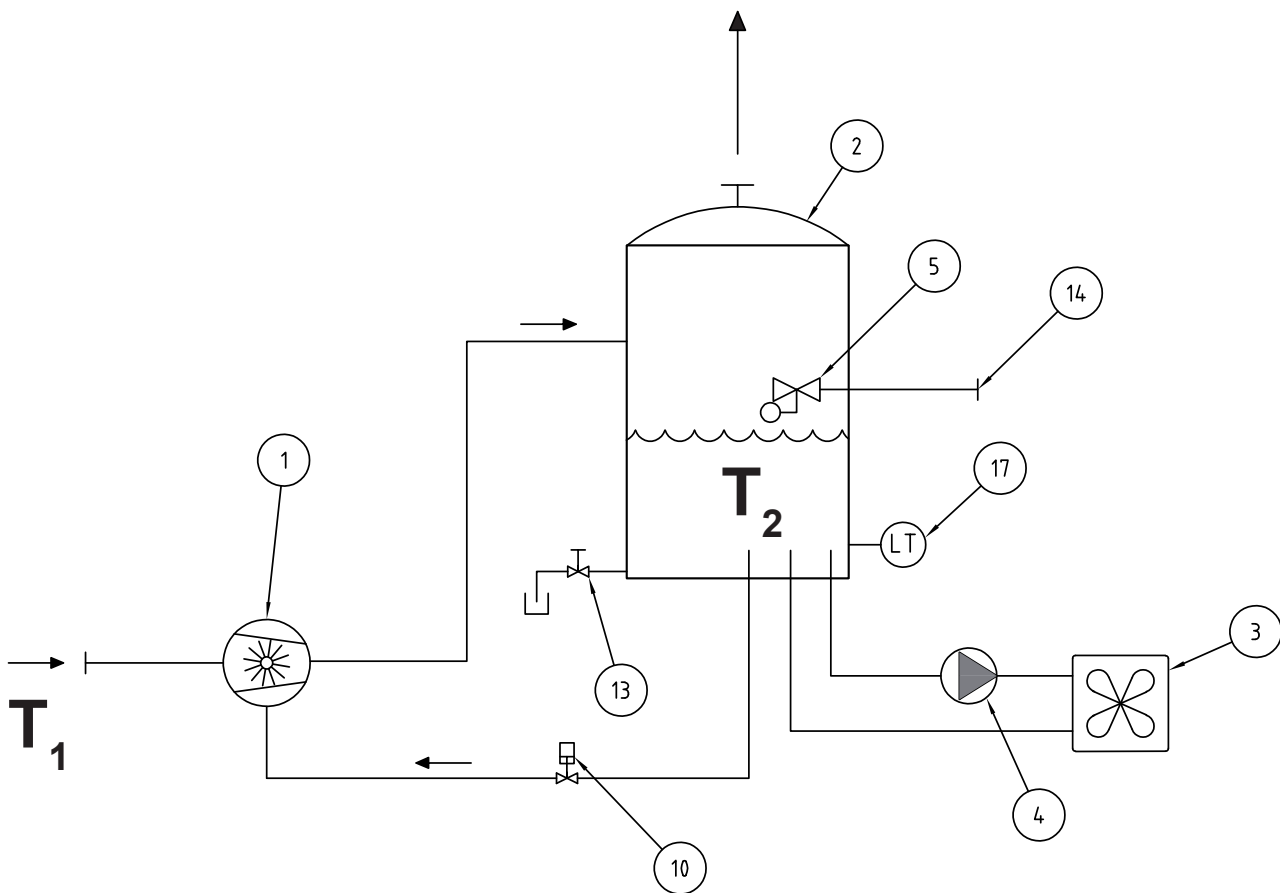
3.4 Cooling system

The compression in the pump generates heat, which will cause the temperature of the service liquid to rise. This means that it will often be necessary to cool the liquid. This can be done using an air cooler or heat exchanger. For short-term operation with intermittent breaks, natural cooling may be sufficient.

Depending on the temperature, the suctioned gas may be sufficient for cooling purposes, though it may also lead to an increased need for cooling.

The necessary cooling requirement can be found in chapters 3.4.1 to 3.4.12

Delta T (Δt) is the temperature difference between the suctioned gas (T_1) and the maximum acceptable service liquid temperature (T_2). See below.



1638149

Pos.	Description
1	Vacuum pump
2	Liquid separator
3	Cooler
4	Circulation pump
5	Float valve
10	Stop valve
13	Drain valve
14	Service liquid connection
17	Level transmitter

Example 1: The intake temperature is 5°C, and the desired maximum service liquid temperature is 45°C.

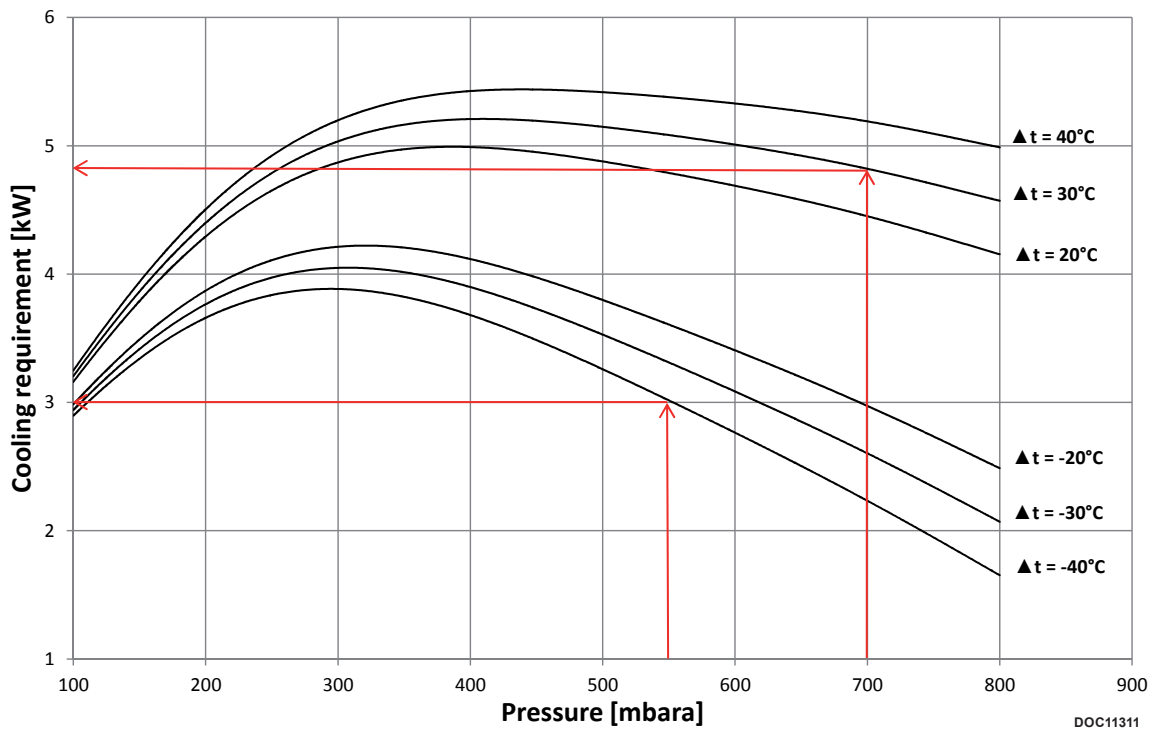
$$\Delta t = 5 - 45 = -40^\circ\text{C}.$$

The cooling requirement at a pressure of 550 mbara will be 3 kW. See below.

Example 2: The intake temperature is 60°C, and the desired maximum service liquid temperature is 30°C.

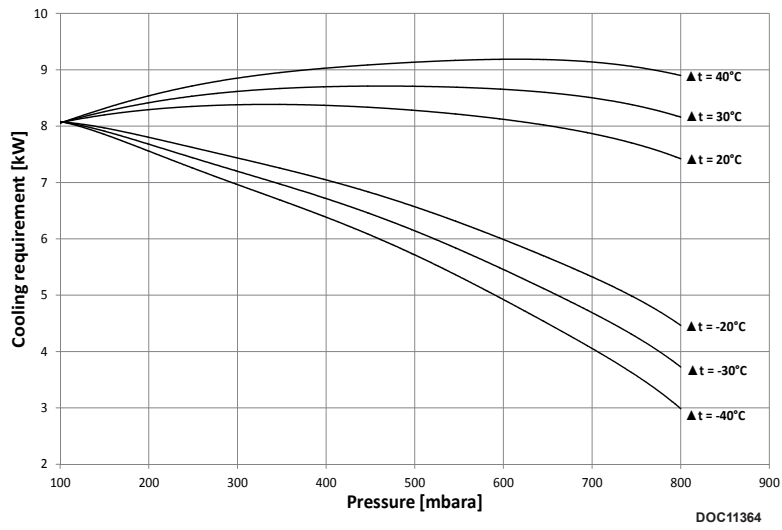
$$\Delta t = 60 - 30 = 30^\circ\text{C}.$$

The cooling requirement at a pressure of 700 mbara will be 4.8 kW. See below.

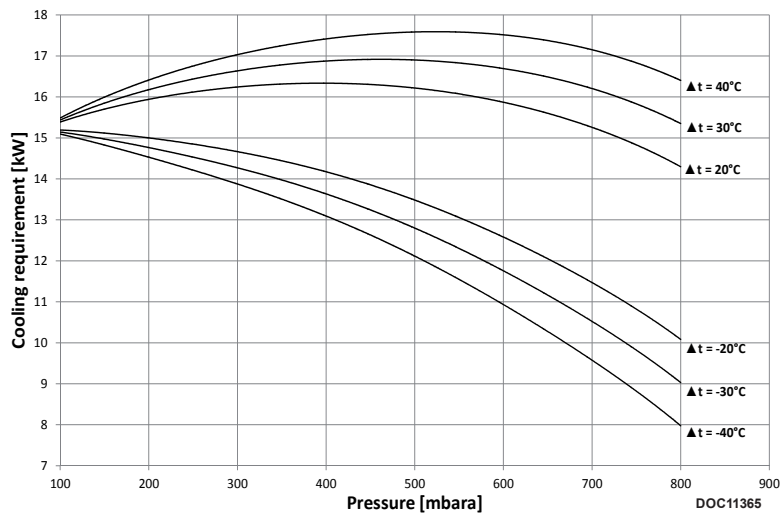


3.4.1 KS500 - Vacuum

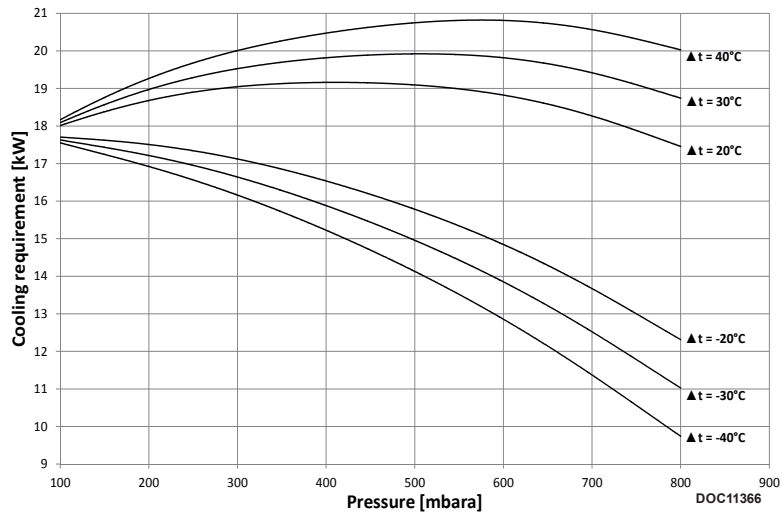
KS500 - 1000 rpm - Vacuum



KS500 - 1450 rpm - Vacuum

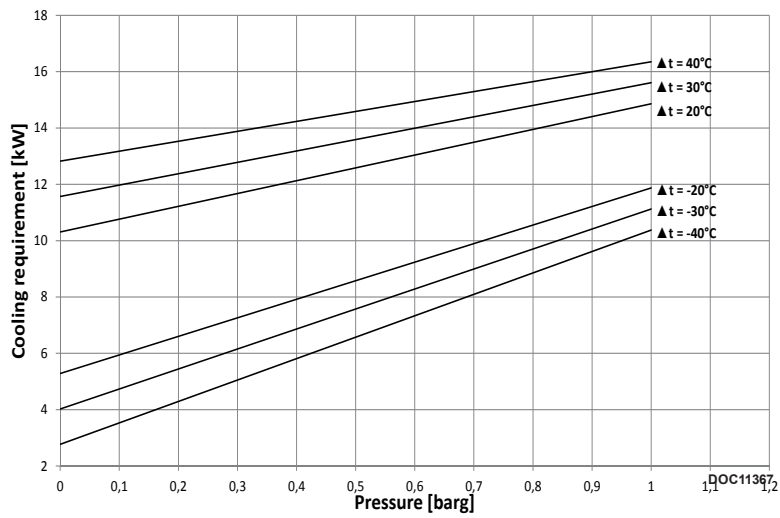


KS500 - 1750 rpm - Vacuum

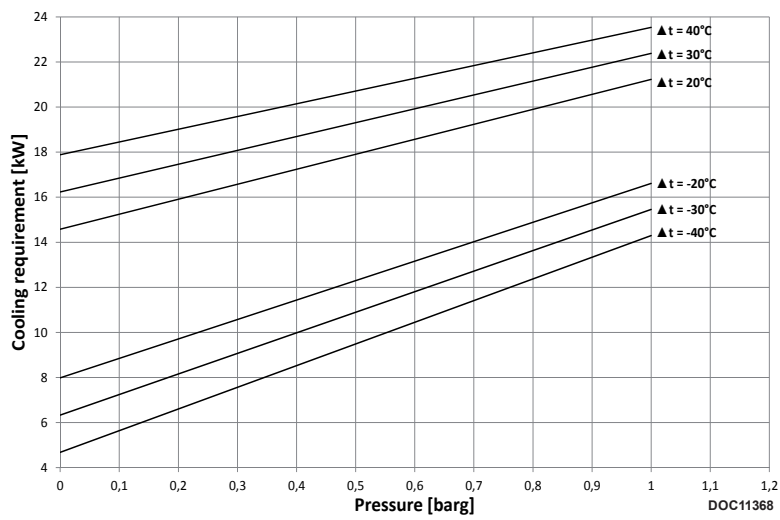


3.4.2 KS500 - Pressure

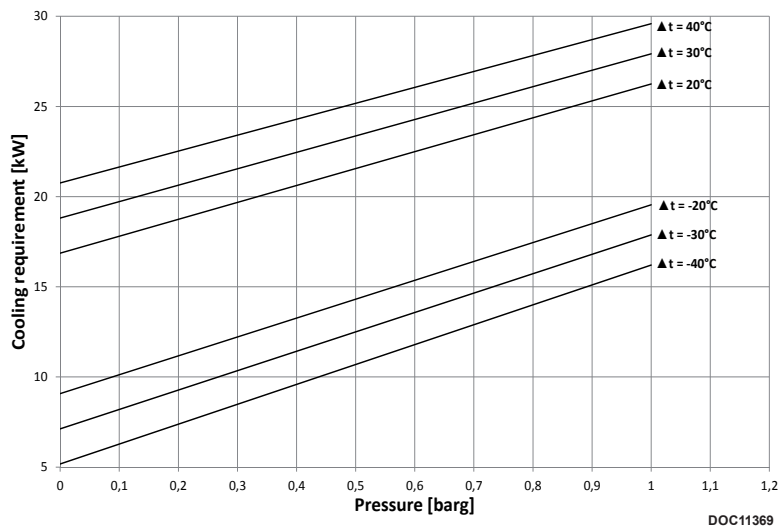
KS500 - 1200 rpm - Pressure



KS500 - 1450 rpm - Pressure

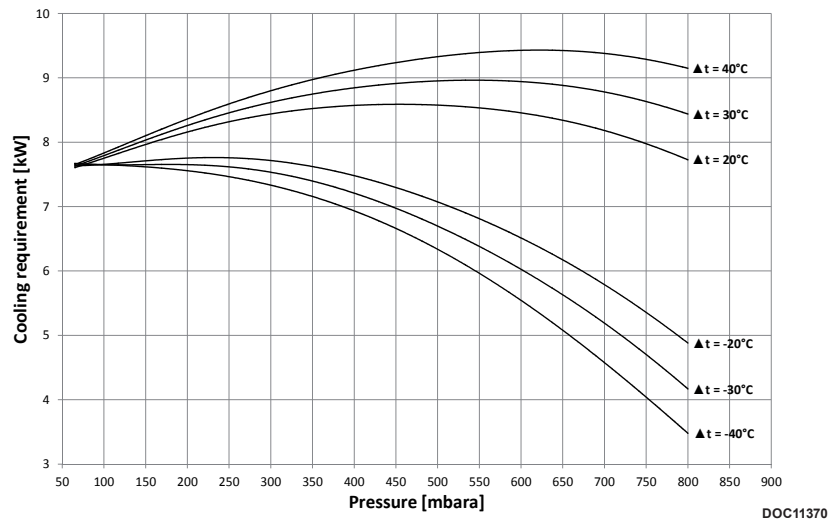


KS500 - 1750 rpm - Pressure

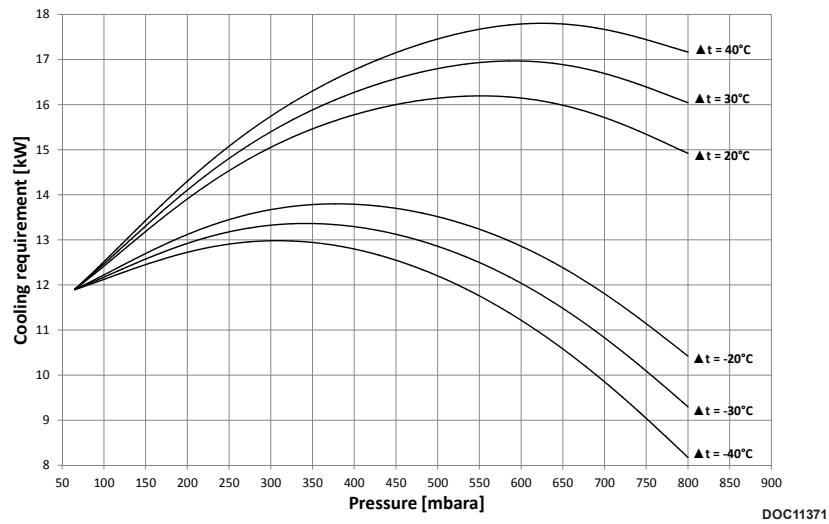


3.4.3 KS510 - Vacuum

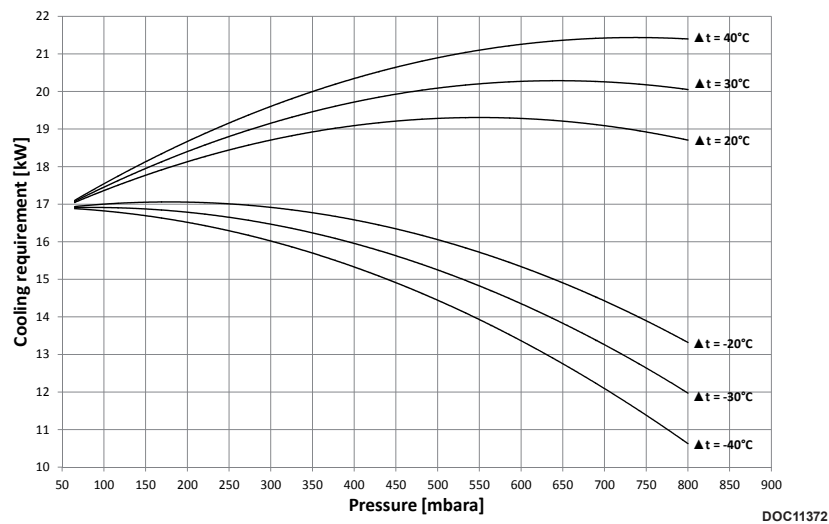
KS510 - 1000 rpm - Vacuum



KS510 - 1450 rpm - Vacuum

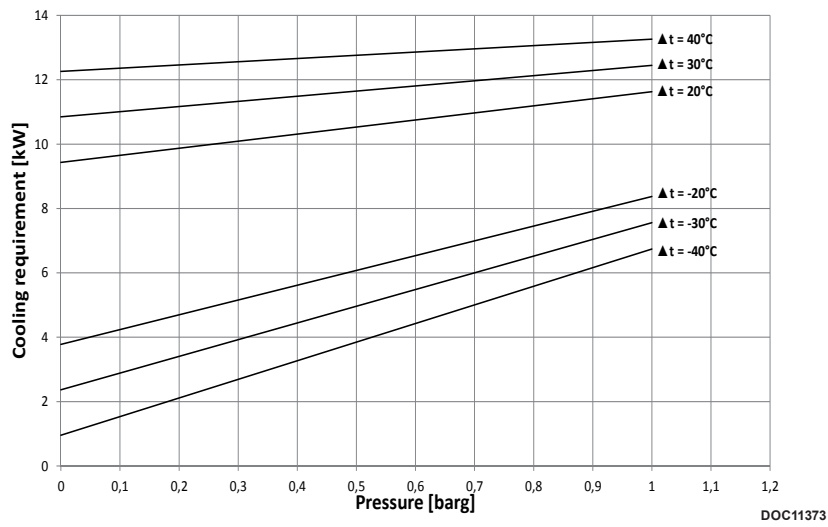


KS510 - 1750 rpm - Vacuum

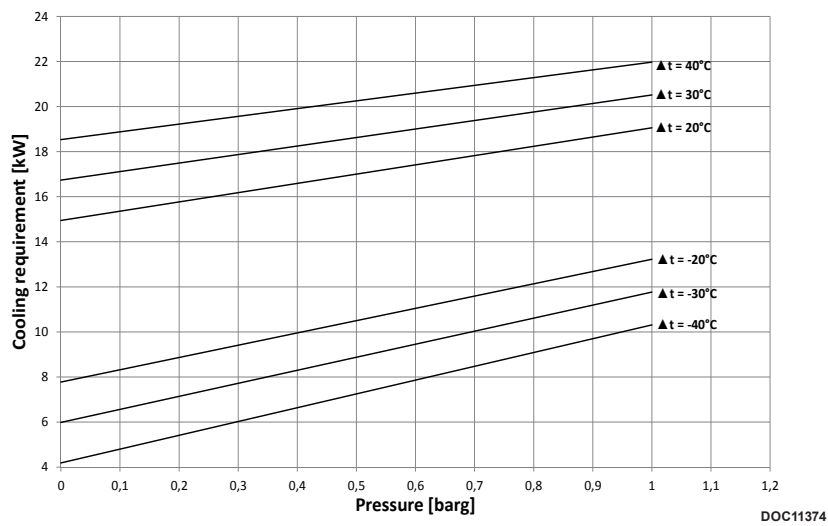


3.4.4 KS510 - Pressure

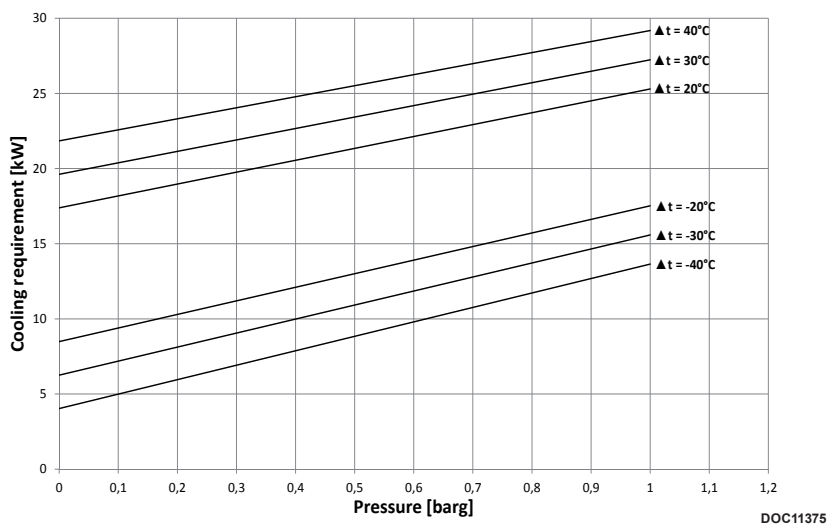
KS510 - 1200 rpm - Pressure



KS510 - 1450 rpm - Pressure

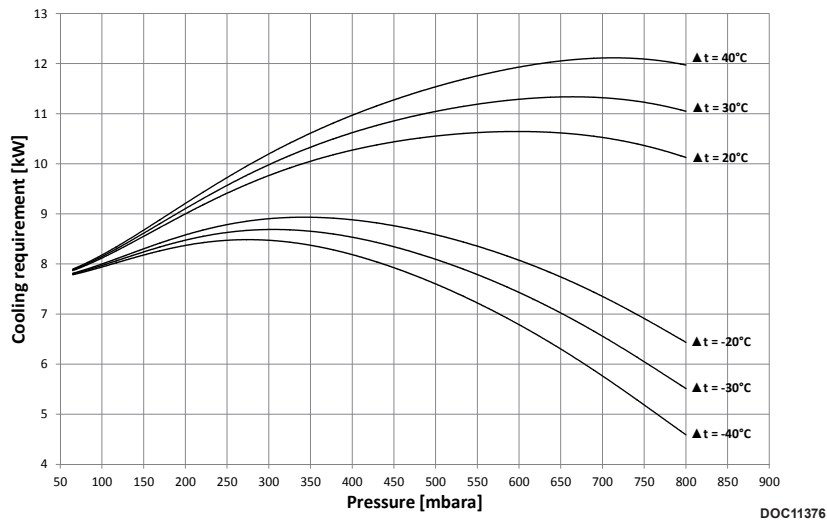


KS510 - 1750 rpm - Pressure

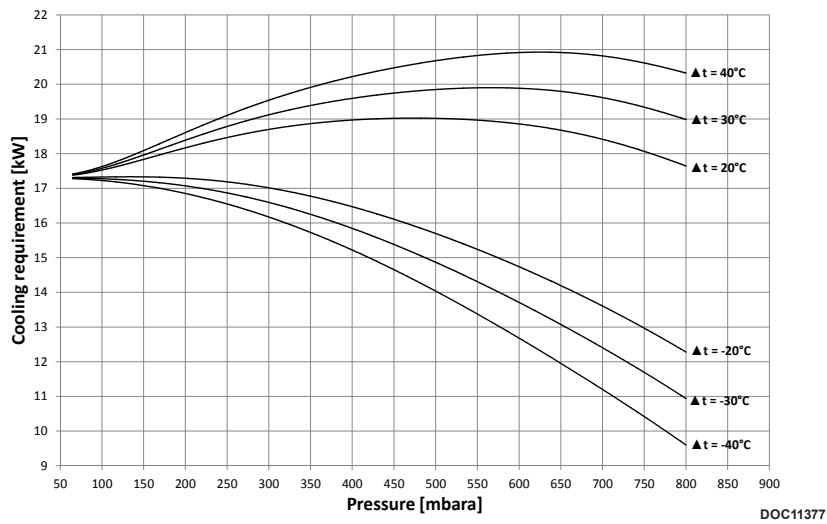


3.4.5 KS625 - Vacuum

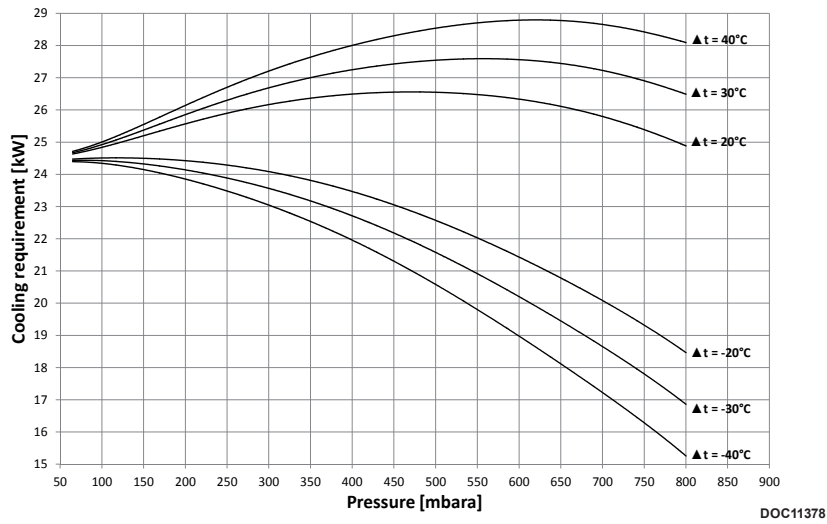
KS625 - 1000 rpm - Vacuum



KS625 - 1450 rpm - Vacuum

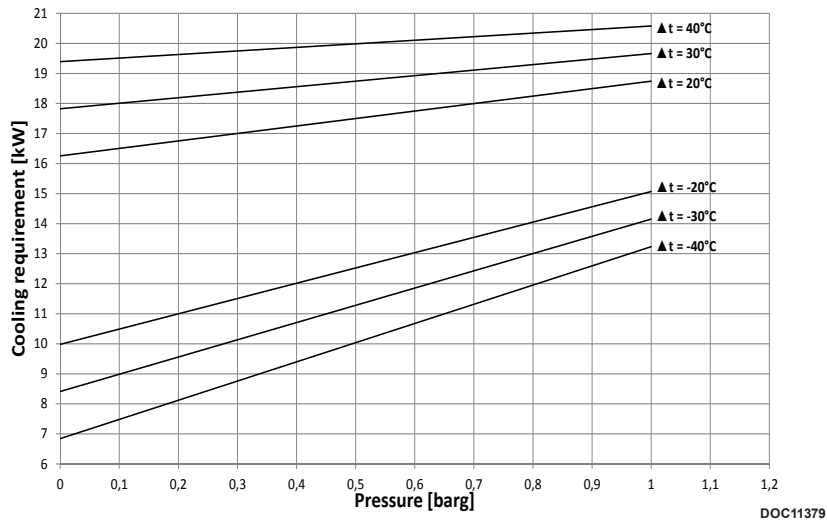


KS625 - 1750 rpm - Vacuum

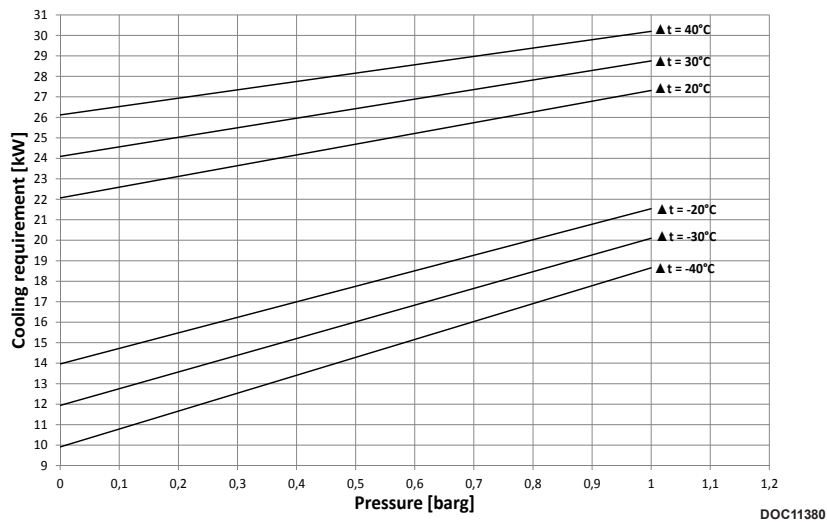


3.4.6 KS625 - Pressure

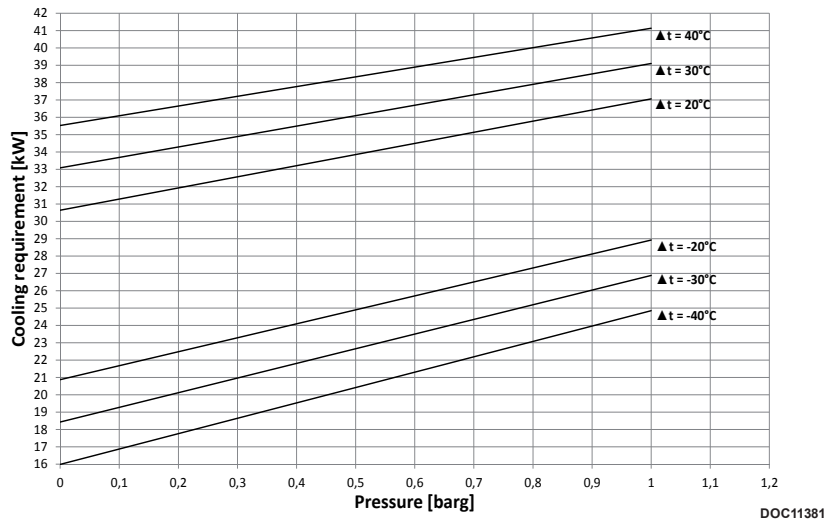
KS625 - 1200 rpm - Pressure



KS625 - 1450 rpm - Pressure

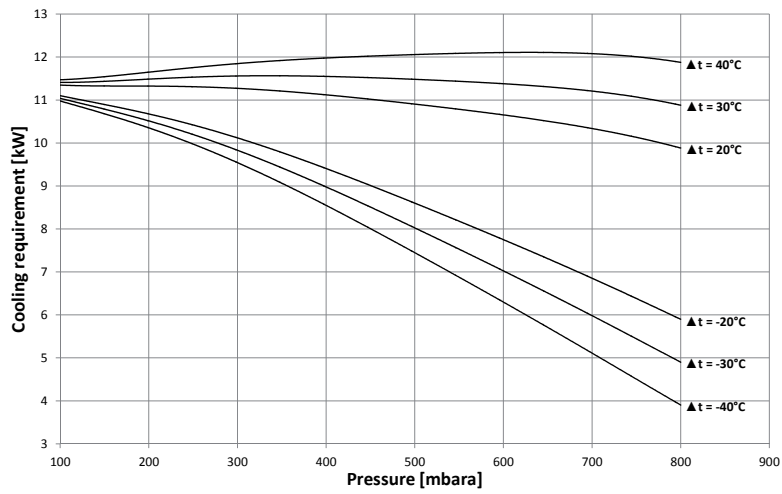


KS625 - 1750 rpm - Pressure



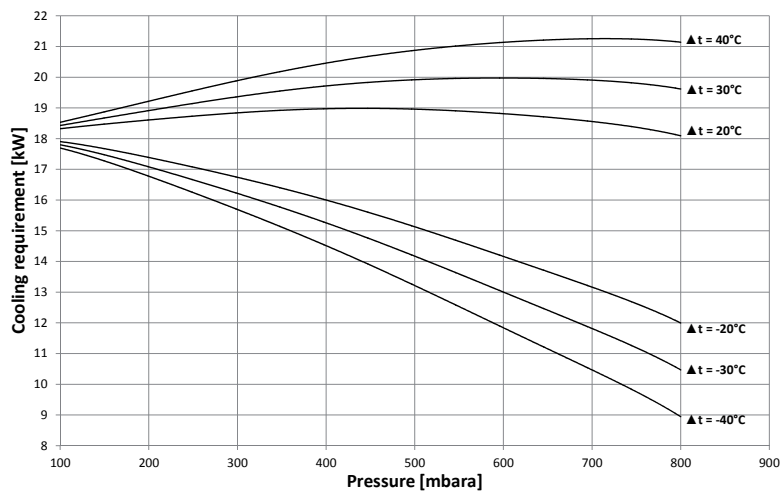
3.4.7 KS725 - Vacuum

KS725 - 1000 rpm - Vacuum



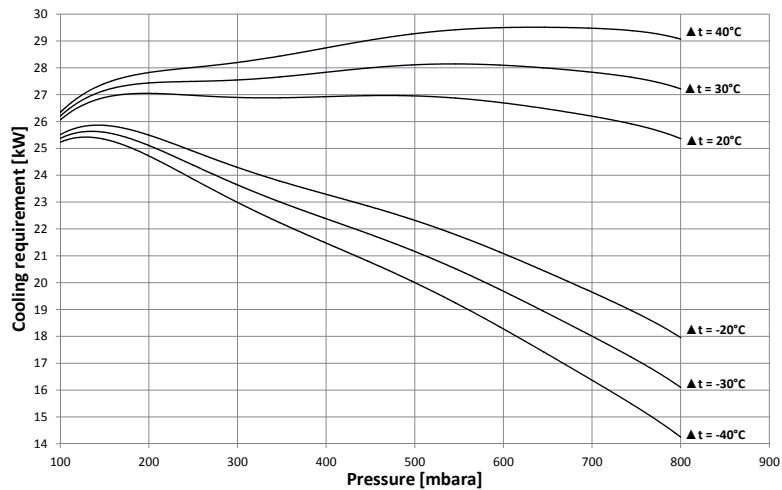
DOC11382

KS725 - 1450 rpm - Vacuum



DOC11383

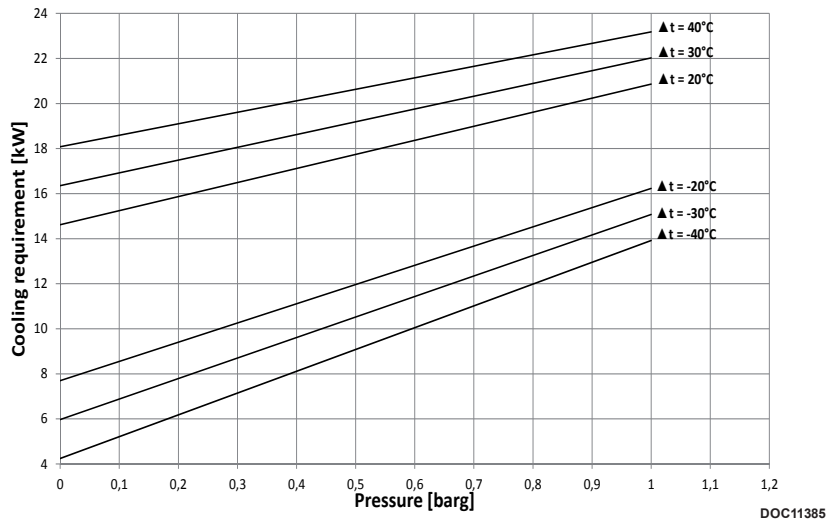
KS725 - 1750 rpm - Vacuum



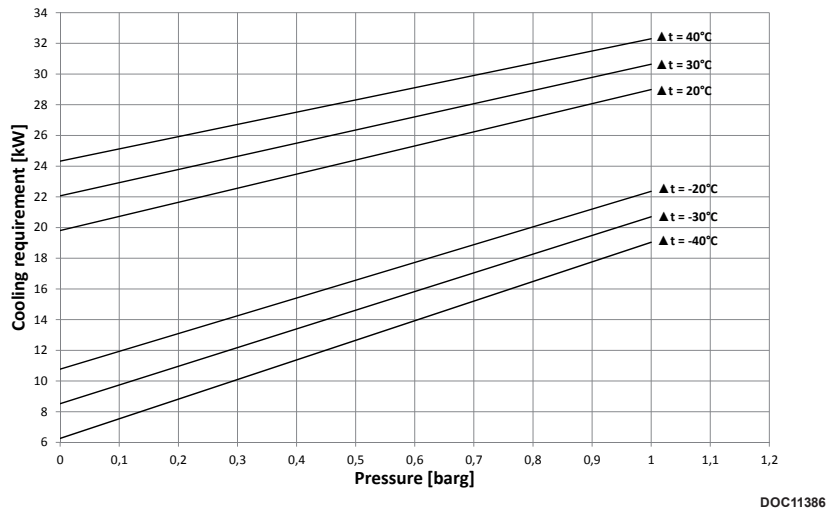
DOC11384

3.4.8 KS725 - Pressure

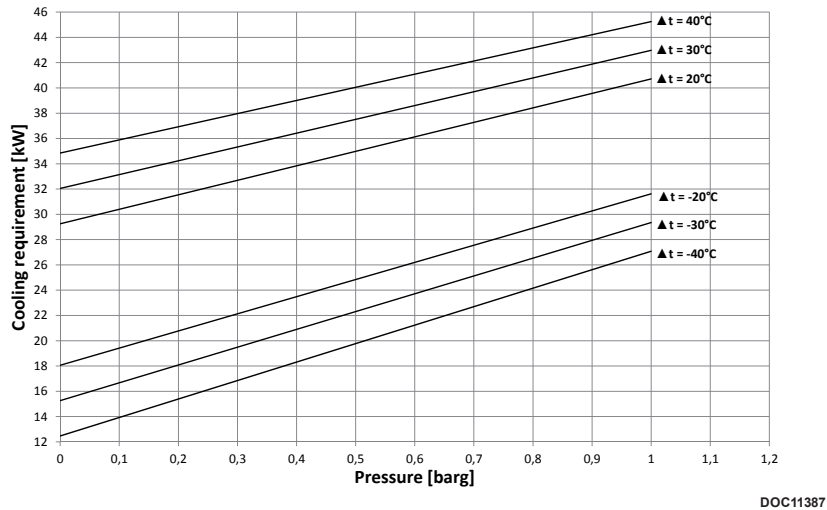
KS725 - 1200 rpm - Pressure



KS725 - 1450 rpm - Pressure

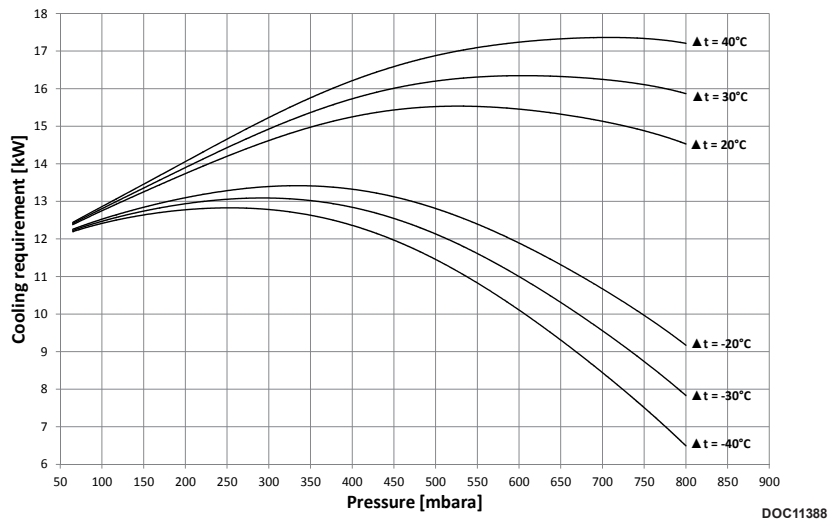


KS725 - 1750 rpm - Pressure

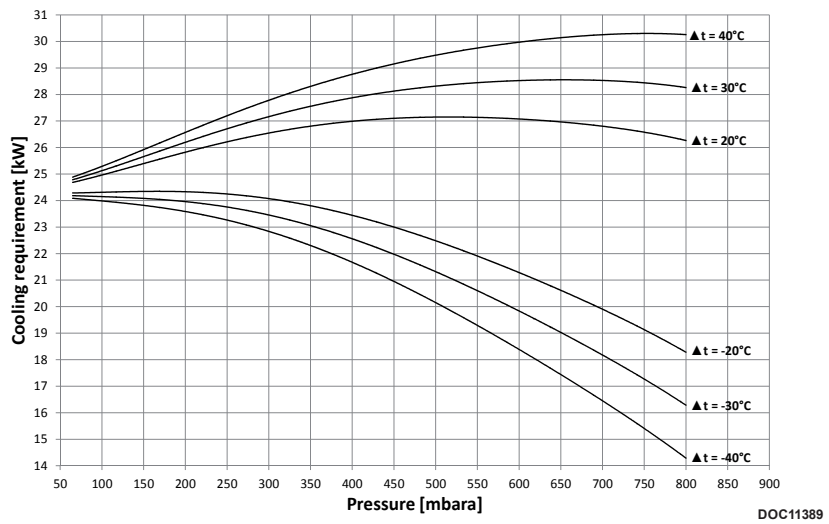


3.4.9 KS910 - Vacuum

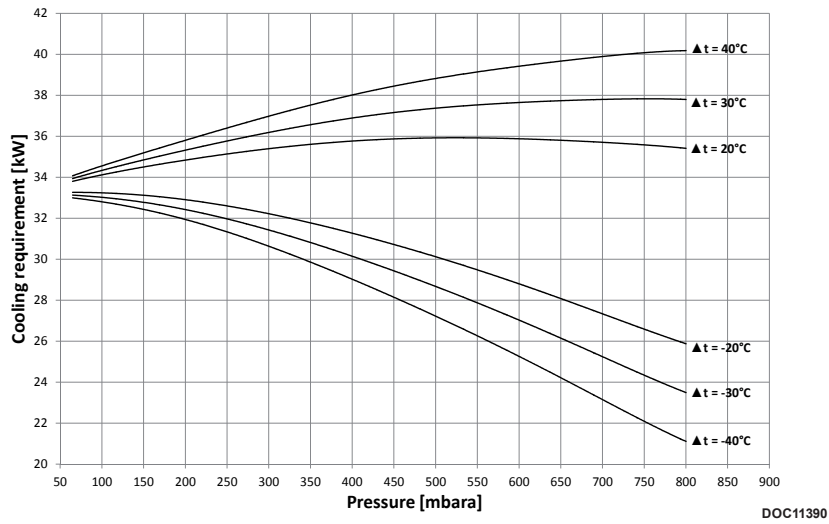
KS910 - 1000 rpm - Vacuum



KS910 - 1450 rpm - Vacuum

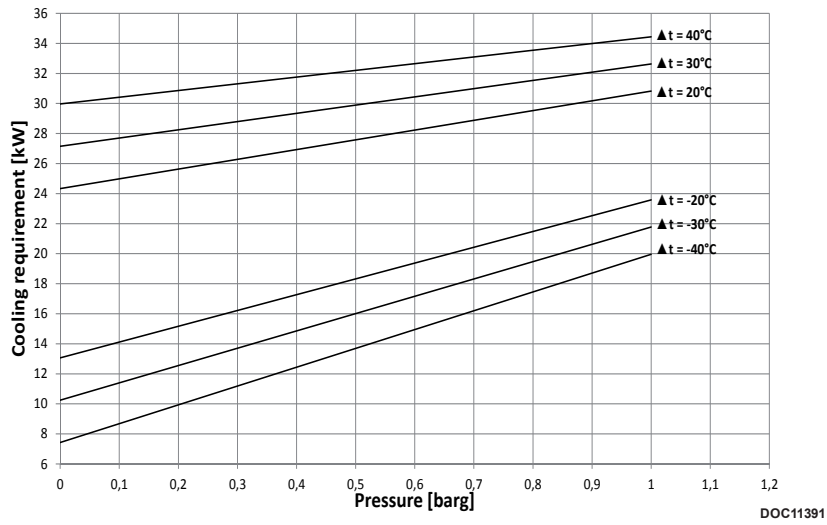


KS910 - 1750 rpm - Vacuum

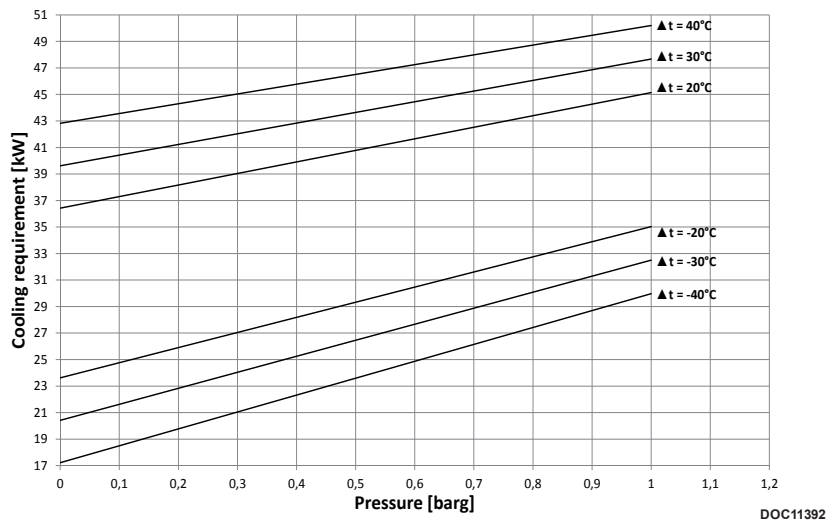


3.4.10 KS910 - Pressure

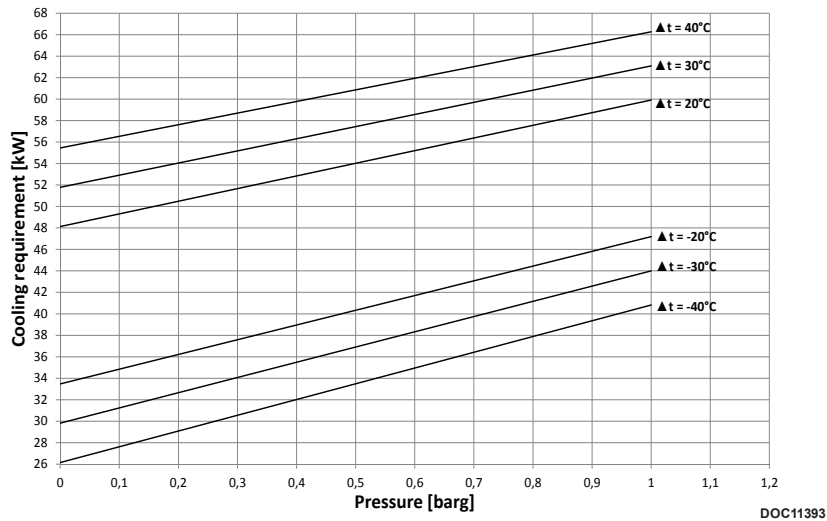
KS910 - 1200 rpm - Pressure



KS910 - 1450 rpm - Pressure

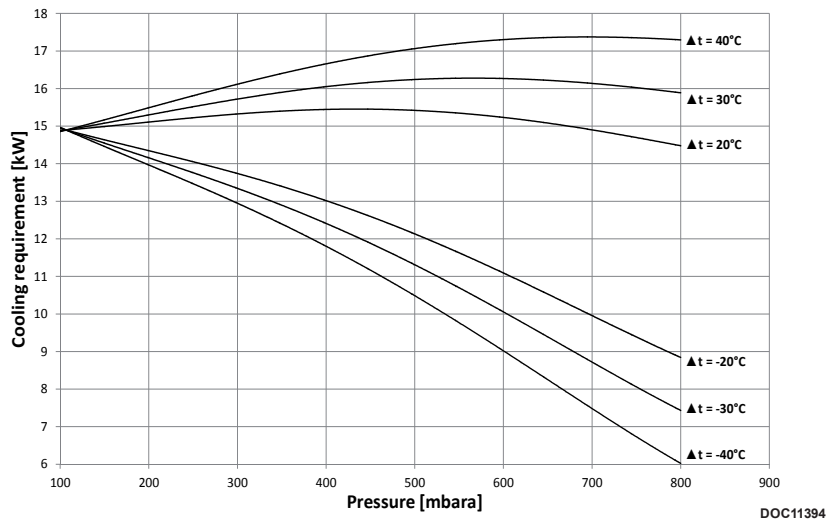


KS910 - 1750 rpm - Pressure

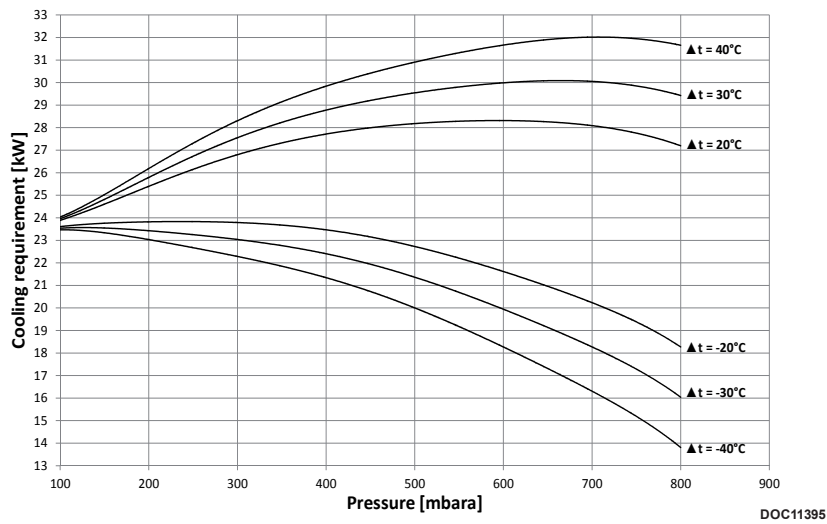


3.4.11 KS1025 - Vacuum

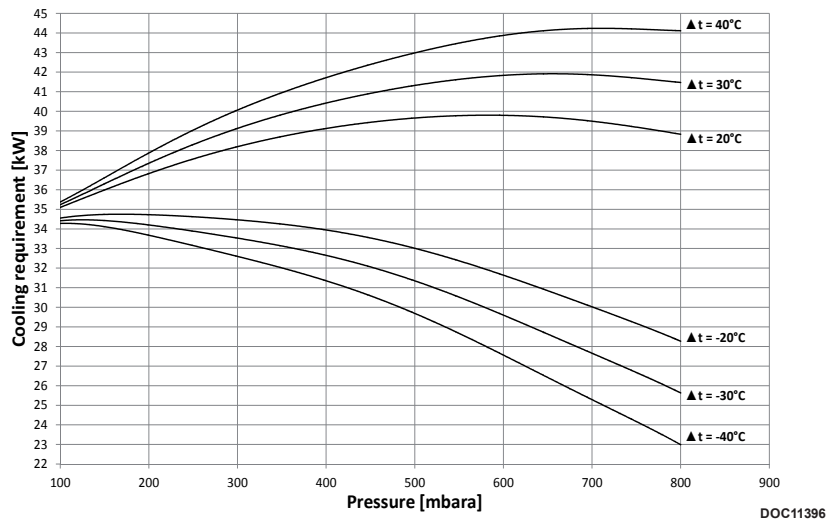
KS1025 - 1000 rpm - Vacuum



KS1025 - 1450 rpm - Vacuum

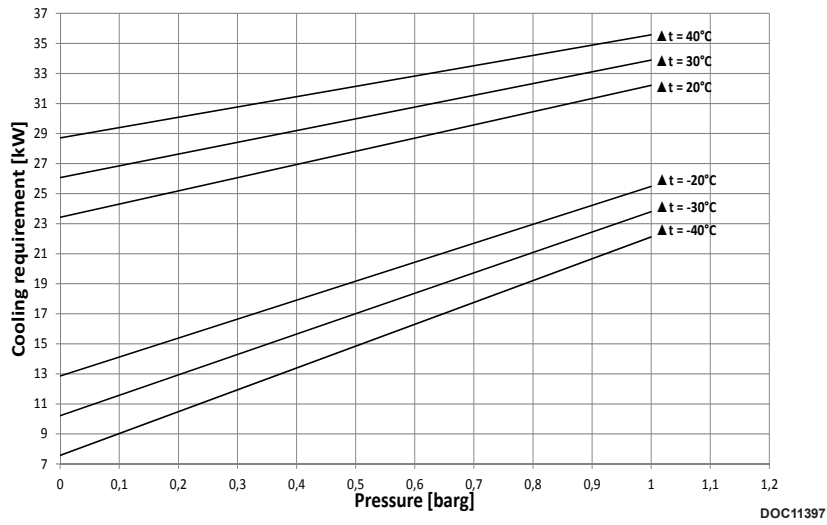


KS1025 - 1750 rpm - Vacuum

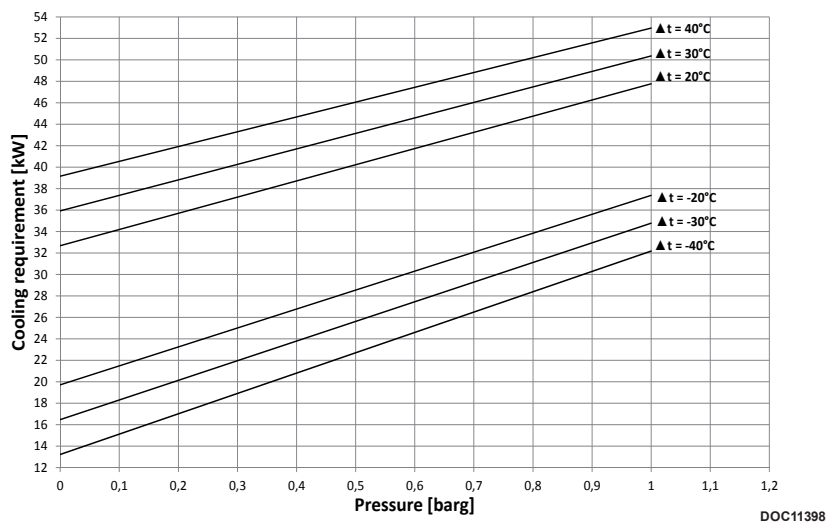


3.4.12 KS1025 - Pressure

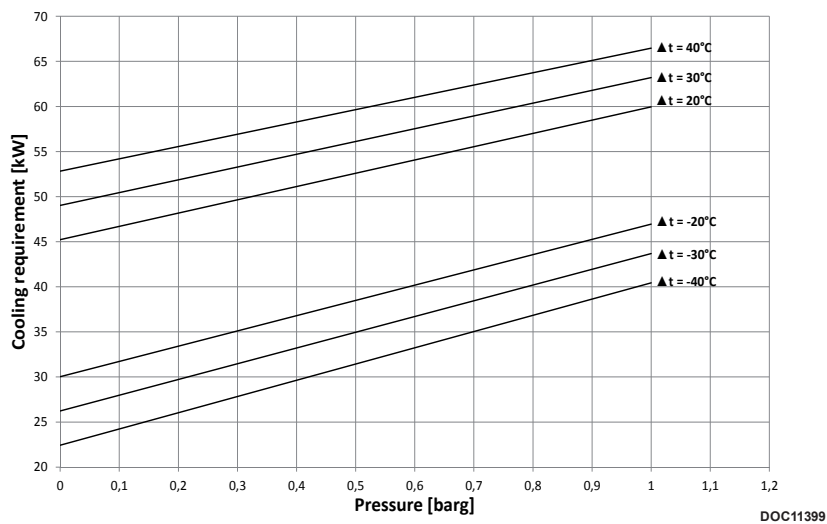
KS1025 - 1200 rpm - Pressure



KS1025 - 1450 rpm - Pressure



KS1025 - 1750 rpm - Pressure



3.5 Pipe system

The pipes that are connected to the pump's suction and outlet sides must be at least the same dimension as the pump. The length of the pipe system affects the pump's capacity and should be calculated to account for pressure drop in longer pipe installations.

Depending on the operating pressure, longer pipe lengths may affect the pump's output. For pipe lengths greater than 20 metres, a pressure drop calculation should be made, and the pipe dimensions should be increased so that the pressure loss is held to an acceptable level.

The pipe system should be mounted so that the horizontal pipes have a min. of 1% decline back towards the liquid separator.

Table below can be used for reference values.

Connection	Length < 20 metres	Length 20-50 metres	Length 50-100 metres
Suction side	Min. DN 100	Min. DN 125	Min. DN 150
Outlet side	Min. DN 100	Min. DN 125	Min. DN 150

The outlet from the liquid separator should be led outside of the building, because the outlet air is warm and humid.

With respect to the exhaust, measures must be put in place to account for damp air that may form ice in cold surroundings.

3.6 Service liquid requirements

Only water-based liquid may be used as service liquid.

For operating conditions where there is a risk of ice formation in the service liquid system, a suitable anti-freeze must be used.

4 INSTALLATION AND START-UP

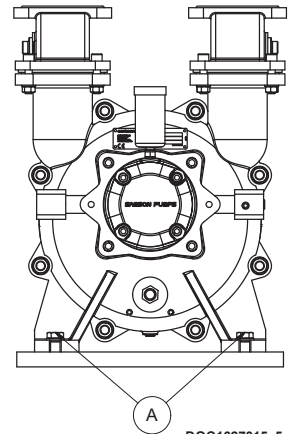
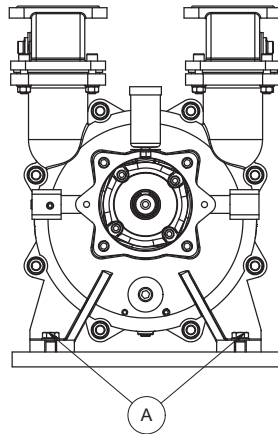
4.1 Securing the pump



If the tolerance for securing the pump is not observed, there is a risk of damage.

The pump must be installed on a stable foundation, which must be level and stable, so that the pump is not twisted or exposed to a profile distortion.

The pump must be anchored with M16 foundation bolts on all four legs, which must be tightened to 180 Nm. (A)



DOC1627315_5

4.2 Connections to the pump

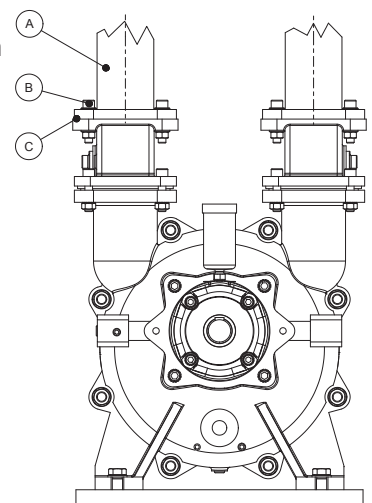


- Check for foreign objects in the pump and physical damage on pump.
- Gaskets to be handled with highest degree of caution.
- Gasket and sealing surfaces must be cleaned before assembly.

Immediate before connecting the pipes, remove protective covers. Connection of the pump's suction and pressure pipe connections must be made with a gasket in between. (C)

The M12 bolts must be tightened to 60 Nm. (B)

In order to prevent tensions in the pump, the pipe connections (A) must be tensionless while tightening the bolts.

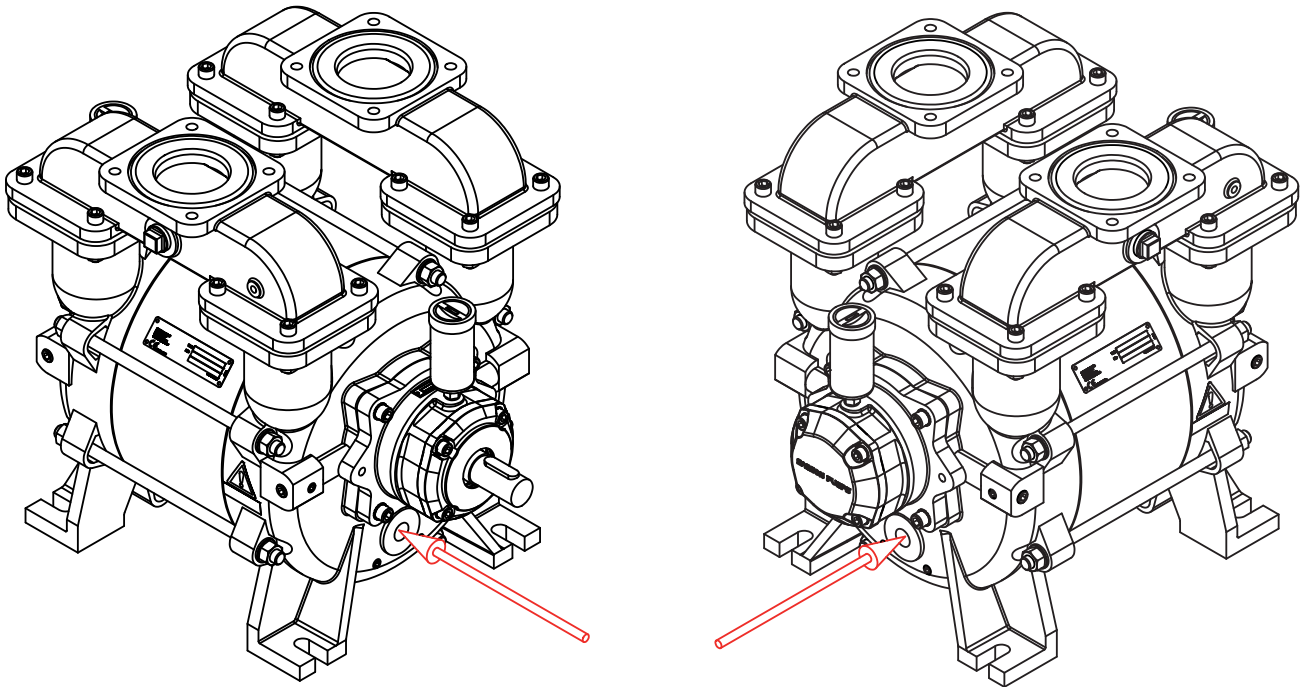


DOC1627315_2

4.3 Connecting the service liquid

The service liquid connection must be established on both ends of the pump to ensure optimal working conditions for the pump, and so that the mechanical shaft seals are lubricated by the service liquid.

A valve is to be mounted on the connection, which can open and close the service liquid supply independently of the pump.



DOC1627312_2

4.4 Transmission

The pump can be connected to direct or belt transmission. For belt transmission, it must be ensured that the permissible radial force is not exceeded. See specifications.

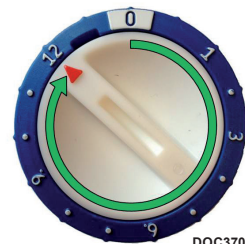
4.5 Prior to start-up



- Do not start the pump without service liquid, as this will damage the mechanical shaft seals.
- Do not start the pump if it is completely filled with service liquid.
- Do not start the pump before the grease cartridges have been activated, as this can damage the pump. (if equipped)
- Stop the pump immediately if the rotational direction does not correspond to the directional arrow.
- A failure to follow the above guidelines may result in damage to the pump.

Activating the grease cartridges

Turn the knob on both grease cartridges clockwise to position 12.



DOC3707

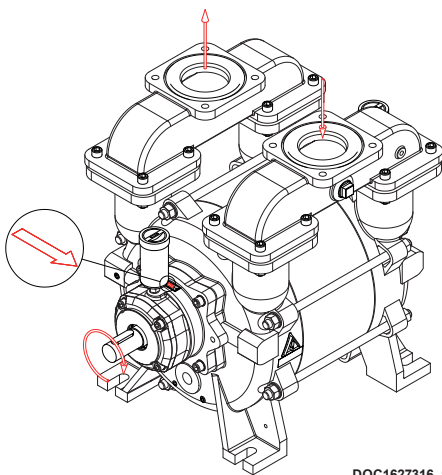
4.6 Direction of rotation

Check the direction of rotation by briefly starting the pump.

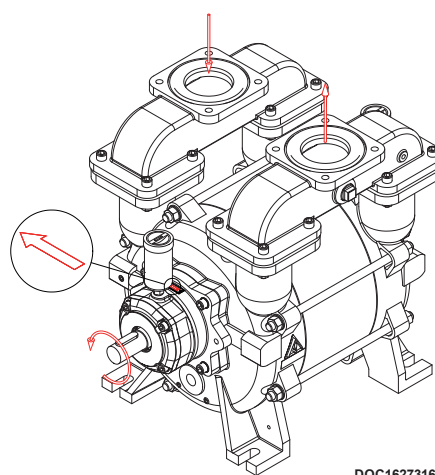
The direction of rotation of the rotor must correspond to the direction arrow!

Below left, a right-side pump is shown which has a clockwise direction of rotation. (CW)

Below right, a left-side pump is shown which has a counter-clockwise direction of rotation. (CCW)



DOC1627316_1



DOC1627316_2

5 RECOMMENDED SERVICE, MAINTENANCE AND INSPECTION INTERVALS



A failure to observe the inspection intervals described in table below may result in damage to the pump.

Section	Operation	Interval
5.1	Drain liquid separator to remove contaminants	Weekly
5.2	Check grease cartridges (if equipped)	Weekly
5.3	Lubrication of bearings	Monthly
5.4	Inspection and cleaning of service liquid's supply pipe	Monthly

5.1 Draining the liquid separator

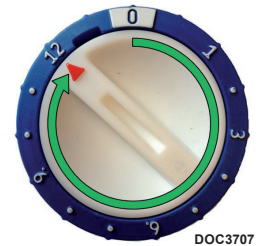
While the pump is stopped, the liquid separator must be drained to remove contaminants.

5.2 Check grease cartridges

If the pump is equipped with an automatic lubrication feature. It must be inspected and replaced as needed.

When the pump is commissioned for the first time, the cartridges must be activated by turning the arrow in the clockwise direction.

The cartridge is set to 12, which corresponds to an emptying time of 12 months. The cartridge must be replaced when empty.



DOC3707

It is only allowed to use automatic lubricator of type **LAGD 125/WA2**.

5.3 Lubrication of bearings

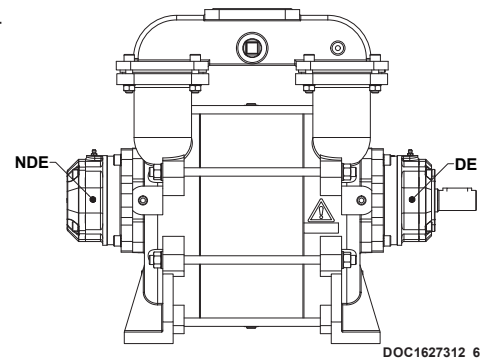


Over-lubrication of bearings may result in bearing failure! Do NOT exceed the amount of grease specified below!

The bearings must be lubricated with grease of type SKF LGWA2, once a month.

It is recommended to lubricate the bearings while pump is running.

Pump	K500 / KS510 / KS625 / KS725	KS910 / KS1025
Drive end (DE)	3 g/mth	10 g/mth
Non drive end (NDE)	3 g/mth	3 g/mth



DOC1627312_6

5.4 Inspection and cleaning of service liquid's supply pipe

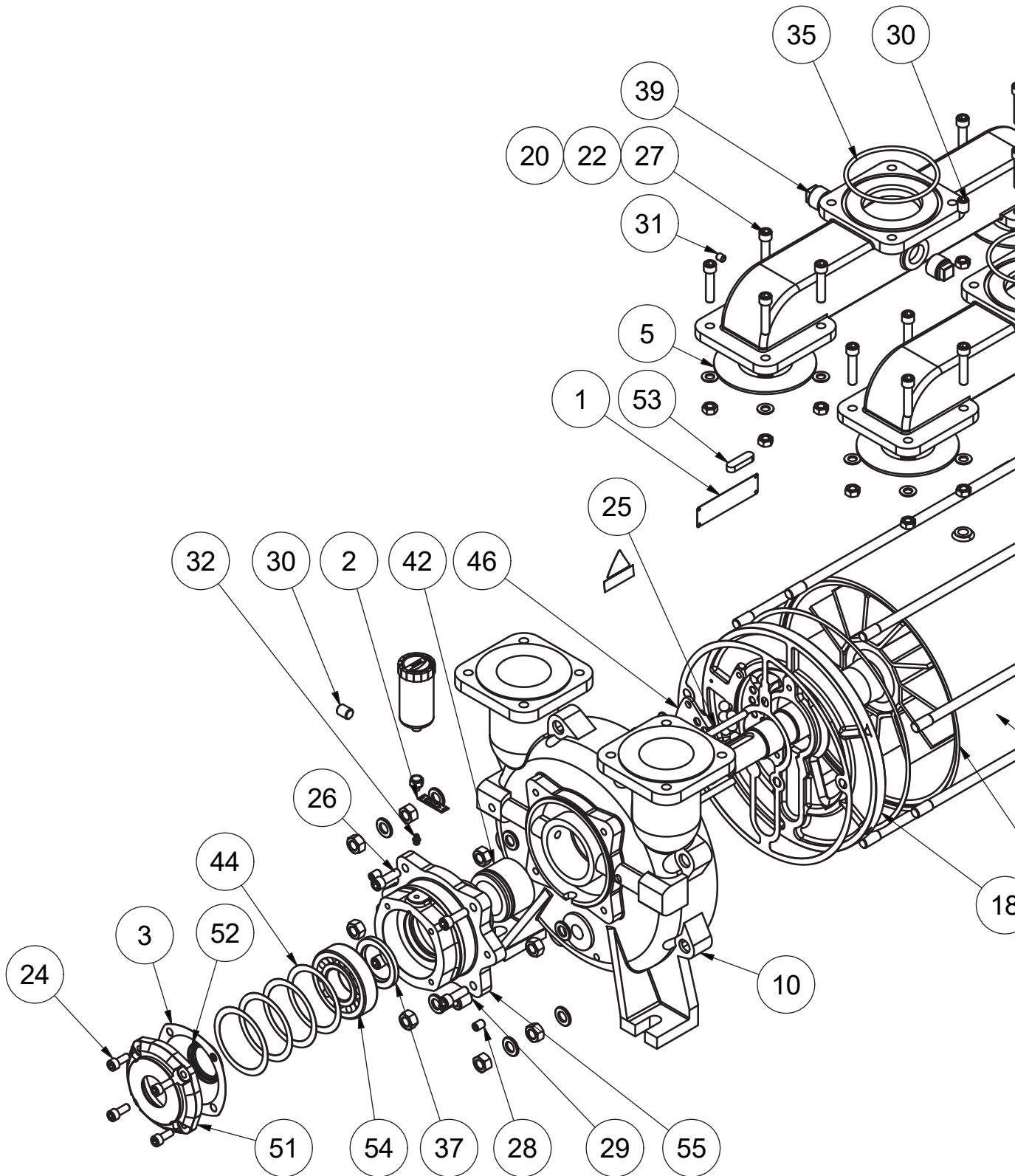
The pipe connection between the liquid separator and pump must be inspected at least once a month, and any contaminants must be removed.

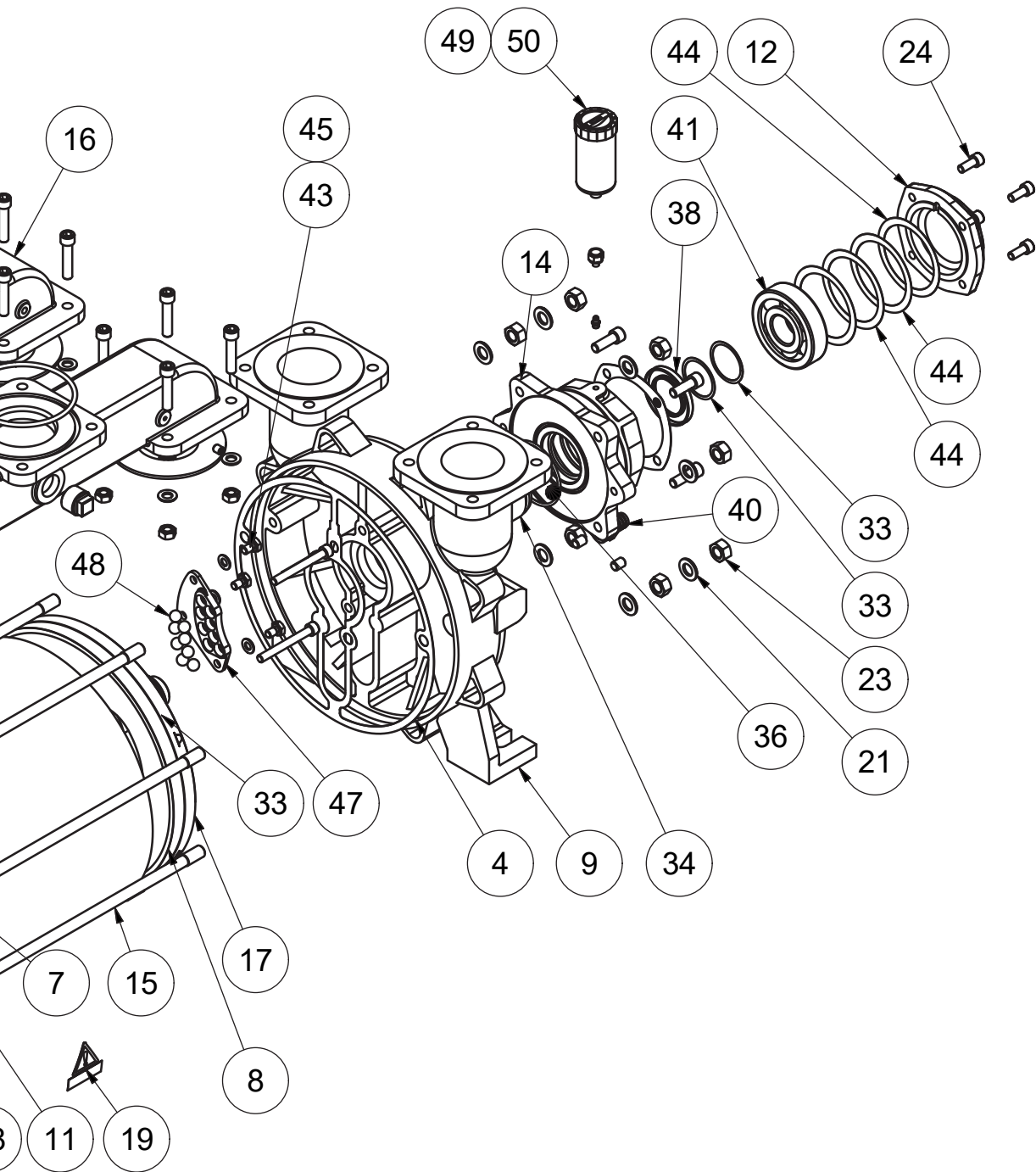
6 TROUBLESHOOTING

Problem	Cause	Effect	Corrective measure
The pump is unable to create a vacuum	<ul style="list-style-type: none"> • The pump is not receiving enough service liquid • The temperature of the service liquid is too high 	<ul style="list-style-type: none"> • Reduced output • The pump can become damaged during cavitation 	<ul style="list-style-type: none"> • Check the liquid supply • Stop the pump and wait until the temperature has dropped to a sufficient level, or lower the temperature of the service liquid inlet.
Power consumption too high during operation	<ul style="list-style-type: none"> • The pump is receiving too much service liquid 	<ul style="list-style-type: none"> • The pump can become worn 	<ul style="list-style-type: none"> • Check the liquid supply
The start-up power is too high	<ul style="list-style-type: none"> • Too much service liquid in the pump prior to start-up 	<ul style="list-style-type: none"> • Noise at start-up and possible overload of the power supply 	<ul style="list-style-type: none"> • Check the stop valves in the liquid supply for leakage
Noise during operation	<ul style="list-style-type: none"> • Cavitation 	<ul style="list-style-type: none"> • Severe damage to the pump and potential risk of breakdown 	<ul style="list-style-type: none"> • Increase the suction pressure or lower the temperature of the service liquid
Leakage from the bearing housing's drain holes	<ul style="list-style-type: none"> • Damaged shaft seal 	<ul style="list-style-type: none"> • Bearings may become damaged • Potential risk of explosive gas leak 	<ul style="list-style-type: none"> • Stop the pump and contact the manufacturer

7 SPARE PARTS

7.1 Standard model





Pos.	Description	Qty.
1	Identification plate 35x125 mm	1
2	Direction arrow	1
3	Gasket f/bearing cap 0,4mm	2
4	Gasket f/pump housing 0.4mm	2
5	Rubber gasket ø150/79x4	4
7	Rotor*	1
8	Gasket for shell	1
9	Pump housing NDE	1
10	Pump housing DE	1
11	Shell*	1
12	Bearing cap NDE	1
14	Bearing housing NDE	1
15	Stay bolt M16*	8
16	Branch pipe*	2
17	Flow plate NDE*	1
18	Flow plate DE*	1
19	Sticker Warning!	2
20	M12 washer 13/24x2,5	16
21	M16 washer 17/30x3	16
22	M12 nut DIN 934 8.8FZB	16
23	M16 nut DIN 934 8.8FZB	16
24	M10x25 Allen bolt DIN912 8.8	8
25	M10x90 Allen bolt	4
26	M12x35 Allen bolt DIN912	8
27	M12x55 Allen bolt	16
28	Prop 1/4" Orig.	6
29	Prop 3/4" Orig.	1
30	Prop 3/8"	4
31	Prop 1/8" Orig.	2
32	Grease nipple M8x1,25 H1	2
33	Shim 50X58X0,1 DIN 988	-
34	Mechanical shaft seal NBR*	1
35	O-ring 134,30x5,70 NBR70	2
36	O-ring 88,49x3,53	2
37	Radial shaft seal 55x80x8 DIN3760A	1
38	Radial shaft seal 50x80x8 DIN 3760A	1
39	Plug 1" galv.	4
40	Hose nipple 3/4"x20mm	1

*-See section 1.3 for configuration of pump.

**- Optional. Not equipped as standard.

**-Only available on KS510, KS625 and KS910.

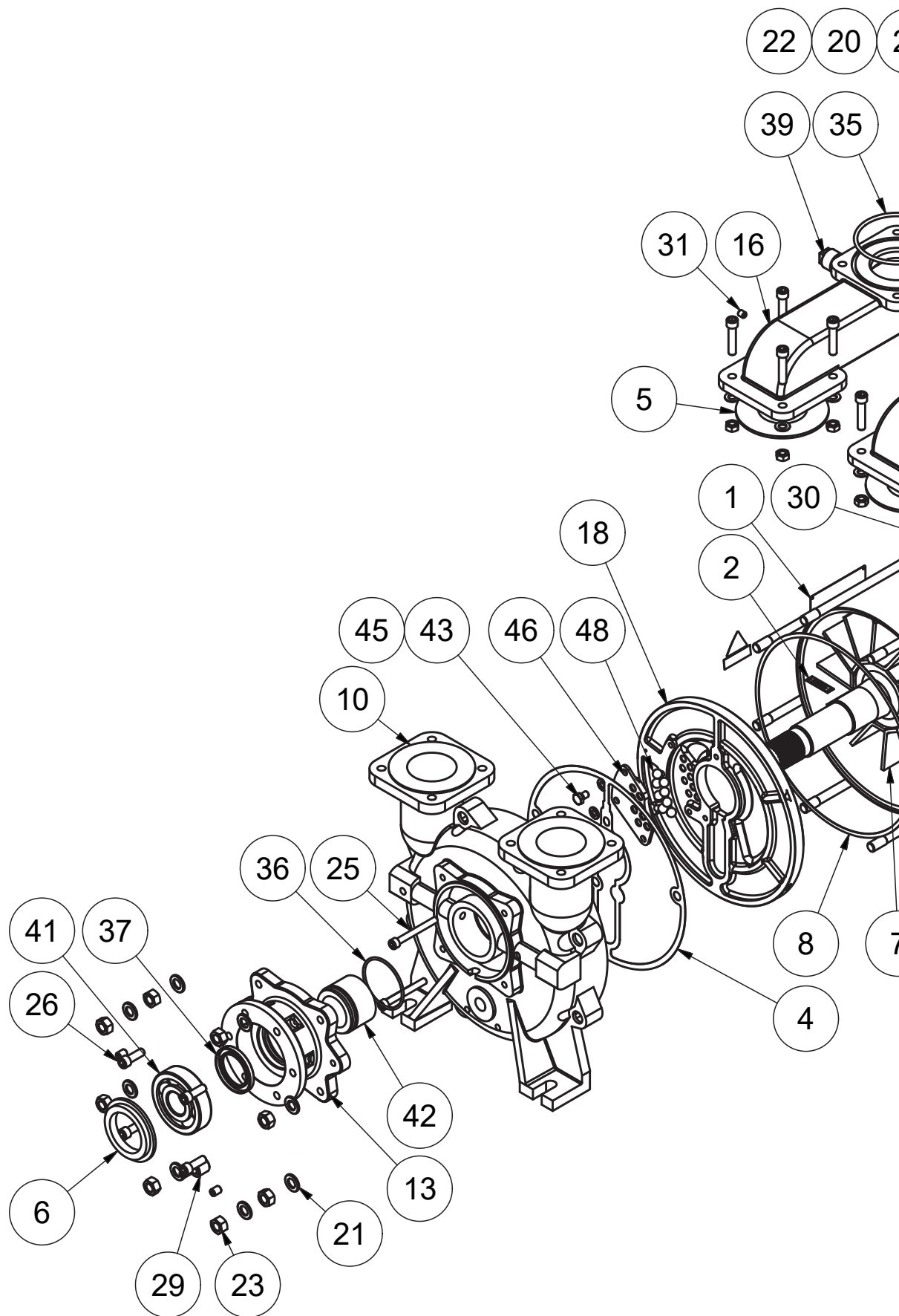
Pos.	Description	Qty.
41	Ball bearing NDE*	1
42	Mechanical shaft seal NBR*	1
43	M10x16 bolt DIN933	6
44	Shim 90x110x0,1	-
45	M10 washer 10,5/20x2	6
46	Ball guide KS PEHD1000 DE***	1
47	Ball guide KS PEHD1000 NDE**	1
48	Valve ball Ø15***	16
49	Nipple G1/4 - M8x1,25**	2
50	Automatic lubricator LAGD 125/WA2**	2
51	Bearing cap DE	1
52	Radial shaft seal 50x65x10 DIN3760A	1
53	Parallel key 14x9x50 DIN6885A	1
54	Roller bearing spherical DE*	1
55	Bearing housing DE	1

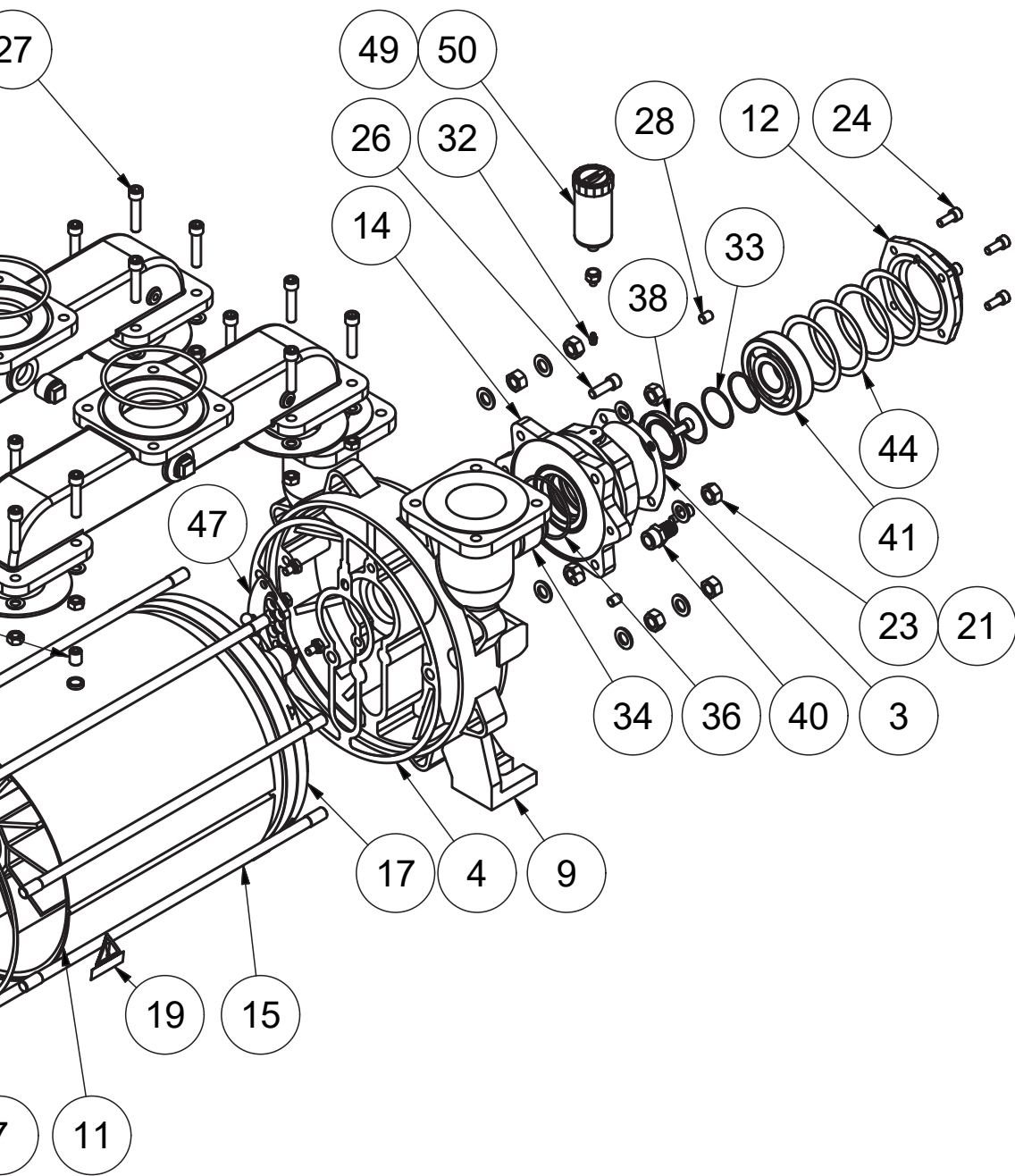
*-See section 1.3 for configuration of pump.

**- Optional. Not equipped as standard.

***-Only available on KS510, KS625 and KS910.

7.2 Spline model





Pos.	Description	Qty.
1	Identification plate 35x125 mm	1
2	Direction arrow	1
3	Gasket f/bearing cap 0,4mm	1
4	Gasket f/pump housing 0.4mm	2
5	Rubber gasket ø150/79x4	4
6	Guide for B600 gear	1
7	Rotor*	1
8	Gasket for shell	2
9	Pump housing NDE	1
10	Pump housing DE	1
11	Shell*	1
12	Bearing cap NDE	1
13	Bearing housing DE	1
14	Bearing housing NDE	1
15	Stay bolt M16*	8
16	Branch pipe*	2
17	Flow plate NDE*	1
18	Flow plate DE*	1
19	Sticker Warning!	2
20	M12 washer 13/24x2,5	16
21	M16 washer 17/30x3	16
22	M12 nut DIN 934 8.8FZB	16
23	M16 nut DIN 934 8.8FZB	16
24	M10x25 Allen bolt DIN912 8.8	4
25	M10x90 Allen bolt	4
26	M12x35 Allen bolt	8
27	M12x55 Allen bolt	16
28	Prop 1/4" Orig.	6
29	Prop 3/4" Orig.	1
30	Prop 3/8"	4
31	Prop 1/8" Orig.	2
32	Smørenippel M8x1,25 H1	1
33	Shim 50X58X0,1 DIN 988	-
34	Mechanical shaft seal NBR*	1
35	O-ring 134,30x5,70 NBR70	2
36	O-ring 88,49x3,53	2
37	Radial shaft seal 55x80x8 DIN3760A	1
38	Radial shaft seal 50x80x8 DIN 3760A	1

*-See section 1.3 for configuration of pump.

**- Optional. Not equipped as standard.

**-Only available on KS510, KS625 and KS910.

Pos.	Description	Qty.
39	Plug 1"	4
40	Hose nipple MS 20mm, 3/4"	1
41	Ball bearing DE / NDE*	2
42	Mechanical shaft seal NBR*	1
43	M10x16 bolt DIN933	6
44	Shim 90x110x0,3	-
45	M10 washer 10,5/20x2	6
46	Ball guide KS PEHD1000 DE***	1
47	Ball guide KS PEHD1000 NDE***	1
48	Valve ball Ø15 PP***	16
49	Nipple G1/4 - M8x1,25**	1
50	Automatic lubricator LAGD 125/WA2**	1

*-See section 1.3 for configuration of pump.

**- Optional. Not equipped as standard.

***-Only available on KS510, KS625 and KS910.

SAMSON PUMPS

Samson Pumps is the only company in the world to specialise exclusively in liquid ring vacuum pumps. Samson pumps are made in Denmark and used around the globe. We offer worldwide delivery, and we export to more than 80 countries around the world.

For over 40 years, our name has been synonymous with the strongest pumps for vacuum trucks and tankers. We constantly adapt our products to meet the changing needs of our customers. Today, it is not enough to simply produce a pump. Products must be refined so the customer can concentrate on what they do best. We therefore offer a wide range of standardised components that allow our customers to build vacuum systems without the need for specialist in-house expertise.

Strength and durability are our hallmarks! We have often heard from customers that our pumps are working in many years, and in most cases without the need for maintenance or repair. This emboldens us to say that we have the strongest program of pumps on the market.