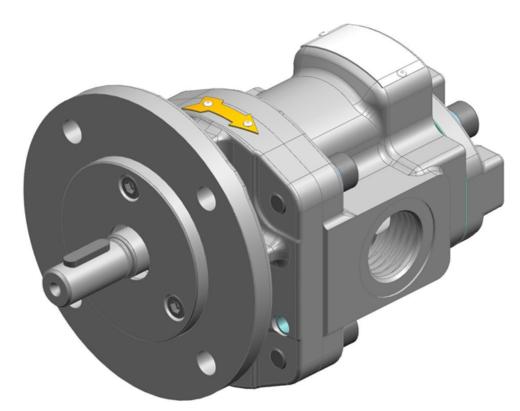
KRACHT

D.0038410002

Operating instructions (Translation)



Gear pump KF 1 - coated Magnetic coupling MINEX®-S English

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Kracht GmbH General | 1

1 General

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following product:

Gear pump KF 1 - coated

Magnetic coupling MINEX®-S

These operating instructions are an integral part of the product and must be kept in the immediate vicinity of the

product and accessible to the personnel at all time.

Different versions of the product are produced. Which version is concerned

is stated on the device's type plate.

If you have any questions about this operating manual, please contact the manufacturer.

1.2 Manufacturer address

KRACHT GmbH Gewerbestraße 20 D-58791 Werdohl Tel: +49 2392 935-0

Fax: +49 2392 935-209 Email: info@kracht.eu Web: www.kracht.eu

1.3 Other applicable documents

In addition to these instructions, also comply with the relevant instructions of plants or plant parts available or planned on site.

1 | General Kracht GmbH

1.4 Symbols



⚠ DANGER

Identification of an immediate hazard, which can lead to death or severe bodily injury if not avoided.



MARNING

Identification of a potential medium risk hazard, which can lead to death or severe bodily injury if not avoided.



A CAUTION

Identification of a possible low-risk hazard that can result in minor or moderate physical injury if not avoided

ATTENTION

Identification of notes to prevent property damage.



NOTICE

Identification of basic safety instructions. Non-compliance can lead to hazards for people and the product



TIP

Identification of special user tips and other particularly useful or important information

Kracht GmbH Safety | 2

2 Safety

2.1 Intended use

- 1. The product has been designed for operation with fluids. Dry operation is not permitted.
- 2. The product may only be operated when completely filled.
- 3. The fluid must be compatible with the materials used in the product. Chemical expertise is required for that. Be careful with ethylene oxide or other catalytically or exothermically reacting or self-decomposing substances. Please consult the manufacturer in cases of doubt.
- 4. The product may only be used in normal industrial atmospheres. If there are any aggressive substances in the air, always consult the manufacturer.
- 5. The product may only be operated in compliance with these operating instructions and the applicable documents.
 - Deviating operating conditions require the express approval of the manufacturer.
- 6. Use of the product for purposes other than those for which it is intended invalidates any warranty.
- 7. The product may only be operated in combination with a magnetic coupling.

2.2 Personal qualification

The personnel charged with the assembly, operation and maintenance of the product must have the necessary qualifications.

This can be achieved through training or appropriate instruction.

The personnel must be familiar with the contents of these operating instructions.



NOTICE

Read the operating instructions in full before using the product.

2 | Safety Kracht GmbH

2.3 Basic safety instructions



NOTICE

Basic safety instructions

Non-compliance can lead to hazards for people and the unit.

- a) Follow existing regulations for accident prevention and safety at work as well as the internal regulations of the operating company.
- b) Ensure the greatest possible cleanliness.
- c) Wear suitable personal protective equipment.
- d) Do not remove type plates or other information or make them illegible or unrecognisable.
- e) Do not make any technical modifications.
- f) Comply with maintenance intervals.
- g) Only use spare parts approved by the manufacturer.

Kracht GmbH Safety | 2

2.4 Fundamental hazards



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



A DANGER

Hazardous fluids

Danger to life when handling hazardous fluids.

- a) Defective components and connection lines must be replaced or fixed without delay.
- b) Use only components and connection lines approved for the expected pressure range.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Take measures to prevent accidental touching of rotating parts.



⚠ WARNING

Rotating parts

Risk of injury caused by ejected parts

a) Enclose rotating parts so that in the event of fracture or malfunction, there is no risk caused by ejected parts.

2 | Safety Kracht GmbH



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury caused by flying parts.

Risk of injury caused by splashing fluids.

- a) Do not operate the product with shut-off devices closed.
- b) Do not operate the production in the wrong rotational direction.

Kracht GmbH Safety | 2

2.5 Special hazards



⚠ DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

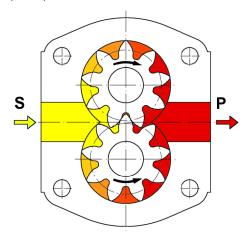
a) Maintain a minimum clearance of 1 m to the magnetic field.

3 | Device description Kracht GmbH

3 Device description

3.1 Functional principle

The pumps of this series are external gear pumps, which operate according to the displacement principle.



- S Suction connection
- P Pressure connection

During rotation, two interlocking gears cause a volume increase by opening the tooth spaces on the suction side (S), so that the medium can flow in and at the same time, on the discharge side (pressure side, P), a corresponding volume is displaced by the meshing of the teeth in the filled tooth gaps. Fluid transport takes place through entrainment in the tooth spaces along the wall of the wheel chamber.

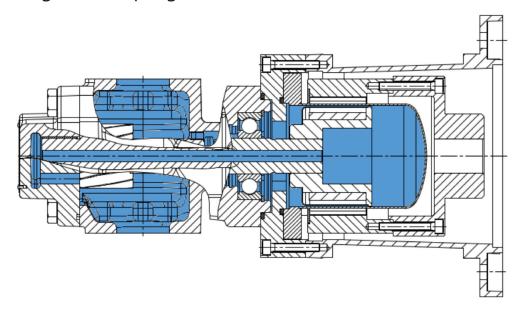
With each gear rotation, the so-called geometric displacement volume V_g is displaced. A value that is named the rated volume V_{gn} in technical documents to specify the pump size.

The displacement process described takes place initially without a noticeable pressure build-up. Only after external loads are applied, e.g. by head, flow resistances, pipe elements, etc., does the required working pressure set in to overcome these resistances.

The pressure applied to the shaft seal equals the pressure at the suction connection of the product. The permissible pressure is determined by the type of seal.

Kracht GmbH Device description | 3

3.1.1 Magnetic coupling



Versions with magnetic coupling are used when absolute leak-proofness is required on the shaft seal or when being operated with supply pressure on the suction side. The magnetic coupling is leak-proof within the permissible technical limits.

This magnetic coupling has the exterior rotor installed on the motor shaft and the interior rotor on the pump shaft. The torque is transmitted between the two rotors via magnetic force. A separating can installed in-between the two rotors provides hermetic sealing of the pump.

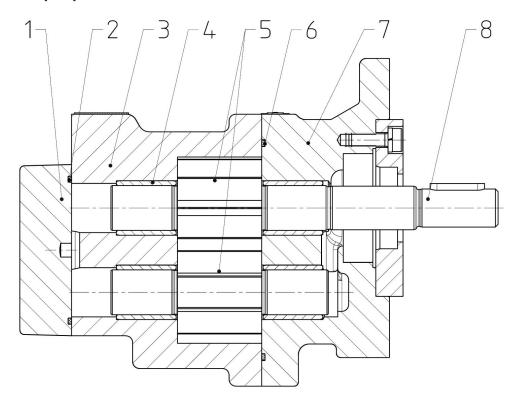
The device can be used in vacuum mode, e.g. for filling brake fluid, while doing so, the penetration of air into the system is reliably prevented. Leakagefree operation is ensured during operation in closed systems that have the system pressure applied on the suction side.

On versions with rinsing, an internal forced rinsing of the interior rotor by the pumping medium is provided for continuous removal of the heat developing in the air gap. The magnetic coupling is cooled by a substream of the pumping medium.

3 | Device description Kracht GmbH

3.2 Variants

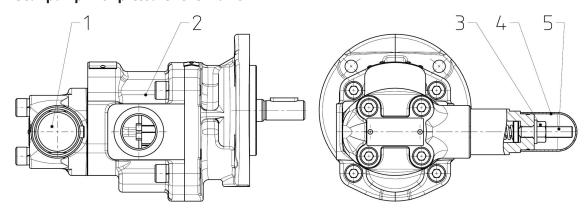
Gear pump



- 1 End cover
- 3 Housing
- 5 Gears
- 7 Flange cover

- 2 O-ring
- 4 Plain bearings
- 6 O-ring
- 8 End of drive shaft

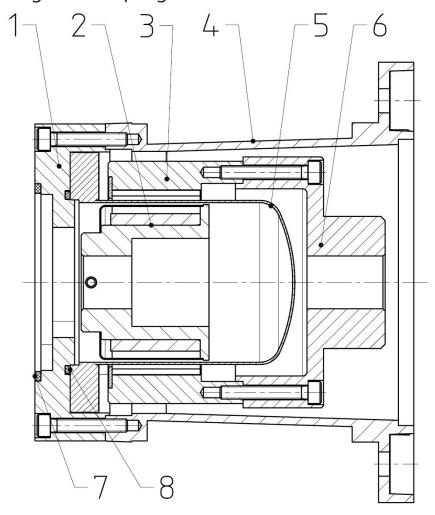
Gear pump with pressure relief valve



- 1 Pressure relief valve
- 3 Collar nut
- 5 Adjustment screw
- 2 Gear pump
- 4 Cover

Kracht GmbH Device description | 3

3.2.1 Magnetic coupling



- 1 Adapter flange
- 3 External rotor
- 5 Containment shroud
- 7 O-ring

- 2 Internal rotor
- 4 Bellhousing
- 6 Flange hub
- 8 O-ring

3 | Device description Kracht GmbH

3.3 Type key

Ord	Ordering example																						
KF		1/24		6	F	1	0		В	6	Z	V	0	0	0	Α	Α	Е	1	G	S	М	/
1.		2.		3.	4.	5.	6.		7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.

Ordering example												
+		F	1		F	6		0	08	/		
		22.	23.		24.	25.		26.	27.	28.		

Expl	Explanation of type key									
1. P	1. Product name									
2. N	2. Nominal									
V _{gn}	V _{gn} Size 1: 4; 8; 11; 16; 20; 24									
3. H	ousing material									
6	EN-GJL-250 2 EN-GJS-400-15									
4. Se	Seal material									
F	FKM									
5. C	Pirection of rotation									
1	Clockwise		2	Counterclockwise						
6. C	outbord bearing									
0	Without									
7. FI	ange type									
В	4-hole flange									
В	A-Ø = 110; Z-Ø= 65; LK-Ø= 90									
A= (Outer diameter ; Z= Centering diameter ;	LK= Bolt o	ircle							
8. FI	ange cover material									
6	EN-GJL-250		2	EN-GJS-400-15						
9. SI	naft end									
Z	Cylindrical shaft end									
10.	Type of end cover									
D	End cover		V	Valve						
11. (Cover material									
6	EN-GJL-250									
12.	2nd shaft end									
0	Without									
13.	Axial clearance compensation									
0	Without									
14. 9	4. Suction side connection Nominal									
Α	G 1/2 ⁽¹⁾ 4									
Α	G 3/4 ⁽¹⁾	8; 11; 16; 2	20; 24	4						
15. I	5. Pressure side connection									
Α	G 1/2 ⁽¹⁾ 4									

Kracht GmbH Device description | 3

Exp	Explanation of type key									
Α	G 3/4 ⁽¹⁾	8; 11; 16; 20	0; 24	4						
⁽¹⁾ Pi	pe thread: ISO 228-1									
16.	6. Gear material									
Е	E 16MnCrS5 - 1.7139									
17.	17. Gear coating									
1	Yes									
18.	Type of bearing									
G	Plain bearings									
19.	Material bearing									
S	Steel (St)									
20.	Seal type									
М	Magnetic coupling		N	Magnetic coupling						
IVI	with rinsing		IN	without rinsing						
21.	Special number									
Spe	cial numbers [▶ 18]									
22.	Valve									
F	Pressure relief valve									
23.	Size KF									
1	Size 1									
24.	Seal material									
F	FKM									
25.	Housing material									
26.	Material bearing									
0	Without									
27.	Pressure stage (Pressure setting range	es)								
04	24 bar		16	816 bar						
08	8 48 bar 25 1625 bar									
28.	Special number									

3 | Device description Kracht GmbH

3.3.1 Type key magnetic coupling

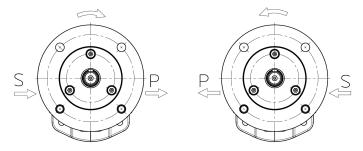
Ordering exa	Ordering example											
MSC75	-	Α	-	2	-	FKM						
1.		2.		3.		4.						

Explanation	Explanation of type key									
1. Coupling size										
MSA46; MSA60; MSB60; MSA75; MSB75; MSC75; MSB110; MSC110; MSC110S; MSC135; MSC135S; MSD135S; MSD135S; MSD165; MSE165; MSD200										
2. Maximur	2. Maximum operating temperature									
Α	150 °C	В	300 °C							
3. Pressure	range									
1	16 bar	3	40 bar							
2	2 25 bar 4 60 bar									
4. Material	O-ring									

3.4 Direction of rotation and discharge

The direction of rotation is indicated by the curved arrow, when looking towards the end of the drive shaft. The pump connections are below the drive shaft.

The flow direction is indicated by the straight arrow.



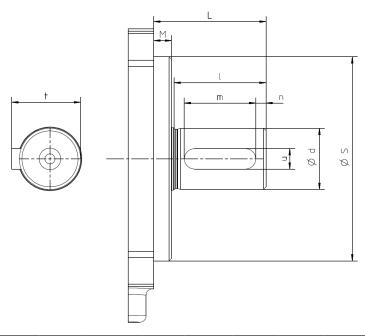
S = Suction connection
P = Pressure connection

3.5 Special numbers

Special number	Description			
303	Version for higher pressure; $\Delta p = 35$ bar			
	Viscosity up to approx. 100 mm²/s			

Kracht GmbH Device description | 3

3.6 Shaft ends



Size	L	S _{h6}	М	d _{k6}	I	m	n	t	u
KF 1	40	65	5	14	30	20	5	16	5

4 | Technical data Kracht GmbH

4 Technical data

4.1 General

General information							
		without fluid buffer	Any				
Mounting position		with fluid buffer Shaft end horizontal , f buffer connection top					
External loads on shaft end		Axial and radial forces are not	allowed				
Speed	n	Assignment of viscosity - sp	eed [> 21]				
Operating process	p _e	Allowable procesures [1, 22]					
Operating pressure	p _b	Allowable pressures [▶ 22]					
Viscosity	\mathbf{v}_{min}	12 mm²/s					
Viscosity	\mathbf{v}_{max}	15000 mm²/s					
Fluid temperature	∂ _m	Pormissible temperature range [N 22]					
Ambient temperature	$oldsymbol{\vartheta}_{\cup}$	Permissible temperature range [▶ 23]					
Filtering	β	≤ 60µm					
Materials		Material data [▶ 23]					
		Lubricating fluids with abrasiv	e components				
		Lubricating fluids without abrasive components					
Permissible media		Example:					
remissible media		PUR components, plasticizers, resins, adhesives, varnishes, paints, mineral oils, synthetic oils					
		((Petrols, solvents, etc. are not permissible))					

Magnetic coupling									
Coupling size	Rated torque [Nm] at 20 °C								
	Pressure range	Pressure range Pressure range Pressure range							
	16 bar 25 bar 40 bar 60 bar								
MSA46	3	-	-	-					
MSA60	-	-	7	-					
MSB60	-	-	14	-					
MSB75	-	24	-	-					
MSC75	40	40	-	40					

Kracht GmbH Technical data | 4

4.2 Nominal sizes

Nominal	Geom. displace- ment	Speed		Mass inertia
V_{gn}	V _g	n _{min}	n _{max}	x10 ⁻⁴
	[cm³/rev.]	[rpm]		J (kg m²]
4	4.6			0.2
8	8.3			0.35
11	11.3	200	2000	0.45
16	16.6	200		0.65
20	20.5			0.75
24	24.8			0.87

4.3 Assignment of viscosity - speed

Kinematic viscosity ν [mm²/s]	Recommended rpm n [1/min]
200	20000
250	15000
300	10000
450	6000
650	3000
800	2000
1200	1000
1800	500
2000	400



TIP

Select the speed of rotation so that complete filling of the pump is ensured. This is the case if the pressure on the suction side does not fall below the permissible pressure pe min.

4 | Technical data Kracht GmbH

4.4 Allowable pressures

4.4.1 Operating pressure, suction and pressure side

Gear pump						
Nominal		Operati	ng pressure			
V_{gn}	Suction si	Suction side Pressure side				
	p _{e min} [bar _{abs.}]	p _{e max} [bar _{rel.}]	p _b [bar _{rel.}]	p _{b max} [bar]		
				(Maximum pressure) ⁽²⁾		
			ous pressure)			
4 - 20	0.6 (1)			60		
24	Vacuum equipment: 0.08	40	50	50		
	Standing still: 0					

bar_{abs.}= Absolute pressure ; **bar**_{rel.}= Relative pressure

 $^{^{(2)}}$ Maximum pressure: only applicable when using mineral oil at speeds of >700 rpm and viscosity values of 30 mm²/s - 1000 mm²/s

	Gear pump with magnetic coupling (Minex®)						
Nominal	Pressure	Operating pressure					
V_{gn}	range Mag-		on side	Pressu	ıre side		
-	netic coupling	p _{e min} [bar _{abs.}] p _{e max} [bar _{rel.}]		p _b [bar _{rel.}]	p _{b max} [bar]		
				(perm. continous pressure)	(Maximum pressure)		
	1		16		60		
4 - 20	2	0.6 (1)	25	50			
4 - 20	3	Vacuum	40				
	4	equipment:	60				
	1	0.08	16		50		
24	2	Standing still:	25				
24	3	0	40				
	4		50				

bar_{abs.}= Absolute pressure ; **bar**_{rel.}= Relative pressure

⁽¹⁾ Start-up condition: 0.4 bar absolute (max. 30 minutes)

⁽¹⁾ Start-up condition: 0.4 bar absolute (max. 30 minutes)

Kracht GmbH Technical data | 4

4.5 Permissible temperature range

Sealing material	Fluid temperature 🖰 m			
	ϑ _{m min} [°C]	ϑ _{m max} [°C]		
CR		100		
EPDM - peroxide cured		130		
FEP with FKM-core	20	200		
FKM	-20	150		
HNBR		150		
NBR		90		
FKM (Low temperature)	-30	150		

Sealing material	Ambient temperature ئ				
	ϑ _{u min} [°C]	ϑ _{ս min} [°C]			
CR					
EPDM - peroxide cured					
FEP with FKM-core	20				
FKM	-20	60			
HNBR					
NBR					
FKM (Low temperature)	-30				



NOTICE

Note media-specific properties.

4.6 Material data

Seal type	Materials					
	Seal Housing / Flange		Gears	Plain bearings		
		cover				
	FKM		Casehardened			
	EPDM		steel			
N 4 = ==== = 4 : =		EN-GJL-250	16MnCrS5 -	ETG 100		
Magnetic coupling			1.7139	Electroless nickel with		
		EN-GJS-400-15	Electroless	SiC deposits		
			nickel with SiC			
			deposits			

4 | Technical data Kracht GmbH

Magnetic coupling								
Maximum op-		Materials						
erating tem- perature	Internal rotor	External rotor	Containment shroud	Bellhousing	Other materials			
150 °C (A)	1.4571 / Sm2co17	Steel (St) / Nd- FeB Steel (St) / Sm2Co17	1.4571 1.4571 /	Aluminium (Al) (percent by weight Mg ≤ 7.5 %)	Steel (St)			
300° (B)		Steel (St) / Sm2Co17	Hastelloy	1.5 70)				

4.7 Weight

Nominal	Gear pump				
V_{gn}	[kg]				
	End cover	Pressure relief valve			
4	3.0	3.8			
8	3.7	4.5			
11	2.0	4.6			
16	3.8	4.6			
20	4.1	4.9			
24	4.2	5.0			

Magnetic coupling [kg]					
MSA 46 MSA 60 MSB 60 MSB 75 MSC75					
2.8	5.5	12.0	14.0		

4.8 Dimensions

The dimensions of the product are given in the technical data sheets.

5 Transport and storage

5.1 General

- a) After receiving the delivery, check the product for transport damage.
- b) If transport damage is found, the manufacturer and the transport company must be notified immediately. The product must then be replaced or repaired.
- c) Dispose of packaging materials and used parts according to local regulations.

5.2 Transport



↑ WARNING

Falling or toppling loads

Risk of injury during transport of large and heavy loads.

- a) Use only suitable means of transport and lifting gear with sufficient load-bearing capacity.
- b) Attach lifting gear only to suitable places on the load.
- c) Attach the lifting gear so that it cannot slip.
- d) Note the centre of gravity of the load.
- e) Avoid sudden, jerky movements, impacts and strong vibrations during transport.
- f) Do not step under overhead loads, do not work under overhead loads.



NOTICE

Eyebolts can be screwed into the thread of the flanged connections to transport the product.

5.3 Storage

The product's function is tested in the factory with mineral hydraulic oil. The connections are then closed. The remaining residual oil preserves the internal parts for up to 6 months.

Bright metallic external parts are also protected against corrosion by suitable preservation measures for up to 6 months.

During storage, ensure a dry, dust-free and low-vibration environment. The product must be protected from weather, moisture and large temperature fluctuations. Comply with the recommended storage conditions.

Below the permissible ambient temperature ϑ_U , elastomer seals lose their elasticity and mechanical loading capacity, as the temperature is below the glass transition temperature. This process is reversible. Avoid the application of force on the product during storage below the permissible ambient temperature ϑ_U .

5 | Transport and storage Kracht GmbH

Products with EPDM seals are not mineral oil resistant and their function is not tested. The internal parts are not preserved. If the product is not put into operation immediately, all surfaces exposed to corrosion must be protected by suitable preservation measures. The same applies to products that are not tested for other reasons.

In case of storage for a longer period (> 6 months), all surfaces exposed to corrosion must be retreated with suitable preservatives.

If high humidity or an aggressive atmosphere is to be expected, additional suitable corrosion prevention measures must be taken.



NOTICE

Storage in corrosion protection bags (VCI) for maximum 6 months.

ATTENTION

Corrosion/chemical attack

Improper storage can make the product unusable.

- a) Use suitable preservation measures to protect exposed surfaces.
- b) Comply with the recommended storage conditions.

5.4 Storage conditions



TIP

Recommended storage conditions

- a) Storage temperature: 5 °C 25 °C
- b) Relative humidity: < 70 %
- c) Protect elastomer parts from light, particularly direct sunlight.
- d) Protect elastomer parts from oxygen and ozone.
- e) Note the maximum storage period of elastomer parts:
 - ⇒ 5 years: AU (polyurethane rubber)
 - ⇒ 7 years: NBR, HNBR, CR
 - ⇒ 10 years: EPM, EPDM, FEP/PFTE, FEPM, FKM, FFKM, VMQ, FVMQ

5.5 Special hazards



⚠ DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

6 | Installation Kracht GmbH

6 Installation

6.1 Safety instructions for installation



▲ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Take measures to prevent accidental touching of rotating parts.



MARNING

Rotating parts

Risk of injury caused by ejected parts

a) Enclose rotating parts so that in the event of fracture or malfunction, there is no risk caused by ejected parts.



MARNING

Exposed gears

Gearwheels can trap and crush fingers and hands.

a) Do not engage gearwheels.

Kracht GmbH Installation | 6



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

6 | Installation Kracht GmbH

6.1.1 Special hazards



A DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

6.2 Noise reduction



TIP

Measures to reduce noise

- a) Use of suction and pressure hoses.
- b) Use of pump supports with high damping properties (plastic or grey cast iron)
- c) Use of damping rings and damping rails to isolate structure-borne sound.

Kracht GmbH Installation | 6

6.3 Mechanical installation

6.3.1 Preparation

- a) Check the product for transport damage and contamination.
- b) Check the product for smooth and easy movement.
- c) Remove any preservative present.
- d) Clean all lines.
 - ⇒ Only use cleaning agents that are compatible with the materials used.
 - ⇒ Do not use cleaning wool.
- e) Compare the environmental and ambient conditions at the place of use with the permissible conditions.
 - ⇒ Make sure that the foundation is sufficiently stable and level.
 - ⇒ Expose the product only to low vibrations, see IEC 60034-14.
 - ⇒ Ensure sufficient accessibility for maintenance and repair.
- f) Position the product and secure it against slipping.
 - ⇒ Comply with the manufacturer's instructions.
 - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.
- g) Remove existing protective plugs.

6.3.2 Gear pump for magnetic coupling

The prerequisite for trouble-free operation is suitable load transmission between the gear pump and the drive.

By default, a permanent magnetic coupling is used for this.

- a) Preassemble the coupling parts as described by the manufacturer.
- b) Position the pump and drive relative to each other.
 - ⇒ Note the allowable installed position.
 - ⇒ Note the allowable direction of rotation.
- c) Tighten the fastening screws to the specified torque.

Tightening torques [Nm]							
Thread size	M6	M8	M10	M12	M16	M20	M24
Counter-thread Aluminium	4.6	11	22	39	95	184	315
Counter-thread Cast iron / Steel	10	25	49	85	210	425	730
Screws/Nuts with min. strength class 8.8/8							

6 | Installation Kracht GmbH



NOTICE

- a) Comply with the allowable displacement values of the coupling.
- b) Prevent stressing of the product.
- c) Make sure the fastening screws have sufficient depth of engagement.



NOTICE

- a) Make sure no foreign bodies can get into the device.
- b) Mount the specified monitoring units as per the manufacturer's instructions.



TIP

For the assembly we recommend to have the data sheet of the magnetic coupling with you. Specifications entered in the dimensional drawing have to be primarily observed.



TIP

For assembly, the coupling halves can be heated to approx. 80 °C and pushed onto the shaft ends while warm.



A CAUTION

Hot surfaces

Burns of the skin on contact.

a) Wear protective gloves at temperatures ≥48°C.



MARNING

Strong magnetic forces

Danger of crushing due to sudden tightening of the magnets of the internal and external rotor.

Kracht GmbH Installation | 6

6.4 Connection lines

6.4.1 General



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.



NOTICE

Additional connections

- a) Provide measurement connections for pressure and temperature as near as possible on the device.
- b) If necessary, provide an option for filling and draining the device and line system.
- c) If necessary, provide an option for venting the device and line system.

6.4.2 Suction line

A suction line that is not optimally designed can lead to increased noise emissions, cavitation and even a reduction in the capacity (due to less filling of the pump).

When designing the lines, bear in mind the following points:

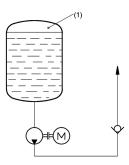
- Lay the suction line as short and straight as possible.
- Specify the nominal size of the suction line so that the operating pressure on the suction side is not less than the permissible operating pressure pe min.
- Avoid large suction heights.
- Avoid additional pressure loss through line resistances such as fittings, screwed connections, formed parts or suction filters/suction baskets. Ensure that all technically required suction filters/suction baskets are appropriately dimensioned.
- Pay attention to sufficient distance of the suction opening from the floor and walls of the media tank.
- Make sure that the suction opening is below the lowest fluid level in any operating situation.
- When using hoses, make sure that they have sufficient stability so that they do not become constricted by the suction effect.
- Note the recommended flow velocity in the suction line (max. 1.5 m/s).

6 | Installation Kracht GmbH

Suction line at vacuum operation

If medium is to be drawn from a tank under vacuum, the pump must be positioned approx. 1 m below the tank. The suction line must be laid straight and without any resistances.

The tank may be subjected to vacuum only then when the pipework and the pump have been filled with liquid. Only pumps suitable for vacuum operation may be used for this purpose.





NOTICE

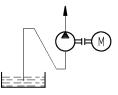
Cavitation damage

Pressure below the permissible suction side pressure causes cavitation

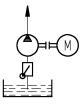
- a) Design the suction line so that the pressure that sets in during operation is always higher on the suction side than the vapour pressure of the pumped medium. At the same time, make sure that the device is installed above sea level.
- b) If fluids contain water, install the device below the fluid level and limit the operating temperature to 50 °C and the speed to 1500 1/min.

Prevention of suction problems

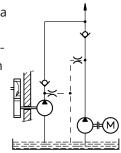
If there is a possibility of the suction line running dry while the pump is at a standstill, laying the suction line as a U-trap is a way of avoiding suction problems. This way, the pump will remain permanently filled after initial commissioning.



In case of longer suction lines that can run empty during the standstill, it is useful to insert a foot valve or a non-return valve. These must have been designed for use in suction lines and should offer as low a flow resistance as possible.



When operating a pump that has to pump via a non-return valve into a pressurized circuit (e.g. reserve pump in a lubricant circuit), intake difficulties can occur if the suction line is filled with air. In this case the pressure line must be vented directly upstream of the non-return valve. If a venting nozzle is not inserted, the volume of the pressure line between the pump and non-return valve must be at least 75% of the suction line volume.



Kracht GmbH Installation | 6

6.4.3 Pressure pipe

When designing the lines, bear in mind the following points:

 Choose the nominal size of the pressure line so that the maximum permissible pressures are not exceeded.

If necessary, provide a venting nozzle to prevent suction problems.

6.4.4 Connection line installation

- a) Clean all lines.
 - ⇒ Do not use cleaning wool.
 - ⇒ Pickle and rinse welded pipes.
- b) Remove existing protective plugs.
- c) Install the lines.
 - ⇒ Comply with the manufacturer's instructions.
 - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.



TIP

Location of the device connections: Direction of rotation and discharge

6.5 Change of the direction of rotation

A change in the direction of rotation is not possible.

7 | Commissioning Kracht GmbH

7 Commissioning

7.1 Safety instructions for start-up



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury caused by flying parts.

Risk of injury caused by splashing fluids.

- a) Do not operate the product with shut-off devices closed.
- b) Do not operate the production in the wrong rotational direction.



A CAUTION

Hot surfaces

Burns of the skin on contact.

a) Wear protective gloves at temperatures ≥48°C.

Kracht GmbH Commissioning | 7

7.1.1 Special hazards



▲ DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

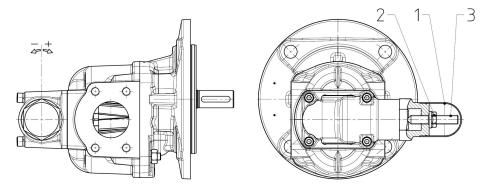
7.2 Preparation

- a) Before starting the system make sure that a sufficient quantity of the service fluid is extant to avoid dry running. This must be taken into account especially with large line volumes.
- b) Check all fastening screws on the product.
- c) Fill the pump and the suction line with medium.

7 | Commissioning Kracht GmbH

7.3 Pressure valve setting

The valves are set to the rated pressure of the respective pressure stage in the factory. Set pressures deviating from this are given on the type plate.



- response pressure lower
- + response pressure higher
- 1 Cover
- 2 Collar nut
- 3 Adjustment screw
- a) Remove cover.
- b) Loosen the hexagon nut.
- c) Use the adjusting screw to set the set pressure.
- d) Secure the adjusting screw with a hexagon nut.
- e) Mount cover.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury caused by splashing fluids.

- a) Note the permissible pressure setting range of the valve.
- b) Check the pressure setting (the valve must not block).

7.3.1 Pressure relief valve

Directly attached series D pressure relief valves are used only to protect the gear pump and may only operate for a short time.



NOTICE

Failure of the gear pump

Longer operation of the valve can cause the gear pump to overheat.

a) Operate the valve for a short time only.

Kracht GmbH Commissioning | 7

7.4 Additional commissioning

- a) Open existing shut-off elements in front of and behind the product.
- b) Set pressure relief valves installed in the system to the lowest opening pressure.
- c) Start the product without pressure load or with low pressure (jog mode).
 - ⇒ A flow should have developed after 30 s at the latest.
- d) Run the product pressureless or at low pressure for a few minutes.
- e) Vent the system at the highest possible point.
- f) Gradually increase the pressure up to the required operating pressure.
- g) Operate the system until the final operating condition is reached.
- h) Check the operating data.
 - **⇒ Maintenance table [▶ 46]**
- i) Document the operating data of the initial commissioning for later comparison.
- j) Check the level of the operating medium in the system.
- k) Check the level of the seal fluid (if present).
- I) Check the product for leaks.
- m)Check all fittings for leaks and retighten if necessary.

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8 | Removal Kracht GmbH

8 Removal

8.1 Safety instructions for disassembly



▲ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



MARNING

Exposed gears

Gearwheels can trap and crush fingers and hands.

a) Do not engage gearwheels.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



A CAUTION

Hot surfaces

Burns of the skin on contact.

a) At temperatures \geq 48 °C allow the product to cool first.

Kracht GmbH Removal | 8

ATTENTION

Blocking of the product due to curing media

Curing media can mechanically block the product and make it unusable.

a) Clean the product immediately after operation with curing media.

8.1.1 Special hazards



⚠ DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

8 | Removal Kracht GmbH

8.2 Dismantling

- a) Depressurise and de-energise the system.
- b) Close existing shut-off elements in front of and behind the product.
- c) Open existing drain elements and undo connection lines. Collect and dispose of leaking media so that no hazard is created for persons or the environment.
- d) Dismantle the product.
- e) Clean the product.
- f) Seal the process connections and lines to prevent the ingress of dirt.



NOTICE

The concrete procedure for cleaning depends on the media being used.

a) See the safety data sheet of the media in use.

9 Maintenance

9.1 Safety instructions for maintenance



A DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



A CAUTION

Hot surfaces

Burns of the skin on contact.

a) At temperatures \geq 48 °C allow the product to cool first.

9 | Maintenance Kracht GmbH

9.1.1 Special hazards



A DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

9.2 Maintenance work



TIP

Checking and documentation of the operating data

Regular checking and documentation of all operating data helps to detect faults at an early stage.

- Perform the maintenance work according to specifications.
- Replace defective or worn components.
- If necessary, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the initial commissioning.
 In case of large deviations (> 10 %) determine the cause.
- Dispose of packaging materials and used parts according to local regulations.



NOTICE

Protective devices and notes

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

9.3 Maintenance instructions

The following information provides recommendations for maintenance work and maintenance intervals for the product in use.

Depending on the actual loads occurring during operation, the type, scope and interval of the maintenance work may deviate from the recommendations. A mandatory maintenance plan must be drawn up by the installer/operating company.



TIP

In the course of preventive maintenance, it is advisable to replace wearing parts before the wear limit is reached.

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company.

If necessary, request spare parts lists and assembly drawings from the manufacturer.

Please consult the manufacturer for this purpose.



NOTICE

Warranty

Any warranty will be void if not executed properly.

9 | Maintenance Kracht GmbH

9.4 Maintenance table

9.4.1 Maintenance table

		First time after max. 24h	Daily	3000 operating hours	6000 operating hours	If necessary	Additional in- formation
9.4.2	Check the operating pressure	2					
9.4.3	Check the media temperature	2					
9.4.4	Check the device temperature	2					
9.4.5	Check the function of the add-on valve	2					
9.4.6	Check the equipotential bonding	2					
9.4.7	Check the condition of the operating fluid	2					
9.4.8	Noise test unusual noises		1				
9.4.9	Cleaning		1				
9.4.10	Visual inspection of leakage		1				
9.4.2	Check the operating pressure			2			
9.4.3	Check the media temperature			2			
9.4.4	Check the device temperature			2			
9.4.5	Check the function of the add-on valve			2			
9.4.6	Check the equipotential bonding			2			
9.4.7	Check the condition of the operating fluid			2			
9.4.11	Visual check of the gearbox condition				3		
9.4.12	Visual check of the condition of hous- ing parts				3		
9.4.13	Visual check of the condition of the plain bearings				3		
9.4.14	Visual check of the condition shaft seal				3		
9.4.15	Visual check of the condition of the outboard bearing				3		
9.4.16	Replacing the outboard bearing					3	
9.4.17	Replacing the plain bearings					3	
9.4.18	Replacing the shaft seal					3	
9.4.19	Replacing other seals					3	

^{1 - 0,1} h; 2 - 0,2 h; 3 - 0,75 h

9.4.2 Check the operating pressure

The operating pressure is indicated by the pressure gauges.

- If there is no operating pressure, check the individual components of the product.
- Comply with the product-specific data sheets/operating instructions.

9.4.3 Check the media temperature

The media temperature is measured through the temperature sensor.

The values are displayed by the built-in controller in the electrical control system.

- If the media temperature is too high or too low, check the product components.
- Comply with the product-specific data sheets/operating instructions.

9.4.4 Check the device temperature

Measure the surface temperature in the area of the bearing.

9.4.5 Check the function of the add-on valve

Add-on valves must be operated at regular intervals. This is necessary to ensure their faultless function.

9.4.6 Check the equipotential bonding

Check the equipotential bonding for tight fit and proper functioning.

9.4.7 Check the condition of the operating fluid

Pay attention to colour (dark colouring), odour and milky turbidity.

- Replace operating fluid if necessary.

9.4.8 Noise test unusual noises

In this case, attention must be paid to increased noise or uneven operation (pump unit).

- In case of unusual noises, examine the individual components of the product and line fixings and check the operating medium for foaming.
- Comply with the product-specific data sheets/operating instructions.

9.4.9 Cleaning

Remove dust deposits and dirt with a damp, clean cloth.

9.4.10 Visual inspection of leakage

Care must be taken here to ensure that there is no leakage from the connections.

 In the event of leaks in the connections, the glands must be tightened and, if necessary, the seals replaced.

9 | Maintenance Kracht GmbH

9.4.11 Visual check of the gearbox condition

The driving shaft pinion and driven shaft pinion are wearing parts. In case of excessive wear, the parts or the pump must be replaced.

Important places to check are the surfaces opposite the shaft seal and bearing bushes, end faces of the driving shaft pinion and driven shaft pinion as well as the tooth flanks.

9.4.12 Visual check of the condition of housing parts

Important places to check are the end faces of the impeller chamber.

9.4.13 Visual check of the condition of the plain bearings

The plain bearings are wearing parts. In case of excessive wear, the parts or the pump must be replaced.

In case of multilayer plain bearings, the wear limit is reached if the bronze layer of the bearing is 50-70 % exposed.

When loaded on the suction side, the driving shaft pinion and driven shaft pinion are supported in the bearings so that wear is identified there first.

9.4.14 Visual check of the condition shaft seal

Pay attention to leak quantities and impermissible temperature increases.

- Small leaked quantities are indispensable for the function of the seal.
- In case of excessive leaked quantities or impermissible temperature increase, the pump must be shut down immediately. Replace the seal.

9.4.15 Visual check of the condition of the outboard bearing

The outboard bearing is a wearing part.

The life of the bearing primarily depends on the operating conditions.

The bearing should therefore be checked for damage after 4000 h at the latest. In the event of unacceptable wear, the bearing must be replaced.

Onsetting wear or pending failure can become noticeable due to increased heating of the bearing, increased power consumption, irregular running or even noise emissions.

9.4.16 Replacing the outboard bearing

With the appropriate know-how and adequate equipment, the repair can also be carried out by the installer/operating company.

To this end, if necessary, request spare parts and assembly drawings from the manufacturer.

Only use spare parts approved by the manufacturer.

9.4.17 Replacing the plain bearings

These are replaced only by the manufacturer.

Contact the manufacturer.

9.4.18 Replacing the shaft seal

With the appropriate know-how and adequate equipment, the repair can also be carried out by the installer/operating company.

To this end, if necessary, request spare parts and assembly drawings from the manufacturer.

Only use spare parts approved by the manufacturer.

9.4.19 Replacing other seals

With the appropriate know-how and adequate equipment, the repair can also be carried out by the installer/operating company.

To this end, if necessary, request spare parts and assembly drawings from the manufacturer.

Only use spare parts approved by the manufacturer.

10 Repair

10.1 Safety instructions for repairs



A DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



A DANGER

Rotating parts

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



MARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



A CAUTION

Hot surfaces

Burns of the skin on contact.

a) At temperatures \geq 48 °C allow the product to cool first.

Kracht GmbH Repair | 10

10.1.1 Special hazards



▲ DANGER

Strong magnetic field

Risk to life for people with active implanted cardiac devices

- a) Maintain a safety distance of at least2 m from unmounted components of the magnetic coupling.
- b) Maintain a safety distance of at least
 0.5 m from couplings to be installed with axially aligned magnetic rotors and surrounding bell housing (pump support).



MARNING

Strong magnetic field

Risk of injury caused by uncontrolled mutual attraction between magnetic or magnetisable parts.

a) When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

ATTENTION

Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

a) Maintain a minimum clearance of 1 m to the magnetic field.

10.2 General

Corrective maintenance includes:

- Troubleshooting
 Finding damage, determining and localising the cause of the damage.
- Damage repair
 Removing the primary causes and replacing or repairing defective components. Repairs are generally carried out by the manufacturer.

Repair by the manufacturer

Before returning the product, fill out the return form. The form can be filled out online and is available to download as a pdf file or can be requested from the manufacturer.



NOTICE

Device contains hazardous substances

If the device has been operated with hazardous fluids it must be cleaned before it is returned. If this is not possible, the safety data sheet of the hazardous material must be provided in advance.

Repair by the installer/operating company

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company. Please consult the manufacturer for this purpose.

- a) If necessary, request spare parts lists and assembly drawings from the manufacturer.
- b) Only use spare parts approved by the manufacturer.
- c) Dispose of packaging materials and used parts according to local regulations.



NOTICE

Warranty

Any warranty will be void if not executed properly.



NOTICE

Protective devices and notes

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

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10.3 Fault table

Fault	Potential causes	Possible measures		
Increased noise				
	Excessive negative pressure	Check suction line design		
	(not complete filling of the pump)	Use noise-optimised pump		
	Suction line clogged	Clean the suction line		
Pump cavitation	Suction filter plugged or too	Clean suction filter or use a larger filter		
	small	Replace filter element		
	Suction bascet plugged or too small	Clean intake strainer or dimension larger		
	Fluid temperature too low	Adjust the temperature of medium		
		Check the oil level in the tank		
	Pump does not suck	Check suction line		
		Check the shaft seal		
	Shaft seal defective	Replace seals		
Ecoming or air in modia	Suction connection leaking	Tighten or replace the screw connections		
Foaming or air in media		Replace seals		
	System not vented	Vent the system		
	Return line ends above the fluid level	Extend return line		
	Heavy foaming in the system, e.g. in gears	Use noise-optimised pump		
	Incorrectly aligned and/or loose coupling	Correct the alignment of the coupling and secure the coupling halves		
Mechanical vibrations	Incorrectly and/or insufficient line fastening	Fixate lines with suitable fastening material (e.g. pipe clamps)		
	Wobbling pressure relief valve	Increase valve opening pressure		
	Not a noise-reducing setup	Use dampers		
Pump does not suck				
	Dry run	Fill pump and the suction line with medium		
	Minimum filling level in the reservoir tank undercut	Refill media		
	Wrong direction of rotation	Correct the direction of rotation		
	Throttled/closed shut-off element in the suction line	Open the shut-off element		
	Suction line clogged	Clean the suction line		

Pump does not suck		
1 dilip does not suck		Reduce the start-up pressure
	The air in the suction line can-	Vent the pressure line
	not be compressed in the pressure line	Increase volume of the pressure line
		Check the pump design
	Speed of the pump is too low	During frequency inverter oper-ation: Check the operation/line frequency
	Geodetic suction head too	Check installation location
	high	Provide pre-filling pump
Insufficient pressure Insufficient pumping flow rat	e	
	Excessive negative pressure (not complete filling of the pump)	Check suction line design
	Too high media viscosity	Provide pre-filling pump
		Check the pump design
	Speed of the pump is too low	During frequency inverter oper-ation: Check the operation/line frequency
	Throttled/closed shut-off element in the suction line	Open the shut-off element
	Suction line clogged	Clean the suction line
	Suction filter plugged or too	Clean suction filter or use a larger filter
	small	Replace filter element
	Suction bascet plugged or too small	Clean intake strainer or dimension larger
	Constant triggering of pressure relief valve (if existing)	Increase valve opening pressure
		Check the oil level in the tank
	Pump does not suck	Check suction line
	Wear	Replace the device
Excessive operating temperat	ure	
	Cooling and heat dissipation insufficient	Increase the cooling capacity
	Not sufficient oil in the system	Check the container layout
	Excess fluid is being delivered into the supply tank via pressure relief valve under load	Check the pump design

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Impermissible pump	heating			
	Constant triggering of pressure relief valve (if existing)	Increase valve opening pressure		
	Pressure too high in association with a media viscosity that is too low	Check the system design		
	Speed too fast in connection with media viscosity that is too high	Check the system design		
	Gland lid overtightened (for gland seal)	Unscrew gland lid and readjust leakage		
	Suction pressure too high	Reduce the pressure		
	Wear	Replace the device		
Leckage				
	Lack of maintenance	Comply with maintenance intervals		
		Replace seals		
	Mechanical damage	Replace seals		
	Thermal overload	Check operating data		
	Thermal Overload	Replace seals		
	Pressure too high	Check operating data		
		Replace seals		
	Cas content in modia too high	Check operating data		
	Gas content in media too high	Replace seals		
Seal failure	Corrosion/chemical degradation	Check material compatibility		
		Replace seals		
	Wrong direction of rotation	Correct the direction of rotation		
		Replace seals		
		Provide filtration		
	Contaminated medium	Replace seals		
	Gland lid not sufficiently tightened (for gland seal)	Retighten gland lid		
	Loose screw connection	Tighten or replace the screw connections		

Magnetic coupling				
agee ee apg	Alignment error			
Change in operating noise	Breakdown of the magnetic forces	See Operating/installation in- structions for magnetic coup-		
and/or the occurrence of vibrations	Damaged exterior magnets due to assembly error (external rotor striking the containment shroud)	ling: Failures, causes and clea		
	Operating parameters do not match the coupling power			
Repeated breakdown of the magnetic forces	Excessive operating temperature	See Operating/installation in- structions for magnetic coup- ling: Failures, causes and clear-		
magnetic forces	Abrasive particles in the pumping medium that block the pump	ance		
Pump does not suck The torque is not transmitted	The magnets of the interior and exterior rotors are not placed flush above one another	Check the assembly dimensions in accordance with the assembly drawing		
Motor protection switch tripp	ed			
	Driving power too low	Check the drive design		
	Motor incorrectly connected	Check motor connection		
	Phase failure	Check feed/supply		
		Check operating data		
	Current consumption too high	Check direction of rotation		
	Motor circuit breaker incor- rectly designed	Check operating data		
Consult the manufacturer in the	event of unidentifiable faults			