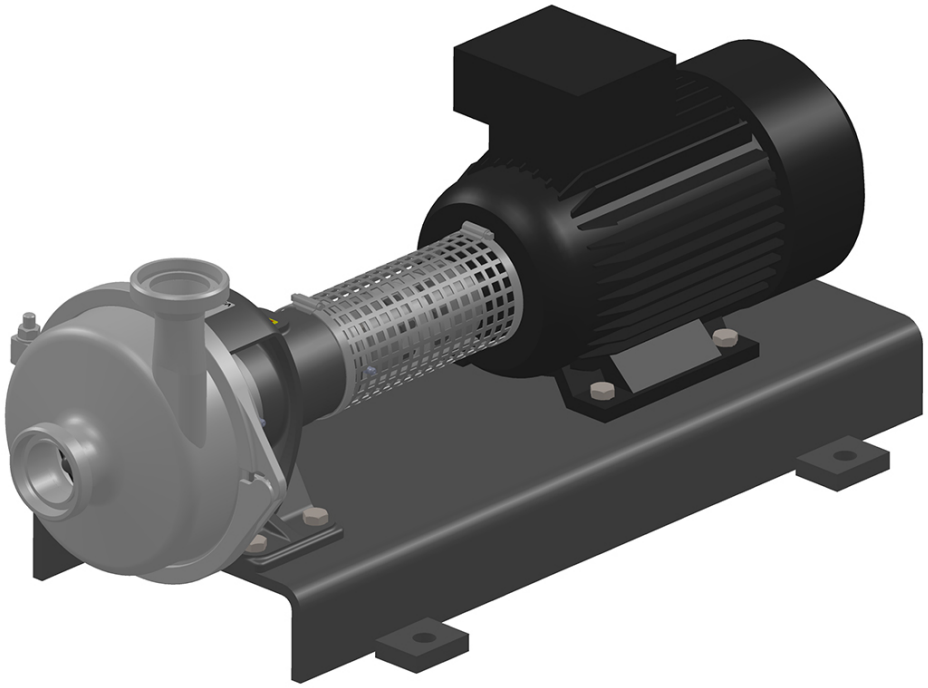

Hygienic Pumps

GEA Hilge HYGIA CN

Operating instruction (Translation from the original language)

430BAL013363GB_1

engineering for a better world

gea.com

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→ Your feedback matters!

We would be glad if you would answer a few questions about this operating manual. It just takes a few minutes.
Use the following QR code or link to access the questionnaire:

https://www.ntgt.de/ra/s.aspx?s=367115X57707121X25063

LEGAL NOTICE

These instructions are part of the technical documentation for the scope of delivery. They contain important information to ensure safe and proper transportation, mounting, commissioning, economic operation, maintenance, and repair of the pump. Following these instructions will help you avoid risks, reduce repair costs and downtime and increase the pump's reliability and service life.

These instructions are aimed at users of the pump and are intended in particular for the operator and its operating and maintenance personnel.

It is mandatory for the operator and its operating and maintenance personnel to read these instructions prior to transport, installation, commissioning, use, maintenance, repair, disassembly and disposal of the pump. The obligation to read these instructions applies also to persons responsible for carrying out activities in the phases of the life of the pump.

The operator is required to complement these instructions with information based on existing national regulations for occupational safety, health protection, and environmental protection.

In addition to these instructions and the mandatory regulations for accident prevention applicable in the country and place of use, the recognised technical rules for safe and proper work must be observed.

These instructions are part of the pump. The entire documentation consists of these instructions and any additional instructions provided. It must always be kept within reach at the pump’s location of use. When moving the pump to a different site and upon selling the pump, the entire documentation must be passed on as well.

These instructions were written to the best of our conscience. However, the manufacturer is not liable for any errors that may be contained in this document or for any resulting consequences.

The manufacturer reserves the right to make technical changes by further development of the pump described in these instructions.

Illustrations and drawings in these instructions are simplified representations. Due to enhancements and changes, it is possible that the illustrations do not exactly match the pump used by you. The technical data and dimensions are not binding. Claims cannot be derived from them.

The manufacturer assumes no liability for damages

- arising within the warranty period due to
  - unintended operation and usage conditions,
  - insufficient maintenance,
  - improper operation,
  - incorrect installation,
  - incorrect or improper connection of electrical components.
- resulting or arising from unauthorised modifications or failure to follow the instructions,
- caused by use of accessories / spare parts that have not been supplied or recommended by the manufacturer.

LAYOUT INFORMATION

Bullet points and numbered list characters

Bullet points are used to separate logical contents within a section:

- Bullet point 1

  Types of bullet point 1.

- Bullet point 2

  Types of bullet point 2.

Numbered list characters are used to separate enumerations within a descriptive text:

Descriptive text with consecutive numbering:

– Numbered list point 1

– Numbered list point 2

Handling instructions

Handling instructions require you to do something. Several consecutive steps result in a handling sequence that should be run in the specified order. The handling sequence can be divided into separate steps.

Handling sequence

1. Handling sequence step 1
   - step 1,
   - step 2,
   - step 3.
2. Handling sequence step 2

The subsequent handling sequence is the expected result:

→ Result of the handling sequence.

Individual handling steps

Individual handling steps are marked thus:

– Individual work steps

TABLE OF CONTENTS

1 General

1.1 Information about this document

Target group

These operating instructions are intended for:

- the operator/user of the pump,
- the maintenance and service personnel.

The instructions assume a general common technical understanding, which is necessary for the commissioning, maintenance and servicing of pump units.

Sections that are aimed only at special authorised personnel are indicated by a preceding note

Text highlights

The following symbols and text formatting facilitate the reading of this document:

- Bullets and lists points
- Instructions

Instructions that must be executed in a certain order are numbered according to the sequence.

For the marking of safety instructions, please refer to Section 2.3, Page 13.

Technical changes

Versions, technical data and spare part numbers are subject to technical change.

We reserve the right to implement changes due to technical progress.

1.2 Manufacturer address

GEA Hilge
Niederlassung der GEA Tuchenhagen GmbH
Hilgestraße 37-47
55294 Bodenheim
Germany

Phone +49 6135 7016-0
Fax +49 6135 1737
hilge@gea.com
gea.com

1.3 Customer service

Phone +49 6135 7016 100 (Sales support)
Phone +49 6135 7016101 (Service)
spareparts.hilge@gea.com

1.4 EU Declaration of Conformity for Machines
in accordance with the EC Machinery Directive 2006/42/EC, Annex II 1. A

Manufacturer:	**GEA HILGE** **Niederlassung der GEA Tuchenhagen GmbH** **Hilgestrasse 37-47** **D 55294 Bodenheim Germany**

We declare under our sole responsibility that the machine

Designation:	Centrifugal pump
Model:	GEA Hilge HYGIA
Type:	CN

conforms with all the relevant provisions of this directive and the following directives:

Relevant EC directives:	2006/42/EC	EC Machinery Directive
Applicable harmonized standards, in particular:	EN 809:1998/A1+AC(D)	
	EN ISO 12100:2010	
Remarks:	We also declare that the relevant technical documentation for this machine has been prepared in accordance with Annex VII, Part A, and agree to submit the documentation on justified request of national authorities on a data carrier.	

Person authorised for compilation and handover of technical documentation:

GEA HILGE
Niederlassung der GEA Tuchenhagen GmbH
Hilgestrasse 37-47
55294 Bodenheim Germany

Bodenheim, 11/02/2019

Michael Wulle
Managing Director

i.V. B. Kneip

p.p. Dr. Boris Kneip
Head, Development Dept. GEA Hilge

2 Safety

2.1 Intended use

⚠ Warning!

Non-intended use!

► Pump only media that are specified in the order. The pump has been specially designed for them.
► Operate the pump only on the electrical grid that was specified in the purchase order.

2.1.1 Pumped fluids

Use only clean or lightly polluted liquids as pumped fluids as long as they do not chemically or mechanically attack the pump materials or reduce their strength. If you want to pump liquids with higher viscosity than that of water, check for possible overload of the motor.

2.1.2 Minimum flow rate

The pump may not be operated below of a flow rate of Q_{min} = 10-15 % Q_{opt}.

2.1.2.1 Minimum flow rates in explosive atmospheres

For pumps used in explosive atmospheres according to EU explosion protection directive 2014/34/EU, the minimum flow rates of the ATEX additional instructions in Annex B apply.

2.1.3 Connections and piping

The pipe nominal diameters of the system should be equal to or greater than the pump nominal diameters DNE (suction side) or DNA (pressure side), and the fittings to the pump should match exactly the type standard of the fixed mating connection part on the pump. The suction line must be hermetically sealed and routed such that no air pockets can form. Avoid tight bends and valves directly in front of the pump. On the suction side, a straight settling section with a minimum length of 5 times the pipe diameter should be provided. The suction head of the system must not be larger than the suction head guaranteed by the pump.

2.1.4 Switching frequency

Do not exceed a switching frequency of 15 switching operations per hour.

2.1.5 Types

All information and descriptions in these operating instructions on the use and handling of the pumps refer exclusively to the standard versions. Special designs and customised deviations as well as random external influences in the use and operation are not included in this provision.

2.2 Safety precautions in these operating instructions

Read the safety precautions!

These operating instructions contain basic precautions that must be observed during installation, operation and maintenance. They must therefore be read by the installer and relevant personnel or operator prior to installation and commissioning. The operating instructions must always be available at machine/ system site.

In addition to the general safety precautions listed in this chapter on safety, be sure to read also the other, special safety precautions included.

2.3 Explanation of the safety symbols used

⚠ Danger

Stands for an immediate danger which leads to heavy physical injuries or to the death.

► Description to avert the danger

⚠ Warning!

Stands for a possibly dangerous situation which leads to heavy physical injuries or to the death.

► Description to avert the dangerous situation.

⚠ Caution!

Stands for a possibly dangerous situation which could lead to light physical injuries or to damages to property.

► Description to avert the dangerous situation.

Notice

Stands for an important tip whose attention is important for the designated use and function of the product.

► Description of the necessary action for proper operation of the product.

2.4 Safety instructions for the company/operator

Follow the safety instructions contained in this operating manual, the relevant national accident prevention regulations as well as any internal working, operating, and safety provisions of the operating company.

⚠ Warning!

Hot or cold machine parts

Risk of burns.

► Secure hot or cold machine parts against contact!

⚠ Warning!

Rotating machine parts

Hazard of entrapment or entanglement.

► Do not remove contact protection for rotating machine parts (e.g. coupling)!

► Replace defective safety devices promptly!

⚠ Warning!

Hazardous materials

Contact with dangerous substances, e.g. by inhalation.

► Discharge the leakage of dangerous goods such that no danger to persons and the environment arises!
► Comply with legal provisions!
► Switch off the pump in the event of failure of the mechanical seal. Replace the mechanical seal before next use!

⚠ Warning!

Tripping and falling hazard

Danger due to electrical cables.

► Route the electrical supply line such that there is no risk of tripping (only for pumps on a chassis).

⚠ Danger

Live parts

Electric shock by touching live parts

► Use only technically flawless plugs and cables.

2.4.1 Dangers of non-compliance with safety information

Ignoring the safety instructions can result in bodily harm to persons as well as environmental harm and machine damage.

Failure to follow the safety instructions will result in the loss of any claims for damages.

Failure to follow the instructions may entail the following hazards, for example:

- Failure of important functions of the machine/system.
- Failure of prescribed methods for repair and maintenance
- Exposure of persons to electrical, mechanical, and chemical hazards.
- Environmental risks caused by leakage of hazardous substances.

2.4.2 Safety-conscious work behaviour

Follow the safety instructions contained in this operating manual, the relevant national accident prevention regulations as well as any internal working, operating, and safety provisions of the operating company.

2.5 Unauthorised modification and ordering of spare parts

Modification or alteration of the machine is only permitted with the written permission of the manufacturer.

Exclusive use of original spare parts and accessories authorised by the manufacturer ensures safety. The manufacturer will bear no liability for consequences arising from the use of unauthorised parts.

2.6 Staff qualifications and training

The staff for working on and with the pump must have the appropriate qualifications. Responsibilities, competencies and supervision of staff must be clearly defined by the operating company. If personnel do not have the necessary knowledge, they are to be trained and instructed. If necessary, this can be done by the product manufacturer/vendor on behalf of the operating company. The operating company must also ensure that the contents of the operating instructions are fully understood by the staff.

2.7 Safety equipment

Do not remove instructions from the pump.

Signs attached directly on the machine, such as an arrow to indicate the direction of rotation, must absolutely be observed and kept in fully legible condition. Damaged or illegible signs must be replaced.

2.8 Possible residual hazards

Hint!

Despite careful design of the machine and the implementation of all safety-relevant regulations, further risks for persons and machine during all life phases of the pump cannot be fully ruled out. The additional safety instructions in the individual chapters of this manual must therefore be carefully observed!

The residual risks that were ascertained during the risk assessment carried out for the product according to safety standard EN ISO 14121 - Safety of Machines - are:

- mechanical hazards due to sharp sheet metal edges and projecting parts
- electrical hazards as a result of inadvertently coming in contact with terminals and cables
- thermal hazards as a result of inadvertently coming in contact with pump housings and pipes
- exposure to noise
- hazards caused by vibration due to improper installation
- hazards due to working materials and other materials in case of allergies or the like.
- neglect of ergonomic principles
- combinations of various hazards
- unexpected starting, unexpected rotation in case of wrong electrical connections or defects
- shut down, emergency stop when defects are detected
- changes to the rotational speed
- power failure
- Hazard from insufficient / incorrect cleaning - Product contamination,

- failure of the control circuit or control loop
- incorrect assembly
- fracture during operation
- operating media or objects getting thrown out
- loss of stability
- personnel slipping, tripping or falling

3 Description

3.1 Pump overview

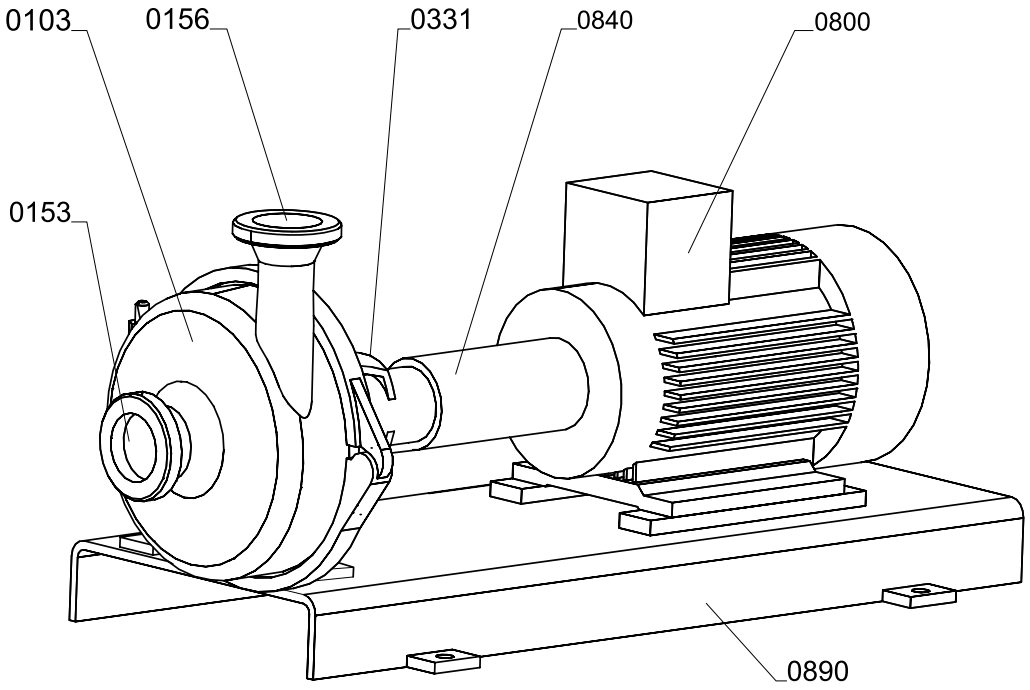

Fig.1: HYGIA CN

0103 - Annular casing
0153 - Suction port
0156 - Discharge port
0331 - Bearing housing
0800 - Motor
0840 - Coupling
0890 - Base plate

3.2 Description

The pump is a end suction, single-stage centrifugal pump in system block design. All wetted parts are based on the “hygienic design” guidelines. The material grade 1.4404 or 1.4435 Fe ≤ 1% and the respective execution standard are carried out according to the order and, if required, certified in writing

3.2.1 Standard version applications

The standard version of the pumps is used in the following areas:

- Breweries (beer, wort, mash, yeast, etc.)
- Dairies (milk, milk mixes, cheese production, etc.)
- Soft drinks (fruit juice, lemonade, mineral water, etc.)
- Wine and sparkling wine production
- Distilleries (mash, distillates, etc.)
- Food production (marinades, pickle, cooking oil, etc.)

- Cleaning systems (CIP)

3.2.2 Hygienic design applications

Due to the consistent hygienic design and the use of pore and porosity-free materials, the pump is ideally suited for use in the following areas:

- pharmaceutical industry
- medical technology
- in biotechnology process plants

Special applications arise in the area of ultrapure water delivery/WFI, as well as in equipment for the production of parenterals and infusion solutions according to FDA.

3.3 Pump name

GEA Hilge pump name					
GEA Hilge HYGIA	**N**	**CN**	**40/40**	**3**	**2**
Pump name	Size	Design type	Nominal width	Output [kW]	Number of poles

3.4 Type plate

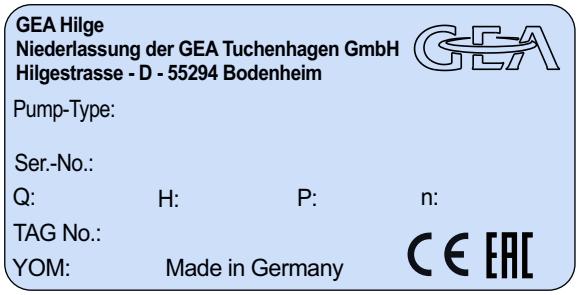

Fig.2: Type plate GEA Hilge

Pump type: Pump name	P: Motor rating
Serial No.: Serial number	n: Speed
Q: Flow rate	TAG No.:customer name
H: Delivery head	YOM: Year of manufacture

Note: The type plate may differ from the presented layout.

4 Transport and Storage

4.1 Special personnel qualification for transport and storage

Transports may only be carried out by qualified staff, who must observe the safety instructions.

4.2 Safety precautions for transport and storage

⚠ Warning!

Falling loads

Danger from falling loads.

► To transport the pump, use suitable lifting gear with sufficient carrying capacity.
► Make sure that there are no persons present under suspended loads.
► Make sure that the pump is horizontally aligned when lifting.

⚠ Warning!

Wrong attachment points!

► Attach the rope to suitable anchor points.
► Never fasten a rope to the pump housing or the suction/discharge port!
► For version with casing: Remove the stainless steel casing before transport.

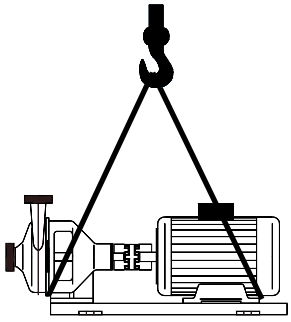

Fig.3: Anchor points (example)

Storage of the pump

⚠ Caution!

Frost

Risk due to external conditions.

► In case of frost risk, drain the pump completely.

If the pump is not used immediately, proper storage conditions are as important for later operation as careful installation and proper maintenance.

Protect the pump from cold, moisture and dust, as well as against mechanical influences.

Qualified personnel is required for proper installation and maintenance.

4.3 Dimensions / weights

Design: Pump on steel base plate with DKM coupling

Weights [kg] GEA Hilge HYGIA I CN			
P2	**n**	**IEC size**	**Weight**
[kW]	**[min-1]**		**[kg]**
0.55	1450	80	55.5
0.75	1450	80	56.5
1.1	2900	80	57
1.1	1450	90S	60.5
1.5	2900	90S	62.5
1.5	1450	90L	63.5
2.2	2900	90L	63
2.2	1450	100L	71.5
3.0	2900	100L	72
4.0	2900	112M	83
5.5	2900	132S	118

Weights [kg] GEA Hilge HYGIA II CN			
P2	**n**	**IEC size**	**Weight**
[kW]	**[min-1]**		**[kg]**
0.75	1450	80	90.5
1.1	2900	80	91
1.1	1450	90S	94.5
1.5	2900	90S	96.5
1.5	1450	90L	97.5
2.2	2900	90L	97
2.2	1450	100L	104
3.0	1450	100L	116
3.0	2900	100L	104
4.0	1450	112M	114
4.0	2900	112M	111
5.5	1450	132S	138
5.5	2900	132S	134
7.5	2900	132S	142
7.5	1450	132M	147
11.0	2900	160M	185
15.0	2900	160M	191
18.5	2900	160L	211
22.0	2900	180M	286

4.4 Unpacking the pump

All of our pumps leave our warehouse properly packaged to avoid damage in transit.

Should you nevertheless find any damage after cautious unpacking and exact inspection of the shipment, immediately notify the carrier (railway, post, freight forwarder, shipping company). Make claims for damages. The transport risk passes to the customer once the shipment has left our warehouse.

4.5 Disposal of packaging material

The generation of waste should be avoided or minimized wherever possible. Surpluses and packaging materials not suitable for recycling should be disposed of through an approved waste disposal company. Packaging materials not suitable for recycling must always be disposed of in accordance with the requirements of environmental protection and waste disposal legislation as well as the requirements of the local authorities.

Packaging materials suitable for recycling should be reused or reprocessed.

5 Technical data

The operating safety of the delivered machine is only guaranteed if the machine is used as intended according to the sections of the operating instructions and the purchase order.

⚠ Warning!

Overload of the pump!

► Do not operate the pump above the maximum permissible operating data.

► Avoid even short-term pressure overloads (e.g. by pressure surges).

5.1 Serial number

The pump can be uniquely identified by the serial number. When ordering spare parts, always quote the serial number. The serial number is indicated on the type plate.

5.2 Performance data

The performance data - delivery head and flow rate - are explained in accordance with ISO 9906: 2012, Grade 3B and documented with the acceptance report.

5.3 Noise emissions

Measured values in accordance with DIN EN ISO 3746 for pump units, measuring uncertainty 3 DB(A).

Noise emissions HYGIA I/II		
Motor output [kW]	**L_{pfa} [dB(A)] 2-pole 50 Hz / 60 Hz**	**L_{pfa} [dB(A)] 4-pole 50 Hz / 60 Hz**
0.55		51 / 54
0.75	65 /68	51 / 54
1.1	65 / 68	55 / 58
1.5	67 / 70	55 / 58
2.2	67 / 70	63 / 66
3.0	73 / 76	65 / 68
4.0	73 / 76	65 / 68
5.5	73 / 76	67 / 70
7.5	75 / 78	70 / 73
11.0	75 / 78	
15.0	76 / 79	
18.5	76 / 79	
22.0	80 /83	

The noise emissions caused by a pump are influenced mainly by its application. The values shown here should therefore be considered merely as a guide.

5.4 Maximum operating temperatures

⚠ Warning!

Exceeding the maximum temperatures!

► Never exceed the specified operating temperatures.

Operating temperatures	
Version	Temp. [°C]
Normal version	95
Sterilisation (SIP)	140

Variations are possible at the above temperatures.

5.5 Maximum operating pressure

⚠ Warning!

Pressure overload of the pump!

► Operate the pump according to the ordering data.
► Never exceed the specified maximum operating pressures.

The pump's maximum operating pressure pump depends on various factors:

- Pump type
- Type of connections
- Type of mechanical seal.

5.6 Resistance of Sealing Materials

The resistance of sealing materials depends on the type and temperature of the medium conveyed. The exposure time can adversely affect the service life of the seals. The sealing materials comply with the regulations of FDA 21 CFR 177.2600 or FDA 21 CFR 177.1550.

Resistance:

- + = good resistance
- o = reduced resistance
- - = no resistance

Sealing resistance table			
Medium	**Temperature**	**Gasket material (general operating temperature)**	
		EPDM -40...+135°C (-40...275°F)	**FKM -10...+200 °C (+14...+392°F)**
Caustics up to 3%	up to 80 °C (176°F)	+	o
Caustics up to 5%	up to 40 °C (104°F)	+	o
Caustics up to 5%	up to 80 °C (176°F)	+	–
Caustics at more than 5%		o	–
Inorganic acids up to 3%	up to 80 °C (176°F)	+	+

Sealing resistance table			
Medium	**Temperature**	**Gasket material (general operating temperature)**	
		EPDM -40...+135°C (-40...275°F)	**FKM -10...+200 °C (+14...+392°F)**
Inorganic acids up to 5%	up to 80 °C (176°F)	o	+
Inorganic acids up to 5%	up to 100 °C (212°F)	–	+
Water	up to 80 °C (176°F)	+	+
Steam	up to 135 °C (275°F)	+	o
Steam, approx. 30 min	up to 150 °C (302°F)	+	o
Fuels/hydrocarbons		–	+
Product with a fat content of max. 35%		+	+
Product with a fat content of more than 35%		–	+
Oils		–	+

* Depending on the installation conditions

6 Assembly and installation

6.1 Safety precautions for setup, installation, and connection

⚠ Warning!

Tipping (tilting) of the pump!

► The surface for setting up the pump should be clean, level and have sufficient load-bearing capacity.
► Bolt the provided fastening points to the foundation for proper setup of the pump according to the usual rules of mechanical engineering.

⚠ Warning!

Mechanical overload!

► Do not use the pump and its connection port as support of the piping. (EN 809 5.2.1.2.3 and EN ISO 14847).
► Follow the general rules of mechanical engineering and plant construction and the regulations of the manufacturers of connecting elements (e.g. flanges). These regulations may include information on tightening torques, max. permissible angular misalignment, tools/equipment to use.
► Be sure to avoid any strain on the pump.
► After piping, check the alignment of the coupling (where applicable).

⚠ Caution!

Overload by foreign bodies!

► Before installing the pump in the system, remove all plastic films and caps from the connectors.

⚠ Caution!

Dry running of the mechanical seal!

► The suction line must be hermetically sealed and laid such that no air pockets can form.
► Avoid tight bends and valves directly in front of the pump. They impair the incoming flow of the pump and the NPSH of the system.
► The suction head of the system must not be larger than the suction head guaranteed by the pump.
► The piping nominal diameters of the system should be equal to or greater than the DNE or DNA connections of the pump.
► For suction operation, install a foot valve.
► Route the suction line in ascending direction and the supply line at a slight slope towards the pump.
► If the local conditions do not permit a continuous ascent of the suction line: Provide a vent at its highest point.
► Install a shut-off valve in the supply line close to the pump.
► Open the suction side shut-off valve completely during operation.
► Do not use the suction side shut-off valve for controlling.
► Install a shut-off valve in the pressure line close to the pump. This can be used to control the flow rate.

⚠ Warning!

Overheating!

► Ensure adequate ventilation.
► Avoid sucking in the heated exhaust air also of adjacent units.
► Maintain minimum distances.

⚠ Caution!

Vibration!

► Ensure stable construction for mounting of the pump and piping. Insufficiently stiffened substructures may cause an overall structure capable of oscillating, which is excited to oscillate by hydraulic and/or motor forces during changing operating conditions in the system.

⚠ Danger

Electric shock by touching live parts!

► Have the electrical connections be made by a licensed electrician.
► Follow the VDE as well as local regulations, in particular the safety regulations.

⚠ Danger

For motors with frequency converter (tronic): Electric shock by touching live parts!

► Even if the power supply is switched off, touching electrical parts may cause an electric shock.
► Disconnect the power supply and wait at least four minutes before touching electrical components.

⚠ Warning!

Electric overload!

► Compare the voltage indicated on the motor plate with the operating voltage. The power supply properties must match the specifications on the type plate.
► Install a motor protection switch.

⚠ Caution!

Voltage spikes in frequency converter operation!

► Use a motor suitable for frequency converter operation.
► Use a dU/dt filter to avoid voltage spikes or a motor with reinforced windings.

6.1.1 Mechanical seals in tandem arrangement

⚠ Caution!

Missing supply of flushing fluid!

Dry running of the mechanical seal.

► Always connect the flushing lines such that supply for flushing is always ensured.
► Ensure that flushing fluid is supplied even when checking the motor's direction of rotation.
► Ensure that the flushing pressure does not exceed 0.2 bar / 29 psi.
► Always keep the level in the liquid tank between the upper and the lower mark (where applicable).

6.1.2 Mechanical seals in back-to-back arrangement

⚠ Caution!

Missing sealing water supply!

Dry running of the mechanical seal.

► Always connect the flushing lines such that supply for flushing is always ensured.
► Ensure that flushing fluid is supplied even when checking the motor's direction of rotation.
► For back-to-back arrangement, ensure that the sealing pressure is at least 1.5-2.0 bar (22-29 psi) above the maximum internal pressure of the pump. Max. internal pressure = system pressure + pumping pressure at Q = zero.
► Always keep the level in the liquid tank between the upper and the lower mark (where applicable).

6.1.3 Vertically installed pumps

⚠ Warning!

Tipping (tilting) of the pump

► Fasten the pump with suitable heavy-duty anchors. The pump tends to tip over due to the elevated centre of gravity.

⚠ Warning!

Short-circuit

► Position the pump part always below the motor. If leakage occurs, the liquid cannot ingress into the motor.

6.2 Special personnel qualification

The personnel used for setup, installation and connection must be adequately qualified for this work. See also Section 2.6, Page 15.

6.3 Setup, installation, and connection

6.3.1 Checking smooth running of the impeller

Before installation, check that the impeller is running smoothly.

Perform the following steps:

1. Remove the motor shroud (only for SUPER version).
2. Remove the motor fan cover.
3. Note the pump's direction of rotation (arrow).
4. Carefully rotate the shaft of the impeller.

   The shaft should be easy to rotate. If the impeller rubs against something, it has some damage that may have happened during transport of the pump.

   In case of rubbing of the impeller: Contact the HILGE service.

   If the impeller rotates freely:
5. Reattach the motor fan cover.
6. Reattach the motor shroud (only for SUPER version).

   → The impeller has been checked for running smoothly.

6.3.2 Setting up and aligning the pump unit

The pump is designed exclusively for horizontal operation.

Aligning the pump:

1. Level the unit via the machined planar surfaces of the ports using a machine spirit level.

   The alignment of the pump unit is carried out by means of steel inserts, which are aligned right next to each fastening screw below the tabs at the base plate. Compensate only at the tabs with inserts! The base plate must be rest fully on the tabs without tightening the screws.
2. After aligning the unit, tighten the fastening screws evenly in a crosswise sequence (where applicable).

   → The pump unit has been set up and aligned.

6.3.3 Aligning the coupling

Careful alignment significantly increases the service life of the coupling as well as the shaft bearing and the seals.

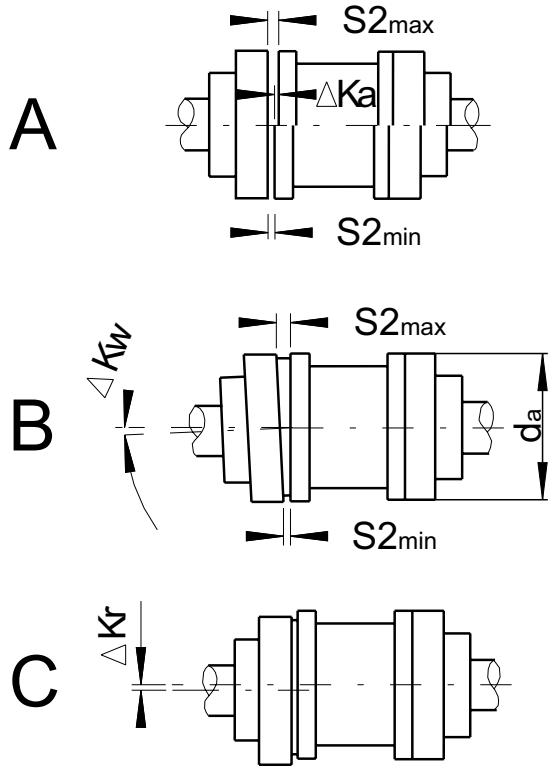

Fig.4: Relocation types (principle)
A - axial offset B | angle offset C | radial offset

To align the coupling carry out the following steps:

1. Disassemble the coupling protection.
2. Place a straightedge at four opposite points (in steps of 90° degrees) across both clutch halves.
3. The straightedge must have the same distance (light gap) everywhere.
4. In the case of a radial or angle displacement: Place calibrated shims under the motor or the pump housing.
5. Reinstall the coupling protection.

→ The coupling has been aligned.

6.3.3.1 Permissible displacement values for Flender couplings

Permissible displacement values for Flender B / BDS coupling

Axial offset type B											
Outer diameter of the coupling (da)		**58**	**68**	**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type B		58	68	80	95	110	125	140	160	180	200	225
max. axial displacement [mm] (clearance)	$S2_{max}$	4	4	4	4	4	4	4	6	6	6	6
	$S2_{min}$	2	2	2	2	2	2	2	2	2	2	2

Axial offset type BDS											
Outer diameter of the coupling (da)		**66**	**76**	**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Size of type BDS		66	76	88	103	118	135	152	172	194	218	245
max. axial displacement [mm] (clearance)	$S2_{max}$	4	4	4	4	4	4	4	6	6	6	6
	$S2_{min}$	2	2	2	2	2	2	2	2	2	2	2

Permissible shaft offset values for radial offset ∆ Kr and difference of clearance (angle displacement) ∆ S2 [mm]												
Size of type B		**58**	**68**	**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type BDS		**66**	**76**	**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Coupling speed [rpm]	250	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8
	500	0.3	0.3	0.3	0.35	0.35	0.4	0.4	0.5	0.5	0.55	0.55
	750	0.25	0.25	0.25	0.25	0.3	0.3	0.35	0.4	0.4	0.45	0.5
	1 000	0.2	0.2	0.2	0.25	0.25	0.25	0.3	0.35	0.35	0.4	0.4
	1 500	0.2	0.2	0.2	0.2	0.2	0.25	0.25	0.3	0.3	0.3	0.35
	2 000	0.15	0.15	0.15	0.2	0.2	0.2	0.2	0.25	0.25	0.3	0.3
	3 000	0.15	0.15	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2	0.25
	4 000	0.1	0.1	0.1	0.1	0.1	0.15	0.15	0.15	--	--	--

Permissible displacement values for Flender H / HDS coupling

Axial offset type H										
Outer diameter of the coupling (da)		**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type H		80	95	110	125	140	160	180	200	225
max. axial displacement [mm] (clearance)	$S2_{max}$	6	6	6	6	6	7	7	7	7
	$S2_{min}$	5	5	5	5	5	6	6	6	6

Axial offset type BDS										
Outer diameter of the coupling (da)		**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Size of type HDS		88	103	118	135	152	172	194	218	245
max. axial displacement [mm] (clearance)	$S2_{max}$	6	6	6	6	6	7	7	7	7
	$S2_{min}$	5	5	5	5	5	6	6	6	6

Permissible shaft offset values for radial offset ∆ Kr and difference of clearance (angle displacement) ∆ S2 [mm]										
Size of type H		**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type HDS		**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Coupling speed [1/min]	250	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8
	500	0.3	0.35	0.35	0.4	0.4	0.5	0.5	0.55	0.55
	750	0.25	0.25	0.3	0.3	0.35	0.4	0.4	0.45	0.5
	1 000	0.2	0.25	0.25	0.25	0.3	0.35	0.35	0.4	0.4
	1 500	0.2	0.2	0.2	0.25	0.25	0.3	0.3	0.3	0.35
	2 000	0.15	0.2	0.2	0.2	0.2	0.25	0.25	0.3	0.3
	3 000	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2	0.25
	4 000	0.1	0.1	0.1	0.15	0.15	0.15	--	--	--

Torques and clearances for types B / BDS, H / HDS

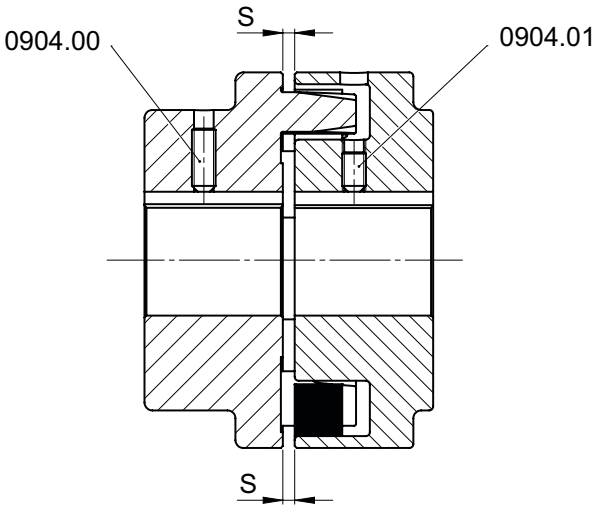

Fig.5: Coupling N-EUPEX, clearance S

Torques and clearances for type B / BDS											
Size of type B	**58**	**68**	**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type BDS	**66**	**76**	**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Clearance S [mm]	3	3	3	3	3	3	3	4	4	4	4
Threaded pin DIN EN ISO 4029 (serrated cup point)	M5	M6	M6	M6	M6	M8	M8	M10	M12	M12	M12
Torque [Nm]	3	4	4	4	4	8	8	15	25	25	25

Tighten the threaded pins (0904.00 / 0904.01) with the torques stated in the table.

Torques and clearances for type H / HDS									
Size of type H	**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Size of type HDS	**88**	**103**	**118**	**135**	**152**	**172**	**194**	**218**	**245**
Clearance S [mm]	5	5	5	5	5	6	6	6	6

Torques and clearances for type H / HDS									
Size of type H	**80**	**95**	**110**	**125**	**140**	**160**	**180**	**200**	**225**
Threaded pin DIN EN ISO 4029 (serrated cup point)	M6	M6	M6	M8	M8	M10	M12	M12	M12
Torque [Nm]	4	4	4	8	8	15	25	25	25

Tighten the threaded pins (0904.00 / 0904.01) with the torques stated in the table.

6.3.3.2 Permissible displacement values for KTR Rotex, DKM

Hint!

Always select the outer diameter (da) of the coupling to determine the deviation values.

Permissible displacement values for Rotex coupling												
Outer diameter of the coupling (da)		**30**	**40**	**55**	**65**	**80**	**95**	**105**	**120**	**135**	**160**	**200**
Size of the coupling		14	19	24	28	38	42	48	55	65	75	90
max. axial displacement Δ Ka [mm] (clearance)	$S2_{max}$	2.5	3.2	3.4	4.0	4.8	5.0	5.6	6.2	7.1	8.0	8.9
	$S2_{min}$	1.5	2.0	2.0	2.5	3.0	3.0	3.5	4.0	4.5	5.0	5.5
max. axial displacement Δ Kr [mm] at n=1500 min^{-1}		0.17	0.20	0.22	0.25	0.28	0.32	0.36	0.38	0.42	0.48	0.50
max. axial displacement Δ Kr [mm] at n=3000 min^{-1}		0.11	0.13	0.15	0.17	0.19	0.21	0.25	0.26	0.28	0.32	0.34
max. angle displacement Δ Kw [degree] at n=1500 min^{-1}		1.20	1.20	0.90	0.90	1.00	1.00	1.10	1.10	1.20	1.20	1.20
max. angle displacement Δ kW [mm] at n=1500 min^{-1}		0.67	0.82	0.85	1.05	1.35	1.70	2.00	2.30	2.70	3.30	4.30
max. angle displacement Δ Kw [degree] at n=3000 min^{-1}		1.10	1.10	0.80	0.80	0.90	0.90	1.00	1.00	1.10	1.10	1.10
max. angle displacement Δ kW [mm] at n=3000 min^{-1}		0.60	0.70	0.75	0.85	1.10	1.40	1.60	2.00	2.30	2.90	3.80

Permitted displacement values for Rotex DKM coupling										
Outer diameter of the coupling (da)		**40**	**55**	**65**	**80**	**95**	**105**	**120**	**135**	**160**	**200**
Size of the coupling		19	24	28	38	42	48	55	65	75	90
max. axial displacement [mm] (clearance)	$S2_{max}$	3.20	3.40	4.00	4.80	5.00	5.60	6.20	7.10	8.00	8.90
	$S2_{min}$	2.00	2.00	2.50	3.00	3.00	3.50	4.00	4.50	5.00	5.50
max. radial displacement Δ Kr [mm] at n=1500 min^{-1}		0.45	0.59	0.66	0.77	0.84	0.91	1.01	1.17	1.33	1.48
max. radial displacement Δ Kr [mm] at n=3000 min^{-1}		0.40	0.53	0.60	0.70	0.75	0.82	0.81	1.05	1.19	1.33

Permitted displacement values for Rotex DKM coupling											
Outer diameter of the coupling (da)		**40**	**55**	**65**	**80**	**95**	**105**	**120**	**135**	**160**	**200**
max. angle displacement ∆ Kw [degree] at n=1500 min^{-1}		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
max. angle displacement ∆ Kw [degree] at n=3000 min^{-1}		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

Torques and clearances for Rotex / Rotex DKM

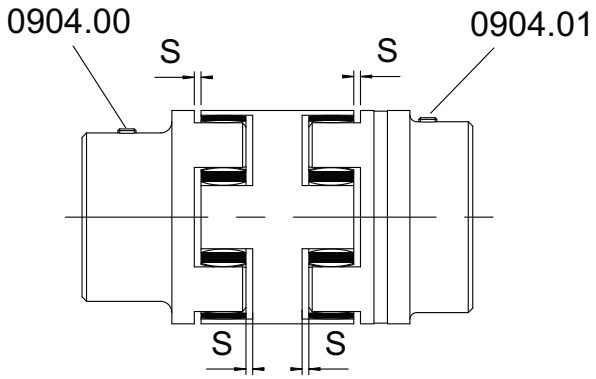

Fig.6: Rotex / Rotex DKM

Outer diameter of the coupling (da)	**30**	**40**	**55**	**65**	**80**	**95**	**105**	**120**	**135**	**160**	**200**
Size of the coupling	14	19	24	28	38	42	48	55	65	75	90
Clearance S [mm]	1.50	2.00	2.00	2.50	3.00	3.00	3.50	4.00	4.50	5.00	5.50
Threaded pin DIN EN ISO 4029 (cup point)	M4	M5	M5	M8	M8	M8	M8	M10	M10	M10	M12
Torque [Nm]	1.5	2	2	10	10	10	10	17	17	17	40

6.3.4 Installation in the piping system

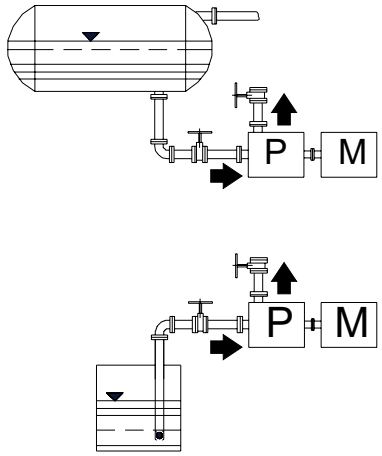

Fig.7: Installation in the piping system
top: Inlet operation | bottom: Suction operation | P - Pump | M - Motor

6.3.4.1 Space requirements

Maintain the following minimum distances.

Pay attention to motor performance.

Horizontal assembly

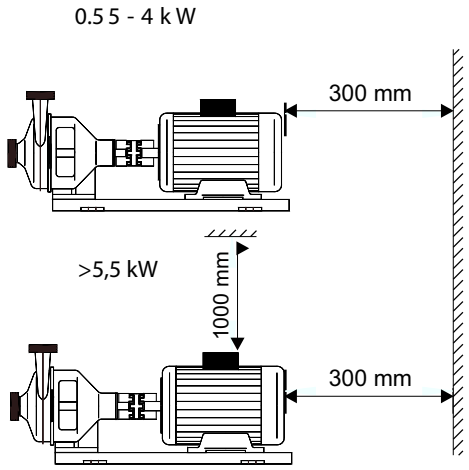

Fig.8: Space requirements

6.3.4.2 Noise and vibration damping

To achieve optimum performance and to minimize noise and vibration, it is recommended to provide the pump with vibration dampers.

In general, this should always be considered for pumps with motor sizes starting from 11 kW. But unwanted vibrations and noises occur also with smaller motor sizes.

Noise and vibration are caused by the rotating parts in the motor and the pump and by the flow in the pipes and fittings.

The effect on the environment is subjective and depends largely on the correct installation and the nature of the rest of the system.

Foundation

Vibration damping is best achieved if the pump is set up on a flat, solid concrete foundation.

As a guideline, the concrete foundation should be 1.5 times as heavy as the pump.

Vibration damper

To avoid the transmission of vibrations to the building, it is recommended to disconnect the pump foundation from parts of the building using vibration dampers.

Selecting the correct vibration damper requires the following data:

- Forces transmitted via the vibration damper
- Motor speed, if necessary, taking into account a speed control
- Required damping in % (suggested value: 70 %)

The correct damper depends on the respective installation. An incorrectly designed damper may even increase the vibration. Vibration dampers should therefore be designed by the vendor of the vibration damper.

Compensators

If the pump is mounted on a foundation along with vibration dampers, be sure to install compensators at the pipe connections. This prevents the pump from “hanging” in the connections.

Compensators are installed to

- absorb expansion/shrinking in the piping caused by varying fluid temperatures;
- reduce mechanical stress occurring in conjunction with pressure surges in the system;
- absorb noise caused by the system in the piping (only rubber ball compensators).

Note: Compensators must not be used to compensate for inaccuracies in the piping, for example, to compensate for an offset in the centre of the connections.

Install the compensators both on the suction side and pressure side at a minimum distance to the pump, which is 1-1.5 times the nominal diameter of the piping. This allows for an improved flow on the suction side of the pump, as well as reduced pressure drop on the pressure side.

For connections with a size over DN 100, we always recommend compensators with length limiters.

The pipes must be started so that they can cause no strain in the compensators and in the pump. Follow the manufacturer's instructions and hand them over to the person responsible or to the plant manufacturer.

Vibration may cause the following damage:

- Damage to roller bearings of pump and motor
- Damage to the mechanical seal
- Increased coupling wear
- Damage to shaft/hub connections
- Cracks on pump ports
- Loosening of screw connections
- Cable breaks in the motor connection
- Contacting of pump impellers.

Acoustic decoupling

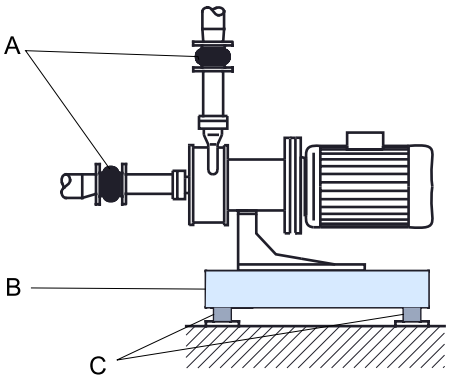

Fig.9: Example for the foundation of a pump
A - compensators | B - solid base | C - Vibration damper

6.3.5 Using the mechanical seal

For perfect operation, mechanical seals require a lubrication film in the sealing gap, which prevents contact between the two sliding surfaces. Usually this lubrication film is formed by the pumped product or by an externally supplied flushing/sealing fluid.

Due to the friction heat between the sliding faces, the lubrication film evaporates towards the atmosphere. This means there is a leak that is invisible in water, water-like or volatile liquids (e.g. alcohol). The amount of leakage is usually very low during proper operation, but it may multiply depending on other factors. Particularly in the running-in phase, mechanical seals, regardless of size, type or design, are subject to low leakage. In individual cases, it may be necessary to tolerate a low, visible leakage or to counteract it with suitable measures.

Dry run

The mechanical seal needs a lubrication film between the sliding surfaces for correct sealing.

If the lubrication film is missing or interrupted between the sliding surfaces, dry running occurs. The friction heat generated by the direct contact of the sliding surfaces leads to the destruction of the mechanical seal. Depending on the material pairing, this can take place within a few seconds.

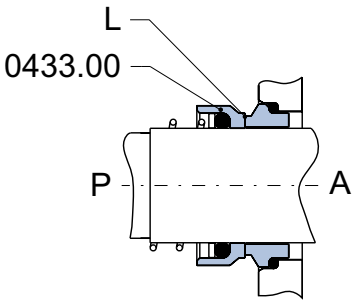

Fig.10: Lubrication film between the sliding surfaces
P - Pump side | A - Atmosphere side | L - Lubrication side | 0433.00 - Mechanical seal

6.3.6 Flush connections for double mechanical seals (optional)

6.3.6.1 Flushing fluid (optional)

Requirements of the flushing fluid

The flushing fluid has the task to lubricate and cool the product-side mechanical seal and the radial packing ring on the atmospheric side.

The flushing fluid must meet the following criteria:

- good flowability
- no impurities
- no solids
- no dissolved components
- adequate thermal conductivity
- no chemical or mechanical attacking of the pump materials, sealing materials, and elastomers.
- No contaminating of the pumped fluid
- Viscosity < 5 mPas
- Water hardness < 5° dH

Demineralised water meets these requirements to a large extent.

6.3.6.2 Double mechanical seals (optional)

Pumps with double-acting mechanical seals are equipped with a seal cartridge. This seal cartridge holds the sealing or flushing fluid, depending on the seal version. The connections for flushing must be made as shown. Only in this way can the flushing fluid flow effectively around the mechanical seal.

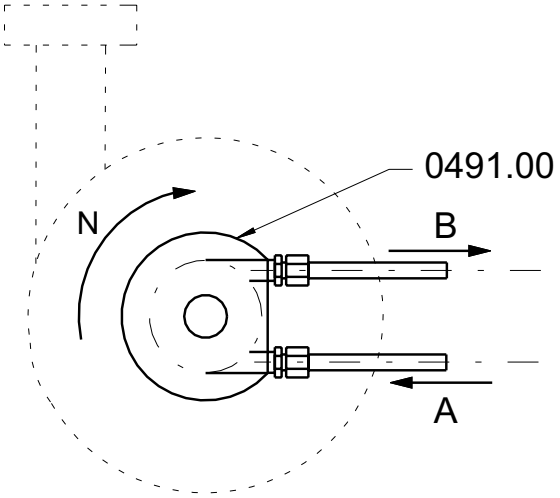

Fig.11: Flush ports

A	Inlet line
B	Outlet line
N	Direction of rotation of the pump
0491.00	Seal housing

Connecting the flushing

1. Connect the inlet line (A).

Note position of the lines depending on the direction of rotation.

2. Connect the outlet line (B).
3. Check correct fit of the connections.
   → The flushing has been connected.

Double mechanical seal - back-to-back arrangement (optional)

Sealing fluid

To maintain their function, mechanical seals need a sealing fluid, which has the following tasks, including others:

- Pressure build-up in the sealing space
- Preventing penetration of fluid into the sealing gap
- Protection against dry running
- Lubrication and cooling of the mechanical seals.

A clean liquid, compatible with the pumped fluid, is used as the sealing fluid.

Ensuring the flushing operation:

1. Open the inlet of sealing fluid.
2. Vent the seal cartridge.
3. Ensure circulation at necessary sealing pressure.
   → Done.

Permissible supply pressures and temperatures

The supply of the mechanical seal with sealing fluid must be pressurised. The sealing pressure should be at least 1.5 - 2.0 bar above the maximum internal pressure of the pump. Max. internal pressure = system pressure + pumping pressure at Q = zero. Obtain the delivery head at Q=0 from the test bench acceptance of your pump.

When operating with a frequency converter, consider the varying delivery heads. When using a closed sealing circuit with a supply reservoir, regularly monitor the fill level (visually or by means of level probes). Change the sealing fluid regularly when using critical media.

The maximum temperature of the flushing fluid must be 20 K below the boiling temperature of the flushing fluid at the outlet. The temperature rise in the pump flushing chamber is normally less than 10 K (inlet/outlet). The maximum permissible operating temperatures of the flushing device must not be exceeded.

Double mechanical seal - tandem arrangement (optional)

Flushing fluid

To maintain their function, mechanical seals need a flushing fluid, which has the following tasks, including others:

- Dissipation of any leakage
- Protection against dry running

- Lubrication and cooling of the mechanical seals

A clean liquid, compatible with the pumped fluid, is used as the flushing medium.

Ensuring the flushing operation

1. Open the inlet of flushing fluid.
2. Vent the seal cartridge.
3. Ensure pressureless circulation.
   → Done.

For abrasive media, use lost flushing in which the flushing fluid is discharged directly.

Permissible supply pressures and temperatures

The supply of the mechanical seal with flushing fluid must be unpressurised. The maximum overpressure must not exceed 0.2 bar. When using a pass-through flushing, secure the flushing fluid connection with a pressure reducer or similar if necessary.

When using a closed flushing circuit with a supply reservoir, regularly monitor the fill level (visually or by means of level probes). Also, make sure that no pressure build-up can occur in the flushing circuit. Keep the reservoir open to the atmosphere. Change the flushing fluid regularly when using critical media.

The maximum temperature of the flushing fluid must be 20 K below the boiling temperature of the flushing fluid at the outlet. The temperature rise in the pump flushing chamber is normally less than 10 K (inlet/outlet). The maximum permissible operating temperatures of the flushing device must not be exceeded.

6.3.6.3 Defective shaft seal

Notice

Leakage of liquids.

► If a leak is detected, switch off the pump and replace the shaft seal immediately.

6.3.7 Electrical connection

6.3.7.1 Star connection

Star connection for high voltage.

Connect the pump according to the ordering information. The following figure shows the wiring diagram of the star connection.

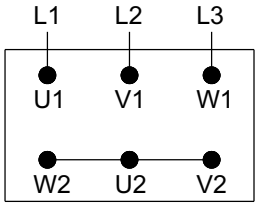

Fig.12: Star connection

6.3.7.2 Delta connection

Delta connection for low voltage.

Connect the pump according to the ordering information. The following figure shows the wiring diagram of the delta connection.

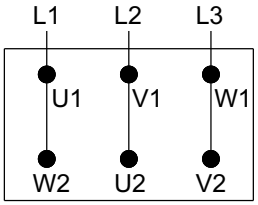

Fig.13: Delta connection

6.3.7.3 Frequency converter operation

All three-phase motors can be connected to a frequency converter. Frequency converter operation may subject the insulation of the motor to a higher load so that louder motor noise than in the normal case may occur due to eddy currents caused by voltage spikes.

Large motors driven by a frequency converter are loaded by bearing currents. For pump motors that are used with an external frequency converter, HILGE recommends the use of insulated motor bearings for sizes of 37 kW and above to avoid increased wear of the motor bearings by possible bearing currents.

Check the following operating conditions if the pump is operated using a frequency converter:

Operation with frequency converter	
Operating conditions	**Measures**
Noise-sensitive applications	Install a dU/dt filter between the motor and frequency converter (reduces voltage spikes and thus noise).
Particularly noise-sensitive applications	Install sinusoidal filter.
Cable length	Use a cable which satisfies the conditions prescribed by the manufacturer of the frequency converter.
Supply voltage up to 500 V	Check that the motor is suitable for frequency converter operation.
Supply voltage between 500 V and 690 V	Install a dU/dt filter between the motor and the frequency converter (reduces voltage peaks and thus noise), or check whether the motor has a reinforced insulation.
Supply voltage 690 V and above	Install a dU/dt filter between the motor and the frequency converter and check whether the motor has a reinforced insulation.

Notice

Incorrect operation of the frequency converter!

► Follow the manufacturer's instructions to install and operate a frequency converter.

6.3.7.4 Checking the direction of rotation after connecting

Perform the following steps:

1. Re-install all safety devices.
2. With double mechanical seal in back-to-back arrangement, connect the sealing fluid (see Section 6.3.6, Page 36).
3. Check that hydraulic connections are firmly secured.
4. Open stop valves.
5. With double mechanical seal in tandem arrangement, connect the flushing fluid (see Section 6.3.6, Page 36)
6. Fill the pump (system).
7. Note the direction-of-rotation arrow on the pump.
8. Switch on the motor briefly (1-2 seconds).
9. Compare the direction of rotation with the specified direction (arrow).
10. Correct the connection if necessary.

    → The direction of rotation has been checked, and corrected if necessary.

6.3.7.5 Earthing

⚠ Warning!

Electrical voltage by different potentials.

The occurrence of potential differences can cause damage to persons and property.

► Properly earth the pump and motor to achieve potential equalisation.

Earthing the motor

Equipotential bonding for the motor is performed via the protective conductor connection in the terminal box.

7 Commissioning

7.1 Special personnel qualification

The commissioning personnel must be suitably qualified for this work. See also Section 2.6, Page 15.

7.2 Safety instructions for commissioning

⚠ Caution!

Hazard due to overheating and pressure overload!

► Never pump for longer than 30 seconds against a closed shut-off device. Pumping against a closed shut-off device leads to rapid warming of the pumped fluid and pressure increase.

► Do not exceed the permissible operating temperatures.

7.3 Commissioning / initial startup

7.3.1 Checking conditions of use

Compare the information in the following documents with the intended conditions of use of the pump:

- Order documents (order confirmation)
- Nameplate
- Operating instructions
- Test bench acceptance
- Make sure that the pump is operated only under the specified conditions of use. These conditions apply to pressure, temperature, fluid, etc.

7.3.2 Commissioning of the pump

Perform the following steps:

1. Check that all connections are firmly secured.
2. Make sure that all safety devices are installed.
3. Make sure that the electrical connections are correct.
4. Ensure that the pipe system provided by the customer is cleaned.
5. For double mechanical seal in back-to-back arrangement, connect the sealing fluid. Start flushing to prevent dry running. For details, see Section 6.3.6, Page 36.
6. Open stop valves in the system.
7. Fill the pump along with the system.
8. Vent the pump along with the system.
9. For double mechanical seal in tandem arrangement, connect the flushing fluid. Start flushing to prevent dry running. For details, see Section 6.3.6, Page 36.

10. Fully open the suction-side stop valve.
11. Close the pressure side stop valve.
12. Switch on the pump.
13. Slowly open the pressure side stop valve.
    → This completes the commissioning.

If there is no increase of delivery head after commissioning:

1. Switch off the pump.
2. Again vent the pump (system).
3. Repeat steps 7 to 10, and follow Section 10.3, Page 53.

7.3.3 Functional testing of the mechanical seal

Perform the following steps:

1. Inspect the pump and check whether liquid exits at the mechanical seal.
   An intact mechanical seal operates virtually without any leakage.

If pumped fluid or flushing fluid exits:

1. Switch off the pump.
2. Replace the mechanical seal.
   Follow the installation instructions Section 10.2, Page 52.

8 Cleaning

To ensure the quality of sensitive fluids, pumps must be cleaned immediately after each use. Only in this way will adhesions and deposits be removed completely and contamination of the products be prevented. To achieve the best possible results, Hilge pumps are optimised with regard to gap and dead spaces, designed according to DIN EN 13951, and resistant to the cleaning agents referred to in the following chapter. Cleaning is carried out inside the system; no parts need to be removed or dismantled.

In general, a distinction is made between CIP and SIP. The procedures must comply with the state of the art and the EC directives. In any case, the operator must ensure that the target specifications are reached and applied as intended using the cleaning and sterilisation procedures, as well as the working temperatures and steps.

8.1 Special personnel qualification

The cleaning personnel must be suitably qualified for this work. See also Section 2.6, Page 15.

8.2 Safety instructions

⚠ Warning!

Damage caused by cleaning agents!

► Use only suitable cleaning agents.
► Observe the safety instructions in the product descriptions of the cleaning agents.
► Use always suitable personal protective equipment when handling cleaning agents.
► Be sure to avoid exceeding the permissible concentrations of cleaning agents.
► Reducing acids should not be used, because they cause pitting.

⚠ Warning!

Risk of burns!

► Do not touch the pump during cleaning. The surfaces may be very hot.

⚠ Warning!

Danger of scalding or burns.

► Do not touch the pump during steam sterilisation and the cooling phase. Surface temperatures may rise to over 100 °C.

⚠ Caution!

Dry running of the mechanical seal!

► Do not run the pump during steam sterilisation. Destruction of the mechanical seal!

⚠ Warning!

Pressure shock by evaporating liquid!

► Completely empty the system before steam sterilisation.

Notice

Disposal of cleaning agents

► Dispose of cleaning agents properly and in an environmentally friendly way.

8.3 CIP

CIP stands for Cleaning in Place, the pump is completely rinsed with cleaning agents. The cleaning agent used must be suitable for the respective cleaning task.

The following table lists approved cleaning and disinfecting agents and their permitted concentrations, using data from DIN11483 Part 1.

Cleaning and disinfecting agents						
Cleaner type	**Chemical name**	**Max. concentration**	**Max. temperature**	**Permissible pH**	**Max. permissible Cl content in the preparation water**	**Max. permissible contact time**
		[%]	[°C]		[mg/l]	[h]
Alkaline	NaOH	5%	140[1]	13-14	500	3
	NaOH and NaClO	5%	70	≥11	300	1
	NaClO or KClO	300 mg/l act. chlorine	20	>9	300	2
	NaClO or KClO	300 mg/l act. chlorine	60	>9	300	0.5
Acid	H_2SO_4	1.0 / 1.5%[2] 3.5%[3]	60		150[4] 250[5]	1
	H_3PO_4 or HNO_3	5%	90		200(2) 300(3)	1
	$C_2H_4O_3$	0.0075%	90		300	0.5
	$C_2H_4O_3$	0.15%	20		300	2
	Iodophore	50 mg/l act. Iodine	30	>3	300	3

1 Depends on the maximum permissible temperature of the pump
2 CrNi steels
3 CrNiMo steels
4 CrNi steels
5 CrNiMo steels

Cleaning agents that contain hydrochloric acid (HCl) or hydrofluoric acid (HF) must not be used. Consult the supplier for the use of special cleaning agents and procedures with respect to the materials. Thoroughly rinse the pump with water to remove any cleaning agents leaving no residues. For the maximum allowable temperatures, refer to Section 5.4, Page 23.

8.4 SIP

SIP stands for sterilisation in place, in which the pump is sterilised with superheated steam. In steam sterilisation or sanitisation, minimum temperatures of 121 °C must act on all wetted surfaces. For the maximum allowable temperatures, refer to Section 5.4, Page 23.

The pump must not be in operation during steam sterilisation. A cool-down period of at least one hour is required after the SIP process.

9 Maintenance / servicing

9.1 Safety instructions for maintenance and repair

⚠ Warning!

Improper execution of work!

► Maintenance and inspection should be carried out by authorised and qualified personnel.

⚠ Warning!

Danger from tilting / toppling over of the pump!

► Before carrying out maintenance and repair work, secure pump against tilting / toppling over.

⚠ Warning!

Hot system and pump parts.

► Always allow the pump to cool before maintenance.

⚠ Warning!

Missing protection and safety devices.

► After completion of work: Reinstall all protective and safety devices and put into operation.

9.2 Special personnel qualification

The maintenance personnel must be suitably qualified for this work. See also Section 2.6, Page 15.

9.3 Pump maintenance

9.3.1 Inspektionen

Die Pumpe ist weitgehend wartungsfrei.

Um eventuellen Störungen vorzubeugen, empfiehlt GEA, regelmäßig Sichtprüfungen (Inspektionen) durchzuführen. Dabei sollte besonderes Augenmerk auf die Dichtheit und die korrekte Funktion der Pumpe gelegt werden.

Um höchste Betriebssicherheit der Pumpe zu gewährleisten, sollten spätestens nach 2000 Betriebsstunden Verschleißteile, wie Gleitringdichtung und O-Ringe, überprüft und ggf. ausgewechselt werden.

In jedem Fall müssen bei der Demontage der Pumpe alle Dichtungen überprüft und, wenn nötig, ausgetauscht werden.

9.3.1.1 Replacement of O-rings

Notice

Hygiene risk, food safety

Worn out and not fully functional components may lead to the contamination of the pump.

► Pay close attention to the condition of the O-rings during regular inspections.

The O-rings must be replaced if any one of these characteristics are visible:

- The O-ring is deformed at one or more locations.
- The O-ring has cracks.
- The surface of the O-ring is porous and brittle.
- The O-ring has lost its elasticity.

9.3.2 Maintenance intervals

To ensure the highest operational reliability, all wearing parts should be replaced at longer intervals.

The actual maintenance intervals can only be determined by the user since they depend on the operating conditions, for instance:

- daily period of use,
- switching frequency,
- type and temperature of the product,
- type and temperature of the cleaning solution,
- ambient conditions.

Maintenance Intervals	
Applications	**Maintenance intervals (guideline values)**
Media at temperatures of 60 °C to 130 °C (140 °F to 266 °F)	approx. every 3 months
Media at temperatures of < 60 °C (< 140 °F)	approx. every 12 months

9.4 Maintenance of the CN bearing

9.4.1 Structure of the CN bearing support

The bearing consists of two angular contact ball bearings 0326.00 and one cylindrical roller bearing 0327.00. The two single row angular contact ball bearings make up the bearing structure on the motor-side. They are paired and

are installed as fixed bearings in an X-arrangement to accommodate axial and radial forces from all directions.

On the pump-side there is only a single-row cylindrical roller bearing that absorbs only radial bearing forces. It allows for axial displacements in both directions.

9.4.2 Bearing replacement

Replace the bearings after approx. 15,000 to 20,000 hours of operation to ensure trouble-free pump operation.

9.4.3 Premature bearing replacement

In case of continuous wear-promoting external influences such as

- dust
- splash water
- aggressive ambient air
- bearing temperature above 70 °C with standard grease (UNIREX N3)
- bearing temperature above 100 °C up to 120 °C with hot bearing grease (OKS 4200)

we recommend replacing the bearings after approximately 5,000 operating hours.

9.4.4 Lubricating the bearings

For the lubrication of roller bearings, use the listed roller bearing greases or established equivalents

Grease quantities (in the case of complete filling of the bearing)				
Size	**BG1**	**BG1**	**BG2**	**BG2**
	HYGIA I	**HYGIA I**	**HYGIA II**	**HYGIA II**
Part no.	0326.00	0327.00	0326.00	0327.00
Volume [cm^3]	7	4.5	15	9
Quantity [g]	6.75	4.25	14.25	8.5

9.4.4.1 Relubrication

Lubricate the roller bearings according to the following table. The listed values refer to normal operating conditions

Hint!

Incorrect lubrication of the bearings (too much or too little grease) can cause damage to bearings, pump or motor. It is essential to avoid applying too much grease to the bearings!

Grease quantity for relubrication		
Bearing point	**Lubricating interval Operating hours**	**Quantity [g]**
0326.00 (0326.01)	approx. 3,000	9
0327.00 (0327.01)	approx. 1,500	7

9.5 Roller bearing greases

For the lubrication of roller bearings, use the listed roller bearing greases or established equivalents.

Roller bearing greases		
	Storage temperature <70 °C **Delivery fluid -10…95 °C**	**Storage temperature > 70 °C / < 100 °C** **Delivery fluid 96 °C...190 °C**
Factory-filled grease	UNIREX N3	OKS 4200
Basic oil type	Mineral oil	Polyalfaolefin
Thickener	Lithium complex soap	Bentonite
Continuous limit temperature	approx. 70 °C	approx. 115 °C
Identification acc. to DIN 51502	K3N-20	KHCF2R-10
	Key to symbols	**Key to symbols**
Grease type for roller bearings according to DIN52825	K also permitted: KP= K with EP/AW (additives) KF= K with solid lubricants, e.g. MoS2 (additives)	KHCF HC = Synt. hydrocarbons (base oil type) F= solid lubricants, e.g. MoS2 (additives)
NLGI class	3	2
Upper usage temperature	N= 140 °C also permitted: P = 160 °C R = 180 °C	R = 180 °C also permitted: P = 160 °C S = 200 °C
Lower usage temperature	20 = -20 °C also permitted: 30 = -30 °C	10 = -10 °C also permitted: 20 = -20 °C 30 = -30 °C

9.6 Maintenance of the motor

Motors without grease nipple

Motors without grease nipple are equipped with lifetime lubrication. The grease life then depends on the bearing life. Prerequisite is that the motor must be used according to the specifications in the catalogue.

Motors with grease nipple

On motors with grease nipple, the specifications for relubrication, type of grease, grease quantity, and other information as applicable are given on the lubrication or nameplate.

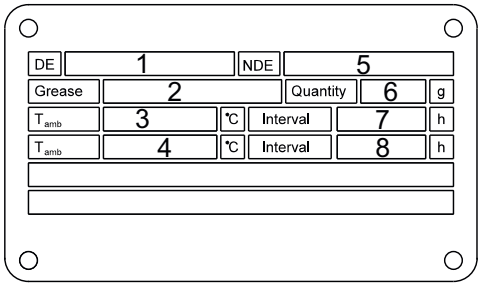

Fig.14: Lubrication information plate of MGE motor (example)

1	Bearing on drive side
2	Type of grease
3	Ambient temperature
4	Ambient temperature
5	Bearing, not drive side
6	Grease grade
7	Lubricating interval
8	Lubricating interval

Note: The nameplate may differ from the presented layout.

10 Malfunctions / repairs

10.1 Special personnel qualification

The troubleshooting / repair personnel must be suitably qualified for this work.
See also Section 2.6, Page 15.

10.2 Safety instructions

⚠ Warning!

Improper execution of work!

► Repair work should be carried out by authorised and qualified personnel.

⚠ Danger

Electric shock by touching live parts!

► Always disconnect the pump from power before troubleshooting.

⚠ Danger

For motors with frequency converter (tronic): Electric shock by touching live parts!

► Even if the power supply is switched off, touching electrical parts may cause an electric shock.
► Disconnect the power supply and wait at least four minutes before touching electrical components.

⚠ Danger

Liquids squirting out under high pressure!

► Always depressurise the pump before troubleshooting.

⚠ Warning!

Hot system and pump parts!

► Always allow the pump to cool before troubleshooting.

⚠ Warning!

Inadvertent switch-on of the pump!

► Be sure to secure the pump against accidental switch-on.

⚠ Warning!

Contact with dangerous substances (e.g. by inhalation).

► Decontaminate a pump that delivers harmful media.

⚠ Warning!

Missing protection and safety devices!

► After completion of work: Reinstall all protective and safety devices and put into operation.

⚠ Caution!

Unsuitable tools!

► Make sure that all the parts can be mounted without damage.
► Use GEA Hilge assembly tools.

10.3 Malfunctions and remedies

Actions for troubleshooting		
Malfunction	**Cause**	**Remedy**
Pump does not deliver or pump delivers with inadequate power.	1. Incorrect electrical connection (2 phases). 2. Incorrect direction of rotation. 3. Air in suction line or pump. 4. Back pressure too high. 5. Suction head too high, NPSH system (supply) too low. 6. Lines clogged or foreign bodies in the impeller. 7. Air inclusion due to defective seal.	1. Check electrical connection, and correct if necessary. 2. Change phases of power supply (swap motor poles). 3. Vent and prime suction pipe or pump. 4. Reset operating point according to the data sheet. Check system for contamination. 5. Raise suction side liquid level, fully open the stop valve in the suction line. 6. Open pump and eliminate malfunctions. 7. Check and, if necessary, replace pipe seals, pump housing seals and shaft seals.
Motor protection switch turns off, motor is overloaded.	1. Pump is blocked due to clogging. 2. Pump is blocked by contacting due to strain on the pump body via the piping. (Check for damage.) 3. Pump runs beyond its rated operating point. 4. The fluid density or viscosity of the liquid is higher than stated in the order. 5. Motor protection switch is not set properly 6. Motor runs on 2 phases.	1. Open pump and eliminate malfunctions. 2. Install pump without strain, support piping by fixed points. 3. Adjust operating point according to data sheet. 4. If a lower power than specified is sufficient, reduce the flow rate on the pressure side: otherwise use a more powerful motor. 5. Check the setting, replace the motor protection switch if necessary. 6. Check electrical connection, replace defective fuse.
Pump causes too much noise. Pump runs unevenly and vibrates.	1. Suction head too high, NPSH system (supply) too low. 2. Air in suction line or pump.[1] 3. Back pressure is less than indicated. 4. Impeller is unbalanced. 5. Worn internal parts. 6. Pump is strained (start-up noise - check for damage.) 7. Bearings are damaged. 8. Bearings have too little, too much or inappropriate lubricant. 9. Motor fan defective. 10. Foreign material in the pump.	1. Raise suction side liquid level, fully open the stop valve in the suction line. 2. Vent and prime suction pipe or pump. 3. Adjust operating point according to data sheet. 4. Clean, check and balance the impeller. 5. Replace parts. 6. Install pump without strain, support piping by fixed points. 7. Replace bearings. 8. Add, reduce or replace lubricants. 9. Replace the fan motor. 10. Open and clean the pump (for self-priming pumps, install a screen if necessary).

Actions for troubleshooting		
Malfunction	**Cause**	**Remedy**
Leakage at the pump body, connections, mechanical seal, gland or socket seal.	1. Pump is strained (causing leaks at the pump body or at the connections). 2. Housing seals and connection seals defective. 3. Mechanical seal soiled or sticky. 4. Mechanical seal worn. 5. Surface of shaft or shaft sleeve shrunk. 6. Elastomer unsuitable for the pumped fluid.	1. Install pump without strain, support piping by fixed points. 2. Replace housing seals and/or connection seals. 3. Check and clean mechanical seal. 4. Replace the mechanical seal. 5. Replace shaft or shaft sleeve, repack gland seal. 6. Use suitable elastomer for pumped fluid and temperatures.
Impermissible temperature increases to pump, bearing support or motor	1. Air in suction line or pump. Suction head too high, NPSH system (supply) too low. 2. Bearings have too little, too much or inappropriate lubricant. 3. Pump with bearing support is strained. 4. Axial thrust is too high. 5. Motor protection switch is defective or not set properly. 6. Pressure valve closed.	1. Vent and prime suction pipe or pump. Raise suction side liquid level, fully open the stop valve in the suction line. 2. Add, reduce or replace lubricants. 3. Install pump without strain, support piping by fixed points. Check coupling alignment. 4. Check the relief holes in the impeller and the split rings at the inlet. 5. Check the setting, replace the motor protection switch if necessary. 6. Open pressure valve.

10.4 Repair

10.4.1 Repair order

Compliance with legal regulations on occupational safety requires all commercial companies to protect their workers and the people and the environment from harmful impacts when dealing with hazardous substances.

Examples of such regulations:

- Workplace ordinance (ArbStättV)
- Hazardous substances ordinance (GefStoffV)
- Accident prevention regulations (BGV A1)
- Regulations to protect the environment, such as the recycling and waste management act (KrW/AbfG), water resources act (WHG).

Certificate of non-objection

The certificate of non-objection (Section 12.1, Page 87) attached to this document is part of the inspection/repair order. Nevertheless we reserve the right to reject the acceptance of this order for other reasons.

HILGE products and their parts are therefore inspected/repaired only if the certificate of non-objection completed properly and completely by authorised and qualified personnel is submitted.

Pumps that have been operated with radioactive substances are not accepted at all.

If, despite careful emptying and cleaning of the pump, safety precautions are required, the necessary information must be given.

10.4.2 GEA Hilge assembly tool kit

Tools from the GEA Hilge assembly tool kit prevent damage to the mechanical seal during assembly.

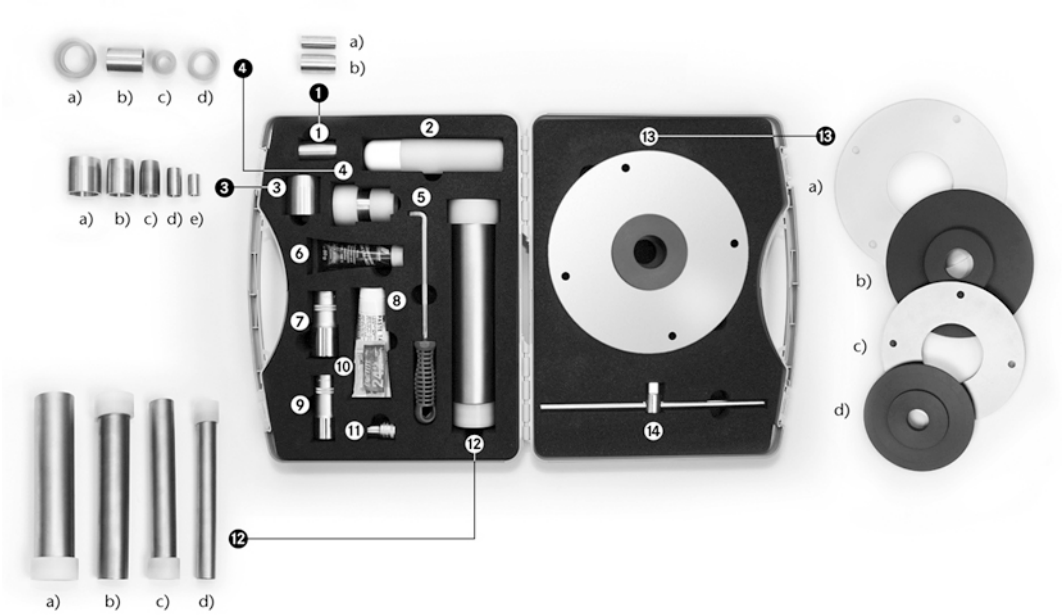

Fig.15: GEA Hilge assembly tool kit

10.4.2.1 Contents and use

Tools in the GEA Hilge assembly tool kit			
Image position	Designation	GEA Hilge HYGIA I	GEA Hilge HYGIA II
1a	Mounting sleeve Ø 19	●	
1b	Mounting sleeve Ø 28		●
2	Spray bottle	●	●
5	Extractor for mechanical seal counter ring	●	●
6	Klüber paste UH1 96-402	●	●
7	Socket wrench a/f 32		●
7	Socket wrench bit a/f 27		●
8	Optimol paste TA	●	●
9	Socket wrench a/f 24	●	
9	Socket wrench bit a/f 17	●	
10	Screw locking compound Loctite Type 243	●	●
12c	Mechanical seal mounting sleeve Ø 28 and Ø 30		●
12c	Plastic adapter Ø 28		●
12d	Mechanical seal mounting sleeve Ø 19 and Ø 22	●	
12d	Plastic adapter Ø 19	●	
14	T-handle with 1/2” square	●	●
	Complete assembly tool kit	●	●

10.4.3 Parts overview

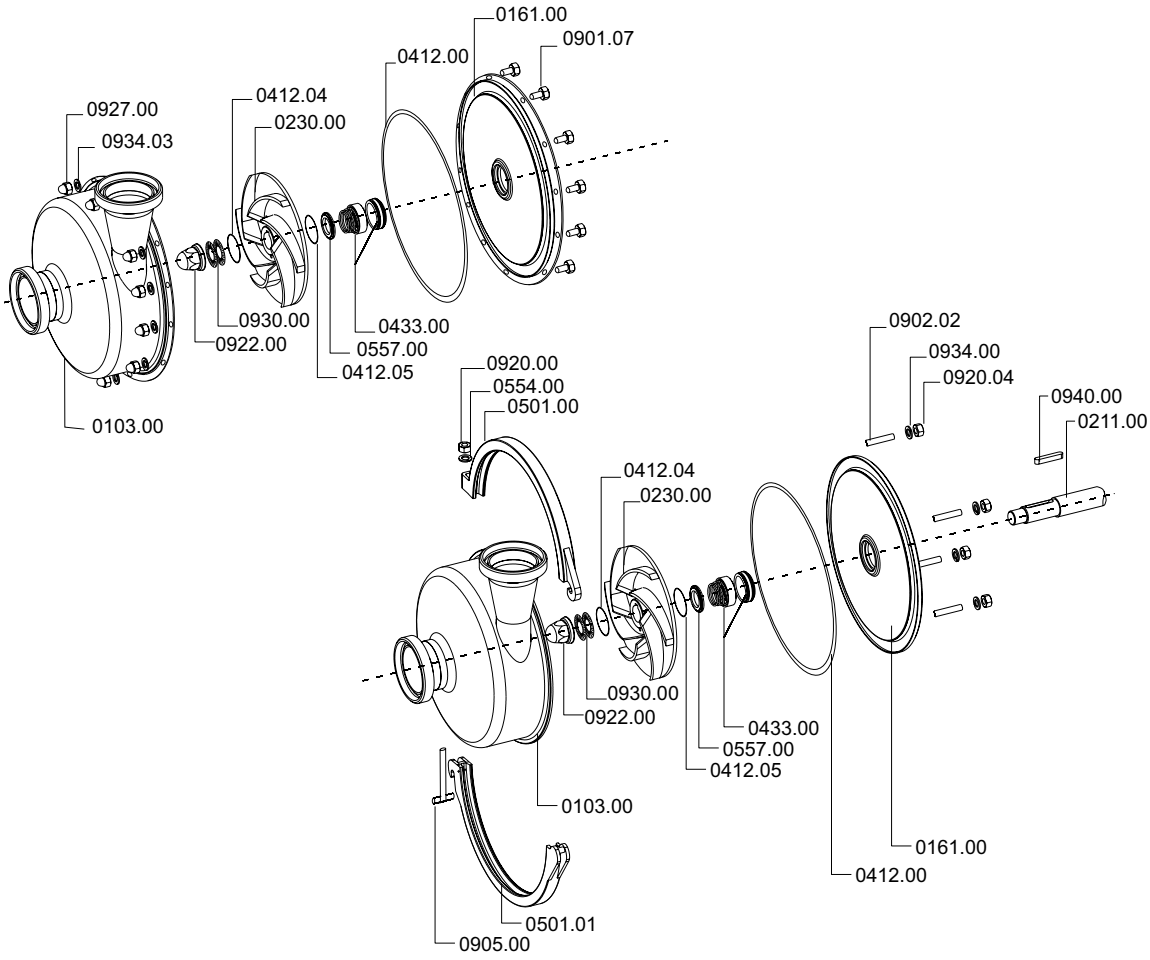

Fig.16: Parts overview – pumps with single mechanical seal
Top: HPM housing | Bottom: KLM housing

Parts list HYGIA I/II					
Pcs.	**Part no.**	**Designation**	**Pcs.**	**Part no.**	**Designation**
1	0103.00	Annular casing	12	0901.07	Hex screw
1	0161.00	Back plate	4	0902.02	Stud bolts
1	0211.00	Shaft	1	0905.00	Connecting screw
1	0230.00	Impeller	1	0920.00	Hexagon nut
1	0412.00	O-ring seal	4	0920.04	Hexagon nut
1	0412.04	O-ring seal	1	0922.00	Impeller nut
1	0412.05	O-ring seal	12	0927.00	Cap nut
1	0433.00	Mechanical seal	1	0930.00	Toothed lock washer
1	0501.00	Clamp ring	4	0934.00	Spring washer
1	0501.01	Clamp ring	12	0934.03	Spring washer
1	0554.00	Washer	1	0940.00	Key
1	0557.00	Seal spacer			

10.4.4 Parts overview CN bearing support

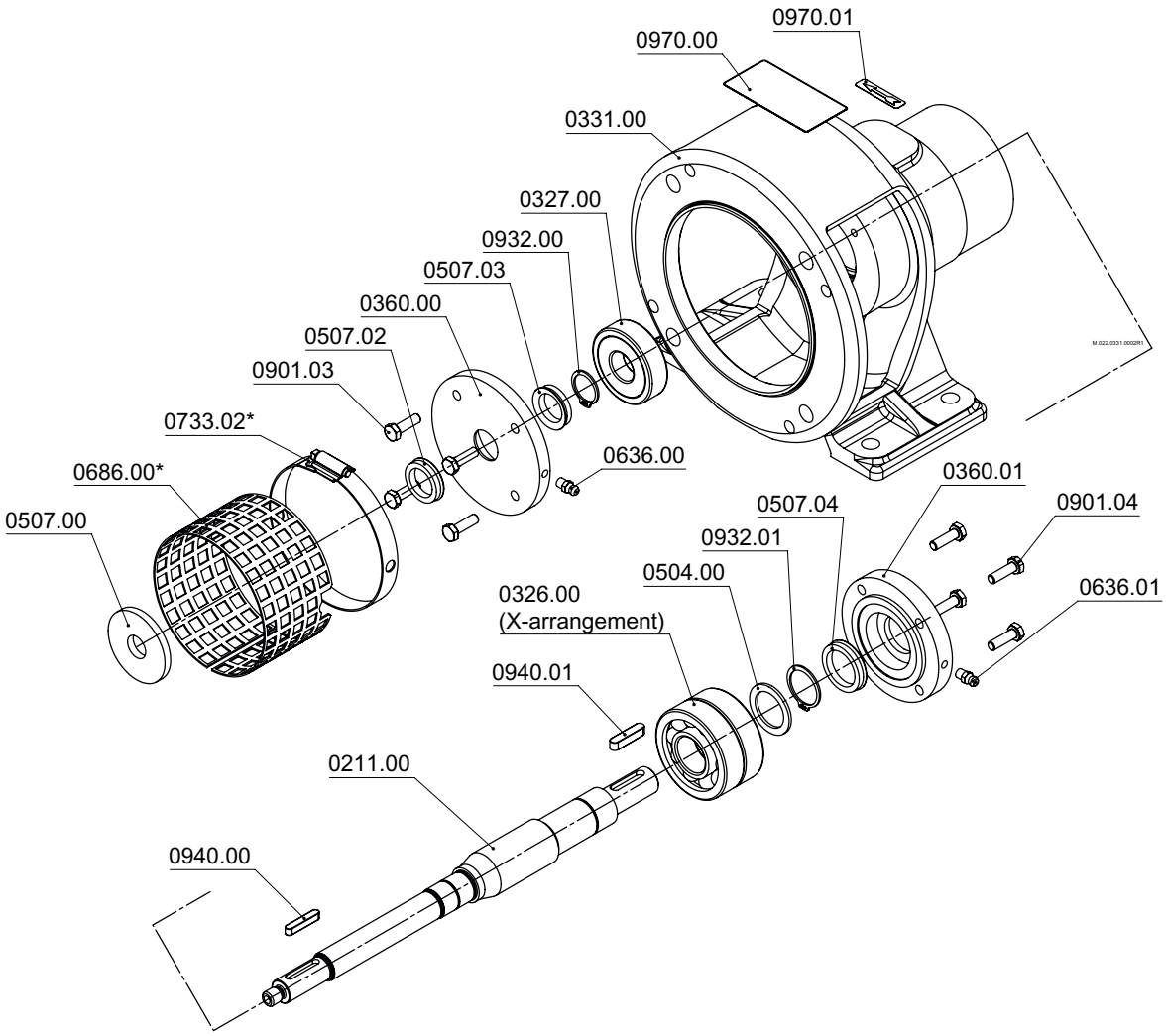

Fig.17: Parts overview

* Safety guard required only for single mechanical seal.

Parts list CN bearing support					
Pcs.	**Item no.**	**Designation**	**Pcs.**	**Item no.**	**Designation**
1	0211.00	Shaft	1	0636.01	Grease nipple
2	0326.00	Angular contact ball bearing	1	0686.00	Safety guard
1	0327.00	Cylindrical roller bearing	1	0733.02	Pipe clip
1	0331.00	Bearing housing	4	0901.03	Hex screw
1	0360.00	Bearing cover	4	0901.04	Hex screw
1	0360.01	Bearing cover	1	0932.00	Retaining ring
1	0504.00	Spacer ring	1	0932.01	Retaining ring
1	0507.00	Deflector	1	0940.01	Key
1	0507.02	Deflector	1	0940.00	Key
1	0507.03	Deflector	1	0970.00	Nameplate

Parts list CN bearing support					
1	0507.04	Deflector	1	0970.01	Rotation arrow
1	0636.00	Grease nipple			

10.4.5 Parts overview of coupling and motor

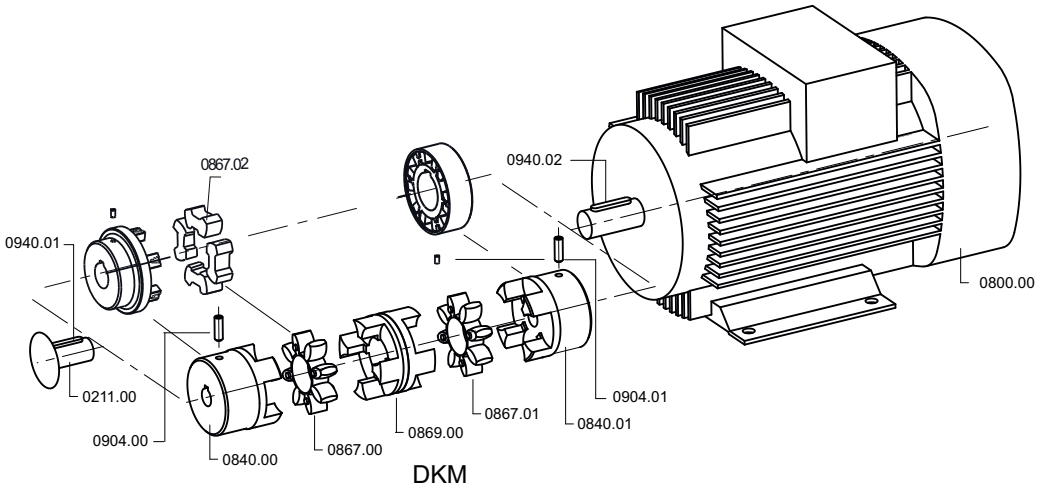

Fig.18: Parts overview

Parts list for the coupling and motor					
Pcs.	**Part no.**	**Designation**	**Pcs.**	**Part no.**	**Designation**
1	0211.00	Pump shaft	1	0869.00	Spacer
1	0800.00	Motor	1	0867.02	Coupling insert
1	0840.00	Coupling	1	0904.00	Set screw
1	0840.01	Coupling	1	0904.01	Set screw
1	0867.00	Coupling insert	1	0940.01	Key
1	0867.01	Coupling insert	1	0940.02	Key

10.4.6 Installation instructions

Notice

These instructions facilitate the installation and prevent damage to the pump.

► Use tools from the HILGE assembly tool kit for installation.
► Always use round seals in original dimensions.
► Use no mineral oil greases for the wet section assembly.
► Always replace mechanical seals completely.
► Use a screwdriver or an impeller nut mounting device to tighten the impeller nut (0922.00).
► Check removed parts for damage and wear, and replace if necessary.
Use only proper, clean parts for installation. Clean installation space and contact surfaces before installation.

10.4.7 Installing CN bearing support size 1 and 2

Install the CN bearing support as follows:

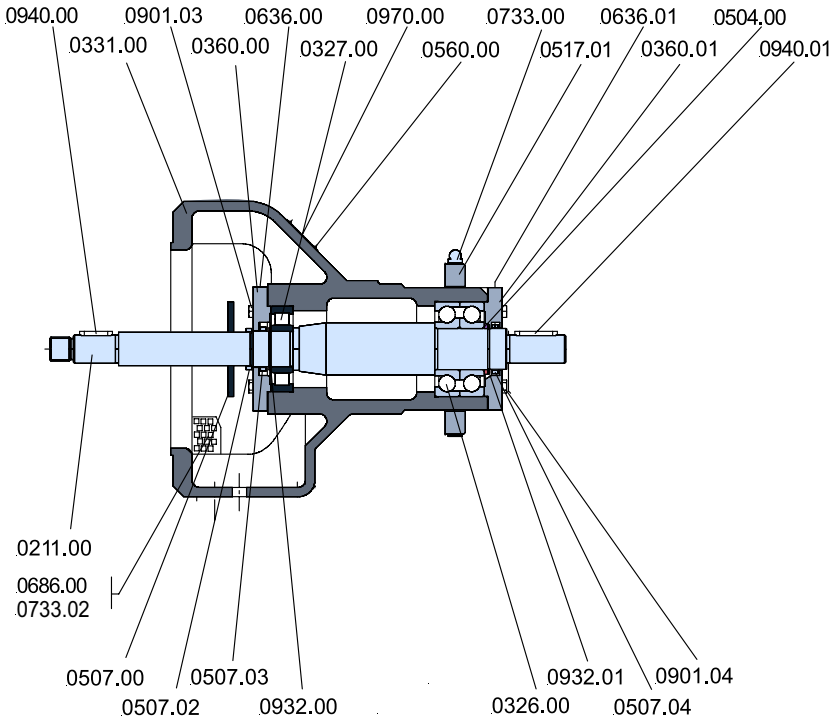

Fig.19: CN bearing support

1. Push the angular contact ball bearing (0326.00) onto the shaft (0211.00).
2. Push the supporting disk (0504.00) onto the shaft (0211.00) until it lightly touches the angular contact ball bearing (0326.00).
3. Push the retaining ring (0932.01) onto the shaft (0211.00).
4. Push the cylindrical roller bearing (0327.00) onto the shaft (0211.00)
5. Push the retaining ring (0932.00) onto the shaft (0211.00).
6. Push the outer ring of the cylindrical roller bearing (0327.00) onto the bearing block (0331.00).
7. Push the deflector (0507.03) onto the shaft (0211.00).
8. Mount the bearing cover (0360.00) using the hex head screws (0901.03).
   Torque: M6 - 8 Nm, M8 - 17 Nm.
9. Carefully push the shaft (0211.00) into the bearing block (0331.00).
10. Push the splash ring (0507.04) onto the shaft (0211.00).
11. Mount the bearing cover (0360.01) using the hex head screws (0901.04).
    Torque: M6 - 8 Nm, M8 - 17 Nm.
12. Push the deflector (0507.02) onto the shaft (0211.00).
13. Push the deflector (0507.00) onto the shaft (0211.00).
14. Insert the key (0940.01) into the shaft (0211.00).

15. Optional: Push the cover hood (0517.01) onto the bearing block (0331.00).

10.4.8 Install coupling

Install coupling

Push the coupling half (0840.00) onto the shaft (0211.00).
Insert the threaded pin (0904.00) one to two rotations into the clutch half (0840.00).

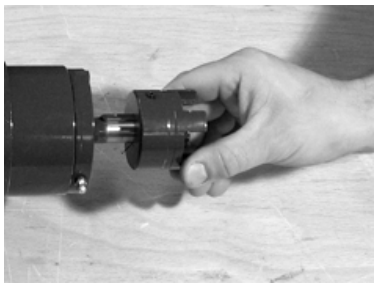

Fig.20: Clutch half, pump shaft

Push the clutch half (0840.01) onto the motor shaft.
Insert the threaded pin (0904.00) one to two rotations into the clutch half (0840.01).

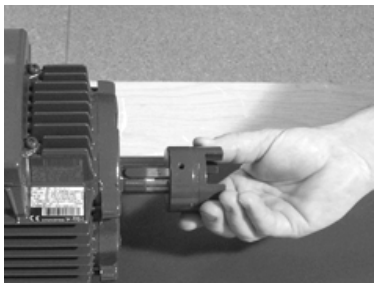

Fig.21: Clutch half, motor shaft

Insert the coupling inserts (0867.00) and (0867.01) into the coupling (0840.00).

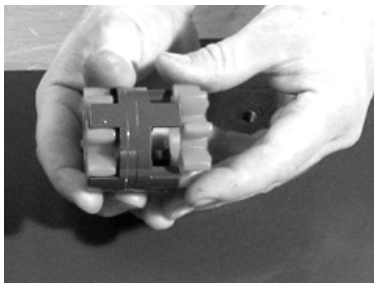

Fig.22: Coupling spiders

Join the clutch halves and fix the bearing support (0330.00) with the washers (0554.02) and the hex head screws (0901.02) on the base plate (0890.00).
Tighten the fastening screws only by hand as long as the coupling has not been aligned yet.

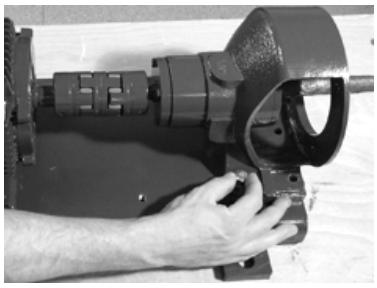

Fig.23: Bearing housing

Install coupling

Align the coupling with a straightedge.
Observe the permissible displacement values in chapter *Align the coupling*.

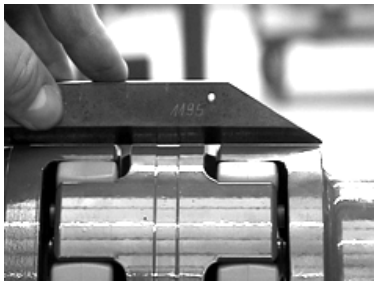

Fig.24: Coupling, straightedge

Tighten the screws for motor (0800.00), coupling (0840.00/01) and bearing support (0330.00).
Check again the correct alignment of the coupling and correct if if necessary.

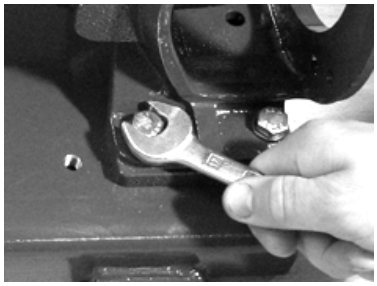

Fig.25: Fastening screws

Secure the safety guard (0681.00) with the trim ring (0517.01) and the pipe clips (0733.00/ 01).

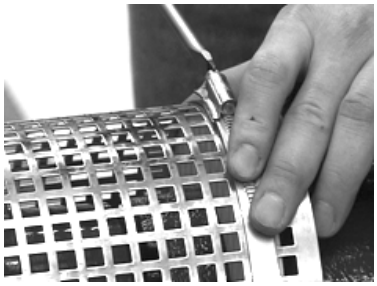

Fig.26: Safety guard

10.4.9 Installing single mechanical seal

Equipment and tools from the GEA Hilge assembly tool kit

- Loctite Type 243
- Klüber paste UH1 96-402

Connecting the back plate with the bearing housing

Wet the threads of the stud bolts (0902.00) with Loctite Type 243 and screw them by hand (!) into the back plate (0161.00).

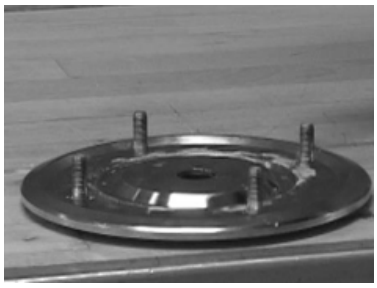

Fig.27: Back plate with stud bolts

Grease the seat of the component that borders on the back plate (0161.00) with Klüber paste UH1 96-402.

Fig.28: Contact surface of back plate / structural part

Connect the back plate (0161.00) to the structural part,
using the stud bolts (0902.02), the spring washers (0934.00), and the hex head screws (0920.04).
torque: M10 - 35 Nm

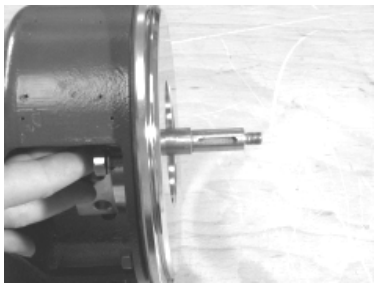

Fig.29: Back plate on the structural part

→ The back plate is connected with the bearing housing.

10.4.10 Determining gap size on HYGIA

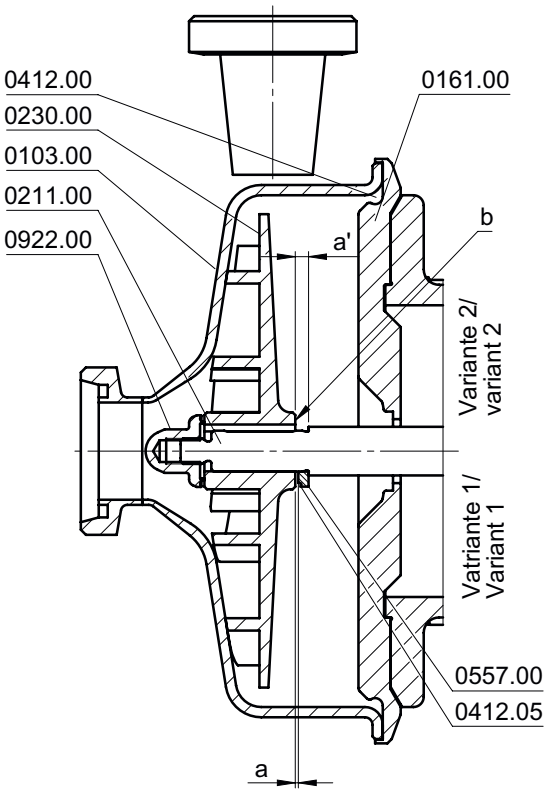

Fig.30: Gap size on HYGIA

General

The gap size needs to be determined only if modifying/replacing the impeller or the ring housing. The gap between the impeller and the annular casing contributes crucially to complying with the intended use. In the case of pumps with a free-flow impeller, it is not necessary to determine the gap size. Such pumps have a larger gap by design, which does not have to be adjusted exactly.

Two versions are described below.

Version 1 – Conical spring mechanical seal with seal spacer

Version 2 – Encapsulated (sterile) mechanical seal

Preparation

1. Remove the feather key (0940.00) from the shaft (0211.00).
2. Remove the mechanical seal (0433.00) and the O-rings (0412.00) and (0412.05).

   → Done.

Determining the air gap (a or a')

Version 1 – Conical spring mechanical seal with seal spacer

1. Push the seal spacer (0557.00) onto the shaft (0211.00) as far as it will go.
2. Push the impeller (0230.00) onto the shaft (0211.00), making sure it does not contact the seal spacer (0557.00). It should be flush with the shaft thread at the front.

3. Carefully place the annular casing (0103.00) against the back plate (0161.00). Thus, the impeller (0230.00) is pushed by the annular casing (0103.00) into the zero gap position. The air gap then forms behind the impeller.
4. Remove annular casing (0103.00) so that the impeller (0230.00) does not move, retaining its position.
5. Screw the impeller nut (0922.00) onto the shaft so that it just touches the impeller without moving it.
6. Determine gap a between the seal spacer (0557.00) and the impeller (0230.00) using a feeler gauge.

   → The gap size has been determined. Permissible clearance: 0.7 mm – 1 mm.

The seal spacers 0557.00 are available in various thicknesses (0.25 mm increments). If the permissible gap size cannot be achieved with the seal spacer used, it must be replaced with another one.

Version 2 – Encapsulated (sterile) mechanical seal

1. Push the impeller (0230.00) onto the shaft (0211.00), making sure it does not contact the shaft shoulder. It should be flush with the shaft thread at the front.
2. Carefully place the annular casing (0103.00) against the back plate (0161.00). Thus, the impeller (0230.00) is pushed by the annular casing (0103.00) into the zero gap position. The air gap then forms behind the impeller.
3. Remove annular casing (0103.00) so that the impeller (0230.00) does not move, retaining its position.
4. Screw the impeller nut (0922.00) onto the shaft so that it just touches the impeller without moving it.
5. Determine gap a’ between the shaft shoulder and the impeller (0230.00) using a feeler gauge or the like.

   → The gap size has been determined. Permissible clearance: 4.7 mm - 5.5 mm.

The actual gap size is obtained by subtracting the 4 mm spacer integrated in the encapsulated mechanical seal. If the measured distance a’ is less than 4.7 mm, the impeller hub rear (b) must be turned off by this difference.

10.4.11 Installing single conical spring mechanical seal

Equipment and tools from the GEA Hilge assembly tool kit

- Spray bottle
- Plastic mounting sleeve
- Mounting sleeve

Installing single conical spring mechanical seal

Wet the fixed ring (counter ring) of the mechanical seal (0433.00) and the shaft (0211.00) with clean water.

Fig.31: Fixed ring of the mechanical seal

Push the counter ring of the mechanical seal (0433.00) into the seat of the back plate (0161.00).

Fig.32: Set ring

Push the mounting sleeve onto the shaft shoulder. Moisten the mounting sleeve with clean water. HILGE assembly tools prevent damage to the mechanical seal during further assembly.

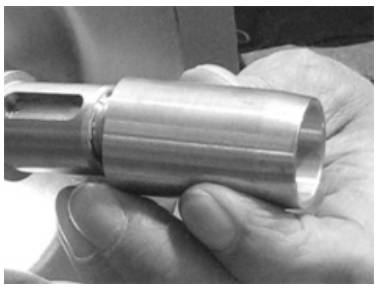

Fig.33: Mounting sleeve

Installing single conical spring mechanical seal

Push the rotating unit of the mechanical seal (0433.00) in the assembled state onto the shaft (0211.00) as far as it will go.

Fig.34: Mechanical seal

Push the seal spacer (0557.00) onto the shaft.

Fig.35: Seal spacer

→ The single conical spring mechanical seal has been installed.

Hint!

For further installation, read Section 10.4.16, Page 79.

10.4.12 Installing the single mechanical seal - spring encapsulated (hygiene)

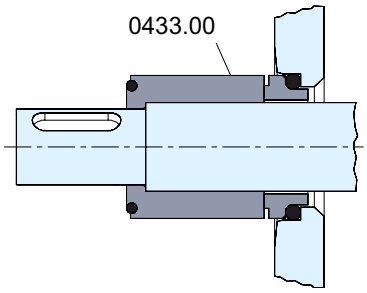

Fig.36: Single hygienic mechanical seal
0433.00 mechanical seal

Features

- Encapsulated spring
- Sealing towards the impeller
- Easy to clean
- For adhesive media
- Optimal arrangement in the pump chamber

Equipment and tools from the GEA Hilge assembly tool kit:

- Spray bottle
- Plastic mounting sleeve

Prior to installation

1. Check the shaft and counter ring holder for impurities and damage (sharp edges). If necessary, clean or replace parts.

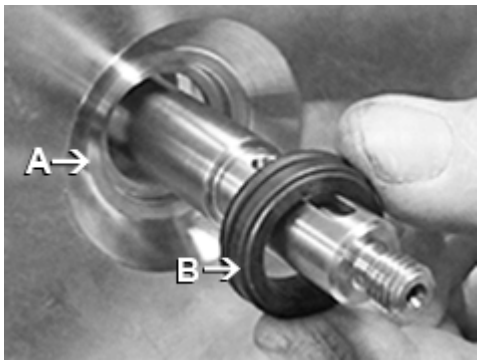

Fig.37: Shaft and counter ring holder
A - Counter ring holder | B - Fixed ring of the mechanical seal (counter ring)

Notice

Hygiene risk, food safety

Danger due to contamination

► Carefully inspect the seat of the mechanical seal.
► Pay attention to groove and pin for mechanical seal with anti-twist protection.

2. Check all O-rings of the mechanical seal for correct seating, and adjust if necessary.
3. Moisten all sliding O-rings with water.

   → Done.

Assembly

1. Slide the fixed ring (counter ring) of the mechanical seal (0433.00) along with the O-ring over the shaft into the seat.

   On a version with anti-twist protection, the slot and pin positions must match.
2. Push the rotating part of the mechanical seal (0433.00) in the assembled state onto the shaft as far as it will go using a slight rotating motion.

   → The mechanical seal has been installed.

Hint!

For further installation, read Section 10.4.16, Page 79.

10.4.13 Installing double mechanical seal

Hint!

This section applies to the installation of the double mechanical seal in back-to-back and tandem arrangements

Equipment and tools from the GEA Hilge assembly tool kit

- Spray bottle
- Plastic mounting sleeve
- Mounting sleeve
- Loctite Type 243
- Klüber paste UH1 96-402
- Extractor
- Socket wrench with plastic insert

Arrangements for double mechanical seals

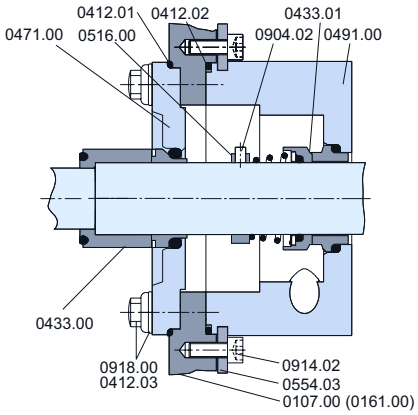

Fig.38: Double tandem mechanical seal with encapsulated spring (HYGIA I)

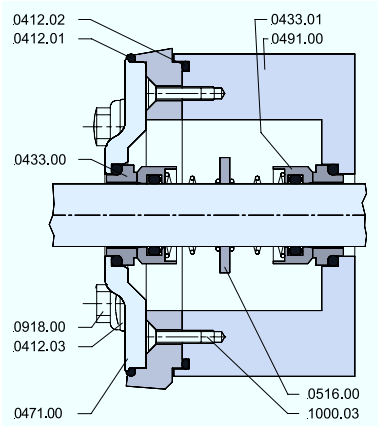

Fig.39: Double back-to-back mechanical seal (HYGIA I)

Installing double mechanical seal

Wet the threads of the stud bolts (0902.00) with Loctite Type 243 and screw them by hand (!) into the back plate (0161.00).

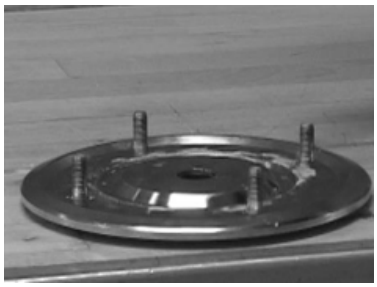

Fig.40: Back plate with stud bolts

Insert the O-ring (0412.02) into the seal cartridge (0491.00).

Fig.41: Seal cartridge with O-ring

Press the seal cartridge (0491.00) into the seat of back plate (0161.00).

Fig.42: Back plate with seal cartridge

Connect the seal cartridge (0491.00) with the back plate (0161.00)
GEA Hilge HYGIA I: Fastening from the front with Phillips screws (1000.03) Torque: M4: 1.5 - 2 Nm
GEA Hilge HYGIA II: Fastening from the rear with hex socket screws (0914.02), washer (0554.03).
torque: M6: 8 Nm

Fig.43: Back plate

Installing double mechanical seal

Connecting the seal cartridge GEA Hilge HYGIA I / II

The seal cartridge is required for the double mechanical seal. Its mounting is very similar for the GEA Hilge HYGIA I and GEA Hilge HYGIA II.

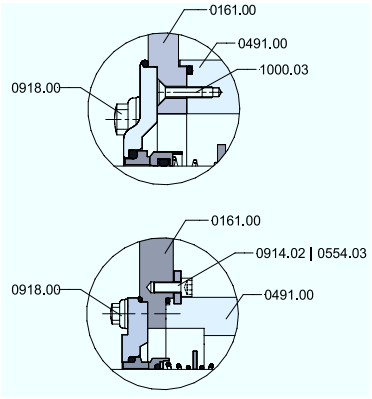

Fig.44: Connection of seal cartridge
top: GEA Hilge HYGIA I | bottom: GEA Hilge HYGIA II

Grease the seat of the component that borders on the back plate (0161.00) with Klüber paste UH1 96-402.

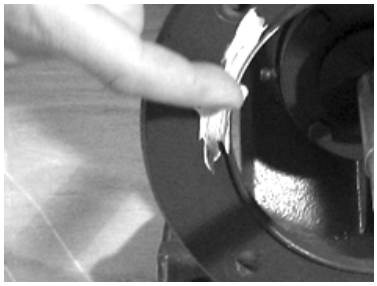

Fig.45: Contact surface of back plate / structural part

Connect the back plate (0161.00) to the structural part,
using the stud bolts (0902.02), the spring washers (0934.00), and the hex head screws (0920.04).
torque: M10 - 35 Nm

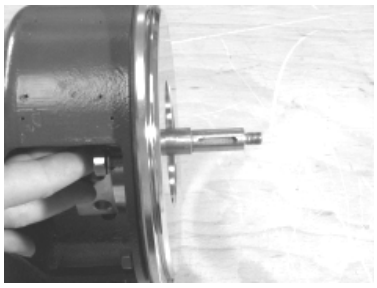

Fig.46: Back plate on the structural part

Installing double mechanical seal

Wet the fixed ring (stationary ring) of the mechanical seal (0433.01) and the shaft (0211.00) with clean water.

Fig.47: Stationary ring of the mechanical seal

Push the fixed ring (stationary ring) of the mechanical seal (0433.01) with the mounting sleeve into the seat of the seal cartridge (0491.00).

Fig.48: Set ring

Wet the mounting sleeve with clean water and push it onto the shaft shoulder.

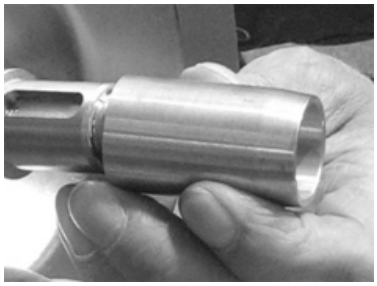

Fig.49: Mounting sleeve

Installing double mechanical seal

Push the rotating unit (rotary ring) of the mechanical seal (0433.01) into the shaft (0211.00) as far as it will go in the assembled state with the mounting sleeve.

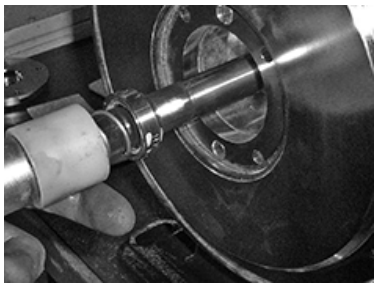

Fig.50: Rotary ring of the mechanical seal

Remove the mounting sleeve.

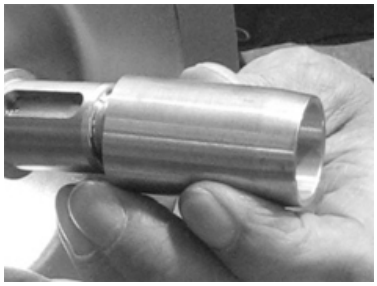

Fig.51: Mounting sleeve

→ The mechanical seal on the atmosphere side has been installed.

Hint!

Further installation steps

- Installing the mechanical seal in tandem arrangement: continue with Section 10.4.14, Page 75
- Installing the mechanical seal in back-to-back arrangement: continue with Section 10.4.15, Page 77.

10.4.14 Installing tandem double mechanical seal

Equipment and tools from the GEA Hilge assembly tool kit

- Spray bottle
- Plastic mounting sleeve
- Mounting sleeve
- Loctite Type 243
- Klüber paste UH1 96-402
- Extractor
- Socket wrench with plastic insert

Installing tandem double mechanical seal

Screw set screws (0904.02) one or two turns into the adjusting ring (0516.00) and wet with Loctite 243.

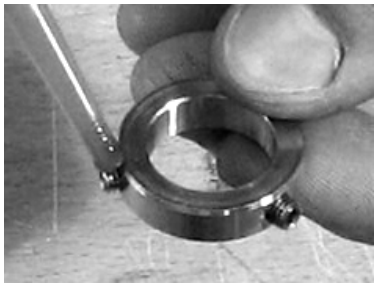

Fig.52: Adjusting ring

Push the adjusting ring (0516.00) to the correct position on the shaft, using a suitable measuring tool.
Lock the adjusting ring (0516.00) with the set screws (0904.02).

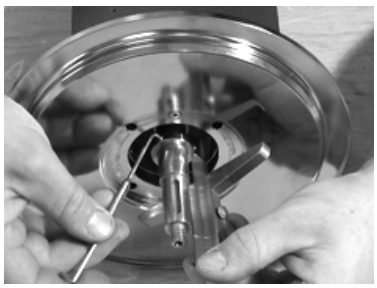

Fig.53: Position of the adjusting ring

Relieve the spring of the mechanical seal (0433.01) against the adjusting ring (0516.00), using the extractor.

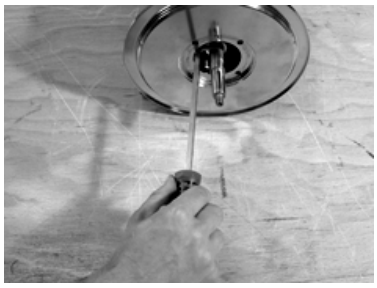

Fig.54: Extractor

Installing tandem double mechanical seal

Wet the O-ring (0412.03) with water and insert it into the sterile screws (0918.00).

Fig.55: Sterile screw

Insert the O-ring (0412.01) into the seal cover (0471.00).

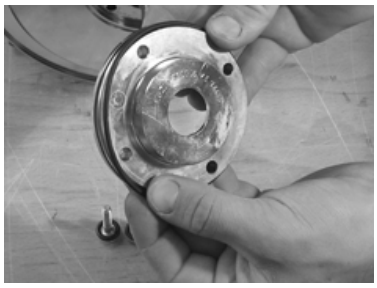

Fig.56: Seal cover

Use the sterile screws (0918.00) to fasten the seal cover (0471.00) to the back plate (0161.00).
torque: M6: 8 Nm
Use the socket wrench with plastic insert to tighten the sterile screws.

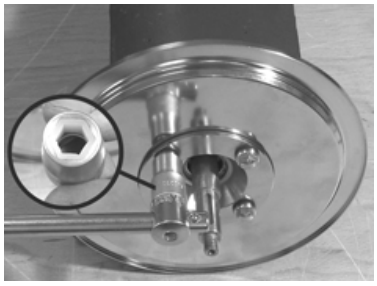

Fig.57: Seal cover

→ The mechanical seal on the atmosphere side has been installed.

Hint!

The next steps for installing the product-side mechanical seal are identical to installing the simple mechanical seal. For a conical spring mechanical seal, follow the steps in Section 10.4.11, Page 66. For an encapsulated hygienic mechanical seal, follow the steps in Section 10.4.12, Page 68.

10.4.15 Installing double mechanical seal in back-to-back position

Installing double mechanical seal in back-to-back position

Hint!

Start by following the steps in Section 10.4.14, Page 75.

Push the adjusting ring (0516.00) onto the shaft (0211.00).

Wet the mounting sleeve with clean water and push it onto the shaft shoulder.

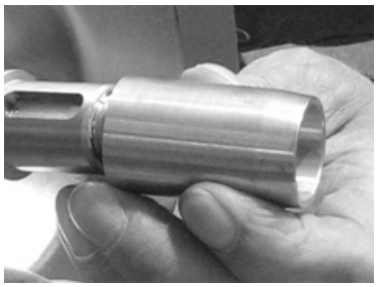

Fig.58: Mounting sleeve

Push the rotating unit (slide ring) of the mechanical seal (0433.00) into the shaft (0211.00) as far as it will go in the assembled state with the mounting sleeve.

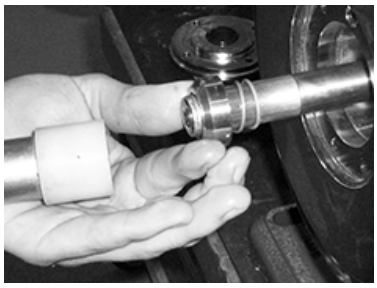

Fig.59: Slide ring of the mechanical seal

Insert the fixed ring (counter ring) of the mechanical seal (0433.00) into the seat of the seal cover (0471.00).

Insert the O-ring (0412.01) into the seal cover (0471.00).

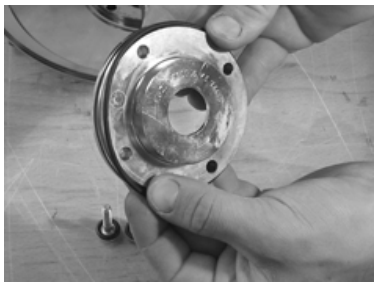

Fig.60: Seal cover

Installing double mechanical seal in back-to-back position

Wet the O-ring (0412.03) with water and insert it into the sterile screws (0918.00).

Fig.61: Sterile screw

Use the sterile screws (0918.00) to fasten the seal cover (0471.00) to the back plate (0161.00).
torque: M6: 8 Nm
Use the socket wrench with plastic insert to tighten the sterile screws.

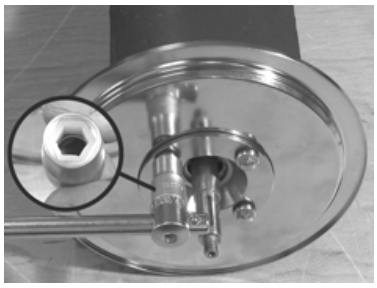

Fig.62: Seal cover

→ The mechanical seal on the atmosphere side has been installed.

Hint!

The next steps for installing the product-side mechanical seal are identical to installing the simple mechanical seal. For a conical spring mechanical seal, follow the steps in Section 10.4.11, Page 66. For an encapsulated hygienic mechanical seal, follow the steps in Section 10.4.12, Page 68.

10.4.16 Installing impeller and housing

Equipment and tools from the GEA Hilge assembly tool kit:

- Klüber paste UH1 96-402
- Extractor
- Spray bottle
- Socket wrench
- Socket wrench bit

Install impeller

Insert the feather key (0940.00).

Fig.63: Feather key

Insert the O-ring (0412.05) into the seal spacer (0557.00) or mechanical seal (0433.00).

Fig.64: O-ring

Grease impeller seat and shaft thread with Klüber paste.

Fig.65: Impeller seat

Install impeller

Install impeller (0230.00).

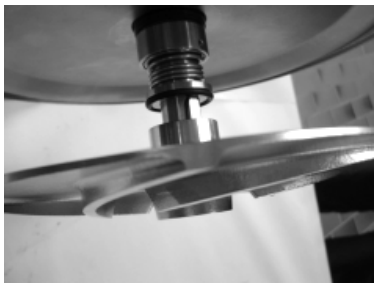

Fig.66: Impeller

Grease the thread of the impeller nut (0922.00) with Klüber paste.

Fig.67: Impeller nut

Grease lock washer (0930.00) with Klüber paste.

Hint!

Only use original part lock washers from GEA Hilge for securing the impeller mounting.

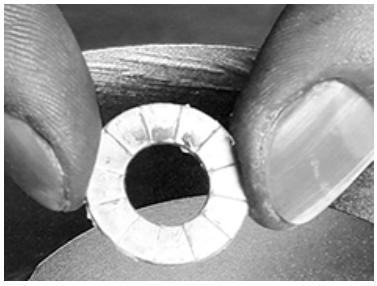

Fig.68: Lock washers

Grease lock washers as shown.

- (0230.00) Impeller | (0412.04) O-ring
- (0922.00) Impeller nut
- (A) Fine gearing - greased
- (B) Coarse gearing against each other - greased

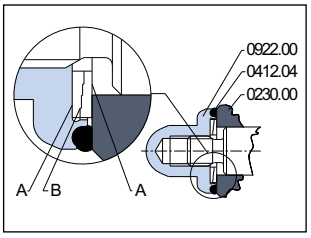

Fig.69: Grease overview

Install impeller

Replace lock washers (0930.00) after 5-time use.

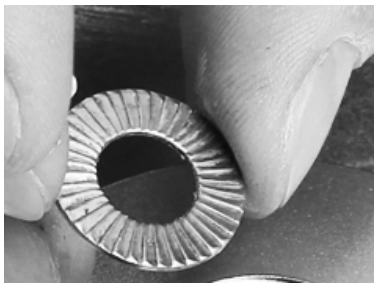

Fig.70: Lock washer

Insert the lock washers (0930.00) into the impeller nut (0922.00).

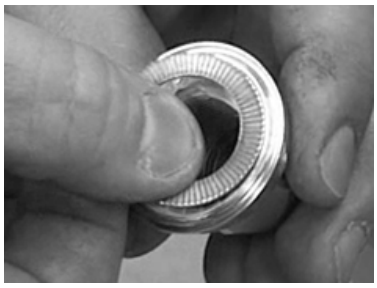

Fig.71: Lock washers in impeller nut

Unscrew impeller nut (0922.00) by hand. Leave a gap of about 3 mm for the O-ring (0412.04).

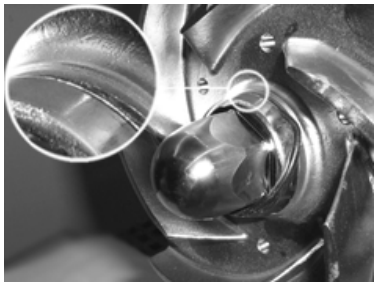

Fig.72: Impeller nut

Wet the O-ring (0412.04) with water and use the impeller nut (0922.00) to push it into the gap between the impeller nut (0922.00) and the impeller (0230.00).

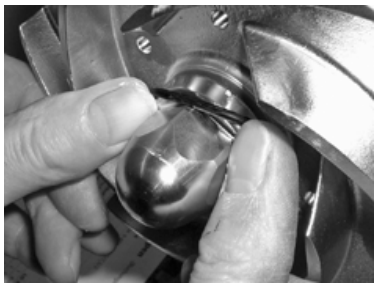

Fig.73: O-ring

Install impeller

To prevent damage, use socket wrench with bit to tighten the impeller nut (0922.00).

Notice

Hygiene risk, food safety
Damaged and scratched surfaces can cause contamination.
► Always tighten impeller nut with socket wrench and insert.

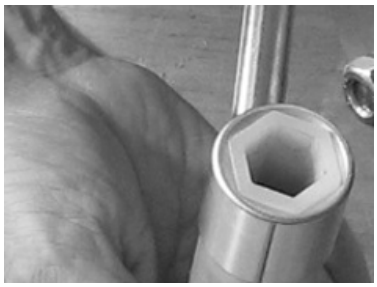

Fig.74: Socket wrench with insert

Tighten the impeller nut (0922.00).
To do so, lock the impeller (0230.00) with the centring key.
Torque M10: 20 Nm, M20 x 1.5: 100 - 120 Nm

Fig.75: Impeller nut

With open conical spring: Relax the spring of the mechanical seal (0433.00) against the seal spacer (0557.00) using the extractor.

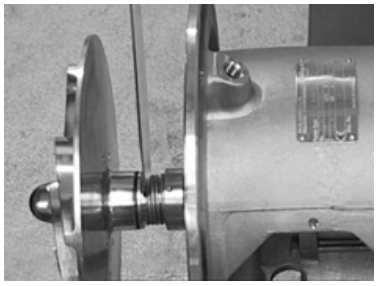

Fig.76: Axial face seal

→ The impeller has been installed.

Installing the KLM housing

Wet the O-ring (0412.00) with water and insert it into the back plate (0161.00).

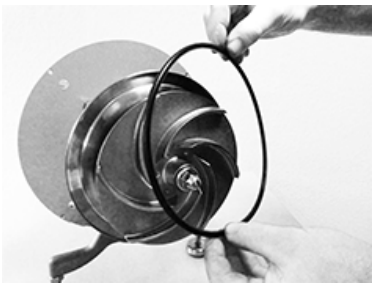

Fig.77: Back plate, O-ring

Install the annular casing (0103.00).

Fig.78: Annular casing

Grease the thread of the connecting screw (0905.00) with Klüber paste.

Install the upper and lower clamp rings (0501.00) and (0501.01), following the direction indicated on the clamp ring. To do so, tighten the connection screw (0905.00), the washer (0554.00), and the hex nut (0920.00) by hand.

Fig.79: Clamp ring

Installing the KLM housing

Align the annular casing (0103.00) via the pressure piece using a mechanic's spirit level.

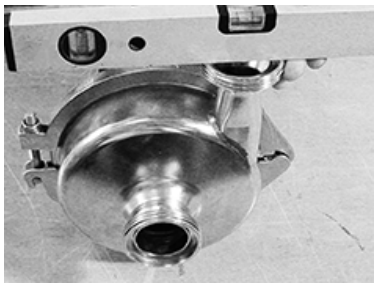

Fig.80: Annular casing

Tighten the hex nut (0920.00).
Torque M10: 35 Nm
Use a plastic mallet to bring the clamp ring into the correct position.

Fig.81: Clamp ring

→ The KLM housing has been installed.

Installing the HPM housing

Wet the O-ring (0412.00) with water and insert it into the back plate (0161.00).

Install the annular casing (0103.00).

Fasten the housing (0103.00) using the hex head screws (0901.07), spring washers (0934.03), and cap nuts (0927.00).
Torques:
HYGIA I (M8): 19 Nm
HYGIA II (M10): 35 Nm

Fig.82: HPM housing

→ The HPM housing has been installed.

11 Decommissioning

11.1 Special personnel qualification

The decommissioning personnel must be suitably qualified for this work. See also Section 2.6, Page 15.

11.2 Safety instructions

⚠ Warning!

Pressure shock!

► Always close shut-off devices (gates, valves) slowly.
► A pressure shock is a sudden increase in pressure in the system. This pressure increase may be triggered by quickly shutting off the flow in the pressure pipe, in addition to other causes. If a pressure shock occurs, the max. permissible pump pressure is briefly exceeded by a multitude.

⚠ Caution!

Sticking of the pump.

► Clean the pump suitably after decommissioning. (See Chapter 8, Page 44

11.3 Temporary decommissioning

Perform the following steps:

1. Close the pressure side shut-off valve.
2. Switch off the pump.
3. Close the suction side shut-off valve.
4. Switch off the flushing.
5. Make sure that the pump is depressurised.
6. Depressurise the sealing system.
   → The pump has been temporarily decommissioned.

11.4 Disposal

Discard the pump or parts thereof in an environment-friendly manner: Use the service of public or private disposal companies. If this is not possible, contact the next GEA Hilge company or service centre.

12 Appendix

12.1 Certificate of non-objection

Certificate of non-objection

This section contains a certificate of non-objection. In the event of inspection or repair send the pump including this certificate to HILGE.

Certificate of non-objection

The following pump and its accessories, together with this certificate of non-objection, are herewith contracted out by the undersigned for inspection/repair:

Pump data

- Model:
- No.:
- Delivery date:

  Reason for inspection / repair contract

_____

_____

_____

_____

The pump (please mark with a cross)

___ was not used in liquids hazardous to health

___ was used for the following:

_____

Please state the last liquid pumped, if known:

_____

The pump was carefully drained and also cleaned inside and out before it was shipped/made available. (please mark with a cross).

___ No special safety measures are required in the course of further handling.

___ The following safety measures pertaining to flushing liquids, residual liquids, and disposal are required:

_____

_____

_____

_____

We confirm that the information given above is correct and complete and that shipment is in compliance with legal regulations.

Company (address): _____

Telephone: _____

Fax: _____

Email: _____

Name (incl. title) (please print): _____

Date: _____

Company stamp / signature:

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