

Hygienic Pumps GEA Hilge HYGIA K (US) - Version C / Version D

Operating instruction (Translation from the original language) BA.H2A.KYY.002.GB_2



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GEA Hilge

Office of GEA Tuchenhagen GmbH

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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

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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 10.

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

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Phone +49 6135 7016101 (Service)

support.hilge@gea.com

2 Safety

2.1 Intended use

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.

2.1.6 Hygiene classification

The pump is suitable for hygienic processes. It must not be used in aseptic processes.

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.

Explanation of the safety symbols used 2.3

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!



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.

3 Description

3.1 Pump overview

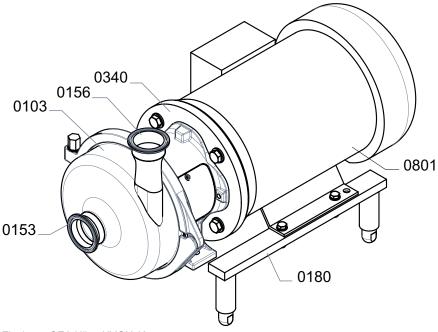


Fig.1: GEA Hilge HYGIA K

0103	Annular casing	0180	3-A stand
0153	Suction port	0340	Motor stool
0156	Discharge port	0801	Motor

3.2 Description

The pump is a end suction, single-stage centrifugal pump in system block design. The selected versions comply with the 3-A standard 02-11. The material quality 1.4404 or 1.4435 (AISI 316 / 316L) Fe \leq 1% and the respective version standard is implemented in accordance with the order and, if desired, fully certified

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 HYGIA	N	1/	R	С	HU	
Pump name	Size	Number of stages	Version	Design type	Assembly	Additional information
		1 = 1-stage	D=USA 3-A	Pump in block design with stub shaft and motor	Horizontal assembly on 3-A dome base	see catalogue No

3.4 Type plate



Fig.2: Type plate

Pump type: Pump name P: Motor rating Serial No.: Pump number n: Speed

P/N: Pump number TAG No.:customer name
Q: Flow rate YOM: Year of manufacture

H: Delivery head

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

3.5 Motor versions

Washable motors (wash down)

These motor variants are used in applications that are subject to strict hygienic regulations, in which nucleation and corrosion must be avoided and in which the pumps (installations) must be cleaned cyclically.

General purpose motors

These motor variants are used in all applications that are not subject to strict hygiene regulations.

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



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/pressure port!
- ► For version with casing: Remove the stainless steel casing before transport.

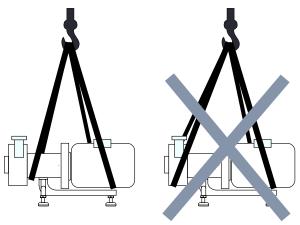


Fig.3: Anchor points (example)

Storage of the pump

\triangle

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

The weights may differ from the ones shown here depending on the version and accessories. Contact the manufacturer for accurate information and quote the pump / order number.

Weights HYGIA K on motor foot 2 pole				
P2 [HP]	NEMA- frame size	Weight [kg]	Weight [lb]	BG1/2
1.5	143T	32.4	71.4	BG1
2	145T	35.15	77.5	BG1
3	182T	45.75	100.9	BG1
5	184T	53.35	117.6	BG1
5	184T	59.6	131.4	BG2
7.5	213T	78.75	173.6	BG1
7.5	213T	85.6	188.7	BG2
10	215T	98.7	217.6	BG2
15	254T	105.3	232.1	BG2
20	256T	121.8	268.5	BG2
25	284TS	190	418.9	BG2
30	286TS	204	449.7	BG2

Weights HYGIA K on motor foot 4 pole				
P2 [HP]	NEMA- frame size	Weight [kg]	Weight [lb]	BG1/2
1	143T	34.1	75.2	BG1
1.5	145T	34.1	75.2	BG1
2	145T	36.15	79.7	BG1
3	182T	60.4	133.2	BG2
5	184T	56.4	124.3	BG2
7.5	213T	79.9	176.1	BG2
10	215T	84.6	186.5	BG2

Weights HYGIA K on combi foot 2 pole				
P2 [HP]	NEMA- frame size	Weight [kg]	Weight [lb]	BG1/2
1.5	143T	36.3	80.0	BG1
2	145T	39.0	86.0	BG1
3	182T	49.6	109.4	BG1
5	184T	57.2	126.1	BG1
5	184T	63.5	139.9	BG2
7.5	213T	82.6	182.1	BG1
7.5	213T	89.5	197.2	BG2
10	215T	104.4	230.1	BG2
15	254T	111.0	244.7	BG2
20	256T	127.5	281.1	BG2

Weights HYGIA K on combi foot 2 pole				
P2 [HP]	NEMA- frame size	Weight [kg]	Weight [lb]	BG1/2
25	284TS	190.0	418.9	AD2
30	286TS	178.0	392.4	AD2

Weights HYGIA K on combi foot 4 pole				
P2 [HP]	NEMA- frame size	Total weight [kg]	Total weight [lb]	BG1/2
1	143T	38.0	83.7	BG1
1.5	145T	38.0	83.7	BG1
2	145T	40.0	88.2	BG1
3	182T	64.3	141.7	BG2
5	184T	60.3	132.9	BG2
7.5	213T	83.8	184.7	BG2
10	215T	90.3	199.0	BG2

Weights HYGIA K	on 3-A-Stand 2 pole			
P2 [HP]	NEMA- frame size	Weight [kg]	Weight [lb]	BG1/2
1.5	143T	38.9	85.8	BG1
2	145T	41.7	91.8	BG1
3	182T	50.6	111.4	BG1
5	184T	58.1	128.1	BG2
5	184T	65.4	144.3	BG2
7.5	213T	84.4	186.1	BG1
7.5	213T	91.2	201.2	BG2
10	215T	104.4	230.1	BG2
15	254T	117.2	258.3	BG2
20	256T	133.7	294.7	BG2
25	284TS	202.7	446.8	AD2
30	286TS	216.7	477.7	AD2

Weights HYGIA K on 3-A-Stand 4 pole				
P2 [HP]	NEMA- frame size	Total weight [kg]	Total weight [lb]	BG1/2
1	143T	40.6	89.5	BG1
1.5	145T	40.6	89.5	BG1
2	145T	42.7	94.0	BG1
3	182T	65.2	143.7	BG2
5	184T	62.2	137.2	BG2
7.5	213T	85.5	188.6	BG2
10	215T	90.3	199.0	BG2

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 GEA Hilge HYGA I / II - 60 Hz			
Output [kW] [HP]	Number of poles	L _{pfa} [dB (A)]	
0.75 (1)	4	60	
1.1 (1.5)	4	60	
1.5 (2)	4	60	
2.2 (3)	4	63	
3.7 (5)	4	63	
5.6 (7.5)	4	68	
7.5 (10)	4	68	
0.75 (1)	2	73	
1.1 (1.5)	2	73	
1.5 (2)	2	73	
2.2 (3)	2	73	
3.7 (5)	2	73	
5.6 (7.5)	2	76	
7.5 (10)	2	76	
11.2 (15)	2	79	
14.9 (20)	2	79	
18.6 (25)	2	80	
22.3 (30)	2	80	

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

Marning!

Exceeding the maximum temperatures!

▶ Never exceed the specified operating temperatures.

Operating temperatures		
Design	Temp. [°C/°F]	
Normal version	95 / 203	
Cleaning (CIP)	140 / 284	

Variations are possible at the above temperatures.

5.5 Maximum operating pressure

Marning!

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 (-40275°F)	FKM -10+200 °C (+14+392°F)		
Caustics up to 3%	up to 80 °C (176°F)	+	0		
Caustics up to 5%	up to 40 °C (104°F)	+	0		

Sealing resistance table				
Medium	Temperature	Gasket material (general operating temperature)		
		EPDM -40+135°C (-40275°F)	FKM -10+200 °C (+14+392°F)	
Caustics up to 5%	up to 80 °C (176°F)	+	-	
Caustics at more than 5%		0	-	
Inorganic acids up to 3%	up to 80 °C (176°F)	+	+	
Inorganic acids up to 5%	up to 80 °C (176°F)	0	+	
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)	+	О	
Steam, approx. 30 min	up to 150 °C (302°F)	+	О	
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

Marning!

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 to support 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).

Overload by foreign objects!

- ▶ Before installing the pump in the system, remove all plastic films and caps from the connectors.
- ▶ Remove and contamination, weld residues or similar from the lines and fitting of the system.

♠ 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.



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.
- ▶ Observe the National Electrical Code (NEC) | NEC, as well as local guidelines - in-particular the safety guidelines.



Danger

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

- ► 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.

Electric overload!

- ► Compare the voltage indicated on the motor plate with the operating voltage. The power supply properties must match the specifications on the nameplate.
- ► 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 seal in quench arrangement

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 / 2.9 psi.
- ▶ Reschedule overlooked flushing.

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 12.

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 GEA Hilge service.

If the impeller rotates freely:

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 for horizontal operation and may only be operated in this position.

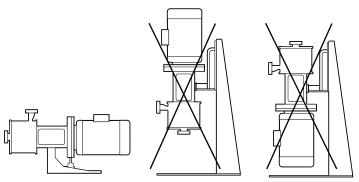


Fig.4: Permissible setups of the pump

Aligning the pump:

- 1. Level the unit via the machined planar surfaces of the ports using a machine spirit level.
- 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 Installation in the piping system

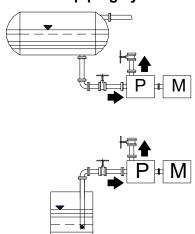


Fig.5: Installation in the piping system top: Inlet operation | bottom: Priming operation (only self-priming pumps) | P - Pump | M - Motor

6.3.3.1 Space requirements

Maintain the following minimum distances.

Pay attention to motor performance.

Horizontal assembly

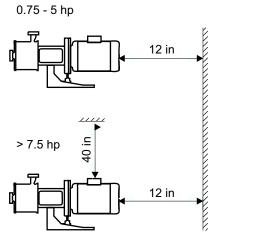


Fig.6: Minimum distances in horizontal assembly

Settings for the 3-A assembly

Installation height of the pump

To ensure proper cleaning of the pump environment, the 3-A stand must have a minimum height. The dimension is shown in the following figure.

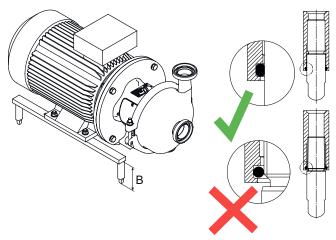


Fig.7: HYGIA on 3-A stand Dimension B: at least 4" (102 mm)

Screw-in depth of the feet

Notice

Hygiene risk, food safety

Feet which are improperly sealed provide space for hidden contaminants.

▶ Screw in the feet so that the O-ring rests on the smooth counterpart.

6.3.3.2 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 from 11 kW (15 HP). 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 larger than DN 100 (4 ") 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

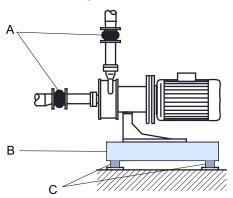


Fig.8: Example for the foundation of a pump
A - compensators | B - solid base | C - Vibration damper

6.3.4 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.

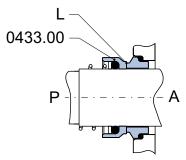


Fig.9: Lubrication film between the sliding surfaces
P - Pump side | A - Atmosphere side | L - Lubrication side | 0433.00 - Mechanical seal

6.3.5 Flush connections for double mechanical seals (optional)

6.3.5.1 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 or 89 ppm

Demineralised water meets these requirements to a large extent.

6.3.5.2 Quench version (optional)

GEA pumps with quench seal are equipped with a lip seal.

The pressureless flushing fluid is located between the mechanical seal and the lip seal.

Connect the piping as described in Section 6.3.5.2, Page 31.

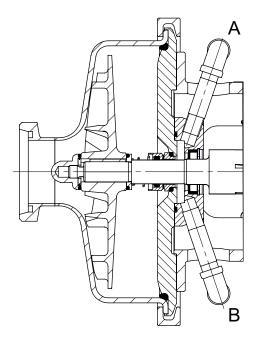


Fig.10: Flushing pipes A - outlet | B - inlet

Permissible supply pressures and temperatures

The supply of the mechanical seal with flushing fluid must be unpressurised. The maximum supply line pressure may not exceed 0.2 bar / 2.9 psi.

Provide a lost flushing for 3-A applications. Discharge the flushing fluid correctly. When using pass-through flushing, secure the flushing fluid port with a pressure reducer or the like if necessary.

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.

Connect the flushing system

- 1. Connect outlet A.
- 2. Connect inlet B.
- 3. Check that the connections are tight.
 - → The flushing system has been connected.

Defective shaft seal

Notice

Leakage of liquids.

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

Self-draining of the seal cartridge



Hint!

For quench pumps used in 3-A applications, self draining is required when switching off the pump. For his purpose install in the supply line (B) a valve that opens automatically when the pump is switched off. \rightarrow Figure 10, Page 31.

6.3.6 Electrical connection

6.3.6.1 Connect NEMA motors

Follow the instructions of the motor manufacturer to connect the power supply.

6.3.6.2 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.

6.3.6.3 Checking the direction of rotation after connecting

Perform the following steps:

- 1. Re-install all safety devices.
- 2. Check that hydraulic connections are firmly secured.
- 3. Open stop valves.
- 4. Fill the pump (system).
- 5. With double mechanical seal in tandem / quench design, connect the flushing fluid (see Section 6.3.5.2, Page 31)
- 6. Note the direction-of-rotation arrow on the pump.
- 7. Switch on the motor briefly (1-2 seconds).
- 8. Compare the direction of rotation with the specified direction (arrow).
- 9. Correct the connection if necessary.
 - → The direction of rotation has been checked, and corrected if necessary.

6.3.6.4 Earthing

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.

Earthing the machine pad support

Equipotential bonding of the machine pad support is achieved via the screw connection to the motor. Use a toothed washer at the appropriate position (B).

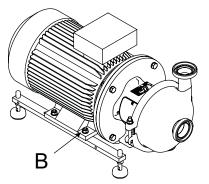


Fig.11: Earthing the machine pad support

7 Commissioning

7.1 Special personnel qualification

The commissioning personnel must be suitably qualified for this work. See also Section 2.6, Page 12.

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. Open stop valves in the system.
- 6. Fill the pump along with the system.
- 7. Vent the pump along with the system.
- 8. For double mechanical seal / quench version, connect the flushing fluid. Start flushing to prevent dry running. For details, see Section 6.3.5.2, Page 31.
- 9. Fully open the suction-side stop valve.
- 10. Close the pressure side stop valve.
- 11. Switch on the pump.

- 12. 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 44.

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 43.

7.3.4 Function test of the rotary shaft seal (quench)

Perform the following steps:

1. Observe the draining flushing fluid and check if it is saturated with pumped liquid.

An intact rotary shaft seal effectively separates the pumped liquid from the flushing media.

If there is pumped liquid in the flushing fluid:

- 1. Switch off the pump.
- 2. Replace the rotary shaft seal/have the rotary shaft seal renewed.

Follow the installation instructions Section 10.2, Page 43.

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 current state of technology and with the local guidelines. 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 12.

8.2 Safety instructions

Marning!

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.

Marning!

Risk of burns!

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

Danger of scalding or burns.

▶ Do not touch the pump during steam sterilisation and the cooling phase. Surface temperatures may rise above 100 °C (212 °F).

Dry running of the mechanical seal!

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

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 detergents and disinfectants and their permitted concentrations. Alternatively, information from DIN11483 Part 1 can be used.

Cleaning and	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] (°F)		[mg/l]	[h]	
Alkaline	NaOH	2.5%	85 (185) ¹	13-14	150	3	
	H ₂ SO ₄ H ₃ PO ₄ HNO ₃	2% ² , ³	60 (140)		150 ⁴ , ⁵	1	
7	C ₂ H ₄ O ₃	0.0075%	90 (194)		150	0.5	
Acid	C ₂ H ₄ O ₃	0.15%	20 (68)		150	2	
	lodophore	50 mg/l act. lodine	30 (86)	>3	150	3	

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 21.

¹ Dependent on the maximum permissible temperature of the pump

² CrNi-steels

³ CrNiMo-steels

⁴ CrNi-steels

⁵ CrNiMo-steels

8.4 SIP

SIP stands for sterilisation in place, in which the pump is sterilised with superheated steam. For steam sterilization or sanitization, minimum temperatures of 121 °C (250 °F) must be applied to all wetted surfaces. For the maximum allowable temperatures, refer to Section 5.4, Page 21.

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.

8.5 Manual exterior cleaning

Notice

Danger due to cleaning agents.

- ▶ Follow the manufacturer's instructions when using cleaning agents.
- Wear safety glasses and gloves.
- ▶ Dispose of cleaning agent properly.
- ▶ Do not use a high-pressure water jet to clean the pumps.
- Regular manual external cleaning of the pump unit facilitates proper operation.
- Always check the impermeability of the motor (terminal box, condensation water holes) before each cleaning.
- Clean the outside of the pump with a soft cloth or brush and use warm water if necessary.
- When using a cleaning agent, make sure that it does not attack the surface of the pump unit.
- Remove dust and debris that may clog the fan and cooling fins of the engine.
- Dry cleaning is preferable to wet cleaning.
- The cleaning intervals depend on the degree of contamination.

9 Maintenance / servicing

Safety instructions for maintenance and repair 9.1

Warning!

Improper execution of work!

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

Narning!

Hot system and pump parts.

► Always allow the pump to cool before maintenance.

Narning!

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 12.

9.3 **Pump maintenance**

9.3.1 Inspections

The pump is maintenance-free for the most part.

In order to prevent possible malfunctions, GEA recommends that regular visual inspections be carried out. Special attention should be paid to the leak tightness and the correct functioning of the pump.

In order to ensure maximum operational safety of the pump wear parts, such as the mechanical seal and O-rings, should be checked after 2000 hours of operation and replaced if necessary.

In addition, the screw connection of the casing and the clamping shaft should be checked.

In any case, all seals must be checked and, if necessary, replaced during disassembly of the pump.

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 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.

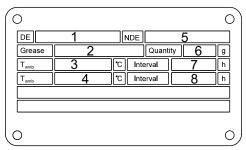


Fig.12: Lubrication information plate of MGE motor (example)

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 12.

10.2 Safety instructions



Improper execution of work!

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

A Danger

Electric shock by touching live parts!

▶ Always disconnect the pump from power before troubleshooting.

A 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.

A Danger

Liquids squirting out under high pressure!

Always depressurise the pump before troubleshooting.

Marning!

Hot system and pump parts!

Always allow the pump to cool before troubleshooting.

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.

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 troub			Parada			
Malfunction	Cau	iuse		medy		
Pump does not deliver or pump	1.	Incorrect electrical connection (2 phases).	1.	Check electrical connection, and correct if necessary.		
delivers with inadequate	2.	. Incorrect direction of rotation.	2.	Change phases of power supply (swap motor		
power.	3.	Air in suction line or pump.		poles).		
	4.	Back pressure too high.	3.	Vent and prime suction pipe or pump.		
	5.	Suction head too high, NPSH system (supply) too low.	4.	Reset operating point according to the data sheet. Check system for contamination.		
	6.	Lines clogged or foreign bodies in the impeller.	5.	Raise suction side liquid level, fully open the stop		
	7.	Air inclusion due to defective seal.		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.	1.	Pump is blocked due to clogging.	1.	Open pump and eliminate malfunctions.		
motor is overloaded.	2.	Pump is blocked by contacting due to strain on the pump body via the piping. (Check for damage.)	2.	Install pump without strain, support piping by fixed points.		
	3.	Pump runs beyond its rated operating point.	3.	Adjust operating point according to data sheet.		
	4.	The fluid density or viscosity of the liquid is higher than stated in the order.	4.	If a lower power than specified is sufficient, reduce the flow rate on the pressure side: otherwise use a		
	5.	Motor protection switch is not set properly	_	more powerful motor.		
	6.	Motor runs on 2 phases.	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	1.	Suction head too high, NPSH system (supply) too low.	1.	Raise suction side liquid level, fully open the stop valve in the suction line.		
unevenly and	2.	Air in suction line or pump. ¹	2.	Vent and prime suction pipe or pump.		
vibrates.	3.	Back pressure is less than indicated.	3.	Adjust operating point according to data sheet.		
	4.	Impeller is unbalanced.	4.	Clean, check and balance the impeller.		
	5.	Worn internal parts.	5.	Replace parts.		
	6.	Pump is strained (start-up noise - check for damage.)	6.	Install pump without strain, support piping by fixed points.		
	7.	Bearings are damaged.	7.	Replace bearings.		
	8.	Bearings have too little, too much or inappropriate lubricant.	8. 9.	Add, reduce or replace lubricants. Replace the fan motor.		
	9.	Motor fan defective.		Open and clean the pump (for self-priming pumps		
	10.	Foreign material in the pump.	١٥.	install a screen if necessary).		

Actions for troubleshooting							
Malfunction	Cause		Re	Remedy			
Leakage at the pump body, connections.	1.	Pump is strained (causing leaks at the pump body or at the connections).	1.	Install pump without strain, support piping by fixed points.			
mechanical seal,	2.	Housing seals and connection seals defective.	2.	Replace housing seals and/or connection seals.			
gland or socket seal.	3.	Mechanical seal soiled or sticky.	3.	Check and clean mechanical seal.			
	4.	Mechanical seal worn.	4.	Replace the mechanical seal.			
	5.	Surface of shaft or shaft sleeve shrunk.	5.	Replace shaft or shaft sleeve, repack gland seal.			
6. Elastomer unsuitab		Elastomer unsuitable for the pumped fluid.	6.	Use suitable elastomer for pumped fluid and temperatures.			
Impermissible temperature increases to	1.	Air in suction line or pump. Suction head too high, NPSH system (supply) too low.	1.	Vent and prime suction pipe or pump. Raise suction side liquid level, fully open the stop valve in			
pump, bearing	2.	Bearings have too little, too much or inappropriate	•	the suction line.			
support or motor		lubricant.	2.	Add, reduce or replace lubricants.			
	3.	Pump with bearing support is strained.	3.	Install pump without strain, support piping by fixed points. Check coupling alignment.			
	4.	Axial thrust is too high.		1 0 0			
	5.	Motor protection switch is defective or not set properly.	4.	Check the relief holes in the impeller and the split rings at the inlet.			
	6.	Pressure valve closed.	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 73) 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.

Repair

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.

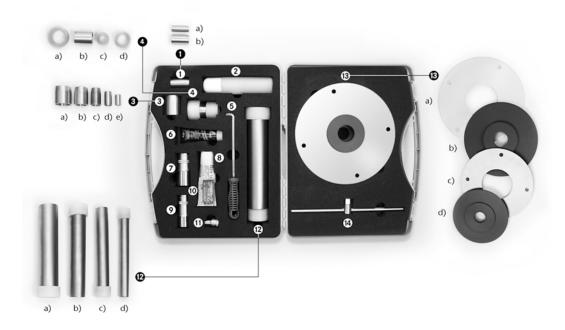
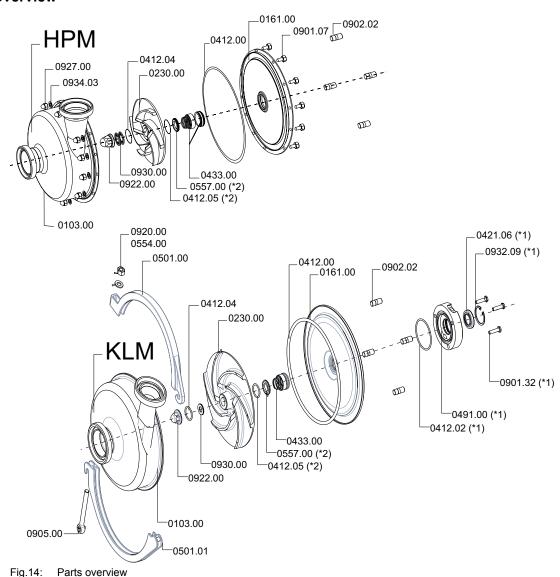


Fig.13: GEA Hilge assembly tool kit

10.4.2.1 Contents and use

Tools in the GI	EA 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



(*1) Only for quench version | (*2) Not applicable with encapsulated mechanical seal

Parts lis	t HYGIA I/II				
Pcs.	Part no.	Designation	Pcs.	Part no.	Designation
1	0103.00	Annular casing	1	0554.00	Washer
1	0161.00	Back plate	1	0557.00	Seal spacer
1	0230.00	Impeller	12	0901.07	Hex screw
1	0412.00	O-ring seal	3	0901.32	Hex screw
1	0412.02	O-ring seal	4	0902.02	Stud bolts
1	0412.04	O-ring seal	1	0905.00	Connecting screw
1	0412.05	O-ring seal	1	0920.00	Hex nut
1	0421.06	Shaft seal	1	0922.00	Impeller nut
1	0433.00	Axial face seal	12	0927.00	Cap nut
1	0491.00	Seal cartridge	1	0930.00	Toothed disc

Parts lis	st HYGIA I/II				
Pcs.	Part no.	Designation	Pcs.	Part no.	Designation
1	0501.00	Clamp ring	1	0932.09	Circlip
1	0501.01	Clamp ring	12	0934.03	Spring washer

10.4.4 Parts overview for K motor stool

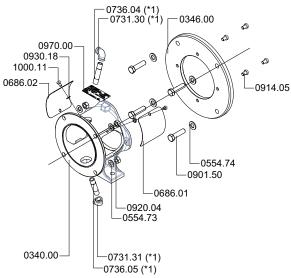


Fig.15: Parts overview (*1) quench version only

Parts list of K motor stool						
Pcs.	Part no.	Designation	Pcs.	Part no.	Designation	
1	0340.00	Motor stool	1	0736.04	Pipe	
1	0346.00	Intermediate motor stool	1	0736.05	Pipe	
4	0554.73	Washer	4	0901.50	Hex screw	
4	0554.74	Washer	4	0914.05	Hex socket screw	
1	0686.01	Protective guard	4	0920.04	Hex nut	
1	0686.02	Protective guard	2	0930.18	Circlip	
1	0731.30	Elbow connector	1	0970.00	Type plate	
1	0731.31	Elbow connector	2	1000.11	Screw	

10.4.5 Parts overview of drive

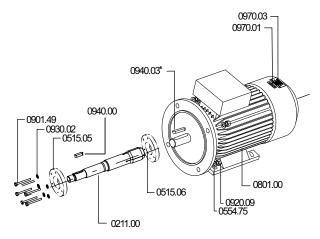


Fig.16: Parts overview

Parts list of drive parts							
Pcs.	Part no.	Designation	Pcs.	Part no.	Designation		
1	0211.00	Shaft	4	0920.09	Hex nut		
1	0515.05	Clamping ring	6	0930.02	Circlip		
1	0515.06	Clamping ring	1	0940.00	Feather key		
4	0554.75	Washer	1	0940.03	Feather key		
1	0801.00	Motor	1	0970.01	Rotation arrow		
6	0901.49	Hex head screws	1	0970.03	Warning label / information label		

10.4.6 Disassembling the pump

Disassembly of the pump takes place in reverse order to the assembly. For this purpose, see the steps in the following sections:

- Disassemble impeller and housing: Section 10.4.13, Page 65
- Disassemble single mechanical seal with encapsulated spring:
 Section 10.4.12, Page 63
- Disassemble single conical spring-mechanical seal: Section 10.4.11,
 Page 61
- Remove the shaft protection sleeve: Page 53.

10.4.7 Installation instructions

Notice

Hygiene risk, food safety

Incorrect installation of the pump can cause subsequent contamination and thus impair food safety.

- ► Always observe the following instructions:
- Use tools from the HILGE assembly tool kit for installation.
- 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.
- Always use original spare parts.
- Only use certified original spare parts for 3-A applications.
- Use no mineral oil greases for the wet section assembly.
- Always replace mechanical seals completely.
- Remember the properties when replacing the O-rings. See Section 9.3.1.1, Page 40
- Use a screw device or an impeller nut mounting device to tighten the impeller nut (0922.00).

10.4.7.1 Cleaning the components before assembly

Notice

Hygiene risk, food safety

Contaminated components contaminate the pump and installation.

▶ Use suitable chemical cleaning agents to remove impurities in the area of the impeller area, the O-rings or the mechanical seal. Use a brush and / or other tools in order not to damage the surface. Plan contact-free cleaning in an ultrasonic bath to clean the mechanical seal.

10.4.8 Installing shaft protection sleeve

Applies to the flushed mechanical seal, quench.

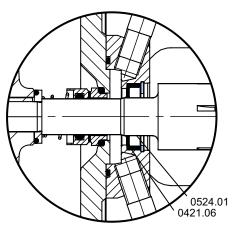


Fig.17: Detailed view of shaft protection sleeve

Note the fitting position of the radial packing ring (0421.06). Use the shaft protection sleeve (0524.01) only for repairs.

Using the shaft protection sleeve

The shaft protection sleeve is used to repair a worn pump shaft, using the original seal size.

The kit to install a shaft protection sleeve includes

- 1 x shaft protection sleeve
- 1 x mounting sleeve

Required tools:

- Extended mounting sleeve or suitable pipe
- Mallet, side cutter, if necessary filler, sandpaper
- Klüber paste

Perform the following steps:

- 1. Clean the surface of the pump shaft and remove any burrs.
- 2. Measure the shaft diameter at two or three intact areas of the shaft near the wear location.
 - If the average diameter matches the diameter of the shaft protection sleeve, the sleeve can be tightly installed.
- 3. Mark the position of the shaft protection sleeve on the shaft.
- 4. If the sealing lip has dug into the shaft: remove the grooves with an epoxy type filler.
 - NOTICE: Pull the shaft protection sleeve onto the shaft before the filler cures!
- 5. Use even strokes against the closed end of the mounting sleeve with the mallet to drive the shaft protection sleeve up to the marked point.
 If the length of the mounting sleeve is not sufficient, use an appropriate pipe section.
- 6. If the shoulder needs to be removed for lack of space: Remove shoulder of the shaft protection sleeve along the predetermined tear line using a side cutter.

- 7. Check the shaft once more for burrs and remove them if necessary.
- 8. Lightly grease the surface with Klüber paste and install the seal (see operating instructions).
 - → The shaft protection sleeve has been installed.

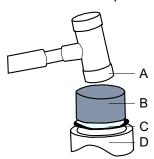


Fig.18: Drive the sleeve with light blows from the mallet onto the shaft A - Hammer, B - Mounting sleeve, C - Shaft protection sleeve, D - Shaft

Removing the shaft protection sleeve

If necessary, the shaft protection sleeve can be removed from the shaft in various ways.

- In most cases, it can be pulled easily from the shaft by heating the sleeve.
- The predetermined tear line can be overcome towards the sleeve using a jerky movement of a side cutter.
- By light blows with the mallet peen across the width of the sleeve, it widens and can be removed easily.
 - → The shaft protection sleeve has been removed.

Notice

Damage to the motor shaft and bearings!

▶ Do not place the pump upright on the fan cover of the motor or install the pump in this position.

Material and tools from the GEA Hilge assembly tool kit:

- Klüber paste UH1 96-402
- Loctite 243 (medium strength)
- Mounting sleeve (included with the pump)



Hint!

Unless stated otherwise, the parts listed in these instructions are shown in Section 10.4.3, Page 48, Section 10.4.4, Page 49, and Section 10.4.5, Page 50.

Installing the motor, motor stool and pump shaft

Preassemble the clamp connection with clamping rings (0515.05) and (0515.06) and pump shaft (0211.00). Grease the screws with Klüber paste.



Fig.19: Pump shaft and motor stool

Make sure that the motor shaft is free of grease. Push the pump shaft (0211.00) onto the motor shaft.

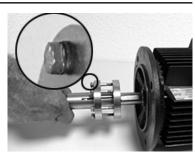


Fig.20: Clamp connection



Hint!

The steps of Figure 21, Page 55 to Figure 29, Page 57 show the installation of the flushed mechanical seal.

For versions with a single mechanical seal (without seal cartridge), continue from Figure 30, Page 57.



Fig.21: Radial packing ring

Wet radial packing ring (0421.06) with water and push it into the seal cartridge (0491.00). Use mounting sleeve.

Insert the circlip 0932.09 into the seal cartridge (0491.00).

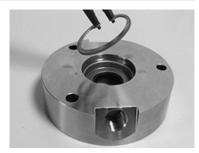


Fig.22: Circlip

Wet hex socket screws (0914.05) with Loctite 243 and connect the intermediate motor stool (0346.00) with the motor stool (0340.00). Torque M8: 7 lbf ft (10 Nm).



Fig.23: Loctite 243

Moisten the O-ring (0412.02) and insert it into the seal cartridge (0491.00).



Fig.24: O-ring

Grease hex head screws (0901.32) with Klüber paste and connect the seal cartridge (0491.00) with the back plate (0161.00).

Torque M6: 6 lbf ft (8 Nm).



Fig.25: Seal cartridge

Wet set screws (0902.02) with Loctite 243 and screw them into the back plate (0161.00) up to the stop.



Fig.26: Set screws

Connect the back plate (0160.00) with the motor stool (0340.00). using the spring washers (0554.73) and the hexagon nuts (0920.04). Torque M10: 26 lbf ft (35 Nm).



Fig.27: Back plate

Wet a thread of the pipes (0736.04) and (0736.05) with Loctite 2701 (high-strength) and connect it with the elbows (0731.30) and (0731.31).



Fig.28: Flushing pipes

Wet the other threads of the pipes (0736.04) and (0736.05) with Loctite 243 (medium strength) and connect it with the seal cartridge (0491.00).



Fig.29: Seal cartridge

Grease the centring for holding the motor stool at the motor flange and grease the screw connection with Klüber paste.

Push the motor stool (0340.00) onto the shaft (0211.00) and fasten it with the hex head bolts (0901.50), washers (0554.74) and (0554.75) and hexagon nuts (0920.09) to the motor flange. Torques:

M10 - 26 lbf ft (35 Nm)

M12 - 48 lbf ft (65 Nm)

M16 - 74 lbf ft (100 Nm)



Fig.30: Motor stool

Push the mounting sleeve onto the shaft (0211.00) and position the clamp connection.



Fig.31: Mounting sleeve

Screw on the impeller nut (0922.00) without the Oring seal and tighten. This sets the correct length of the shaft.



Fig.32: Pump shaft

Tighten the hex head screws (0901.49) of the clamp connection in a crosswise sequence. torque: tighten initially to 4 lbf ft (5 Nm) and then to 6 lbf ft (8 Nm).



Fig.33: Clamp connection

Check the rotation of the pump shaft (0211.00). Max. permissible runout: 0.05 mm (0.2 thou). In case of larger runout, dismount clamp connection and reinstall.

For replacement motor stool: Clean the surface of the motor stool (0340.00) and attach the nameplate (0970.00).



Fig.34: Measuring the pump shaft

→ Motor, motor stool and pump shaft have been installed.

10.4.10 Determining gap size on HYGIA

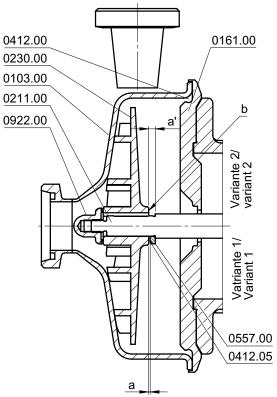


Fig.35: Gap size on HYGIA

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 Variant 2 - encapsulated (hygienic) mechanical seal

Preparation

- 1. Remove the key (0940.00) from the shaft (0211.00).
- 2. Remove the mechanical seal (0433.00) and the O-rings (0412.00) and (0412.05).
 - \rightarrow 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.
 - \rightarrow The gap size has been determined. Permissible clearance: 0.7 mm 1 mm (27.6 39.4 Thou)

Sealing washers 0557.00 are available in various thickness dimensions - 0.25 mm (9.84 Thou) classification. If the permissible gap size cannot be achieved with the seal spacer used, it must be replaced with another one.

Variant 2 - encapsulated (hygienic) 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.
 - \rightarrow The gap size has been determined. Permissible clearance: 4.7 mm 5.5 mm (0.185" 0.217").

The actual gap size is obtained by subtracting the 4 mm (0.157 ") shim integrated in the encapsulated mechanical seal. If the measured distance a' is less than 4.7 mm (0.185 "), the backside of the impeller hub (b) must be unscrewed 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.36: 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.37: 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.38: 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.39: Mechanical seal

Push the seal spacer (0557.00) onto the shaft.



Fig.40: Seal spacer

→ The single conical spring mechanical seal has been installed.



Hint!

For further installation, read Section 10.4.13, Page 65.

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

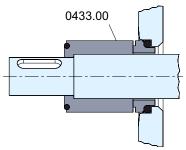


Fig.41: Single hygienic mechanical seal 0433.00 mechanical seal

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.

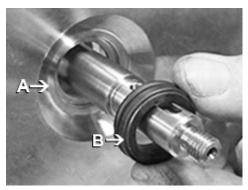


Fig.42: Shaft and counter ring holder

A - Counter ring holder | B - Stationary 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.
 - \rightarrow Done.

Assembly

- 1. Slide the stationary 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 assembly information refer to "Installing impeller and housing" section.

10.4.13 Installing the 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 key (0940.00).



Fig.43: Key

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



Fig.44: O-ring

Grease impeller seat and shaft thread with Klüber paste.



Fig.45: Impeller seat

Install impeller

Install impeller (0230.00).



Fig.46: Impeller

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



Fig.47: Impeller nut

Grease lock washer (0930.00) with Klüber paste.



Hint!

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



Fig.48: 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

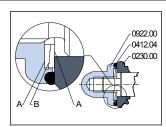


Fig.49: Grease overview

Install impeller

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



Fig.50: Lock washer

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



Fig.51: Lock washers in impeller

Unscrew impeller nut (0922.00) by hand. Leave a gap of approximately 0.12 "(3 mm) for the O-ring (0412.04).



Fig.52: 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.53: 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.54: Socket wrench with insert

Tighten the impeller nut (0922.00).

To do so, lock the impeller (0230.00) with the centring key.

Torque M10: 15 lbf ft (20 Nm), M20 x 1.5: 74 - 89 lbf ft (100 - 120 Nm)

After tightening the impeller nut, check that the Oring (0412.04) is positioned correctly.



Fig.55: Impeller nut

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

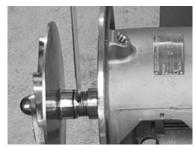


Fig.56: Mechanical seal

 \rightarrow 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.57: Back plate, O-ring

Install the annular casing (0103.00).



Fig.58: 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.59: Clamp ring

Installing the KLM housing

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



Fig.60: Annular casing

Tighten the hex nut (0920.00).

Torque M10: 26 lbf ft (35 Nm).

Use a plastic mallet to bring the clamp ring into the correct position.



Fig.61: 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): 14 lbf ft (19 Nm) HYGIA II (M10): 26 lbf ft (35 Nm)



Fig.62: HPM housing

→ The HPM housing has been installed.

10.4.14 Installing the safety guards

Attaching the safety guards

Install the safety guards (0686.01) and (0686.02) with the screws (1000.11).



Fig.63: Safety guards on the motor stool

 \rightarrow The safety guards are installed.

11 Decommissioning

11.1 Special personnel qualification

The decommissioning personnel must be suitably qualified for this work. See also Section 2.6, Page 12.

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 37

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.

Observe the valve position on the supply line if necessary, see Section , Page 32.

- 5. Make sure that the pump is depressurised.
 - → 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 Clearance certificate

Von uns, der Unterzeichnerin, wird hiermit, gemeinsam mit dieser Unbedenklichkeitsbescheinigung, folgende Pumpe und deren Zubehör in Inspektions- / Reparaturauftrag gegeben:

Angaben zur Pumpe
• Typ:
• Nr.:
Lieferdatum:
Grund des Inspektions- / Reparaturauftrages:
Die Pumpe (bitte ankreuzen)
wurde nicht in gesundheitsgefährdenden Medien eingesetzt.
kam mit kennzeichnungspflichtigen bzw. schadstoffbehafte-
ten Stoffen in Kontakt.
Wenn bekannt, bitte letztes Fördermedium angeben:
Die Pumpe ist vor Versand / Bereitstellung sorgfältig entleert
sowie außen und innen gereinigt worden (bitte ankreuzen).
Besondere Sicherheitsvorkehrungen sind bei der weiteren
Handhabung nicht erforderlich.
Folgende Sicherheitsvorkehrun gen hinsichtlich Spülmedien,
Restflüssigkeiten und Entsorgung sind erforderlich:
Wir versichern, dass die vorstehenden Angaben korrekt und voll-
ständig sind und der Versand gemäß den gesetzlichen Bestim-
mungen erfolgt.
Firma (Anschrift):
Telefon:
Fax:
Email:
Name (in Druckhushetahan)
(in Druckbuchstaben)
Datum Firmonotomool / Untersolviift
Firmenstempel / Unterschrift



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