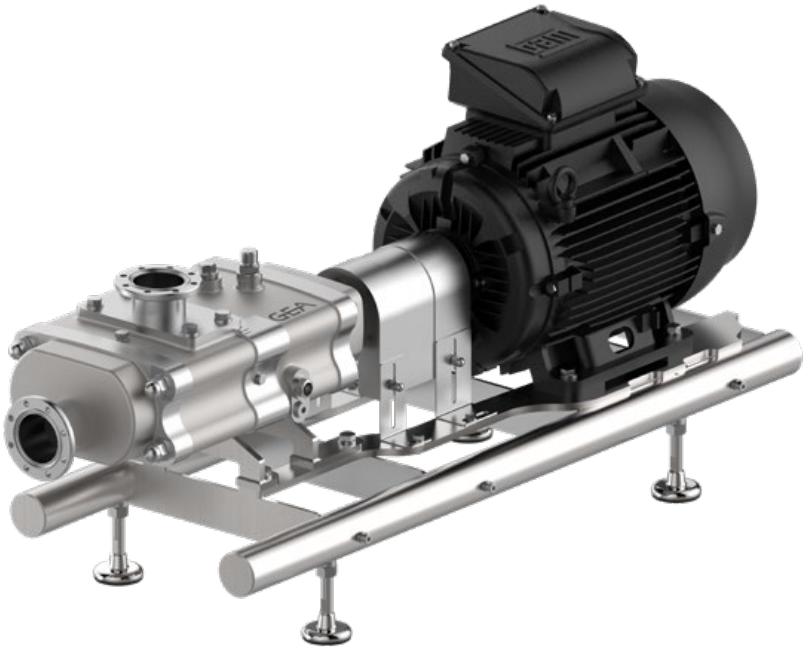
OPERATING INSTRUCTIONS

Original instructions



GEA Hilge NOVATWIN+

Hygienic Pumps

GEA Hilge Niederlassung der GEA Tuchenhagen GmbH
430BAL015812 EN
03.05.2023 / Revision: 1 / Language: English

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General information

This section contains some advance general information on using this manual, as well as the warranty conditions and the contact data for customer service.

About this manual

This manual enables safe and efficient handling of the pump. The manual is an integral part of the pump and must be kept in the immediate vicinity of the pump, accessible to personnel at all times.

The personnel must have carefully read and understood this manual before starting any work. A basic requirement for safe working is the adherence to all safety and handling instructions in this manual. Furthermore, local accident prevention regulations and general safety regulations apply to the area of application of the pump.

Illustrations in this manual are for general understanding and may differ from the actual combination.

Supplementary documents

In addition to this manual, you are receiving supplementary documents. These documents are part of the technical documentation of the pump and familiarity with them is absolutely necessary for the safe operation of the pump. The documents with the necessary information are listed in the following table.

Document	Content
Data sheet	Technical data and operating conditions
Dimensional drawing	Dimensions, weight, and connections
Supplementary document on lubricants and preservatives	List of suitable lubricants and preservatives
Flushing sheet	Operating and installation instructions for the use of a mechanical seal
Operating and installation diagram[1)]	Operating and installation instructions for the use of a sealing supply system
Documentation from suppliers[1)]	Technical documentation for components, for which GEA Hilge is not the manufacturer
Spare parts list[1)]	Sectional drawing and listing of spare parts
Safety data sheets for auxiliary and operating materials[1)]	Information for the safe handling of auxiliary and operating materials
[1)] Only included in the scope of supply if the pump has been ordered correspondingly.	

Technical terms

Term	Meaning
System	Pump/pump assembly and all components connected by the operator
Component	Part which makes a defined contribution to the function of a system
Pump assembly	Pump, coupling and motor on base plate or profile frame
Pump system	Pump assembly with pipelines, fittings and control components

Info boxes and special characters

These info boxes highlight tips and recommendations as well as information for an efficient and trouble-free operation.

At the beginning of individual chapters, these info boxes also contain references to supplementary documents that are relevant for the respective chapter and must be taken into account.

The following special characters are used in this manual to highlight instructions, references and lists:

Special characters	Explanation
	Instruction
	Reference to sections of this manual
→	Reference to supplementary documents
•	Listing without a defined order

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Customer service

For questions about the pump, ordering spare parts and technical information, please contact GEA Hilge using the following contact details:

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In addition, GEA Hilge is always interested in information and experiences resulting from the use of our products which can be valuable for making improvements to them.

Table of contents

1 Overview

This chapter contains an overview drawing of the pump and an example illustration of the type plate. For specifications regarding dimensions and weight ⟶ dimensional drawing.

GEA Hilge NOVATWIN+

The following figure shows the pump only as an example and may differ from the pump supplied. For the order-specific representation of the pump, in particular the position of inlet and outlet nozzles ⟶ dimensional drawing.

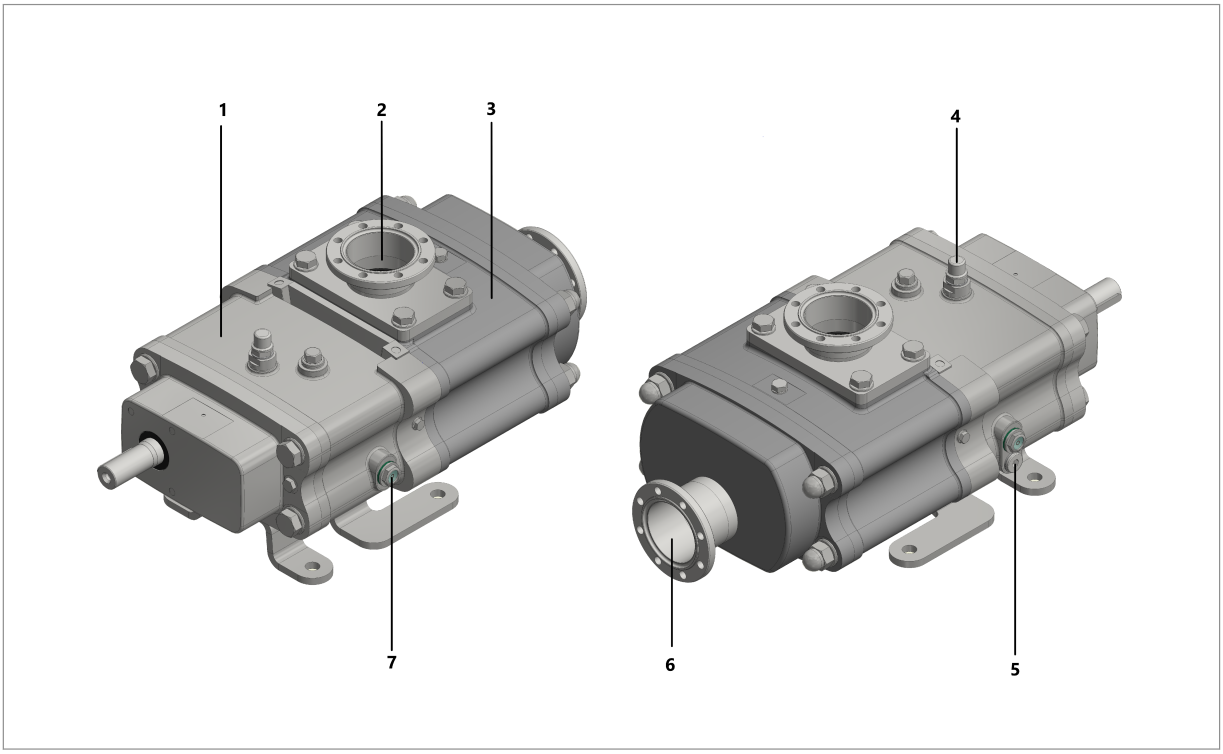

Fig. 1: GEA Hilge NOVATWIN+

1 Bearing casing
2 Outlet nozzle
3 Pump casing
4 Ventilation filter
5 Oil drain
6 Inlet nozzle
7 Oil sight glass (on both sides)

Type key

The following example is intended for illustration purposes only. The specifications in the data sheet and on the name plate of the pump are decisive for the correct type designation of the delivered pump.

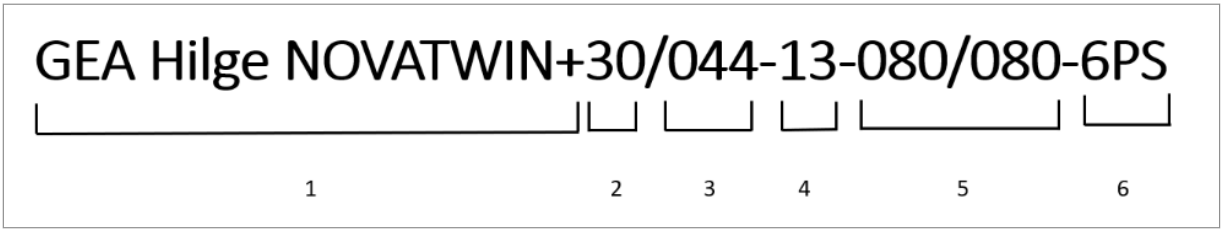

Fig. 2: Type key (example)

1 Series
2 Size
3 Delivery quantity at 1450 rpm
4 Maximum pressure difference
5 Size of inlet/outlet nozzles
6 Code for motor and protective hood

Type plate on the pump (example)

The following figure shows the type plate on the pump only as an example. The type plate attached to the pump is decisive.

Fig. 3: Type plate on the pump

Pump type:	Type designation of the pump
Ser. no.:	Serial number
Ma. no.:	Machine number
Q:	Delivery volume
H:	Pressure
P:	Motor power
n:	Speed
TAG no.:	TAG number
YOM:	Year of manufacturing

Dimensions and weight

All detailed information on dimensions and weight are included in the dimensional drawing.

2 Safety

This chapter contains important information that must be observed under all circumstances in order to use the pump safely.

2.1 Safety and warning information

Safety and warning information is identified in this manual by warning signs and is introduced by signal words which indicate the extent of the risk.

DANGER

This combination of warning sign and signal word indicates an impending, dangerous situation, which could lead to death or serious injury if it is not avoided.

WARNING

This combination of warning sign and signal word indicates a potentially dangerous situation, which could lead to death or serious injury if it is not avoided.

CAUTION

This combination of warning sign and signal word indicates a potentially dangerous situation, which could lead to slight or minor injuries if it is not avoided.

NOTICE

This combination of warning sign and signal word indicates a potentially dangerous situation, which could lead to property damage if it is not avoided.

ENVIRONMENT

This combination of warning sign and signal word indicates possible dangers for the environment.

2.2 Intended use

The pump has an anticipated service life of 20 years.

- Only use the pump in compliance with this manual and all supplementary documents.
- Have all work on the pump performed only by specialist personnel.
- Only operate the pump in technically perfect condition.
- Use pump exclusively for pumping the agreed pumped medium (⟶ data sheet).
- Observe the operating limits of the pump (⟶ data sheet).
- The pump is designed for a limited number of load cycles (N) between the pressureless state and the maximum permissible pressure according to the data sheet (N=1000, see AD 2000 leaflet S1, section 1.4 for this). During operation, any number of pressure fluctuations are permitted, as long as the load range of these does not exceed 10 % of the maximum permissible pressure.
- When pumping liquids containing solids: Comply with the limit values for the proportion of solids and grain size (⟶ data sheet).
- When pumping liquids containing gas: Observe the limit values for the gas contents (⟶ data sheet).
- Only operate the pump if the inlet and outlet lines are properly connected in the direction of flow (⟶ dimensional drawing).
- Avoid dry running: Only put the pump into operation with pumped medium and do not operate without pumped medium
- Avoid cavitation:
  - Open the inlet side valve fully during pump operation and do not use to regulate the pump capacity.
  - Open the outlet side valve fully during pump operation and do not use to regulate the pump capacity.
- Only operate the pump with suitable non-return protection.
- Only operate the pump with suitable differential pressure monitoring.
- Only operate the pump with suitable operating pressure limiting.

2.3 Improper use

Any use other than uses detailed under ➦ *Chapter 2.2 'Intended use' on page 12* shall be considered improper and is impermissible, for example:

- Operating if safety devices are removed or defective
- Operating if the inlet valve is not opened completely
- Operating if the outlet valve is not opened completely
- Throttling the outlet side
- Operating without suitable non-return protection
- Operating without suitable differential pressure monitoring
- Operating without suitable differential pressure limiting
- Using pressure safety valves to regulate the flow rate and the pressure
- Filling the pump while hot
- Filling the pump during operation
- Pumping acids or other corrosive liquids without approval from GEA Hilge
- Pumping pure gases
- Pumping of pumped medium which contains H_2S
- The pumping of explosive media as well as explosive mixtures, which could arise under certain operating conditions
- Installation and operation of the pump in an Ex-area
- Reversing the permissible pumping direction
- Spraying the pump with high-pressure jets or fire extinguishing equipment
- Failure to undertake measurements and checks for early damage detection
- Failure to observe the maintenance intervals
- Impermissible exchange of wearing parts
- Maintenance work was not carried out correctly

- Repair work was not carried out correctly
- Unauthorised modifications to the pump without approval from GEA Hilge

2.4 Obligations of the operator

The pump is used in the commercial sector. The operator of the pump is therefore subject to the statutory occupational safety obligations.

In addition to the safety instructions in this manual, the safety, occupational safety and environmental protection regulations applicable to the area of application of the pump must be observed.

In particular, the following shall apply:

- The operator must inform himself/herself about the applicable occupational health and safety regulations and identify additional hazards arising from the special working conditions at the place of pump installation in a risk assessment,. This must be implemented in the form of operating instructions for the operation of the pump.
- During the entire operating time of the pump, the operator must check whether the operating instructions drawn up by him/her correspond to the current status of the regulations and, if necessary, adapt them.
- The operator must clearly regulate and define the responsibilities for installation, operation, troubleshooting, maintenance and cleaning.
- The operator must ensure that all persons using the pump have read and understood this manual. In addition, he/she must regularly train the personnel and inform them about the risks.
- The operator must provide the personnel with the necessary protective equipment and instruct them to wear the necessary protective equipment.

Furthermore, the operator is responsible for ensuring that the pump is always in perfect technical condition. Therefore the following shall apply:

- The operator must ensure that the maintenance intervals described in this manual are adhered to.
- The operator must have all safety devices checked regularly for functionality and completeness.

Hygiene-protected areas

The operator must comply with and implement further obligations arising from the hygiene regulations for the food industry if the pump is used in such an area.

The following shall apply in this case:

- The operator must provide all employees who will enter hygiene-protected areas with the necessary safety equipment.
- The operator must ensure that all employees don the necessary safety equipment before they enter hygiene-protected areas and remove said equipment before they enter recreation and dining areas.
- The operator must make separate storage facilities available for any safety equipment that is worn and any other clothing.
- The operator must ensure that the safety equipment is cleaned, disinfected and kept in good condition.

2.5 Personnel qualifications

⚠ WARNING

Risk of injury if personnel are not sufficiently qualified!

If unqualified personnel carry out work on the pump/pump assembly or are in the danger area of the pump, dangers arise which can cause serious injuries and considerable damage to the system.

- All activities must be carried out only by qualified personnel.
- Keep unqualified personnel away from danger areas.

Only persons who are expected to perform their work reliably may be permitted to be personnel. Persons whose responsiveness is affected, e.g. by drugs, alcohol or medication, are not permitted.

When selecting personnel, observe the age and occupation-specific regulations applicable at the site of operation.

This manual lists the qualifications of the personnel listed below for the various fields of activity:

Supervisor

The supervisor is a person authorised by the operator, who supervises assembly and repair work as well as operation (commissioning and decommissioning) and gives instructions regarding technical processes and mechanical work. The supervisor has been instructed by the operator and knows the residual risks arising from the system.

The supervisor is also able to carry out the tasks assigned to him/her on the basis of his/her knowledge and experience as well as knowledge of the relevant regulations, and can recognise and avoid possible dangers independently.

Transport specialist

The transport specialist is trained to carry out transport work using a crane or forklift truck. He/she is able to select suitable lifting equipment in accordance with the transport requirements and use it properly. For transport with a forklift truck, the transport specialist is trained on the device and is able to guide it.

The transport specialist is specially trained for the working environment in which he/she works and knows the relevant regulations.

Qualified mechanic

The qualified mechanic is trained to carry out installation, testing, maintenance and repair work on hydraulic and mechanical machines and systems. He/she is able to read, evaluate and use instructions and technical specifications to carry out work properly.

The qualified mechanic is specially trained for the working environment in which he/she works and knows the relevant standards and regulations. He/she is trained in the use of the product and can carry out the assigned tasks safely and without damaging the product. He/she also has knowledge of pneumatics and hydraulics in order to assess and avert the dangers posed by pneumatic and hydraulic systems as well as the reactions of the systems.

Qualified electrician

The qualified electrician is trained to carry out installation, testing, maintenance and repair work on electrical installations. He/she is able to read, evaluate and use instructions, circuit diagrams and technical specifications to carry out work properly.

The qualified electrician is specially trained for the working environment in which he/she works and knows the relevant standards and regulations.

2.6 Personal protective equipment

Personal protective equipment is used to protect people from health and safety impairments at work. Personnel must wear appropriate personal protective equipment during all work on the pump/pump assembly.

The following explains the personal protective equipment:

	**Protective work clothing** Protective work clothing protects the torso, arms and legs from dangers such as: ■ Abrasion and grazing ■ Risk of injury due to moving parts ■ Burns due to hot surfaces or hot liquids ■ Scalds due to hot vapours ■ Injuries due to coming into contact with chemicals The type of protective work clothing must be selected according to the area of application. For work in the Ex-area, the protective clothing must be conductive.
	**Safety shoes** Safety shoes protect the feet from bruising, falling parts and pointy or sharp objects. They also protect against slipping on slippery surfaces. For work in the Ex-area, the safety shoes must be conductive.
	**Industrial safety helmet** An industrial safety helmet protects the head against falling objects, swinging loads and impacts on stationary objects.
	**Safety goggles** Safety goggles protect the eyes from flying parts and liquid splashes.
	**Hearing protection** Hearing protection protects against hearing damage caused by exposure to noise.

Protective gloves

Protective gloves protect the hands from abrasion and grazing, punctures or deeper injuries, as well as from contact with hot surfaces.

Chemical-resistant protective gloves protect hands from aggressive chemicals.

The type of protective gloves must be selected according to the area of application.

2.7 Labelling on the pump

⚠ WARNING

Risk from illegible signs!

In the course of time, stickers and signs may become dirty or otherwise unrecognisable, so that risks cannot be recognised and necessary operating instructions cannot be followed. This results in a risk of injury.

- Keep all safety, warning and operating instructions in a clearly legible condition at all times.
- Immediately replace damaged signs or stickers.

The following symbols are located in the work area. They refer to the immediate environment in which they are installed.

Hot surface

Hot surfaces, such as hot machine parts, containers or materials, but also hot liquids, are not always noticeable. Do not touch them without protective gloves.

2.8 Special hazards

The pump/pump assembly has been designed in accordance with state-of-the-art and current safety regulations. However, special hazards remain that require careful action. These hazards and the resulting behaviours and provisions are listed below.

Electrical current

DANGER

Risk of death due to electrical current!

In case of contact with live parts, there is an immediate risk of death due to electric shock. Damage to the insulation or individual components can be life-threatening.

- Only allow work to be carried out on the electrical systems by qualified electricians.
- If the insulation is damaged, immediately switch off the power supply and arrange for a repair.
- Before starting work on active parts of electrical systems and equipment, ensure that they are in a voltage-free state and that they remain so for the duration of the work. Observe the 5 safety rules:
  - Switch off.
  - Secure against being switched back on.
  - Determine that there is no current.
  - Earth and short-circuit.
  - Cover or isolate neighbouring live parts.
- Never bridge fuses or put them out of service. When replacing fuses, observe the correct current rating.
- Keep moisture away from live parts. This can lead to a short circuit.

Hot pumped medium

WARNING

Risk of scalding due to hot pumped medium!

Pumped medium can exhibit high temperatures. Contact with escaping pumped medium can cause severe scalding.

- Always wear heat-resistant protective work clothing, safety footwear, safety goggles and protective gloves during all work.
- Before all work on the pump: Switch off the pump, close the shut-off valves and wait until the pump has cooled down and the pressurised components of the pump are depressurised.

Hot surfaces

WARNING

Risk of injury due to hot surfaces!

The pumped media, the streamed-through components and the drive can exhibit high temperatures. Skin contact with hot surfaces causes severe burns.

- Always wear heat-resistant protective work clothing and protective gloves when working near hot surfaces.
- Before all work on the pump: Switch off the pump, close the shut-off valves and wait until the pump has cooled down.

High operating pressure

⚠ WARNING

Risk of injury from media under pressure!

The pump can be used to pump pumped media at high pressures. By opening pressurised components and through leakages, media can escape under high pressure and cause injuries.

- Wear personal protective equipment: Protective clothing, safety footwear, safety goggles, chemical-resistant protective gloves.
- Only allow work to be carried out on the system by qualified personnel.
- Do not disassemble any components during operation.
- Before working on components under pressure: Relieve components of pressure completely in the safe area and ensure this condition for the duration of the work.
- Regularly check pressurised components for flawless condition.

Moving parts

⚠ WARNING

Risk of death due to moving parts!

When working near moving parts, such as the drive spindle, hair may be drawn in, body parts may be crushed or other serious injuries may be caused.

- Do not interfere with moving parts during operation and do not handle moving parts.
- Before performing tasks, switch off moving components and secure them against being switched on again.
- Keep covers closed during operation.
- Pay attention to the stopping time: Before opening the covers, ensure that all parts are stationary.

Noise

⚠ WARNING

Risk of injury from noise!

In the area of the pump and drive, the noise level may exceed the permissible limit value and cause permanent hearing damage.

- When working in the immediate vicinity, always wear hearing protection.

Slippery surfaces

CAUTION

Risk of injury due to slippery surfaces!

Leaks can occur in the area of the pump. This can cause slippery surfaces and lead to falls and injuries.

– Regularly clean accessible surfaces to remove slippery deposits and leaks.

2.9 Safety equipment

WARNING

Risk of death due to malfunctioning safety equipment!

In the case of safety equipment that is not functioning or has been disabled, there is a risk of serious injury or death.

– Before starting work, check that all safety equipment is in working order and correctly installed.
– Never disable or override safety equipment.
– Ensure that all safety equipment is accessible at all times.

Providing safety equipment

- Ensure that contact protection is provided for hot, cold and moving parts.
- Ensure that sufficient earthing and an potential equalisation is guaranteed.
- For maintenance and repair work: Provide electrical disconnection devices.
- Provide a suitable non-return device in the system, which prevents uncontrolled back-flow of the pumped medium when the pump is at a standstill.
- Provide suitable operating pressure limiting, which reliably prevents the maximum permissible operating pressure of the system from being exceeded.
- Provide a suitable differential pressure monitoring system for the pump.

Safe handling of EMERGENCY STOP buttons

- If necessary, include EMERGENCY STOP buttons for switching off the system at a sufficient safety distance from the system.
- Remember the positions of all EMERGENCY STOP buttons, in order to be able to react quickly in an emergency.
- Always keep all EMERGENCY STOP buttons freely accessible.
- Only reset the EMERGENCY STOP once the danger has been rectified.

2.10 Securing against restarting

WARNING

Risk of death due to unauthorised or uncontrolled restart!

Unauthorised or uncontrolled restarting can result in serious injuries or even death.

- During all work on the system: Ensure that the system is secured against unauthorised or uncontrolled restarting.
- After completion of work on the system: Ensure that no persons are left in the danger zone before the system is switched on again.

The following provisions can be implemented to secure the system against being switched back on:

- Keep removed circuit breakers or fuse links in a safe place and replace them with suitable locking plugs or dummy elements.
- Lock the circuit breaker, switch cabinet or fuse box and keep the lock key in a safe place.
- Attach suitable switching prohibited signs or warning signs.

2.11 Environmental protection

ENVIRONMENT

Danger to the environment from incorrect handling of environmentally hazardous substances!

Incorrect handling of environmentally hazardous substances, especially incorrect disposal, can cause considerable damage to the environment.

- Always observe the information below regarding the handling of environmentally hazardous substances and their disposal.
- If environmentally hazardous substances accidentally enter the environment, take appropriate provisions immediately. If in doubt, inform the relevant local authority of the damage and ask for appropriate provisions to be implemented.

Lubricants

Lubricants such as oils contain toxic substances. They must not get into the environment. Disposal must be carried out by a specialist disposal company.

Pumping medium

The medium conveyed in the pump may be a hazardous substance for which special disposal requirements exist.

In order to ensure proper disposal, local regulations, laws and technical regulations must be observed and complied with if applicable.

Cleaning agent

Cleaning agents are irritants and contain toxic substances. They must not get into the environment.

In order to ensure proper disposal, local regulations, laws, technical regulations, etc. and the safety data sheets for the respective substances must be observed and complied with.

Preservative agents

Preservatives are irritants and contain toxic substances. They must not get into the environment.

In order to ensure proper disposal, local regulations, laws, technical regulations, etc. and the safety data sheets for the respective substances must be observed and complied with.

3 Product description

This chapter provides detailed information on the individual components and their functions. Depending on the scope of delivery, either a single pump or a pump assembly has been supplied.

3.1 Pump assembly

3.1.1 Pump

An overview of the pump is provided in chapter 1 of this operating manual (Fig. 1).

Heating system (optional)

Only if the pump has been correspondingly ordered: If required, the pump can be operated with an additional heating system. For specifications regarding the intended connections → dimensional drawing.

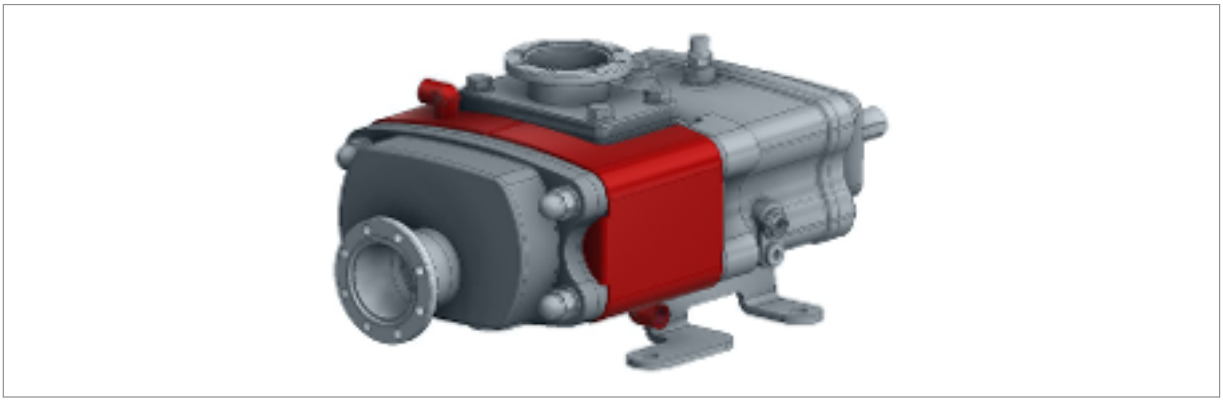

Fig. 4: Heating jacket (example)

3.1.2 Coupling

For further information on the coupling: Observe the technical documentation from the manufacturer of the coupling.

The coupling connects the pump to the motor and serves to transmit power from the motor to the pump. A coupling guard protects against external interference.

3.1.3 Motor

For further information on the motor: Observe the technical documentation from the manufacturer of the motor.

The motor serves to drive the pump. Depending on the scope of delivery, a frequency converter can be provided to control the motor.

3.2 Sealing supply system

Depending on the scope of delivery, a sealing supply system may be provided for the mechanical seals of the pump.

For further information on the sealing supply system: Observe the dimensional drawing, operating and installation diagram, as well as the technical documentation from the manufacturer of the sealing supply system.

The sealing supply system supports the mechanical seals with respect to the lubrication and cooling. The system comprises a closed circulation circuit that leads from the oil-buffered seal tank to the sealing cavity of the mechanical seal and back to the oil-buffered seal tank.

If a circulation pump is included in the delivery: The circulation pump improves the cooling effect of the sealing supply system through increased circulation.

3.3 Other components

3.3.1 Measuring devices

Depending on the scope of delivery, the pump can be equipped with different measuring devices.

For further information on the measuring devices: Observe the dimensional drawing and technical documentation from the respective manufacturer.

Measuring devices can be used to monitor temperature, pressure, vibrations and level at the pump.

3.3.2 Frequency converter

Depending on the scope of delivery, a frequency converter can be provided to control the motor. For further information on the frequency converter: Observe the technical documentation from the manufacturer of the frequency converter.

4 Transportation and storage

This chapter contains information on lifting, transporting and storing the pump. For specifications regarding dimensions and weight ⟶ Dimensional drawing.

4.1 Lifting and transporting the pump/pump assembly

⚠ WARNING

Risk of explosion due to electrostatic discharges of statically charged components!

Electrostatic charging of the pump and further components can lead to sparking. This can cause explosions in potentially explosive atmospheres, which can result in serious or fatal injuries and considerable damage to property.

- Remove packaging outside the hazardous area.
- Before starting transport in the Ex-area, obtain written permission to work (in the EU, refer to the explosion protection document).
- Perform transport only under exclusion of potentially explosive atmospheres. If this is not possible, ensure that the transported item is adequately earthed during transport.
- The transport must be carried out exclusively by transport specialists.
- Only use tools that are approved for use in Ex-areas.

Failure to observe these instructions will result in loss of explosion protection.

⚠ WARNING

Risk of death due to suspended loads!

When lifting loads, there is a risk of fatal injury from falling or uncontrolled swivelling parts.

- Ensure that there are no persons, objects or obstacles in the swivelling area of the cargo during transport.
- Use only approved lifting gear and slings with sufficient load-bearing capacity.
- Do not attach to built-on components.
- Ensure that the slings are securely seated.
- Do not use torn or abraded ropes and belts.
- Do not lay ropes and straps on sharp edges and corners, do not knot or twist them.

⚠ WARNING

Risk of injury from falling or tipping cargo!

Cargo may have an eccentric centre of gravity. Cargo can tip over and fall when incorrectly fastened. Serious injuries can be caused by falling or tipping cargo.

- Observe centre of gravity.
- When transporting by crane, attach the crane hook so that it is above the centre of gravity of the cargo.
- Lift the cargo carefully and observe if it tips. If necessary, change the fastening position.

NOTICE

Property damage due to improper transportation!

- Transport only by adequately trained and qualified personnel.
- Do not allow the transport piece to hit or bump against anything.
- Do not allow the transport piece to fall down or tip over.

Personnel:

- Supervisor
- Transport specialist

Protective equipment:

- Protective work clothing
- Safety shoes
- Industrial safety helmet
- Safety goggles
- Protective gloves

Transport by crane

Cargo can be transported directly by crane under the following conditions:

- The pump is emptied of all media that would pose a risk to health and/or the environment during transport due to uncontrolled leakage.
- Cranes and hoists must be designed for the weight of the cargo.
- Load carrying equipment and lifting gear must be designed for the weight of the cargo.
- The operator must be authorised to operate the crane.
- Transport personnel must be trained for the special requirements in the Ex-area.

Lifting (without lifting lugs)

If the transported item is transported into an Ex-area, it must be unpacked before transport and a potential equalisation must be installed for transport.

Fig. 5: Lifting the pump

Fig. 6: Lift the pump assembly

1. Fasten cables, straps or multi-point hangers in accordance with *Fig. 5* or *Fig. 6*.
2. Ensure that the transported item is hanging straight and observe the eccentric centre of gravity if necessary.
3. Lift the transported item and start transport.

Lifting with lifting lugs

If the transported item is transported into an Ex-area, it must be unpacked before transport and a potential equalisation must be installed for transport.

The lifting lugs must only be used for lifting the individual pump.

Lifting the entire pump assembly by means of lifting lugs is not permitted!

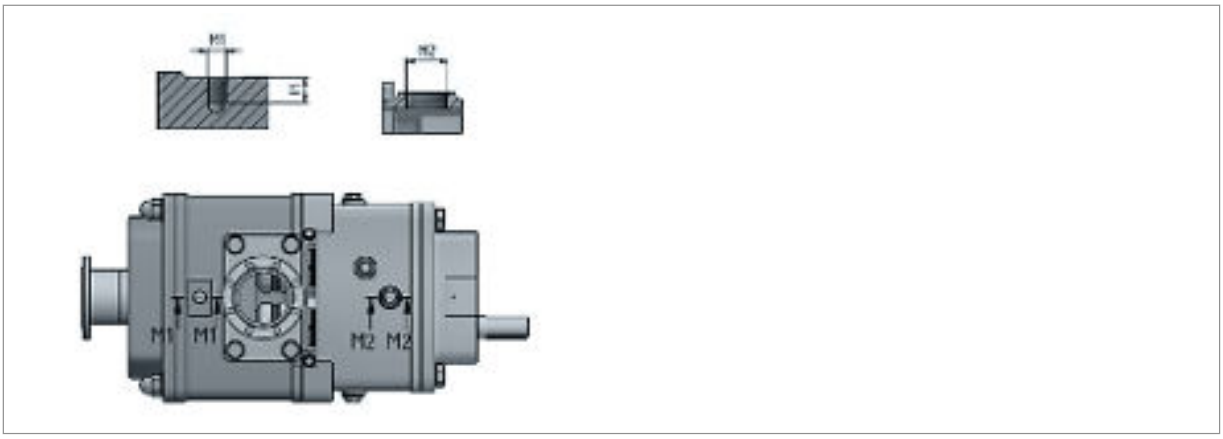

Fig. 7: Thread sizes for lifting lugs (see table below for details)

Tab. 1: Thread sizes for lifting lugs

GEA Hilge NOVATWIN+ Size	M1	t1 [mm]	M2
10	M10	16	M27x2
20	M10	16	M27x2
25	M10	16	M27x2
30	M12	16	M27x2
35	M12	16	M27x2
40	M16	20	M27x2
45	M16	20	M27x2

NOTICE

Property damage caused by uncleanliness!

The oil filling hole is used to fit the lifting lugs.

This requires cleanliness when the oil filling hole is opened and demands a careful approach when fitting the lifting lugs.

1. Select lifting lugs according to *Fig. 8* and ➥ *Tab. 1 'Thread sizes for lifting lugs' on page 28* and attach them to the pump.
2. Fasten cables, straps or multi-point hangers in accordance with *Fig. 8*.

Fig. 8: Lifting the pump with lifting lugs

3. Ensure that the transported item is hanging straight and observe the eccentric centre of gravity if necessary.
4. Lift the pump and start transport.

Lifting with crossbeam

The following prerequisites must be met in order to transport the transported item with a lifting beam:

- The lifting beam and cables must be designed for the weight of the cargo.
- Slings must be designed for the weight of the cargo.
- Transport personnel must be trained for the special requirements in the Ex-area.

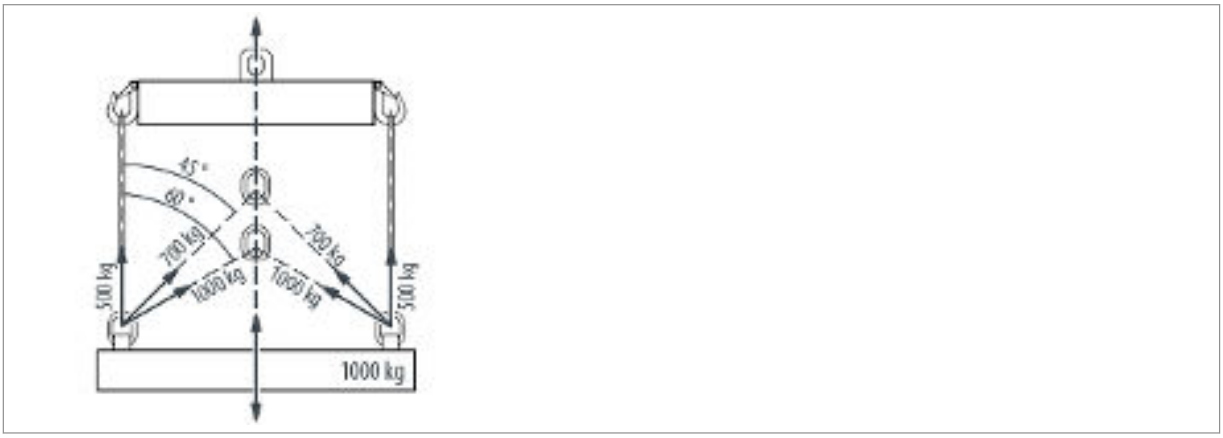

Fig. 9: Single crossbeam

Transport by forklift truck

The cargo can be transported with a forklift truck under the following conditions:

- The pump is emptied of all media that would pose a risk to health and/or the environment during transport due to uncontrolled leakage.
- The forklift truck must be designed for the weight of the cargo.
- The forklift driver must be authorised to drive industrial trucks with a driver's seat or operator's platform in accordance with local regulations.
- Transport personnel must be trained for the special requirements in the Ex-area.

If the transported item is transported into an Ex-area, it must be unpacked before transport and a potential equalisation must be installed for transport.

1. Move the forklift truck with the forks between the bars of the transported item.
2. Retract the forks so far that they protrude on the opposite side.
3. Ensure that the transported item cannot tilt if its centre of gravity is off-centre.
4. Lift the transported item and start transport.

4.2 Storing the pump

NOTICE

Property damage due to inadequate preservation!

– Always preserve the pump properly before storage (➦ *Chapter 5 'Preservative' on page 31*).

1. Seal off the inlet and outlet ports with plastic covers.
2. Protect seals against dust and damage.
3. Store pump under the following conditions:
   - Do not store outdoors.
   - Ambient temperature: 5-25 °C.
   - Protect from direct sunlight.
   - Protect from frost.
   - Store in a dry and dust-free place.
   - Relative humidity: 0-20 %.
   - Do not expose to aggressive media.
   - Protect from rodents.
   - Avoid mechanical shocks.
   - Pump: Rotate the shaft once per month (approx. 30°).
   - For storage periods longer than 3 months: Check the general condition of all parts and packaging regularly.

Following storage periods exceeding 3 years: GEA Hilge should be contacted in order to put the pump back into operation.

5 Preservative

This section contains information on preservation of the pump and removing the preservation.

For information on preserving other components: Observe the documentation from the manufacturer of the respective component.

NOTICE

Property damage due to deficient/lacking preservation!

– Ensure proper preservation in order to avoid corrosion damage.

Personnel:

- Supervisor
- Qualified mechanic

Protective equipment:

- Protective work clothing
- Safety shoes
- Safety goggles
- Protective gloves

5.1 Short-term preservation (up to maximum 3 months)

Unless ordered otherwise, the bearing casing of the pump is filled with lubricating oil by GEA Hilge before delivery. The quantity of lubricating oil added corresponds to the quantity required for operation. The pump is therefore sufficiently preserved for a maximum period of 3 months.

→ Make sure that the bearing casing of the pump is filled with sufficient lubricating oil (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*).

5.2 Long-term preservation (from 3 months)

1. Drain lubricating oil from the bearing casing into a suitable collecting container. The collecting container must be able to collect the following quantities of lubricating oil:

Tab. 2: Lubricating oil quantities

GEA Hilge NOVATWIN+ Size	Bearing casing approx. oil quantity [l]
10	0.60
20	0.60
25	0.60
30	1.20
35	1.20
40	2.40
45	2.40

2. Make sure that the oil outlet on the bearing casing is closed again.
3. Completely fill the bearing casing with preservative (oil ISO VG 68-150). The following quantities of preservative are required:

Tab. 3: Preservative quantities

GEA Hilge NOVATWIN+ Size	Bearing casing approx. oil quantity [l]
10	2
20	2
25	2
30	3
20	3
40	6
45	6

4. Close the oil inlet on the bearing casing with a screw plug.

5. Remove the ventilation filter (*Fig. 10*) from the bearing casing and store it safely. Then close the opening with a blind plug.

Fig. 10: Ventilation filter on the bearing casing

1 Ventilation filter

6. Seal off the inlet and outlet ports with plastic covers.

Following storage periods exceeding 3 years: GEA Hilge should be contacted in order to put the pump back into operation.

5.3 Removing the preservative

After short-term preservation:

→ Check the oil level and, if necessary, top up lubricating oil before commissioning (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*).

After long-term preservation:

Following storage periods exceeding 3 years: GEA Hilge should be contacted in order to put the pump back into operation.

1. → Remove the blind plug and replace the ventilation filter (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*) on the bearing casing.

Fig. 11: Ventilation filter on the bearing casing

1 Ventilation filter

2. → Drain preservative agent completely out of the bearing casing into a suitable collecting container. The collecting container must be able to collect the following quantities of preservative:

Tab. 4: Preservative quantities

GEA Hilge NOVATWIN+ Size	Bearing casing approx. oil quantity [l]
10	2
20	2
25	2
30	3
35	3
40	6
45	6

3. → Make sure that the oil outlet on the bearing casing is closed again.

4. → Fill up with lubricating oil (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*) and close the oil inlet again with the screw plug.

6 Set-up and connection

This chapter contains information on setting up and aligning the pump assembly, as well as connecting pipelines and the electrics.

Personnel:

- Supervisor
- Transport specialist
- Qualified mechanic
- Qualified electrician

Protective equipment:

- Protective work clothing
- Safety shoes
- Industrial safety helmet
- Safety goggles
- Protective gloves

6.1 Preparing the pump assembly

6.1.1 Installing the heat insulation (optional)

NOTICE

Property damage due to improper heat insulation!

– Always install the heat insulation so that a leak on the pump can be safely detected at all times.

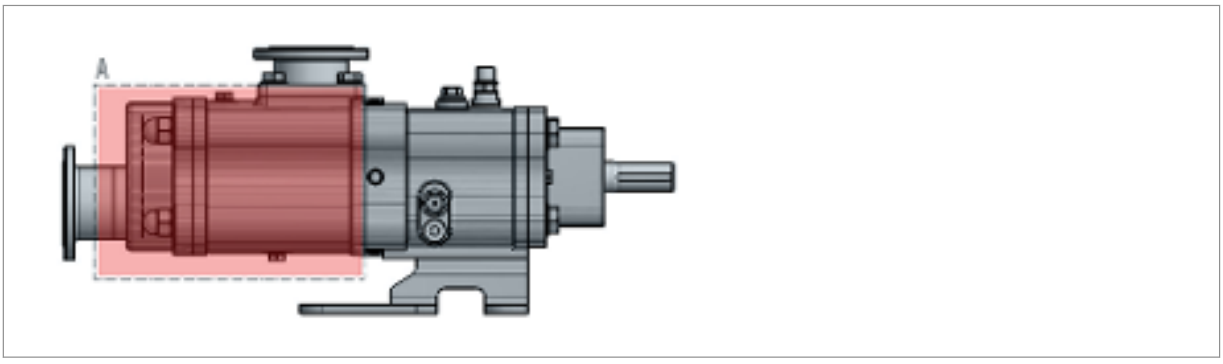

Fig. 12: Limits for heat insulation (A)

→ Installing the heat insulation (*Fig. 12*, area A).

6.1.2 Install pump on profile frame or base plate

Only required when the pump assembly is completed at the site of installation.

If the pump was ordered without profile frame or base plate: Design the profile frame or base plate so that torsions and impermissible vibrations are safely prevented during operation. Provide height compensation for the drive.

1. Lift the pump.
2. Set pump on profile frame or base plate.
3. Turn in screws to fasten, but do not fasten tight.

6.1.3 Installing the coupling

Only required when the pump assembly is completed at the site of installation.

1. For further information and in the case of special couplings: Observe the documentation from the manufacturer of the coupling.
2. Coat motor shaft ends with molybdenum disulphide (for example, Molykote).
3. Insert adjusting spring.
4. **NOTICE**

   Property damage due to installation errors!

   - Do not tilt coupling halves when sliding on.
   - Do not impact or knock any pump, coupling or motor parts.
   - Do not push on the coupling half by heating it.

   Push on the motor-side coupling half according to the manufacturer's instructions (⟶ Operating manual coupling).
5. Tighten the set screws on both coupling halves on the motor side, taking into consideration the tightening torques.

6.1.4 Assemble motor on profile frame or base plate

Only required when the pump assembly is completed at the site of installation.

If the pump was ordered without profile frame or base plate: Design the profile frame or base plate so that torsions and impermissible vibrations are safely prevented during operation. Provide height compensation for the drive.

1. For further information: Observe the documentation from the manufacturer of the motor as well as the documentation from the manufacturer of the coupling.
2. Lift the motor.
3. Set motor on profile frame or base plate.
4. Bring together coupling halves. Maintain the specified gap dimension between the coupling halves (⟶ Operating manual coupling).
5. Adapt the motor shaft end to the height of the pump shaft end using suitable shims on the motor.
6. Turn in screws to fasten, but do not fasten tight.

6.2 Preparing the installation site

Ambient conditions

Ensure that the installation site fulfils the following requirements:

- protected against direct sunlight
- protected against frost
- no effects due to wind loads
- no effects from external vibrations (e.g. earthquakes) on the pump
- sufficient lighting
- sufficient space so that the pump assembly is freely accessible from all sides
- sufficient space to be able to perform all maintenance and repair work, including the installation and removal of components
- sufficient protection against external impacts (e.g. impact of objects, collision).

Foundation and base

Ensure that the foundation and base fulfils the following requirements:

- Level
- Clean (no oil, dust or other contaminants)
- Service weight of the pump assembly and all operational forces can be absorbed
- The stability of the pump assembly is ensured

6.3 Installing the pump assembly

The possible installation and mounting variants for the pump assembly are described below:

- *With machine feet: ➦ Chapter 6.3.1 'With machine feet' on page 38*
- *With metal dowels (screwed): ➦ Chapter 6.3.2 'With metal dowels (screwed)' on page 39)*
- *With anchor bolt (cast): ➦ Chapter 6.3.3 'With anchor bolt (cast)' on page 39)*

6.3.1 With machine feet

The distance between the pump/pump assembly and the ground should be at least 50 mm so that dirt cannot accumulate unnoticed underneath.

1. Transport the pump assembly to the installation site (➦ *Chapter 4.1 'Lifting and transporting the pump/pump assembly' on page 25*).
2. Place the pump assembly on a suitable base.
3. Align the pump assembly:
   - Undo M16 nut (no. 1 in *Fig. 13*) on machine feet (no. 3 in *Fig. 13*).
   - Adjust height of machine feet. This is achieved by turning the machine feet. The folded edge (no. 2 in *Fig. 13*) is used to support the process.
   - Tighten M16 nut (no. 1 in *Fig. 13*) .

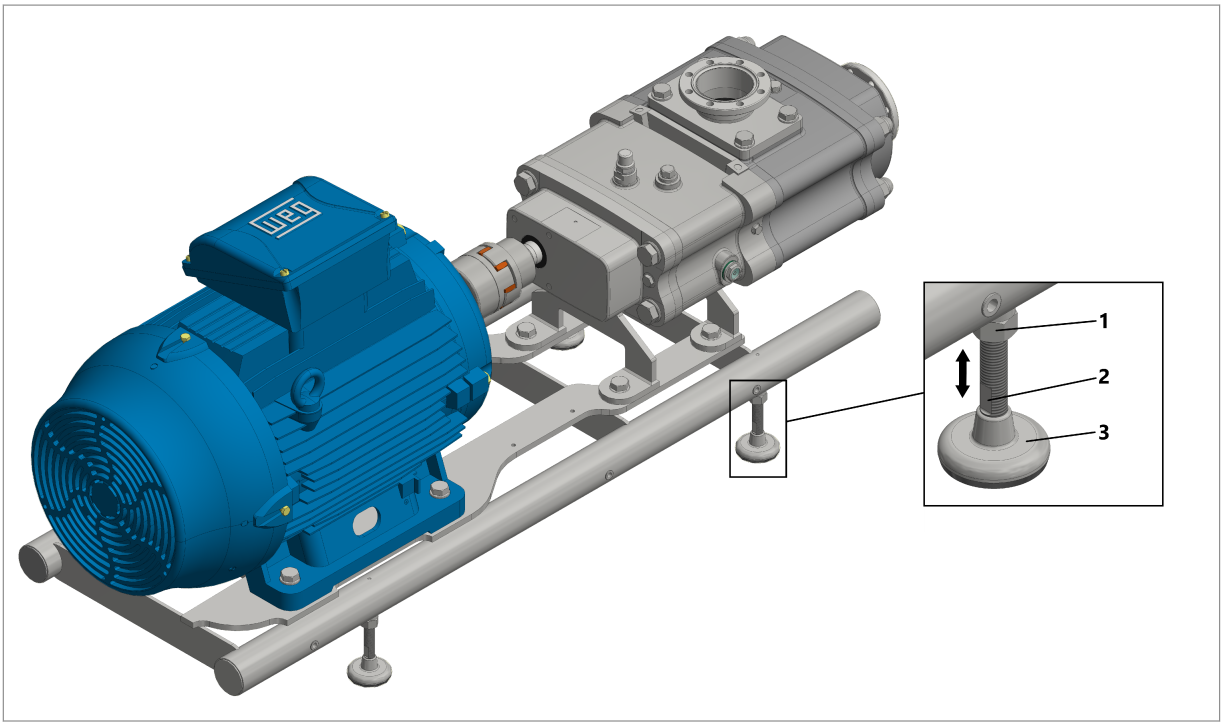

Fig. 13: Align the pump assembly

4. Repeat step 3 for all further levelling machine feet (if necessary).

5. Check the horizontal alignment of the pump assembly using a spirit level. If the pump assembly is not correctly aligned: Correct the alignment.

6.3.2 With metal dowels (screwed)

1. Transport the pump assembly to the installation site (➥ *Chapter 4.1 'Lifting and transporting the pump/pump assembly' on page 25*).
2. Place the pump assembly on the foundation.
3. Fasten pump assembly to the foundation with suitable screws and metal dowels.
4. Check the horizontal alignment of the pump assembly using a spirit level. If the pump assembly is not correctly aligned: Correct the alignment.

6.3.3 With anchor bolt (cast)

! NOTICE

Property damage due to base plate tension!

A tensioning of the base plate may prevent coupling alignment and result in pump damage.

- Mount the base plate on a level foundation.
- It is essential to observe the alignment tolerances.

Placing the pump assembly on the foundation

1. Transport the pump assembly to the installation site (➥ *Chapter 4.1 'Lifting and transporting the pump/pump assembly' on page 25*).
2. Place the pump assembly on the foundation.
3. Hook the foundation bolts (no. 1 in *Fig. 14*) into the base plate fastening holes from below.

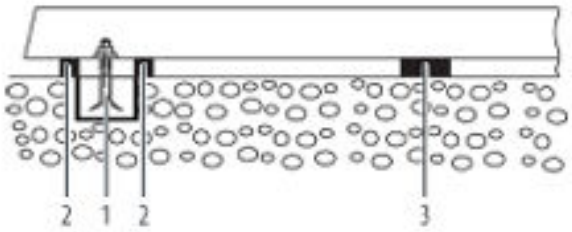

Fig. 14: Placing the pump assembly on the foundation

1 Foundation bolt
2 Steel fixings, left and right of foundation bolt
3 Additional steel fixing (distance of anchor holes > 750 mm)

4. Place the pump assembly on the foundation.

5. Sink the foundation bolts (No. 1 in *Fig. 14*) into the prepared anchor holes.

> *Take into account the minimum dimension for the anchor holes.*

6. Using steel fixtures, align the pump assembly in accordance with the height and system dimensions as follows:
   - Place one steel fixture (No. 2 in *Fig. 14*) to the left and right of each foundation bolt (No. 1 in *Fig. 14*) respectively
   - If the distance from the anchor holes is greater than 750 mm, locate additional steel fixtures (No. 3 in *Fig. 14*) centrally on either side of the base plate
7. Ensure that the base plate and steel fixtures lie flush.
8. Using a digital spirit level (or alternatively, a laser alignment device), check in longitudinal and transverse directions that the following tolerances are not exceeded:

   Permissible tolerances for the evenness of support points in relation to each other:
   - Base plate shorter than or equal to 3 m: **1 mm tolerance**
   - Base plate longer than 3 m: **2 mm tolerance**

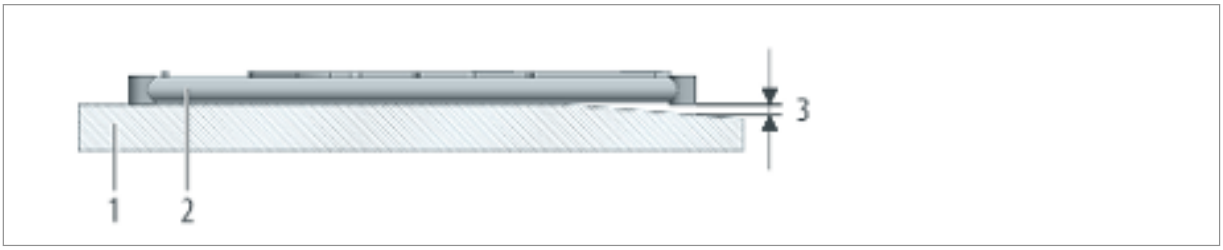

Fig. 15: Aligning the base plate

1 Foundation
2 Base plate
3 Tolerance

9. Repeat the process until the base plate is correctly aligned.

Fastening the pump assembly

1. Cast the anchor holes using a casting mortar.
2. Once the mortar grouting compound has set, tighten the screws on the steel frame (base plate) evenly.
3. Compensate for any unevenness in the fixing surface using spacers adjacent to each screw.
4. Tighten screws with appropriate tightening torque.

6.4 Align the pump assembly

NOTICE

Material damage due to incorrect coupling alignment!

- With height, lateral or angular offset: Align the motor precisely to the pump.
- For detailed information and for special couplings (⟶ Documentation from the manufacturer).

Determining alignment tolerances

1. Determine alignment tolerances for pump (➦ *'Pump alignment tolerances' on page 41*).
2. Determine alignment tolerances for coupling.

Permissible deviations and dimensions: Manufacturer's specifications (⟶ Operating manual coupling).

3. Determine alignment tolerances for the motor.

Permissible deviations and dimensions: Manufacturer's specifications (⟶ Operating manual motor).

4. Determine the lowest value from the ascertained alignment tolerances (pump, coupling, motor).

Pump alignment tolerances

Fig. 16: Axial offset

S_{1max} maximum axial gap
S_{1min} minimum axial gap
ΔKa permissible axial gap in mm

Tab. 5: Axial offset

GEA Hilge NOVATWIN+ Size	Axial offset ΔKa [mm]
10	+1.0
20	+1.0
25	+1.0
30	+1.0
35	+1.0
40	+1.0
45	+1.0

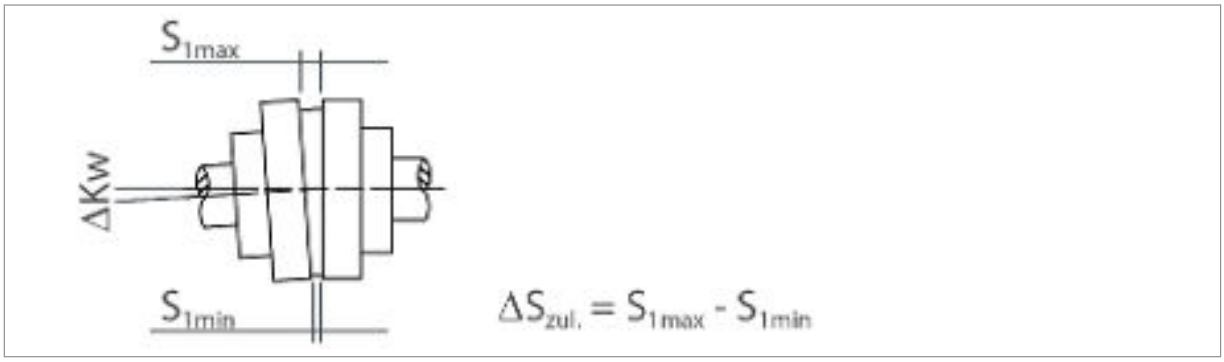

Fig. 17: Angle offset

S_{1max} maximum axial gap
S_{1min} minimum axial gap
ΔKw permissible angle offset in degrees
$\Delta S_{perm.}$ permissible angle offset in mm

Tab. 6: Angle offset

GEA Hilge NOVATWIN+ Size	Angle offset ΔS_{perm} [mm]							
	750 rpm	1000 rpm	1200 rpm	1450 rpm	1750 rpm	2000 rpm	2400 rpm	2800 rpm
10	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
20	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
25	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
30	0.35	0.31	0.28	0.26	0.23	0.22	0.20	0.18
35	0.35	0.31	0.28	0.26	0.23	0.22	0.20	0.18
40	0.40	0.35	0.32	0.29	0.26	0.25	0.22	0.21
45	0.40	0.35	0.32	0.29	0.26	0.25	0.22	0.21

Fig. 18: Radial offset

ΔKr permissible radial offset in mm

Tab. 7: Radial offset

GEA Hilge NOVATWIN+ Size	Radial offset ΔKr [mm]							
	750 rpm	1000 rpm	1200 rpm	1450 rpm	1750 rpm	2000 rpm	2400 rpm	2800 rpm
10	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
20	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
25	0.31	0.27	0.24	0.22	0.20	0.19	0.17	0.16
30	0.35	0.31	0.28	0.26	0.23	0.22	0.20	0.18
35	0.35	0.31	0.28	0.26	0.23	0.22	0.20	0.18
40	0.40	0.35	0.32	0.29	0.26	0.25	0.22	0.21
45	0.40	0.35	0.32	0.29	0.26	0.25	0.22	0.21

Determining peak height changes

1. Determine peak height change of the pump:

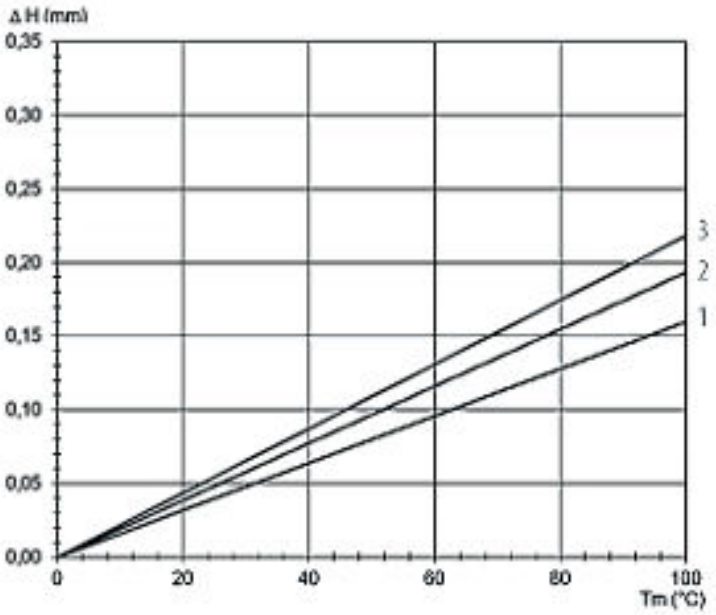

Fig. 19: Peak height change

ΔH (mm)	Peak height change
Tm (°C)	Temperature median value Tm = (T2-T1)/2 T1 = Ambient temperature T2 = Medium temperature
1	GEA Hilge NOVATWIN+ 10
1	GEA Hilge NOVATWIN+ 20
1	GEA Hilge NOVATWIN+ 25
2	GEA Hilge NOVATWIN+ 30
2	GEA Hilge NOVATWIN+ 35
3	GEA Hilge NOVATWIN+ 40
3	GEA Hilge NOVATWIN+ 45

2. Determine peak height change of the motor.

Permissible deviations and dimensions: Manufacturer's specifications (⟶ Operating manual motor).

3. Calculate the difference between the two values determined (pump, motor).

Axial and angular offset alignment tolerances

For the purpose of alignment, the lowest value of the determined alignment tolerances (pump, coupling, motor) applies.

Radial offset alignment tolerances

The permissible radial offset results from the difference of the peak height change (pump, motor) plus the lowest value of the determined alignment tolerances (pump, coupling, motor).

Aligning the coupling

1. Measure the circumference of the coupling on two levels, each offset 90°.
2. Check the gap to the outer diameter with a straight-edge (no. 1 in ➦ *'Aligning the motor' on page 46*):
   - Place straight-edge over both coupling halves.
   - In case of a gap to the outer diameter, align the motor (➦ *'Aligning the motor' on page 46*).

Fig. 20: Checking the coupling alignment

3. Check gap dimension with a feeler gauge (no. 2 in ➦ *'Aligning the motor' on page 46*):
   - Permissible gap dimension: Manufacturer's specifications (⟶ Operating manual coupling).
   - Measure gap dimension (A in ➦ *'Aligning the motor' on page 46*) between the coupling halves with feeler gauge.
   - In the event of an impermissible gap dimension: Align the motor (➦ *'Aligning the motor' on page 46*).
4. Check the lateral and height offset using a dial gauge:
   - Carry out measurement as shown (*Fig. 21*).
   - In the event of a lateral or height offset: Align the motor (➦ *'Aligning the motor' on page 46*).

     Permissible axial or radial deviation, measured on the front face of the coupling or at the coupling circumference: Observe the manufacturer's specifications for the pump, coupling and motor.

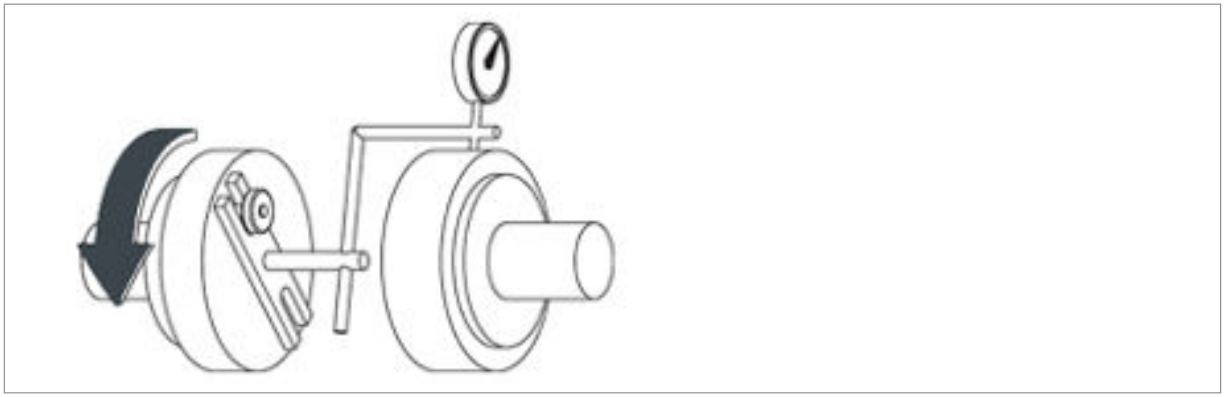

Fig. 21: Checking the lateral and height offset

5. Check the angular offset with a dial gauge:
   - Carry out measurement as shown (*Fig. 22*).
   - In the event of an angular offset: Align the motor (➦ *'Aligning the motor' on page 46*).

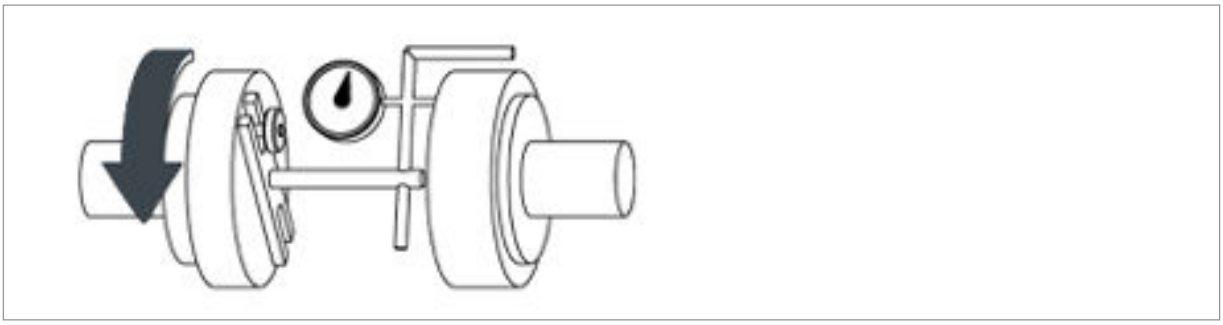

Fig. 22: Checking the angular offset

6. Check the coupling alignment again and correct the motor alignment if necessary.

Aligning the motor

Application scenarios for a motor alignment

In the following cases a motor alignment is necessary:

- *gap dimension too small/too large*
- *lateral, height or angular offset too small/too large*

1. Align the motor such that the coupling halves are precisely flush, if necessary position shim plates under the motor.
2. Check alignment.
3. If the height offset is still evident: repeat the alignment process.
4. Then tighten screws for fastening the pump and motor.
5. Check alignment again.
6. If the height offset is still evident: Repeat the alignment process again.

6.5 Fitting the coupling guard

1. If the coupling guard is not supplied fully fitted:
   - Fit the coupling guard.
   - Adjust the coupling guard to the distance between the pump and motor. In order to do so slide the slide piece into the outer part of the coupling guard.
   - Bolt together the outer part and the slide piece in such a way that contact with the coupling with fingers is no longer possible.
2. If a protective hood is used:
   - Ensure space between the protective hood and pump/motor for ventilating the pump assembly.
   - Design and fasten the protective hood in such a way that contact with the coupling with fingers is not possible.

6.6 Configuring the pipelines

NOTICE

Property damage due to excessively high forces and torques of the piping on the pump!

To avoid damaging the pump, do not exceed permissible values (⟶ dimensional drawings).

If present: Observe instructions of the supply system manufacturer (e.g. sealing system supply).

1. Calculate pipework forces and observe all operating statuses:
   - Cold/warm
   - Empty/full
   - Pressure-free/pressurised
   - Position changes of flanges
2. Ensure that no additional static loads (e.g. wind load, snow load) have an effect on the pump.
3. Ensure that pipe supports are constantly able to slide and do not rust and seize.
4. Incorporate inlet and outlet-side venting.

Determining nominal widths

Keep the flow resistance in the pipework as low as possible.

1. Establish the nominal diameter of the inlet line ≥ the nominal diameter of the inlet nozzle.
2. Establish the nominal diameter of the outlet line ≥ the nominal diameter of the outlet nozzle.

Determining pipeline lengths

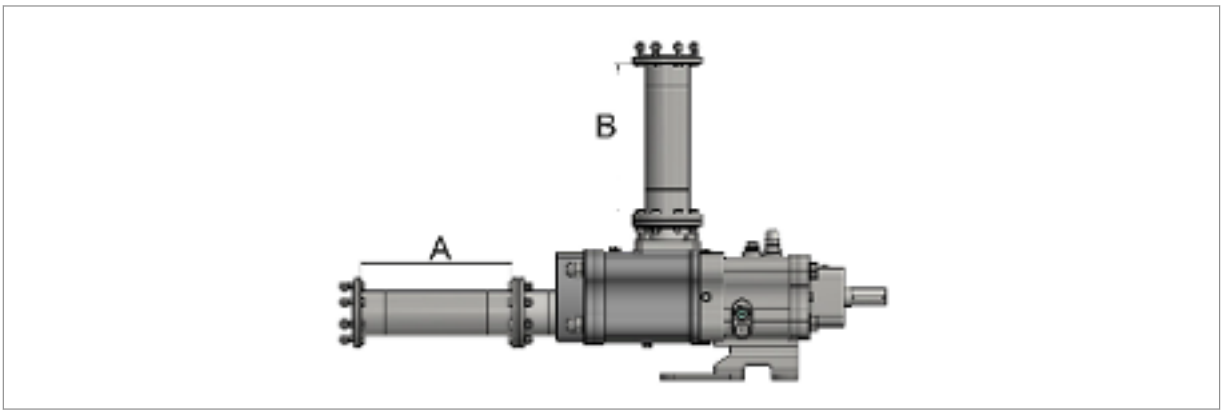

Fig. 23: Use straight lengths of pipe upstream and downstream of the pump (recommendation)

Maintain recommended minimum values for installation of the pump:

- A > 5 x DN
- B > 5 x DN

DN = diameter nominal width

Inlet side: shorter lengths are possible, however, doing so may restrict the hydraulic performance data.

Outlet side: shorter lengths are possible, however, doing so may lead to increased noise.

Optimising changes in diameter and direction

To optimise changes in diameter and direction, proceed as follows:

1. Avoid sudden changes in diameter and direction in the pipe course.
2. Ensure that no cavitation occurs.
3. Account for thermal expansion.

Combination of the operator side lines

NOTICE

Impairment of operation due to incorrect design of the lines!

– For further information on the design of the lines, contact the manufacturer (GEA Hilge).

The design of the pipelines can significantly influence the operating behaviour of the pump.

The following factors are relevant:

- Pipe dimensions,
- Course of the lines,
- Arrangement of the pipe branches.

Avoiding overpressure

In order to avoid overpressure, the following conditions must be ensured:

1. Ensure that the factory setting of the safety device complies with the pump requirements.
2. Always guide the safety device return into the safe (pressureless) area.
3. To exclude impermissible pressure build-up, monitor pressure build-up.
4. Discharge flammable and potentially explosive pumped media safely.
5. Ensure that the pressure level in the safe area guarantees pressure relief via the safety device.

Enabling separation and blocking of the pipes

Provide pipe connections for flushing, bleeding and emptying all relevant pipe areas (operator side installation) for maintenance and repair work:

1. Select shut-off elements, which can be secured against unintentional opening.
2. Include shut-off elements in the inlet and outlet lines.
3. Include blanking discs in the inlet and outlet lines.

Provide filter in the inlet line

NOTICE

Pump damage due to unsuitable filter insert!

The use of an unsuitable filter insert can affect the pumping capacity of the pump and may lead to cavitation and damage to the pump.

- Only operate the system with a suitable filter insert.
- During commissioning or after maintenance work on the pipeline network, a fine filter insert is required.
- The fine filter insert must be removed during operation.

A filter in the inlet line is also recommended during ongoing operation.

Depending on the application, filtration may not be possible for technical reasons if the pumped media is highly viscous. In these cases, alternative protective provisions must be implemented, e.g. safe cleaning of the pipelines on the inlet side before commissioning by the operator.

1. Provide a filter in the inlet line and select the mesh size for the filter insert according to the following table:

Tab. 8: Mesh size for the filter insert

Operating phase	GEA Hilge NOVATWIN+ Size	Mesh side [mm] depending on the viscosity of the medium to be pumped	
		Viscosity: 1 -600 mm²/s	Viscosity: > 600 mm²/s
Start-up phase during commissioning Start-up phase after maintenance work on the pipeline network, etc.	all sizes	1	1
Ongoing operation	10	2	3
	20	2	3
	25	2	3
	30	4	6
	35	4	6
	40	4	6
	45	4	6

2. In order to monitor the contamination include differential pressure monitoring:
   - Observe the filter's permissible differential pressure (⟶ manufacturer's instructions)

Avoiding running in reverse

1. With a safety-related component (non-return protection), make sure that the medium cannot flow back after switching off the pump.

NOTICE

Property damage resulting from pump reversal!

– Do not operate the pump without non-return protection!

2. Select a distance < 2 m between the outlet nozzle and the non-return protection.

6.7 Connecting the pipelines

WARNING

Explosion hazard due to electrostatic discharges when using statically charged mounting covers in Ex-area!

The use of the plastic mounting covers in the Ex-area creates a risk of explosion through static discharge.

– Use plastic mounting covers only outside the Ex-area.
– Only use metal cover plates in Ex-area.

NOTICE

Damage to the pump due to loose residues in the pipework!

Welding slag or weld beads and other loose objects may damage the pump.

– Remove loose residues from the pipework.

Prerequisites:

- All pipelines, sliders and valves are thoroughly cleaned and flushed.
- Pump and drive are aligned (➦ *Chapter 6.4 'Align the pump assembly' on page 41*).
- Pipelines are closed and secured by sliders.

1. Prior to assembly, clean all pipe sections and valves.
2. Remove blank flanges, plugs, protective film and/or protective paint on sealing surfaces of flanges.

Install supply lines

To avoid air pocket formation: Always lay lines such that these rise or fall towards the pump.

Install supply lines (e.g. for sealing supply system) strain-free and leak-tight.

Installing the inlet line

1. Remove transport closures.
2. Install the operator side inlet line so it is tension-free and leak-tight.

Installing the outlet line

1. Remove transport closures.
2. Install the operator side outlet line so it is tension-free and leak-tight.

If provided: Install additional lines on the operator's side

1. Remove transport closures.
2. Install operator side lines.

Guiding operator side pipelines to the safe area

All valves or pipe ends, from which medium can escape into the atmosphere, must be guided to the safe area.

These include e.g.:

- Blow down valve and blow down piping,
- Pressure safety valve and pressure safety piping,
- Ventilation valve and ventilation line,
- Drain valves and drainage lines.

Installing the heating line (if provided)

1. Remove transport closures.
2. Install the fittings.
3. Install the heating line.

Checking that the pipeline connection is tension free

Before the check, the following prerequisite must be fulfilled:

- The pipelines are correctly laid and cooled.

1. Disconnect the pipeline connection flanges from the pump.
2. Check that the pipe can be moved freely in all directions in the vicinity of anticipated expansion:
   - Nominal diameters of less than 150 mm: by hand,
   - Nominal diameters of more than 150 mm: with a small lever.
3. Ensure that the flanges lie plane parallel.
4. Fasten the connection flanges of the pipelines to the pump system again, observing the admissible flange loadings (⟶ dimensional drawing).

Checking the flange connections

Check all flange connections again and tighten if necessary. Tightness test required.

6.8 Electrical connection

Earthing the pump assembly

→ Earth the pump assembly at the connections provided for this purpose. The earthing connections are marked with the earthing symbol (*Fig. 24*).

Fig. 24: Earthing symbol

Connect supply systems (e.g. sealing supply system)

→ Connect the power lines according to the circuit diagram.

Connect the motor

→ Connect the power lines according to the circuit diagram.

Checking the direction of rotation

If present: Use a rotary field meter to check the direction of rotation.

NOTICE

Property damage due to dry running and incorrect direction of rotation!

– Disconnect the motor from the pump.

1. → Switch the motor on and immediately switch it off again.
2. → Check that the motor's direction of rotation matches the direction of the arrow on the pump.
3. → In the event of deviating direction of rotation:
   - Swap the two phases.
4. → Re-couple the motor.

7 Commissioning

This chapter contains information on commissioning the pump. This information applies to both initial commissioning and recommissioning, for example after maintenance and repair work.

Personnel:

- Supervisor
- Qualified mechanic
- Qualified electrician

Protective equipment:

- Protective work clothing
- Safety shoes
- Safety goggles
- Hearing protection
- Protective gloves

7.1 Preparing the pump

Removing the preservative

If the pump was previously preserved: Remove preservative (➥ Chapter 5.3 'Removing the preservative' on page 34).

Check lubrication

Check the oil level at the oil sight glass (*Fig. 26*) and top up lubricating oil if necessary (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*).

Prepare heating system (if provided)

1. Install the pump heating components according to manufacturer's specifications.
2. Put the heating/cooling components into operation according to manufacturer's specifications and take the following points into account:
   - Ensure a temperature difference between the heating medium and the pumped medium of < 50 K.
   - Switch on heating at least 2 hours before commissioning the pump.
   - It is possible that the centre height of the drive shaft may change as a result of heating up. In this case, the pump assembly must be realigned (➥ *Chapter 6.4 'Align the pump assembly' on page 41*).

Flush pump and pipelines with water

During initial commissioning and before recommissioning after maintenance and repair work such as dismantling the pump and/or piping:

➥ Flush pump and pipelines with water.

7.2 Prepare sealing supply system (if provided)

1. ➥ For further information: Observe the documentation from the manufacturer of the seal supply system as well as the Operating & Installation Diagram.
2. ➥

The barrier fluid must be compatible with the conveyed medium!

Put sealing supply systems into operation according to manufacturer's specifications.

3. ➥ If the sealing supply system has a circulation pump: Switch on circulation pump at least 5 minutes before commissioning the pump.

7.3 Render inert (in potentially explosive atmospheres)

Rendering inert is part of the explosion protection. The aim is to completely remove any oxygen that is present from the pump and all operator side connected pipelines.

The pump and pipelines can either be rendered inert with inert gas (1) or, alternatively, must be filled completely with liquid (2):

- *(1) When rendering inert with inert gas, absolutely no liquid may be in the pump and piping on the process side so that everything can flow through.*
- *(2) When completely filling with liquid, it must be ensured that the selected liquid is compatible with the pumped medium.*

Rendering inert with inert gas

The following prerequisites for rendering inert with inert gas must be fulfilled:

- The system is correctly installed and connected (➥ *Chapter 6 'Set-up and connection' on page 35*)
- All pipeline connections sealed leak-tight and tension-free.
- The system is fully shut down and pressure-free.
- The system is secured against being switched back on (➥ *Chapter 2.10 'Securing against restarting' on page 21*).
- If present: Filter with corresponding filter insert installed in the inlet line for commissioning (➥ *'Provide filter in the inlet line' on page 49*).
- Inert gas (e.g. nitrogen) for rendering inert available and ready for use.

1. ➥ Make sure that all interfaces for the pumping process are securely closed.
2. ➥ If no suitable valve for venting (venting valve) is present:
   - Install a suitable venting valve on the outlet side blank flange or at an as high as possible point of the system.
3. ➥ Open the venting valve.

4. Select a suitable connection for rendering inert (at the lowest possible point of the system).
5. Fill the pump and pipelines with maximum 5.0 bar fill pressure from the bottom with inert gas, until only pure inert gas escapes at the venting valve.
6. Close the venting valve.
7. Close the connection for inertisation.

7.4 Fill and bleed pump

NOTICE

Property damage due to dry running!

Dry running can cause damage to the pump, including total failure.

– Ensure that the pump is filled with liquid medium before switching on.

Filling the pump with pumped medium via an inlet side shut-off valve (to be provided by the operator) is described below.

Alternatively, the pump can also be filled via a suitable connection for filling in the inlet line. The medium used for filling must be compatible with the pumped medium. Steps 3 and 4 of the following procedure are then to be implemented accordingly via the connection for filling.

The following prerequisites for filling must be fulfilled:

- The system is correctly installed and connected (➦ *Chapter 6 'Set-up and connection' on page 35*)
- All pipeline connections sealed leak-tight and tension-free.
- The system is fully shut down and pressure-free.
- The system is secured against being switched back on (➦ *Chapter 2.10 'Securing against restarting' on page 21*).
- If present: Filter with corresponding filter insert installed in the inlet line for commissioning (➦ *'Provide filter in the inlet line' on page 49*).

1. If present: Ensure that the drain line is closed through suitable fittings.
2. If no suitable valve for venting (venting valve) is present:
   - Install a suitable venting valve on the outlet side blank flange or at an as high as possible point of the system and lead it into the safe area.
3. Open inlet side shut-off valve or alternative.
4. Wait until pressure equalisation has taken place and close the inlet side shut-off valve or alternative once more.
5. Open the venting valve in order to vent the pump and pipelines.
6. Close the venting valve again.
7. *If complete filling with liquid was selected as an alternative to rendering inert, the pump and pipework must subsequently be completely filled with liquid medium.*

   Repeat filling procedure (steps 3-6) until the pump has been completely filled with liquid medium.

8. Ensure that all of the connections and connecting pieces are leak-tight.

7.5 Switching on at commissioning

1. Ensure that the pump has been properly filled and vented (➦ *Chapter 7.4 'Fill and bleed pump' on page 56*).
2. Ensure that all safety devices are functional and properly installed or fastened (➦ *Chapter 2.9 'Safety equipment' on page 20*).
3. Ensure that the pumped medium is at the operating temperature (⟶ data sheet).
4. If present: Fully open the outlet side valve.
5. If present: Fully open the inlet side valve.
6. Switch on the motor and ensure that it runs smoothly.
7. In the event of hot pumped medium: Ensure temperature change of less than 2 K/min.
8. After reaching operating temperature: Stop the pump briefly and check alignment.
9. After initial operation under pressure at operating temperature: check that the pump is leak-tight.

8 Operation

This chapter contains information on the normal operation of the pump and provisions to be implemented depending on the pumped medium during interruptions in operation.

Personnel:

- Supervisor
- Qualified mechanic
- Qualified electrician

Protective equipment:

- Protective work clothing
- Safety shoes
- Safety goggles
- Hearing protection
- Protective gloves

8.1 Starting operation

1. Ensure that the commissioning of the pump has been properly performed (➥ *Chapter 7 'Commissioning' on page 54*).
2. If present: For the filter in the inlet line (to be provided by the operator), change the filter insert for the ongoing operation (➥ *'Provide filter in the inlet line' on page 49*).
3. With heating: Switch on pump heating at least 2 hours before pump operation.
4. Ensure that the pumped medium is at the operating temperature (⟶ data sheet).
5. If present: Switch on the sealing supply system according to the manufacturer's instructions (⟶ documentation from the sealing supply system manufacturer).
6. Fully open the outlet side valve.
7. Fully open the inlet side valve.
8. Switch on the motor and ensure that it runs smoothly.
9. In the event of hot pumped medium: Ensure temperature change of less than 2 K/min.

8.2 Stopping operation

1. Switch off the motor.
2. Close the inlet side valve.
3. Close the outlet side valve.
4. If a sealing supply system is available: Wait until 2 minutes have elapsed since switching off the motor (step 1) and switch off the sealing supply system according to the manufacturer's instructions (⟶ documentation from the sealing supply system manufacturer).
5. If present and permitted in the process (solidifying of pumped medium must be prevented!): Switch off heating.

6. Observe provisions in the event of operational interruption (➥ *Chapter 8.4 'Provisions in the event of operational interruptions' on page 61*).

8.3 Cleaning/sterilising the pump

- *Pumps of the GEA Hilge NOVATWIN+ series can be cleaned/sterilised without dismantling.*
- *According to DIN EN 13951, the pump corresponds to cleanability grade 4.*

NOTICE

Damage to pump, hoses and fittings with pressure testing or rinsing!

- When carrying out pressure tests or rinsing:
  - Do not expose pump, hoses or fittings to impermissible pressure.
  - Separate pumps, hoses or fittings from the system in advance if necessary.

NOTICE

Property damage due to impermissible temperature shocks!

- Temperature shocks > 50 K are not permitted.
  In this case, heating must take place gradually, whereby a maximum temperature gradient of ΔTmax = 10 K/min must not be exceeded.

8.3.1 Cleaning/sterilising with CIP/SIP medium < 80 °C

Prerequisites:

- For pumps with sealing supply system: Sealing supply system in operation.
- Pump stopped.

1. *The CIP/SIP medium must be compatible with the material!*

   Switch pipeline system to CIP/SIP medium.
2. Start pump.
3. Clean pipeline system and pump.
4. Stop pump.
5. Remove all traces of the CIP/SIP medium.

8.3.2 Cleaning/sterilising with CIP/SIP medium > 80 °C and pump with sealing supply system

Prerequisites:

- Sealing supply system in operation.
- Pump stopped.

1. 

   The CIP/SIP medium must be compatible with the material!

   Switch pipeline system to CIP/SIP medium.
2. Start pump and observe the following when pump is cold:
   - Stop the pump for approx. 10 minutes shortly after starting.
   - Wait for casing temperature above 60 °C.
   - Restart the pump.
3. Clean/sterilise pipeline system and pump.
4. Stop pump.
5. Remove all traces of the CIP/SIP medium.

8.3.3 Cleaning/sterilising with CIP/SIP medium > 80 °C and pump without sealing supply system

Prerequisite:

- Pump stopped.

NOTICE

Material damage due to overheated mechanical seal!

– Only clean/sterilise pump when it is stopped.
– Cleaning time shorter than 30 minutes.

NOTICE

Material damage due to turbine effect!

– During cleaning/sterilising due to steaming: Lock pump.

1. 

   The CIP/SIP medium must be compatible with the material!

   Switch pipeline system to CIP/SIP medium.
2. Clean/sterilise pipeline system and pump.

3. Remove all traces of the CIP/SIP medium.
4. Remove the blockage.

8.4 Provisions in the event of operational interruptions

Carry out provisions depending on the pumped medium and the duration of the operating interruption according to the following table:

Tab. 9: Provisions in the event of operational interruptions

Pumped medium behaviour	Provisions depending on the duration of the operational interruption (process-dependent)	
	short (Guideline value: maximum 1 week)	long
Sludge solids	1. Empty pump and pipelines (➥ *Chapter 11.1 'Emptying' on page 78*). 2. Clean pump and pipelines (➥ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*).	1. Empty pump and pipelines (➥ *Chapter 11.1 'Emptying' on page 78*). 2. Clean pump and pipelines (➥ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*).
solidified/frozen	Heat or empty pump and pipelines (➥ *Chapter 11.1 'Emptying' on page 78*).	1. Empty pump and pipelines (➥ *Chapter 11.1 'Emptying' on page 78*). 2. Clean pump and pipelines (➥ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*).
remains liquid	-	1. Empty pump and pipelines (➥ *Chapter 11.1 'Emptying' on page 78*). 2. Clean pump and pipelines (➥ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*).

8.5 Operating the pump as a stand-by pump

Parallel operation of pumps only with express approval of GEA Hilge.

Alternately operate the pump and stand-by pump:

- Operate the stand-by pump at least once per week.

8.6 Winter operation

⚠ WARNING

Risk of injury due to frost!

In case of frost, contact with metallic components leads to injuries due to freezing.

- Wear personal protective equipment, in particular suitable protective gloves.
- Avoid unnecessary contact with components.

! NOTICE

Property damage due to frost!

If the system is switched off, the remaining medium in the components may freeze and cause them to burst at low temperatures.

- Ensure that the components are drained and depressurised.
- Ensure that the system has been put out of operation properly (➥ *Chapter 11 'Putting out of operation' on page 78*).

9 Service

This chapter contains information on servicing the pump, as well as ordering spare parts. It also describes how the pump can be removed and sent to the manufacturer for repair.

For information on servicing other components: Observe the documentation from the manufacturer of the respective component.

Personnel:

- Supervisor
- Qualified mechanic
- Qualified electrician

Protective equipment:

- Protective work clothing
- Safety shoes
- Industrial safety helmet
- Safety goggles
- Hearing protection
- Protective gloves

9.1 Monitoring

1. For trouble-free operation, monitor and ensure:
    - No deposits of greater than 5 mm on surfaces (clean surfaces regularly!)
    - valves open on inlet and outlet side (if present)
    - free and clean filter in the pipelines (if present)
    - Ventilation filter in bearing casing clear and clean
    - Sufficient supply pressure
    - No impermissible leakage at the mechanical seal
    - proper functioning of the sealing supply system (if present) as well as sufficient barrier fluid and barrier pressure
    - Proper function of the safety equipment
    - No dry run
    - No cavitation
    - Tightness
    - No unusual running noises or vibrations
    - No rigid body vibrations, e.g. via the foundation or pipeline connections, which influence the pump

2. Check at suitable intervals:

The test intervals are dependent on the pump loads.

- Alignment of the coupling and condition of the elastic elements
- Temperature of roller bearings (alarm at 100°C, shut-down at 120°C)
- Sealing supply system and condition of the barrier fluid (if present)
- All warning and information signs present and legible

3. To prevent danger due to unexpected corrosion:

- Inspect components that are in contact with the transport medium for unexpected detectable corrosion (e.g. pitting corrosion, surface corrosion).

  In case of visible corrosion: Decommission the pump correctly (➥ *Chapter 11 'Putting out of operation' on page 78*) and contact GEA Hilge.
- In case of corresponding suitable disassembly work (e.g. while changing mechanical seals, changing conveying elements): Inspect shafts and conveying elements for corrosion.

  In case of visible corrosion: Do not commission the pump again, contact GEA Hilge.

9.2 Maintenance schedule

Maintenance intervals are shorter with more severe operating conditions (e.g. frequent switching on/off, high temperatures, low viscosity, aggressive environmental and process conditions).

Performing maintenance work

1. Before all maintenance work: Ensure that there is no danger to persons or the environment.

   To this end, do the following, subject to the type of maintenance work being carried out:

   - Switch the drive system off and secure it to prevent a restart/being switched on again (➥ *Chapter 2.10 'Securing against restarting' on page 21*).
   - Securely close all interfaces to the pumping process.
   - Relieve the pressure from the pump and the operator's piping into the safe area and secure against renewed pressurisation.
   - Empty the pump and operator-side piping into the safe area (➥ *Chapter 11.1 'Emptying' on page 78*) and clean (➥ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*).

2. Unless otherwise necessary due to the operating mode, carry out maintenance work in accordance with the following table:

Tab. 10: Maintenance - general intervals and provisions

Interval	Assembly	Provision
Once, after reaching operating temperature for the first time	Pump, coupling, motor	■ Check hot alignment (➦ *Chapter 6.4 'Align the pump assembly' on page 41*).
Hourly, during start-up phase	Sealing supply system (if present)	■ Check filling level of barrier fluid.[1)] ■ Check filter and ventilation valve for contamination.[1)]
Weekly	Bearing casing	■ Check oil level. – Only at a standstill (wait approx. 15 min) ■ Top up/replace oil if necessary (➦ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70* / ➦ *Chapter 9.3.5 'Changing the lubricating oil' on page 71*)
	Mechanical seal	■ Check for leakage. ■ In the event of severe leakage: – Determine leakage intensity by counting the drops. – Consult with GEA Hilge (specify leakage site and intensity). – Replace mechanical seal (consult with GEA Hilge).
	Lip seals	■ Check for leakage. ■ In the event of severe leakage: – Check oil levels at short intervals. – Determine leakage intensity by counting the drops. – Consult with GEA Hilge (specify leakage site and intensity). – Replace lip seal (consult with GEA Hilge).
	Drive unit	■ Check for wear.
	Sealing supply system (if present)	■ Check function.[1)] ■ Clean filter and ventilation valve.[1)] ■ Top up barrier fluid if necessary.[1)] ■ If barrier fluid is contaminated: – Check mechanical seal.
	Heating system (if present)	■ Check function.[1)] ■ Check tightness.[1)]
Once after the first 250 hours of operation, at the latest after 3 months	Sealing supply system (if present)	Change barrier fluid.[1)]
Once after 3 months	Coupling	Service the coupling in accordance with the manufacturer's instructions (→ Operating manual coupling).
	Motor	Service the motor in accordance with the manufacturer's instructions (→ Operating manual motor).
After 4000 hours of operation, at the latest after 12 months	Sealing supply system (if present)	Change barrier fluid.[1)]

Interval	Assembly	Provision
yearly	Coupling This maintenance interval can be shortened depending on the coupling type.[1)]	Service the coupling in accordance with the manufacturer's instructions (⟶ Operating manual coupling).
	Motor This maintenance interval can be shortened depending on the motor type.[1)]	Service the motor in accordance with the manufacturer's instructions (⟶ Operating manual motor).
[1)] Observe the manufacturer's instructions!		

Tab. 11: Maintenance - Oil lubrication maintenance intervals

Application	Interval	Assembly	Provision
■ Area: Foods & pharmaceuticals ■ Ambient temperature: -40 °C to ≤ 40 °C ■ PAO oil	Oil lubrication: ■ After the first 250 hours of operation, at the latest after 3 months ■ intermittent operation: every 4000 hours of operation, at the latest after 24 months ■ continuous operation: every 8000 hours of operation, at the latest after 18 months	Gears and bearings	■ Change oil (➦ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*).

9.3 Lubricate

The lubricant used for first filling is noted on a material label on the pump.

NOTICE

Property damage resulting from the use of incompatible lubricants!

– Only use one type of lubricant!

NOTICE

Property damage due to incorrect lubrication!

– Ensure correct type of lubricant (⟶ Supplementary document on lubricants and preservatives).
– Ensure correct lubricant quantity. (➦ *Chapter 9.3.3 'Lubricant quantity' on page 70*).

9.3.1 Lubrication points

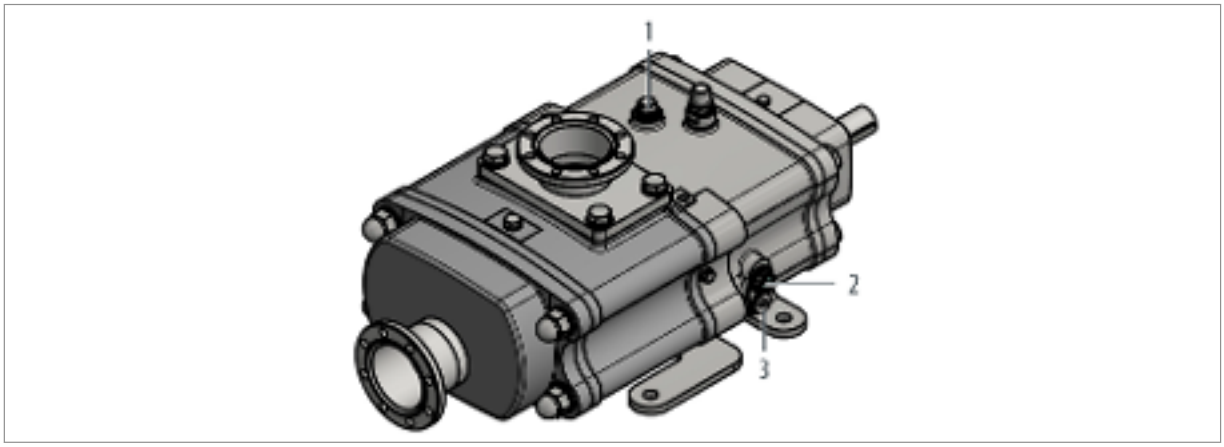

Fig. 25: Overview with lubrication points (oil lubrication)

1 Oil inlet
2 Oil sight glass
3 Oil drain

9.3.2 Lubricant

Tab. 12: Lubricant – transmission oils suitable for the food and pharmaceutical industries

Manufacturer	Synthetic oils based on polyalphaolefin (PAO)
Aral	Aral Eural Gear 150
BP	Optileb GT 150
Castrol	Optileb GT 150
Classic	VALSUR SV 150 H1
Elf	Nevastane SL 150
Fina	Nevastane SL 150
Total	Nevastane SL 150
Finke	Lubriplate SFGO Ultra ISO VG 150
Fuchs	Geralyn SF 150
Klüber	Klüberoil 4 UH 1 - 150
Mobil	Mobil SHC Cibus 150
Lukoil	LUKOYL STILO PREMIUM 150

Select lubricant according to application:

- *Ambient temperature 0 °C to 40 °C ➦ Chapter 9.3.2.1 'Transmission oils for industrial applications – ambient temperature 0 °C to 40 °C' on page 68*
- *Ambient temperature ≥ 40 °C ➦ Chapter 9.3.2.2 'Transmission oils for industrial applications – ambient temperature ≥ 40 °C' on page 69*
- *Ambient temperature -40 °C to 0 °C ➦ Chapter 9.3.2.3 'Transmission oils for industrial applications – ambient temperature -40 °C to 0 °C' on page 69*

9.3.2.1 Transmission oils for industrial applications – ambient temperature 0 °C to 40 °C

Tab. 13: Lubricant – transmission oil (normal temperature)

Manufacturer		Transmission oil based on mineral oil
Agip		Blasia 150
Aral		Degol BG 150
BP		Energol GR-XP 150
Castrol	Tribol	Alpha SP 150
	Optimol	Optigear BM 150
Chevron		Meropa 150
Classic		ILSAN GM 150
Elf		Reductelf SP 150
Fina		Giran 150
Finke		Aviaticon Oel EP 150
Fuchs		Renolin CLP 150 PLUS
Gulf		Meropa 150
Klüber		Klüberoil GEM 1-150
Mobil		Mobilgear 600 XP 150
Shell		Omala S2 GX 150
Texaco		Meropa 150
Total		Carter EP 150
Q8		Goya NT 150
PDV		ENGRALUB EP ISO 150
TNK		Reductor CLP 150
Lukoil		Steelo 150
Gazpromneft		Reductor CLP 150
Rosneft		Reductor CLP 150

9.3.2.2 Transmission oils for industrial applications – ambient temperature ≥ 40 °C

Tab. 14: Lubricant – transmission oil (increased ambient temperatures)

Manufacturer		Synthetic oil based on polyalphaolefin (PAO)
Agip		Blasia SX 150
Aral		Degol PAS 150
BP		Energol HTX 150
Castrol	Tribol	Tribol 1510/150
	Optimol	Qptigear RMO 150
Chevron		Pinnacle EP 151
Classic		Ilsan GV 150 PAO
Elf		Carter SH 150
Fina		Carter SH 150
Total		Carter SH 150
Finke		Aviaticon Finkol PA 150
Fuchs		Renolin Unisyn CLP 150
Gulf		EP Lubricant SY 150
Klüber		Klübersynth GEM-4-150
Mobil		SHC 629
Shell		Omala S4 GX 150
Texaco		Pinnacle EP 150
Q8		El Greco 150
Lukoil		Lukoyl Stilo Premium 150

9.3.2.3 Transmission oils for industrial applications – ambient temperature -40 °C to 0 °C

Tab. 15: Lubricant – transmission oil (low temperature)

Manufacturer		Synthetic oil based on polyalphaolefin (PAO)
Agip		Blasia SX 150
Aral		Degol PAS 150
BP		Energol HTX 150
Castrol	Tribol	Tribol 1510/150
	Optimol	Qptigear RMO 150
Chevron		Pinnacle EP 151
Classic		Ilsan GV 150 PAO
Elf		Carter SH 150
Fina		Carter SH 150

Manufacturer	Synthetic oil based on polyalphaolefin (PAO)
Total	Carter SH 150
Finke	Aviaticon Finkol PA 150
Fuchs	Renolin Unisyn CLP 150
Gulf	EP Lubricant SY 150
Klüber	Klübersynth GEM-4-150
Mobil	SHC 629
Shell	Omala S4 GX 150
Texaco	Pinnacle EP 150
Q8	El Greco 150
Lukoil	Lukoyl Stilo Premium 150

9.3.3 Lubricant quantity

Tab. 16: Lubricant quantities — Lubricating oil

GEA Hilge NOVATWIN+ Size	Bearing casing approx. oil quantity [l]
10	0.60
20	0.60
25	0.60
30	1.20
35	1.20
40	2.40
45	2.40

9.3.4 Refilling the lubricating oil

The lubricant used for first filling is noted on a material label on the pump.

NOTICE

Property damage resulting from the use of incompatible lubricants!

– Only use one type of lubricant!

1. Switch off pump and safeguard against a restart.
2. Let pump cool down (at least 15 minutes).

3. Open the oil inlet.
4. Fill bearing casing with lubricating oil until the oil level in the oil sight glass is within the specified limits (*Fig. 26*).

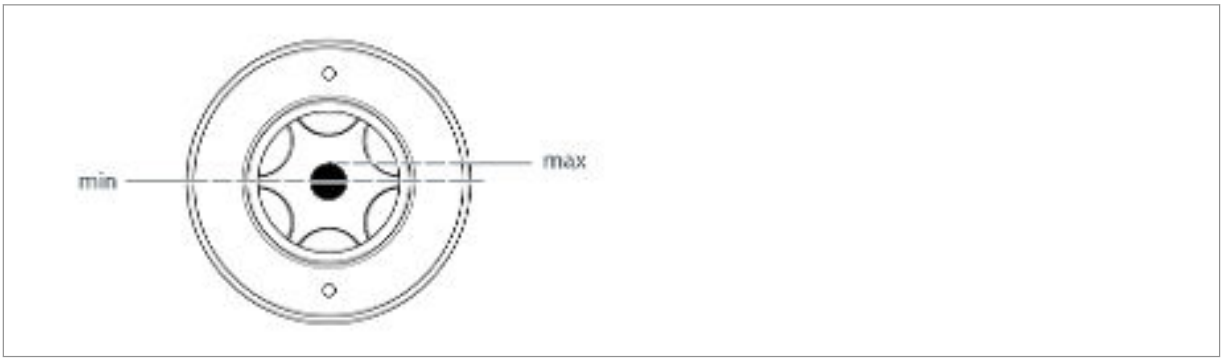

Fig. 26: Oil sight glass on bearing casing

max Maximum oil level
min Minimum oil level

5. Close the oil inlet.

9.3.5 Changing the lubricating oil

1. Switch off pump and safeguard against a restart.
2. Let pump cool down (at least 15 minutes).
3. Open the oil drain and drain the lubricating oil at operating temperature into a suitable collection container. The collecting container must be able to collect the following quantities of lubricating oil:

Tab. 17: Lubricating oil quantities

GEA Hilge NOVATWIN+ Size	Bearing casing approx. oil quantity [l]
10	0.60
20	0.60
25	0.60
30	1.20
35	1.20
40	2.40
45	2.40

4. Close oil drain again and top up lubricating oil (➥ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*, start with step 3).

9.4 Repairs

Warranty claims shall be void in the event that the pump is opened by an unauthorised person during the warranty period. The pump may only be opened by trained technicians from GEA Hilge.

Trained customer service technicians from GEA Hilge are available for repairs. Upon request, present verification for the pumped material – DIN safety data sheet or declaration of no objection (➥ Appendix 'Declaration of no objection' on page 88).

9.4.1 Wearing parts

Wearing parts have a limited shelf-life because of their functionality and are therefore not subject to the warranty.

Regarded as standard wearing parts are:

- Mechanical seals
- Gaskets
- Roller bearings
- Radial lip seals
- O-rings

Regarded as long-term wearing parts are:

- Feed screw
- Pump casing

Mechanical seals are subject to natural wear, which largely depends on the respective conditions of use. It is therefore not possible to provide general information regarding the service life.

9.4.2 Ordering spare parts

Only use original parts or parts approved by GEA Hilge.

Spare parts lists can be requested of GEA Hilge if desired.

1. The following information is required for ordering spare parts (*Fig. 3*):
   - Pump type
   - Order number
   - Serial number
   - Position number of the part (⟶ spare parts list)
   - Name of the part (⟶ spare parts list)
   - Quantity
2. Specify internal clearance when ordering bearings:

   Tab. 18: Bearing clearance of the roller bearings

Roller bearings	internal clearance
Cylindrical roller bearing	Normal air
single-row angular contact ball bearing	Normal air

9.4.3 Removing the pump

1. Decommission the pump correctly (➦ *Chapter 11 'Putting out of operation' on page 78*).
2. Make sure that the power supply to the drive system is switched off and secured to prevent it from being switched back on.
3. Make sure that all interfaces for the pumping process are securely closed.
4. Ensure that pump and pipelines have been de-pressurised properly and secured to prevent re-pressurisation.
5. Ensure that the pump has cooled down.
6. For coupling with spacer: Remove the spacer.
7. Safely disconnect all connections from the pump.
8. Drain lubricating oil from the bearing casing and collect it safely.
9. Remove the pump.

9.4.4 Sending the pump to the manufacturer

Repair work may only be executed if the declaration of no objection has been received (➦ Appendix 'Declaration of no objection' on page 88).

Prepare the pump for transport:

1. Disassemble the pump correctly (➦ *Chapter 9.4.3 'Removing the pump' on page 73*).
2. Clean the pump.
3. Seal off the inlet and outlet sides with plastic covers.

Ship the pump:

1. Only send the pump to GEA Hilge with a truthful and fully completed declaration of no objection (➦ *Appendix 'Declaration of no objection' on page 88*).
2. Depending on the desired repair, observe the required provisions for return in accordance with the following table.

Tab. 19: Repair and return

Repair	Provisions for return
To be performed by GEA Hilge	■ Return complete pump (not disassembled) to GEA Hilge. ■ Specify the following details: – Reason for repair – Operating conditions
With warranty claim via GEA Hilge	■ Return complete pump (not disassembled) to GEA Hilge. ■ Specify the following details: – Information about occurrence of damage – Operating conditions

9.5 Cleaning agent

The cleaning agent must be compatible with the material!

Only use cleaners that are permitted for hygiene-protected areas.

10 Troubleshooting

This chapter provides information on possible pump faults, their causes and on provisions through which to rectify the faults.

For information on troubleshooting on other components: Observe the documentation from the manufacturer of the respective component.

Behaviour during faults

The following always applies:

1. Immediately initiate an EMERGENCY STOP in the event of faults that present an immediate danger to persons or property.
2. Determine the cause of the fault (➥ *Tab. 21 'Fault table' on page 75*).
3. If fault rectification requires work in the danger area, switch off the system and secure it against being switched on again/restart (➥ *Chapter 2.10 'Securing against restarting' on page 21*).

   Immediately inform those responsible at the place of installation of the fault.
4. Depending on the type of fault, have it rectified by authorised specialist personnel or repair it yourself.

Faults that are not specified in the following table or that are not traceable to one of the specified causes should be discussed with GEA Hilge.

The possible faults are assigned a number in the following table. The number can then be used to determine the cause of the fault and the provisions to be implemented to rectify this with the aid of the fault table.

Tab. 20: Faults and assigned numbers

Fault	Number
Pump fails to convey	1
Pump conveys insufficiently	2
Pump conveys excessively	3
Pump runs unevenly or extremely loudly	4
Pump jams	5
Pump leaks	6
Power consumption of the motor too high	7

Tab. 21: Fault table

Number of the fault							Cause of the fault	Provisions for fault rectification
1	2	3	4	5	6	7		
X	X	-	-	-	-	-	Excessive clearance between: ■ Feed screws ■ Feed screws and casing	■ Repair or exchange worn parts. ■ Consult with GEA Hilge.
X	-	-	X	-	-	-	Delivery/inlet line closed by valve.	■ Fully open valves.

Number of the fault							Cause of the fault	Provisions for fault rectification
1	2	3	4	5	6	7		
X	-	-	X	-	-	-	Pump not sufficiently filled.	■ Fill the pump (➞ *Chapter 7.4 'Fill and bleed pump' on page 56*).
X	X	-	X	-	-	-	Speed too low.	■ Increase speed with speed regulator.
X	X	-	X	-	-	-	Delivery/inlet line, pump or filter blocked or encrusted.	■ Clean delivery/inlet line, pump or filter. ■ Check filter mesh size and change if necessary, in consultation with GEA Hilge.
X	-	X	X	-	-	-	Pump direction of rotation incorrect.	■ Check and, if necessary, correct the direction of rotation of the motor (➞ *'Checking the direction of rotation' on page 53*).
X	-	-	X	X	-	X	Pump contaminated.	■ Consult with GEA Hilge.
X	X	-	X	.	.	X	Outlet line blocked.	■ Clean outlet line.
X	X	-	X	X	X	X	Connecting screws not properly tightened.	■ Tighten connecting screws.
X	X	X	X	X	X	X	Viscosity or temperature of the pumped medium deviates from the design data for the pump (→ data sheet).	■ Consult with GEA Hilge.
-	X	-	X	-	-	-	Diameter of the inlet or outlet line too narrow.	■ Increase diameter. ■ Clean inlet or outlet line of deposits.
-	X	-	X	-	-	-	Temperature of the pumped medium too high: Pump cavitation.	■ Lower temperature. ■ Adjust speed. ■ Consult with GEA Hilge.
-	X	-	X	-	-	X	Outlet side valve insufficiently opened.	■ Fully open the outlet side valve.
-	-	X	X	-	-	X	Speed too high.	■ Lower speed with speed regulator.
-	-	-	-	-	X	-	Pump leaking.	■ Consult with GEA Hilge.
-	-	-	X	-	-	-	Coupling elements worn. Coupling not properly aligned.	■ Replace the coupling elements, check and, if necessary, correct the coupling alignment (➞ *'Aligning the coupling' on page 45*).
-	-	-	X	-	-	-	Insufficient oil in bearing casing.	■ Refilling the lubricating oil (➞ *Chapter 9.3.4 'Refilling the lubricating oil' on page 70*).
-	-	-	X	X	-	-	Pipelines too tight.	■ Check pipeline. ■ Connect pipelines so that they are slack.
-	-	-	X	X	-	X	Expansion of the internal pump components under excessive temperatures.	■ Wait for the temperature to equalise.
-	-	-	X	X	-	X	Bearings/gears faulty.	■ Consult with GEA Hilge. If necessary, send pump to GEA Hilge. (➞ *Chapter 9.4 'Repairs' on page 72*)

Number of the fault							Cause of the fault	Provisions for fault rectification
1	2	3	4	5	6	7		
-	-	-	X	X	-	X	Pump excessively tight.	■ Check the connections and pipeline nozzles and fastenings on the pump. ■ Check the alignment of the coupling. ■ If present: Check the fastening of the support. ■ Check foundation.
-	-	-	X	X	-	X	Motor bearings faulty.	■ Consult with the manufacturer of the motor.

11 Putting out of operation

This chapter contains information on decommissioning the pump. Decommissioning must be performed in the following situations:

- *in the event of interruptions in operation depending on the pumped medium ➦ Chapter 8.4 'Provisions in the event of operational interruptions' on page 61*
- *before maintenance and servicing work*
- *before removing the pump from the plant*

After each decommissioning, recommissioning must be performed in accordance with ➦ Chapter 7 'Commissioning' on page 54!

Personnel:

- Supervisor
- Qualified mechanic
- Qualified electrician

Protective equipment:

- Protective work clothing
- Safety shoes
- Safety goggles
- Hearing protection
- Protective gloves

11.1 Emptying

1. Switch the drive system off and secure it to prevent a restart/being switched on again (➦ *Chapter 2.10 'Securing against restarting' on page 21*).
2. Make sure that all interfaces for the pumping process are securely closed.
3. Relieve the pump and operator side pipelines of pressure in the safe area.
4. *Always safely collect any pumped medium that leaks out and dispose of this in accordance with applicable local regulations!*

   Empty the pump and operator side pipelines completely in the safe area.

11.2 Clean

The following prerequisites for cleaning must be fulfilled:

- All interfaces for the pumping process are securely closed.
- The system is completely emptied and pressure-free (➦ *Chapter 11.1 'Emptying' on page 78*).

Clean the pump in accordance with ➦ *Chapter 8.3 'Cleaning/sterilising the pump' on page 59*.

12 Disposal

This chapter contains information on proper disposal. Ensure that the pump has been decommissioned properly prior to disposal (➥ Chapter 11 'Putting out of operation' on page 78).

1. Drain lubricating oil from the bearing casing and collect it safely.
2. Thoroughly clean components and disassemble these in compliance with applicable local occupational safety and environmental protection regulations.

   If necessary, enclose a declaration of no objection (➥ Appendix 'Declaration of no objection' on page 88) with each disassembled component.

3. Insofar as no return or disposal agreement has been concluded, disassembled components must be recycled (if necessary with a declaration of no objection):
   - Scrap metals.
   - Give plastic elements to recycling.
   - Dispose of remaining components in accordance with locally applicable regulations.

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Appendix

Noise level

Measurements carried out as per DIN 45635, Part 1. The emission values have been determined under reproducible conditions in accordance with DIN 45635, Part 24. The measurement is based on a single screw pump.

The specified sound levels are approximate values.

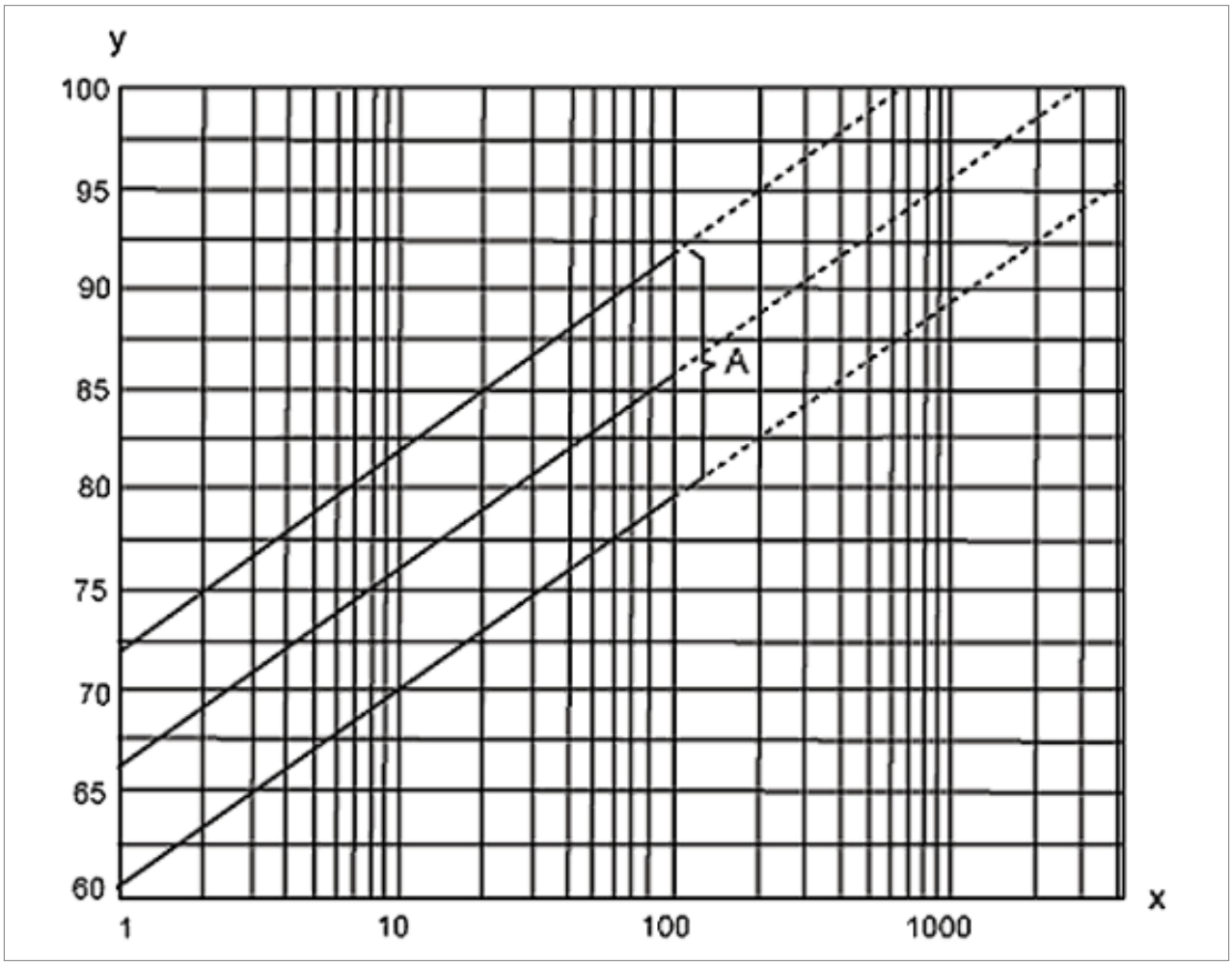

Fig. 27: Airborne sound level diagram (source: VDI 3734)

x Output demand [kW]
y Airborne sound level measurement surface LpA [dB]
A Scatter band

Declaration of no objection

→ Please copy, fill it out and send it with the pump.

Statutory regulations oblige all commercial companies to protect their employees, the public and the environment from the hazardous effects of dangerous substances.

For this reason, repair and inspection of the components may only be undertaken once the following declaration has been correctly and fully filled out and signed by an authorised, qualified specialist.

If safety measures must be employed despite complete emptying and cleaning on the part of the operator, then this required information must be passed on. This declaration of no objection comprises part of the repair or inspection order.

We hereby declare that the enclosed component

Type: _____

Serial number: _____

- is free of hazardous materials. Special safety measures for further handling of the device are not necessary.
- The device has been fully emptied and thoroughly cleaned inside and out prior to dispatch.

The following media was previously conveyed by the pump: _____

The medium was hazardous:	❒ YES	❒ NO
The pump was emptied by the operating firm:	❒ YES	❒ NO
The pump was thoroughly cleaned inside and out by the operating firm:	❒ YES	❒ NO
The pump came into contact with hazardous substances:	❒ YES	❒ NO

If yes: Hazardous material number according to Ordinance on Hazardous Substances (GefStoffV): _____

or CAS registration number (Chemical Abstract Service): _____

Company/Institute: _____

Street: _____

Postcode, city: _____

Telephone: _____

Name: _____

Item: _____

Date: _____

Signature, Company stamp: _____

Declaration of conformity in accordance with the EC machinery directive

The completed and signed original declaration is supplied with the respective pump, separately to this operating manual.

EG declaration of conformity in accordance with Machinery Directive 2006/42/EC appendix II A

We,

GEA HILGE branch of GEA Tuchenhagen GmbH

Hilgestraße 37-47

55294 Bodenheim

Germany

Tel.: +49 (0) 6135 7016-0, Fax: +49 (0) 6135 1737

hereby declare that the following machine:

Designation:	Screw pump
Model:	GEA Hilge NOVATWIN+
Build dimensions:	10, 20, 25, 30, 35, 40, 45

Conforms with the following EC directives, insofar as the prerequisites for commissioning stated in the engineering document, in particular in the operating instructions, are fulfilled:

- **Machinery directive (2006/42/EC)**
- **If required by the datasheet, application of the EMC directive (2014/30/EU)**

Applied harmonised standards:

- **EN 349:1993+A1:2008**
- **EN 14120 :2015**
- **EN 13732-1:2008**
- **EN 1672-2:2005+A1:2009**
- **EN 13951:2012**
- **EN 12162:2001+A1:2009**
- **EN ISO 12100:2010**
- **EN 809:1998+A1:2009+AC:2010**
- **EN ISO 14159:2008**

Authorised for the compilation and handover of this documentation:

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