OPERATING INSTRUCTIONS

Translation of the original instructions

GEA Hilge TP/TPE (IEC)

Hygienic pumps

GEA Hilge
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1 General

This chapter contains basic instructions on the use of this document and explanations of typographical conventions. In addition, this chapter contains details on the version and structure.

In this document, the term pump refers to GEA Hilge TP/TPE (IEC).

1.1 Information about the document

1.1.1 Purpose and structure of the document

The purpose of this Operating Manual is to convey information on operation of the pump. It is divided into several chapters for this purpose. This structure is oriented towards the various life phases of the pump. When the contents are observed, the service life and reliability of the pump increased and the risk of personal injuries and property damage are reduced. In addition, the Operating Manual is applicable for the operator as a basis for compiling instruction manuals.

1.1.2 Design elements

In this document, the following design elements are used as orientation aids.

General orientation aids

- Figure numbers
- Table numbers
- Chapter numbers
- Page numbers
- Headers and footers
- References
- Lists

Lists

Bullet points are shown in lists and do not prescribe a specific sequence.

- Bullet point
- Bullet point
  - Sub-point
  - Sub-point
- Bullet point

Numbered lists

In a sequence of actions, the order of the action steps is specified by a numbered list. Partial results and the result of a sequence of actions are marked by arrows.

1. Action step one
2. Action step two
   2.1 First sub-step two
   2.2 Second sub-step two
   → Partial result
3. Action step three
   → Partial result
4. Action step four

⇒ Outcome

INFO

Informational texts contain additional information about a description or action step.

1.1.3 Reading obligation and storage

This document must be read by every person who carries out actions at the pump and must be available for these persons at all times.

1.1.4 Respective documents

In this Operating Manual, reference is made to the documents listed below.

GEA documents
- Pump data sheet
- ATEX supplementary operating manual for pumps approved for use in potentially explosive atmospheres.

External documents (where applicable)
- Operating manual for mounted components, such as motor, coupling, discharge valve, flushing container

The documents named are not part of this Operating Manual. Documents which are not available can be requested from GEA Hilge.

1.2 Manufacturer address

GEA Hilge, subsidiary of GEA Tuchenhagen GmbH

Hilgestrasse 37-47

Germany

55294 Bodenheim

1.3 Customer service

Phone: +49 (0) 6135 7016-0

Fax: +49 (0) 6135 759 55

Spare parts: spareparts.hilge@gea.com

Technical Service: hilge.technicalservice@gea.com

www.gea.com

1.4 Declarations of conformity

1.4.1 CE Declaration of Conformity

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

The following declaration does not contain serial numbers or signatures. The original declaration is delivered with the pump.

Manufacturer:	GEA HILGE Subsidiary of GEA Tuchenhagen GmbH Hilgestrasse 37-47 55294 Bodenheim Germany

We declare under our sole responsibility that the machine	
Model:	
Type:	
Serial number	
conforms with all the relevant provisions of this directive and the following directives:	
Relevant EC directives:	2006/42/EC – EC Machinery Directive
Applicable harmonized standards, in particular:	EN 809:1998/A1+AC(D) EN ISO 12100:2010
Remarks:	We also declare that the relevant technical documentation for this machine has been prepared in accordance with Annex VII, Part A, and agree to submit the documentation on justified request of national authorities on a data carrier.
Person authorised for compilation and handover of technical documentation:	GEA HILGE Subsidiary of GEA Tuchenhagen GmbH Hilgestrasse 37-47 55294 Bodenheim Germany
Bodenheim, ... Signature Managing Director	 Signature Manager Product Development
Original declaration: CO.099.YYY.017DEGB_R1	

1.4.2 UKCA Declaration of Conformity

Declaration of Conformity

The following declaration does not contain serial numbers or signatures. The original declaration is delivered with the pump.

We,	GEA HILGE Subsidiary of GEA Tuchenhagen GmbH Hilgestrasse 37-47 55294 Bodenheim Germany
hereby declare that the machine	
Model:	
Type:	
Serial number	
complies with the following UK directives, provided that the conditions for start-up are fulfilled as specified in the technical documentation, in particular in the operating manual:	

Supply of Machinery (Safety) Regulations 2008, 2008 No. 1597	
Applicable harmonized standards:	EN 809:1998/A1+AC(D) EN ISO 12100:2010
Person authorised for compilation and handover of technical documentation:	GEA Mechanical Equipment UK Ltd Westfalia House Old Wolverton Road, Old Wolverton, Milton Keynes MK12 5PY, United Kingdom
Bodenheim, ... Signature Managing Director	 Signature Manager Product Development
Original declaration: CO.099.YYY.018GB_R1	

2 Safety

This chapter describes the minimum requirements for intended use of the pump. It forms the basis for safe operation of the pump.

2.1 Intended use

The pump has been specially designed.

- Pump only media that are specified on the pump data sheet.
- Operate the pump only in the electrical grid that was specified on the pump data sheet.

Intended use - drainage valve VTP

The drainage valve VTP is used for residual draining (complete draining) of GEA Hilge centrifugal pumps. The drainage valve can be operated manually or pneumatically.

2.1.1 Pumped fluids

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

2.1.2 Connections and pipelines

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

2.1.3 Types

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

2.1.4 Starting frequency

The switching frequency of pumps describes the number of times electric motors are started up per hour. Frequent switching increases wear and reduces the life span of the mechanical seal, so 15 switch-on processes per hour should not be exceeded.

Starting frequency

Do not exceed the switching frequency of the motor used. Observe the motor operating manual for details of starting frequency.

2.2 Modification

Modification or alteration of the pump is only permitted with the written permission of GEA Hilge. Modifications can endanger the operating safety and lead to personal injuries and property damage. Exclusive use of original spare parts and accessories authorised by GEA Hilge ensures safety. The manufacturer will bear no liability for consequences arising from the use of unauthorised parts.

2.3 Structure of warning notices

Warning notices warn of hazards which can occur when certain actions are carried out. The warning notices described below are used in this document. The extent of hazards is classified in risk levels and can be recognised by the respective signal words.

2.3.1 Preceding warning notices

Preceding warning notices are used when there is a hazard during a sequence of actions. Warning notices are colour-highlighted and supplemented by a pictogram in the event of possible personal injury.

⚠SIGNAL WORD

Nature and source of the hazard

Consequence of disregarding the warning.

- Measure to avoid or escape the danger.

Figure 2-1 - Structure of a preceding warning notice

2.3.2 Integrated warning notices

Integrated warning notices are used when there is a hazard involved in a single action step.

1. **SIGNAL WORD** Nature and source of the hazard
   Consequence of disregarding the warning.
   - Measure to avoid or escape the danger.

Figure 2-2 - Structure of an integrated warning notice

2.3.3 Signal words

ATTENTION

The signal word IMPORTANT indicates a hazard that could result in property damage if not avoided.

CAUTION

The signal word CAUTION indicates a hazard with a low risk level which could result in light to medium injuries if not avoided.

WARNING

The signal word WARNING indicates a hazard with a medium risk level which could result in death or severe injury if not avoided.

DANGER

The signal word DANGER indicates a hazard with a high risk level which will result in death or serious injury if not avoided.

2.4 Personnel qualification

The basic pre-requisites listed below must always be fulfilled for all actions on the pump.

- This Operating Manual has been read and understood.
- Safety-related tasks in the vicinity of the pump are regulated and assigned.
  - Maintaining order
  - Compliance with safety requirements
  - Securing of danger areas

The groups of people named below must also have the personnel qualifications or skills listed below and be authorised for actions at the pump by the operator.

operating staff

- Instructed by the operator, a trained customer specialist or a GEA service specialist

customer specialist

- Technical training

trained customer specialist

- Technical training in a specific specialist area
- Training by GEA personnel or participation in training at GEA Hilge

GEA service specialist

- Personnel from GEA Hilge, see *1.3 Customer service*

Where necessary, reference is made to the respective group of people in this Operating Manual.

2.5 General safety instructions

The pump has been built according to state-of-the-art and the recognised safety regulations valid at the time it is put into circulation. Nevertheless, the measures stipulated by the operator and listed below must be kept in order to maintain safety.

The hazards listed in this section can cause property damage and personal injuries of different intensities.

2.5.1 General hazard

Source	Consequences	Measures
Machine not in proper condition	Personal injuries and property damage	Check proper condition of the pump.
Non-observance of this Operating Manual	Personal injuries and property damage	Read this Operating Manual completely and understand it.
Operating media	Personal injuries	• Wear personal protective equipment. • Avoid contact with operating media.

2.5.2 Mechanical hazard

Source	Consequences	Measures
Moving or rotating components	• Being drawn in or caught • Entrapment • Crushing • Impact	• Remove jewellery. • Tie hair back or wear a hair net. • Wear tight-fitting clothing.
• Sharp edges • Cutting parts • Pointed parts	• Cutting or shearing • Penetration or puncture • Shearing • Rubbing or grazing	• Wear personal protective gear. • Use transport protection and available jigs.
• Rough or slippery surfaces • Stumbling hazards	• Slipping • Stumbling • Falling	• Wear personal protective gear. • Eliminate leaked liquids and stumbling hazards.
• Gravity • Falling objects	• Impact • Crushing	• Do not walk under suspended loads. • Eliminate the stumbling hazards. • Only move mobile pumps on level surfaces. • Secure mobile pumps against rolling away. Actuate the parking brake (where applicable).
Height above the ground	Falling	Use supports and permitted climbing aids.

2.5.3 Electrical hazard

Source	Consequences	Measures
Electromagnetic processes	Implications for electronic medical implants	People with medical implants must keep their distance.
Electrostatic processes	• Electric shock • Fire • Chemical reaction	• Avoid contact to components. • Check the voltage of components. • Wear personal protective gear. • Eliminate leaked flammable substances.

2.5.4 Thermal hazard

Source	Consequences	Measures
Objects or materials at high or low temperature	• Freezing • Burns • Scalding	• Wear personal protective gear. • Wait for adjustment to room temperature.
Radiation from heat sources	• Burns • Discomfort	• Wear personal protective gear. • Keep time spent to a minimum.

2.5.5 Hazard caused by noise

Source	Consequences	Measures
Manufacturing process or production process	• Permanent hearing loss • Tinnitus (ringing in the ears) • Dizziness • Discomfort • Loss of consciousness • Fatigue • Stress	• Keep time spent at a minimum. • Wear personal protective gear.

2.5.6 Hazard through vibration

Source	Consequences	Measures
• Moving equipment • Cavitation processes • Frictional surfaces • Vibratory equipment	Discomfort	Keep time spent at a minimum.

2.5.7 Radiation hazard

Source	Consequences	Measures
• Optical radiation • Laser beams	• Eye damage • Skin damage	• Wear personal protective gear. • Avoid looking at the source of radiation.

2.5.8 Hazard due to operating environment

Source	Consequences	Measures
• Lightning • Electromagnetic interference • Humidity • Lack of oxygen • Snow • Dust and fog • Temperature • Contamination • Water • Wind	Personal injuries and property damage	• Take note of the permissible operating conditions, see chapter *5.1 Requirements on the place of use*.

2.5.9 Ergonomic hazard

Source	Consequences	Measures
• Flickering • Orifice plates • Shadow formation • Stroboscopic effects	Discomfort	• Avoid looking into the source. • Keep time spent at a minimum.

2.5.10 Hazard through hazardous substances

Source	Consequences	Measures
• Dangerous media • Operating media • Cleaning agents	• Caustic and irritant effect on eyes, skin and the respiratory system • Material damage to surfaces and seals	• Wear personal protective equipment. • Observe the product data sheet and manufacturer information. • Conduct leakages away in such a way that they do not present a hazard.
• Decontamination • Contamination	• Poisoning • Infections	• Make sure there are no objects in the pump. • Clean the pump before initial start-up and after all assembly work. • Carry out CIP and SIP cleaning cycle.

2.6 Personal protective equipment

To prevent possible personal injuries, the personal protection equipment must be worn.

In addition, GEA recommends keeping the requirements listed below.

- Locally applicable accident prevention regulations
- Instruction manual from the operator or employer

2.7 Safety devices

Safety devices monitor operating parameters. To protect the pump, measures are initiated automatically if the specified tolerance values are exceeded.

If one of the safety devices triggers stopping of the pump, the pump may only be restarted after the cause has been determined and eliminated.

There are no safety devices installed on this pump.

2.8 Residual Hazards

Despite all the measures taken, the following residual hazards can lead to personal injuries and property damage at any time.

- Improper use
- Material fatigue
- Failure of safety devices

2.9 Safety signs

The following safety signs are used in these Operating Manual or are attached to the pump.

The position of the safety signs used on the pump is shown on an overview diagram, see *3.2 Signs*.

Signs giving orders

Observe manual

Hazard if this Operating Manual is not read before actions at the pump.

Warning signs

General warning sign

Hazard for persons, conveyed by the additional sign.

Beware of crushing hazard

Hazard due to mechanical parts which can move towards each other.

Beware of electric voltage

Hazard due to contact with electric voltage.

2.10 Emergency measures

If an emergency occurs at the pump, the company regulations must be followed and the measures listed below must be taken.

Fire

- Call local experts
- Use extinguishing equipment according to company regulations
- Leave the danger area
- Warn endangered persons

Personal injuries

- Do first aid
- Call local emergency services

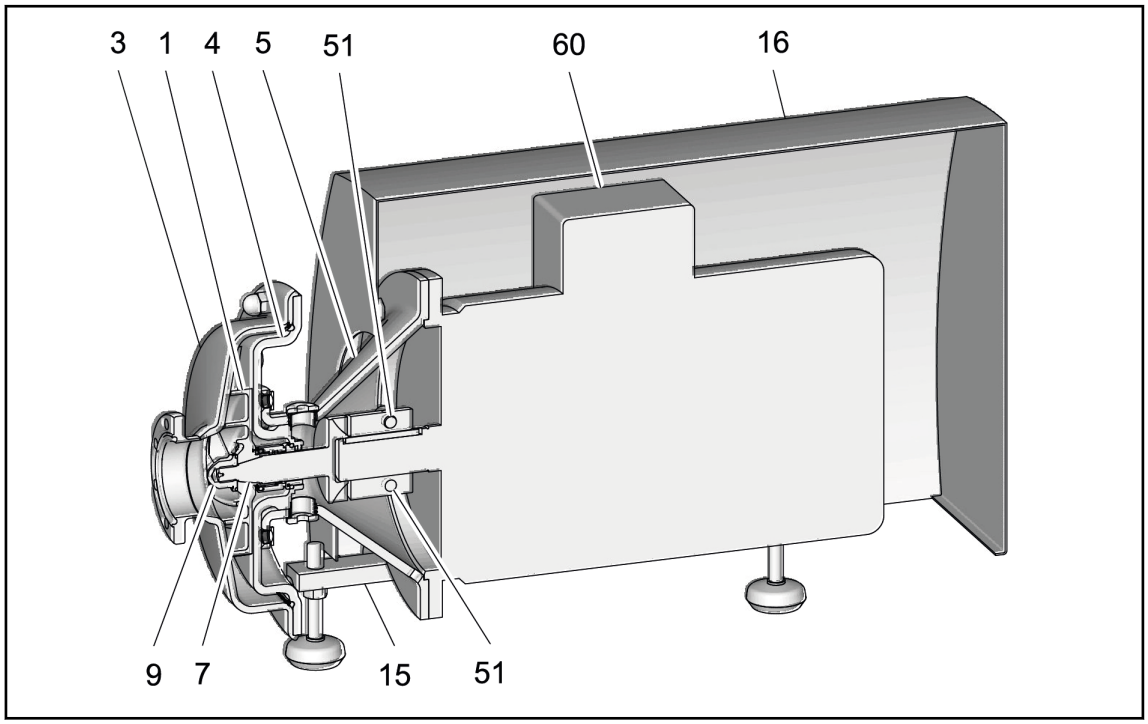
3 Description

This chapter contains descriptions of the set-up and function of the pump.

3.1 Structure and function

3.1.1 Component overview

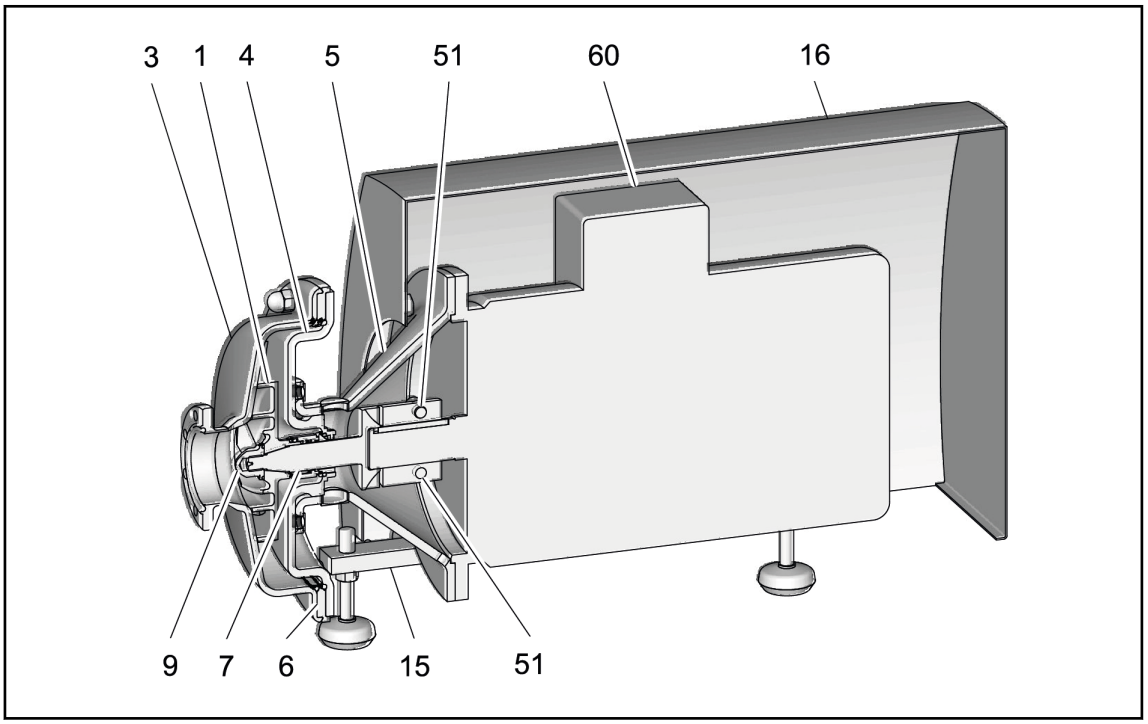
Pump TP (Standard)



Item	Designation	Item	Designation
1	Impeller	7	Shaft
3	Pump cover	9	Cap nut

Item	Designation	Item	Designation
4	Pump casing	60	Three-phase asynchronous motor
5	Motor stool	15	Cup-shaped feet carrier
6	Spacer ring (Only for pump TPE)	16	Protective hood

Pump TPE (with enlarged gap behind the impeller)



Item	Designation	Item	Designation
1	Impeller	7	Shaft
3	Pump cover	9	Cap nut
4	Pump casing	60	Three-phase asynchronous motor
5	Motor stool	15	Cup-shaped feet carrier
6	Spacer ring (Only for pump TPE)	16	Protective hood

The pump shaft (7) is attached on the shaft end of the three-phase asynchronous motor.

The pump shaft is fixed axially by 2 cylinder screws (51).

The motor stool (5) allows the connection of different motor sizes to the pump.

The motor stool (5) connects the motor to the pump housing (4). It has 2 holes to indicate leakage.

Depending on the design, the pump has a single-acting (EW), a single-acting flushed (QU) or a double-acting mechanical seal (DW).

The slide-ring of the mechanical seal is carried along with the impeller by a pin.

The impeller is installed between the pump housing and the pump cover.

The height and the horizontal orientation of the pump are set with 4 height-adjustable cup-shaped feet.

If necessary, the pump can be equipped with a stainless steel hood to protect the motor.

3.1.2 Structure and quality

The centrifugal pump TP has normal suction. It requires the constantly supply of fluid on the suction port. The impeller with its blades curved backward, rotates in the pump at the speed of the motor. The rotation of the impeller transmits energy in the form of centrifugal forces and speed increases to the conveying medium which is then pumped from the discharge port.

The suction port is aligned radially and centrically with the body of the pump. The discharge port is tangential, generally upwards, otherwise in 45 ° angles on the pump body.

3.1.2.1 Areas of application

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

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

3.1.2.2 Hygienic design applications

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

- Pharmaceutical industry
- Medical technology
- In biotechnology process plants

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

Pumps for hygienic design applications

Pumps used for hygienic applications must have certain equipment features and are configured accordingly when ordered. Execute connections in accordance wit the “EHEDG White Paper on GFSI Hygienic Design Scope”.

3.1.2.3 Pump denomination

Example for pump code

TP	2050	1	/	A	/	C	S	/	40 x 40	/	Ra ≤ 3.2 µm	/	Fe ≤ 1 %
1	2	3		4		5	6		7		8		9

Item	Designation	Item	Designation
1	Pump type	6	W: without shroud S: with shroud
2	Size		W: with shroud, without logo
3	Number of stages		

Item	Designation	Item	Designation
4	Standard A: non 3-A B: non 3-A A: non 3-A D: 3-A (USA) E: non 3-A F: non 3-A	7	Nominal diameter suction port Nominal diameter discharge port
		8	Surface quality
		9	Ferrite content (if specified)
5	Design type K: plug-in shaft		

3.2 Signs

Overview and layout

All safety signs and labels must meet the following criteria during the entire life span of the pump:

- Complete
- Attached as illustrated
- Clean and legible

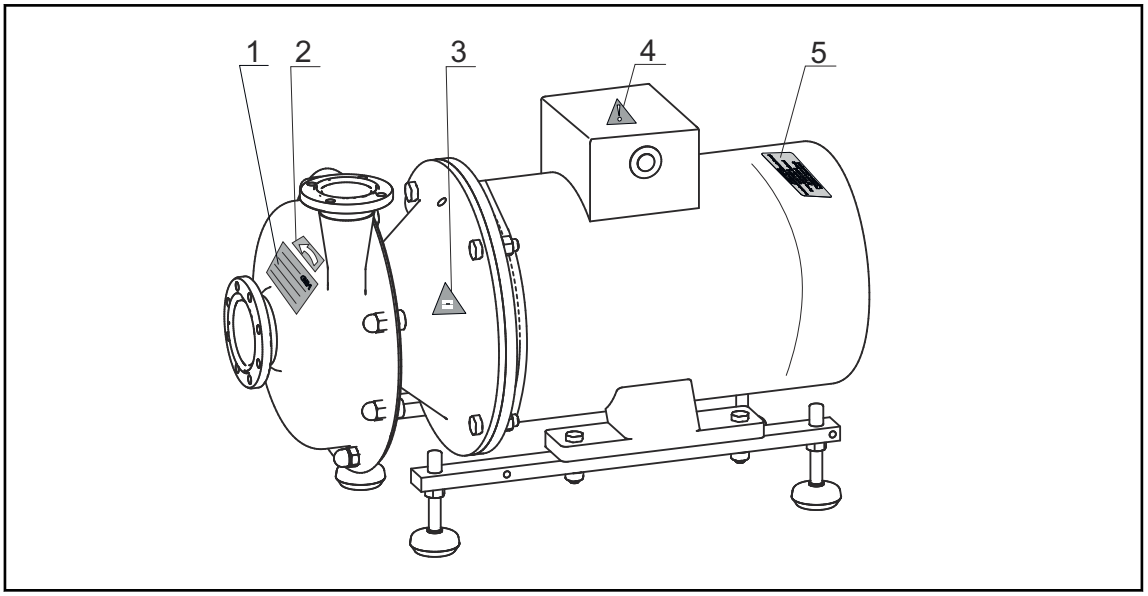


Figure 3-1 - Overview diagram of the signs on the pump

Position	Description	Position	Description
1	Nameplate	2	Rotation arrow
3	Warning Crushing	4	General hazard warning
5	Caution dry running		

The representation and meaning of the safety signs used are listed in an overview according to their category, see chapter *2.9 Safety signs*

3.3 Protective devices

The motor stool is equipped with two safety plates to guard the shaft connection.

3.4 Technical data

3.4.1 Type plate

Each pump carries a nameplate. For information about exact positioning, see chapter *3.2 Signs*.

The nameplate contains the following information:

- Manufacturer name and address
- Product safety mark
- Type: Pump denomination
- Model: Pump code
- Ser.no: serial number
- Q: flow rate
- H: head
- P: Motor rating
- n: speed
- YOM: year of manufacture
- TAG/Mat.: Customer name

3.4.2 Weights

Pump weights [kg]

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

Motor size	Number of poles	Output [kW]	TP 1020	TP 1540	TP 2030	TP 2050	TP 2575	TP 3050	TP 5060	TP 7060	TP 8050	TP 8080	TP 16040
80	2	1.1	35			-	-	-	-	-	-	-	-
90S	2	1.5	40		42	-	-	-	-	-	-	-	-
90L	2	2.2	42		44	-	-	-	-	-	-	-	-
100L	2	3	59	62	61	63	-	66	-	-	-	-	-
112M	2	4	70	73	72	74	-	77	-	-	83	-	-
112M	2	5.5	75	78	77	79	83	82	84	-	88	-	-
112M	2	7.5	-	84	83	85	89	88	90	91	94	-	-
132S	2	5.5	-	91	90	92	96	95	97	98	101	-	-
132S	2	7.5	-	106	105	107	111	110	112	113	116	-	-
132M	2	9	-	114	113	115	119	118	120	121	124	-	-
132M	2	11	-	115	114	116	120	119	121	122	125	124	128
132M	2	15	-	129	-	130	134	133	135	136	139	138	142

Motor size	Number of poles	Output [kW]	TP 1020	TP 1540	TP 2030	TP 2050	TP 2575	TP 3050	TP 5060	TP 7060	TP 8050	TP 8080	TP 16040
160M	2	11	-	163	-	164	168	167	169	170	173	172	176
160M	2	15	-	169	-	170	174	173	175	176	179	178	182
160L	2	18.5	-	-	-	-	183	182	184	185	188	187	191
160L	2	22	-	-	-	-	192	191	193	194	197	196	200
200L	2	30	-	-	-	-	300	-	301	302	305	304	308
200L	2	37	-	-	-	-	-	-	-	-	-	316	320
200M	2	45	-	-	-	-	-	-	-	-	-	349	353
80	4	0.75	34	37	36	38	-	41	-	-	-	-	-
90S	4	1.1	39	42	41	43	-	46	-	-	-	-	-
90L	4	1.5	41	44	43	45	-	48	-	-	-	-	-
100L	4	2.2	61	64	63	65	-	68	70	71	80	-	-
100L	4	3	64	67	66	68	72	71	73	74	83	-	86
112M	4	4	-	-	75	77	81	80	82	83	86	85	89
132S	4	5.5	-	-	92	94	98	97	99	100	103	102	106
132M	4	7.5	-	-		112	116	115	117	118	121	120	124

Motor weights [kg]

Motor size	Number of poles	Output	Weight
		[kW]	(Tolerance +10%)
80	2	1.1	16
90S	2	1.5	22
90L	2	2.2	24
100L	2	3	34
112M	2	4	40
112M	2	5.5	45
112M	2	7.5	51

Motor size	Number of poles	Output	Weight
132S	2	5.5	54
132S	2	7.5	69
132M	2	9	77
132M	2	11	78
132M	2	15	92
160M	2	11	110
160M	2	15	116
160M	2	18.5	125
160L	2	22	134
200L	2	30	223
200L	2	37	235
200M	2	45	268
80	4	0.75	15
90S	4	1.1	21
90L	4	1.5	23
100L	4	2.2	36
100L	4	3	39
112M	4	4	43
132S	4	5.5	56
132M	4	7.5	74

3.4.3 Torques

Torques

Observe part numbers in the parts overviews.

Torques [Nm]

Size	Cap nut (48)		Impeller nut (9)	
	M_{min}[Nm]	M_{max}[Nm]	M_{min}[Nm]	M_{max}[Nm]
TP 1020	17.5	22	45	50
TP 2030	35	39	45	50

Size	Cap nut (48)		Impeller nut (9)	
TP 1540	60	74	55	60
TP 2050	60	74	55	60
TP 3050	60	74	55	60
TP 5060	60	74	90	95
TP 7060	60	74	90	95
TP 2575	95	110	90	95
TP 8050	95	110	90	95
TP 8080	95	100	90	95
TP 16040	95	110	90	95

Torques [ft lb]

Size	Cap nut (48)		Impeller nut (9)	
	M_{min}[ft lb]	M_{max}[ft lb]	M_{min}[ft lb]	M_{max}[ft lb]
TP 1020	13	16	33	37
TP 2030	26	29	33	37
TP 1540	44	55	41	44
TP 2050	44	55	41	44
TP 3050	44	55	41	44
TP 5060	44	55	66	70
TP 7060	44	55	66	70
TP 2575	70	81	66	70
TP 8050	70	81	66	70
TP 8080	70	74	66	70
TP 16040	70	81	66	70

Torques of the pump shaft

Cylinder screw (51)	Torques	
	[Nm]	[ft lb]
M8	35	26
M10	70	52
M12	110	81

Torques of the motor stool

Hex head screw (44)	Torques	
	[Nm]	[ft lb]
M10	39	29
M12	74	55
M16	100	74

3.4.4 Serial number

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

3.4.5 Performance specifications

The performance data - delivery head and flow rate - are explained in accordance with ISO 9906:2012, Grade 2B and documented with the acceptance report.

3.4.6 Noise emissions

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

Pump	Switching sound pressure level nominal [dB(A)]
TP 1020	63
TP 2030	74
TP 1540	67
TP 2050	74
TP 3050	74
TP 5060	74
TP 7060	77
TP 2575	77
TP 8050	78
TP 8080	77
TP 16040	83

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

3.4.7 Operating temperatures

Temperature range	Permissible values
Operating temperature	-5 ... +100 ° C, +140 ° C for a temporarily (with corresponding sealing quality)
Ambient temperature	-16 to + 40 °C

Further temperatures on request.

3.4.8 Maximum operating pressure

Max. permissible operating pressure (MAWP) [bar]= Suction pressure + max. output pressure (pump)

TP 1020	TP 2030	TP 1540	TP 2050	TP 3050	TP 5060	TP 7060	TP 2575	TP 8050	TP 8080	TP 16040
10	16	16	16	16	16	16	16	16	16	16

Max. allowable suction pressure [bar]

TP 1020	TP 2030	TP 1540	TP 2050	TP 3050	TP 5060	TP 7060	TP 2575	TP 8050	TP 8080	TP 16040
10	16	16	16	16	16	16	16	16	16	16

3.4.9 Resistance of sealing materials

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

The maximum operating temperature is determined by the type of seal and its mechanical load. GEA Hilge recommends users carrying out resistance tests themselves in order to check the suitability of the elastomer selected for their application. Resistance of the sealing materials depend on operating conditions such as length of contact with the medium, process temperature, flow speed, concentration of the cleaning agent and ambient conditions. These can only be determined by the user. If necessary, GEA Hilge can support you with further information for special applications.

Resistance[1]:

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

Sealing material, general operation temperature

Medium	Temperature	EPDM -40...+135 °C (-40...275 °F)	FKM -10...+200 °C (+14...+392 °F)
Caustics up to 3%	up to 80 °C (176 °F)	+	o
Caustics up to 5%	up to 40 °C (104 °F)	+	o
Caustics up to 5%	up to 80 °C (176 °F)	+	–
Caustics at more than 5%		o	–
Inorganic acids up to 3%	up to 80 °C (176 °F)	+	+
Inorganic acids up to 5%	up to 80 °C (176 °F)	o	+
Inorganic acids up to 5%	up to 100 °C (212 °F)	–	+
Water	up to 80 °C (176 °F)	+	+
Steam	up to 135 °C (275 °F)	+	o
Steam, approx. 30 min	up to 150 °C (302 °F)	+	o
Fuels/hydrocarbons		–	+
Product with a fat content of max. 35%		+	+
Product with a fat content of more than 35%		–	+
Oils		–	+

1) depending on the installation situation

3.4.10 Minimum flow rate

Flow rates and heads depending on pump type

Nominal values	TP 1020	TP 2030	TP 1540	TP 2050	TP 3050	TP 5060	TP 7060	TP 2575	TP 8050	TP 8080	TP 16040
Discharge, nominal [m³/h]	10	20	15	20	30	50	70	25	80	80	160
Discharge, maximum [m³/h]	20	36	35	36	75	75	110	40	115	120	210
Discharge head, nominal [m]	20	30	40	50	50	60	60	75	50	80	40
Discharge head, maximum [m]	24	36	42	60	65	75	74	85	57	90	49

3.4.11 Viscosity

The maximum dynamic viscosity of the pump range is 1000 mPa*s = 1000 cP.

3.4.12 Motor data

Pump	TP 1020	TP 2030	TP 1540	TP 2050	TP 3050	TP 5060	TP 7060	TP 2575	TP 8050	TP 8080	TP 16040
Motor	IEC three-phase AC motor, IM B34 and B35 design, make and version freely selectable, see motor selection table.										
Output range [kW]	0.75 … 5.5	0.75 … 11	0.75 … 15	0.75 … 15	0.75 … 22	2.2 … 30	2.2 … 30	3.0 … 30	2.2 … 30	4.0 … 45	3.0 … 45
Operating voltage (standard)	up to incl. 2.2 kW: Δ 230 V and Y 400 V with 50 Hz / Δ 265 V and Y 460 V with 60 Hz incl. 3.0 kW: Δ 400 V and Y 690 V with 50 Hz / Δ 460 V with 60 Hz										

Observe different operating voltages if the motors deviate from the standard.

3.4.13 Motor selection

The axial forces may not be exceeded by the requirement profile of the motor.

Motor selection

Motor size	Output [kW]	Speed [rpm]	Min. axial forces [N][2]	Permissible axial shaft movement [mm][2]
80 L	0.75	1450	570	0.1
90 S	1.1	1450	570	0.1
90 L	1.5	1450	570	0.1
100 L	2.2	1450	600	0.1
100 L	3	1450	700	0.1
112 M	4	1450	800	0.1
132 S	5.5	1450	800	0.1
132 M	7.5	1450	1100	0.1
80 L	1.1	2900	570	0.1
90 S	1.5	2900	570	0.1
90 L	2.2	2900	600	0.1
100 L	3	2900	700	0.1
112 M	4	2900	800	0.1
112 M	5.5	2900	800	0.1
112 M	7.5	2900	1100	0.1
132 M	11	2900	1100	0.1
132 M	15	2900	1100	0.1
160 L	18.5	2900	1100	0.2
160 L	22	2900	1400	0.2
200 L	30	2900	1400	0.3
200 L	37	2900	1400	0.3
225 M	45	2900	2000	0.3

2) from the direction of the motor

3.4.14 Materials - product contacting

Materials - product contacting

Component	Material
Pump casing	1.4404 / 316L
Pump shaft	1.4404 / 316L
Impeller	1.4404 / 316L
Shaft seal standard	Carbon - Silicon Carbide (C / SIC)
Shaft seal alternative	Silicon Carbide - Silicon Carbide (SIC / SIC) Carbon - Stainless Steel (C / SS)
Notes	All mechanical seals are available in single-acting, flushed or a double-acting flushed versions. Double-acting mechanical seal in the standard program only in SIC/SIC.
Seals	EPDM/FKM

3.4.15 Lubricants

Lubricant name	Material no.
Rivolta F.L.G. MD-2 (1000 g)	413-071
Rivolta F.L.G. MD-2 (100 g)	413-136

3.4.16 Types of mechanical seals

TP	E	EW	SHJ	C	S	25
Pump type	Use	Configuration	Design	Material	Elastomer	Shaft diameter
TP/TPS	U: Conversion kit K: Mechanical seal complete V: Wear parts kit	EW: Single-acting QU: Single-acting, flushed DW: Double-acting	SHJ (Burgmann) TSA (MTU)	C: C/SIC S: SIC/SIC B: C/SS	E: EPDM F: FKM	25/30

3.4.17 Technical data flushing

Feature	Design	Limit values
Sealing liquid pressure	Type DW, double-acting mechanical seal	Min. 0.7 bar (10.2 psi) max. 16 bar (232.1 psi)
Sealing liquid temperature	Type DW, double-acting mechanical seal	-10 to 100 °C (14 to 212 °F) 140 °C (284 °F) SIP, briefly

Feature	Design	Limit values
Sealing liquid pressure	Type QU, single-acting mechanical seal flushed, with lip seal for barrier liquid	up to 2000 rpm: Max. 0.35 bar (5 psi) up to 3500 rpm: Max. 0.2 bar (2.9 psi) (according to DIN 3760)
Sealing liquid temperature	Type QU, single-acting mechanical seal, with lip seal for barrier liquid	-10 to 100 °C (14 to 212 °F) 140 °C (284 °F) SIP, briefly
Water consumption of sealing liquid		0.25 … 0.5 l/min 0.066 … 0.132 gpm (US)

3.4.18 Speeds TP

Speeds

Frequency	2-pin	4-pin
max.	3,500 rpm	
50 Hz	2,900 rpm	1,450 rpm
60 Hz	3,500 rpm	1,750 rpm

3.4.19 Technical data - drainage valve VTP

Designation	Description
Size	DN 10
Weight	0.3 kg (0.661 lb)
Material of product contact parts	Stainless steel 1.4404 |1.4435
Installation position	Headover to allow the valve to drain
Ambient temperature	0 to 60 °C (32 ... 140 °F), standard
	< 0 °C (32 °F): Use control air with low dew point. Protect valve stems against freezing.
Product temperature and operating temperature	Depending on the sealing material
Draining (pressure free)	1.2 l/min (0.32 gpm)
Product pressure	Max. 16 bar (232 psi) during sealing
	Max. 6 bar (87 psi) during opening
Control air pressure	Min. 6 bar (87 psi)
	max. 8 bar (116 psi)
Control air	acc. to ISO 8573-1
- Solid particle content:	Quality class 6

Designation	Description
	Particle size max. 5 µm (1.969x10-4 inch)
	Particle density max. 5 mg/m3 (1.8 x 10-11 lb/ inch3)
- Water content:	Quality class 4
	Max. dew point +3 °C (37.4 °F)
	If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3,
	preferably oil free
	max. 1 mg oil to 1 m3 air
Air hose	
- Metric	Material PE-LD
	Outer Ø 6 mm (0.236 inch)
	Interior-Ø 4 mm (0.157 inch)
- Inch	Material PA
	Outer Ø 6.35 mm (0.25 inch)
	Interior-Ø 4.3 mm (0.169 inch)

4 Storage and transport

This chapter contains information for the transport of the pump with and without packaging material. In addition, this chapter describes the minimum requirements for storage after delivery as well as for possible intermediate storage. The target group for this chapter are all those who perform actions related to the transport or storage of the pump.

INFO For all transport, observe chapter *2 Safety* of this document.

4.1 Storage

Seal inlet and outlet side with a plastic cover.

Protect seals against dust and damage.

Store the pump under the following conditions:

- Do not store outdoors.
- Store dry and dust-free.
- Do not expose to aggressive media.
- Protect against sunlight.
- Protect against frost.
- Protect against rodents.
- Avoid mechanical vibrations.
- Turn the pump shaft (by approx. 30°) once every month.
- If stored for longer than three months: check the general condition of all parts and package regularly.

INFO After a storage period of more than three years: contact GEA Hilge to have the pump repaired again.

4.2 Transport aids

If the weight of the pump exceeds 40 kg, transport may only be by crane or forklift truck.

4.3 Transport

Transporting the pump with packaging

Prerequisites

- The packaging is undamaged.
- The pump is in a box on a pallet that can be driven underneath.

Tools

- Forklift truck

1. Drive the load handling equipment under the pallet and pick it up. Make sure it is aligned correctly.
2. Transport the pump to its destination.

⇒ The pump has been transported to its destination with packaging.

Unpacking the pump

Prerequisites

- The pump is in a box on a wooden pallet.
- The packaging is undamaged.

Tools

- Scissors or knife
- Gloves
- Strap, load lifting equipment with sufficient load-bearing capacity.
- Crane or forklift truck

1. **CAUTION** Injury due to packaging straps with sharp edges.
   Careless handling of packaging straps can lead to cuts.
   - Wear gloves.

   Cut the packaging straps open and remove them.
2. Lift the box over the pump.
3. Remove fastening material on the pump.

⇒ The pump has been unpacked and can be transported to its place of use.

Transporting the pump without packaging

Prerequisites

- The shroud (if appropriate) has been removed.

Tools

- Strap, load lifting equipment with sufficient load-bearing capacity
- Forklift truck or crane

1. **ATTENTION** Danger due to unsuitable anchor points.
   Forces acting on the pump can damage it.
   - Never fasten a strap to the pump casing or the suction/discharge port!

   Attach the strap to suitable anchor points.

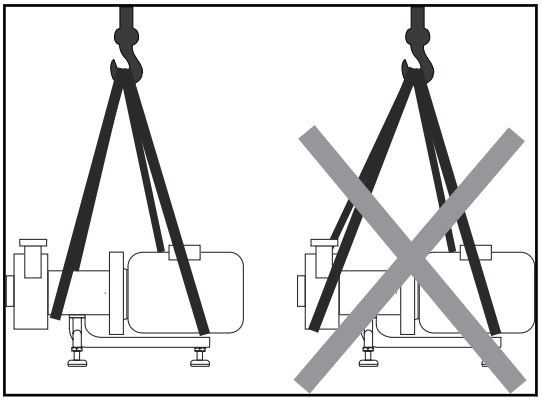


Figure 4-1 - Correct attachment of the straps

2. Align the pump horizontally during lifting.
3. Lift the pump by crane or forklift truck and transport it to the place of use.

⇒ The pump is ready for installation in the system.

5 Assembly and installation

This chapter contains information and instructions for the assembly and installation of the pump. The target group for this chapter are all those who carry out actions at the pump in this context.

INFO During assembly and installation observe chapter *2 Safety* of this document.

5.1 Requirements on the place of use

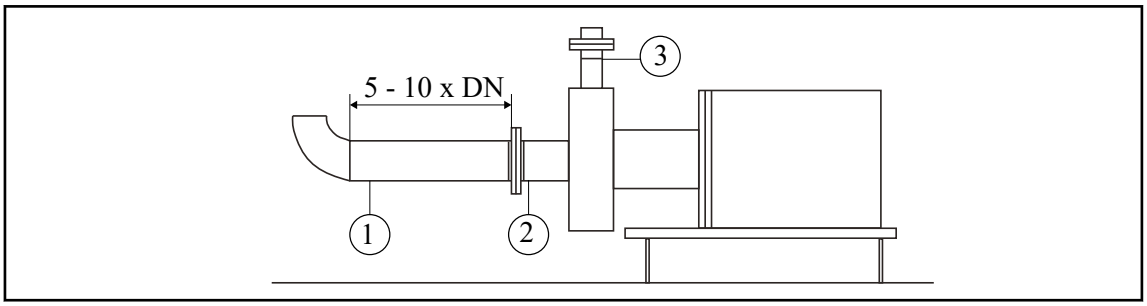
The place of use must fulfil the requirements listed below.

- The ground must be clean, level and able to bear a sufficient load.
- There are no local oscillations that can be transferred to the pump.
- The ambient temperature is at least 0 °C up to maximum 40 °C.

Operator-side measures feed line and discharge line

- Bolt the provided fastening points to the foundation for proper setup of the pump according to the usual rules of mechanical engineering.
- Do not use the pump and its connecting pieces to support the pipeline (EN 809 5.2.1.2.3 and EN ISO 14847).
- Follow the general rules of mechanical engineering and plant construction and the regulations of the manufacturers of connecting elements (for example flanges). These regulations may include information on tightening torques, max. permissible angular misalignment, tools/equipment to use.
- Be sure to avoid any strain on the pump.
- Ensure stable construction for mounting of the pump and piping. Insufficiently stiffened substructures may cause an overall structure capable of oscillating, which is excited to oscillate by hydraulic and/or motor forces during changing operating conditions in the system.
- The suction line must be hermetically sealed and laid such that no air pockets can form.
- Avoid tight bends and valves directly in front of the pump. They impair the incoming flow of the pump and the NPSH of the system.
- The suction head of the system must not be larger than the suction head guaranteed by the pump.
- The piping nominal diameters of the system should be equal to or greater than the DNE or DNA connections of the pump.
- For suction operation, install a foot valve.
- Route the suction line in ascending direction and the supply line at a slight slope towards the pump.
- If the local conditions do not permit a continuous ascent of the suction line: Install a venting option at its highest point.
- Install a shut-off valve in the supply line close to the pump.
- Open the suction side shut-off valve completely during operation.
- Do not use the suction side shut-off valve for controlling.
- Install a shut-off valve in the pressure line close to the pump. This can be used to control the flow rate.
- Ensure adequate ventilation. Avoid sucking in the heated exhaust air also of adjacent units. Maintain minimum distances.

Do not install any elbow directly upstream of the pump. The calming section before the inlet should correspond to five to ten times the diameter of the inlet nozzle.



Position	Description	Position	Description
1	Inlet pipe	2	Suction port
3	Discharge port		

Operator-side measures electrical connection

- Have the electrical connections be made by a licensed electrician.
- Follow the VDE as well as local regulations, in particular the safety regulations.
- Compare the voltage indicated on the motor plate with the operating voltage. The power supply properties must match the specifications on the nameplate.
- Install a motor protection switch.
- Use a motor suitable for frequency converter operation.
- Use a dU/dt filter to avoid voltage spikes or a motor with reinforced windings.

Operator-side measures flushing for mechanical seals

- Always connect the flushing lines such that supply for flushing is always ensured.
- Ensure that flushing fluid is supplied even when checking the motor’s direction of rotation.
- Ensure that the flushing pressure does not exceed 0.2 bar / 2.9 psi.
- Provide for lost flushing.

Operator-side measures vertical pump installation

- Fasten pump with suitable heavy-duty anchors. The pump tends to tip over due to the elevated centre of gravity.
- Position the pump part always below the motor. If leakage occurs, the liquid cannot ingress into the motor.

Spatial requirements with horizontal set-up

If pumps are set up horizontally, observe the following minimum clearances.

Pay attention to motor performance.

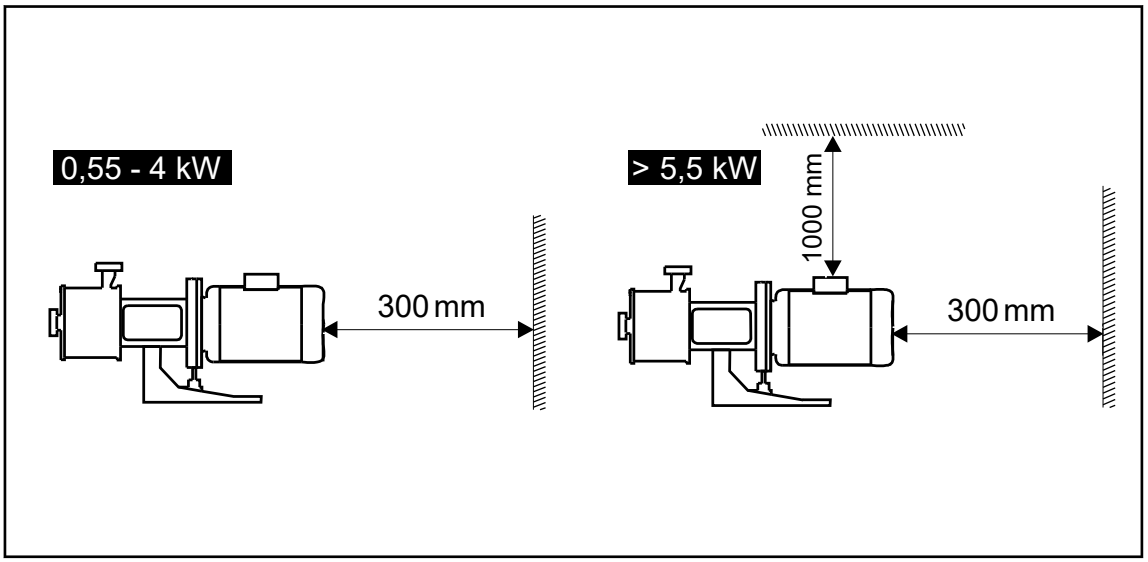


Figure 5-1 - Minimum clearances with different motor sizes

5.1.1 Reducing noises and vibration

Foundation and vibration absorbers

To achieve optimum performance and to minimize noise and vibration, it is recommended to provide the pump with vibration absorbers. In general, this should always be considered for pumps with motor sizes starting from 11 kW (15 hp).

But unwanted vibrations and noises occur also with smaller motor sizes. Noise and vibration are caused by the rotating parts in the motor and the pump and by the flow in the pipes and fittings. The effect on the environment is subjective and depends largely on the correct installation and the nature of the rest of the system.

Vibration damping is best achieved if the pump is set up on a flat, solid concrete foundation. As a guideline, the concrete foundation should be 1.5 times as heavy as the pump.

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

Selecting the correct vibration absorber requires the following data:

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

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

Compensators

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

Compensators are installed to

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

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

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

For connections with a size over DN 100 (4"), we always recommend compensators with length limiters.

The pipes must be supported in such a way that they cannot cause strain in the compensators and in the pump. Follow the manufacturer's instructions and hand them over to the person responsible or to the plant manufacturer.

Vibration may cause the following damage:

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

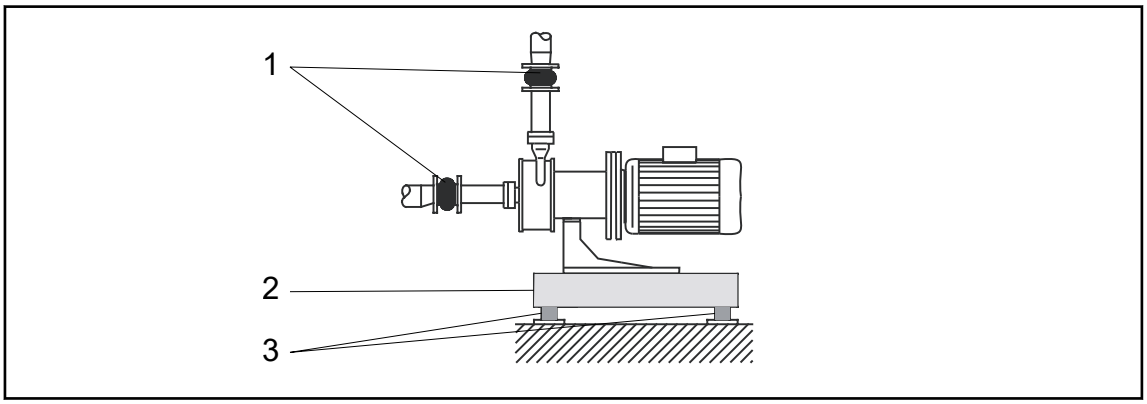


Figure 5-2 - Installation of vibration absorbers

Position	Description	Position	Description
1	Compensators	2	Solid base
3	Vibration absorber		

5.2 Assembly preparations

Unpacking and checking the scope of delivery

Prerequisites

- None

1. Remove transport packaging.
2. Remove all the plastic films and caps at the connections.
3. Check delivery for completeness in accordance with the packing list.
4. Check delivery for possible property damage.
5. Dispose of packaging material in accordance with the pertinent regulations.

⇒ The pump has been unpacked and scope of delivery checked.

Checking smooth running of the impeller

Prerequisites

- The pump has been removed from the packaging and is ready and easily accessible.

Tools

- Screwdriver, spanner

1. Remove motor shroud (if appropriate).
2. Remove the motor fan cover.
3. Heed the direction of rotation of the pump (arrow).
4. Carefully rotate the shaft of the impeller. The shaft should be easy to rotate. If the impeller rubs against something, it has some damage that may have happened during transport of the pump. If the impeller rubs, contact GEA Hilge Customer Service.
5. If the impeller is rotating freely: attach the motor fan cover again.
6. Attach the motor shroud (if appropriate).

⇒ The impeller has been checked for running smoothly.

5.3 Set-up, assembly, connection

Setting up and aligning

Responsibility

- Customer specialist

Prerequisites

- *5.1 Requirements on the place of use* are fulfilled.

Tools

- Machine spirit level
- Spanner
- Fastening material (if appropriate)

1. Note the permissible type of set-up. The pump is designed for horizontal operation.

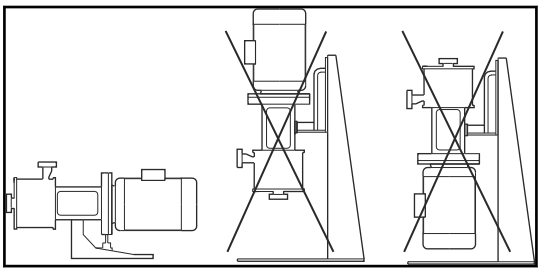


Figure 5-3 - Permissible set-ups of the pump

2. Level the unit via the machined planar surfaces of the ports using a machine spirit level. Compensation by adjusting the machine feet or by using shims.
3. Tighten the fastening screws evenly crosswise (where applicable).

⇒ The pump has been set up and aligned.

5.3.1 Installation in the piping system

Installation in the piping system

Responsibility

- Customer specialist

Prerequisites

- The pump is free of packaging material.
- Transport covers have been removed from suction port and discharge port.

1. Install the pump in the pipeline according to type of operation (gravity feed mode / suction mode), note *Operator-side measures feed line and discharge line*, page *37*

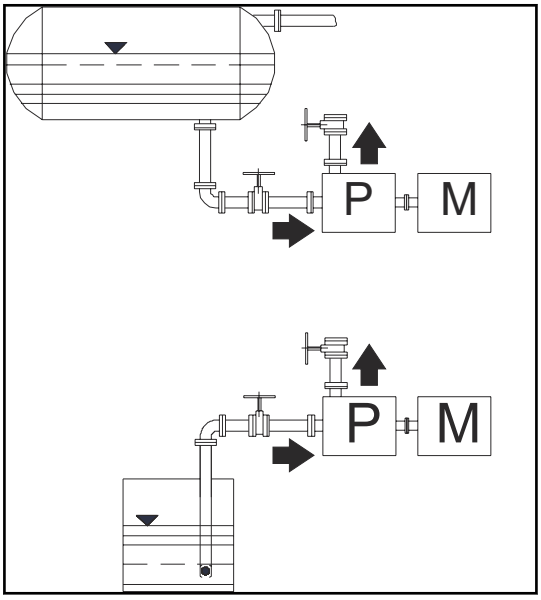


Figure 5-4 - top: gravity feed mode | bottom: suction mode | P - pump | M - motor

⇒ The pump has been installed in the pipeline.

5.3.2 Connecting the flushing

Dry running of the mechanical seal

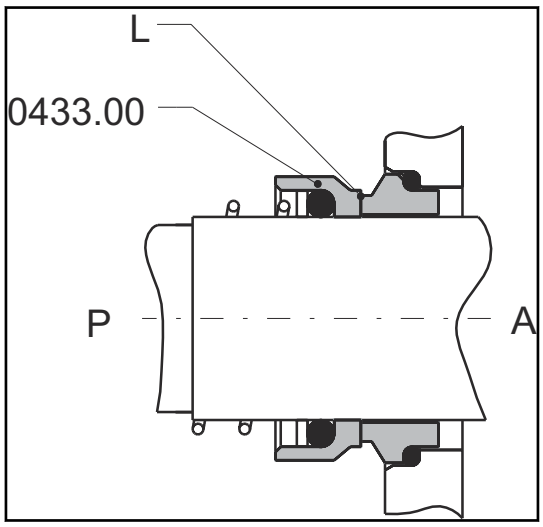


Figure 5-5 - Single-acting mechanical seal

For correct sealing, the mechanical seal (0433.00) requires a lubricant film (L) between the sliding surface on the atmosphere side (A) and product side (L). If the lubrication film is missing or interrupted between the sliding surfaces, dry running occurs. The friction heat generated by the direct contact of the sliding surfaces leads to the destruction of the mechanical seal. Depending on the material pairing, this can take place within a few seconds.

5.3.2.1 Connect flushing of the mechanical seal

Requirements on the flushing fluid

The flushing liquid serves the purpose of lubricating and cooling both the product-side and atmospheric-side shaft seals.

The flushing fluid must meet the following criteria:

- Good flowability
- No impurities
- No solids
- No dissolved components
- Adequate thermal conductivity
- No chemical or mechanical corrosion of the pump materials, sealing materials, and elastomers used
- No contaminating of the pumped fluid
- Viscosity < 5 mPas
- Water hardness < 5° dH

Demineralised water meets these requirements to a large extent.

Pressure of the supply fluid

Seal type	Pressure
Single-acting, flushed mechanical seal (quench)	0.2 - 0.35 bar (2.9 - 5.07 psi)
Double-acting mechanical seal	min. 0.7 bar (10.15 psi), max. 16 bar (232 psi) over max. possible pump internal pressure.

The max. possible pump internal pressure depends on several factors. When determining the blocking pressure, the following must be considered: zero delivery head of the pump (bar) + inlet height/system pressure/vapour pressure (bar) + density of the pumped medium (t/m^3)

5.3.3 Connecting the pump to the power supply

⚠DANGER

Live parts

Electrical shocks can cause serious personal injuries or death.

- Only allow properly qualified staff to work on the electrical equipment.
- Prior to establishing electrical connections, check the maximum permissible operating voltage.

⚠DANGER

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

Electrical shock can result in serious personal injury or death.

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

⚠CAUTION

Danger to due short circuit or electrical overloading

Short circuit due to electrical overloading can lead to damage to pump and system and can trigger fire.

- Implement measures for motor monitoring in accordance with the motor operating manual. The motors selected by GEA Hilge are equipped with PTC thermistors to monitor the winding temperature. These must be connected to suitable motor isolators. The documents supplied with the motor contain detailed information on this.

5.3.3.1 Operator-side pre-requisites equipotential bonding

Earthing the motor

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

Earthing the motor shroud

Prerequisites

- The pump is ready for connection.

Tools

- Toothed lock washer
- Earth cable
- Spanner

1. Use the bore hole (A) provided to connect the earth cable on the side of the motor shroud.

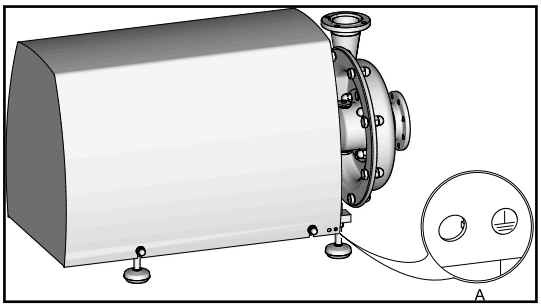


Figure 5-6 - Connection for the earth cable

2. Connect the earth cable to the earth conductor.

⇒ The equipotential bonding of the motor shroud is established.

Connecting the pump to the power supply

Responsibility

- Trained customer specialist

Prerequisites

- Conditions for connecting the pump to the power supply are fulfilled.
- The pump has been earthed in accordance with the specifications in this operating manual.

Tools

- Spanner
- Screwdriver

1. Please note the order data and prescribed connection voltage.
2. Connect the pump in star circuit.

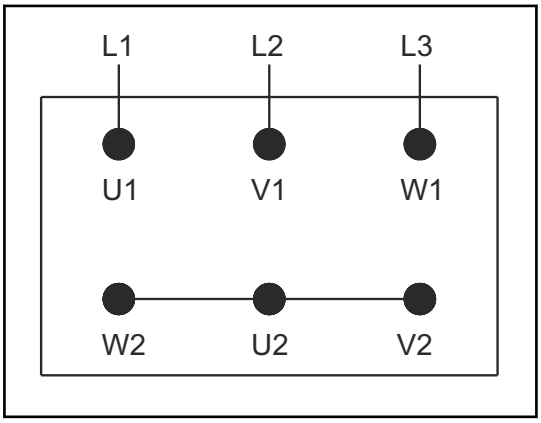


Figure 5-7 - Connection diagram for star circuit

3. Connect the pump in delta circuit.

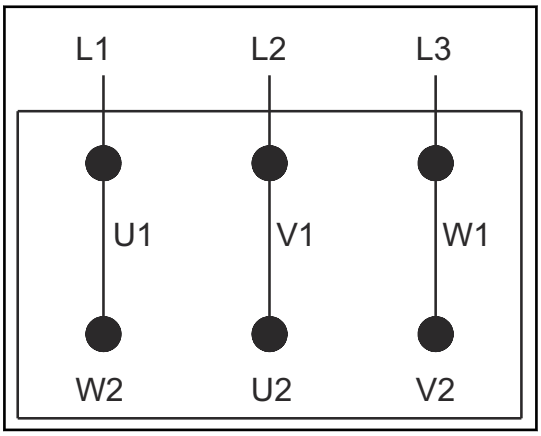


Figure 5-8 - Connection diagram for delta circuit

⇒ The pump is connected to the power supply.

5.3.3.2 Checking the direction of rotation

ATTENTION

Pump damage.
If the direction of rotation is wrong, there is a risk that the cap nut on the impeller will become loose and the pump will be damaged.

- Make sure to check the tightening torque of the cap nut on the impeller if the pump has been started in the wrong direction of rotation.

Checking the direction of rotation after connecting

Responsibility

- Trained customer specialist

Prerequisites

- The pump has been connected to the power supply.
- All safety devices have been installed.
- All hydraulic connections have been checked for a firm fit.
- The pump is earthed.

Tools

- Screwdriver, spanner

1. Open check valves.
2. Fill the pump (system).
3. For double mechanical seal / quench version, connect the flushing fluid.
4. Note the direction-of-rotation arrow on the pump.
5. Switch on the motor briefly (1-2 seconds).
6. Compare the direction of rotation with the specified direction (arrow).
7. If the direction of rotation does not correspond to the specified one, correct the electrical connections.

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

5.3.3.3 Connecting frequency inverter

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

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

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

Incorrect operation of the frequency converter

Follow the manufacturer's instructions for the installation and operation of a frequency converter.

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

6 Commissioning

This chapter contains information for initial start-up and every recurring start-up of the pump. In addition, this chapter describes the checks and tests to be performed during this. The target group for this chapter are all those who carry out actions at the pump in this context.

INFO Observe chapter *2 Safety* for every start-up.

6.1 Preparing commissioning

6.2 Operating conditions

Checking conditions of use

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

- Pump data sheet (order documents)
- Nameplate
- Operating manual
- Test bench acceptance
- Make sure that the pump is operated only under the specified conditions of use. These conditions apply to pressure, temperature and pumped medium, for example.
- Carry out a cleaning cycle before the first start-up or after conversion of the pump.
- Make sure there are no foreign objects in the pump.

6.3 Initial start-up

Initial start-up of the pump

Responsibility

- Operating staff

Prerequisites

- All connections have been checked for a firm fit.
- All safety devices have been installed.
- The electrical connections are correct.
- The pump and the system-side pipe system have been cleaned.

Tools

- Screwdriver, spanner

ATTENTION

Fast increase and pressure and heating due to pumping against a closed shut-off valve

Pumping against a closed shut-off valve can cause damage to the pump.

- Open the shut-off valve after 30 seconds at the latest.

1. Open check valves in the system.
2. Fill the pump along with the system.
3. Vent the pump along with the system.
4. With flushed mechanical seals, connect the flushing liquid. Start flushing to prevent dry running.
5. Fully open the suction-side check valve.
6. Close the pressure side check valve.
7. Switch on the pump.
8. Slowly open the pressure side check valve.

⇒ Initial start-up is completed.

INFO If the head does not rise after the pump has been switched on, switch the pump off, vent it again and repeat the work steps in section *Initial start-up of the pump*.

Functional testing of the mechanical seal

INFO In the running-in phase, mechanical seals, regardless of size, type or design, are subject to low leakage. In individual cases, it may be necessary to tolerate a low, visible leakage or to counteract it with suitable measures. After the running-in phase, an intact mechanical seal works practically without leakage. If pumped or flushing medium leaks out, switch the pump off and replace the mechanical seal (have the seal replaced).

Responsibility

- Operating staff

Prerequisites

- The pump has been started-up.

1. Inspect the pump and check whether liquid is escaping at the mechanical seal.

⇒ The function of the mechanical seal has been checked.

6.4 Restarting

Following temporary decommissioning

Temporary decommissioning includes putting out of operation for maintenance and repair work.

The pump can be put back into operation after temporary decommissioning without additional measures, see *6.3 Initial start-up*.

6.5 Monitoring operation

Dangerous situations during operation can be avoided by safety-conscious and proactive behaviour of the personnel.

For operation, the following principles apply:

- Monitor the pump during operation.
- Do not modify or disassemble safety devices or put them out of operation. Check safety devices at regular intervals.
- All guards and hoods must be fitted as intended.
- The installation location of the pump must always be properly ventilated.
- Structural changes to the pump are not permitted. Report any change to the pump immediately to the person in charge.

6.6 Shutdown

Shutdown

Responsibility

- Operating staff

Prerequisites

- The pump and valves are freely accessible.

1. **CAUTION** Pressure surge
   A pressure surge can cause damage to the pump and system.
   - Always close shut-off valves slowly.

   INFO

   A pressure surge is a sudden increase in pressure in the system. This pressure increase may be triggered by quickly shutting off the flow in the pressure pipe, in addition to other causes. If a pressure surge occurs, the maximum permissible pump pressure is much higher for a short time.

   Close the pressure side shut-off valve.
2. Switch off the pump.
3. Close the suction side shut-off valve.
4. Switch off the flushing.
5. Make sure that the pump is depressurised.

⇒ The pump has been shut down.

7 Cleaning

This chapter contains information about cleaning the pump. In addition, this chapter provides information about cleaning intervals and the use of cleaning agents. The target group for this chapter are all those who carry out actions related to cleaning at the pump.

INFO For all cleaning, observe chapter *2 Safety* of this document.

7.1 General

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

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

7.2 CIP cleaning

CIP stands for Cleaning in Place, the pump is completely rinsed with cleaning agents. During CIP cleaning, run the pump at a flow speed of at least 1.5 m per second. Execute total drainage for horizontally installed pumps utilizing the drain valve (e.g., GEA VTP valve), drain port, or by downward rotation of the discharge port.

If the pumps are installed vertically, drainage is carried out via the suction port.

The cleaning agent used must be suitable for the respective cleaning task.

The following table lists approved detergents and disinfectants and their permitted concentrations. Alternatively, information from DIN11483 Part 1 can be used.

Cleaner type	Chemical designation	Max. concentration [%]	Max. temperature [°C] (°F)	Permissible pH	Max. permissible Cl content in the preparation water [mg/l]	Max. permissible contact time [h]
Alkaline	NaOH	2.50%	85 (185)[3]	13-14	150	3
Acid	H2SO4	2%[4]	60 (140)		150[4]	1
Acid	H3PO4, HNO3					

3) Depends on the maximum permissible temperature of the pump

4) CrNi steels and CrNiMo steels

Cleaner type	Chemical designation	Max. concentration [%]	Max. temperature [°C] (°F)	Permissible pH	Max. permissible Cl content in the preparation water [mg/l]	Max. permissible contact time [h]
Acid	C2H4O3	0.01%	90 (194)		150	0.5
Acid	C2H4O3	0.15%	20 (68)		150	2
Acid	Iodophore	50 mg/l act. Iodine	30 (86)	>3	150	3

Cleaning agents that contain hydrochloric acid (HCl) or hydrofluoric acid (HF) must not be used. Consult the supplier for the use of special cleaning agents and procedures with respect to the materials. Thoroughly rinse the pump with water to remove any cleaning agents leaving no residues. The maximum permissible temperatures can be found in chapter *3.4.7 Operating temperatures*.

7.3 Cleaning at standstill

Manual exterior cleaning

INFO Regular manual external cleaning of the pump unit facilitates proper operation. Dry cleaning is preferable to wet cleaning. The cleaning intervals depend on the degree of contamination. Rinse with clear water when aggressive cleaning agents are used.

Prerequisites

- The pump has been shut down.

Tools

- Soft cloth or brush
- Cleaning agents

1. Ensure the tightness of the motor (terminal box, condensation holes).
2. **ATTENTION** Danger due to high-pressure water jet
   Cleaning with a high-pressure cleaner can cause damage to the pump.
   - Only wipe the pump down or rinse it off without pressure.

   Clean the outside of the pump with a soft cloth or brush and use warm water if necessary.
3. Vent the pump along with the system.
4. Remove dust and debris that may clog the fan and cooling fins of the engine.

⇒ Manual exterior cleaning is completed.

8 Maintenance

This chapter contains information about the maintenance, inspection and repairs of the pump. The target group for this chapter are all those who carry out actions at the system in this context.

INFO During all maintenance actions, observe chapter *2 Safety* of this document.

8.1 Maintenance and inspection

⚠WARNING

Danger to life due to unauthorised or uncontrolled restart!

Unauthorised or uncontrolled restart can lead to serious injuries or even death.

- During all work on the system: make sure that the system is secured against unauthorised or uncontrolled restart.
- Secure actuation device with a lock.
- In the case of pumps with trolley, disconnect the mains plug and fasten it to the trolley in such a way that it is visible for maintenance personnel.
- After completing work on the system: make sure that there is no-one still in the danger zone before the system is switched back on.

Measures to secure against unintentional restart

- Keep removed mains plugs, circuit breakers or fuse inserts in a safe place and replace them by blocking plugs or dummies.
- Disconnect circuit breakers, switch cabinet or fuse box and keep the key to the lock in a safe place.
- Attach suitable signs prohibiting switch-on or warning signs.

Maintenance schedule

To prevent any faults and guarantee maximum operational safety of the pump, GEA recommends the following inspection and maintenance work.

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

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

Hygiene risk, food safety

Worn out and not fully functional components may lead to the contamination of the pump. Pay close attention to the condition of the O-rings during regular inspections.

Component / assembly	Measure	Interval	Qualifications
Mechanical seal	Inspection, always replace mechanical seals completely when worn.	When used in media with temperatures 60 °C to 130 °C (140 °F to 266 °F): after 2,000 operating hours or three months When used in media with temperatures< 60 °C (< 140 °F): after 9,000 operating hours or 12 months.	Trained customer specialist
O-rings	Replace	When used in media with temperatures 60 °C to 130 °C (140 °F to 266 °F): after 2,000 operating hours or three months When used in media with temperatures< 60 °C (< 140 °F): after 9,000 operating hours or 12 months. Independently of the period of use, O-rings must be replaced if the following properties are indicated: • The O-ring is deformed at one or more locations. • The O-ring has cracks. • The surface of the O-ring is porous and brittle. • The O-ring has lost its elasticity.	Trained customer specialist
Motor, where appropriate	Relubricate	On motors with grease nipple, the specifications for relubrication, type of grease, grease quantity, and other information as applicable are given on the lubrication or nameplate.	Customer specialist
Pump	Visible inspection for tightness and correct function	During every operation / every start-up	Operator

8.1.1 Maintenance jobs

Replace O-rings

INFO The O-rings should be replaced every time the pump is disassembled.

Prerequisites

- Access to the pump
- The pump is at a standstill and secured against restart.

1. Disassemble the pump. See *8.2 Dismantling*.
2. Replace O-rings. The position of the different O-rings can be seen in the detailed illustrations.
3. Assemble the pump.

⇒ The O-rings have been replaced.

Replace the mechanical seal

Prerequisites

- Access to the pump
- The pump is at a standstill and secured against restart.

1. Disassemble the pump. See *8.2 Dismantling*.
2. Replace the mechanical seal.
3. Assemble the pump. See *8.3.3.2 Installing the single mechanical seal EW* or *8.3.3.3 Installing the single-acting mechanical seal, flushed QU*.

⇒ The mechanical seal has been replaced.

Maintenance - drainage valve VTP, inspections

The drainage valves must be monitored for leakage and proper functioning between the maintenance intervals.

For maintenance intervals, see .

Observe the motor manual

Hazard if the operating manual is not read before actions at the motor.

Lubricating the motor

INFO Observe the motor operating manual.

Motors without grease nipple

Motors without grease nipple are equipped with lifetime lubrication. How long grease can be used depends on the temperature and determines the service life of the bearings. Prerequisite is that the motor must be used according to the specifications in the catalogue.

Motors with grease nipple

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

8.2 Dismantling

Disassembly of the pump is carried out in the reverse order of assembly. For this purpose, obtain the work steps from the respective sections in the chapters *8.3 Assembly*.

Pre-requisites for disassembly:

- The pump has been disconnected from the power supply.
- The pump is depressurised.
- The pump has cooled down.
- The pump has been secured against being switched on unintentionally.
- If hazardous media have been pumped, the pump has been decontaminated.

Tools from the GEA Hilge assembly tool kit make disassembly easier and avoid damage to the pump, see page *69*.

ATTENTION

Overloading during assembly/disassembly can lead to damage to the pump shaft.

A damaged pump shaft can cause pump malfunctions and destroy it.

- Follow the operating manual for the work steps.
- Use appropriate tools.
- Handle the sensitive pump shaft gently, do not apply force.

8.2.1 Remove pump cover

Remove pump cover and lock shaft

Responsibility

- Trained customer specialist

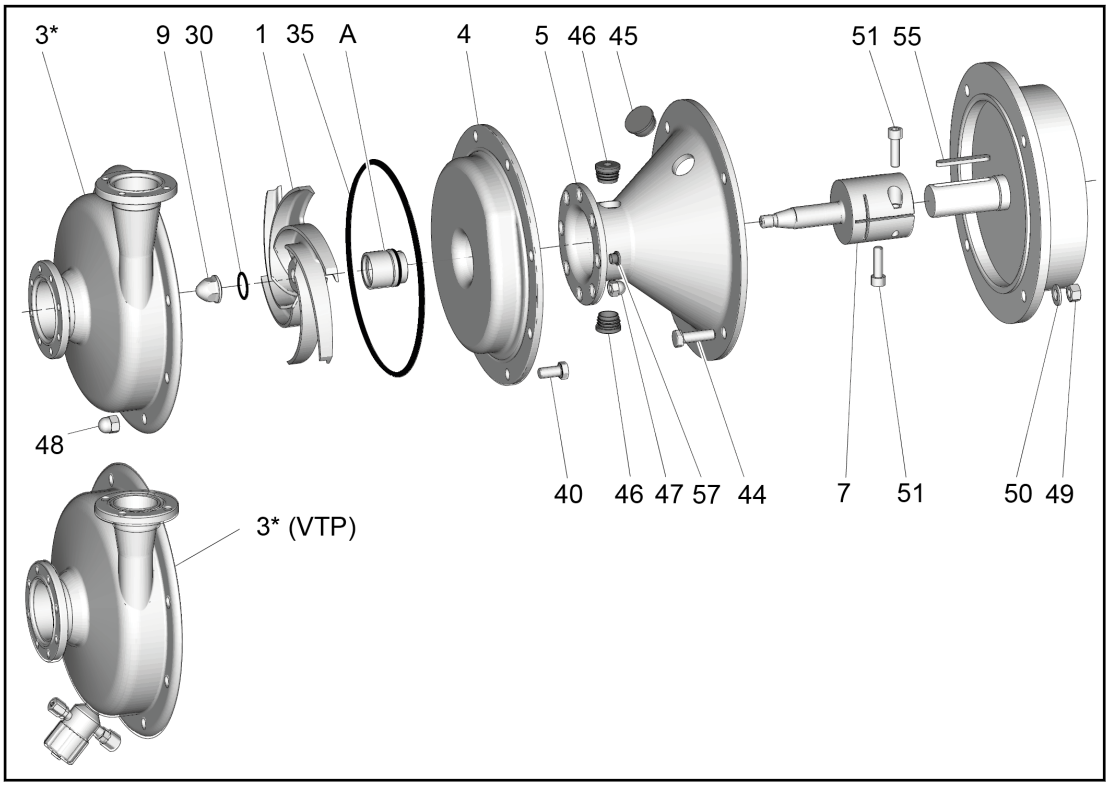
Prerequisites

- Pump motor is disconnected from the power supply
- Pump has been removed from the pipeline, drained and cooled down to room temperature.

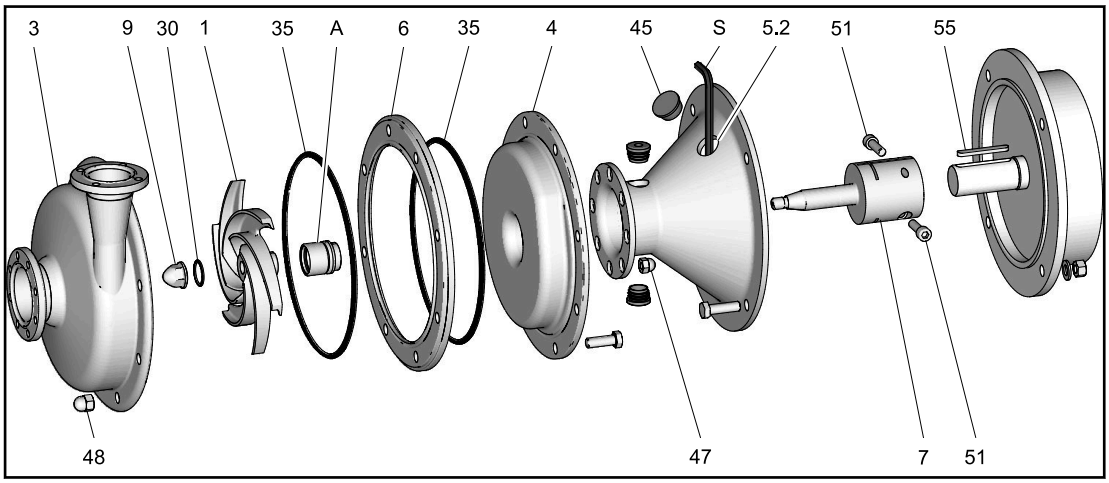
Tools

- Equipment and tools from the GEA Hilge assembly tool kit

Pump TP



Pump TP, variant TPE (with enlarged gap)



1. Check the gaskets (suction and discharge port) and replace them necessary.
2. Loosen the cap nuts (48) and remove the pump cover (3).

3. Only for TPE: Remove spacer ring (6).
4. Check the O-ring (35) and replace it if necessary.
5. Remove round plug (45).
6. Lock and secure the shaft against rotation with the hex key (S) through the opening in the motor stool (5.2). The hex key engages in the socket head cap screw of the clamping shaft connection.
7. Turn the impeller (1) until the hexagon socket screwdriver locks into the hexagon socket head. The shaft (7) is then secured against twisting.

⇒ The impeller and the pump cover are dismantled.

8.2.2 Remove impeller and single-acting mechanical seal EW

Responsibility

- Trained customer specialist

Prerequisites

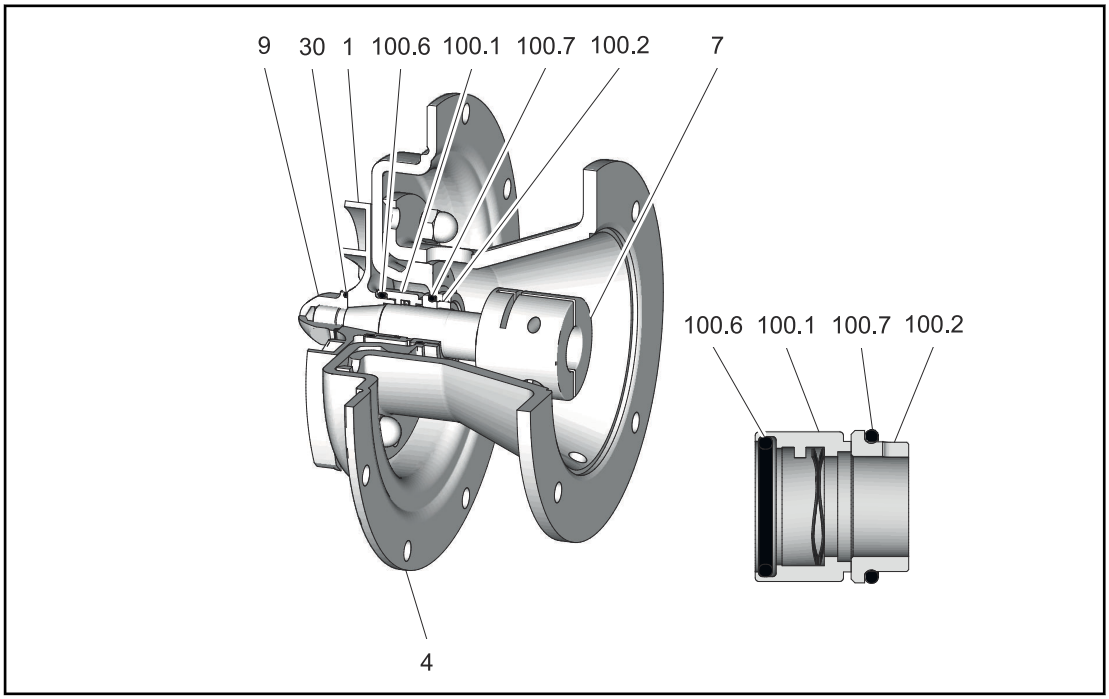
- The pump cover is disassembled.
- The shaft is locked and secured against rotation.

Tools

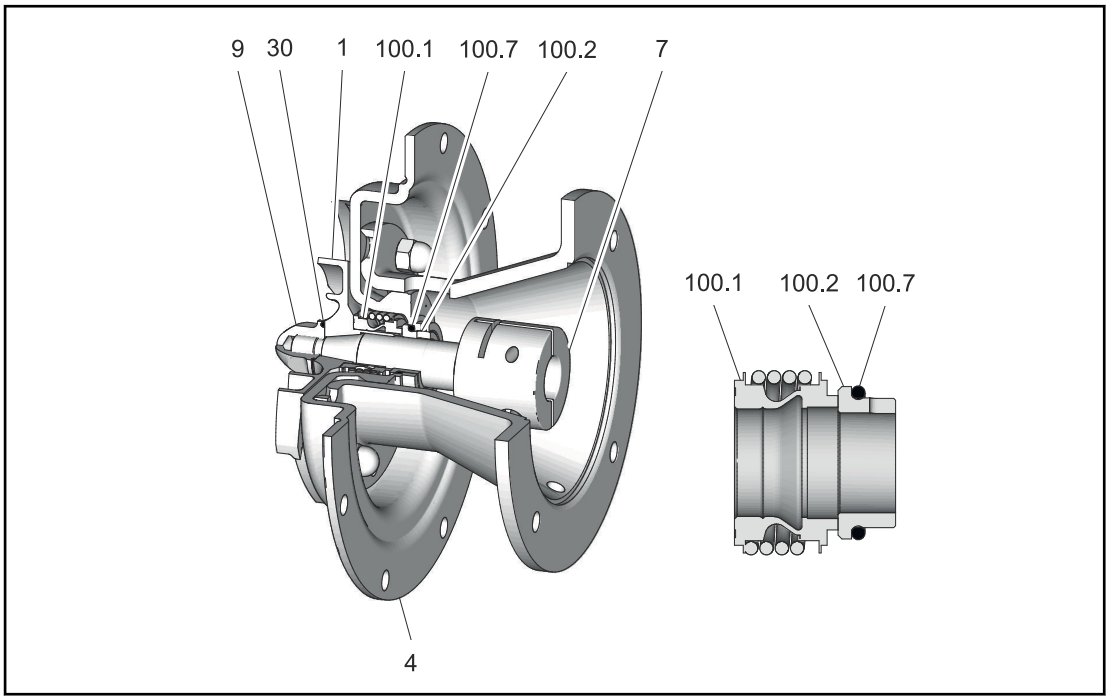
- Equipment and tools from the GEA Hilge assembly tool kit
- Hex key (long)
- Socket wrench
- Socket wrench bit

- Slotted screwdriver

Mechanical seal EW (A) with detail drawing



Mechanical seal EW-MG1 with detail drawing



1. Check if the hex key locks the shaft.
2. Unscrew the cap nut (9).
3. Check the cap nut-O-ring (30) and replace it if necessary.
4. TP with SHJ mechanical seal: Pull the impeller (1) together with the integrated driver ring, slide-ring (100.1), O-ring (100.6) from the shaft (7).
5. Carefully pull the counter-ring (100.2) and the O-ring (100.7) from the pump housing (4) using a slotted screwdriver.

⇒ Single-acting mechanical seal EW is disassembled.

8.2.3 Remove impeller and single-acting flushed mechanical seal QU

Remove impeller and single-acting flushed mechanical seal QU

Responsibility

- Trained customer specialist

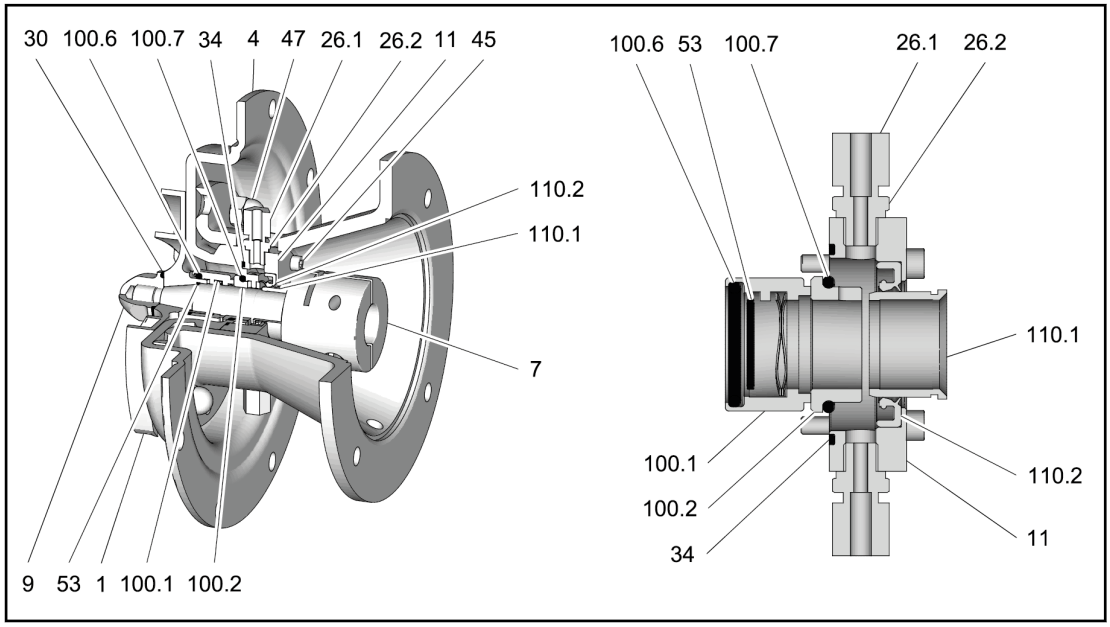
Prerequisites

- The pump cover is disassembled.
- The shaft is locked and secured against rotation.

Tools

- Equipment and tools from the GEA Hilge assembly tool kit
- Hex key (long)
- Socket wrench
- Socket wrench bit
- Slotted screwdriver

Single-acting flushed mechanical seal QU (A) with detail



1. Check if the hex key locks the shaft.
2. Unscrew the cap nut (9).
3. Check the cap nut-O-ring (30) and replace it if necessary.
4. Pull the impeller (1) together with the integrated driver ring, O-ring (53), slide-ring (100.1), and O-ring (100.6) from the shaft (7).
5. Unscrew the union nut (26.1) from the screwed insert connection (26.2).
6. Unscrew the screwed connections (26.2) from the slide-ring mounting (11).
7. Loosen the cap nut (47) and push the pump housing (4) out forward.
8. Unscrew the hexagon socket screw (45) and remove the pump housing together with the slide-ring mounting (11).
9. Remove the radial shaft gasket (110.2) from the slide-ring mounting (11).
10. Check the surface of the shaft protection sleeve (110.1) and replace if damaged.
11. Remove the O-rings (34) from the slide-ring mounting (11).
12. Carefully pull the counter-ring (100.2) and the O-ring (100.7) from the pump housing (4) using a slotted screwdriver.

⇒ Single-acting flushed mechanical seal QU (A) is dismantled.

8.2.4 Removing the double-acting mechanical seal DW

Responsibility

- Trained customer specialist

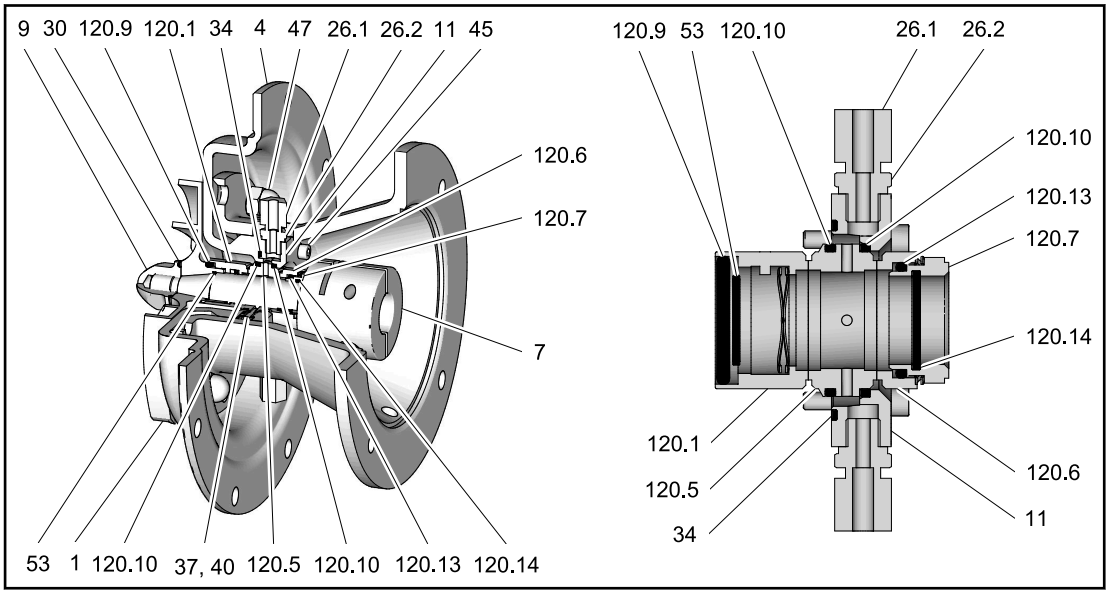
Prerequisites

- The pump cover is disassembled.
- The shaft is locked and secured against rotation.

Tools

- Equipment and tools from the GEA Hilge assembly tool kit
- Hex key (long)
- Socket wrench
- Socket wrench bit
- Slotted screwdriver

Double-acting mechanical seal DW (A) with detail



1. Check if the hex key locks the shaft.
2. Unscrew the cap nut (9).
3. Check the cap nut-O-ring (30) and replace it if necessary.
4. Pull the impeller (1) together with the integrated driver ring, O-ring (53), slide-ring (100.1), and O-ring (100.6) from the shaft (7). When using tools, make sure that the slide-ring (120.6) and the counter-ring (120.5) of the atmospheric mechanical seal are not damaged.
5. Unscrew the union nut (26.1) from the screwed insert connection (26.2).
6. Unscrew the screwed connections (26.2) from the slide-ring mounting (11).
7. Loosen the cap nut (47) and push out the pump housing (4) together with slide-ring mounting (11) and the counter-ring (120.5) forward.
8. Unscrew the locking screws (40) with the flat sealing ring (37) and push the counter-ring (120.5) and O-rings (120.10) out of the rotary ring holder (11) forward.
9. Unscrew the hexagon socket screws (45) and take the slide-ring mounting (11) out of the pump housing (4).
10. Remove the O-rings (34) from the slide-ring mounting (11).
11. Remove the slide-ring (120.6) on the atmosphere side and the O-ring (120.13) from the shaft (7).
12. Check driver ring (120.7) and O-ring (120.14) and replace them if damaged.

⇒ Double-acting mechanical seal DW (A) is dismantled.

8.2.5 Removing the motor

Disassemble impeller and double-acting mechanical seal DW

Responsibility

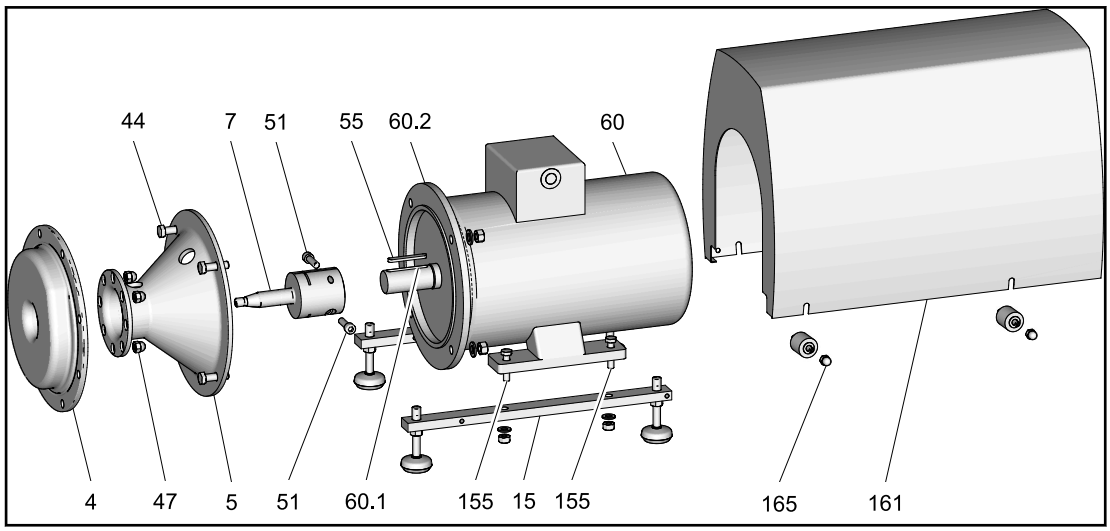
- Trained customer specialist

Prerequisites

- The pump cover is disassembled.
- The impeller is disassembled.
- The mechanical seal is disassembled.

Tools

- Equipment and tools from the GEA Hilge assembly tool kit
- Spanner



1. Loosen the screws (165) and lift off the protective hood (161).
2. Unscrew the four domed nuts (47) on the motor stool (5).
3. Pull the pump housing (4) from the motor stool (5).
4. Loosen the hexagonal screws (44).
5. Pull the motor stool (5) down evenly from the motor (60.2).
6. Remove the cylinder screws (51) from the shaft (7).
7. Pull off the shaft (7).
8. Remove the key (55) from the motor shaft (60.1).
9. Loosen the screws (155) and separate the cup-shaped feet carrier (15) from the motor (60).

⇒ Motor is disassembled.

8.2.6 Disassemble drainage valve VTP

Prerequisites

- Pump motor is disconnected from the power supply
- Pump has been removed from the pipeline, drained and cooled down to room temperature.

Tools

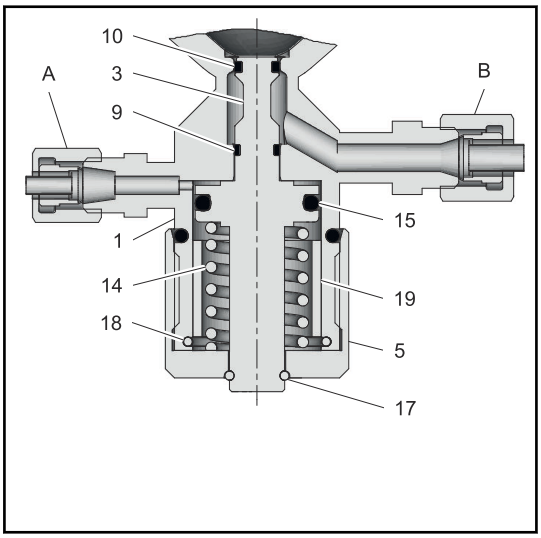
- Open-ended wrench SW14, 17

⚠CAUTION

Danger from the valve's spring tension.
The drive cover may suddenly detach from the valve and cause injuries.

- Carefully relax the compression spring when unscrewing the drive cover.

1. Open the valve pneumatically.



2. Remove the spring-lock washer (17).
3. Close the valve.
4. Disconnect the air hose from the pneumatic connector (A).
5. Disconnect the drainage hose - if present - to the drainage connection (B).
6. Unscrew drive cover (5) by hand in the counter-clockwise direction.
7. Remove the pressure spring (14).
8. Push the spring-lock washer (18) out of the housing through the borehole for disassembly.
9. Pull the valve plate (3) together with the sleeve (19) out of the housing (1).
10. Take off the O-rings (9, 10, 15).

⇒ Drainage valve VTP is disassembled.

8.3 Assembly

8.3.1 Installation instructions

Always observe the following instructions:

- Use tools from the HILGE assembly tool kit for installation.
- Check removed parts for damage and wear, and replace if necessary. Use only proper, clean parts for installation. Clean installation space and contact surfaces before installation.
- Always use original spare parts.
- Only use certified original spare parts for 3-A applications.
- Use no mineral oil greases for the wet section assembly.
- Always replace mechanical seals completely.
- Observe the properties indicating that replacement of the O-rings is necessary, see *8.1 Maintenance and inspection*.
- Use an impact wrench or an impeller nut mounting device to tighten the impeller nut (0922.00).

ATTENTION

Hygiene risk through contamination of the components

Contaminated components contaminate pump and system and can endanger food safety.

- Use suitable chemical cleaning agents to remove impurities in the area of the impeller hub, enclosed threads of impeller nut and pump shaft, O-rings, pump shaft and mechanical seal, for example
- 1. Clean with warm water (approx. 40° C) and a commercially available dish-washer detergent.
- 2. Rinse the cleaned parts with hot water (approx. 80 °C) to thoroughly remove bacteria, germs and cleaning agent residues.
- Use a brush and / or other tools without damaging the surface.
- Plan contact-free cleaning in an ultrasonic bath to clean the mechanical seal.

Assembly tool kit

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

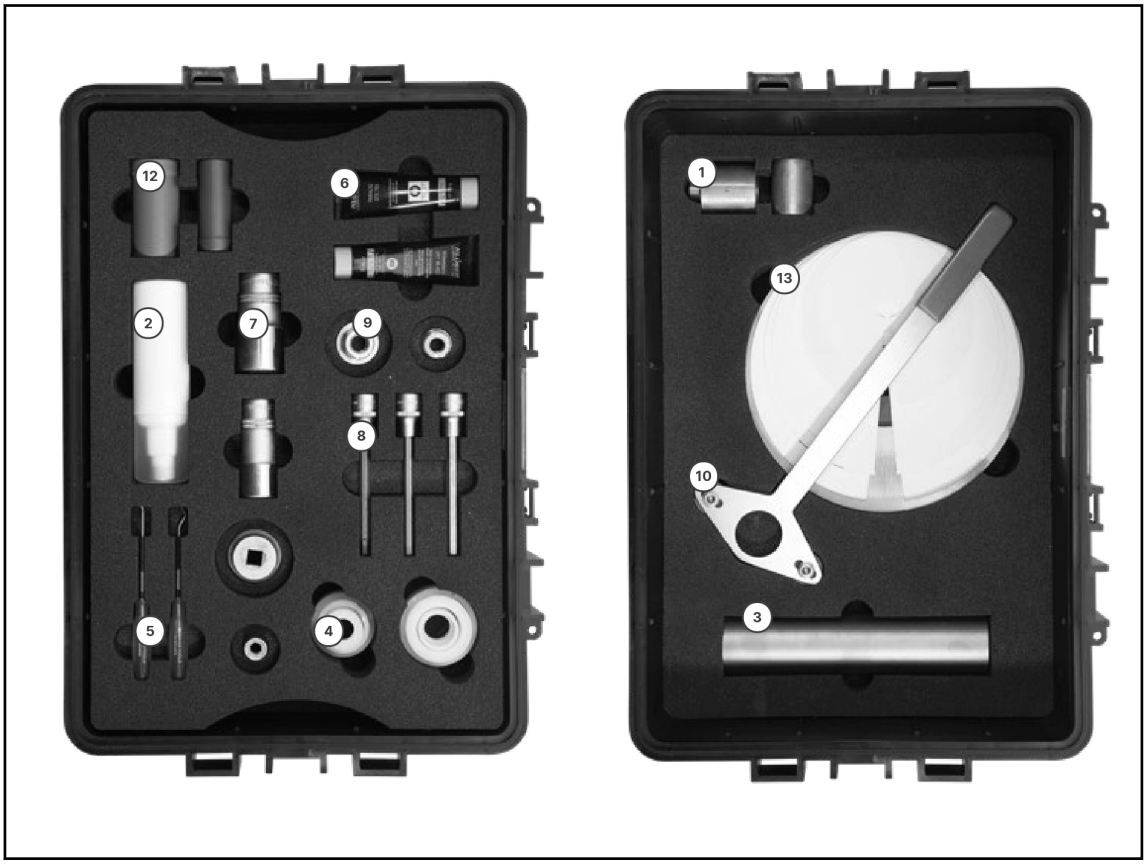


Figure 8-1 - Tools in the GEA Hilge assembly tool kit

Contents of the assembly kit

Image position	Designation
1	Mounting sleeve
2	Spray bottle
3	Assembly sleeves for mechanical seal
4	Plastic adapter for assembly sleeve
5	Extractor for mechanical seal counter ring
6	Klüber paste UH1 96-402 Silicone grease Paraliq GTE 703 - 80 g
7	Socket wrench, socket wrench insert
8	Socket wrench, hex key
9	TPS lock nut
10	Centring wrench for mounting the impeller

Image position	Designation
11	Support plate impeller nut CONTRA
12	Assembly sleeve HYGIA K and F&B
13	TP shim set

8.3.2 Installing the motor

Installing the motor

Responsibility

- Trained customer specialist

Prerequisites

- The pump is disassembled.

Tools

- Equipment and tools from the GEA Hilge assembly tool kit
- Spanner
- Hex socket key

INFO A motor of the IM B35 design (with foot and flange) is used. The required axial clearance and permissible axial forces of the motor must be observed.

INFO Ensure that the motor is equipped with an A-side fixed bearing. Before installing the pump flange, make sure that the motor flange fits into the open recesses of the pump flange.

INFO The installation is carried out in the reverse order of the disassembly sequence. Figure *66*.

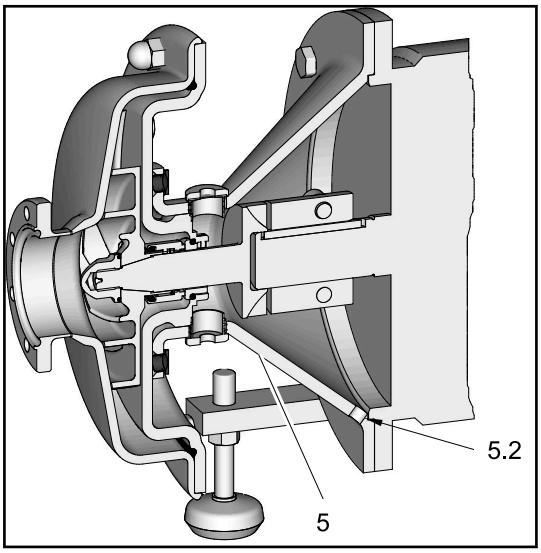
1. Install the cup-shaped feet carrier (15) on the motor (60) with the screws (155).
2. Check shaft end and shaft surface for damage and if necessary eliminate the damage.
3. Degrease the motor shaft (60.1).
4. Insert one half of the key (55) into the groove of the motor shaft (60.1).
5. Push the shaft (7) onto the shaft (60.1) of the motor.
6. **INFO**

   The axial gaps are adjusted in a later step. Thereafter, the cylinder screw must be tightened to the specified torque.

   Screw the cylinder screws (51) into the prescribed shaft boreholes, initially hand-tight.

7. Install the motor stool (5) on the flange (60.2) of the motor with 4 screws (44) together with washers and nuts. Ensure that the drain hole (5.2) is always oriented downwards.

Discharge hole



⇒ The motor is installed.

8.3.3 Installing the mechanical seal

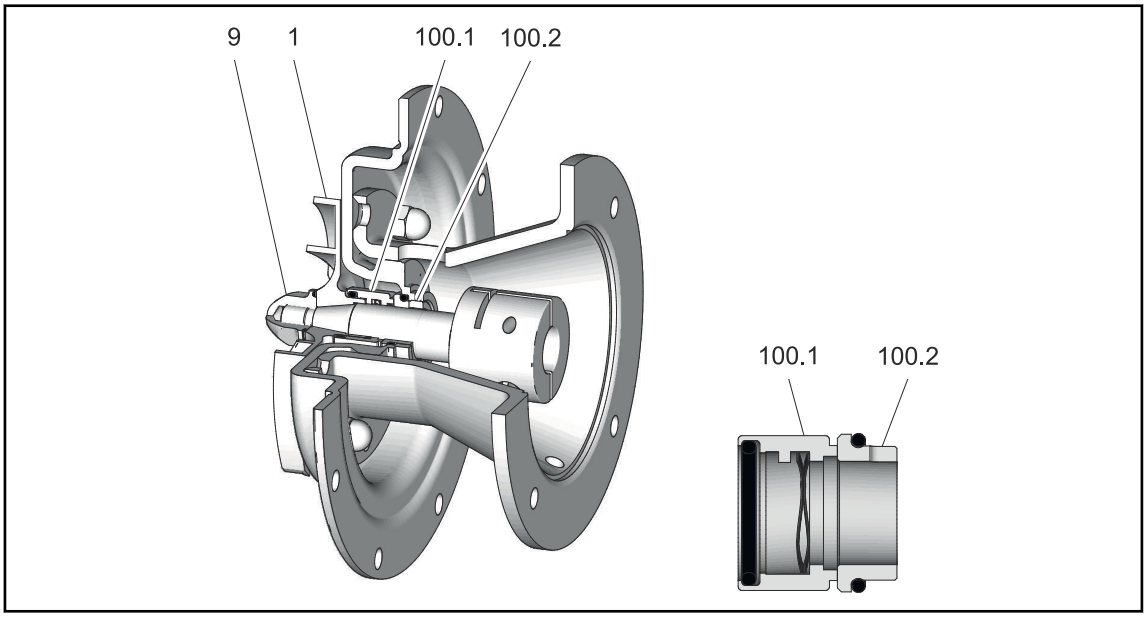
8.3.3.1 Assembly instructions for the mechanical seal

Install the mechanical seal in the reverse order of the disassembly sequence. In doing so observe the following instructions:

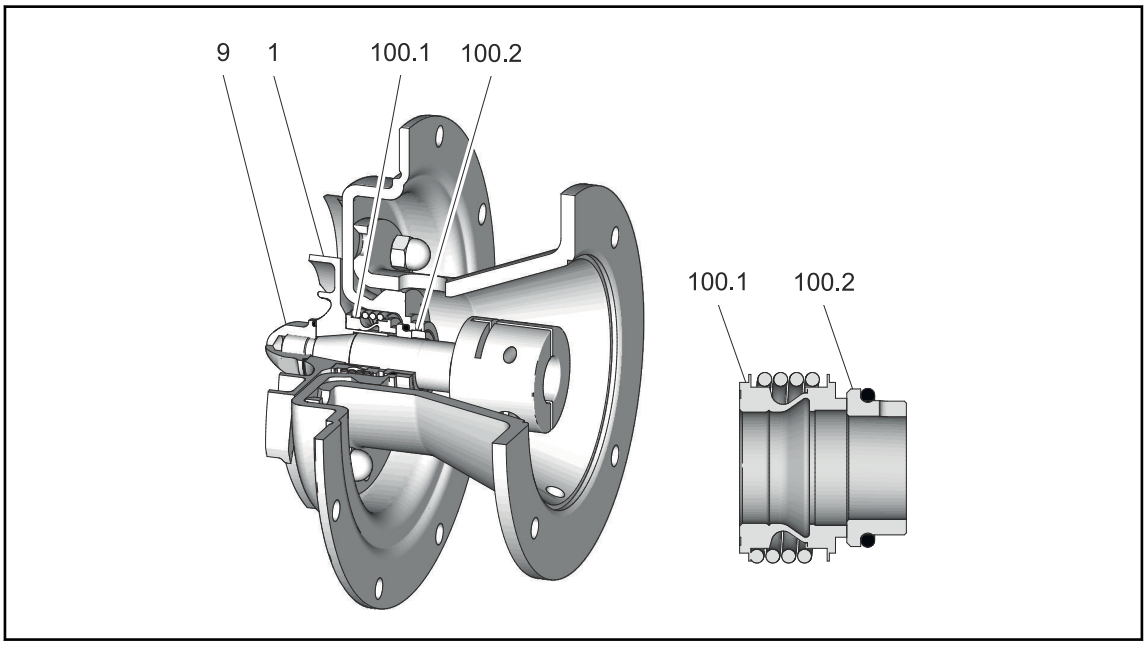
- Carry out the installation under clean conditions and very carefully.
- Assemble the mechanical seal gently, avoid using force. The ceramic parts could be damaged.
- To reduce friction during installation, lubricate all sliding surfaces for O-rings with silicone grease. The lubricants used must conform to the application requirements and must be food-safe and resistance to media.
- Degrease the sliding surfaces of the mechanical seal before assembly.
- Apply a thin layer of silicone grease on the O-ring.
- Make sure that the O-rings are correctly inserted.
- Degrease the sliding surfaces of the mechanical seal with alcohol before installation.
- Tighten the nut (9) to specified level of torque M 20 Nm.
- Fix the lantern (5) with the domed nuts (47) to the pump casing (4). Observe torque *3.4.3 Torques* values.

8.3.3.2 Installing the single mechanical seal EW

Mechanical seal EW with detail drawing



Mechanical seal, driver pins

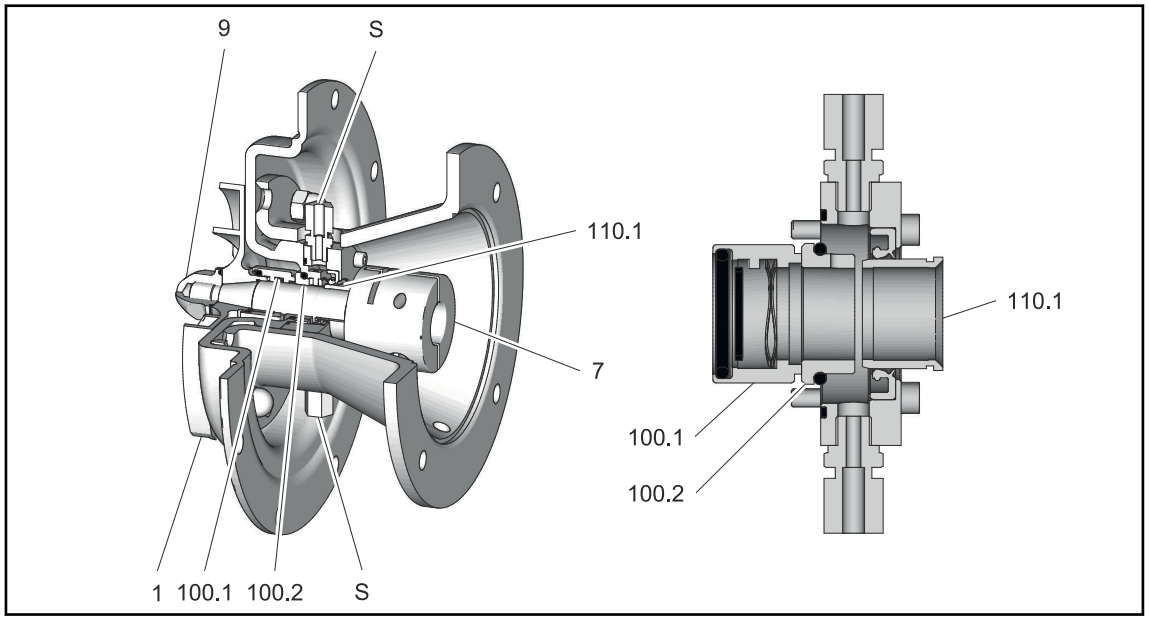


Observe the following instructions when installing the mechanical seal:

- The two drive pins in the rotary ring (100.1) must engage in the designated grooves of the impeller (1) with integrated drive pin.
- Only for TP: The sliding surfaces of the rotary ring (100.1) and stationary ring (100.2) must be free of grease.

8.3.3.3 Installing the single-acting mechanical seal, flushed QU

Single-acting mechanical seal, flushed QU, with detail drawing

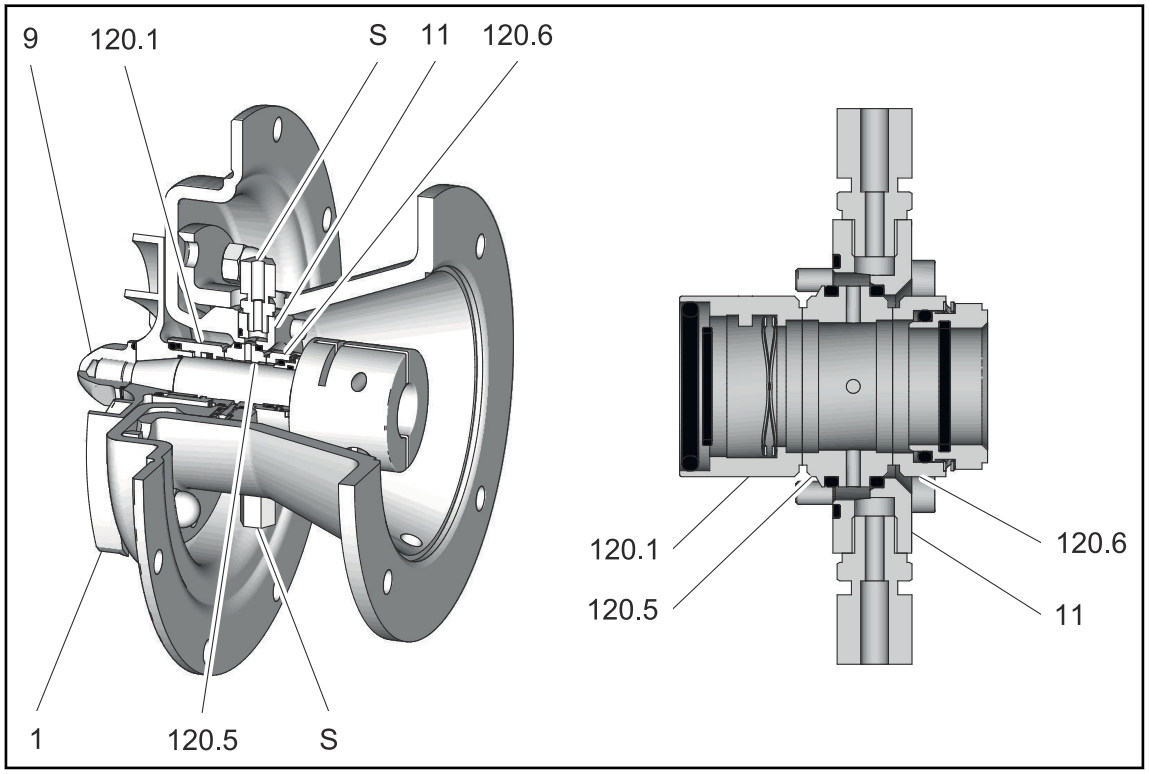


Observe the following instructions when installing the mechanical seal:

- The two flushing bores (S) must be vertically aligned to allow air to escape from the flushing chamber.
- Check the shaft protection sleeve (110.1) for correct fit. The shaft protection sleeve (110.1) must be pressed on until it rests against the shoulder of the shaft (7).
- The two drive pins in the rotary ring (100.1) must engage in the designated grooves of the impeller (1) with integrated drive pin.
- The sliding surfaces of the slide-ring (100.1) and the counter-ring (100.2) must be free of grease.

8.3.3.4 Installing the double-acting mechanical seal DW

Double-acting mechanical seal DW with detail drawing



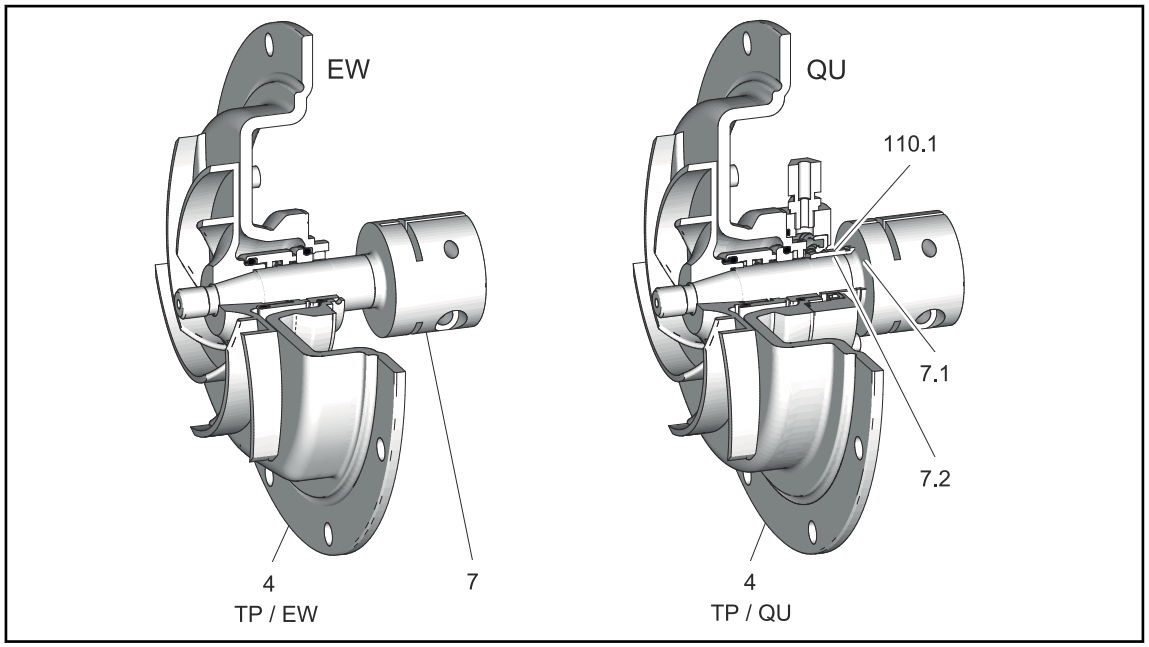
Observe the following instructions when installing the mechanical seal:

- The two flushing bores (S) must be vertically aligned to allow air to escape from the flushing chamber.
- The atmospheric side-ring (120.6) must be pressed through the pump housing (4) and into the slide-ring mounting (11) so that the locking borehole of the slide-ring mounting (11) coincides with the borehole of the atmospheric side slide-ring (120.6).
- The two drive pins in the rotary ring (120.1) must engage in the designated grooves of the impeller (1) with integrated drive pin.
- The sliding surfaces of the slide-ring (120.1, 120.6) and the counter-ring (120.5) must be free of grease.

8.3.4 Converting the mechanical seal

8.3.4.1 Convert single-acting mechanical seal EW to mechanical seal, flushed QU

Converting the mechanical seal



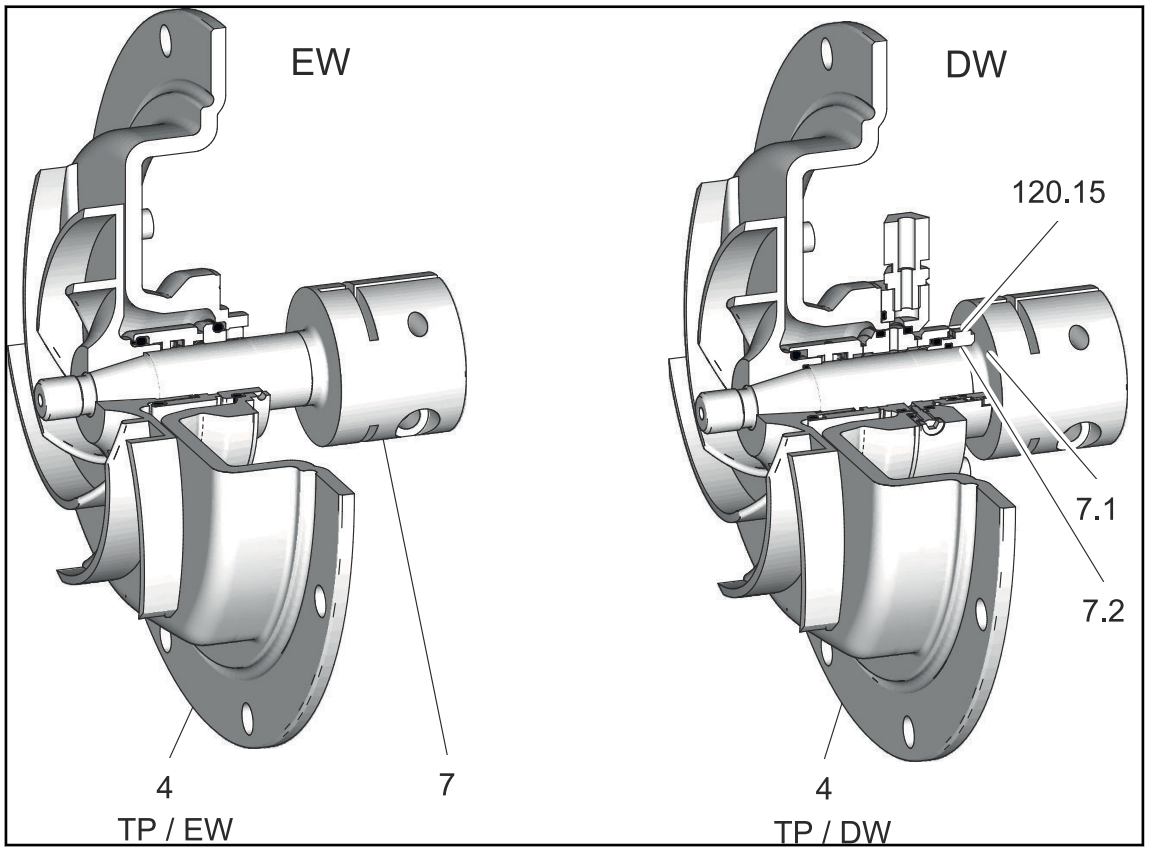
Position	Description	Position	Description
	7.2 Press fit		

The slide-ring packing of the centrifugal pump TP can be converted from the version EW to the version QU. Taking the following into account:

- The pump housing TP/EW (4) must be replaced or converted the version TP/QU pump housing. The manufacturer has prepared further information for independent conversion.
- Fit the pump shaft (7) with the shaft sleeve (110.1). Press the shaft sleeve until it reaches the stop of the shaft shoulder (7.1). The press-fit is carried out the easiest by heating the shaft protection sleeve and by uniformly raising it with a suitable soft hollow mandrel, for example one made of brass. We recommend having this carried out at GEA if these options are not available.
- The existing mechanical seal EW can be used completely, if undamaged.
- The disassembly and assembly of the mechanical seal is performed according to the description on the previous pages.

8.3.4.2 Convert single-acting mechanical seal EW to double-acting mechanical seal DW

Converting the mechanical seal



Position	Description	Position	Description
	7.2 Press fit		

The slide-ring packing of the centrifugal pump TP can be converted from the version EW to the version DW. Taking the following into account:

- The pump housing TP/EW (4) must be replaced with the version TP/DW pump housing.
- The pump shaft (7) must be equipped with the driver ring (120.15). The driver ring must be pressed on until it rests against the shoulder of the shaft (7.1). The press-fit is carried out the easiest by heating the driver ring (120.15) and by uniformly raising it with a suitable soft hollow mandrel, for example one made of brass. We recommend having this carried out at GEA if these options are not available.
- The existing mechanical seal EW cannot be used. It is replaced by the mechanical seal DW.
- The disassembly and assembly of the mechanical seal is performed according to the description on the previous pages.

8.3.5 Adjusting the axial gap

⚠CAUTION

Danger from an incorrectly adjusted axial gap.

If the axial gap is not adjusted correctly, the impeller may come in contact with the pump housing and damage both parts.

- Adjust the axial gap (S1) between the impeller (1) and pump cover (3) according to the table for each pump assembly.
- For TP 16040, adjust the axial gap (S2) between the impeller (1) and pump casing (4) using a feeler gauge.

Pump type	Axial gap S1 between cover (3) and impeller (1)		Axial gap S2 between housing (4) and impeller (1)	
	[mm]	[inch]	[mm]	[inch]
TP 1020, 2030	0.3	0.0118	--	--
TP 1540, 2050, 2575, 3050	0.5	0.0196	--	--
TP 5060, 7060, 8050, 8080	0.5	0.0196	--	--
TP 16040	--	--	1.0 mm[5]	0.0393

5) * results approx. in a gap S1 = 0.8 mm (0.3 inch)

Adjusting the axial gap

Responsibility

- Customer specialist

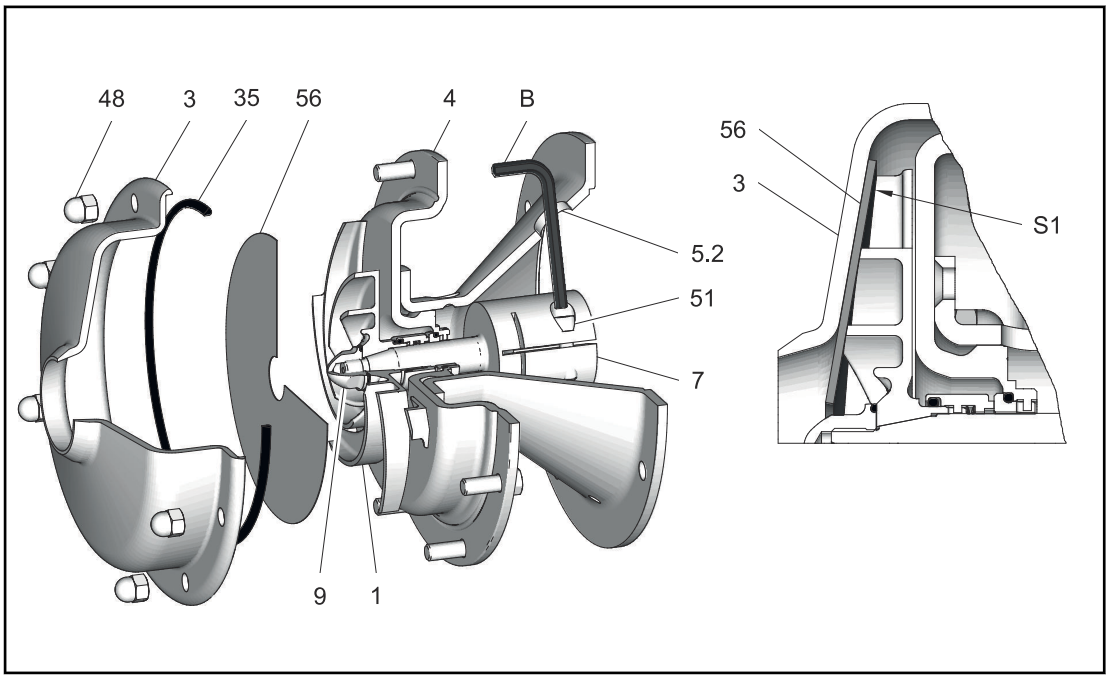
Prerequisites

- The pump cover (3) is removed.

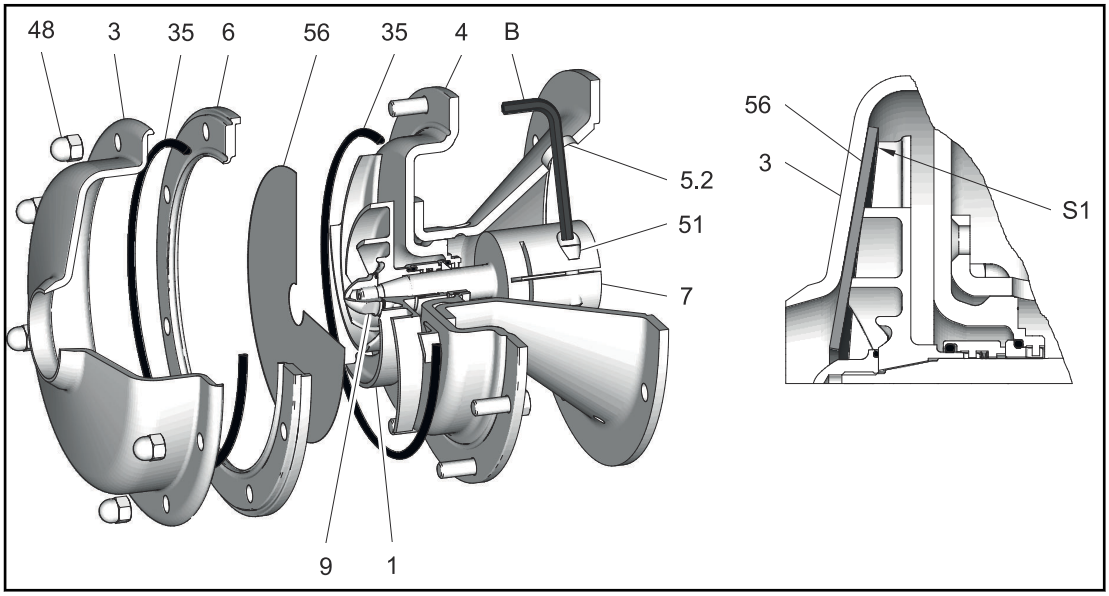
Tools

- Spacer disk for adjusting the axial gap
- Hex key (B)

Pump TP with detail



Pump TPE with detail



1. Insert the hex key (B) through the hole in the motor stool (5.2) and rotate the impeller (1) until the hex key (B) engages in the screw (51).
2. Loosen the socket head cap screw (51) to separate the shaft (7) from the motor shaft.

3. Pull the impeller (1) together with the shaft (7) forward by a few millimetres.
4. Place the spacer disk (56) in front of the impeller and attach the pump cover (3) - without O-ring (35) - with four screws (48), evenly distributed over the bolt circle. As a result, the impeller and the shaft are pushed into the correct setting position.
5. Tighten the cylinder screw (51) of the pump shaft (7) to the specified torque (see table). The screws provided for the torques correspond to the strength class A4-80. The use of lower strength class crews is not permitted.
6. Remove the screws (48) and remove the pump cover (3).
7. Remove the spacer disk (56).
8. Check if the impeller rotates freely.

⇒ Axial gap is adjusted.

8.3.6 Installing the pump cover

Installing the pump cover

Responsibility

- Customer specialist

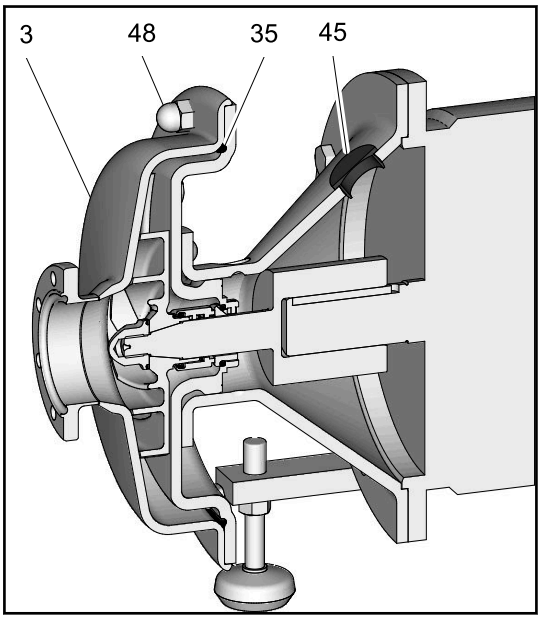
Prerequisites

- The axial gap is adjusted.

Tools

- Hexagonal torque wrench

1. Grease O-ring (35) and install on the pump housing.



2. Install the pump cover (3). Tighten all domed nuts (48) evenly in a cross pattern with the specified torque, see *3.4.3 Torques*
3. Press round plug (45) into the hole of the motor stool.

⇒ The pump cover is mounted.

Mount pump cover with TPE spacer ring

Responsibility

- Customer specialist

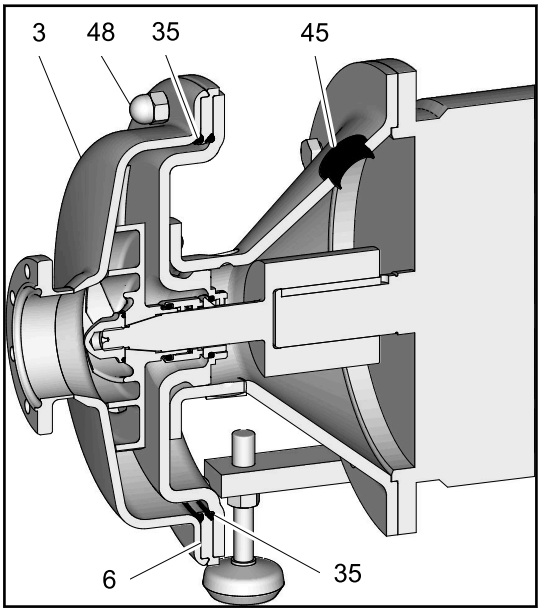
Prerequisites

- The axial gap is adjusted.

Tools

- Hexagonal torque wrench
- Grease for O-ring

1. Grease O-ring (35) and install on the pump housing.

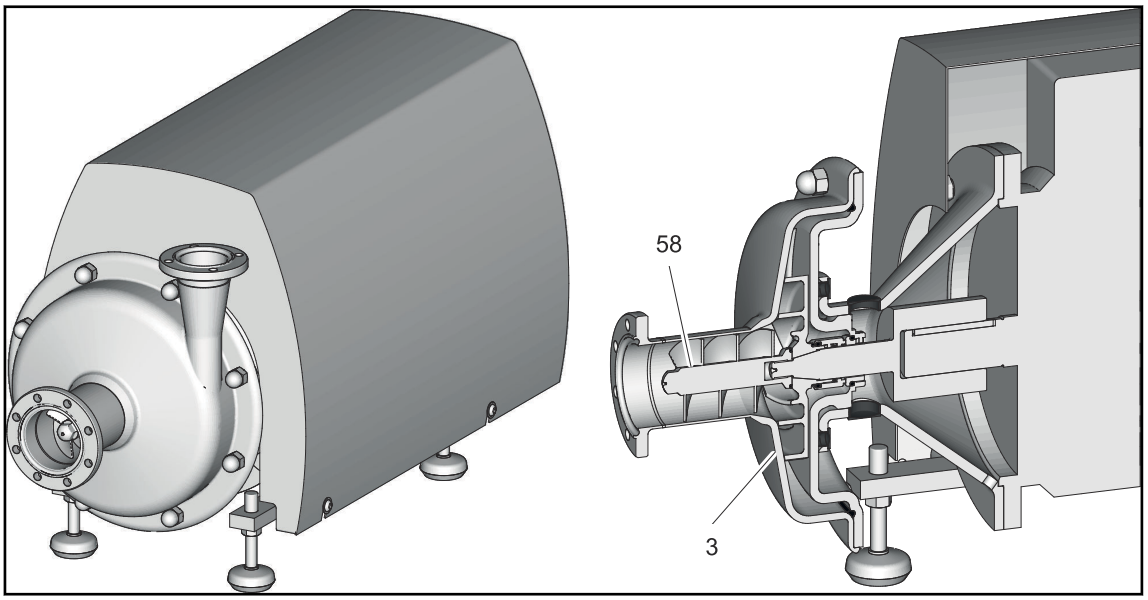


2. Insert the spacer ring (6).
3. Grease O-ring (35) and insert the spacer ring (6).
4. Mount the pump cover (3). Tighten all domed nuts (48) evenly in a cross pattern to the specified torque, see *3.4.3 Torques*
5. Press the round plug (45) into the hole of the motor stool.

⇒ The pump cover TPE is mounted.

8.3.7 Mount pump with inducer

Mounting the pump with inducer, application



Position	Description	Position	Description
1	3 - Pump cover	2	58 - Inducer

The inducer (58) reduces the NPSH value, increases the suction capacity of the pump and, in limiting cases, prevents the performance of the pump from being impaired by cavitation on the pump impeller.

Each system must be calculated for its NPSH value to reliably prevent cavitation at the impeller. The following condition must be observed as a basic rule: $NPSH_{system} > NPSH_{Pump}$

This statement is only a general specification. In individual cases, additional actuators must be considered. For this reason, GEA shall not assume any liability for the dimensioning or calculation of the NPSH value of the system on the system side.

Mount inducer

Responsibility

- Customer specialist

Prerequisites

- The axial gap is adjusted.

Tools

- Hexagonal torque wrench

1. Screw the inducer (58) in place of the domed nut to secure the impeller. All assembly and disassembly instructions as well as tightening torques apply analogously to the cap nut.
2. After assembly, check if the inducer runs freely and does not wobble around its axis.

⇒ The inducer is mounted.

Retrofit installation of inducer

When using an inducer, an extended suction port of the pump is required. During retrofitting, the inducer should not protrude into the system-side pipe section. Damage to the inducer and pump shaft may occur during installation or removal of the pump.

For conversion to the inducer version, contact the manufacturer GEA Hilge.

Pump size	DN Suction port	Inducer Material-No.	NPSH reduction	Flow rate	Port extension X[6]
1540	65	244-000276	up to 0.6 m	10 ... 35 m³/h	80 mm
1540	80	244-000616	up to 1.0 m	5 m³/h and 20 ... 40 m³/h	92 mm
2030	65	244-000276	up to 1.0 m	up to 30 m³/h	88 mm
2050	65	244-000276	up to 0.5 m	30...40 m³/h	70 mm
2575	65	244-000277	up to 0.4 m	10 ... 40 m³/h	71 mm
	80	244-000617	up to 0.7 m	15 ... 40 m³/h	87 mm
3050	65	244-000276	up to 0.5 m	up to 30 m³/h	70 mm
5060	80	244-000617	up to 0.7 m	20 ... 70 m³/h	78 mm
7060	80	244-000617	up to 0.7 m	20 ... 70 m³/h	78 mm
8050	100	244-000615	up to 1.0 m	up to 100 m³/h	70 mm
			up to 5.0 m	from 120 m³/h	
8080	100	244-000615	up to 1.0 m	up to 100 m³/h	70 mm
			up to 5.0 m	from 120 m³/h	

6) The dimension x must also be added to the dimensions b, c and x; see pump dimension sheet.

8.3.8 Drainage valve VTP

Mount drainage valve VTP

Prerequisites

- The valve has been removed.

Tools

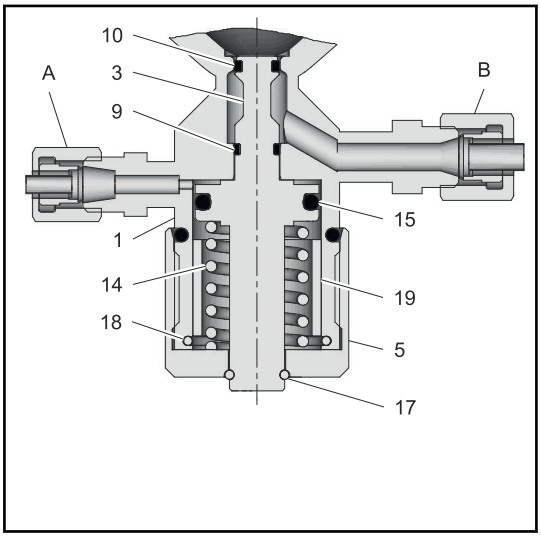
- Grease Rivolta F.L.G. MD-2, PARALIQ GTE 703 and grease BARRIERTA L 55/3[7]
- Open-ended wrench SW14, 17

⚠CAUTION

Risk due to improper handling of sensitive areas.
Improper handling of valve stem, valve disc (3), and valve seat can lead to property damage.

- Assemble precision areas with utmost care and, if necessary, gently.

1. Grease the parts.



2. Install the O-rings (9, 10, 15) in the valve plate (3).
3. Carefully insert the valve plate (3) into the housing (1).
4. Install the sleeve (19).
5. Insert the spring-lock washer (18) into the groove provided in the housing (1).
6. Insert the spring (14) into the housing (1).
7. Preload the pressure spring (14) together with the cover (5) until the thread engages. Screw on the cover as far as it will go. Preload the pressure spring (14) slowly.
8. Connect the air hose to pneumatic connector (A).
9. Connect the drainage hose - if present - to the drainage connection (B).
10. Open the valve pneumatically.
11. Install the spring-lock washer (17).

7) These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. They do not affect the taste or the consistency of the products and are compatible with the seals in contact with product. PARALIQ GTE 703 can be ordered under the material no. 413-064, Rivolta F.L.G. MD-2 under the material no. 413-071 and grease BARRIERTA L 55/3* under the material no. 413-137 from GEA

12. Close the valve.

⇒ Drainage valve VTP is installed.

Retrofitting of the drain valve VTP

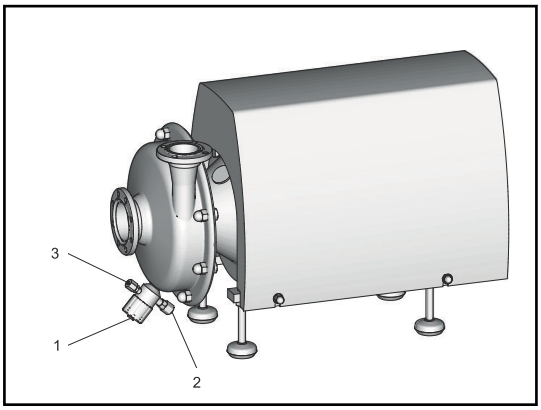
Responsibility

- Customer specialist

Prerequisites

- The pump motor is electrically disconnected.
- Pump has been removed from the pipeline, drained, cleaned and flushed.

1. Replace the pump cover with one that is designed for the installation of the drainage valve, see replacement parts.
2. Install drainage valve at the lowest point of the corresponding pump cover, see figure:



Position	Description
	1 - Drainage valve
	2 - Drainage connection
	3 - Air connection

⇒ Drainage valve VTP is installed.

9 Malfunctions

This chapter contains information about handling faults at the pump. In addition, it describes the personnel qualifications required for the individual actions.

It addresses all those who carry out actions at the pump in this context.

INFO For all troubleshooting, observe chapter *2 Safety* in this operating manual.

9.1 Faults and remedies

Malfunction	Cause	Remedy
Motor does not start	No power supply to the motor	Switch off the pump, check the cable connections and the fuse
	Motor protection has tripped	Check the power consumption of the motor
	Motor protection or residual current circuit breaker has tripped or fuses are blown because cables, motors or control devices are damaged	Measure parts and repair or replace defective parts
	Contact of the switchgear are defective	Check the switchgear, remove, clean and replace any defective parts
Power consumption of the motor is too high	Viscosity of material being conveyed too high	Check pump system, throttle if necessary, unscrew impeller, change pump or motor
	Gap between the housing and the impeller not adjusted properly	Adjust the gap
	Resistance in the pressure line too low (delivery flow too high)	Check pump system, throttle if necessary, unscrew impeller, change pump or motor
	Impeller diameter too large	Install smaller impeller
		Unscrew the impeller
Noise emission too high (also cavitation)	Resistance in the suction line too high	Check suction line, shorten or enlarge
	Fluid level in the suction tank is too low	Fill the suction tank
	impeller is rubbing	Measure the axial gap and re-adjust according to chapter "Check axial gap"
	Bearing damage of the motor	Replace the bearings
	Mechanical seal has run dry	Switch off the pump immediately, check the mechanical seal and replace if necessary

Malfunction	Cause	Remedy
		Check the cause of running dry and eliminate the fault
Discharge head or delivery flow too low	Wrong direction of rotation of the motor	Reverse the phases
	Motor speed too low (wrong voltage, frequency); number of poles wrong	Apply the correct voltage change the motor
	Impeller diameter too small	Install a larger impeller
	The impeller is worn out	Replace the Impeller
	Too much resistance in the suction and/or pressure line	Check the lines
	Viscosity of material being conveyed too high	Check the pump system, install the larger impeller
The pump leaks	Mechanical seal defective	Replace the mechanical seal
	O-ring defective	Replace the O-ring
The pump does not produce suction	No residual liquid in the pump	Fill the pump with a minimum amount of liquid
	Installation not implemented according to specifications	Install the system on the suction and pressure side according to specifications

Troubleshooting - drainage valve VTP

In case of malfunctions, immediately switch off the drainage valve and secure against reactivation. Malfunctions may only be remedied by qualified personnel, who must observe the safety instructions.

Malfunction	Cause	Remedy
Drainage valve is not working	Fault in the control system	Check the system configuration
	No compressed air Compressed air pressure too low	Check the compressed air supply Check air hoses for free passage and air tightness
	Fault in the electrical system	Check the control / external regulator and the electrical power supply
	O-rings in the drive defective	Replace the O-rings
Drainage valve does not close	Dirt and foreign objects between the valve seat, valve plate, and the O-ring	Clean valve seat, valve plate and O-ring

Malfunction	Cause	Remedy
Drainage valve closes too slowly	O-rings in drive (8) and valve housing (9) are dry (friction losses)	Grease O-rings
Leakage at the outlet	O-ring (10) on the valve seat is defective	Replace the O-ring (10) on the valve seat

10 Decommissioning, dismantling and disposal

This chapter contains information about decommissioning the pump and describes dismantling and disposal. The target group for this chapter are all those who carry out actions at the machine in this context.

This chapter contains information about decommissioning and disposing of the pump. The target group for this chapter are all those who carry out actions at the pump in this context.

INFO For all decommissioning, observe chapter *2 Safety* in this document.

10.1 Decommissioning

Longer-term decommissioning

Responsibility

- Customer specialist

Prerequisites

- Shutting down the pump is completed. See chapter *6.6 Shutdown*
- Pump is secured against being switched back on again.

1. Drain the pump with the system.
2. Clean the pump, see chapter *7 Cleaning*, page *53*
3. Switch the cleaning flow off and drain the cleaning system.
4. Heed storage conditions, see chapter *4.1 Storage*, page *35*

⇒ Longer-term decommissioning has been completed.

10.2 Dismantling

Responsibility

- Customer specialist

Prerequisites

- Make sure that no process is in operation in the area concerned during disassembly.

1. Drain the pump and all the pipeline elements leading to the pump.
2. Drain the cleaning lines and cleaning containers.
3. Disconnect the power supply.
4. Take the pump out of the pipe section, with all housings and housing connections if possible.
   → Pump is dismantled.

10.3 Disposal

Dispose of the pump in an environmentally friendly way. Observe the statutory waste disposal regulations applicable at the place of installation.

The pump consists of the following materials:

- Metals
- Synthetic materials
- Electronic parts
- Lubricants containing oil and grease

Separate the different materials and dispose of them correctly sorted. Also observe the instructions regarding disposal in the operating manuals for the individual components.

11 Annex

11.1 Clearance certificate

Clearance certificate

Certificate	Your specifications	
We, the undersigned, together with this clearance certificate hereby order the following pump and its accessories to be inspected/repaired:	Pump specifications Type: Pump number: Delivery date:	Reason for inspection/repair order:
The pump (please mark with a cross)	___ has not been used in harmful media. ___ came into contact with substances requiring special labelling or pollutant substances.	If known, please specify the last pumped medium:
The pump was drained carefully before shipping / provision and cleaned on the outside and inside (please mark with a cross).	___ Special precautions are not necessary during further handling.	___ The following safety precautions are necessary concerning flushing liquid, residual liquids and disposal:
We assure that the above information is correct and complete and that the shipment is carried out in accordance with the legal requirements.	Company: Street, number: Postcode, town Country Phone: Fax: E-mail:	Name (printed) Date Company stamp / signature

11.2 Abbreviations and terms

Abbreviation	Explanation
rpm	"Unit of measurement for the speed Revolutions per minute"
bar	"Unit of measurement for the pressure All pressure data [bar] is assumed to be gauge pressure [barg] unless explicitly specified otherwise.”
C	Carbon
approx.	approximately
°C	"Unit of measurement for the temperature Degree Celsius”
dB(A)	Sound level DN DIN nominal width
DIN	German standard DIN German Institute for Standardization e.V.
DW	Double-acting mechanical seal DW EN European Standard
EPDM	“Material specification Short description according to DIN/ISO 1629 Ethylene Propylene Diene Rubber
EW	Single-acting mechanical seal
FKM	Material specification Short description according to DIN/ISO 1629 Fluorine rubber
h	Unit of measurement for time hour
IEC	International Electrotechnical Commission International Electrotechnical Commission (valid worldwide)
IP	Protection class
ISO	International standard of the International Organization for Standardization
kg	kilogram Unit of measurement for the weight
l	Unit of measurement for the volume litre
max.	maximum
mm	Unit of measurement of length millimetre
µm	Unit of measurement of length micrometre

Abbreviation	Explanation
M_{min}	Torque (Nm)
M_{max}	Torque (Nm)
m^3/h flow rate	1 m^3/h = 4.409 gpm
Nm	Unit of measurement for work Newton meter Torque specification 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
NPSH	Holding pressure height (m) (Net Positive Suction Head)
QU	Single-acting flushed mechanical seal (quench)
SIC	Silicon carbide
SS	Molybdenum steel
AF	Indicates the size of spanners width across flats
kW	Unit of measurement for performance

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