

# Operating instructions

Electronically controlled magnetic  
pump with control unit Type BMU:

Item no.: 4108 (TMG-03), 4109 (TMG-05), 4110 (TMG-20)

with control unit type BLE:

Item no.: 4112 (TMG-03), 4113 (TMG-05), 4114 (TMG-20)





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# 1. General

## 1.1 General

This operating manual describes the installation, operation, and maintenance of the TMG gear pump, hereinafter referred to as the pump. The pump is manufactured in various versions. The version you have can be found on the type plate on the pump.

The structure of the type designation and a more detailed description of the individual series and nominal sizes can be found in Chapter 3 *Description* and Chapter 4 *Technical Data*.

If you have any questions about these operating instructions, please contact the manufacturer. Be sure to read these operating instructions before commissioning the pump for the first time!

Here you will find all the information you need to ensure safe use and a long service life for the pump. It is essential that you observe all the safety instructions in this manual!

In addition to the information provided in this operating manual, please also observe the following documents:

- Operating instructions for the BMU or BLE motor controller
- Operating instructions for the drive motor

Both from Oriental Motor Europa GmbH:

<https://www.orientalmotor.eu/eu/products/brushless-motors/bmu>

<https://www.orientalmotor.eu/eu/products/brushless-motors/ble2>

<https://www.orientalmotor.eu/de/products/detail?hinmei=BLM5200HP-AS>

<https://www.orientalmotor.eu/de/products/detail?hinmei=BLM5300HP-AS>

## 1.2 Manufacturer address

Schnitzler GmbH

Höffgeschhofweg 26

47807 Krefeld

Tel.: +49 (0) 2151 82865

Website [www.schnitzler.de](http://www.schnitzler.de)

Videos for the operating instructions: [\\_](#)

<https://www.youtube.com/channel/UCnCnglHtJbVPTIauzH2iofA> E-mail [info@schnitzler.de](mailto:info@schnitzler.de)



### 1.3 Intended use

The pump is a gear pump for continuous

Pumping liquids. The pump is designed for operation with liquid media. Dry running is not permitted.

The medium must ensure minimum lubrication.

The medium must not contain any abrasive components. Gasoline, solvents, etc. are not permitted.

Use in potentially explosive atmospheres is not permitted.

The operator must ensure that the medium to be pumped is compatible with the materials used in the pump.

This requires chemical expertise.

The maximum permissible operating data listed in Chapter 4 *Technical Data* must be observed without fail.

Deviations from the above data and operating conditions require the express approval of the manufacturer.

Type plates or other information on the pump must not be removed or made illegible or unrecognizable.

Any other use is considered improper, and any violations will void the warranty and manufacturer's liability!

## 1.4 Explanation of symbols


Hazard warnings and instructions are clearly marked in the operating instructions. The following symbols are used:

 **DANGER!**


**Immediate danger to life or injury!**  
Immediately dangerous situation that will result in death or serious injury.

 **WARNING!**


**Probable danger to life or injury!**  
Generally dangerous situation that could result in death or serious injury.

 **CAUTION!**

**Potential risk of injury!**  
Dangerous situation that could result in injury.

 **WARNING!**

**Risk of damage to equipment!**  
Situation that could result in property damage.

 **Note:**  
Information provided to aid understanding of the procedures.

Symbols located directly on the pump must not be removed or covered. Any labels on the pump that are no longer legible must be replaced immediately.

## 1.5 Personnel selection and qualification

Personnel assigned to the installation, operation, and maintenance of the pump must have the appropriate qualifications. Personnel must be familiar with the contents of this operating manual.

## 2. Safety



### **DANGER!**

#### **Danger of death from electric shock!**

- Observe the special safety regulations when working on electrical systems.
- Work on electrical systems may only be carried out by a qualified electrician.



### **DANGER!**

#### **Danger due to breakage or splashing liquid!**

Operating the pump at impermissibly high pressures can cause damage to the pump and other components of the system. In the event of breakage, flying parts or ejected liquid can cause accidents resulting in death or serious injury.

- Do not allow the pump to deliver against a closed pressure line.
- Do not operate the pump without a pressure relief device.



### **DANGER!**

#### **Danger due to breakage or ejected liquid!**

The use of unsuitable or damaged connections and lines can lead to breakage, flying parts or squirting liquid can lead to accidents resulting in death or serious injury.

- Only use connections and lines that are approved for the expected pressure range.
- Replace damaged connections and lines immediately.

** DANGER!****Danger due to incorrect direction of rotation!**

Operating the pump in the wrong direction of rotation can cause damage to the pump and other components of the system. In the event of breakage, flying parts or spurting liquid can cause accidents resulting in death or serious injury.

- Only use connections and lines that are approved for the expected pressure range.
- Replace damaged connections and lines immediately.

** WARNING!****Danger from exposed gears!**

Gears can pull in and crush or sever fingers and hands.

- Do not reach into the gears.
- Only start up the pump with the lines connected.

** WARNING!****Danger from rotating parts and splashing liquid!**

- Depressurize the connecting lines when working on the pump.
- When working on the pump, disconnect the drive motor from the power supply and secure it against being switched back on.
- Wear suitable protective clothing.
- Do not operate the pump without protective equipment.

**WARNING!****Danger from hazardous liquids!**

Contact with hazardous liquids or inhalation of vapors from these liquids can be fatal.

- Observe safety data sheets and regulations for handling hazardous liquids.
- Comply with national and international regulations.
- Collect and dispose of leaks in such a way that there is no danger to people or the environment.
- Wear suitable protective clothing.

**CAUTION!****Danger from hot surfaces!**

When operating the pump with hot media, there is a risk of burns and scalding when touching hot surfaces.

- Wear protective gloves.
- Take measures to prevent accidental contact.
- Allow the pump to cool down before performing maintenance work.

**CAUTION!****Risk of damage to equipment!**

Improper operation can lead to damage and malfunctions of the pump and the system.

- All work on the pump must only be carried out by trained and qualified personnel.

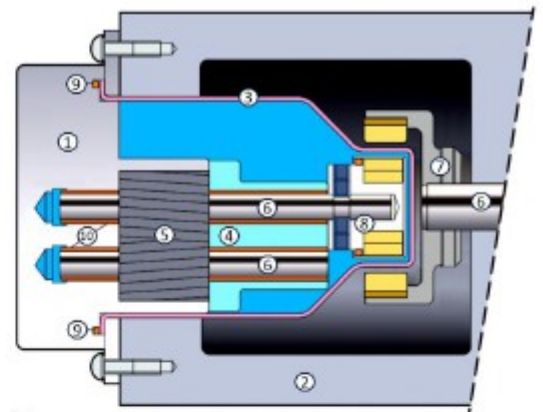
### 3. Description

#### 3.1 Function

The pumps in the TMG series are small, seal-less, magnetically driven gear pumps that have been developed for optimum smooth and leak-free operation. Thanks to their high efficiency, combined with their compact design, the TMG series can be found in a wide variety of applications. These range from simple circulation processes to sophisticated medical and laboratory equipment.

### Constructional Impression / Konstruktionschema

- 1. Pump body | Pumpenkörper - SST 316, Edelstahl 316
- 2. Pump house | Pumpengehäuse - POMC
- 3. Gear case | Gehäuse Topf - SST 316, Edelstahl 316
- 4. Bearing holder | Lagergehäuse - SST 316, Edelstahl 316
- 5. Gears | Zahnräder - PEEK
- 6. Shafts | Achsen - SST 316, Edelstahl 316
- 7. Outside magnet | Außenmagnet
- 8. Inner magnet | Innenmagnet - FKM - SST 316, Edelstahl 316
- 9. Seals | Dichtungen - FKM
- 10. Bearings | Lager - CF+PTFE



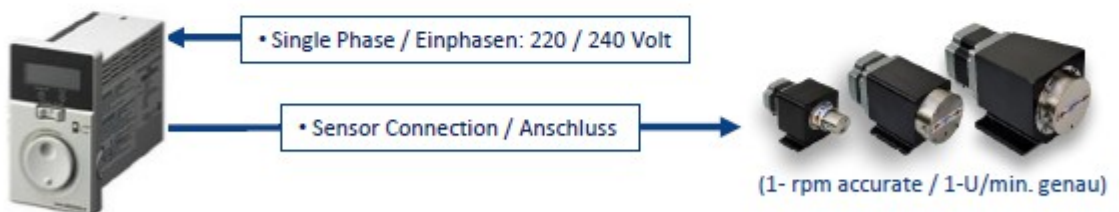
#### TMG Gear Pumps are standard equipped with:

- Seal-less pump body construction (eliminate leakage problems)
- Liquid wetted parts produced from SST 316 / PEEK / PTFE
- Self-priming ability up to 9.0 kPa (0,9 bar)
- High efficiency AC or DC motor
- Magnet coupling (prevents liquid overpressure)

#### TMG Zahnradpumpen standardausführung:

- Dichtungslose Konstruktion (ohne Leckagerisiko !)
- Nassteile bestehen aus Edelstahl 316 / PEEK / PTFE
- Selbstansaugfähigkeit bis zu 9.0 kPa (0,9 bar)
- Hocheffizienter AC oder DC motor
- Antriebsmagneteneinheit verhindert Überdruck

### Electronic controlled dosing / Elektronisch gesteuerte Dosierung



### Application / Applikationen

- ✓ Water Treatment Systems
- ✓ Desinfection Installations
- ✓ Food & Beverage Ingredient Industry
- ✓ Petfood Ingredient Industry
- ✓ Greenhouse Applications
- ✓ Paint & Printing Industry

- ✓ Metal Surface Industry
- ✓ Cleaning Systems
- ✓ Solvent, Base & Toxic Industry
- ✓ Pharmaceutical Industry
- ✓ Laboratories
- ✓ Cosmetic Industry

- ✓ Medical Devices
- ✓ Adblue Systems
- ✓ Chilling Systems
- ✓ Plasma Etching
- ✓ Semiconductor Industry
- ✓ PCB Industry

## 3.2 Application

Gear pumps are suitable for pumping liquid media that have some lubricity and do not contain any solid contaminants. Due to its special design, the TMG series is ideal for integration into complete systems. The magnetic coupling prevents sealing problems that occur with conventionally driven pumps. The gear pump offers the following advantages:

- High chemical resistance
- Pulsation-free
- Precise dosing
- Low-noise operation
- High efficiency

## 3.3 General information

### General information TMG

Design: Gear pump (internal gearing)

Filtration: Filter fineness  $\leq 60 \mu\text{m}$  required

Permissible media

Liquids without abrasive components that are compatible with the pump materials used. The liquids must ensure minimum lubrication

Media-specific properties must be observed. Gasoline, solvents, etc. are not permitted.



#### CAUTION!

##### **Risk of damage to equipment!**

When pumping water-containing liquids, cavitation damage may occur due to insufficient pressure on the suction side.

- Observe the media-specific properties.
- Limit the operating temperature to max. 50 °C, the speed to max. 1500 min<sup>-1</sup> and install the pump below the liquid level.



#### CAUTION!

##### **Risk of damage to the device!**

Dry running can lead to premature wear of the bearings.

- Do not allow the pump to run dry (without liquid) for longer than two minutes.



#### CAUTION!

##### **Risk of damage to the device!**

Simultaneous use of several operating limits can lead to damage or premature wear of the pump.

-Do not apply minimum and maximum parameters at the same time, e.g., maximum operating pressure in conjunction with low speed and/or low viscosity.



## 4. Technical data

### TMG-03

Flow rate up to	3 liter / min.	Förderleistung bis zu
Pressure up to	6 bar	Druck bis zu
Max. liquid viscosity	500 mPas	Max. Flüssigkeitsviskosität
Temperature range	0 to 95°C	Temperaturbereich
Dosing accuracy	< 0,5 %	Dosiergenauigkeit
In / Out Connections	1/8"	Anschlüsse Saug / Druck
Output power	120 Watt	Ausgangsleistung
Adjustable rpm	On request / Auf Anfrage	Einstellbarer U/Min.
Max. dimensions	L = 165 mm / W = 90 mm / H = 125 mm *	Max. Abmessungen
Weight	4 Kg *	Gewicht

### TMG-05

Flow rate up to	6 liter / min.	Förderleistung bis zu
Pressure up to	10 bar	Druck bis zu
Max. liquid viscosity	1000 mPas	Max. Flüssigkeitsviskosität
Temperature range	0 to 95°C	Temperaturbereich
Dosing accuracy	< 0,5 %	Dosiergenauigkeit
In / Out Connections	1/4"	Anschlüsse Saug / Druck
Output power	200 Watt	Ausgangsleistung
Adjustable rpm	On request / Auf Anfrage	Einstellbarer U/Min.
Max. dimensions	L = 210 mm / W = 90 mm / H = 125 mm *	Max. Abmessungen
Weight	5 Kg *	Gewicht

### TMG-20

Flow rate up to	21 liter / min.	Förderleistung bis zu
Pressure up to	10 bar	Druck bis zu
Max. liquid viscosity	1500 mPas	Max. Flüssigkeitsviskosität
Temperature range	0 to 95°C	Temperaturbereich
Dosing accuracy	< 0,5 %	Dosiergenauigkeit
In / Out Connections	1/2"	Anschlüsse Saug / Druck
Output power	300 / 400 Watt	Ausgangsleistung
Adjustable rpm	On request / Auf Anfrage	Einstellbarer U/Min.
Max. dimensions	L = 235 mm / W = 120 mm / H = 150 mm *	Max. Abmessungen
Weight	6 Kg *	Gewicht

## 5. Transport and storage

### 5.1 Transport

- Inspect the pump for transport damage upon receipt.
- Report any transport damage to the transport company immediately.
- If the damage impairs the proper operation of the pump, it must be replaced or repaired.  
Please contact the manufacturer for this purpose.
- Dispose of packaging material after unpacking in accordance with the applicable legal regulations.

### 5.2 Storage and preservation

The pump is test run at the factory with mineral hydraulic oil. Afterwards, all connections are sealed. The remaining oil preserves the internal parts for a period of approx. 6 months.

Metallic bare external parts are treated with anti-corrosion oil or metal protective paint and are therefore also protected against corrosion for a period of approx. 6 months.

During transport and storage, the pump must not be exposed to weather conditions or extreme temperature fluctuations. The pump must be stored in a clean and dry place.

If the pump is to be stored for a longer period of time, it must be treated inside and outside with a suitable anti-corrosion oil. Moisture must be kept away from the pump using moisture-absorbing agents. Check the condition of the pump and the preservation at least once a year and repeat the preservation process if necessary.



#### CAUTION!

##### **Risk of damage to equipment!**

Incompatibilities between the preservative and the materials and elastomers used in the pump can lead to damage to the pump or the seals used.

- Ensure that the preservative is compatible with the materials and elastomers used in the pump.
- Ensure that the preservative is compatible with the media to be pumped.

## 6. Installation and removal

### 6.1 Suction line

#### DANGER!

##### **Danger due to breakage or escaping fluid!**

The use of unsuitable or damaged connections and lines can lead to breakage, flying parts, or liquid spurting out, which can result in accidents causing death or serious injury.

- Only use connections and lines that are approved for the expected pressure range.
- Replace damaged connections and lines immediately.

#### CAUTION!

##### **Risk of damage to the device!**

Tension can lead to malfunctions of the pump or breakage of connections or the housing.

- Route pipes in such a way that no stresses can be transmitted to the pump during operation, e.g., due to changes in length caused by temperature fluctuations.

#### ATTENTION!

##### **Risk of damage to the device!**

An incorrectly designed suction line can lead to malfunctions and damage to the pump.

- Plan the suction line carefully.

#### **Requirements for the suction line**


- Lay the suction line as short and straight as possible.
- Avoid large suction heights.
- Avoid additional pipe resistance such as fittings, valves, or close-mesh filters.
- The nominal diameter of the suction pipe should be at least equal to that of the pump connection.
- Use transition pieces to larger nominal diameters with as small an expansion angle as possible to avoid increased pressure losses.

- The negative pressure in the suction line is calculated from the sum of all suction-side resistances and the suction height, taking into account the media-specific data.
- Check the negative pressure with a vacuum gauge that is installed as close as possible to the suction connection.
- When laying the suction line in the media container, ensure that suction is unobstructed. Maintain sufficient distances from the floor and bulkheads.
- The suction opening must be at a sufficient distance from the lowest liquid level.
- When using hose lines, ensure that the hoses are sufficiently stable. They must not be constricted by the suction effect.
- The recommended flow velocity in the suction line is max. 1.5 m/s.
- The suction line must be completely leak-proof.

#### Protection against the suction line running dry

Running dry of the suction line can be prevented by installing it as a siphon. For longer suction lines, we recommend using a foot valve or a check valve that is designed for use in suction lines and has the lowest possible flow resistance. The air in the pressure line can be fed directly into the tank via a nozzle.

## 6.2 Pressure line

 **DANGER!**

**Danger due to breakage or splashing liquid!**  
Operating the pump at impermissibly high pressures can cause damage to the pump and other components of the system. In the event of breakage, flying parts or ejected liquid can cause accidents resulting in death or serious injury.

- Observe DGUV 113-020
- Do not allow the pump to deliver against a closed pressure line.
- Do not operate the pump without a pressure relief device.

#### Requirements for the pressure line

- Select the nominal diameter of the pressure line so that the maximum permissible pressures are not exceeded.
- Check the pressure with a pressure gauge that is installed as close as possible to the pressure connection.

- When using hose lines, lay pressure hoses with sufficiently large radii.
- When operating a pump that has to deliver via a check valve in a pressurized circuit (e.g., reserve pump in a lubrication circuit), suction difficulties may arise if the suction line is filled with air. In this case, the pressure line must be vented immediately upstream of the check valve, e.g., by means of a vent nozzle with return or a throttled bypass.

### 6.3 Installing the pump



#### **DANGER!**

##### **Danger due to breakage or splashing liquid!**

The use of unsuitable or damaged connections and lines can lead to breakage, uncontrolled flying parts or ejected liquid can lead to accidents resulting in death or serious injury.

- Only use connections and lines that are approved for the expected pressure range.
- Replace damaged connections and lines immediately.



#### **WARNING!**

##### **Danger from exposed gears!**

Gears can pull in and crush or sever fingers and hands.

- Do not reach into the gears.
- Only start the pump with the lines connected.



#### **CAUTION!**

##### **Risk of damage to the device!**

Tension can lead to malfunctions of the pump or breakage of connections or the housing.

- Route pipes in such a way that no tension can be transferred to the pump during operation, e.g., due to changes in length caused by temperature fluctuations.

- Check the pump for transport damage and contamination.
- Clean the pipe system of dirt, scale, chips, etc.
- Remove the protective covers from the suction and pressure connections of the pump.
- Wet the inside of the pump from the suction side with a little pumped medium. This seals the gear against the pump housing.

- Position the pump so that air can flow freely and there is sufficient space for maintenance or repair work.
- Ensure that the foundation is level, clean, and stable.
- Bolt the pump to the foundation. All mounting feet must be flat to prevent tension on the housing.
- Connect the pipes to the suction and pressure connections.
- The pipes must not transmit any stress to the pump during installation or operation.

## 6.4 Electrical connection



### **DANGER!**

#### **Danger of death from electric shock!**

- Observe the special safety regulations for all work on electrical systems.
- Work on electrical systems may only be carried out by a qualified electrician.
- Disconnect the power supply from the mains and secure it against being switched back on.



#### **Note:**

Connect the motor; see the operating instructions for the drive motor.

- Connect the connection cables according to the circuit diagram.

## 6.5 Remove the pump

### **DANGER!**

#### **Danger of death from electric shock!**

- Observe the special safety regulations when working on electrical systems
  - Work on electrical systems may only be carried out by a qualified electrician.
- Disconnect the power supply from the mains and secure it against being switched back on.

### **WARNING!**

#### **Danger from rotating parts and splashing liquid!**

- Depressurize the connection lines before performing any work on the pump.
- Disconnect the drive motor from the power supply and secure it against being switched back on.
- Wear suitable protective clothing.
- Do not operate the pump without protective equipment.

### **CAUTION!**

**Danger from hot surfaces and hot pumped medium!** When removing the pump, there is a risk of burns and scalding when touching hot surfaces and coming into contact with the hot medium.

- Wear protective gloves.
  - Allow the pump and pumped medium to cool down.
- 
- Disconnect the connection cables from the motor.
  - Shut off the suction and pressure lines.
  - Remove the depressurized pipes from the pump connections.
  - Collect any escaping pumped medium in a suitable collection container.
  - Seal the connections with suitable protective covers.
  - Loosen the screws on the mounting feet.

## 7. Commissioning

### 7.1 Preparation



#### CAUTION!

##### **Risk of damage to the device!**

Incorrect commissioning can lead to malfunctions and damage to the pump and the system.

Only allow trained and qualified personnel to carry out any work on the pump.

- Observe the permissible operating data and conveying media.
- Ensure maximum cleanliness during all work.
- Ensure that there is a sufficient quantity of the pumped medium to prevent dry running.

Before starting the system, fill the pump and suction line with the pumped medium. This prevents damage to the pump and shaft seal due to dry running and ensures that the pump can suck in the medium.

- Ensure that all lines and connections are completely tight. There must be no leaks or air being sucked in.

- Check that the installation is correct.
- Check the direction of rotation of the pump and motor.
- Check pipes and connections for damage. If any parts are damaged, the pump must not be put into operation.

## 7.2 Adjusting the bypass valve



### DANGER!

#### Danger due to breakage or escaping liquid!

Fully tightening the adjustment screw can lead to impermissibly high pressures in the system. If the adjustment screw is completely unscrewed, fluid may spray out of the valve.

In the event of breakage, flying parts or squirting fluid can cause accidents resulting in death or serious injury.

- Never operate the pump without the cap.
- Never screw the adjustment screw completely into the valve.
- Never unscrew the adjustment screw completely from the valve.



### CAUTION!

#### Risk of damage to the device!

The pressure relief valve is intended solely for protecting the pump. The valve may only be activated for a short period of time.

Continuous discharge of the delivery volume via the valve will destroy the pump due to overheating.

- Ensure that the valve only responds briefly.
- Use a separate valve with a return line to the suction tank in the pressure line if a large part of the delivery volume has to be discharged over longer periods of time.

- Unscrew the cap.
- Adjust the response pressure with the adjustment screw:  
Increase response pressure: Turn clockwise  
Decrease response pressure: Turn counterclockwise
- Screw the cap back on with a new copper sealing ring once the desired pressure has been set.

### 7.3 Start up the pump



#### CAUTION!

**Risk of damage to the device!**

Incorrect commissioning can lead to malfunctions and damage to the pump and the system.

- Only allow trained and qualified personnel to perform any work on the pump.
- Observe the permissible operating data and pumped media.
- Ensure maximum cleanliness during all work.
- Ensure that there is a sufficient quantity of the pumped medium to prevent dry running.
- Before starting the system, fill the pump and suction line with the pumped medium. This prevents damage to the pump and shaft seal due to dry running and ensures that the pump can suck in the medium.
- Ensure that all pipes and connections are completely tight. There must be no leaks or air being sucked in.

- Open all shut-off valves on the suction and pressure sides.
- Check that the pump is working properly by repeatedly switching the motor on and off quickly (tip operation) without reaching full speed. This procedure prevents damage to a cold pump due to thermal shock when the pumped medium is heated.

Leave the motor switched on.

The pump is functioning properly if it is quiet and the pressure gauges are reading correctly. The time from switch-on to delivery should be no more than 30 seconds.

- Check the static seals on the suction and pressure connections and on the pump's separation joints for leaks.

- Check the screw connections for leaks. Such leaks can be quickly eliminated by simply retightening the screw connections.

Check all motor and pump mounting screws for tightness after a few hours of operation.

## 8. Maintenance and servicing



### WARNING!

#### **Danger from hazardous liquids!**

Contact with hazardous liquids or inhalation of vapors from these liquids can be fatal.

- Safety data sheets and regulations for handling hazardous liquids.
- Comply with national and international regulations.
- Collect and dispose of spills in such a way that there is no danger to people or the environment.
- Wear suitable protective clothing.



### CAUTION!

#### **Danger from hot surfaces!**

When operating the pump with hot media, there is a risk of burns and scalding when touching hot surfaces.

- Wear protective gloves.
  - Take measures to prevent accidental contact.
- Allow the pump to cool down before performing maintenance work.



### CAUTION!

#### **Risk of damage to equipment!**

Improper work can lead to damage and malfunctions of the pump and the system.

- All work on the pump must be carried out by trained and qualified personnel.

## 8.1 General information

Under normal operating conditions and when installed correctly, the pump requires only minimal maintenance.

The scope and intervals for inspections and maintenance depend on local conditions and must be specified by the operator in a corresponding maintenance plan.

The following activities are recommended:

- Checking the operating data
- Check for unusual noises
- Checking the surface temperature
- Checking for damage
- Checking for cleanliness
- Check that the fastening screws and connections are secure
- Check the pump for leaks, especially the shaft seal

## 8.2 Activities

### Check operating data

- Compare the operating data with the values from commissioning. Investigate the cause of any significant deviations. Significant deviations indicate wear on pump parts such as bearings, gears, housing, or valve parts.

### Unusual noises

- Investigate the cause of any changes in the operating noise of the pump.

### Surface temperature

- Check the temperatures on the pump surface (bearings, housing, shaft seal). The surface temperature should not be significantly higher than the temperature of the pumped medium at the pump inlet (max. 10 °C). Excessive surface temperatures indicate wear or bearing damage.

### Damage

- Check the pump and surrounding area for damage and replace any damaged parts.

### Cleanliness

- Keep the pump clean and ensure that the motor ventilation openings are unobstructed. Do not clean the pump with a steam cleaner; only clean the motor when dry!

### Screw connections and connections

- Check fastening screws and connections for tightness. Tighten loose screw connections.

### Tightness

- Radial shaft seal
  - The radial shaft seal is maintenance-free. If there are significant leaks, the radial shaft seal must be replaced.
- Connection lines and separation joints of the pump
  - If there are visible leaks on the connection lines or the pump's separating joints, tighten the screw connection.  
If this does not fix the leak, the seal in question must be replaced.

## 8.3 Repair

Defective pumps are usually replaced on site by the operator. Repairs are carried out by the manufacturer (see page 4, *1.2 Manufacturer's address*).

## 8.4 Return


The pump must be suitably packaged for repair or inspection by the manufacturer. A safety data sheet for the pumped medium must be enclosed.

When operating with hazardous liquids, the pump must be cleaned before packaging.

Suction and pressure connections must be closed.

## 8.5 Disposal

The following points must be observed when disposing of the pump:

- This device does not belong in household waste! Dispose of it properly. You can obtain information on this from your local waste disposal association.
- Devices marked with the adjacent symbol must not be disposed of with household waste. You are obliged to dispose of such electrical and electronic waste separately. 
- Dispose of the pump, motor, and packaging material in accordance with the national regulations of your country.
- Dispose of the pumped medium in accordance with the national regulations of your country. Please also observe the applicable safety data sheet.
- Empty the pump completely.
- Disassemble the pump into its individual parts for recycling. Separate, for example, seals, cast iron, and steel.

## 9. Troubleshooting

The following overview lists the possible causes of malfunctions and provides information on how to remedy them. If malfunctions occur that are not listed here, please contact the manufacturer.

Malfunctions					Cause	Remedy
Pumpe saugt nicht an	Pumpe bringt nicht volle Leistung	Pumpe arbeitet laut	Pumpe wird zu warm	ungleichmäßige Förderung		
X					Incorrect direction of rotation	Check direction of rotation, reverse motor polarity if necessary
X	X	X			Pump not filled	Fill pump and suction line (if necessary) and vent
X	X	X			Suction line leaking	Replace seals
X	X	X			Shaft seal leaking	Replace seals
X	X	X			Suction line incorrectly designed (line length, cross-section, too many bends, etc.)	Check the design of the suction line. If necessary, reduce the pipe length or increase the cross-section
X	X	X		X	Suction or pressure line blocked	Remove blockage, remove foreign objects or deposits
X	X	X			Suction filter clogged or too small	Clean the suction filter or use a larger one
X	X	X	X		Pump worn	Replace worn parts or replace pump
X	X	X			Liquid level in storage tank too low	Refill medium
		X			Pipes vibrating	Check pipe fastenings
		X			Pump vibrates	Check installation location, use damping elements if necessary
		X			Malfunctions in the pump drive	Check motor, replace if necessary
	X		X	X	Pressure relief valve stuck or opens too early	Check valve and setting

Malfunctions					Cause	Remedy
Pumpe saugt nicht an	Pumpe bringt nicht volle Leistung	Pumpe arbeitet laut	Pumpe wird zu warm	ungleichmäßige Förderung		
X	X	X		X	Air pockets or gas bubbles in the pumped medium	Check pipes for leaks, vent pressure line; ensure return lines end below the liquid level in the storage tank
			X		Supply pressure too high	Reduce pressure, increase pressure line size , reduce line resistance
X					Check valve in the pressure line	Vent pressure line
X					Not vented Pump speed too low	Increase speed
			X		Pump speed too high	Reduce speed
	X		X		Viscosity of the pumped medium too low	Reduce temperature of pumped medium; increase speed.
	X				Viscosity of the pumped medium too high	Increase the temperature of the pumped medium; Reduce speed

For further questions regarding operation, maintenance, and repair, please contact the manufacturer:

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