

## 6. Maintenance

### 6.1. General

The machine and the entire system must be inspected and maintained at regular intervals. The time limit for maintenance is set by the manufacturer and applies to the general conditions of use. The manufacturer should be consulted if the system is to be used with corrosive and/or abrasive pumped liquids, as the time limit between inspections may need to be reduced.

Note the following information:

- The operating and maintenance manual must be available to the maintenance personnel and its instructions followed. Only the repair and maintenance measures listed here may be performed.
- All maintenance, inspection and cleaning work on the machine and the system may only be carried out by trained specialists exercising extreme care in a safe workplace. Proper protective clothing is to be worn. The machine must be disconnected from the electricity supply before any work is carried out. There must be no way that it can be inadvertently switched on.
- Above a weight of 100lbs, only hoisting gear which has been officially approved and which is in a technically perfect condition should be used for lowering and raising the machine.

**Make sure that all fastening devices, ropes and safety devices are in a technically perfect condition. Work may only commence if the auxiliary hoisting gear has been checked and found to be in perfect working order. If it is not inspected, danger to personnel may result!**

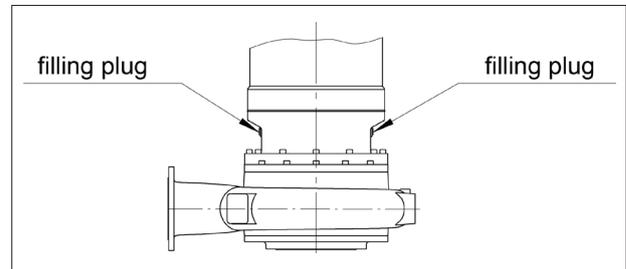
- Wiring work on the machine and system must be carried out by an electrician. For machines approved for work in areas subject to explosion danger, please refer to the "Explosion protection in accordance with the regulation" chapter.
- When working with inflammable solvents and cleaning agents, fires, unshielded lighting and smoking are prohibited.
- Machines which circulate fluids hazardous to health, or which come into contact with them, must be decontaminated. It must be ensured that no dangerous gases can form or are present.
- Ensure that all necessary tools and materials are available. Tidiness and cleanliness guarantee safe and problem-free operation of the machine. After working on the machine all cleaning materials and tools should be removed from it. All materials and tools should be stored in an appropriate place.
- Operating supplies such as oil and lubricants must be collected in appropriate vessels and properly disposed. Appropriate protective clothing is to be worn for cleaning and maintenance jobs. Only lubricants expressly recommended by the manufacturer may be used. Oils and lubricants should not be mixed. Only use genuine parts made by the manufacturer.

**A trial run or functional test of the machine must be performed as instructed in the general operating conditions.**

**Oil type:** white mineral oil. Used oil is to be disposed accordingly.

When using white mineral oil, note the following:

- Machines which have previously been operated using other lubricants must first be thoroughly cleaned before they can be operated using white mineral oil.



### 6.2. Maintenance intervals

**Before initial start-up or after a longer period of storage:**

- Check insulation resistance
- Check oil level in seal chamber
- Check that impeller rotates freely by hand

**Monthly:**

- Monitor the amperage and voltage
- Check the used relays for proper operation

**Every six months:**

- Visual inspection of the power supply cable
- Visual inspection of the cable holder and the cable bracing
- Visual inspection of accessories, e.g. the suspension device and hoisting gears

**8,000 operating hours or after two years, whichever is earlier:**

- Check the insulation resistance
- Check the lubricant in the seal chamber
- Functional inspection of all safety and control devices

**15,000 operating hours or after five years, whichever is earlier:**

- General overhaul

**If it is used in highly abrasive or corrosive material, the maintenance intervals should be reduced!**

### 6.3. Maintenance tasks

**Monitoring the current consumption and voltage**

The current consumption and voltage is to be monitored periodically for all winding phases. This remains constant during normal operation. Slight fluctuations are a result of the composition of the pumped fluid. The current consumption can assist in early detection and correction of damage and/ or faulty operation in the impeller/propeller, bearings and/or the motor. More extensive resulting damage can thus be largely prevented and the risk of a total failure can be reduced.

### Checking the used relays for resistors, oil chamber monitors, etc.

Check the relays used are functioning fault-free. Defective devices must be immediately replaced, because these cannot ensure safe operation of the machine. The test procedure details should be followed closely (in the operating instructions for each relay).

### Checking the insulation resistance

To check the insulation resistance, the power supply cable must be disconnected. The resistance can then be measured with an insulation tester (measuring voltage = 1000V DC).

The following values may not be exceeded:

- The insulation resistance may not be below 20 M $\Omega$  during initial operation. For all further measurements the value must be greater than 2 M $\Omega$ .
- Insulation resistance too low: Moisture may have penetrated the cable and/or the motor.

**Do not connect the machine, consult manufacturer!**

### Visual inspection of power supply cables

The power supply line must be examined for bubbles, cracks, scratches, chafed areas and/or crushed sections. If damage is found, the power cable must be exchanged immediately.

**The cables may only be changed by the manufacturer or an authorized/certified service workshop. The machine may not be used again until the damage has been adequately rectified.**

### Visual examination of the cable holders (carabiners) and the cable bracing

When the machine is used in basins or pits, the lifting cables/cable holders (carabiners) and the cable bracing are subject to constant wear. Regular inspections are necessary in order to prevent the lifting cables/cable holders (carabiners) and/or cable bracing from wearing out and to prevent the electricity cable from being damaged.

**The lifting cables/cable holders (carabiners) and the cable bracing are to be immediately replaced if any signs of wear appear.**

### Visual inspection of accessories

Inspect accessories such as suspension units and hoisting gear to check whether they are secured in a stable manner. Loose and/or defective accessories should be repaired immediately or replaced.

### Oil Level check in Seal Chamber

#### Visual Inspection of Oil Chamber:

##### Oil Level

Please take the precise filling quantity from the spare parts list or contact the manufacturer with the pump serial number.

##### Oil Condition

The condition of the mechanical seals can be visually inspected as follows: Put the pump in horizontal position, so that the oil chamber drain plug is on top. Remove the drain plug and take out a small quantity of oil. The oil becomes greyish white like milk if it contains water.

This may be the result of defective shaft seals. In this case the condition of the shaft seals should be checked by a HOMA Service shop. Oil type: Mineral Oil.

Used oil has to be disposed according to the existing environmental rules and regulations.

### Functional inspection of safety and control devices

Monitoring devices are temperature sensors in the motor, oil chamber monitors, motor protection relays, overvoltage relays, etc.

Motor protection and overvoltage relays and other trip elements can generally be triggered manually for test purposes. To inspect the oil chamber monitor or the temperature sensor, the machine must be cooled to ambient temperature and the electrical supply cable of the monitoring device in the switch cabinet must be disconnected. The monitoring device is then tested with an ohmmeter.

The following values should be measured:

**Bi-metal sensor:** Value = "0" - throughput

**PTC sensor:** A PTC sensor has a cold resistance of between 20 and 100  $\Omega$ . For 3 sensors in series this would result in a value of between 60 and 300  $\Omega$ .

**PT 100 sensor:** PT 100 sensors have a value of 100ohms at 0°C. Between 32°F and 212°F this value increases by 0.214  $\Omega$  per 1°F. PT 20 sensors have a value of 107.7  $\Omega$  at 68°C.

**Moisture sensor:** This value must approach infinity. If there is a low value, there may be water in the oil.

Also observe the instructions of the optionally available evaluation relay.

**In the case of larger deviations, please consult the manufacturer.**

Please consult the appropriate operating manual for details on inspecting the safety and monitoring devices on the auxiliary lifting gear.

### General overhaul

During this the bearings, shaft seals, O rings and power supply cables are inspected and replaced as required in addition to normal maintenance work. This work may only be conducted by the manufacturer or an authorized service workshop.

### Changing the oil

The drained oil must be checked for dirt and water content. If the oil is very dirty and shows water intrusion, it must be changed again after four weeks. If there is again water in the oil then, it seems likely that a seal is defective. In this case, please consult the manufacturer. If an oil chamber or leakage monitoring system is being used, the display will light up again within four weeks of changing the oil if a seal is defective.

**The general procedure for changing oil is as follows: Switch off the machine, let it cool down, disconnect it from the power supply (have this done by an electrician), lock out tag out the control panel, clean it and place it vertically on a solid base. Warm or hot oil may be pressurized. The leaking oil may cause burns. For that reason, let the machine cool down to ambient temperature before you touch it.**

## 6.4. Sealing chamber

As there are several versions and designs of these motors, the exact location of the screw plugs varies depending on the pump unit used.

- Slowly and carefully remove the filling plug from the seal room.

### Caution: The oil may be pressurized!

- Remove the drain plug. Drain the oil and collect it in a suitable reservoir. Clean the drain plug, fit with a new sealing ring and screw it in again. For complete drainage, the machine must be slightly tipped on to its side.

### Make sure that the pump is on its side and secure!

- Fill lubricant by means of the opening in the filling plug. Comply with the specified lubricants and filling quantities.
- Clean the filling plug, fit with a new sealing ring and screw it in again.

## 7. Repairs

### 7.1. General

When carrying out repair work, the following information should always be noted:

- Round sealing rings as well as existing seals should always be replaced.
- Screw fixings such as spring washers should always be replaced.
- The correct torques must be observed.



In general, the following applies to repairs: Switch off the machine, disconnect it from the power supply (have this done by an electrician), clean it and place it on a solid base in a horizontal position. Secure it from falling over and/or slipping.

En général, les dispositions suivantes s'appliquent aux réparations :

Éteindre la machine, la débrancher du réseau électrique (faire appel à un électricien), la nettoyer et la placer sur une base solide en position horizontale. Éviter qu'elle ne tombe et/ou ne glisse.

If not otherwise stated, the torque values of the below tables should be used. Values stated are for clean, lubricated screws. Fixing torque [ft lbs] for screws A2/A4 (Coefficient of friction = 0.2)

	<b>A2/A4, Hardeness class 70</b>	<b>A2/A4, Hardeness class 80</b>
	DIN912/DIN933	DIN912/DIN933
M6	5 ft lbs	9 ft lbs
M8	12.5 ft lbs	21 ft lbs
M10	24 ft lbs	43 ft lbs
M12	42 ft lbs	73.5 ft lbs
M16	103 ft lbs	180.5 ft lbs
M20	201.5 ft lbs	364.5 ft lbs

### 7.2. Changing the impeller and volute

#### Changing the impeller and the volute.

- Loosen and remove the screws holding the volute to the oil chamber.
- Secure and remove the volute from the oil chamber with suitable equipment, e.g. hoisting gear. Place on a secure base.
- Fasten the impeller with suitable equipment, loosen and remove the impeller fastening (cylindrical screw with socket hex).

#### Pay attention to the locking screw!

- Remove the impeller from the shaft using a suitable extractor.
- Clean the shaft
- Attach a new impeller to the shaft.

#### Make sure that the sliding surfaces do not become damaged!

- Screw a new impeller bolt and clamping disk back onto the shaft. Fasten the impeller and tighten the impeller bolt. See table below for torque values.
- Place the motor assembly with impeller back onto the volute and fasten it with screws.
- It must be possible to turn the impeller by hand.

<b>Impeller Bolt Size</b>	<b>Torque</b>
10mm	35 Nm / 26 ft lb
12mm	61 Nm / 45 ft lb
16mm	146 Nm / 108 ft lb
20mm	285 Nm / 210 ft lb

#### Changing wear ring

The stationary and rotating wear rings determine the gap between the impeller (rotating wear ring) and the suction port (stationary wear ring). If this gap is too big, the performance of the machine decreases, and/or it can lead to ragging or clogging. If the stationary ring shows signs of wear, it should be replaced. This minimizes wear on the suction port and impeller, consequently reducing expense for spare parts.

**Only OEM Parts may be used for replacement!**