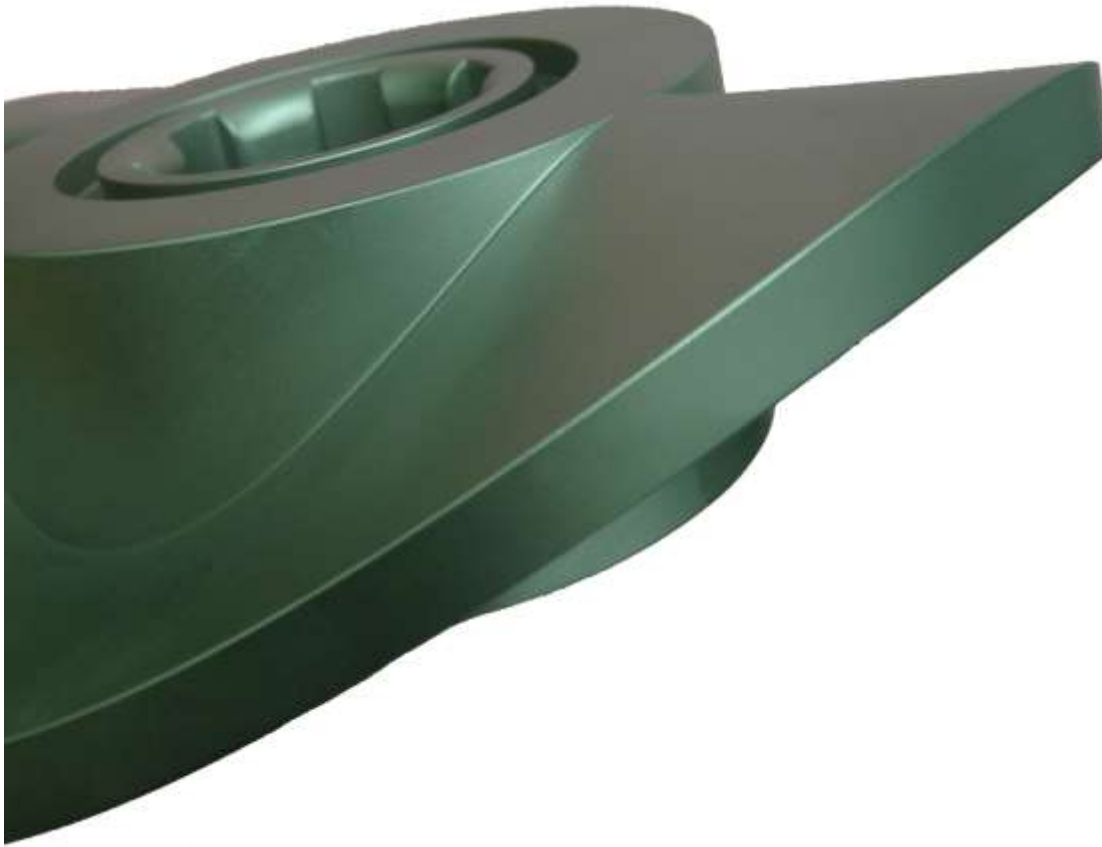


Manual - Technical Documentation



Watson-Marlow MasoSine – Pump

SPS 600

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Technical datasheet

Please remove all technical information from the delivery note.

For spare parts ordering refer to software component list.

If you have problems to identify parts, please refer the drawing and parts list. In case of any questions please contact the Technical Support.

1 General

The operating instructions apply for the **Watson-Marlow MasoSine** Pump :

SPS 600

The operating instructions must be read before installing the pump. Please observe the safety instructions and the safety regulations.

2 Purpose

The purpose of your pump is defined exactly in the delivery note. The ATEX certification becomes null and void following any changes to the purpose, including changes to components and materials. This is why you should always consult the manufacturer first!

3 Functioning principle

The functioning principle of the **Watson-Marlow MasoSine** is ingeniously simple. The pump consists of modular components. Because of the sinusoidal form of the rotor, a chamber through which the product to be pumped is „pushed through“ or displaced is created four times per revolution when running through the stator space.

As soon as a chamber closes, the opposite chamber opens by the same fraction of a millimeter as the closing chamber is contracted.

A suction and pressure characteristic of the pump free of pulsation results. The scraper prevents the pressure compensation of the pressure to the suction side. At the same time the scraper undertakes the important function of forced lubrication of the pump bearings, or when the pump is cleaned the intensive purging of the bearing or of the seal.

4 Safety instructions

4.1 Basic safety instructions

A basic requirement for safe handling and troublefree operation of this machine is knowledge of the basic safety instructions and of the safety regulations.

These operating instructions contain the most important instructions to operate the machine safely.

These operating instructions, especially the safety instructions, must be observed by all persons who work on the machine.

Moreover the rules and regulations for accident prevention applicable at the place of use must be complied with.

The following safety instructions must be observed absolutely.

They are an essential and indispensable part of the user documentation. Non-compliance can result in loss of warranty claims.

It is recommended in the interest of all involved to enter all installation measures, maintenance, fault and repair cases, training courses, instructions and special occurrences in a logbook assigned to the machine.

4.2 Safety symbols



Safety instruction which can cause danger for persons if not complied with



Safety instruction for electrical voltage



Safety instruction which can cause danger for the pump and its function if not complied with.

4.3 Obligation of the operator

The operator obligates himself to let only persons who are familiar with the basic regulations concerning working safety and accident prevention and are instructed in handling the machine, as well as have read, understood and confirmed by their signature the warning notes in these operating instructions to work on the machine.

The safety-conscious working of the personnel will be checked at regular intervals.

4.4 Organizational measures

The required personal protective equipment shall be provided by the operator.

All existing safety devices shall be checked regularly.

4.5 Obligation of the personnel

All persons who are authorized to work on the machine obligate themselves to observe the basic regulations concerning working safety and accident prevention before starting work, to read the safety chapter and the warning notes in these operating instructions and to confirm by their signature that they have understood these.

4.6 Training of the personnel

Only trained and instructed personnel may work on the machine. The responsibilities of the personnel shall be defined clearly for assembly, start-up, operation, setting, maintaining and repairing.

Personnel under training may work on the machine only under supervision of an experienced person.

4.7 Informal safety measures

The operating instructions must be kept constantly at the place of use of the machine. The generally valid as well as the local regulations for accident prevention and environmental protection shall be provided and observed in addition to the operating instructions. All safety and danger warnings on the machine shall be kept in legible condition.

4.8 Dangers when handling the machine

The **Watson-Marlow MasoSine** Pump is built according to the state of the art and the recognized safety engineering rules.

Nevertheless danger to life and limb of the user or third persons or impairments to the machine or to other assets can arise in its use.

The machine must be used only:

- for the intended use delivery note
- in perfect safety engineering condition.

Faults which can impair safety must be rectified immediately.

4.9 Safety measures in normal operation

Operate the machine only if all protective devices are fully functioning.

Before switching the machine on make sure that no one can be endangered by the starting machine.

At least once per shift inspect the machine for "externally detectable damage" and for functioning of the safety devices.

4.10 Protective devices

All protective devices must be attached correctly and functioning before every start-up.

Protective devices may be removed only

- after standstill **and** simultaneous protection against restarting the machine.

On delivery of part components the protective devices must be attached according to regulations by the operator.

If hot or cold machine parts can lead to danger, these must be protected by the operator on site against contact.

4.11 Dangers due to hazardous pumped material

In the case of hazardous pumped material (according to ArbStoffV) the corresponding regulations must be complied with.

4.12 Dangers due to electrical energy



Have work on the electrical supply performed only by an electrician. Check the electrical equipment of the machine regularly. Rectify loose connections and scorched cables immediately.

Keep the control cabinet closed always. Access is allowed only to authorized personnel with key or tool.

If work on parts conducting voltage is necessary, call in a second person who switches off the main switch if necessary.

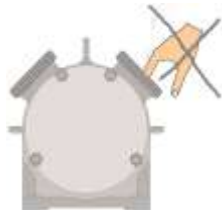
**If you make the electrical connection of the pump, act according to DIN EN 60204
Connect only by skilled personnel**

4.13 Dangers due to hydraulic energy

Only personnel with special knowledge and experience in hydraulics may work on hydraulic devices.

Relieve the pressure in system sections and pressure lines to be opened before starting repair work. Replace hydraulic hose lines at appropriate intervals, even if no safety-relevant defects are detectable.

4.14 Special danger points



Rotating rotor in the pump. Danger of crushing or cutting off fingers and hands.

The pump must be protected by the customer so that it is not possible for persons to grasp in the opening with the rotor running. In the case of work on the stationary rotor, the drive must be secured against unintentional switching on.

Increased danger exists with dismantled pipes and opened pump.

4.15 Constructional changes to the machine

Make no changes, attachments or conversions to the machine without approval of the manufacturer. All conversion measures require a written confirmation of the **Watson-Marlow MasoSine** company. Immediately replace machine parts in not perfect condition. Use only original spare and wearing parts. In the case of parts not obtained from **MasoSine** it is not guaranteed that they are designed and manufactured in compliance with load and safety requirements.

4.16 Noise of the machine

The continuous sound pressure level proceeding from the machine is max. 70 dB(A). A higher sound pressure level that causes noise deafness can arise depending upon the local conditions. In this case protect the operating personnel with corresponding protective equipment / protective measures.

4.17 Maintenance and repair, troubleshooting

Perform specified adjustment, maintenance and inspection work on time. Inform operating personnel before starting the maintenance and repair work. Protect all plant parts and operating media connected before and after the machine such as compressed air and hydraulics and similar against unintentional start-up. In all maintenance, inspection and repair work switch the machine free of voltage and secure the main switch against unexpected switching back on. Switch off the main switch and withdraw the key. Attach a warning sign indicating that the switch must not be turned on again. Fasten and secure larger assemblies on replacement carefully to lifting gear. Check loosened screw connections for firm seating. Use only original spare parts.



After ending the maintenance work check the safety devices for function.

4.18 Cleaning the machine

The bearings that are placed in the bearing housing of the pump wear off continuously which influences the run time. That is why both bearings should be replaced after a certain amount of working hours. (see table below)

	200 rpm	400 rpm	600 rpm
5 bar	10000 Std.	10000 Std.	10000 Std.
10 bar	10000 Std.	7238 Std.	4825 Std.
15 bar	3747 Std.	1873 Std.	1249 Std.

4.19 Cleaning the machine

Handle substances and materials used correctly, especially:

- when working on lubricating systems
- when cleaning with solvents.

4.20 Faults

In the case of operating faults switch off the machine and secure it against unauthorized or inadvertent starting up again.

4.21 Use as intended

The accurate intention is listed in the order confirmation.

Another use or use going beyond this is not as intended.

If you want to change the product, the pressure, the speed or the temperature, you must firstly consult the **Watson-Marlow MasoSine** company or one of our representatives.

5 Safety instructions (ATEX)

Watson-Marlow MasoSine - Pump used in production machinery with explosive mixtures will be equipped accordingly in the factory.

5.1 Safety signs

The following ATEX symbols are only given as an example.

The specific ATEX classification is printed on the nameplate and the certificate of conformance provided with every ATEX pump.

 Ex II 2G c IIB T4

 Ex II 2D c T=120°C



Grounding symbol

5.2 Pump classification

The pumps are only designed for jobs lasting several days and are therefore assigned to the Device Group II – Application field “dust – or gas – explosive areas”!

5.3 Zone classification

The **Watson-Marlow MasoSine** Pumps can be used in explosive areas of the zone 1 / 21. This corresponds to the category 2 G / D. It is expressly forbidden to use the pump(s) in the zone 0!

5.4 Classification of the ex-atmospheres

A distinction is made between dust and gas explosive atmospheres. In the model code, the atmosphere is abbreviated with G (Gas) and D (Dust). **Watson-Marlow MasoSine** Pumps are only designed for the explosive atmospheres **G** (Gas) and **D** (Dust)!

5.5 Ignition protection

Our pumps are subject to ignition protection "c" constructive safety according to the standard for "non-electric appliances for use in explosion-risk areas" EN 13463-5

5.6 Temperature classes

- EX II 2 G c IIB T4
- EX II 2 D c T=120°C

5.7 Limit values for the pump

The limit values for the pump (max. speed, max. pressure, max. temperature) are stated in the delivery note. These limit values must never be exceeded under any circumstances! This applies in particular when using a frequency converter. If the pumps are supplied without a drive, the following values apply!

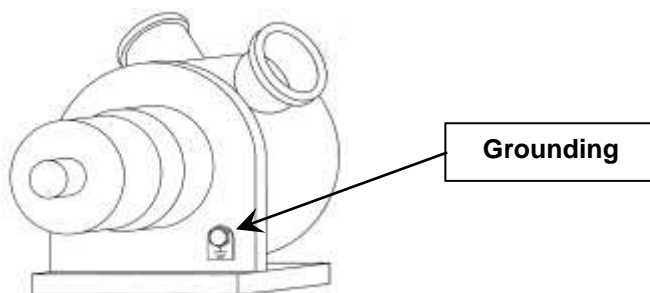
		SPS 600
max. Druck	*	15 bar
max. Drehzahl	*	600 UpM
max. Temperatur (T4) *		60°C
max. Temperatur (T3) *		120°C
Umgebungstemperatur		-12°C bis +40°C

5.8 Grounding the pump

All supplied pumps are equipped with a grounding option.

In particular in ex-areas, the pump must be grounded by fixing a grounding cable to the corresponding position (see diagram).

In addition to the grounding of the pump, the motor also needs to be grounded! If the drive is not grounded, the pump aggregate may not be operated.



5.9 Material properties

Plastic parts that are fitted inside the pump react more to temperature changes than stainless steel parts. For this reason, the specified maximum medium temperature ($T_m=100^\circ\text{C}$), for which the pump is designed, may not be exceeded. If the specified temperature is exceeded, this may cause a linear expansion and may block single components; this in turn could cause the pump to fail or could result in damage to parts of the pump. Also, excessive temperatures can accelerate the wear of dynamic parts and therefore reduce the lifespan of the plastic parts.

Corrosion may occur to the Power Frame of the pump if the paintwork is damaged. Corrosion represents a hazard for the use of pumps in explosive areas (for measures, see Troubleshooting Chap. 21).

5.10 Pressure Conditions

To avoid any over-pressure in the pump as a result of a closed pressure line, a pressure controller must be installed.

5.11 Maintenance / Repair

- The Filling of the pump is only permitted outside the explosion area. Tools that are used should be in compliance with ATEX.
- The pump aggregate always needs to be kept clean of dust with a damp cloth to prevent the dust from smouldering.
- The rinsing channels in the power frame must always be checked for blockages and if necessary cleaned.

5.12 Cleaning

Caution! No solvent cleaning agents may be used to clean the pump as this could create an uncontrollable explosive atmosphere.

5.13 Medium to be pumped

Chemicals that are combustible below the temperature 120 degrees Celsius and Carbon disulphide must not be pumped.

5.14 Coupling

If the pump is used in an explosion-risk area, the pump must only be coupled to the drive by means of an elastic, positive coupling with ATEX certification, at least corresponding to the supplied pump. Chains, toothed belts, v-belts or similar equipment which may transmit radial forces on the bearings should not be used.

5.15 Drive

Any preceding reduction gears and/or control units must have the corresponding ATEX certification, at least corresponding to the supplied pump. Combustion engines must never be used!

For operation with a frequency converter, this must either be installed outside the ex-zone, or have the same ATEX certification corresponding to the delivered pump. In any case the converter must have the properties required for operation in ex-zones, for example, temperature monitoring, speed limitation, etc.

6 Warranty and liability

Basically our "General sales and delivery conditions" apply. These are available to the operator at the latest since conclusion of the contract.

Warranty and liability claims for personal and material damage are excluded if they are attributable to one or several of the following causes:

- Use of the machine not as intended
- Incorrect installation, operation and maintenance of the machine
- Operating the machine with defective safety devices or not correctly attached or not functioning safety and protective devices
- Non-compliance with the instructions in the operating instructions regarding
 - transport,
 - storage,
 - installation,
 - start-up,
 - operation, maintenance and setting of the machine.
- Unauthorized constructional changes to the machine
- Insufficient monitoring of machine parts subject to wear
- Incorrectly performed repairs
- Cases of catastrophe due to effect of foreign bodies and acts of God.

Watson-Marlow MasoSine grants no warranty on this documentation as well as no implicit warranties on customary quality and suitability for a certain application.

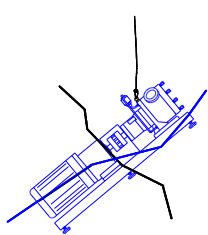
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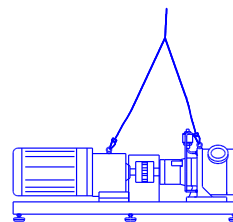
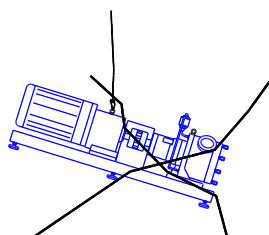
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7 Transport instructions

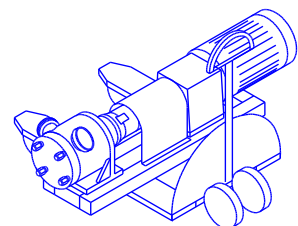
The choice of the means of transport is according to the size of the pump and of the drive. The pump must be suspended correctly for transport. The crane/forklift truck and the ropes/belts must be sufficiently dimensioned. If the pump is transported with a lift truck or a forklift truck, it must be noted that the console centre point is not automatically the centre of gravity.



wrong



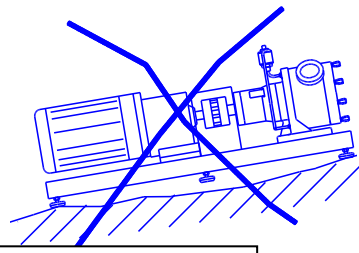
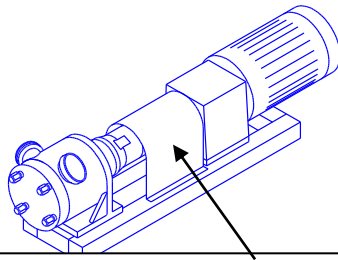
right



8 Installation

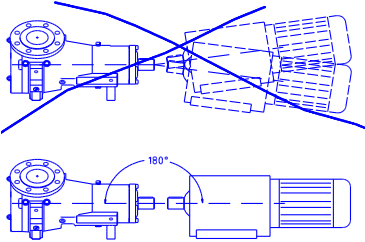


The motor shaft and pump shaft connection must be protected against contact!



wrong

DO NOT START WITHOUT PROTECTION AGAINST CONTACT!!



Place the pump on a level ground.
 Do not start without the protection against contact!!
 The foundation should be dimensioned sufficiently for the weight of the pump.
 There should be sufficient space for maintenance work around the pump.
 It must be guaranteed that the motor receives an adequate air supply.
 If the pump is used in explosion endangered rooms, an Ex protected motor must be used.
 The total unit must be protected against static charge.
 Align the shaft of the pump with the shaft of the drive.

9 Connection to the piping

CAUTION

Before connection clean the piping and remove foreign bodies.
 (e.g. there can still be residues in the pipes due to welding work).

CAUTION

Fit elastic intermediate members (compensators) between pump and fixed piping on the suction and pressure side. This should prevent vibrations of the pump being transmitted to the piping system.

CAUTION

Forces and torques acting from the piping on the pump connections (e.g. due to distortion, expansion due to temperatures etc.) must be avoided.

CAUTION

The pressure line should point upwards, so that later residual liquid can always flow back into the pump. Thus total dry running is avoided. Further it facilitates the later suction process.

CAUTION

The operator has to ensure that an inadmissible pressure rise (above the pressure agreed in the order and listed in the technical data) is not possible.

CAUTION

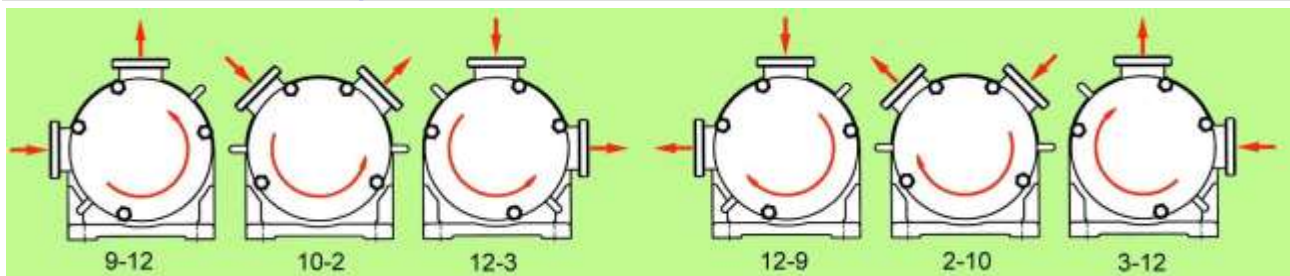
The **Watson-Marlow MasoSine** pumps normally run with such a low resonant frequency that no corresponding damage is caused. However, particularly when running with converters, certain frequencies can cause interfering vibrations which must be avoided. It is important during initial commissioning to ascertain whether such vibrations exist and to define them accordingly, so that the frequency converter can then be programmed to avoid these frequencies. Similarly, interference from cavitation or rigid lines must be ruled out.

CAUTION

The operator has to ensure that the pump can work free of cavitation.

Cavitation destroys the pump

10 Possible connection positions



Counterclockwise rotation of the rotor and motor

Clockwise rotation of the rotor and motor

Unless otherwise ordered, the pump is delivered in position 10 - 2

11 Changing the connection position



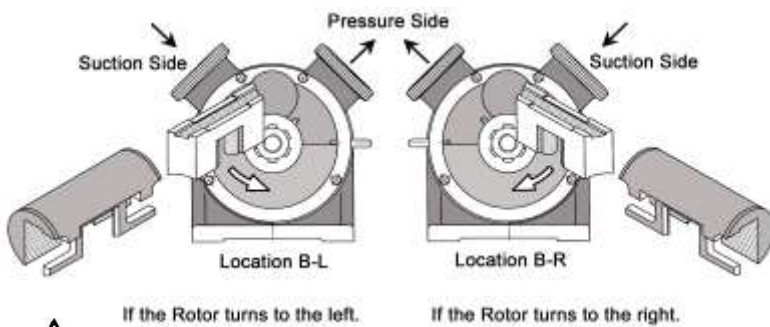
Remove the screws on the bearing block. Turn the housing by an angle of 45° to the left or right. Tighten the screws again. **(with 45 Nm)**

However, take care that due to the corresponding arrangement of the pressure line in the pump, a certain residual amount remains. By this measure you make it easier for the pump to draw in highly viscous products. However, in the case of horizontally lying pressure connection you must absolutely take care that the pressure line is run so that the pump is always covered with residual liquid. In this way total dry running is avoided.



When the nozzle orientation is changed, the motor must be protected against unintentional switching on!

12 Changing the direction of rotation



The suction or the pressure side changes on changing the direction of rotation of the drive. Then the **gate** and the **gate guide** must **absolutely** be turned, since otherwise the pump cannot bring its full output. If the direction of rotation is changed, the rotation direction arrows must be turned correspondingly. Further the suction or pressure connection must be marked. The set direction of rotation is stated by an arrow. The pump can run against the set direction only for a short time. It cannot build up more than 2 bar pressure if the direction of rotation is wrong.



Let the change of direction of rotation on the drive be made only by trained skilled personnel. The motor must be protected against unintentional switching on!

13 Important: Observe before start-up!

If you have performed cleaning or repair work or make the first start-up, check before start-up that all screws are correctly and completely tightened.



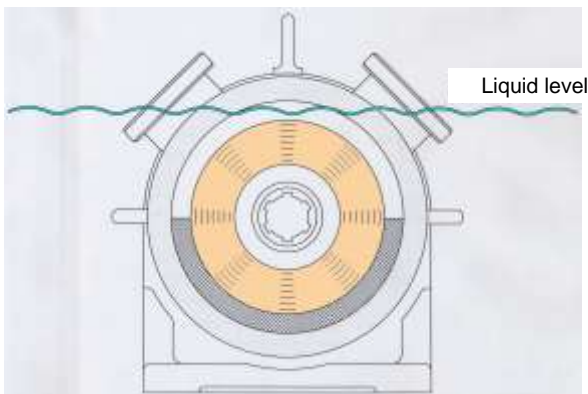
Observe the corresponding regulations in the case of hazardous pumped material (according to ArbStoffV).

The pump can possibly be contaminated by transport, therefore remove the front cover and clean if necessary before start-up.

Before you start up the pump, convince yourself once again that the gate and the gate guide are in the correct position in relation to the pressure side (see change of direction of rotation).

CAUTION

The operator must ensure that the pump is installed in an appropriate position with all necessary safety precautions (sensors, switches, pressure gauges, etc.)!



The pump must always be filled with the corresponding medium before commissioning and during operation, with the liquid level above the rotor (see diagram). The filling of the pump should be done outside the combustible area.

When the pump runs dry, the temperature limit for the explosive area is exceeded!



The motor must be connected by an expert according to DIN EN 60204.

CAUTION

Make sure before start-up that all valves on the pressure and suction side are open. The pump may not pump against a closed valve without overpressure valve.

CAUTION

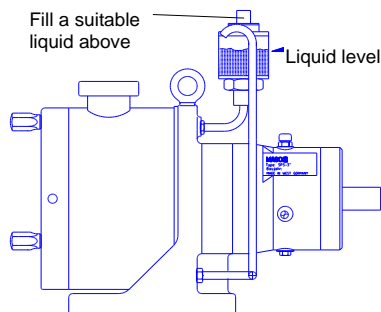
If the pump leaks, end operation as quickly as possible to replace the damaged sealing elements.

CAUTION

The operator must ensure that the pump can work free of cavitation.
Cavitation destroys the pump.

14 Purging

- The purging medium must correspond at least to the quality of pure drinking water. Under no circumstances may it be contaminated by particles (sand or other dirt). This would automatically lead to failure of the seals. We also recommend using transparent plastic pipes as purging piping.
- Purging should be without pressure, i.e. the purging water running out should run out from the purging system without pressure (thumb test: it must be possible to stop water with the thumb).
- To protect the pump against running dry, fill this with some water, possibly through a separate filling valve fitted on the suction or pressure pipe.



14.1 Static purging device

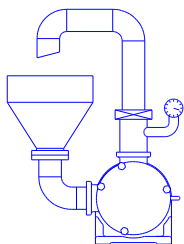
Before start-up you must fill the purging device (if also ordered) with a suitable purging liquid (depending upon the product to be pumped). The purging liquid is filled into the sight glass above through the folding lid until the liquid level in the sight glass is just below the bent outlet of the pipe.

The pump is rinsed without pressure, e.g. the draining rinsing water should be allowed to drain out of the system without pressure (thumb test: it must be possible to stop the water with your thumb).

15 Cleaning

All **Watson-Marlow MasoSine** Pumps are fully capable of CIP cleaning. Please observe our CIP cleaning regulations.

15.1 Cleaning in own circuit with water, alkali, acid

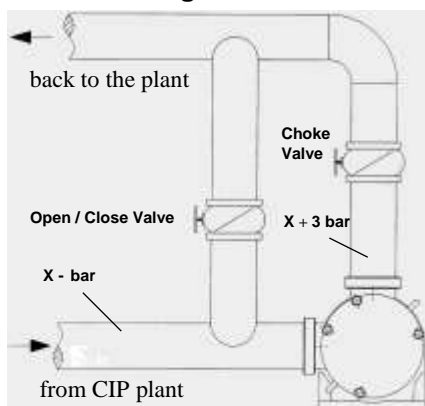


- Set control gear to maximum speed (at least 400 rpm).
- Choke after the pump so that a counterpressure of 3 to 4 bar arises.
- Should the required cleaning effect not be achieved after this process, it is necessary to dismantle the pump. This is done in a few minutes as described in detail in the operating instructions.

Manual cleaning of the pump can be performed after complete dismantling of the pump.

Pay attention to parts sensitive to breakage!!

15.2 Cleaning in the CIP circuit



1. Purging surge

Open the choke valve and let the **Watson-Marlow MasoSine** Pumps run with maximum speed to perform the first rough cleaning.

2. Purging

Set the choke valve so that the pressure side of the pump is at least 3.0 bar higher than the suction side.

Open the open/close valve to guarantee cleaning of the series connected devices.

15.3 Manual cleaning

Manual cleaning of the pump can be performed after complete dismantling of the pump.
Pay attention to parts sensitive to breakage!!



If the pump is stopped during the process and opened for the purpose of cleaning or checking, the responsible fitter or electrician must be notified to undertake suitable measures so that the pump cannot be put into operation (remove fuses, notify electrician).



The pump may also never be put into operation if the housing cover is removed. Should the pump not yet be connected to the piping system, then reliable care must be taken that the drive machine cannot be switched on.
Observe the accident prevention regulations!!

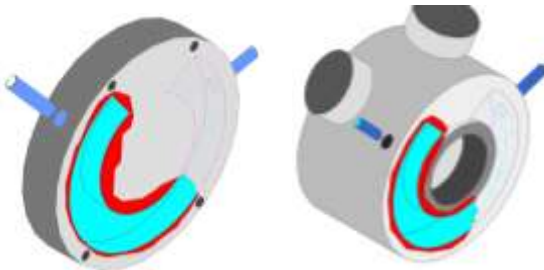
15.4 Sterilisation

Sterilization of the pump with standard equipment is possible **up to 110°C only in standstill!**
 In the case of special equipment of the pump or higher temperatures, please always firstly consult the manufacturer!

16 Heating / cooling

Front housing

Pump housing

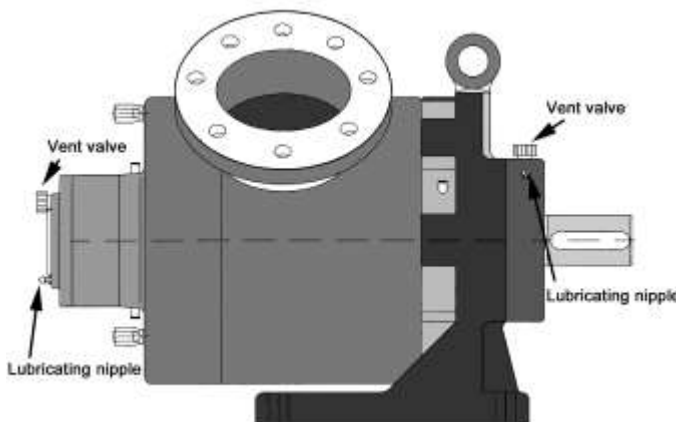


There is a crescent-shaped channel milled into the housing which is sealed later by a stainless steel plate. There are connections on two sides through which the heating or cooling agent flows. Counter-pressure should not exceed 1 bar. You can dictate temperature and pumping rate by the heating or cooling agent.

The cooling/heating agent should enter the system at the lowest point.

If a heater is to be used at the pump, the temperature must be clarified with the manufacturer!

17 Lubrication



The first filling with a corresponding grease lubricant (such as MOLYDUVAL Soraja C532, DIN 51502, +180°C to -20°C according to FDA Reg. 21CFR178.3570 or ESSO multipurpose grease NLGI K2-K30) is made at MASO. However, the filling amount should be checked regularly and replenished if necessary. For this purpose unscrew the vent valve and refill with grease through the lubricating nipple - until it escapes through the vent bore. **If the valve is not unscrewed before this process, damage to the radial shaft sealing rings cannot be ruled out!** After ending filling simply screw the vent valve back on!

18 Disposal

Send the used oil or used grease for recycling.

19 Spare parts

Basically repairs should be performed only by factory personnel or by customer service organizations authorized by the factory. If you perform the work yourself, observe the relevant safety regulations and contact the factory customer service before starting the work, especially if there are still warranty obligations that can be lost due to not approved interventions.

Only original **Watson-Marlow MasoSine** spare parts may be used.

You should record changes in the fixtures and fittings, for example another sealing system or a material change, in writing.

Please provide all information on orders:

- Pump number
- Material
- EDP number
- Quantity
- Article

Ask for our express delivery !

Watson-Marlow MasoSine

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 EMail : Info@masosine.com
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20 Taking out of service

20.1 Provisional taking out of service

Short-term:

Remove product residues (cleaning) ⇒ Switch main switch off ⇒ Clean pump surface

Longer-term:

Remove product residues carefully (cleaning) ⇒ Switch main switch off ⇒ Clean pump surface ⇒ Separate connections ⇒ Drain off static washing liquid ⇒ Loosen washing connections.

20.2 Final taking out of service

Separate the power and washing liquid supply. Send oils and greases for recycling.
If you send the remaining parts to us carriage paid, we will dispose of the parts.

Error	Cause	Remedy
<i>Pump does not draw in</i>	Direction of rotation not correct	Check direction of rotation
	No wetting liquid in the pump	Fill pump with liquid
	Screw fastening not tight	Check screw fastening
	Suction pipe too long	Adapt suction pipe
	Pipe cross-section too narrow	Adapt suction pipe
	Shaft seal leaking	Check all seals for damage
	Wear in the pump	Change wearing parts
	Motor speed not correct	Measure, regulate speed
	Gate and Gate Guide wrongly inserted	Check position (see changing direction of rotation)
<i>Pump does not deliver</i>	Direction of rotation not correct	Check direction of rotation
	Suction and pressure pipe confused	Check pipe system
	Motor speed not correct	Check speed based on output diagrams
	Wearing parts worn	Replace wearing parts
	Gate and Gate Guide wrong	Check position (see changing direction of rotation)
	Inserted closed gate valve	Check pipe system
<i>Pump is noisy</i>	Noises come from the drive	Consult Watson-Marlow MasoSine
	Noises come from the pump	Consult Watson-Marlow MasoSine
	Suction pipe too small (cavitation)	Shorten suction pipe or increase diameter, reduce speed
	Knocking noises from the pump head	Gate valve wear
	Noises from power frame	Fill oil, change tapered roller bearings
	Coupling not aligned	Align coupling with hairline
<i>Pump leaking at leakage hole</i>	Sealing system is leaking	Change seal faces, static / dynamic or lip seals
	O-ring seal leaking	Replace O-ring
	Radial shaft sealing ring on the power frame leaking, oil escapes	Dismantle power frame, replace lip seals
<i>Pump leaking at the front housing</i>	Housing seal not or wrongly installed	Install housing O-ring correctly or replace
	Housing seal defective	Install housing O-ring correctly or replace
<i>Pump has blocked</i>	Foreign body in the pump	Remove foreign body, examine pump for damage
	Power supply interrupted	Check electrical installations (fuses), check drive
	Defect on the drive	(Separate the coupling and turn the pump by hand)
<i>Strong wear after short operating time</i>	Solids in the pumped material	Frequent change of the wearing parts, change material pairing, reduce speed
	Pumped material is abrasive	

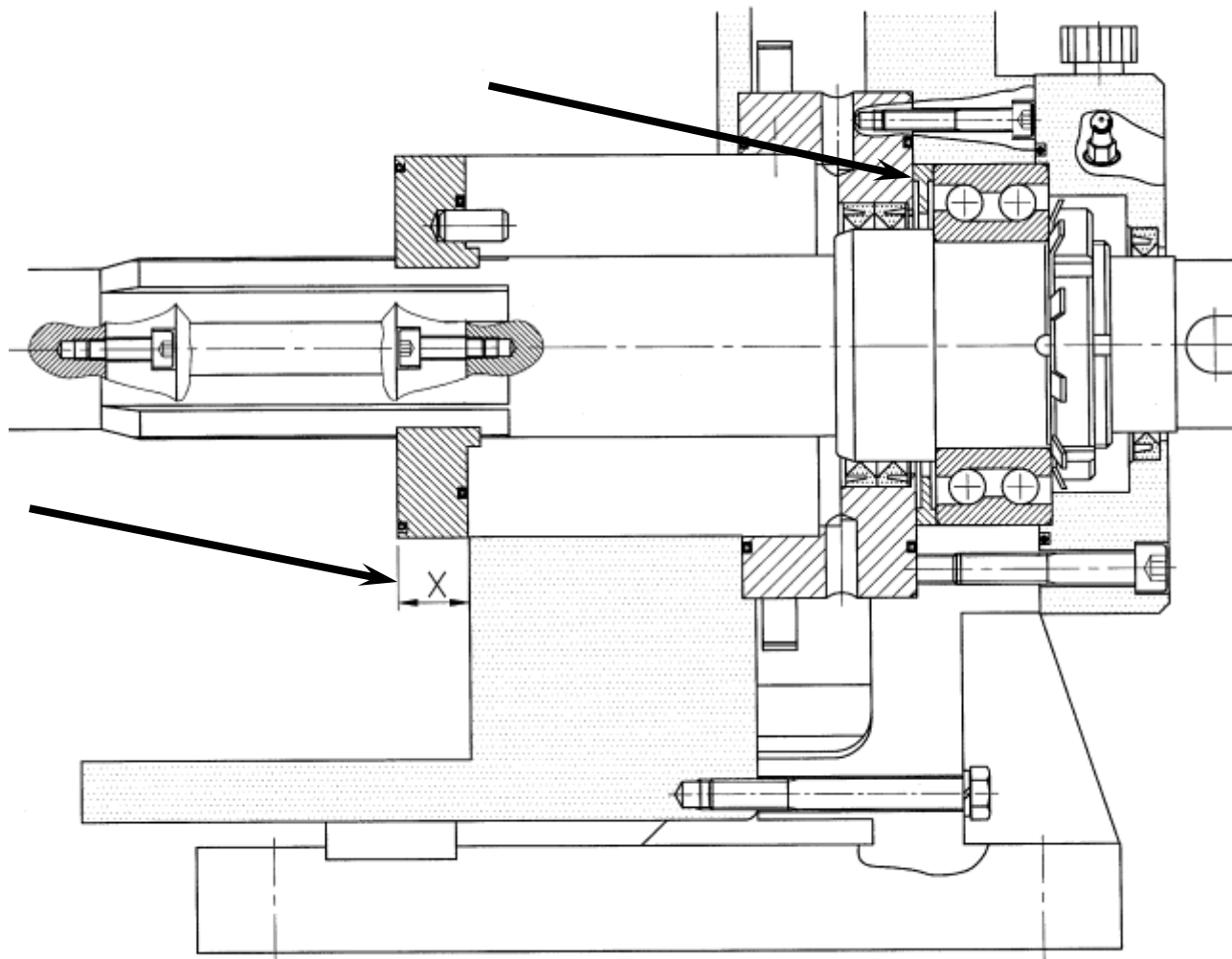
Error	Cause	Remedy
<i>Rotor has wear on one side</i>	Rotor not tightened correctly on installation	Tighten Shaft Nut firmly on block
	Adjusting dimensions changed after working on the Bearing Housing	Check and correct the adjusting dimensions SPS 600 = 27,5 mm + 0,1 mm
<i>Pump not clean after CIP cleaning</i>	Cleaning regulation not complied with	Choke on the pressure side Check differential pressure 3-4 bar
<i>Rotor has seized on Liner</i>	Rotor not correctly tightened	Tighten Shaft Nut firmly on block
	Temperature too high (thermal expansion)	Choose Liner with larger tolerances
<i>Purging between housing and Power Frame leaking</i>	O-ring in the power frame missing or defective	Install or replace O-ring
<i>Water or pumped material in the Bearing Housing</i>	Purging pressure too high	Purging must be pressureless (attach pressure reducer, max. 0.1 bar)
	Leakage bores closed	Check leakage bores for free passage, replace shaft seals on pump and power frame
<i>Front Support has seized on Rotor</i>	O-ring in the front bearing missing or worn	Install or replace O-ring
	Front bearing wrongly installed	Examine front bearing for damage and install in correct position
<i>Product is leaking from the Bearing Housing openings</i>	Sealing system in the pump is leaking	Inspect and if necessary replace the sealing system and clean the rinsing channels
<i>Pump aggregate subject to vibrations</i>	Speed of the (drive) motor is too high	Lower the speed of the (drive) motor
<i>Smells and smoke coming from the pump</i>	Pump is running dry	Stop the pump immediately. Check inner parts for damage and replace if necessary
<i>Corrosion</i>	Corrosion occurs	Eliminate corrosion and varnish or use spray oil

22 Setting dimension

The setting dimension of 27.5mm (see diagnostic aid) is measured at the place X.

If the dimension is too small, turn down on the setting ring.

If the dimension is too large, you should contact the factory and order a new setting ring.



23 Dismantling



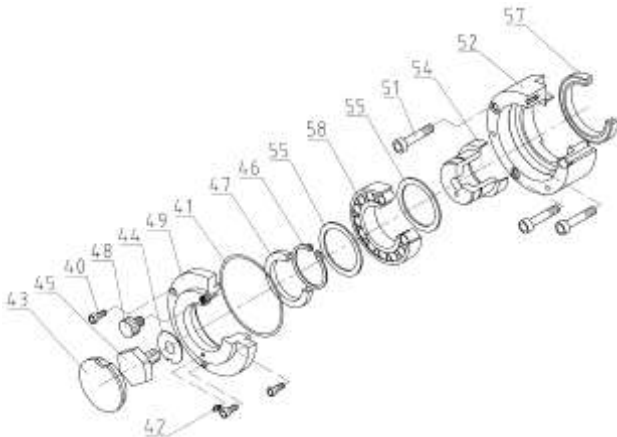
**Inform electrician!
Disconnect drive unit from mains!
Secure against being accidentally
switched back on!**

Undo the 3 cap screws Item 40 and remove the front bearing housing cover Item 49. Release the tabwasher Item 44.

Undo and remove the locking screw Item 45.

Undo the 3 cap screws Item 51 and remove them.

The front bearing housing Item 52 can then be pulled off the carrier shaft Item 24 together with the spacer sleeve Item 54.



Remove the flushing pipes from the flush ports. Undo and remove the lock nut Item 56 from the pump shaft.

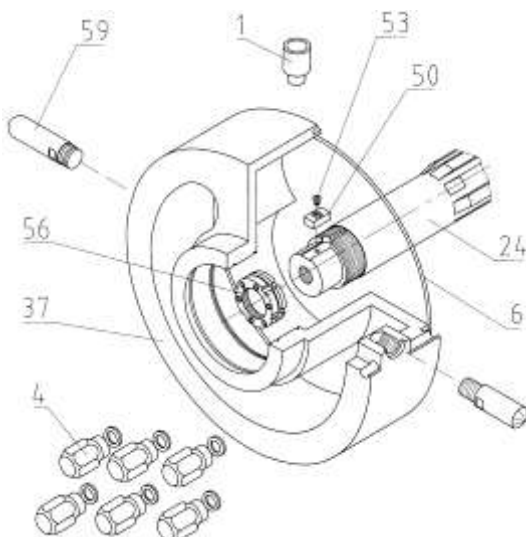
Undo and remove the 6 cap nuts Item 4, which hold the front cover to the pump housing.

Once the cap nuts have been removed, with the help of a second person you can remove the front cover from the pump housing, by pulling it off horizontally via the studs Item 38.

The two front cover pins Item 59 help you to grip the housing.



**Attention:
The front housing is very
heavy!!! (Approx. 60 kg)**



The innards of the pump are now in front of you. I.e., you can see the gate guide, the gate, the shaft sleeves, the rotor and the two halves of the liner.

ATTENTION!

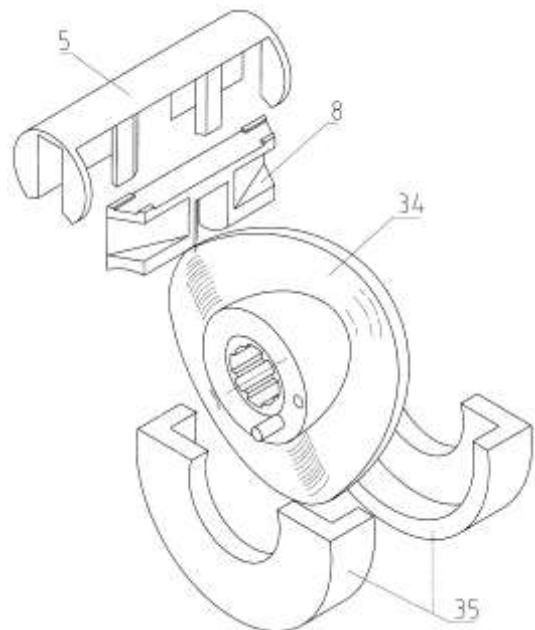
When dismantling please ensure that the pump parts, especially the internal parts and the seals are not damaged.

You can now pull off the complete front sealing system from the shaft. Remove the front half of the liner from the pump housing.

The rotor Item 34, the gate Item 8 and the gate guide Item 5 are pulled off the pump shaft Item 24, or the pump housing Item 32 as a single unit.



Here too you should have another person to help you, one person should protect the gate guide from falling and the other the rest.



The remaining parts and the second half of the liner can also be axially pulled from the shaft or the pump housing.

If you also want to replace the sealing fixture, or the lip seals, it might be necessary to unscrew the pump housing Item 32.

To do this you should use the special assembly tool from **Watson-Marlow MasoSine**.

**Attention: The pump housing
is very heavy and must not
fall onto the shaft!**



24 Assembly

The pump is assembled in exactly the reverse order. All parts of the pump now lie in front of the pump on a soft base. You see that dismantling was very easy. If you now start with the installation and assembly of the pump, please take care that the sealing lips of the lip seals are not damaged.

If you have the impression that the O-ring or indeed all other O-rings are damaged, replace these by new parts.

Push the rear half of the liner into the pump housing. The rotor, gate and gate guide are pushed as pre-assembled unit into the pump housing. Please note that the bore hole in the front of the rotor points towards you!

To simplify assembly we suggest that you apply a suitable oil or grease to the pump shaft. Push on the rotor sleeve coupling Item 36 so that the larger fixing pin engages in the bore hole of the rotor. Then push the shaft sleeve Item 74 onto the stop so that the fixing pin engages in the bore hole of the rotor sleeve coupling Item 36.

Remove the feather key Item 50 from the shaft.

Screw the lock nut Item 56 on the shaft stump and tighten this (with a special tool) with approx. 200 Nm, to guarantee axial clamping of shaft sleeve and rotor. For security tighten all screws in the lock nut with **2,5 Nm!**

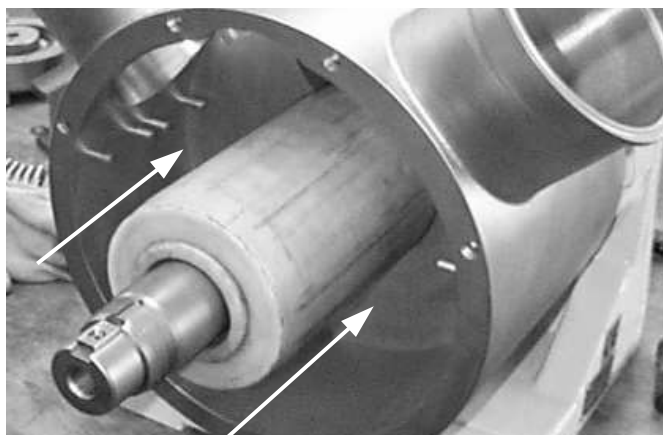
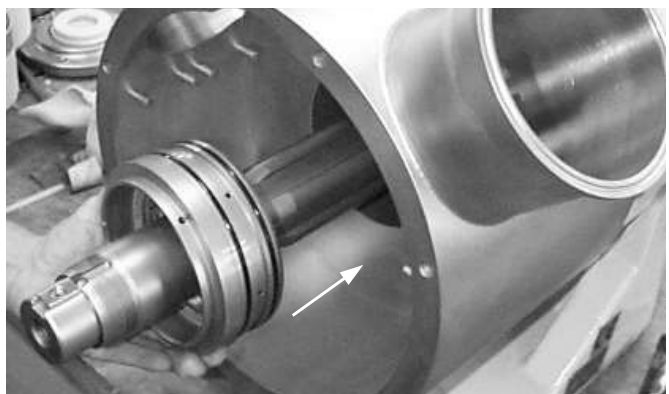
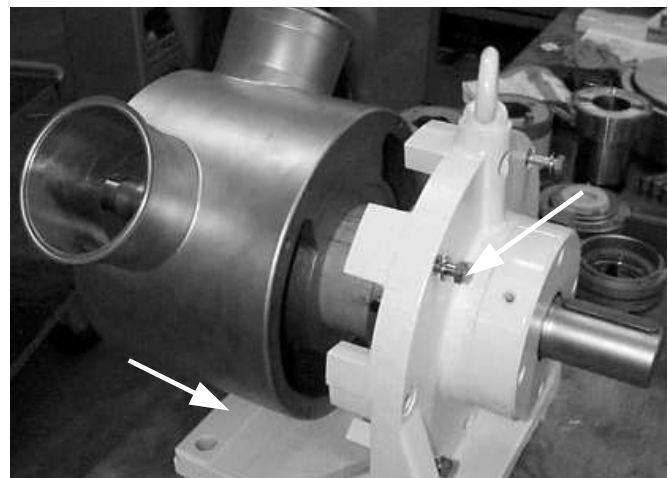
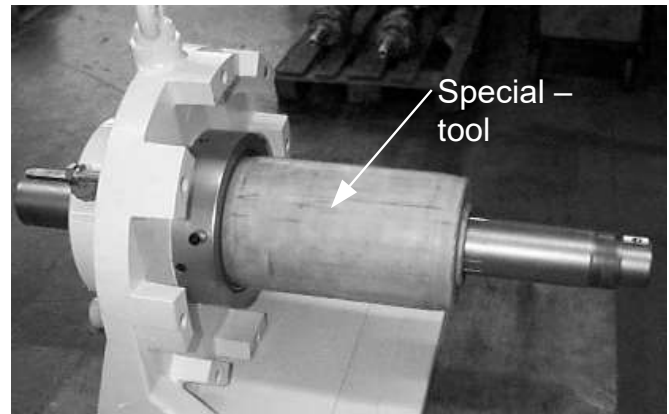
Caution! Refit the feather key No. 50 and screw this tight!

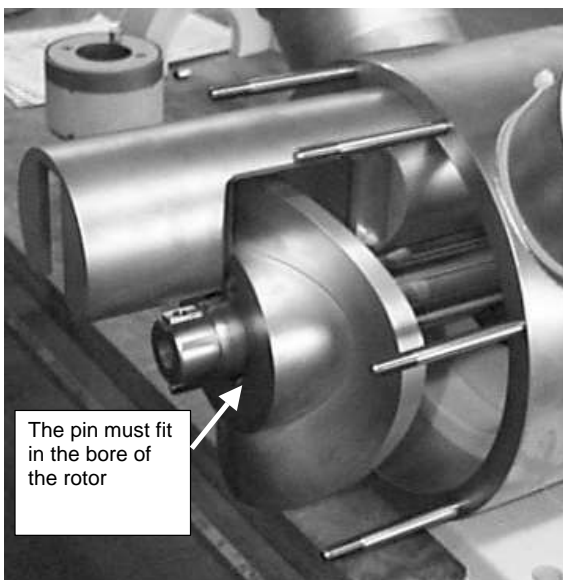
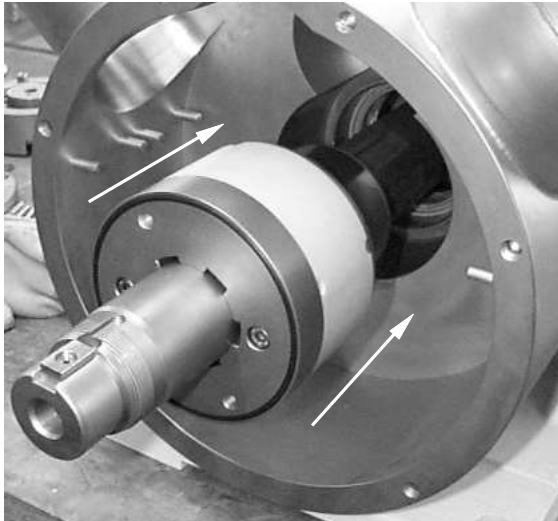
Push the second half of the liner up to the stop into the pump housing.

Push the front cover Item 37 (with sealing holder and sealing rings), guided by the studs, onto the pump housing. Take care that the housing gasket is in the correct position. Here as well if you think that the gasket is damaged, replace it! Screw the 6 cap nuts onto the studs and tighten these uniformly and firmly, so that the front cover is connected firmly with the pump housing.

Then push on the front bearing housing. Take care that the feather key screwed firmly in the shaft sits in the slot of the spacer sleeve provided for it!

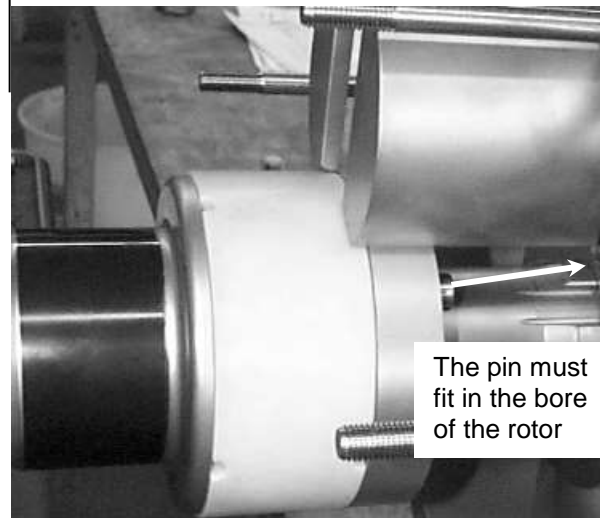
Tighten the 3 Allen screws, fit the front cover and tighten this firmly.





The pin must fit in the bore of the rotor

Push the rotor, the gate and the gate guide as one unit into the housing. Make sure that the gate guide and the gate are in the correct installation position. (Refer to the ROTATION DIRECTION CHANGE chapter)
The bore in the rotor must look to the front.



The pin must fit in the bore of the rotor

To loose the lock nut please do not fully unscrew all 12 screws

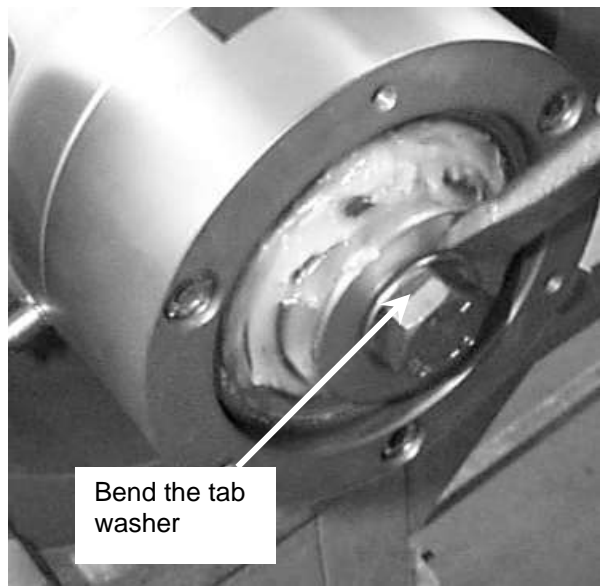
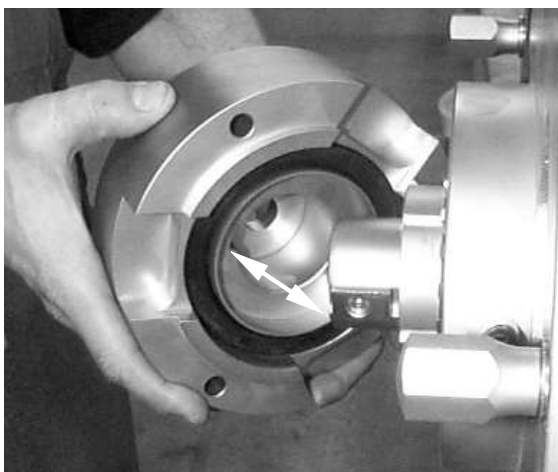
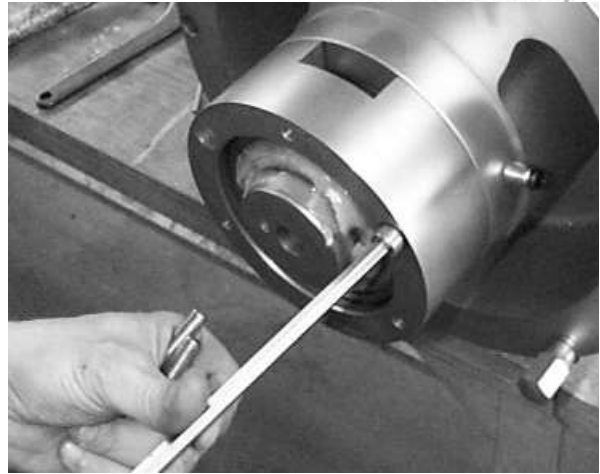


Cap screw

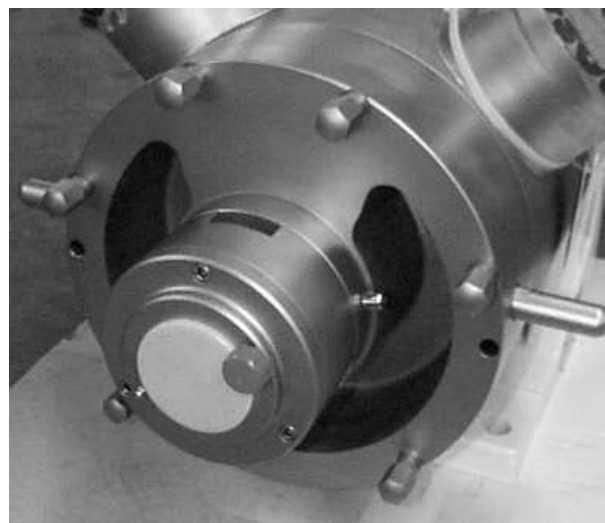
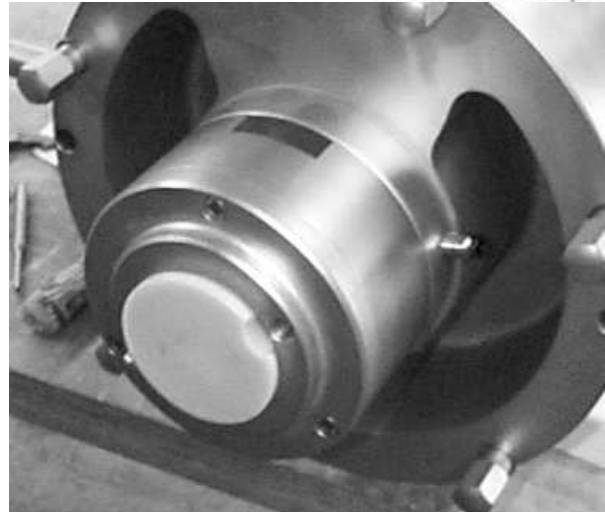
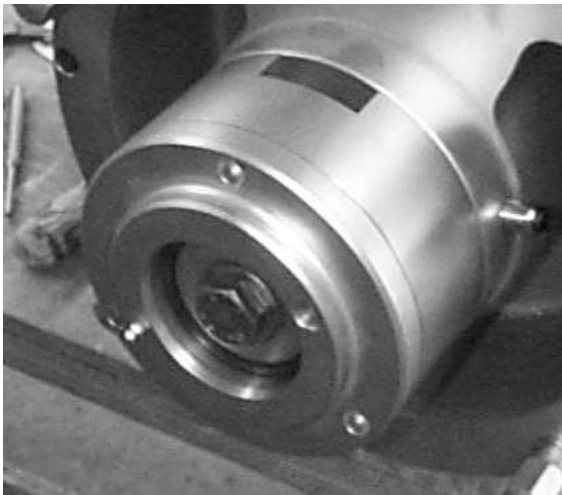
Optional tool S60-9006-25



The lock nut at pos. 56 is tightened with a special tool with a torque of 200 Nm. Then tighten all screws on the adjusting nut. (using a torque of brass: 2,5Nm, Stainless steel: 10 Nm)



Bend the tab washer



Please pay attention, that the O-rings are assembled completely and without defects !

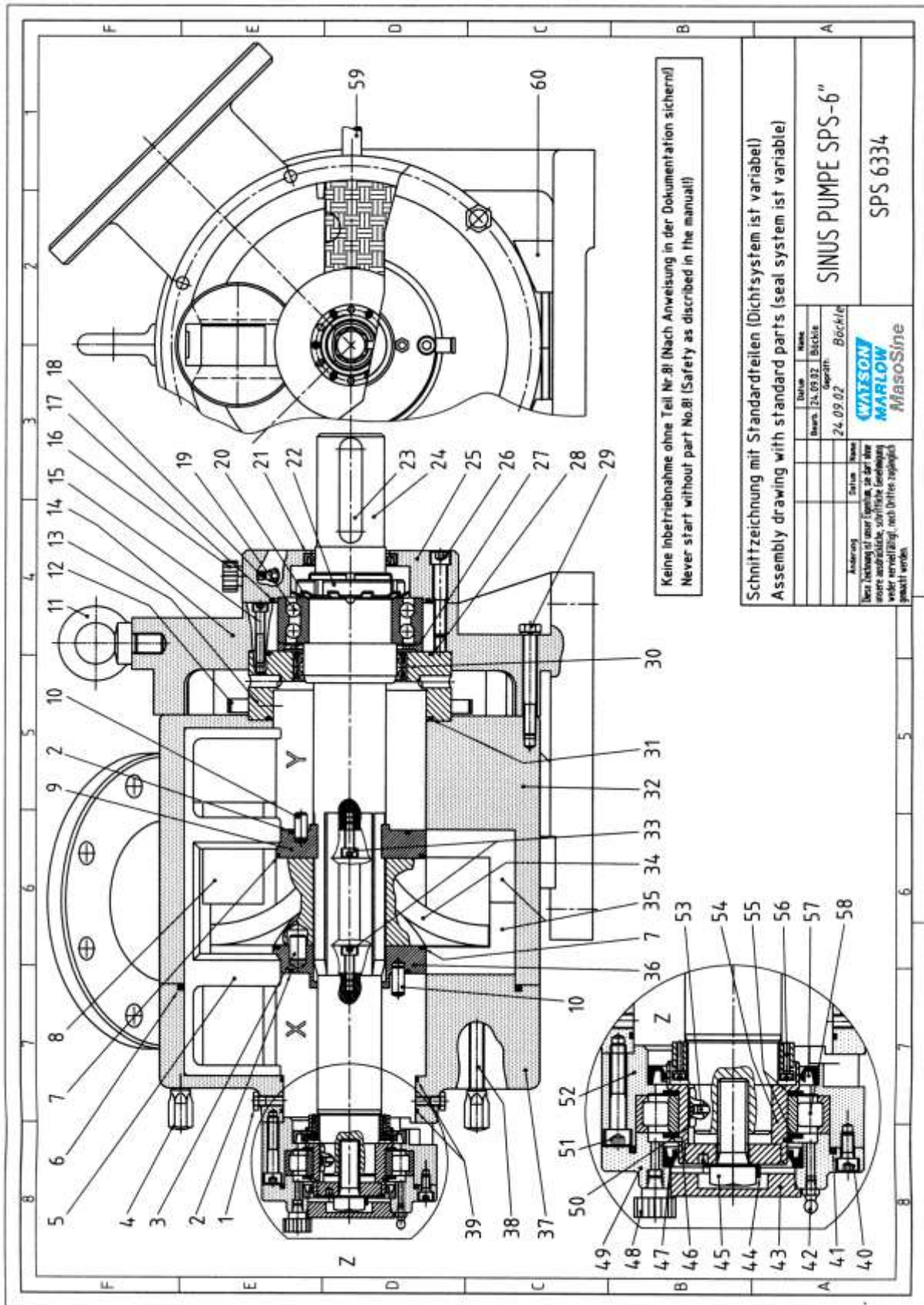
*If you have any questions, give us a call.
We will be pleased to help you.*

Watson-Marlow MasoSine

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25 Drawings and part list

25.1 Pump

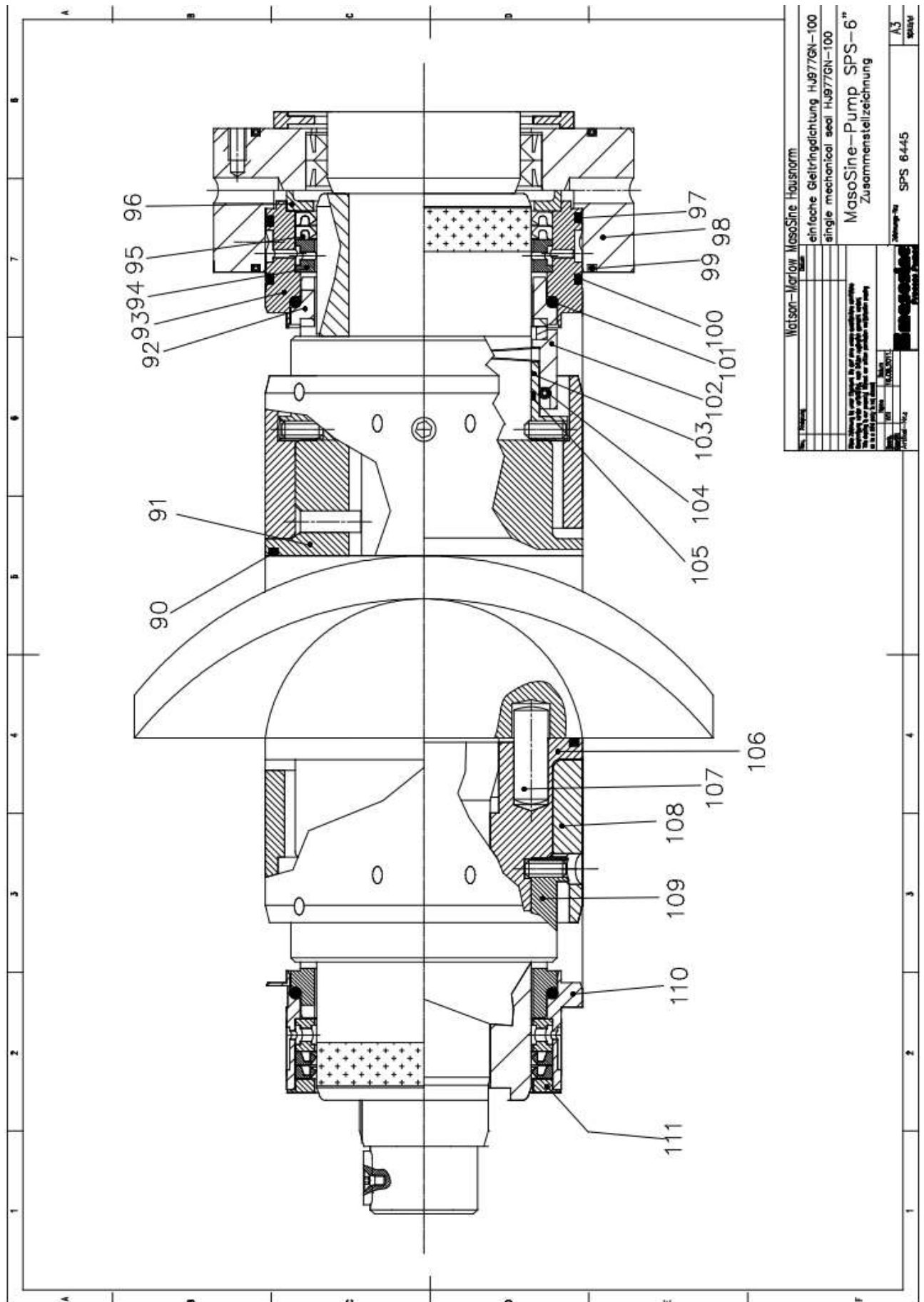


25.2 Part list of the pump

Pos	Qty	EDP-No.	Description	Pos	Qty	EDP-No.	Description
1	2	S60-9002-12	Threaded Plug	32	1	S60-0300-10	Pump Housing
2	2	S60-0622-__	O-ring	33	4	S60-0682-12	Cap Screw
3	1	S60-0601-10	Shaft Sleeve Pin	34	1	S60-0100-10	Rotor
4	6	S60-1600-12	Front Cover Cap Nut	35	2	S60-1200-__	Liner
5	1	S60-0700-10	Gate Guide	36	1	S60-0651-10	Rotor Sleeve Coupling, front
6	1	S60-1701-__	O-ring, Front Cover	37	1	S60-0200-10	Front Cover
7	2	S60-4100-__	O-ring	38	6	S60-1800-12	Front Cover Stud
8	1	S60-0400-__	Gate	39	2	S60-2500-__	O-ring
9	1	S60-0612-10	Rotor Sleeve Coupling, rear	40	3	S60-4700-12	Cap Screw
10	2	S60-0632-10	Pin	41	1	S60-4400-__	O-ring
11	1	S60-3900-25	Lifting Eye Screw	42	1	S60-1501-12	Grease Nipple
12	2	S60-0504-34	Flush Port	43	1	S60-9030-50	cover, shaft nut
13	1	S60-1305-10	Power Frame Spacer	44	1	S60-1002-12	Tabwasher
14	1	S60-1301-__	Power Frame	45	1	S60-1001-12	Cap Screw
15	4	80-0129-12	Cap Screw	46	1	S60-4600-25	Snap Ring
16	1	80-1521-50	Vent Valve	47	1	S60-1502-__	Lip Seal
17	1	S60-2901-__	O-ring	48	1	80-1521-59	Vent Valve
18	1	S60-1501-12	Grease Nipple	49	1	S60-1403-10	Front Bearing Housing Cover
19	1	S60-2600-25	Ball Bearing	50	1	S60-3201-10	Shaft Key, front
20	1	S60-2700-25	Tabwasher, Bearing Lock Nut	51	3	S60-4800-12	Cap Screw
21	1	S60-3100-__	Lip Seal	52	1	S60-1400-10	Bearing Housing, front
22	1	S60-2800-25	Bearing Lock Nut	53	1	S60-9000-12	Set Screw, Shaft Key (front)
23	1	S60-3202-25	Shaft Key, rear	54	1	S60-4500-10	Spacer Sleeve
24	1	S60-1000-16	Pump Shaft	55	2	S60-4501-10	Spacer Ring
25	1	S60-1500-__	Bearing Housing Cover	56	1	S60-5201-58	Lock Nut MS
26	4	S60-2900-12	Cap Screw	57	1	S60-1401-__	Lip Seal
27	1	S60-2310-20	Adjusting Ring	58	1	S60-2401-25	Cylinder Roller Bearing
28	1	S60-3700-__	O-ring	59	2	S60-5000-12	Front Cover Pin
29	4	S60-1900-10	Housing Mounting Bolt	60	1	S60-0310-30	Supporting Wedge
30	2	S60-2300-__	Lip Seal	X	1		Sealing System, front
31	1	S60-3700-__	O-ring	Y	1		Sealing System, back

Please ensure you quote the pump number when ordering spare parts! (See cover sheet or data sheet)

25.3 Sealing system „Mechanical Seal Assembly“

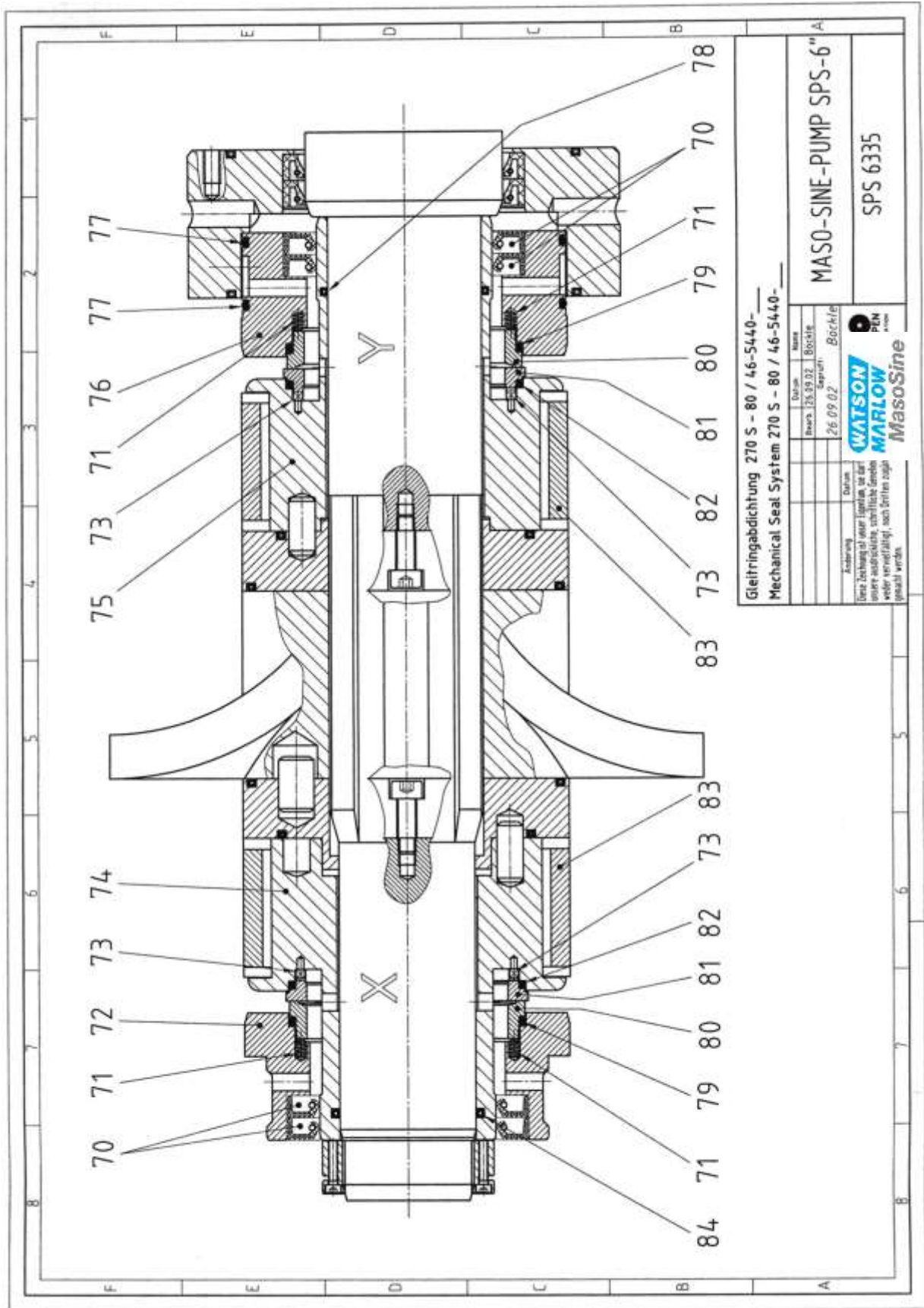


25.4 Parts list „Mechanical Seal Assembly“

Pos	Qty	Part No.	Description
90	2	S60-4100-__	O-Ring
91	1	S60-5106-10	Shaft sleeve, back, coated
92	2	S60-5123-41	Stationary seal ring
93	1	S60-5107-10	Stationary seal ring holder support, back
94	2	S60-0502-34	Backing ring
95	4	S60-0501-80	Radial shaft seal
96	1	S60-4900-34	Backing ring
97	1	S60-3700-__	O-Ring
98	1	S60-1305-10	Pump bracket frame-distance
99	1	S60-3700-__	O-Ring
100	2	S60-4100-__	O-Ring
101	2	S60-5110-__	O-Ring
102	2	S60-5122-41	Rotating seal ring
103	2	S60-5103-10	Pressure ring
104	2	S60-5108-__	O-Ring
105	2	S60-5109-__	O-Ring
106	1	S60-5115-10	Shaft sleeve, front
107	1	S60-0613-10	Tappet (pin)
108	2	S60-5500-__	Bearing for mechanical seal
109	4	80-0211-25	Pint
110	1	S60-5101-10	Stationary seal ring holder support, front
111	1	S60-0516-34	Distance (ring)

Bitte geben Sie unbedingt die Pumpennummer bei der Ersatzteilbestellung an! (siehe Deckblatt oder Lieferschein)

25.5 Sealing system „Mechanical Seal Assembly“

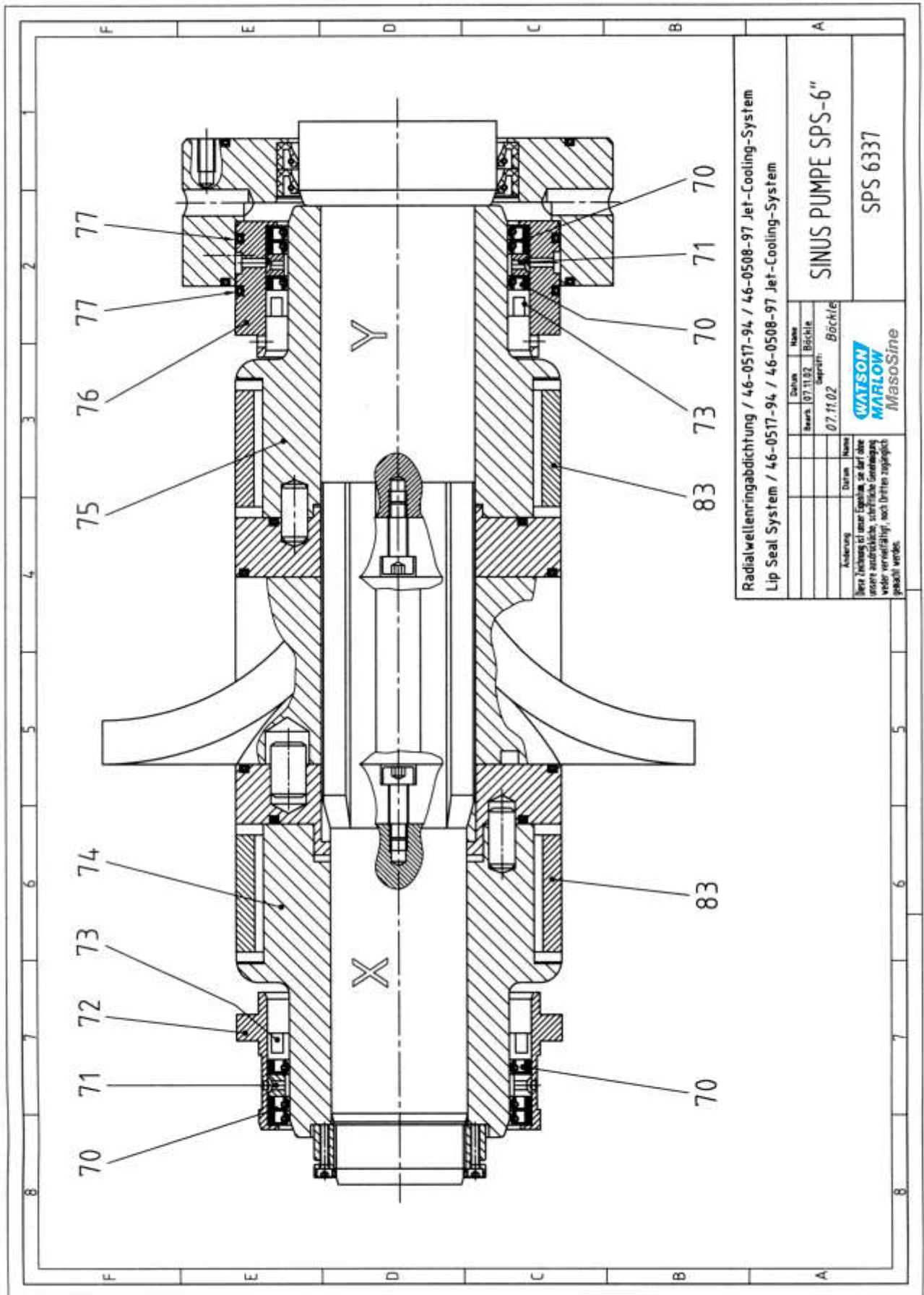


25.6 Parts list „Mechanical Seal Assembly“

Pos	Qty	Part No.	Description
70	4	S40-9000-__	Lip Seal
71	16	S60-5410-15	Pressure Spring
72	1	S60-5455-10	Static Seal Ring Holder, Front
73	4	S60-5464-12	Driving Pin
74	1	S60-5456-10	Impeller Ring Housing, Front
75	1	S60-5476-10	Impeller Ring Housing, Rear
76	1	S60-5475-10	Static Seal Ring Holder, Rear
77	2	S60-4100-__	O-ring
78	1	025P540. __	O-ring
79	2	S60-5463-__	O-ring Dash no. 243
80	2	S60-5461-__	Static Face, inside
81	2	S60-5460-__	Dynamic Face w/ Cup, inside
82	2	S60-5462-__	O-ring Dash no. 242
83	2	S60-0642-__	sleeve
84	1	S40-1113-__	O-ring

Please ensure your quote the pump number when ordering spare parts! (See cover sheet or delivery note)

25.7 Sealing system „Lip Seal Assembly“



25.8 Parts list „Lip Seal Assembly“

Item	Qty	Part No.	Description
70	6	S60-0501-80	Lip Seal
71	2	S60-0502-34	Backing Ring, Front / Rear
72	1	S60-0074-10	Lip Seal Housing, Front
73	2	S60-0501-88	Lip Seal
74	1	S60-0623-10	Rotating Hub, Front
75	1	S60-0652-10	Rotating Hub, Rear
76	1	S60-0079-10	Lip Seal Housing, Front
77	2	S60-4100-__	O-ring
83	2	S60-0642-__	Backing Ring

Please ensure your quote the pump number when ordering spare parts! (See cover sheet or delivery note)

25.9 Dimensional drawing

