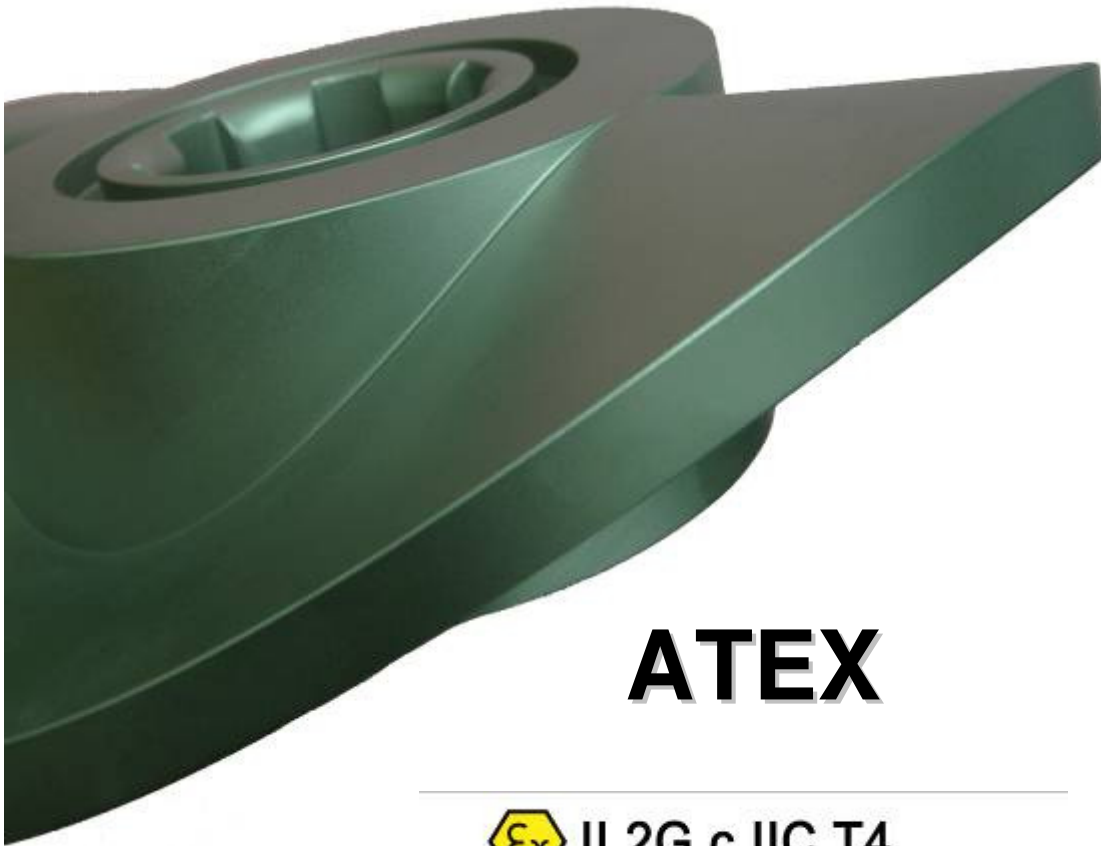

Manual - Technical Documentation



ATEX

 II 2G c IIC T4

 II 2D c IIC T=120°

Watson-Marlow MasoSine Pumps

SPS-2" / SPS-2,5" / SPS-4"

Type:

Pump-No.:

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Technical datasheet

Please remove the all technical information from the technical Data Sheet.

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** Pumps:

SPS-2“ / SPS-2,5“ / SPS-4“

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

2 Purpose

The purpose of your pump is defined exactly in the Montageauftrag. 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** Pump 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 Liner space.

As soon as a chamber closes, the opposite chamber opens by the same fraction of a millimetre 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 Montageauftrag
- 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**. Immediately replace machine parts in not perfect condition. Use only original spare and wearing parts. In the case of parts not obtained from **Watson-Marlow 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. 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 Maintenance of the bearings

- For pumps in series **SPS-2“ and SPS-2,5“** , both bearings must be replaced by new ones after running for 10,000 hours!
- For pumps in series **SPS-4”** , please refer to the enclosed table:

	200 rpm	400 rpm	600 rpm
5 bar	10000 hours	10000 hours	10000 hours
10 bar	10000 hours	10000 hours	10000 hours
15 bar	10000 hours	7689 hours	5126 hours

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 us or one of our representatives.

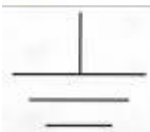
5 Safety instructions (ATEX)

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

5.1 Safety signs

 Ex II 2 G c T4

 Ex II 2 D 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 T₄≥135 °C
- 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 data sheet (see page 4). 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!

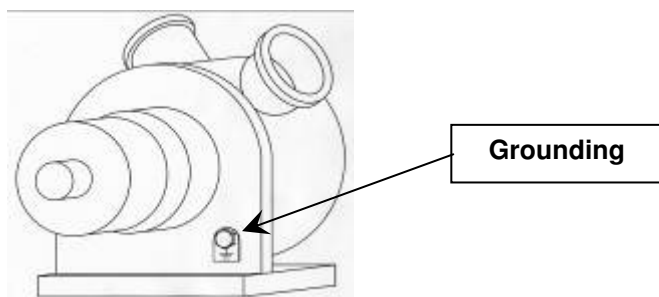
	SPS-2“	SPS-2,5“	SPS-4“
max. Pressure *	10 bar	15 bar	15 bar
max. Speed *	1.000 rpm	600 rpm	600 rpm
max. Temperature *	100 °C	100 °C	100 °C
Ambient temperature	-12 °C bis +40 °C	-12 °C bis +40 °C	-12 °C bis +40 °C

* depending on the rating of the pump (pls. see order confirmation)

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 °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 aria. Tools that are used should 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 combustibile 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.

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

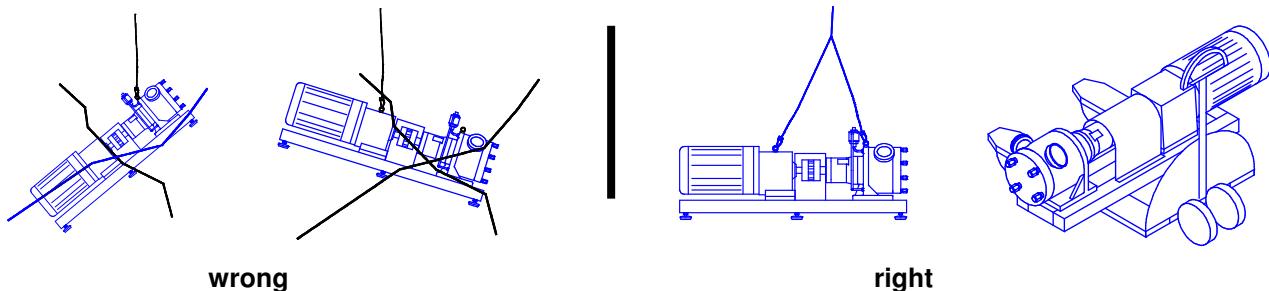
The **Watson-Marlow MasoSine** undertakes no liability for errors contained in it or consequential damage occurring by chance arising due to the design, performance and the use of this documentation.

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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.



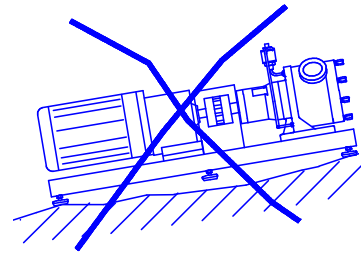
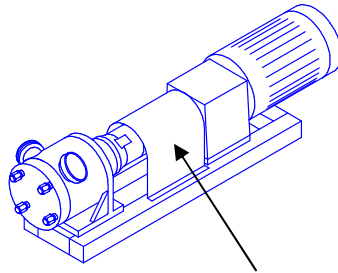
wrong

right

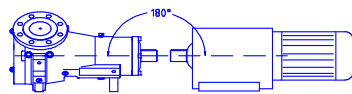
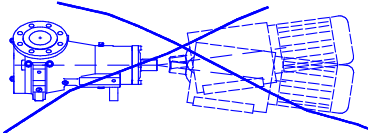
8 Installation



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



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

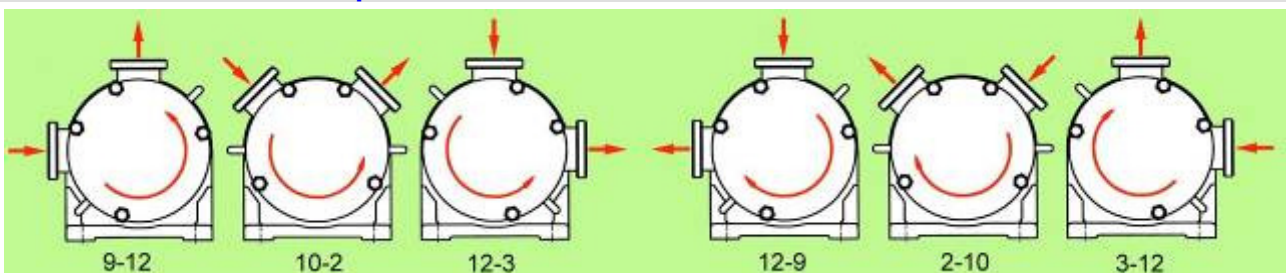
The **Watson-Marlow MasoSine** Pumps normally run with such a low resonant frequency that no corresponding damage is caused. However, particularly when running with converters, certain frequencies can cause interfering vibrations which must be avoided. It is important during initial commissioning to 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



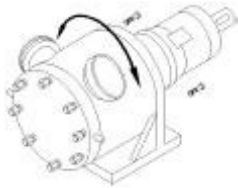
Counterclockwise rotation of the rotor and motor

Clockwise rotation of the rotor and motor

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

11 Changing the connection position

11.1 Watson-Marlow MasoSine - PUMP SPS-2", SPS-2.5", SPS-4"



Remove the screws on the power frame. Turn the housing by an angle of 45° to the left or right. Tighten the screws again.

SPS-2" ⇒ 35 Nm SPS-2,5" ⇒ 40 Nm SPS-4" ⇒ 45 Nm

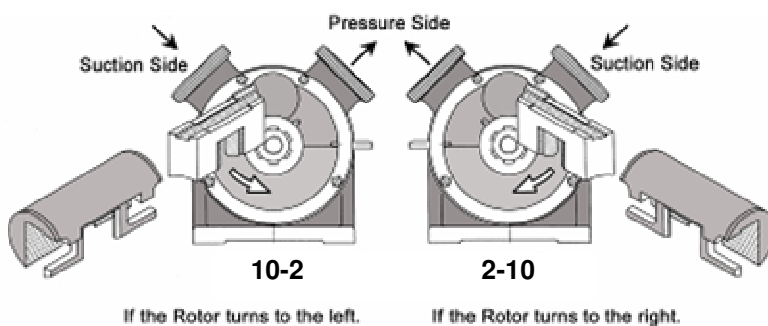
However, take care that due to the corresponding arrangement of the pressure line in the pump, a certain residual amount remains. By this measure you make it easier for the pump to draw in highly viscous products. However, in the case of horizontally lying pressure connection you must absolutely take 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 connection position is changed, the motor must be protected against unintentional switching on!!

12 Changing the direction of rotation

Changing the direction of rotation for a SPS-2", SPS-2.5", SPS-4"



The suction or the pressure side changes on changing the direction of rotation of the drive. Then the **scrapergate** and the **scrapergate 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 be 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.



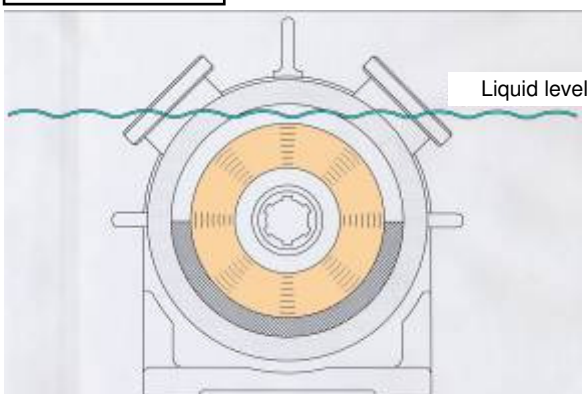
Observe the corresponding regulations in the case of hazardous pumped material (according to ArbStoffV).

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

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

ACHTUNG

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

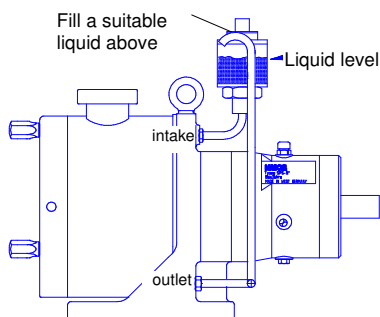
If the pump leaks, end operation as quickly as possible to replace the damaged sealing elements.

CAUTION

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

14 Purging

- The quality of the rinsing medium must correspond at least to pure drinking water. It must never be contaminated by particles (sand or other dirt). This would automatically cause failure of the seals. We also recommend that transparent plastic tubes are used as rinsing tubes.
- 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).
- Fill the pump with water to prevent it from running dry, possibly via a separate intake valve connected to the suction or pressure pipe
- In the case of permanent rinsing, always check the intake and outlet (see diagram).



14.1 Static purging device

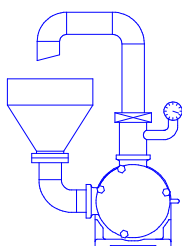
Before initial commissioning, fill the rinsing device (if included in the scope of supply) with a suitable rinsing liquid (depending on the product being pumped). The rinsing liquid is filled into the hinged cover in the sight glass until the liquid level in the sight glass is just below the bent outlet 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

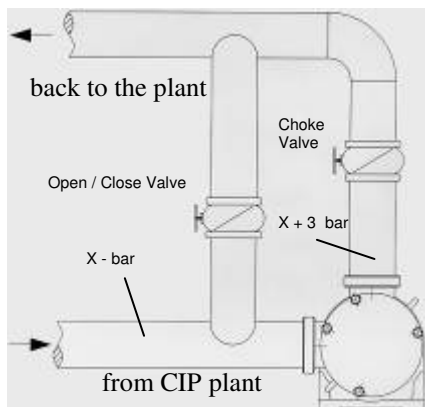
All Watson-Marlow MasoSine Pumps are fully capable of CIP cleaning. Please observe our CIP cleaning regulations.

15.1 Cleaning in own circuit with water, alkali, acid



1. Set control gear to maximum speed (at least 400 rpm).
2. Choke after the pump so that a counterpressure of 3 to 4 bar arises.
3. 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 Pump** 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!!

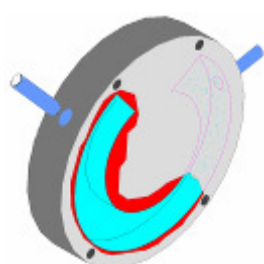
15.4 Sterilisation

Sterilisation of the pump with standard equipment is possible **up to 110°C only in standstill!**

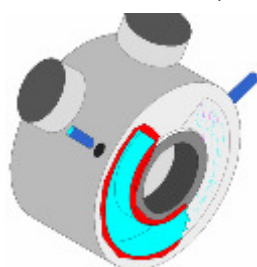
In the case of special equipment of the pump or higher temperatures, please always firstly consult the manufacturer!

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 Oil change

In the case of the pumps of the series **SPS-2"**, **SPS-2,5"**, **SPS-4"**, the oil viewing glass (Pos. 27) in the bearing housing (Pos. 11) must be checked every day for damage and that there is enough oil in the power frame component, in particular every time before the pumps are used. The oil viewing glass in the bearing housing must always be filled up to the middle. Please use the following oil type that is applicable for your application! If the pump is to be used in an area that is combustible where ATEX applies, the oil viewing glass is replaced by a screwed plug.

Standard first filling of Watson-Marlow MasoSine Pumps

- For -10°C to 60°C

Klüberoil 4 UH 1-220 N (lube oil for the food and pharmaceutical industry)

Oil grades for ex-zones

Only the following oil type may be used in pumps operated in explosive areas:

Klüberoil 4 UH 1-220 N (lubrication oil for the food and pharmaceuticals industries)

17.1 Filling volumes

SPS-2" approx. 0,10 litre

SPS-2,5" approx. 0,18 litre

SPS-4" approx. 0,38 litre

18 Disposal

Send the old oil or old grease for treatment.

19 Spare parts

Basically repairs should be performed only by factory personnel or by customer service agencies authorized by the factory. If you make repairs yourself, observe the relevant safety regulations and contact the factory customer service before starting the work, especially if warranty obligations which can be lost by not approved repairs still exist.

Only **Watson-Marlow MasoSine** original-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 data when ordering:

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

Ask for our express delivery!

Watson-Marlow MasoSine

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Steinbeisstraße. 3
D-74358 Ilsfeld (Germany)
Telefon : +49 (0)7062 9560-0
Fax : +49 (0)7062 64593
EMail : Info@masosine.com
Internet : <http://www.masosine.com>

20 Taking out of service

20.1 Provisional taking out of service

Short term:

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

Longer term:

Remove product residues carefully (cleaning) ⇒ Switch off main switch ⇒ Clean pump surface ⇒ Disconnect connections ⇒ Drain off static purging liquid ⇒ Loosen purging connections ⇒ Store the scrapergate in water.

20.2 Final putting out of service

Separate power and purging liquid supply. Send oils and greases for treatment.

If you send us the remaining parts freight paid, we will dispose of the parts.

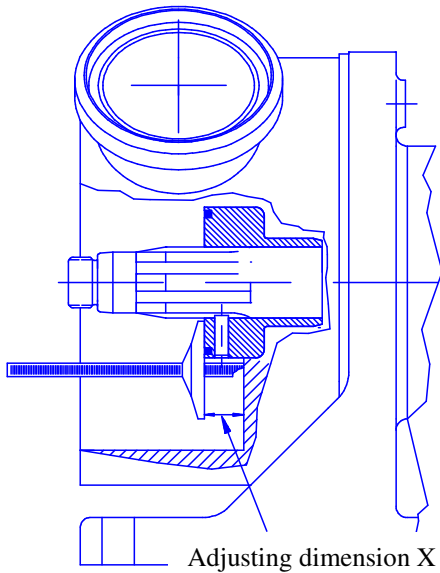
21 Troubleshooting

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
	Scrapergate and Scrapergate 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
	Scrapergate and Scrapergate 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
	Pumped material is abrasive	Choose larger pump, reduce speed

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-2" = 17.5 mm +0.1 SPS-2.5" = 23.0 mm +0.1 SPS-4" = 15.0 mm +0.1
<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 Adjusting dimension

For the pumps of the series SPS-2“, SPS-2,5“ and SPS-4“

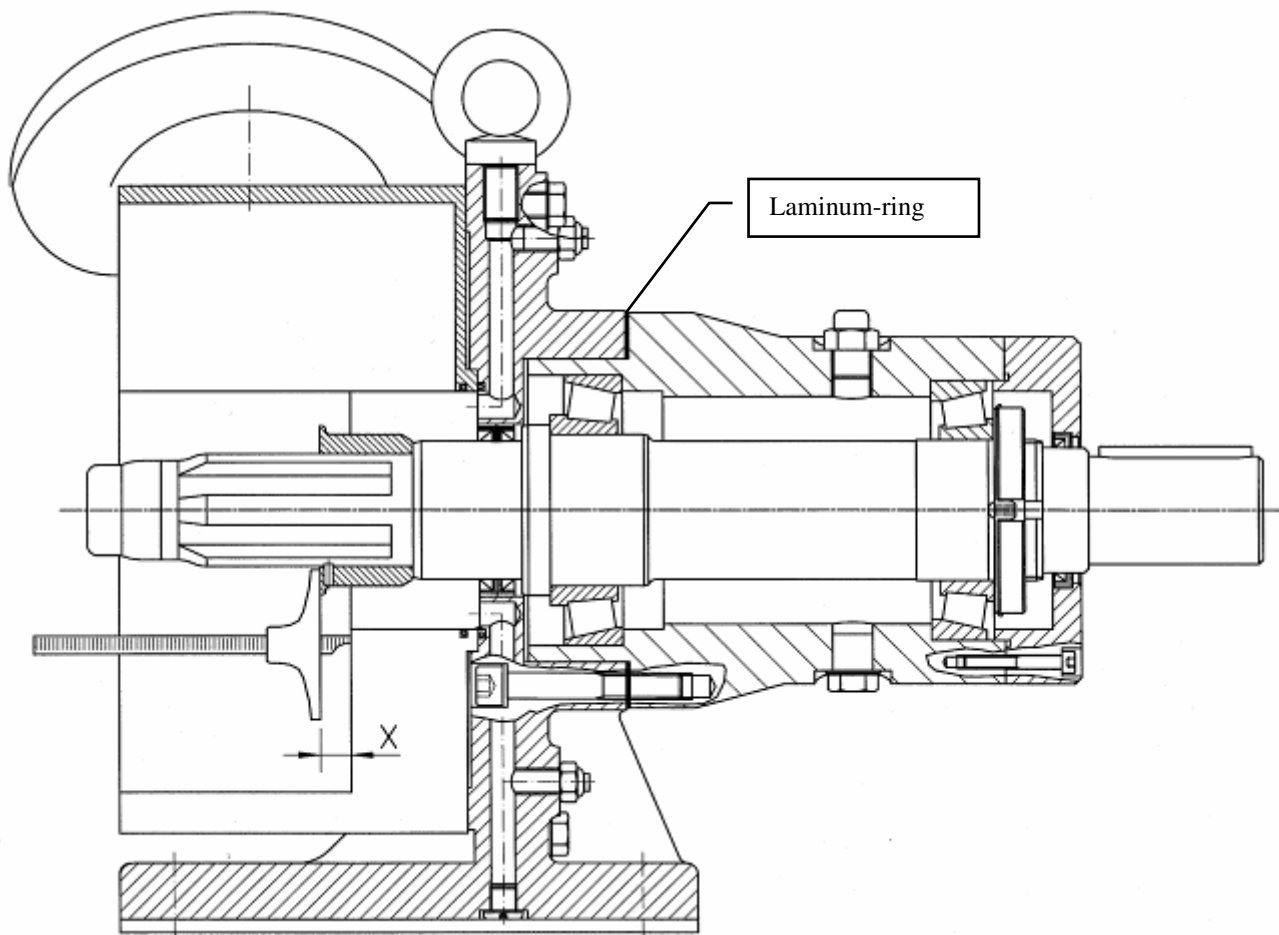


Remeasure the adjusting dimension X.

If this dimension is not correct, install a new Laminum ring and measure the adjusting dimension once again. Then peel off the layer(s) by the difference so that the necessary adjusting dimension is achieved.

One layer is 0.05 mm thick.

Pump type	Adjusting dimension X
SPS-2“	17,5 mm +0,1
SPS-2,5“	23,0 mm +0,1
SPS-4“	15,0 mm +0,1



23 Tightening torques

Watson-Marlow MasoSine - pump SPS-2"

Bearing Housing Cover – Bearing Housing	M6 8.8 DIN 912	10 Nm
Power Frame – Bearing Housing	M8 DIN 912	25 Nm
Power Frame – Plug	R 1/8" DIN 908	10 Nm
Pump Housing – Power Frame	M8 A2 70 DIN 931	35 Nm
Shaft – Shaft Nut		75 Nm
Shaft – Locking Screw	LEFT-HAND THREAD	65 Nm
Front Cover – Cap Nut		35 Nm

Watson-Marlow MasoSine - pump SPS-2,5"

Bearing Housing Cover – Bearing Housing	M6 8.8 DIN 912	10 Nm
Power Frame – Bearing Housing	M10 DIN 912	50 Nm
Power Frame – Plug	R 1/4" DIN 908	25 Nm
Pump Housing – Power Frame	M10 A2 70 DIN931	40 Nm
Shaft – Shaft Nut		110 Nm
Shaft – Locking Screw	LEFT-HAND THREAD	95 Nm
Front Cover – Cap Nut		45 Nm

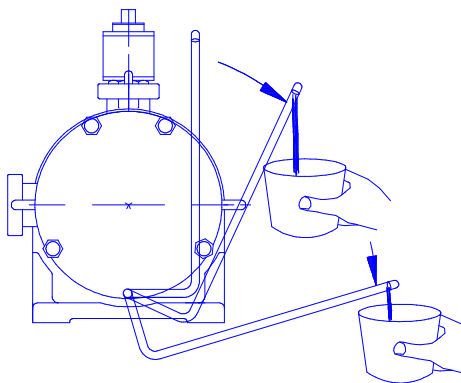
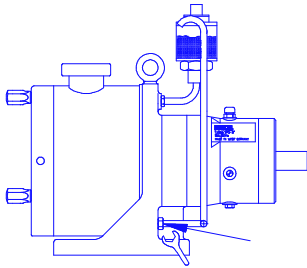
Watson-Marlow MasoSine - pump SPS-4"

Bearing Housing Cover – Bearing Housing	M6 8.8 DIN 912	10 Nm
Power Frame – Bearing Housing	M12 DIN 912	35 Nm
Power Frame – Plug	R 1/4" DIN 908	25 Nm
Pump Housing – Power Frame	M12 A2 60 DIN931	40 Nm
Shaft – Shaft Nut		125 Nm
Shaft – Locking Screw	LEFT-HAND THREAD	105 Nm
Front Cover – Cap Nut		45 Nm

24 Dismantling

Dismantling the static purging device (optional)

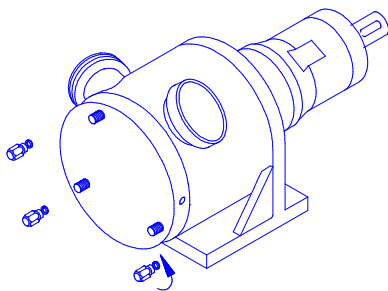
The purging device must be emptied before dismantling the pump



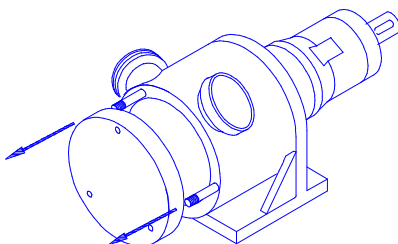
Hold a vessel under the bent outlet. Wait until there is no longer any residual liquid in the power frame.



Dismantling the front cover



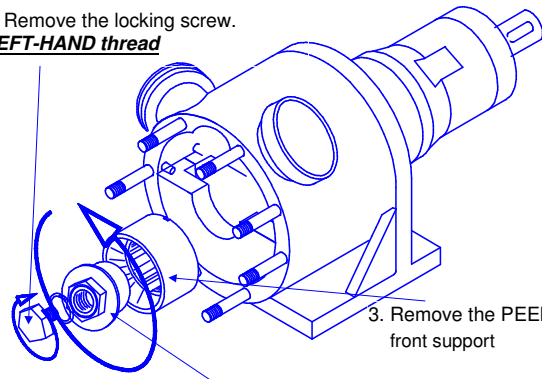
Remove the cap nuts (right-hand thread)



Draw off the front cover to the front.

Dismantling the front support

1. Remove the locking screw. **LEFT-HAND thread**



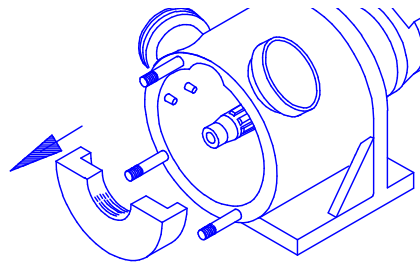
2. Loosen and remove the shaft nut. **RIGHT-HAND thread**

3. Remove the PEEK front support

The PEEK front support is sensitive to breakage

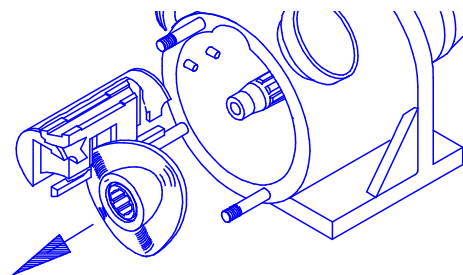
In the SPS-2" pump the front support is removed before loosening the locking screw - and shaft nut.

Dismantling the front liner



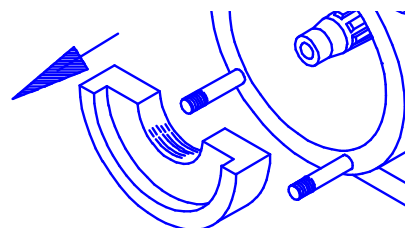
Remove the front liner.

Dismantling the rotor, the scrapergate and the scrapergate guide



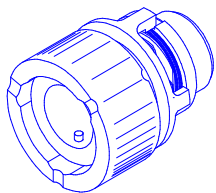
Remove the rotor, the scrapergate guide and the scrapergate together.

Dismantling the rear liner



Remove the rear liner

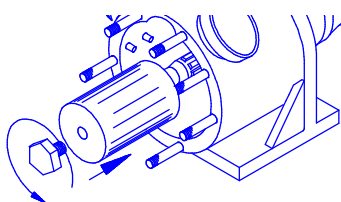
Dismantling the sealing system



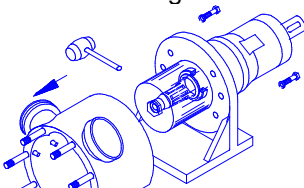
Remove the sealing system completely (withdraw to the front)

Removing the pump housing

No special tool is required for the SPS-2" pump.



Guide the **Watson-Marlow MasoSine** special tool over the shaft. Tighten the locking screw by hand. Loosen and remove the 2 screws on the power frame / housing.



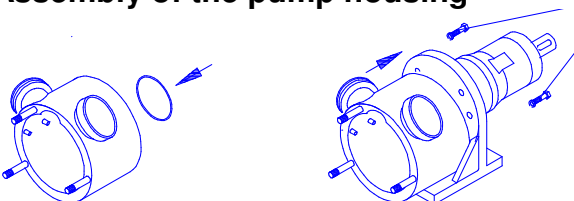
With a light plastic hammer strike weakly on the connection until the pump housing can be withdrawn to the front. Withdraw the pump housing carefully.



The housing is heavy !!

25 Assembly

Assembly of the pump housing

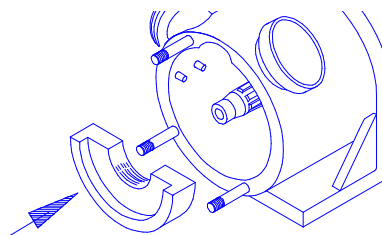


Preassemble the O-ring in the housing. Then push the housing carefully over the shaft into the power frame and fasten with 2 screws.

SPS-2" Tighten screw with **35Nm**
SPS-2,5" Tighten screw with **40Nm**
SPS-4" Tighten screw with **40Nm**

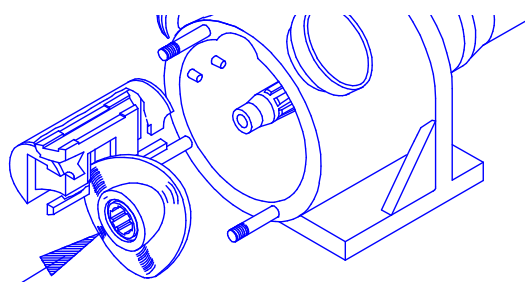
Assembly of the sealing system

Installation of the rear liner



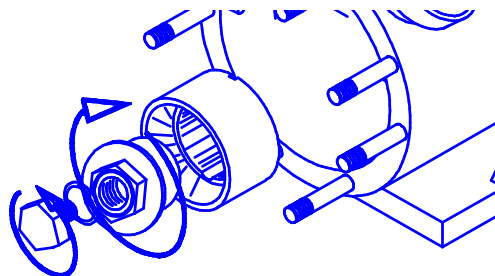
Push in the rear liner

Installation of the rotor



Push the rotor, the scrapergate guide and the scrapergate as preassembled unit over the shaft.

Installation of the shaft nut



Screw the shaft nut on the shaft.

Right-hand thread. Tighten powerfully.

SPS-2" Tighten with **75Nm**

SPS-2,5" Tighten with **110Nm**

SPS-4" Tighten with **125Nm**

Screw the locking screw into the shaft.

Left-hand thread. Tighten powerfully.

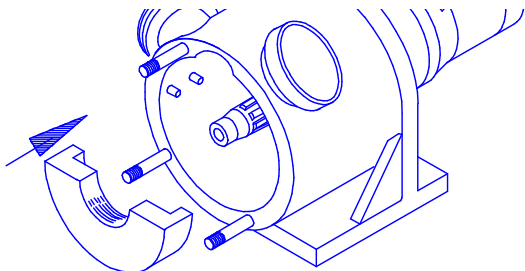
SPS-2" Tighten with **65Nm**

SPS-2,5" Tighten with **95Nm**

SPS-4" Tighten with **105Nm**

For the SPS-2" pump the front support is not yet preassembled !

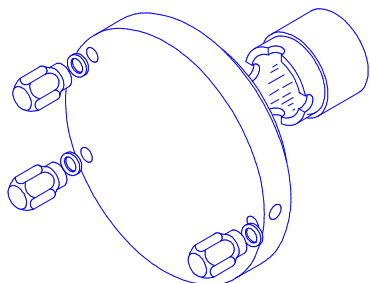
Installation of the front liner



Push in the front liner

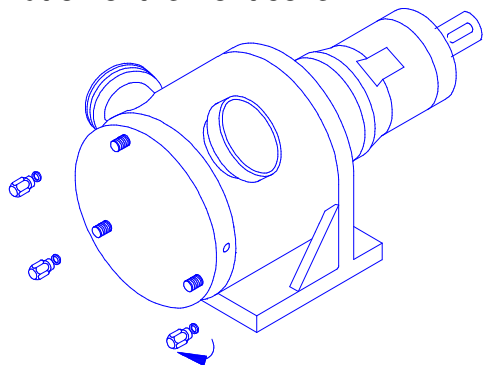
Only for SPS-2“

Installation of the MASOTRONIC-2080-PK front support



Push the front support *carefully* in the front cover.

Installation of the front cover



Push the cover over the studs of the pump housing until it is in position.
Tighten the cover with the cap nuts.

SPS-2“ Tighten cap nuts with **35Nm**
SPS-2,5“ Tighten cap nuts with **45Nm**
SPS-4“ Tighten cap nuts with **45Nm**

Attach the static purging device again.

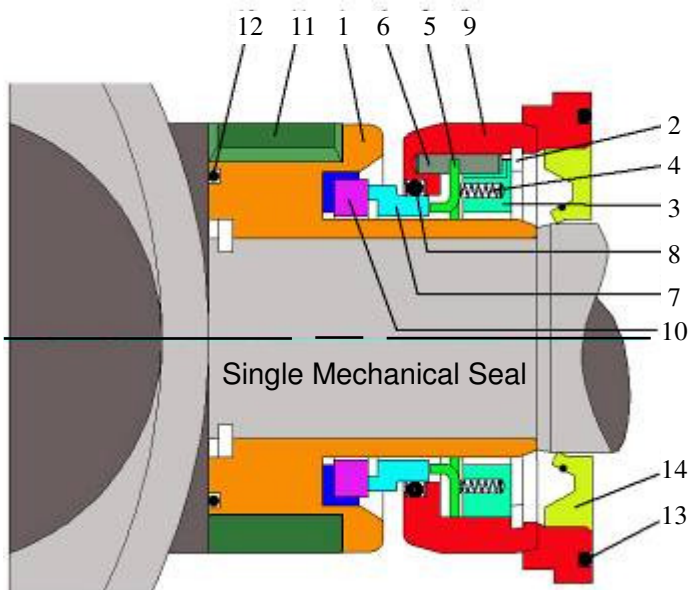
Take care in all work that the O-rings are installed undamaged and completely.

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

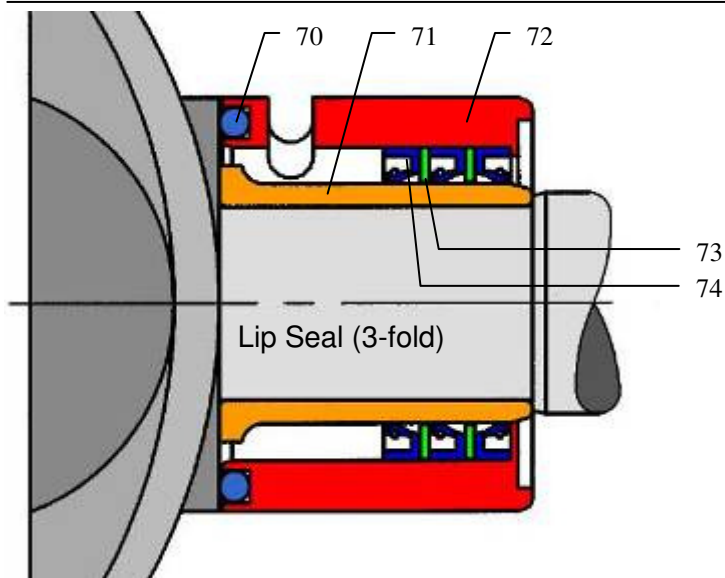
Watson-Marlow MasoSine

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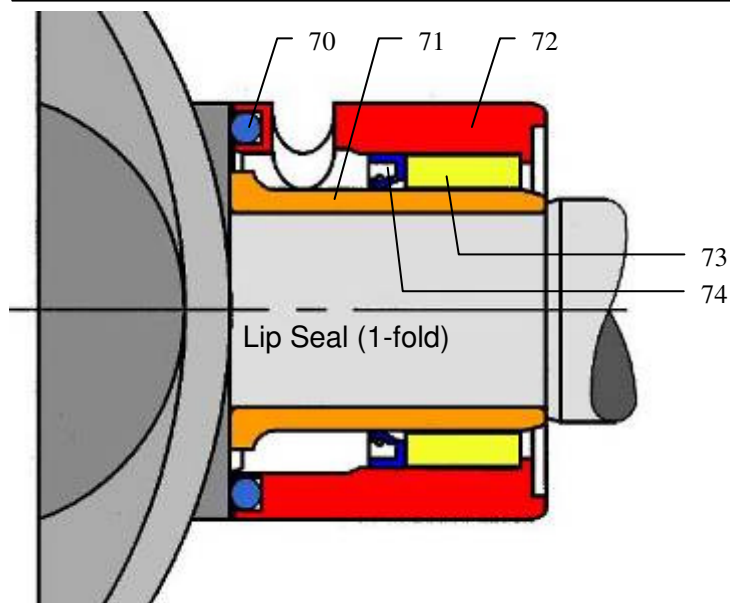
26 Seal versions



Mechanical Seal, Single			
Pos	Qty	Item No.	Article
1	1	__-5210-10	Dynamic Ring Holder
2	1	__-5223-12	Snap Ring
3	1	__-5220-10	Spring Holder
4	6	P572.1420A1	Spring (SPS-2")
	8	P572.1420A1	Spring (SPS-2,5")
	12	P572.1420A1	Spring (SPS-4")
5	1	__-5230-10	Spring Support
6	3	__-5222-10	Straight Pin
7	1	__-5245-__	Stat. Surface
8	1	__-5246-__	O-Ring
9	1	__-5200-10	Static Ring Holder
10	1	__-5240-__	Cup with Dyn. Surface
11	1	__-5250-__	Backing Ring
12	1	__-8505-__	O-Ring (SPS-2.5 / 4")
13	1	__-8500-__	O-Ring (SPS-2")
14	1	__-2300-__	Lip Seal (SPS-2")

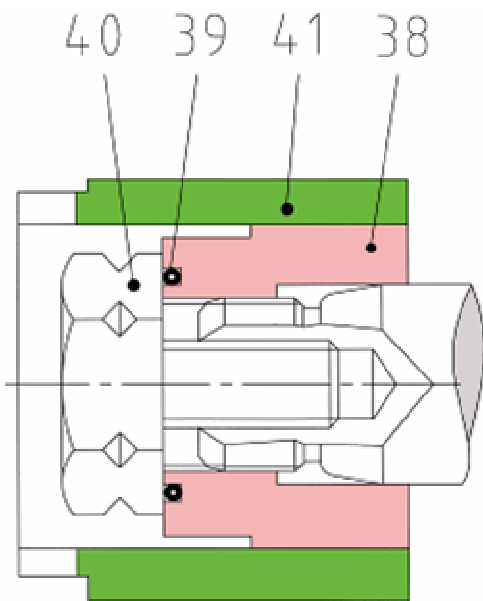


Lip Seal Assembly (3-fold)			
Pos	Qty	Item No.	Article
70	1	__-4200-__	O-Ring
71	1	__-0610-10	Shaft Sleeve
72	1	__-0510-__	Seal Housing
73	2	__-5310-10	Support Ring
74	3	__-0501-__	Lip Seal



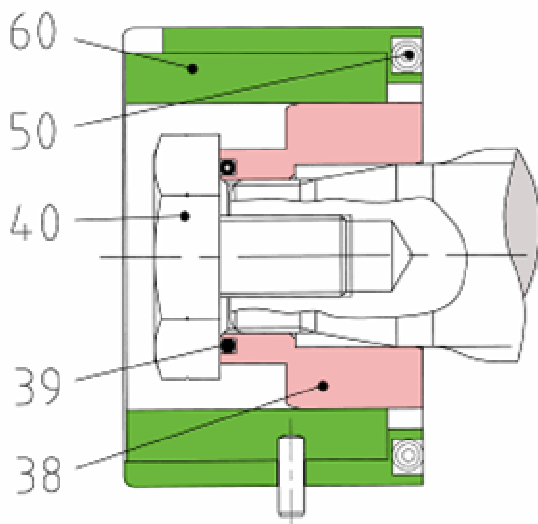
Lip Seal Assembly (1-fold)			
Pos	Qty	Item No.	Article
70	1	4200-__	O-Ring
71	1	0610-10	Shaft Sleeve
72	1	0510-__	Seal Housing
73	1	5315-10	Support Ring
74	1	0501-__	Lip Seal

27 Front support versions



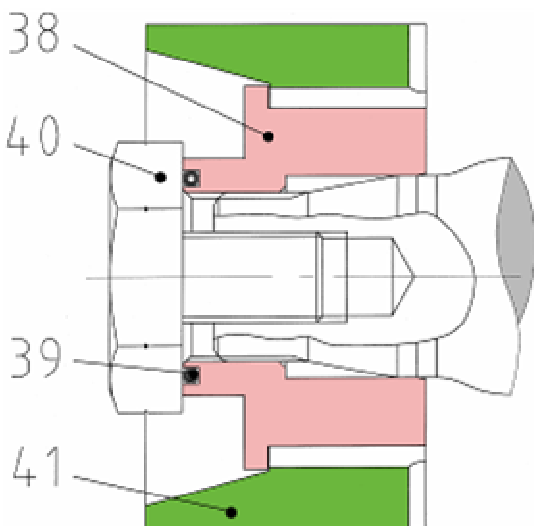
SPS-2''

2'' Front Support Assembly			
Pos	Qty	Item No.	Article
38	1	__-0800-10	Shaft Nut
39	1	__-1752-__	O-Ring
40	1	__-1100-10	Locking Screw
41	1	__-0900-__	Front Support



SPS-2,5'' / 4''

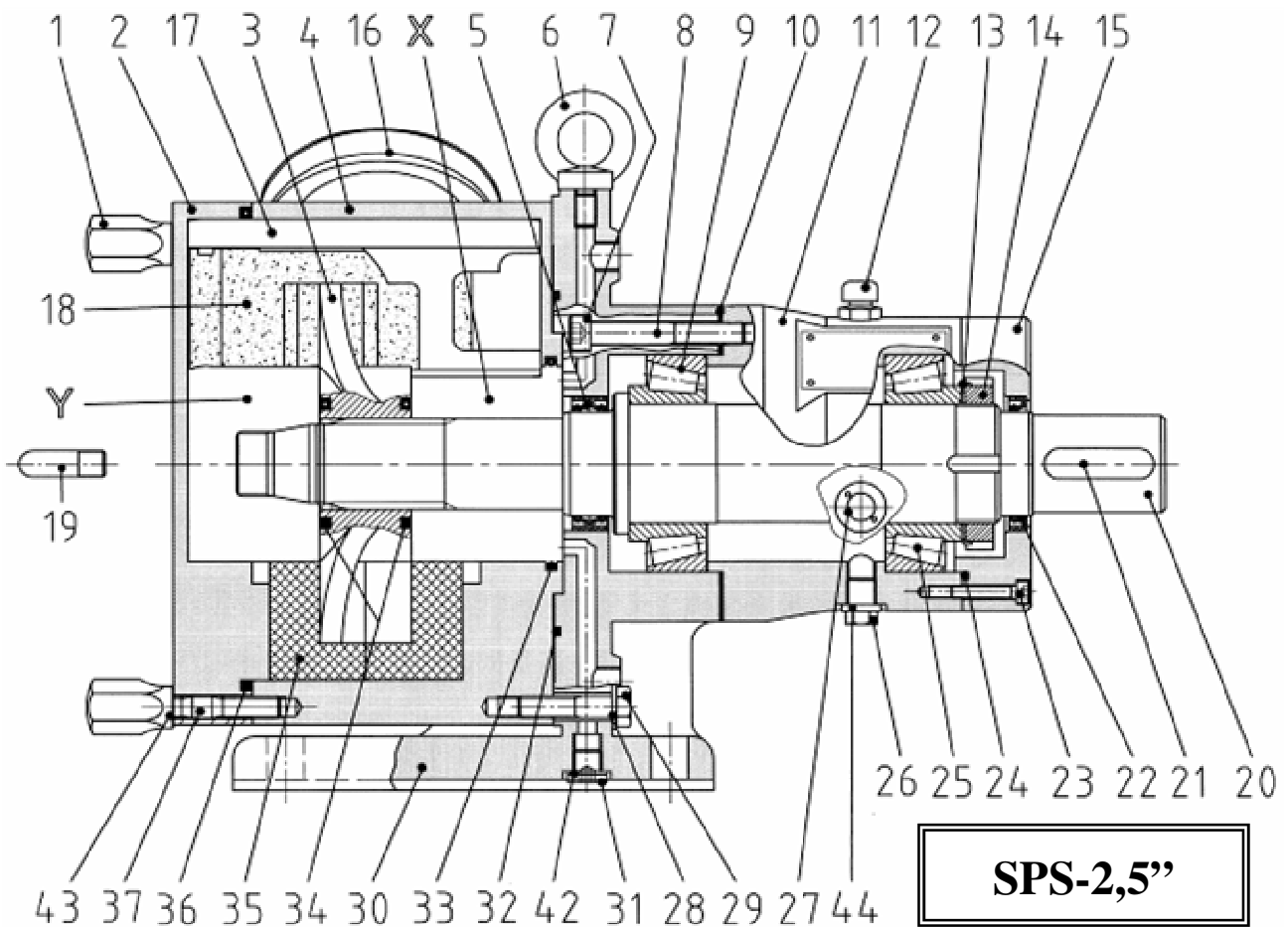
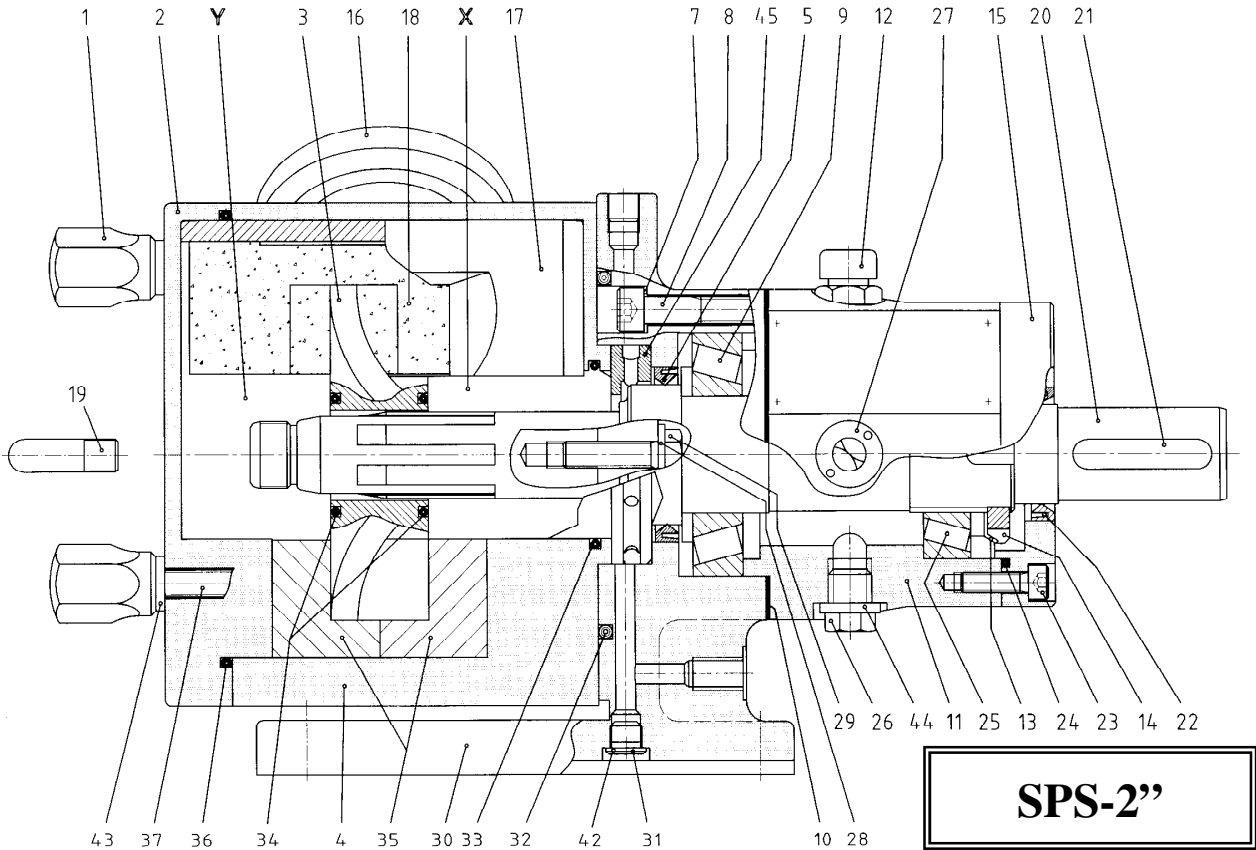
2,5'' / 4'' Front Support Assembly (Ca or 2800-PO)			
Pos	Qty	Item No.	Article
38	1	__-0800-10	Shaft Nut
39	1	__-1752-__	O-Ring
40	1	__-1100-10	Locking Screw
50	1	__-4200-__	O-Ring
60	1	__-0900-10	Front Support

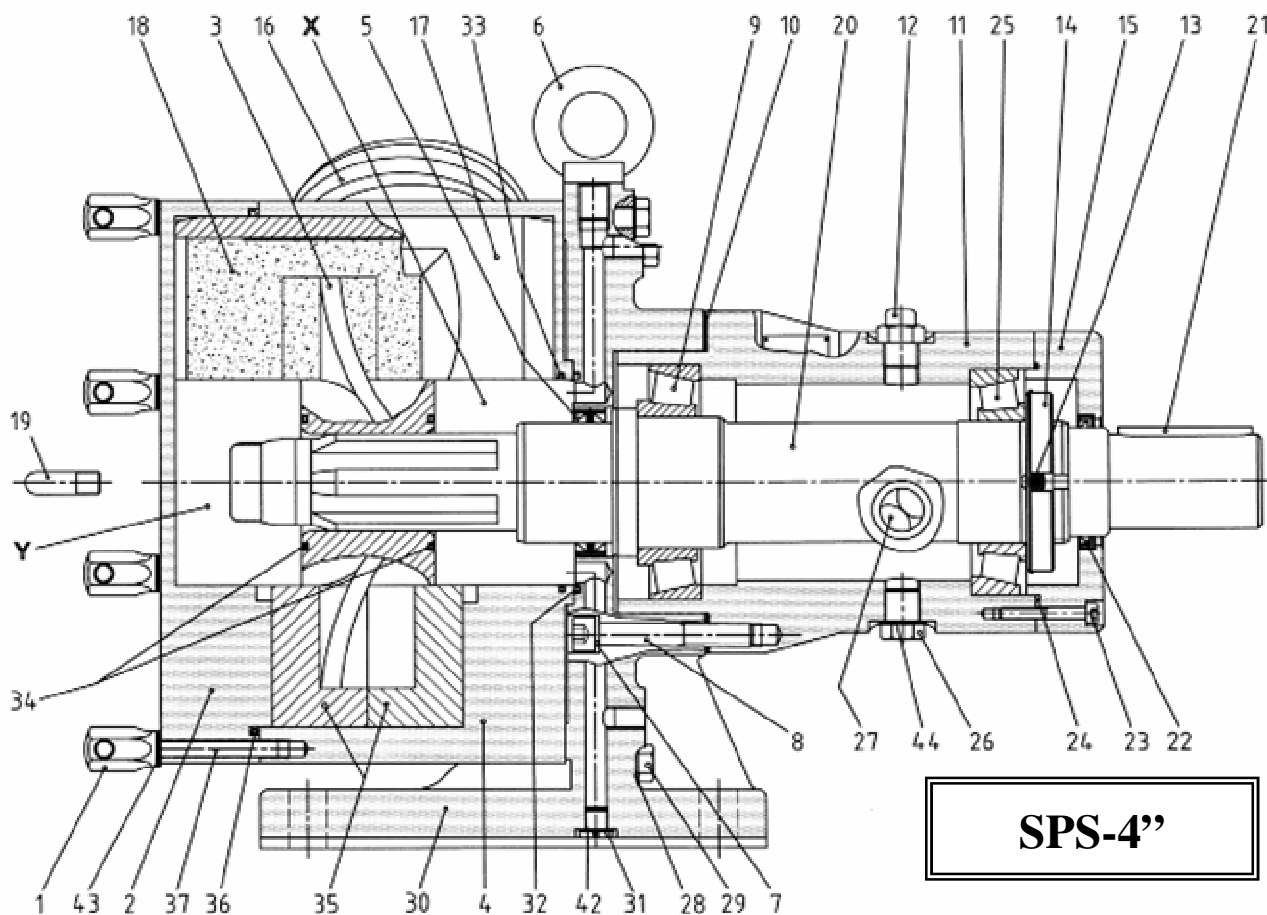


SPS-2,5'' / 4''

2,5'' / 4'' Front Support (2080-PK)			
Pos	Qty	Item No.	Article
38	1	__-0820-10	Shaft Nut
39	1	__-1752-__	O-Ring
40	1	__-1100-10	Locking Screw
41	1	__-0960-__	Front Support

28 Pump sizes



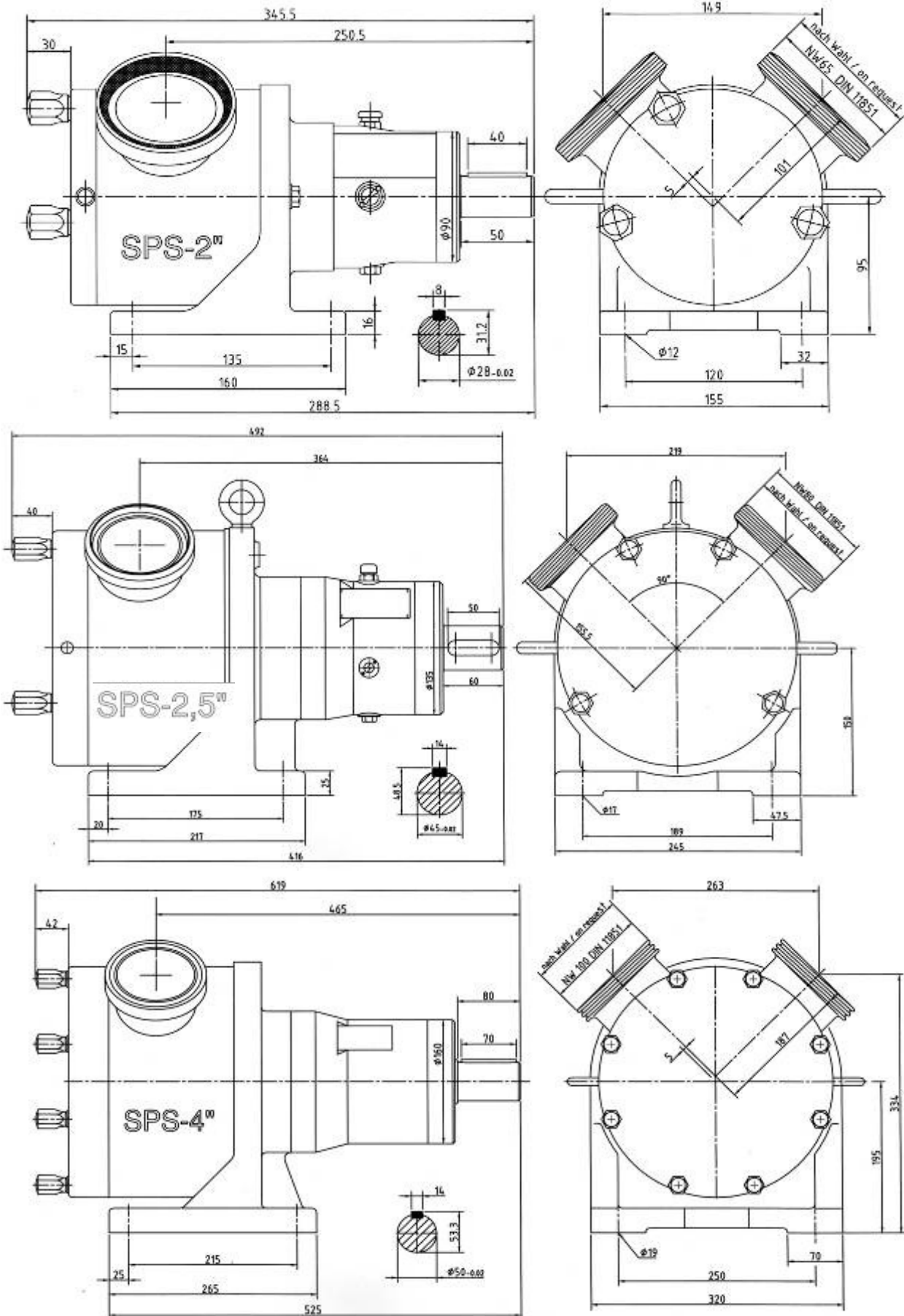


28.1 Part list for SPS-2" / SPS-2.5" / SPS-4"

Pos	Qty	EDP-No.	Article	Pos	Qty	EDP-No.	Article
1	3	__-1600-12	Cap Nut (SPS-2")	23	3	__-2900-25	Cap Screw (SPS-2")
	4	__-1600-12	Cap Nut (SPS-2.5")		4	__-2900-25	Cap Screw (SPS-2.5" / 4")
	8	__-1600-12	Cap Nut (SPS-4")	24	1	__-3000-__	O-Ring, Bearing Housing
2	1	__-0200-10	Front Cover	25	1	__-2600-25	Bearing, Tapered Roller
3	1	__-0100-10	Rotor	26	1	__-3700-25	Threaded Plug
4	1	__-0300-10	Pump Housing	27	1	__-3800-51	Oil Level Glass
5	2	__-2300-__	Radial Shaft Seal	27	1	__-3700-25	Seal Plug (ATEX)
6	1	__-3900-25	Lifting Eye Bolt	28	2	__-1901-12	Washer
7	3	__-2100-33	Seal out of Copper (SPS-2")	29	2	__-1900-12	Hexagon Head Cap Screw
	4	__-2100-33	Seal out of Copper (SPS-2.5" / 4")	30	1	__-1300-20	Power Frame
8	3	__-2200-25	Cap Screw (SPS-2")	31	1	__-2000-25	Lock Nut
	4	__-2200-25	Cap Screw (SPS-2.5" / 4")	32	1	__-1753-__	O-Ring, Power Frame
9	1	__-2400-25	Bearing, Tapered Roller	33	1	__-1750-__	O-Ring, Pump Housing
10	1	__-1401-30	Laminum-Ring	34	2	__-1751-__	O-Ring, Rotor
11	1	__-1400-20	Bearing Housing	35	2	__-1200-__	Liners
12	1	__-6000-25	Vent Valve	36	1	__-1701-__	O-Ring, Front Cover
13	1	__-2700-25	Tab Washer	37	3	__-1800-12	Front Cover Studs
14	1	__-2800-25	Shaft Nut		4	__-1800-12	Front Cover Studs
15	1	__-1500-20	Bearing Housing Cover		8	__-1800-12	Front Cover Studs
16	2		Nozzles	42	1	__-2001-33	Seal out of Copper
17	1	__-0700-10	Scrapergate Guide	43	3	__-1601-12	Washer
18	1	__-0400-__	Scrapergate		4	__-1601-12	Washer
19	1	__-0250-12	Handle Pin		8	__-1601-12	Washer
20	1	__-1000-16	Shaft	44	1	__-3701-33	Seal out of Copper
21	1	__-3200-25	Shaft Key	45	1	__-0513-10	Distance Ring (SPS-2")
22	1	__-3100-__	Radial Shaft Seal	X			Seal System (see page. 22)
				Y			Front Support (see page. 23)

Please ensure you quote the **serial number** when ordering spare parts!
(See cover sheet or Montageauftrag.)

28.2 Dimensional drawings



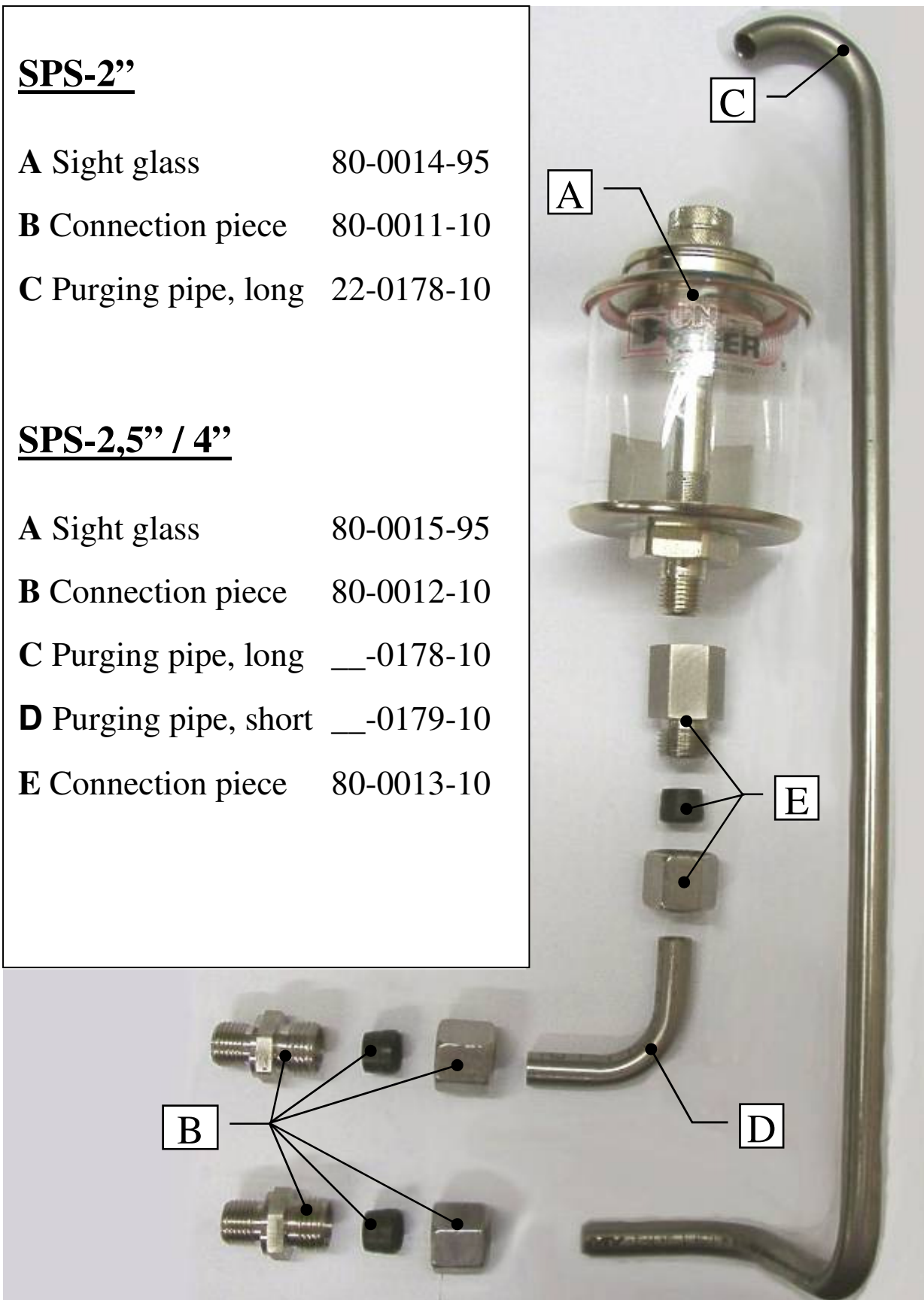
29 Components for „ static purging device “

SPS-2”

A Sight glass	80-0014-95
B Connection piece	80-0011-10
C Purging pipe, long	22-0178-10

SPS-2,5” / 4”

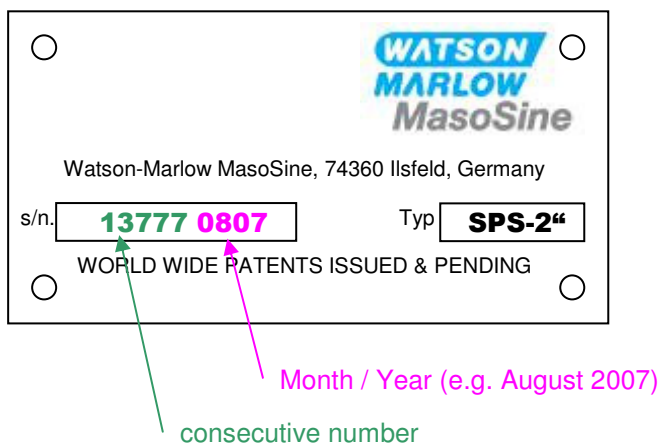
A Sight glass	80-0015-95
B Connection piece	80-0012-10
C Purging pipe, long	__-0178-10
D Purging pipe, short	__-0179-10
E Connection piece	80-0013-10



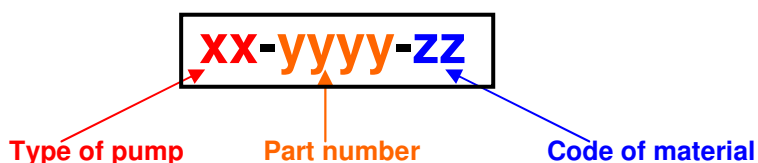
30 Code-Combination for spare part orders

30.1 Structure of the pump number

Each single pump is provided with a pump number, which identifies clearly the specific features of the pump/unit. The pump number is listed on the type plate, which is adjusted at the bearing housing (Pos. 11). Additionally you can find the pump number on the cover sheet of the manual.



30.2 Structure of the article number



1. Type of pump

code	pump size	code	pump size
S10	SPS-1"	S20	SPS-2"
S25	SPS-2,5"	S40	SPS-4"

2. Part numbers: Please see attached Montageauftrag.

3. Code of material

a. Elastomer

Code	Material	Code	Material
80	NBR / BUNA	82	EPDM
84	VITON	88	PTFE

b. Plastics

Code	Material
49	MASOTRONIC-2070-WR
50	MASOTRONIC-2800-PO or MASOTRONIC-2810-PO
53	MASOTRONIC-2050-UH
62	MASOTRONIC-2080-PK

c. Carbide / Carbon

Code	Material	Code	Material
40	ceramic	41	silicon carbide
66	carbon		