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Regulations of the EC/EU directive 2006/42/EC Annex II 1.A

2006/42/EG	Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery and amending Directive 95/16/EC (recast) (1) Official Journal of the EU: L 157/24 of 09.06.2006
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast), Official Journal of the EU: L 96/79 of 29.03.2014
2014/35/EU:2014-02-26	Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
2014/68/EU, Artikel 4.3	Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment

Harmonised standards:

EN ISO 12100: 2011-03	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13857: 2008	Safety distances against reaching of hazardous areas
EN 809: 1998+A1:2009 + AC:2010	Pumps and pump units for liquids - General safety requirements



Machinery Safety Regulations 2008 No. 1597 as per Annex II 1.A

2008 No. 1597	The Supply of Machinery (Safety) Regulations 2008, made 19th June 2008, laid before Parliament 23rd June 2008, coming into force 29th December 2009
2016 No.1091	The Electromagnetic Compatibility Regulations 2016, made 15th November 2016, laid before Parliament 16th November 2016, Coming into force 8th December 2016
2016 No. 1101 Annex I No. 1.5.1 of 2008 No 1597	The Electrical Equipment (Safety) Regulations 2016

Harmonised standards:

BS EN ISO 12100:2010-12-31	Safety of machinery - General principles for design - Risk assessment and risk reduction
BS EN ISO 13857: 2008	Safety distances against reaching of hazardous areas
BS EN 809+A1:1998-12-15	Pumps and pump units for liquids - General safety requirements

1 Warranty

Watson-Marlow GmbH MasoSine Division ("MasoSine") warrants, subject to the conditions and exceptions below, through either MasoSine, its subsidiaries, or its authorised distributors, to repair or replace free of charge the pump housing or the pump front cover if it fails within 20 years of the day of manufacture of the product. Such failure must have occurred because of defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in this manual. Warranty on other parts will be in accordance with legal regulations.

MasoSine will not be liable for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products, including damage or injury caused to other products, machinery, buildings, or property. MasoSine will not be liable for consequential damages, including, without limitation, lost profits, loss of time, inconvenience, loss of product pumped, and loss of production. This warranty does not obligate MasoSine to bear any costs of removal, installation, transportation, or other charges which may arise in connection with a warranty claim.

Specific exceptions to the above warranty are:

Exceptions

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 or maintenance of the machine
- Operating the machine with defective safety devices or safety and protective devices not correctly attached or not functioning
- Non-compliance with the operating instructions regarding transport, storage, installation, start-up, operation, maintenance and setting of the machine.
- Unauthorised constructional changes to the machine
- Incorrectly performed repairs
- Catastrophe due to the effect of foreign bodies and acts of God

MasoSine grants no implicit warranties on the suitability of the products described for a certain application. MasoSine accepts no liability for errors contained in this documentation or consequential damage occurring due to the design, performance and the use of this documentation.

MasoSine's "General sales and delivery conditions" contain full details. These are available to the purchaser at the latest when the purchase contract is finalised.

2 Information for returning pumps

In compliance with the regulations in your area concerning the control of substances hazardous to health, you are required to declare the substances which have been in contact with product(s) you return to MasoSine or its distributors. Failure to do so will cause delays. Please ensure that you email us this information and receive a RGA (Returned Goods Authorisation) before you despatch the product(s). A copy of the RGA form must be attached to the outside of the packaging containing the product(s).

Please complete a separate decontamination certificate for each product and attach it to the outside of the packaging containing the product(s). A copy of the appropriate decontamination certificate can be downloaded from the Watson-Marlow Limited website at www.wmftg.com.

You are responsible for cleaning and decontaminating the product(s) before return.

3 Environment and disposal of waste



Always observe the local rules and regulations with respect to safe disposal of waste.

Enquire within your local government about the possibilities for reuse or environment-friendly processing of materials, (contaminated) lubricant and oil. Dispose of materials safely, and in accordance with regulations in your area.

- Stainless steel parts should be recycled where possible
- Plastic should be recycled where possible
- Oil, grease and lubricants should be washed out and disposed of properly according to local regulations
- Elastomers should be recycled where possible

4 When you unpack your pump

Unpack all parts carefully, retaining the packaging until you are sure all components are present and in good order. Check against the components supplied list, below.










Packaging disposal

Dispose of packaging materials safely, and in accordance with regulations in your area. The outer carton is made of corrugated cardboard and can be recycled.

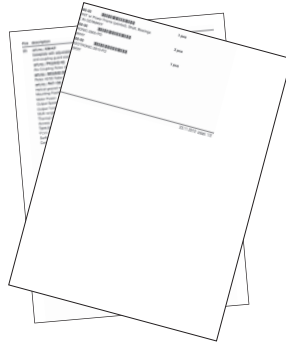
Inspection

Check that all components are present. Inspect components for damage in transit. If anything is missing or damaged, contact your distributor immediately.

Components supplied (SPS 100, SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500)

	stainless power frame	cast iron power frame
SPS 100		n/a
SPS 200		
SPS 250		n/a
SPS 300		
SPS 400		
SPS 500		n/a

- SPS 100, SPS 200, SPS 250, SPS 300, SPS 400 or SPS 500 sinusoidal pump, bare-shaft, with stainless steel or cast iron power frame



- The technical datasheet identifying, describing and defining the pump
- Operating instructions

Optional items

- Coupling
- Coupling guard
- Drive
- Baseplate

Optional special design

- Flush systems
- Guard master
- Jacketing for heating and cooling

Storage

This product has an extended shelf life. However, plastic parts and elastomeric parts should be stored in a cool, dry environment. Care should be taken after storage to ensure that all parts function correctly.

5 Sinusoidal pumps - an overview

The functioning principle of MasoSine pumps is ingeniously simple.

The pump consists of modular components.

The **sinusoidal rotor** creates a **chamber** within the **pump body** four times per revolution, in which the pumped fluid is displaced. As a filled chamber rotates, it contracts, closes and discharges its contents. At the same time, the opposite chamber opens by the same fraction of a millimetre to draw in more fluid. The result is a pump free of pulsation.

The **gate** works as a seal between the pressure side and the suction side of the pump. It prevents an equalisation of the pressure created by the rotor, stopping it escaping to the suction side.

6 Safety notes

Knowledge of these safety instructions and of the safety regulations in your area is a requirement for safe handling and trouble-free operation of this machine.

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. In addition, the rules and regulations for accident prevention applicable at the place of use must be obeyed.

The following safety instructions must be observed absolutely. They are an essential and indispensable part of the user documentation. Non-compliance can result in failure of warranty claims.

It is recommended in the interests 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.



This symbol highlights a safety instruction which must be followed to avoid danger to people or to the pump.



This symbol means: Beware of high voltage.



This symbol means: Caution, hot surface.



Caution: The pump contains rotating parts. The user must take care not to trap fingers, loose clothing, etc. inside the pump.

6.1 Obligation of the operating organisation

The operating organisation must ensure that people who work on the machine are familiar with and comply with the regulations concerning working safety and accident prevention.

6.2 Organisational measures

The personal protective equipment required must be provided by the operating organisation. Safety devices must be checked regularly.

6.3 Obligation of the operators

People who work on the machine must observe the relevant safety regulations concerning working safety and accident prevention before starting work; must read the safety chapter and the warning notes in these operating instructions.

6.4 Personnel training

Only trained people may work on the machine. Their responsibilities must be defined clearly for assembly, start-up, operation, setting, maintenance and repairing.

6.5 Safety measures

The operating instructions must be kept with the machine. General and local regulations for accident prevention and environmental protection, and the operating instructions, must be observed. Safety and danger warnings on the machine must be legible.

6.6 Dangers when handling the machine

The MasoSine pump is built according to state-of-the-art principles and the recognised 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 its intended use
- if it is in a safe engineering condition.

Faults which may compromise safety must be rectified immediately.

6.7 Safety measures in normal operation

Operate the machine only if all protective devices are functioning. Before switching the machine on make sure that no one can be endangered when the machine starts. At least once per shift inspect the machine for damage and for proper functioning of the safety devices.

6.8 Protective devices

All protective devices must be attached correctly and functioning before every start-up. Protective devices may be removed only after the machine has stopped and protection measures against restarting the machine have been taken.

After spare parts have been fitted, protective devices must be attached according to the operating organisation's regulations.

If contact with hot or cold machine parts could be dangerous, protection must be provided for the pump user.

6.9 Dangers due to hazardous pumped material

If hazardous material is to be pumped, the appropriate regulations must be observed.

6.10 Dangers due to electrical energy

Work on the electrical supply must be performed only by an electrician.



Check the electrical equipment of the machine regularly. Rectify loose connections and scorched cables immediately.

Keep the control cabinet locked closed or secured with a tool. Access is allowed only to authorised personnel.

If work on parts conducting voltage must be done, call in a second person to switch off the mains power if necessary.

Electrical connection of the pump must be made according to local regulations, by skilled personnel only.

6.11 Dangers due to hydraulic energy

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

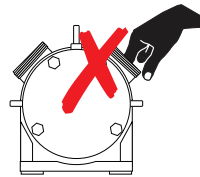
Relieve the pressure in the system sections and pressure lines to be opened before starting repair work.

Replace hydraulic hose lines at appropriate intervals, even if no safety-relevant defects are detectable.

6.12 Special danger points



The pump contains a rotating rotor, which can crush or sever fingers and hands. The pump must be guarded so that it is not possible for people to hold the pump by its inlet or delivery ports with the rotor running. When the rotor is stationary, the drive must be secured against unintentional start-up. Increased danger exists if pipes are dismantled or the pump is open.



6.13 Constructional changes to the machine

Make no changes, attachments or conversions to the machine without the manufacturer's approval. All conversion measures require the written confirmation of Watson-Marlow GmbH MasoSine Division.

Replace machine parts which are not in perfect condition immediately. Use only original spare and wearing parts. Parts that are not obtained from MasoSine are not guaranteed to be designed and manufactured in compliance with load and safety requirements.

The warranty is invalid if genuine spare parts from MasoSine are not used.

6.14 Noise

The continuous sound pressure level proceeding from the machine should not exceed 70 dB(A). Higher sound pressure levels that can cause deafness can arise, depending upon local conditions. If this occurs, protect the operating personnel with appropriate protective equipment / protective measures.

6.15 Temperature



The pump bearing frame can heat up when in use and can reach a temperature of about 70°C. Caution should be exercised, as this can cause injury to the operator. In addition, the pump itself can heat up if hot product is transferred.

6.16 Limit values for the pump

The pump's maximum speed, maximum pressure and maximum temperature are included in the technical data sheet supplied with each pump. These limit values must not be exceeded in any circumstances. This applies in particular when using a frequency converter.

If pump is supplied without a drive, the following values apply:

	SPS 100	SPS 200	SPS 250	SPS 300	SPS 400	SPS 500
Maximum pressure*	10 bar/ 145 psi	10 bar/ 145 psi	15 bar/ 217 psi	15 bar/ 217 psi	15 bar/ 217 psi	15 bar/ 217 psi
Maximum speed*	1000rpm	1000rpm	800rpm	600rpm	600rpm	600rpm
Maximum temperature*	100C/ 212F	100C/ 212F	100C/ 212F	100C/ 212F	100C/ 212F	100C/ 212F
Ambient temperature	-12C to 40C/10F to 104F	-12C to 40C/10F to 104F	-12C to 40C/10F to 104F	-12C to 40C/10F to 104F	-12C to 40C/10F to 104F	-12C to 40C/10F to 104F

* These limits may vary, depending on the drive, the application and the rating of the pump. (See your purchase order confirmation, or contact MasoSine and quote your pump's serial number.) On customer request, higher pressures and temperatures are possible.

6.17 Maintenance and repair

Maintenance and repair work on the pump should only be carried out by trained service personnel, who should have read and understood this manual prior to installing, operating or servicing this equipment.

Inform operating personnel before starting maintenance and repair work. Protect all plant parts and operating media connected before and after the machine, such as compressed air and hydraulics, against unintentional start-up. In all maintenance, inspection and repair work, switch the machine off and secure the main switch against unintentional start-up.

Secure larger assemblies carefully to lifting gear. Check loosened screw connections for firm seating. Use only original spare parts.



After maintenance work is finished, check the safety devices are functioning.

Bearings maintenance

- The bearings of **SPS 100** pumps must be renewed after running for the periods shown in the table below.

	200 rpm	400 rpm	600 rpm	800 rpm	1,000 rpm
5 bar	10,000 hours	10,000 hours	6,986 hours	5,239 hours	4,191 hours
10 bar	2,079 hours	1,040 hours	693 hours	520 hours	416 hours

- We recommend renewing the bearings of **SPS 200** pumps with **cast iron** power frames after running for 10,000 hours at any pressure.
- We recommend renewing the bearings of **SPS 200** pumps with **stainless steel** power frames after running for the periods shown in the table below.

	200 rpm	400 rpm	600 rpm	1,000 rpm
5 bar	10,000 hours	10,000 hours	10,000 hours	10,000 hours
10 bar	10,000 hours	10,000 hours	10,000 hours	6,260 hours

- We recommend renewing the bearings of **SPS 250** pumps with **stainless steel** power frames after running for 10,000 hours at any pressure.
- We recommend renewing the bearings of **SPS 300** pumps with **cast iron** or **stainless steel** power frames after running for 10,000 hours at any pressure.
- We recommend renewing the bearings of **SPS 400** pumps with **cast iron** power frames after running for the periods shown in the table below.

	200 rpm	400 rpm	600 rpm
5 bar	10,000 hours	10,000 hours	10,000 hours
10 bar	10,000 hours	10,000 hours	10,000 hours
15 bar	10,000 hours	7,689 hours	5,126 hours

- We recommend renewing the bearings of **SPS 400** pumps with **stainless steel** power frames after running for the periods shown in the table below.

	200 rpm	400 rpm	600 rpm
5 bar	10,000 hours	10,000 hours	10,000 hours
10 bar	10,000 hours	10,000 hours	10,000 hours
15 bar	10,000 hours	7,210 hours	4,800 hours

- We recommend renewing the bearings of **SPS 500** pumps with **stainless steel** power frames after running for the periods shown in the table below.

	200 rpm	400 rpm	600 rpm
5 bar	10,000 hours	10,000 hours	10,000 hours
10 bar	10,000 hours	10,000 hours	10,000 hours
15 bar	10,000 hours	10,000 hours	7,500 hours

Note: Remove the bearing housing of SPS 200, SPS 300 and SPS 400 models only to replace or adjust the shim ring (see "Adjusting the shaft" on page 34). Do not attempt to dismantle the power end of the pump or replace the bearings. Pumps needing repair, servicing, new bearings or other work on the power end must be returned to MasoSine for attention. Special training is available for users of SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 models. Please contact MasoSine for further information.

6.18 Cleaning the pump

Handle substances and materials used correctly, especially when working on lubricating systems and when cleaning with solvents. For information on cleaning the parts in contact with the pumped fluid, see "Cleaning and sterilisation" on page 28.

6.19 Faults

If an operating fault occurs, switch off the machine and secure it against unintentional start-up.

6.20 Use as intended

The intended use of this product is listed in the order confirmation. The product should not be put to a different use or a use going beyond the use described.

Consult MasoSine if you wish to change the product, its pressure, speed or operating temperature.

7 Safety notes (ATEX)

If your MasoSine pump is to be used in production machinery in potentially explosive atmospheres, it will be equipped accordingly from the factory.

7.1 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.

 II 2 G c IIB T4

 II 2 D c T = 120C

Grounding symbol

Pump classification

MasoSine pumps are designed for continuous duty and are therefore assigned to the Device Group II – Application field “dust – or gas – explosive areas”.

Zone classification

MasoSine pumps can be used in explosive areas of zone 1 / 21. This corresponds to the category 2 G / D.



It is expressly forbidden to use the pumps in zone 0.

Classification of explosive 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). MasoSine pumps are designed to be used in explosive atmospheres G (Gas) or D (Dust).

Ignition protection

MasoSine 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.

Temperature classes

- EX II 2 G c IIB T4 ≥ 135C
- EX II 2 D c T = 120C

7.2 Earthing the pump

SPS pumps are equipped with an earthing point. The pump must be earthed by an earthing cable secured to the correct position. SPS 100 must be earthed at the base of the rear foot. Other models must be earthed as shown: with cast iron power frame, right; with stainless steel power frame, below right. This is particularly important in potentially explosive atmospheres.



Cast iron power frame



Stainless steel power frame



In addition to earthing the pump, the drive motor must also be earthed. If the drive is not earthed, the pump unit may not be operated.

7.3 Material properties

The plastic parts fitted inside the pump react more to temperature changes than stainless steel parts. For this reason, the specified maximum fluid temperature for which the pump is designed must not be exceeded. This temperature is included in your purchase documents. If the specified temperature is exceeded, linear expansion may block the pump; this in turn could cause the pump to fail or could result in damage to parts of the pump. In addition, excessive temperatures can accelerate the wear of dynamic parts and reduce the life of plastic parts.

Corrosion may occur to a pump's cast iron power frame if the paintwork is damaged. Corrosion represents a hazard for the use of pumps in potentially explosive atmospheres (for measures, see "Troubleshooting" on page 32).

Pumps with a stainless steel power frame are not subject to power frame corrosion.

7.4 Pressure conditions

A pressure controller must be installed to avoid over-pressure in the pump as a result of a closed pressure line.

7.5 Maintenance and repair

- Fill the pump with product before starting only outside the explosive atmosphere area. All tools used should comply with ATEX regulations.
- The pump unit must be kept free of dust with a damp cloth: accumulated dust can smoulder.
- The flushing channels in the power frame must be free of blockages and, if necessary, cleaned.

7.6 Cleaning the pump



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

7.7 Medium to be pumped

Carbon-sulfur compounds and chemicals with an ignition temperature below 120C must not be pumped.

7.8 Coupling

If the pump is used in potentially explosive atmospheres, it must be coupled to the drive by means of an elastic, positive coupling with ATEX certification for use with the pump. Chains, toothed belts, V-belts or similar equipment which may transmit radial forces to the bearings should not be used.

7.9 Drive

Any reduction gears in the drive chain and control units must be ATEX-certified for use with the pump. Combustion engines must never be used.

An inverter must be installed away from potentially explosive atmospheres, or have the same ATEX certification as the pump. In any case the inverter must have the properties required for operation in potentially explosive atmospheres: temperature monitoring, speed limitation, etc.

8 Pump specifications

Your pump carries a type plate on the bearing housing. It includes a serial number, which identifies the features of the product. The serial number also appears on the technical data sheet.

An example name plate is shown below.

(the abbreviations on the label are as follows: Pm=maximum pressure, max.=maximum speed, s/n=serial number)

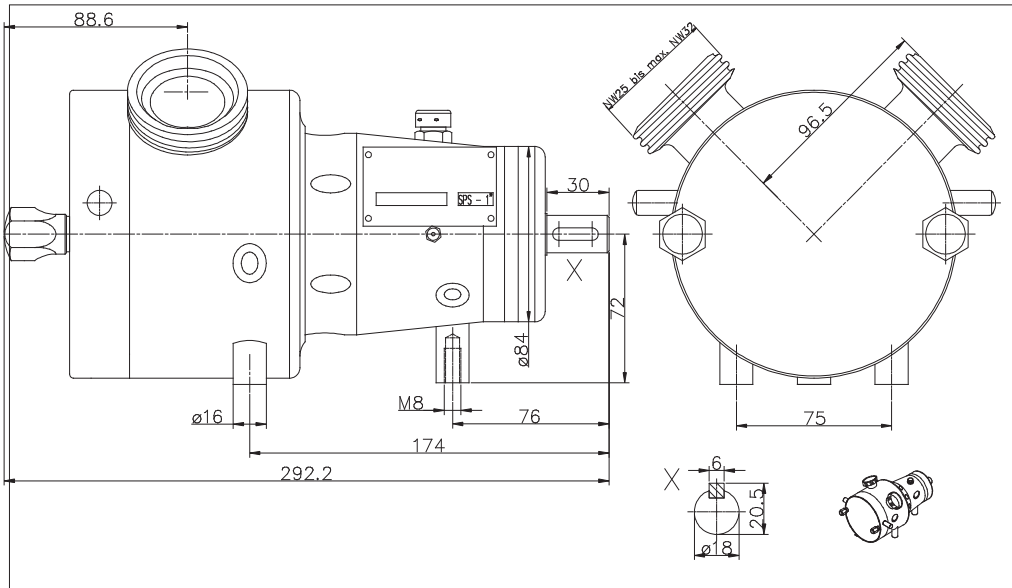


Standards

Relevant EC directives	2006/42/EC: EC Machinery Directive
	73/23/EEC: EC Low Voltage Directive
	2004/108/EC: EMC Directives
	97/23/EG: Pressure Equipment Directive
EC harmonised standards	Safety of machinery—electrical equipment of machines: EN 60204-1
	EN ISO 12100, 1-2 : Safety of machinery
	For ATEX: EN 1127-1: Explosive atmospheres— Explosion prevention and protection Part 1
	For ATEX: EN 13463-1: Non-electrical equipment for use in potentially explosive atmospheres Part 1
	For ATEX: EN 13463-5: Non-electrical equipment for use in potentially explosive atmospheres Part 5
National technical standards, guidelines and specifications	EN 809: Pumps and pump units for liquids— Common safety requirements
	DIN 31000/A1: General principles for the safe design of technical products (Amendment 1)
	DIN 11850: Pipes made of stainless steel for food and chemical industries
	DIN 11851: Stainless steel fittings for the food and chemical industry - Screw pipe connections for expanding and welding

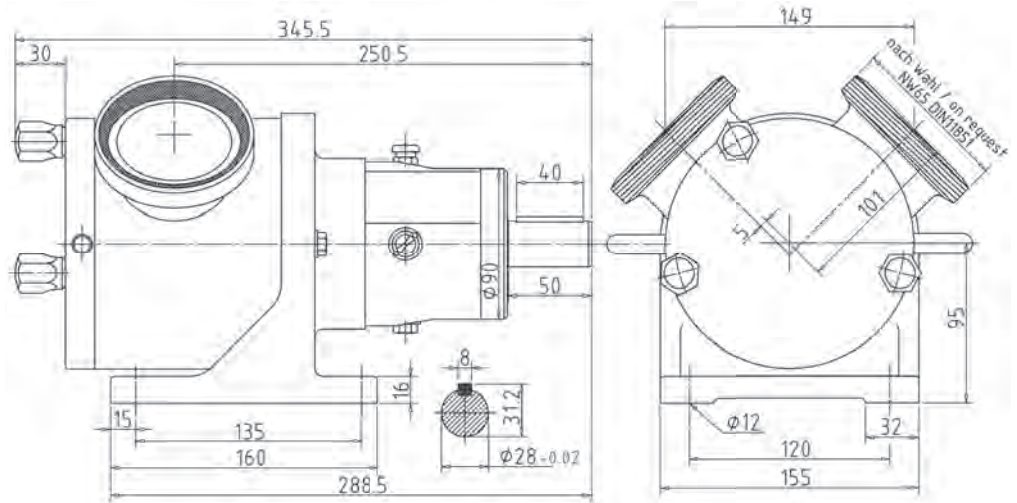
8.1 Dimensions (in millimetres)

SPS 100

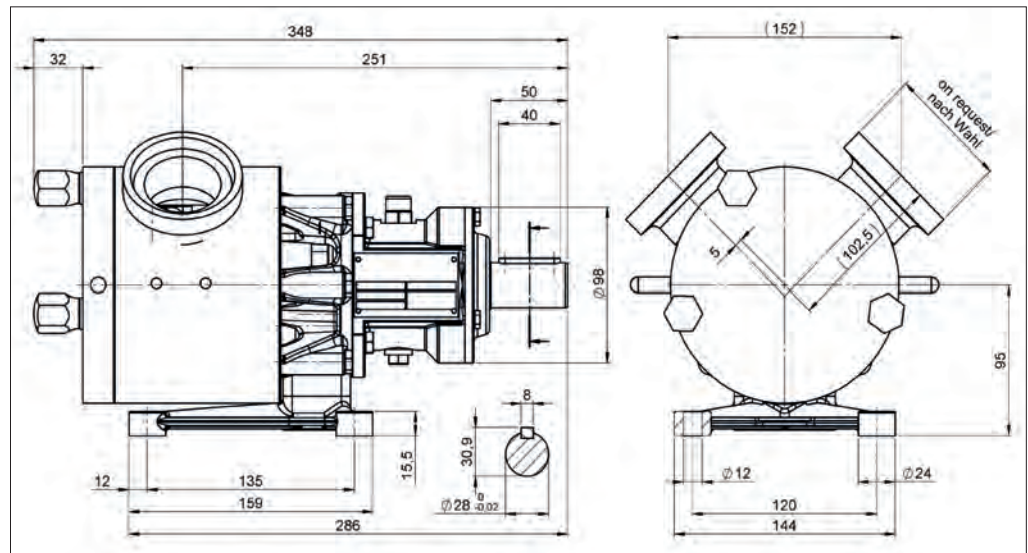


SPS 200 pumps, dimensions

Cast iron power frame



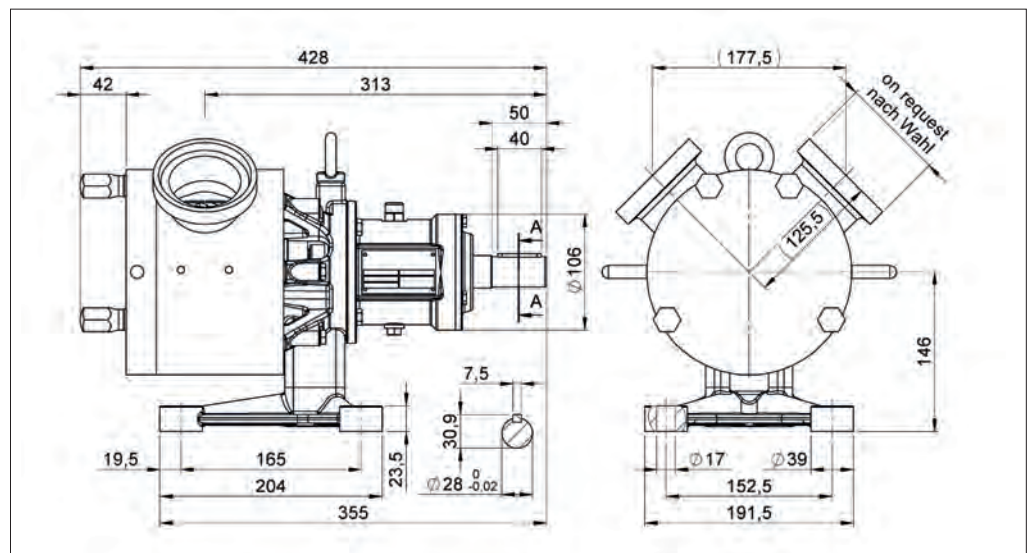
Stainless steel power frame



All critical dimensions of old and new power frame designs are the same, including mounting bolt holes. Both designs are interchangeable

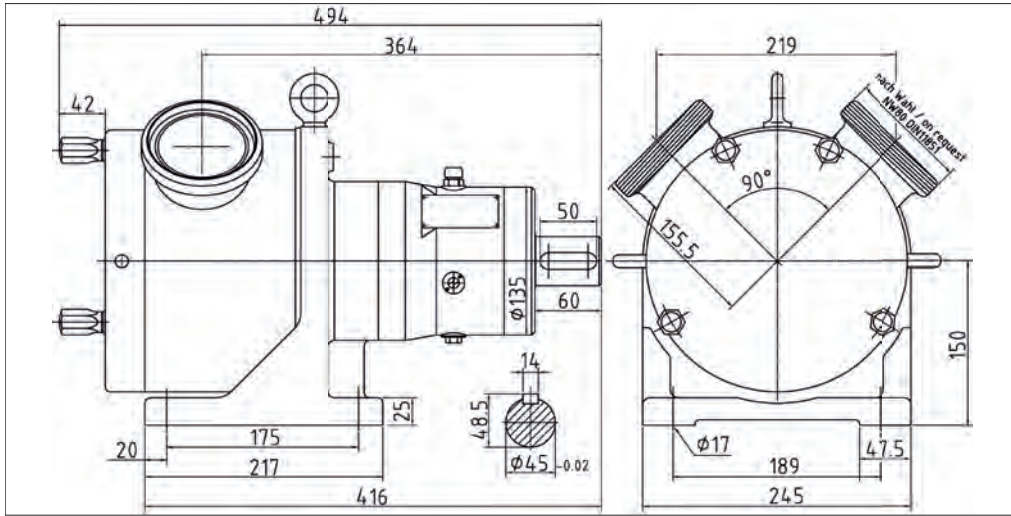
SPS 250 pumps, dimensions

Stainless steel power frame

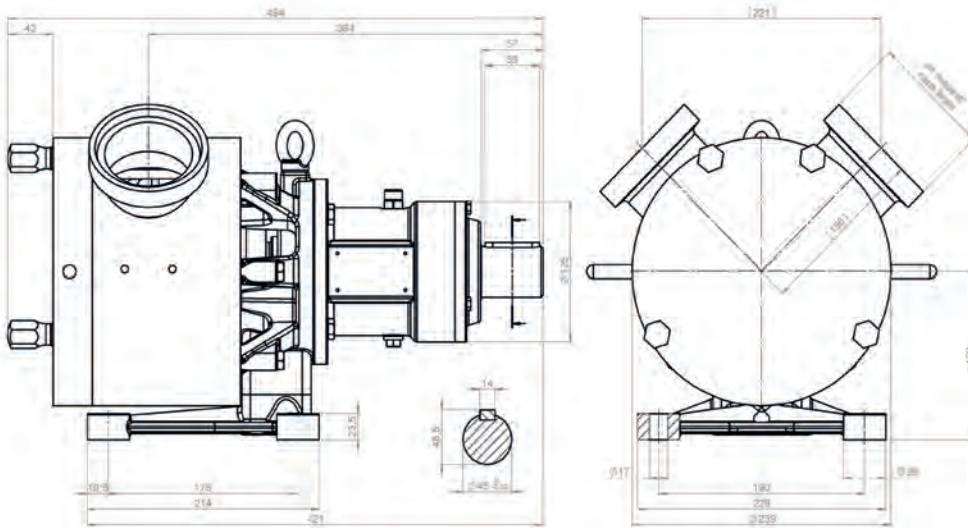


SPS 300 pumps, dimensions

Cast iron power frame



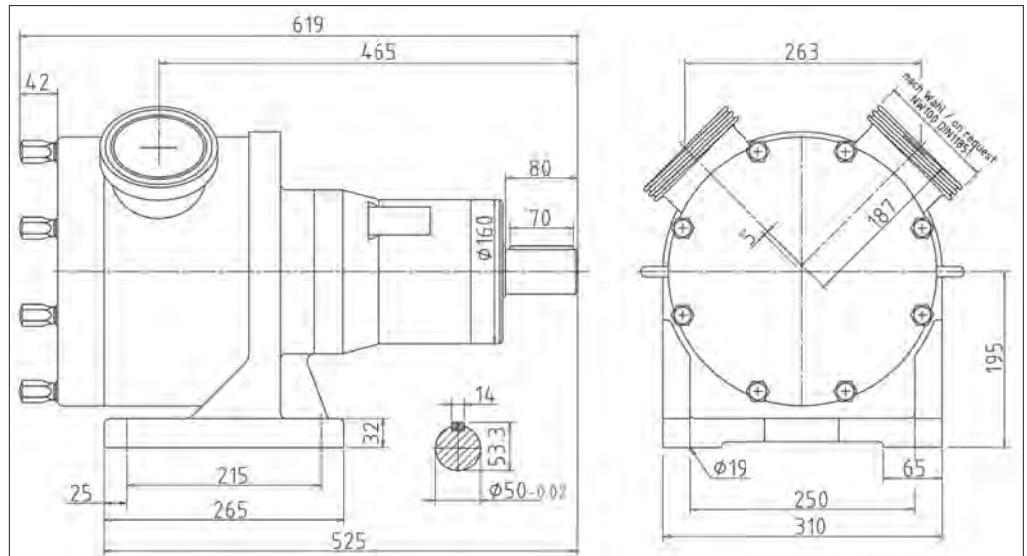
Stainless steel power frame



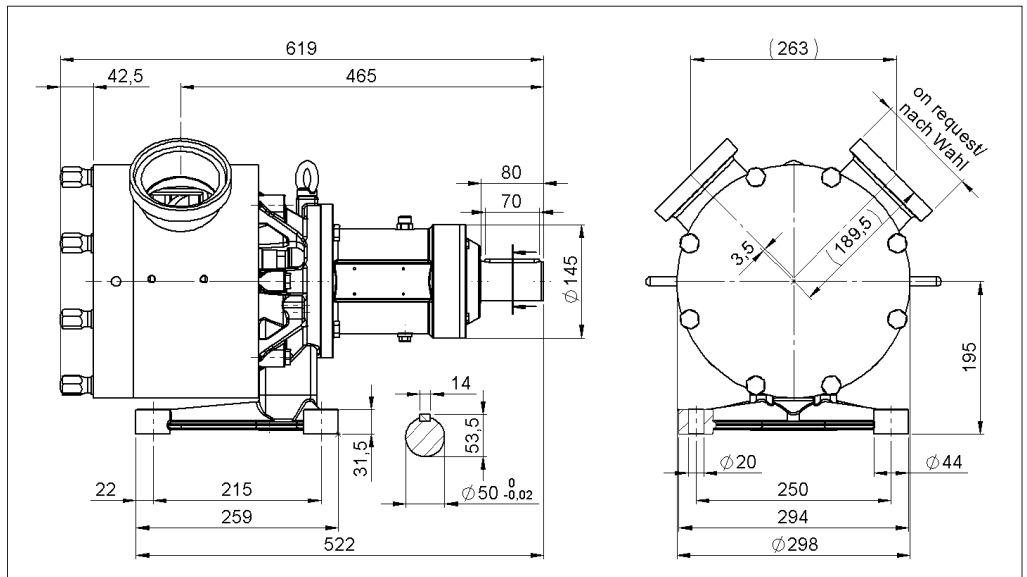
All critical dimensions of old and new power frame designs are the same, including mounting bolt holes. Both designs are interchangeable

SPS 400 pumps, dimensions

Cast iron power frame



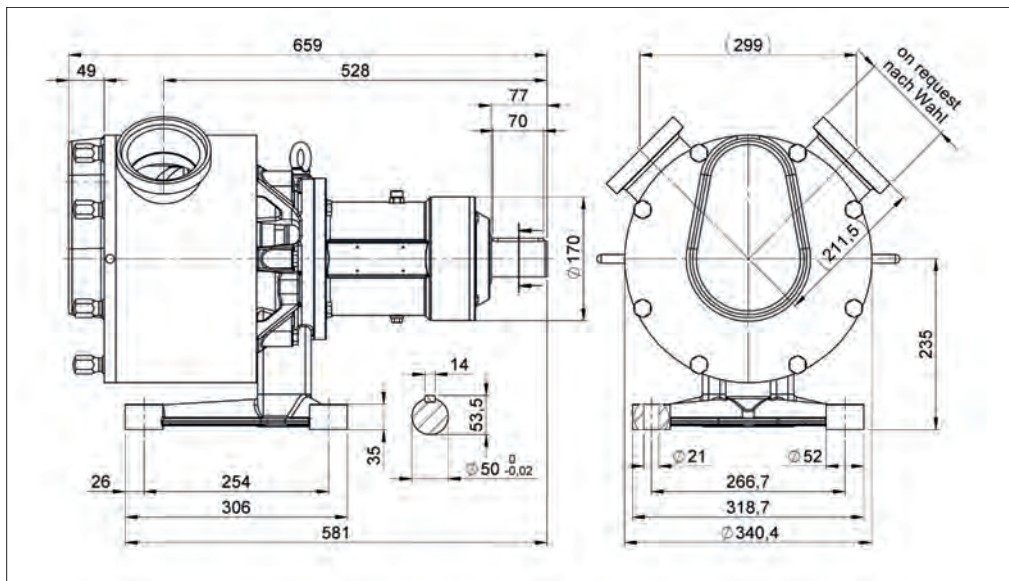
Stainless steel power frame



All critical dimensions of old and new power frame designs are the same, including mounting bolt holes. Both designs are interchangeable

SPS 500 pumps, dimensions

Stainless steel power frame

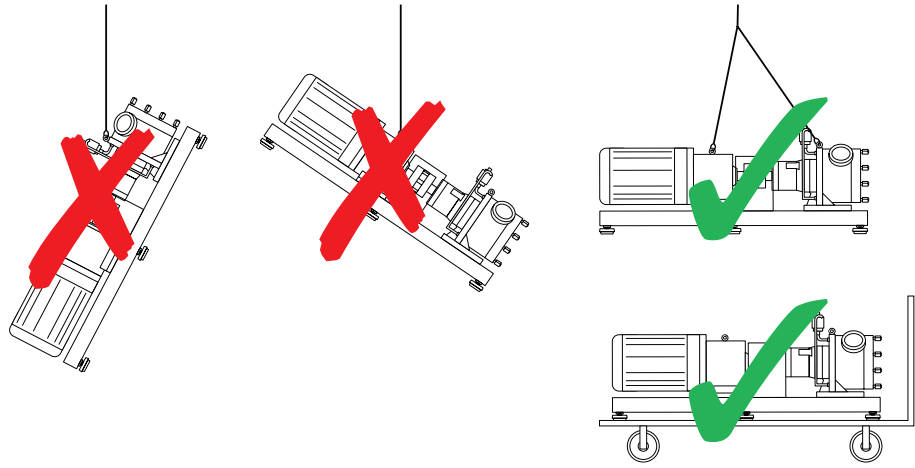


Unit weights

	Pump weight, cast power frame	Pump weight, stainless steel power frame	Weight of standard baseplate	
SPS 100		17.00kg 37lb 8oz	Part no: KK-...	13.00kg 28lb 11oz
SPS 200	23.00kg 50lb 11oz	20.00kg 44lb 1oz	Part no: KK-...	13.00kg 28lb 11oz
SPS 250		39.00kg 86lb	Part no: KK-...	13.00kg 28lb 11oz
SPS 300	80.00kg 176lb 6oz	68.00kg 149lb 15oz	Part no: KM-...	19.00kg 41lb 14oz
SPS 400	160.00kg 352lb 12oz	125.00kg 275lb 9oz	Part no: KG-...	31.00kg 68lb 5oz
SPS 500		171.00kg 377lb	Part no: KG-...	31.00kg 68lb 5oz

9 Transport

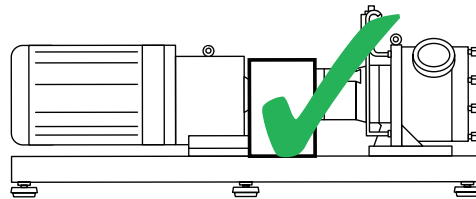
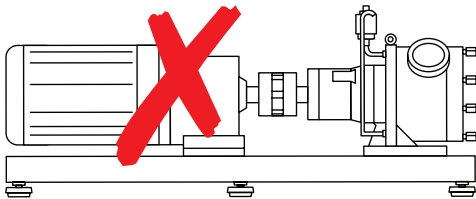
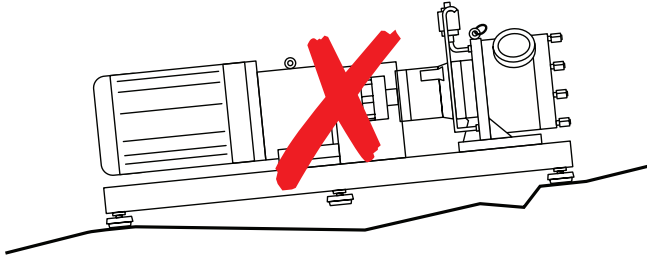
Choose the right means of transport according to the size of the pump and the drive. The pump must be suspended correctly for transport. If using a crane or fork-lift truck, the ropes or belts must be sufficiently dimensioned. If the pump is transported with a lift truck or fork-lift truck, note that the unit's centre point is not necessarily the centre of gravity.



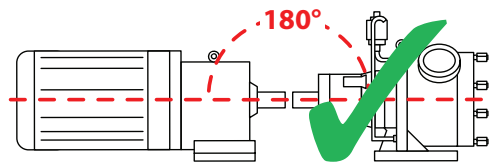
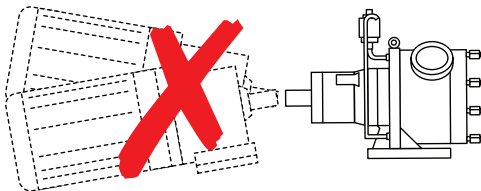
10 Good pump installation practice



The motor shaft and pump shaft connection must be guarded to protect the user from contact, when in use.



- Place the pump on a level surface
- Do not start the pump without a coupling guard to protect the user from contact.
- The mounting surface should be strong enough to support the pump.
- There should be sufficient space for maintenance work around the pump.
- The motor must receive an adequate air supply.
- If the pump is used in potentially explosive atmospheres, an Ex-protected motor must be used. Contact the manufacturers for assistance.
- The unit must be protected against static charge.
- Align the pump shaft with the drive shaft.



10.1 Dos and don'ts

- Do not build a pump into a tight location without adequate airflow around the pump.
- Do not pump any chemical not compatible with the materials of the pumphead.
- Do keep delivery and suction pipes as short and direct as possible - though ideally not shorter than one metre - and follow the straightest route. Use bends of large radius: at least four times the pipe diameter. Ensure that connecting pipework and fittings are suitably rated to handle the predicted pipeline pressure. Avoid pipe reducers and lengths of smaller bore pipe than the pumphead section, particularly in pipelines on the suction side. Any valves in the pipeline must not restrict the flow. Any valves in the flow line must be open when the pump is running.
- Do use suction and delivery pipes equal to or larger than the nozzle diameter bore.
- Do site the pump at or just below the level of the fluid to be pumped if possible. This will ensure flooded suction and maximum pumping efficiency.
- Valves in the process flow must be opened before the pump operates. Users are advised to fit a pressure relief device between the pump and any valve on the discharge side of the pump to protect against damage caused by accidental operation with the discharge valve closed.

11 Connection to the piping



Before connection, clean the piping and remove foreign bodies such as welding residues.



Fit elastic intermediate members (compensators) between pump and fixed piping on the suction and pressure sides, to stop pump vibrations being transmitted to the piping system.



Avoid forces and torques acting from the piping on the pump connections (e.g. distortion, expansion due to temperatures etc.).



The piping on the pressure side of the pump should run upwards from the pump, so that residual liquid can flow back into the pump when pumping stops, and total dry running is avoided. Fluid left in the pump facilitates suction when pumping re-starts.



The user must ensure that a pressure rise above the pressure agreed in the purchase order and listed in the technical data sheet is not possible.



MasoSine pumps normally run with such a low resonant frequency that no damage results. However, particularly when running with inverters, certain frequencies can cause interference vibrations which must be avoided. It is important during commissioning to ascertain whether such vibrations exist and to define them, so that the inverter can be programmed to avoid these frequencies. Similarly, interference from cavitation or rigid lines must be avoided. See "Cavitation" below.

11.1 Cavitation

Cavitation is a problem in certain devices where fluid interacts with a moving surface. It can occasionally occur in sinusoidal pumps.

Where a surface moves through a fluid, low pressure areas are formed on the surface. The faster the surface moves, the lower the pressure around it can become. If the static pressure of the liquid falls below its vapour pressure, vapour bubbles form on the pressure side. These implode, causing very high, short-term pressure peaks up to several thousand bar. These pressure peaks can cause material erosion and are noisy.

To identify cavitation

If the pump is very noisy and vibrates vigorously, along with the pipe system attached to the pump, cavitation is likely to be the cause.

To avoid or remove cavitation

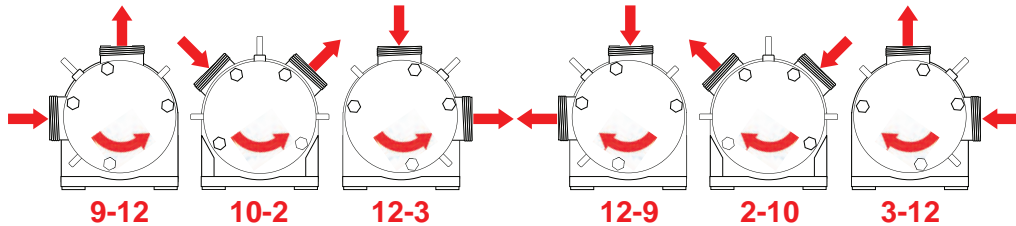
Increasing the inlet pressure on the suction side, installing a larger diameter or shorter inlet pipe or slowing the pump may solve the problem. Make sure that the pump is not starved of duty fluid at all times.



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

12 Possible pump orientations

The pump can be positioned in one of eight orientations, and can rotate clockwise or counter-clockwise.



Counter-clockwise rotation of the rotor and motor

Clockwise rotation of the rotor and motor

Unless ordered otherwise, the pump is delivered in position 2-10. Special customised nozzle orientations are possible

12.1 Changing the pump orientation



Disconnect the pump from the mains power, and secure it against-unintentional start-up.

SPS 100



- Turn the pump on to its side to allow access to the baseplate securing bolts.
- Remove the three bolts and washers using a 13mm spanner. As each bolt is withdrawn, a spacer between the baseplate and the pump will fall out.
- Three sets of threaded fixing points are provided on the pump; the central set (pictured in use above) allows the inlet and outlet ports to be positioned at 10-2 or 2-10; the other sets (one fixing point arrowed) allow the pump to be positioned with the inlet or outlet horizontal and the other port vertical.
- Pass the bolts with washers through the baseplate and the spacers (**Note:** the longer bolt and the longer spacer secure the baseplate to the bearing housing at the rear of the pump). Screw the bolts into the set of fixing points appropriate for the desired pump orientation. Tighten to 25Nm using a 13mm spanner.

SPS 200, SPS 250 SPS 300, SPS 400, SPS 500

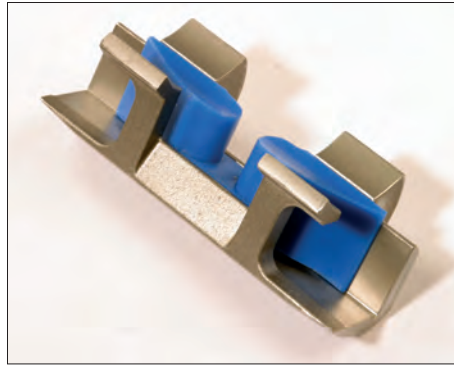
- Follow the dismantling and assembly steps for your pump model. See "Disassembly and assembly" on page 38
- Remove the screws on the power frame. Turn the housing by an angle of 45° to the left or right.
- Refit the screws in their new position and tighten them to the correct torque: SPS 200: 16 Nm SPS 250: 16 Nm SPS 300: 33 Nm SPS 400: 56 Nm SPS 500: 56 Nm

Note: If the direction of flow is also changed, the gate and gate guide must be reversed. See "Changing rotation direction" below.

Take care that fluid in the pressure line leaves the pump in an upward direction, so that when pumping stops, some fluid remains in the pump. This will make it easier for the pump to draw in viscous products when pumping restarts. This applies particularly when the pressure connection is horizontal: positions 12-3 and 12-9. Take care that the pressure line is run so that the pump rotor is always covered with fluid, and dry running is avoided.

12.2 Changing rotation direction

When the direction of rotor rotation is reversed, the suction side and the pressure side of the pump are exchanged. The orientation of the gate and the gate guide must be changed, too, or the pump cannot pump efficiently. **The pump can run for only a short time with the gate and the gate guide wrongly oriented, and it will not achieve more than 2 bar pressure.** See "Disassembly and assembly" on page 38. SPS 100 is shown here. All models are similar.



The gate and gate guide shown inverted to make clear the gate's position within the guide for counter-clockwise rotor rotation



The gate and gate guide oriented for counter-clockwise rotor rotation



The gate and gate guide oriented for clockwise rotor rotation

If the direction of rotation is reversed, change the rotation direction indicator arrows and mark the suction and pressure ports correspondingly.



Disconnect the pump from the mains power, and secure it against unintentional start-up. Ensure that the direction change is carried out by a trained engineer.

- Follow the dismantling and assembly steps for your pump model. See "Disassembly and assembly" on page 38
- Take special note of the instructions for fitting the rotor, the gate and the gate guide

Take care that fluid in the pressure line leaves the pump in an upward direction, so that when pumping stops, some fluid remains in the pump. This will make it easier for the pump to draw in viscous products when pumping restarts. This applies particularly when the pressure connection is horizontal: positions 12-3 and 12-9. Take care that the pressure line is run so that the pump rotor is always covered with fluid, and dry running is avoided.

13 Connecting this product to a power supply



The motor must be connected according to local regulations by a qualified person. See the instruction manual supplied with your drive motor.

14 Start-up and operation

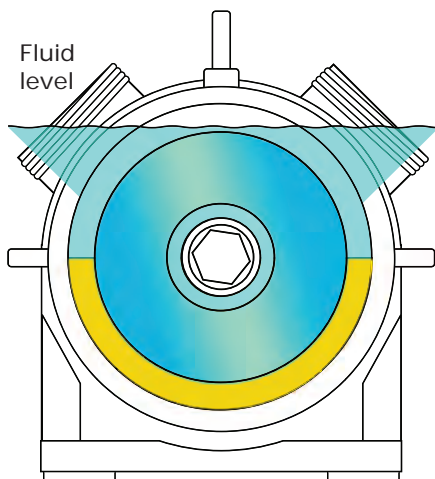
- If you are starting the pump for the first time, or have performed cleaning or repair work, check first that all screws are correctly and completely tightened.
- The pump may have been contaminated during transport. Remove the pump front cover and clean if necessary before start-up.
- Before you start the pump, check that the gate and the gate guide are in the correct orientation in relation to the suction side and the pressure side of the pump. (See "Possible pump orientations" on page 24).



Observe the appropriate regulations if hazardous fluid is to be pumped.



Ensure that the pump is installed in an appropriate position with all necessary safety guards and precautions (sensors, switches, pressure gauges, etc.).



MasoSine pumps must be primed before use. Before commissioning and during operation, the pump must be filled with fluid, with the fluid level above the rotor (see diagram). This can be done manually through a side channel of your system's pipework, or by using a vacuum device where very viscous fluids are to be pumped; contact MasoSine for further information. The need to prime can be avoided by leaving product in the pump after it is stopped; by leaving CIP or SIP fluid in the pump after cleaning. For ATEX use, fill the pump away from potentially explosive atmosphere, and be aware that **if the pump runs dry, the temperature limit for the explosive area may be exceeded.**



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



If the pump leaks, stop pumping as quickly as possible and replace the damaged sealing elements. See "Disassembly and assembly" on page 38 and "Seals" on page 119.



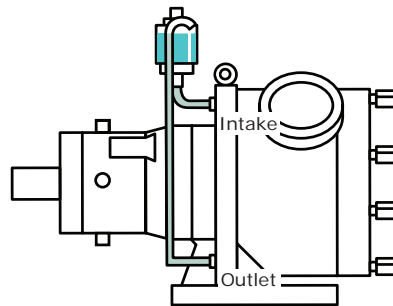
The operator must ensure that the pump can work free of cavitation. Cavitation can destroy the pump. See "Cavitation" on page 23.

15 Flushing the seal system

Flushing fluid at atmospheric pressure—usually water—flushes the area behind the seal system and prevents the product from hardening and damaging the seal system. If a static flushing device is fitted, the flushing fluid fills the area behind the seal.

- Cast iron power frame: If no static flushing device is fitted, adapt a fitting and a tube to the threads of the intake and outlet in the power frame (see diagram below; models differ) and circulate flushing fluid through the system.
- Stainless steel power frame: Make sure that the correct flush ring is installed with tube connections and circulate flushing fluid through the system.
- The flushing medium must be at least suitable to the product being pumped. It should not contain abrasive particles, which would damage the seals. We recommend that transparent plastic tubes are used as flushing tubes.
- The pump should be flushed without pressure: the flushing fluid should be allowed to drain from the system without pressure.
- Fill the pump with liquid to prevent it from running dry, possibly via a separate intake valve connected to the suction or pressure pipe.
- If your pump is set up for permanent flushing, always check the intake and outlet (see diagram below).

15.1 Static flushing device



Before commissioning, fill the flushing device (if supplied) with a suitable flushing fluid, depending on the product being pumped. Fill the sight glass with flushing fluid until the fluid level is just below the bend in the outlet pipe.

Note: The diagram shows a flushing device fitted to a pump with a cast iron frame. Pumps with stainless steel frames are similar.

16 Cleaning and sterilisation



Attention: Keep a minimum distance of 50cm (20 inches) from the pump while performing high-pressure cleaning.

MasoSine SPS pumps may be cleaned in place. Please follow our CIP cleaning instructions—see below.

Maintaining a clean process line is vital to maintain a high level of hygiene and no contamination of an end-product. Contamination costs time and money.

The heat or chemical reaction from clean-in-place (CIP) and steam-in-place (SIP) cleaning processes damages a living cell's essential structures, including the cytoplasmic membrane, rendering the cell no longer viable.

The process automatically re-circulates cleaning detergent and rinse solutions.

16.1 The benefits of clean-in-place (CIP) and steam-in-place (SIP)

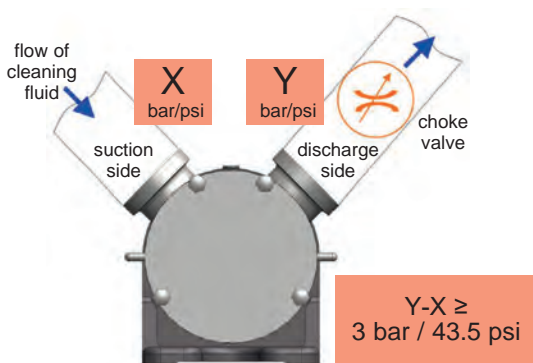
- Cleaning is faster
- Cleaning is less labour-intensive
- Cleaning is repeatable
- There is a reduced chance of operators being exposed to hazardous chemicals

16.2 Clean-in-place (CIP) for MasoSine products

Clean-in-place (CIP) is a method of cleaning the interior surfaces of pipes, vessels, process equipment and associated fittings without disassembling.

16.3 The CIP procedure

- Before the CIP process begins, a preliminary clean should be performed at maximum speed with no back pressure. This will remove most of the residual product.
- Suitable cleaning fluids for the CIP process may include concentrations below 1% of additives. They may be:
 - Sodium hydroxide in distilled water
 - Nitric acid in distilled water
 - Phosphoric acid in distilled water
- CIP cleaning can be carried out between 80C and 90C as standard.
- Cleaning should be done at maximum pump speed to achieve a good cleaning result.
- It is very important that the differential pressure on the discharge side of the pump is at least 3.0 bar / 43.5 psi higher than the pressure on the suction side of the pump during the CIP process.
- A choke valve should be installed in the discharge pipeline immediately after the pump. Close the choke valve slowly until the pressure difference is correct.
- The CIP time for the pump is in accordance with the time required for system cleaning: usually 20 to 40 minutes.



16.4 Steam-in-place (SIP) for MasoSine products

Steam sterilisation kills micro-organisms through the application of moist heat (saturated steam) under pressure without disassembly.

- Sterilising the pump with standard equipment is possible up to 120C only at standstill.
- The pressure should be high enough to ensure that the steam reaches all parts of the static pump through the existing clearances.

Class II SIP and CIP procedure	Maximum temperature	Recommended pressure differential
CIP	80—90C / 176—194F	3 bar
SIP	120C / 248F	N/A

Key CIP and SIP safety information

- A distance of one metre around the pump should be kept clear during SIP to minimise danger in case of leakage.
- CIP and SIP processes should be monitored continuously.
- If a leak occurs during CIP or SIP, the pumphead should not be touched until system pressure has been relieved and the pumphead has been allowed to cool down.
- Ensure that an acclimatisation period is observed after SIP before the pump process is started. The temperature inside a standard pump should not exceed 85C (176F) during operation.

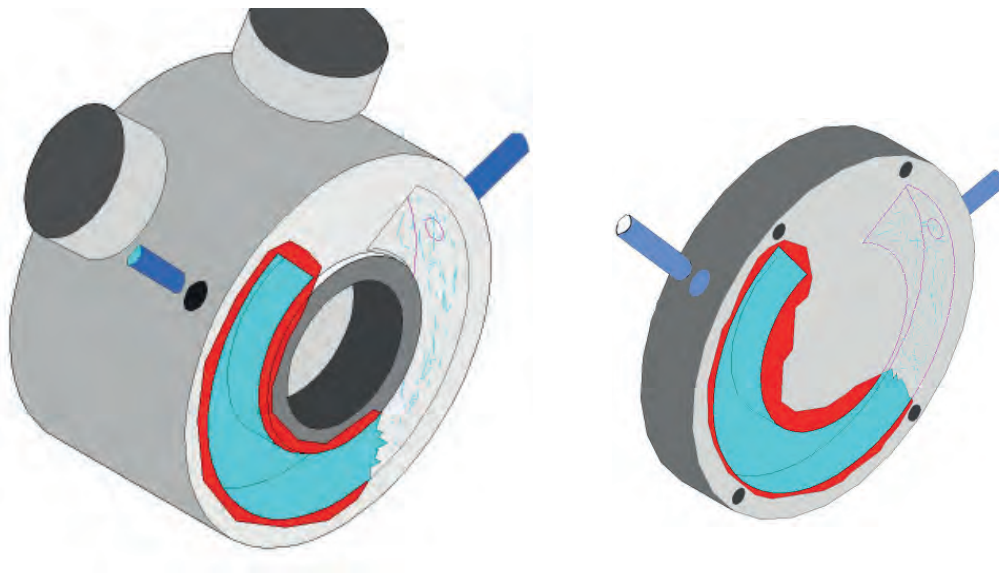
17 Heating and cooling option

Special versions of MasoSine SPS 100, SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 pumps can be heated or cooled to provide the correct temperature for your process—pumping chocolate or ice cream, for example—by passing fluid at the temperature required through crescent-shaped channels in the pump housing and the front housing. The pump has 1/4in or 1/8in connections on two sides through which the heating or cooling agent flows. The position of the connections varies depending on the model. Counterpressure should not exceed 1 bar.

Note: Most pumps can be retro-fitted to allow heating and cooling.

Note: The connections on the front cover may hinder some maintenance work at the pump. In most cases, the heating / cooling of the pump housing is sufficient. Maintenance is not hindered by the connections.

Note: If a heater is used to maintain a raised temperature, that temperature must be approved by MasoSine.



17.1 Part numbers for heating and cooling options

	SPS 100	SPS 200	SPS 250	SPS 300	SPS 400	SPS 500
Pump housing	MP-HZG-G-SPS10	MP-HZG-G-SPS20	MP-HZG-G-SPS21	MP-HZG-G-SPS25	MP-HZG-G-SPS40	MP-HZG-G-SPS50
Front cover	MP-HZG-D-SPS10	MP-HZG-D-SPS20	MP-HZG-D-SPS21	MP-HZG-D-SPS25	MP-HZG-D-SPS40	MP-HZG-D-SPS50

18 Changing the oil

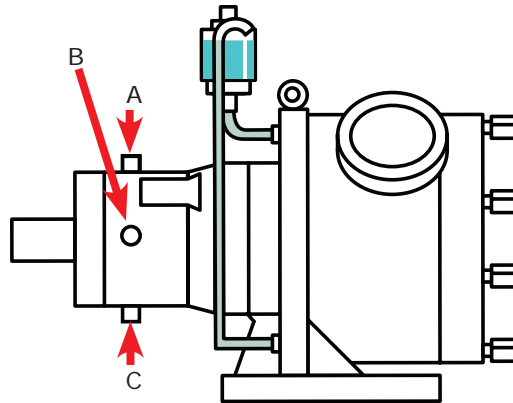
18.1 SPS 100

Every day before using your pump, check that there is enough grease in the storage chamber. Remove the vent at **A** and insert grease through the nipple at **B** until grease starts to come out at **A**. Refit the vent.

Standard first filling, for -10 to 60°C (14 to 140°F): MOLYDUVAL Soraja C532, DIN 51502.

Grease grades for Ex zones:

- At temperature class T4 (60°C (140°F) or less: MOLYDUVAL Soraja C532, DIN 51502.
- At temperature class T3 (61 to 120°C (142 to 248°F) or less: MOLYDUVAL Pegasus KD 460.



18.2 SPS 200, SPS 250, SPS 300, SPS 400, SPS 500

Every day before using your pump, check the oil viewing glass at **B** (see 27 in the parts list, "Parts lists" on page 91) in the bearing housing (see 11 in the parts list, "Pumps" on page 92) for damage and to confirm that enough oil is in the power frame. The oil should reach the middle of the glass.

- Check that the drain plug **C** is in place and fully tightened.
- Open port **A** and fill the power frame with suitable oil (see Note, below) until it is nearly full.
- Close port **A**.
- Check the oil level in viewing glass at **B**. Do not allow the level to fall below the viewing glass centre line.

Note: If the pump is intended to be used in an area where ATEX regulations apply, the oil viewing glass is replaced by a screwed plug.

Note: When a new pump is supplied, it is filled as standard with Klüberoil 4 UH 1-220 N lubrication oil for the food and pharmaceutical industries, which is suitable for process temperatures between -30C (-22F) and 120C (248F). **If the pump is intended to be used in an area where ATEX regulations apply, only this oil must be used.**

Filling volumes

	SPS 200	SPS 250	SPS 300	SPS 400	SPS 500
Cast iron power frame	Approx 0.10 litre	N/A	Approx 0.18 litre	Approx 0.38 litre	N/A
Stainless steel power frame	Approx 0.10 litre	Approx 0.10 litre	Approx 0.18 litre	Approx 0.35 litre	Approx 0.45 litre

Dispose of used oil according to local regulations.

Oil or grease needs to be changed at least once a year.

19 Troubleshooting

Error	Cause	Remedy
Pump does not draw in	Direction of rotation not correct	Check direction of rotation
	No wetting liquid in pump	Fill pump with liquid
	Screw fastening not tight	Check screw fastening
	Suction pipe too long	Adapt suction pipe
	Suction pipe too narrow	Adapt suction pipe
	Shaft seal leaking	Check all seals for damage
	Wearing parts worn	Replace wearing parts
	Motor speed not correct	Measure and regulate speed
	Gate and gate guide wrongly positioned	Check position (see "Changing rotation direction" on page 24)
Pump does not deliver	Direction of rotation not correct	Check direction of rotation
	Suction and pressure pipe confused	Check pipe system
	Motor speed not correct	Check pump speed against performance curves—see your purchase order
	Wearing parts worn	Replace wearing parts
	Gate and gate guide wrongly positioned	Check position (see "Possible pump orientations" on page 24)
	Inserted gate valve closed	Check pipe system
Pump is noisy	Noises from the drive	Consult manufacturer
	Noises from the pump	Consult manufacturer
	Suction pipe too small (cavitation)	Shorten suction pipe or increase diameter, reduce speed
	Knocking noises from the pumphead	Check if gate is worn and replace if necessary
	Noises from power frame	Fill oil, change tapered roller bearings
	Coupling not aligned	Align coupling correctly. See "Good pump installation practice" on page 22.
Pump leaks	Sealing system is leaking	Change seal faces, static / dynamic or lip seals
	O-ring seal leaking	Replace O-ring
	Lip seal ring on the power frame leaking, oil escapes	Dismantle power frame, replace lip seals
Pump leaks at front housing	Housing seal not installed or wrongly installed	Install housing O-ring correctly or replace
	Housing seal defective	Install housing O-ring correctly or replace

Error	Cause	Remedy
Pump is blocked	Foreign body in the pump	Remove foreign body, examine pump for damage
	Power supply interrupted	Check electrical installation and fuses, check drive
	Defect in the drive	Separate the coupling and turn the pump by hand to confirm
Severe wear after short operating time	Solids in the pumped fluid	Change the wearing parts frequently; check material compatibility
	Pumped fluid is abrasive	Choose larger pump, reduce speed
Rotor has wear on one side	Rotor not tightened correctly on installation	Tighten shaft nut firmly on block
	Adjusting dimensions changed after working on the bearing housing	Check and correct dimension X: SPS 200 = 17.5 mm +0.1~ SPS 250 = 17.4 mm +0.1 SPS 300 = 23.0 mm +0.1 SPS 400 = 15.0 mm +0.1 SPS 500 = 25.4 mm +0.1 See "Adjusting the shaft" on the next page
Pump not clean after CIP cleaning	Cleaning regulation not complied with. See "Cleaning and sterilisation" on page 28	Choke on the pressure side: Check that the pressure difference is 3-4 bar
Rotor has seized on liner	Rotor not correctly tightened	Tighten shaft nut firmly on block
	Temperature too high (thermal expansion)	Choose liner with larger tolerances
Flushing material between housing and power frame leaking	O-ring in the power frame missing or defective	Install or replace O-ring
Water or pumped material in the bearing housing	Flushing pressure too high	Flushing must be pressureless (attach pressure reducer, maximum 0.1 bar)
	Leakage bores—bore holes in the power frame where pumped material can escape if the seal system leaks—blocked (see graphic in "Heating and cooling option" on page 30)	Check leakage bores for free passage, replace shaft seals on pump and power frame
Front Support has seized on Rotor	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
Product is leaking from the bearing housing openings	Sealing system in the pump is leaking	Inspect and if necessary replace the sealing system and clean the rinsing channels in the power frame
Pump assembly subject to vibrations	Speed of the drive motor is too high	Lower the speed of the drive motor
Smells and smoke coming from the pump	Pump is running dry	Stop the pump immediately. Check inner parts for damage and replace if necessary
Corrosion	Corrosion occurs	Eliminate corrosion; lacquer or use spray oil

20 Adjusting the shaft

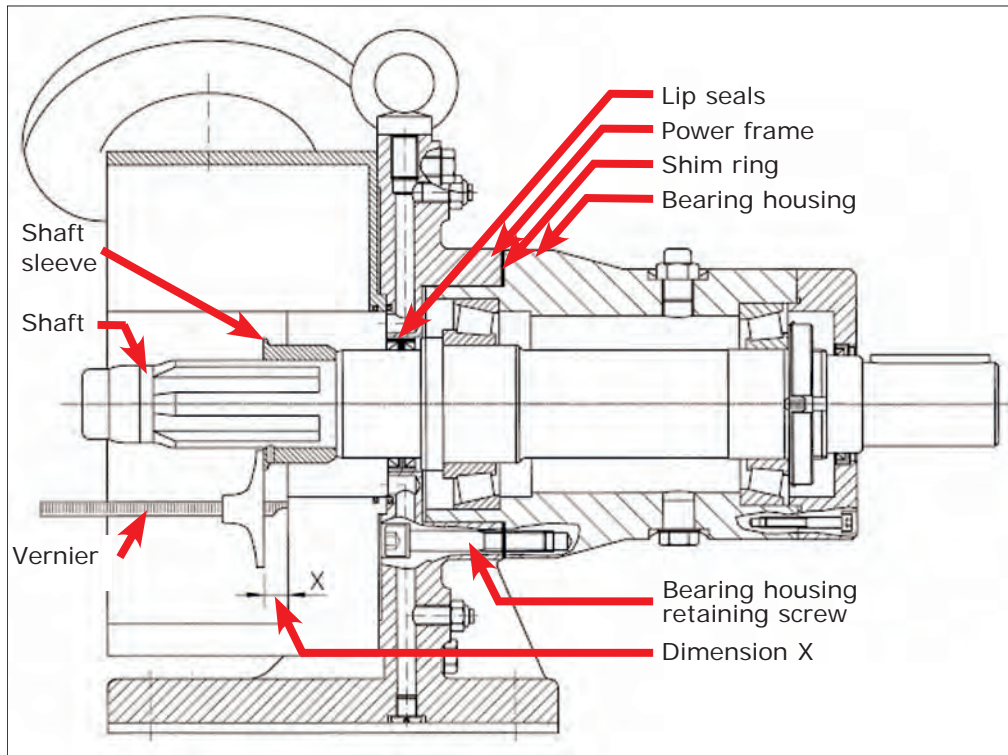
20.1 SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 pumps

It is important that dimension X is correct to achieve efficient pumping.

Note: Dimension X in all pumps may be measured as below. However, the structure of the SPS 100 pump casing is different from other models (and not as shown here) and SPS 100 dimension X is adjusted differently. SPS 100 pumps must be returned to MasoSine for dimension X adjustment.

20.2 Adjusting dimension X in models with cast power frame

SPS 200, SPS 300 and SPS 400 pumps



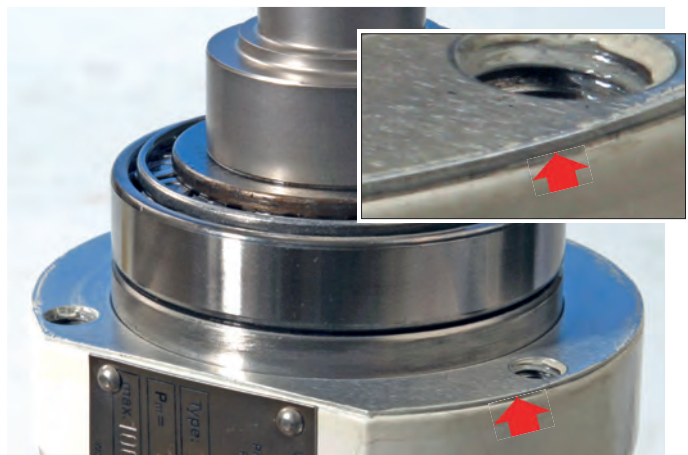
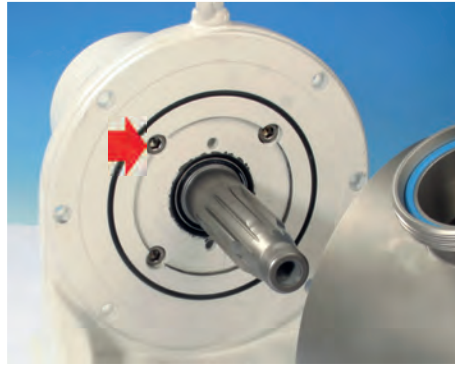
Dimension X

SPS 100	SPS 200	SPS 300	SPS 400
10.0mm +0.05	17.5mm +0.1	23.0mm +0.1	15.0mm +0.1

SPS 200, SPS 300 and SPS 400: adjusting dimension X

Note: SPS 100 pumps must be returned to MasoSine for dimension X adjustment.

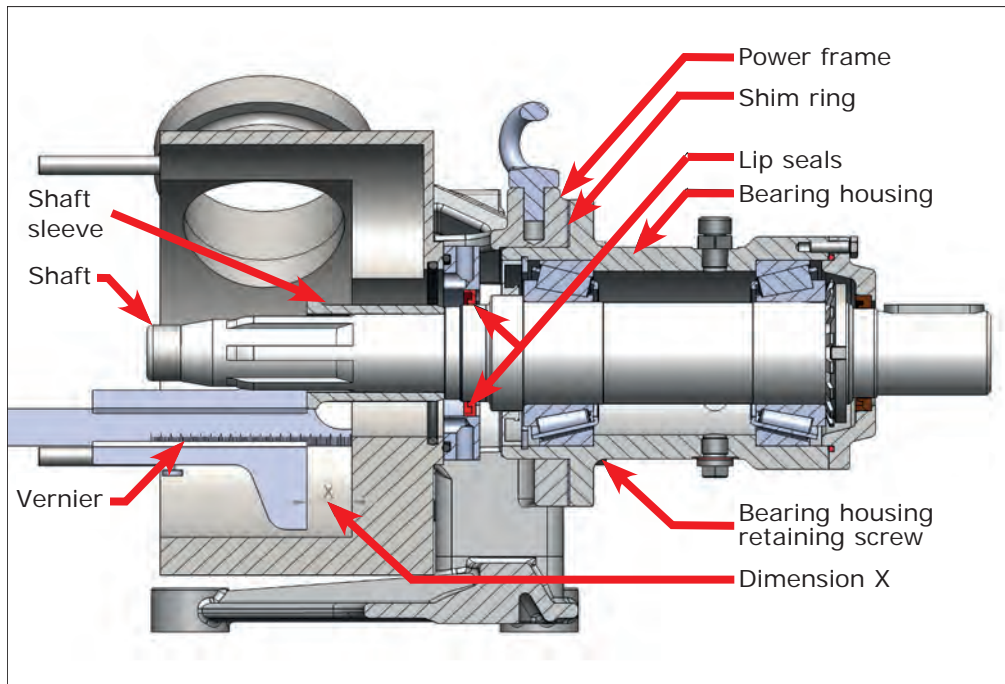
- Remove the front cover, the front support, the front liner, the rotor, the gate and the gate guide. See "Disassembly and assembly" on page 38.
- Measure dimension X.
- Check this dimension against the table above.



- If this dimension is not correct, continue disassembly (see "Disassembly and assembly" on page 38) until the face of the power frame is accessible (the SPS 300 and the SPS 200 pumps are shown here; the SPS 400 is similar).
- Use a 6mm Allen key to loosen and remove the bearing housing retaining screws and copper washers (arrowed; the number of screws varies with pump model.)
- Remove the bearing housing and the pump shaft, being careful not to damage the lip seals (arrowed). Note: lubricating oil will spill out as the bearing housing is removed.
- Remove the shim ring (arrowed in the three lower pictures) and install a new one. Reassemble, tightening the bearing housing retaining screws to 25Nm (SPS 200) 50Nm (SPS 300) 35Nm (SPS 400), and measure dimension X again.
- If this dimension is not correct, disassemble and peel layers from the shim ring equal in total thickness to the difference between there-measured distance and the correct distance, so that the correct dimension X is achieved. One layer is 0.05mm thick.
- Reassemble.

20.3 Adjusting dimension X in models with stainless steel power frame

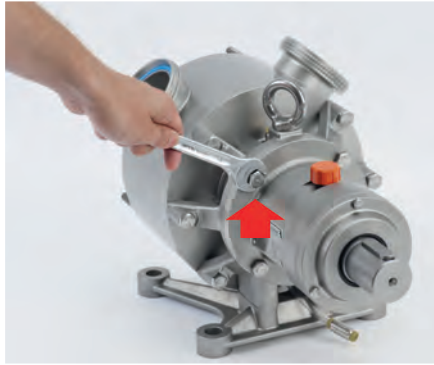
SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500



Dimension X					
SPS 100	SPS 200	SPS 250	SPS 300	SPS 400	SPS 500
10.0mm	17.5mm	17.4mm	23.0mm	15.0mm	25.4mm
+0.05	+0.1	+0.1	+0.1	+0.1	+0.1

Note: SPS 100 pumps must be returned to MasoSine for dimension X adjustment.

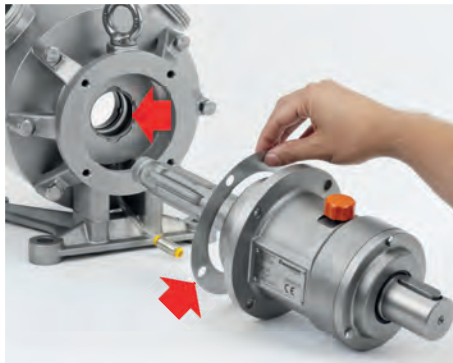
- Remove the front cover, the front support, the front liner, the rotor, the gate and the gate guide. See "Disassembly and assembly" on page 38.
- Measure dimension X.
- Check this dimension against the table above.



Picture 1



Picture 2



Picture 3

- If this dimension is not correct, use a wrench to loosen and remove the screws securing the bearing housing to the power frame (arrowed; the number of screws varies with pump model). (Picture 1).
 - For SPS 200: 13mm wrench
 - For SPS 250: 13mm wrench
 - For SPS 300: 16mm wrench
 - For SPS 400: 18mm wrench
 - For SPS 500: 18mm wrench
- Remove the bearing housing and the pump shaft, being careful not to damage lip seals (arrowed). (Picture 2).
- Remove the shim ring (arrowed) and install a new one between the power frame and the bearing housing. (Picture 3) Reassemble, tightening the bearing housing retaining screws as follows:
 - For SPS 200 M8: 16 Nm
 - For SPS 250 M8: 16 Nm
 - For SPS 300 M10: 33 Nm
 - For SPS 400 M12: 56 Nm
 - For SPS 500 M12: 56 Nm
- Measure dimension X again.
- If this dimension is not correct, disassemble and peel layers from the shim ring equal in total thickness to the difference between the re-measured distance and the correct distance, so that the correct dimension X is achieved. One layer is 0.05mm thick.
- Reassemble.

21 Disassembly and assembly

Note: The colour of plastic parts can vary from those shown in the pictures.

21.1 Dismantling all models



Disconnect the pump from the mains power, and secure it against unintentional start-up.

Removing the static flushing device (if supplied)

Note: The flushing device must be emptied and removed before dismantling the pump.

See "The static flushing device" on page 83.

21.2 Dismantling and assembling the SPS 100

Dismantling the SPS 100

Removing the front cover



- Use a 22mm spanner to remove the cap nuts (**right-hand thread**) and washers.
- Lightly tap the two front cover pins if necessary and use them to pull off the cover.
- You can now access the front cover O-ring (arrowed in the first picture in "Removing the locking nut" below) in its groove in the front cover.

Removing the locking nut



It is important to ensure that the shaft cannot rotate while the shaft nut is removed. If necessary, it may conveniently be secured using a well-padded wrench on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw: (SPS 100: TL-SP10-010-31).

- Use a 17mm spanner to remove the locking nut from the end of the shaft (**right-hand thread**).



The locking nut

Removing the front liner and the front bushing



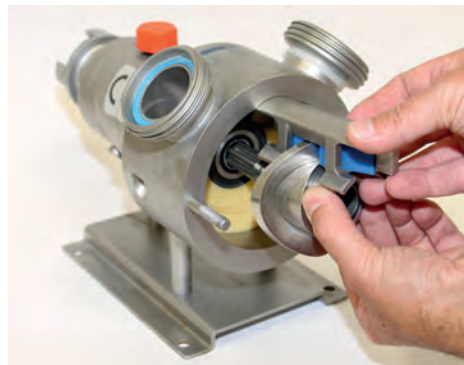
- Pull the front liner to remove it.

Note: You may find it convenient to turn the pump shaft and rotor a little to create space for your fingertips to grasp the top of the front liner.

- Remove the front bushing.
- You can now access the rotor front O-ring (arrowed) in its groove in the rotor front.



Removing the rotor, the gate and the gate guide



- Note the orientation of the gate and the gate guide so that they can be refitted in the same orientation. This is important because if the gate guide is refitted in the wrong orientation the pump will not work properly and the gate guide can be damaged. Use two hands to remove the rotor, the gate and the gate guide together.



The gate and gate guide shown inverted to make clear the gate's position within the guide for counter-clockwise rotor rotation

Removing the rear liner



- Pull the rear liner to remove it.

Removing the mechanical seal and the static face



- Remove the mechanical seal. You can now access the mechanical seal O-rings.
- Remove the static face. You can now access the static face O-ring. **Note:** If the static face cannot be removed by hand, it can be removed with the sealing system (see "Removing the sealing system" on the facing page).



The static face with its O-ring, left, the mechanical seal with one of its O-rings visible and the back bushing

Removing the distance piece and the back bushing



- Remove the distance piece. You can now access the distance piece O-ring.
- Remove the back bushing.



The distance piece



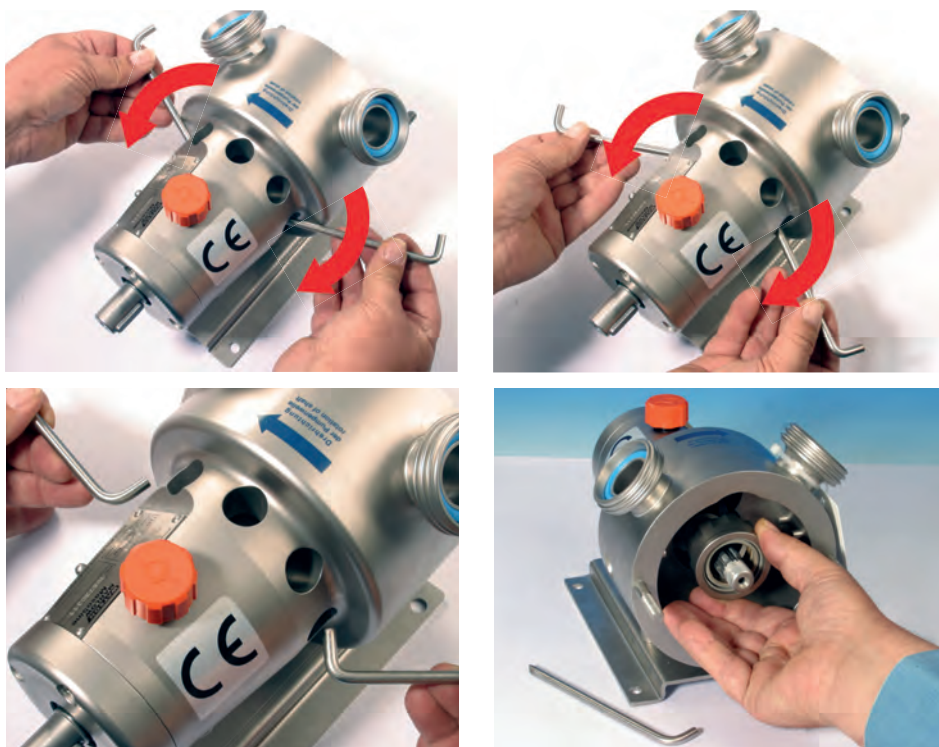
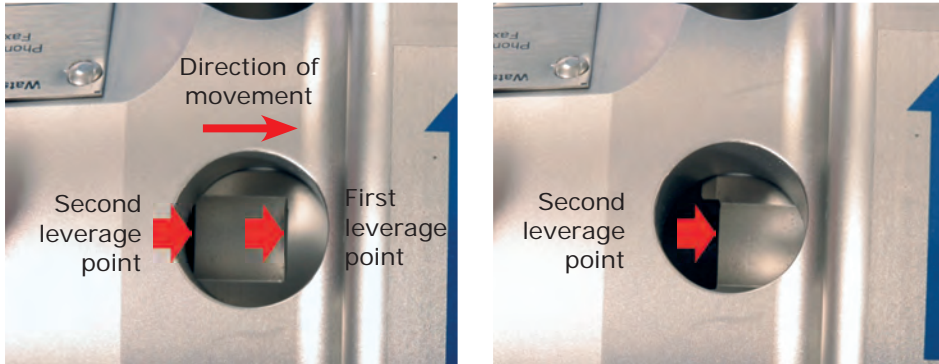
The front and back bushing.
They are identical

Removing the sealing system

Note: If your SPS 100 pump is fitted with a static flushing system, this must be removed before removing the sealing system. See "The static flushing device" on page 83.



- Use the special tools supplied with the pump to remove the seal housing.
- Position the pointed ends of the special tools to apply leverage to opposite sides of the seal housing at once: first, to the castellations of the seal housing; then to the end of the seal housing.



- Reverse the special tools and use the angled ends in the same way to apply further leverage to the end of the seal housing, until it is accessible within the pump chamber. Remove it.



The two versions of the SPS 100 pump seal housing: left, where no static flushing system is fitted; right, where a static flushing system is fitted

Disassembling the seals

- Graphics making clear how to disassemble and assemble the seals appear in section "Seals" on page 119.

Assembling the SPS 100

During assembly, check that all O-rings are properly positioned before fitting each component, and that all components are clean and lubricated.

Fitting the seal housing



The two versions of the SPS 100 pump seal housing: left, where no static flushing system is fitted; right, where a static flushing system is fitted



- Push the reassembled seal housing into position, castellations first. Make sure it is pressed all the way home. This can be done using the special tools as pushers, or using a special cylindrical tool which is available from MasoSine. Note: If a static flushing device is to be fitted, align the threaded sockets on both sides of the seal housing vertically, so they are central to the top hole in the bearing housing. See "The static flushing device" on page 83.

Fitting the static face and the mechanical seal—SPS 100 pumps with a single mechanical seal

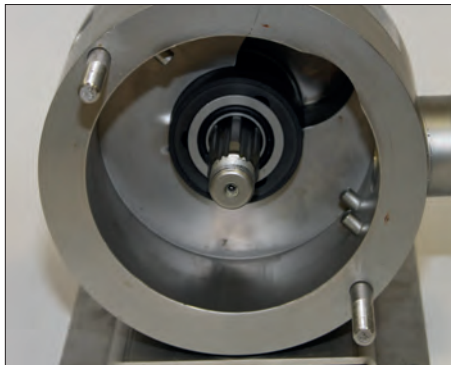
- Check that the static face's O-ring is properly positioned and that the O-rings either side of the mechanical seal are properly positioned.



The static face with its O-ring, left, and the mechanical seal with one of its O-rings visible. The surfaces of the two components seen here must come together on reassembly. The back bushing is seen, right



- Position the static face in the mechanical seal, with the static face's O-ring facing the mechanical seal. The static face has two recesses (arrowed) which must be correctly aligned with lugs (arrowed) either side of its seat



- Use a finger to retain the static face in position on the mechanical seal and push them on to the pump shaft and all the way home into the pump housing. **Note:** The mechanical seal has a lug on its inner surface which must be aligned with the shaft splines.

SPS 100 pumps with a triple lip seal: fitting the distance piece



- Check that the distance piece O-ring is in position.
- Push the distance piece into position, flanged end first.

Pumps with a triple lip seal: fitting the back bushing



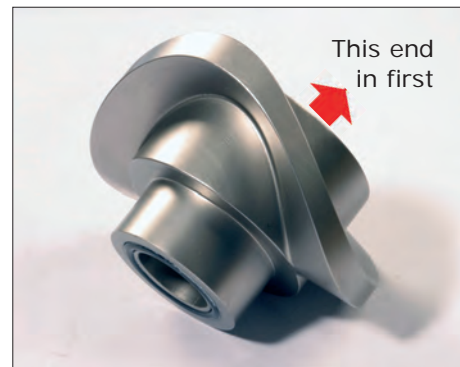
- Push the back bushing into position, thick end (arrowed) towards the front. (The two bushings are identical.)

Fitting the rear liner—all SPS 100 pumps



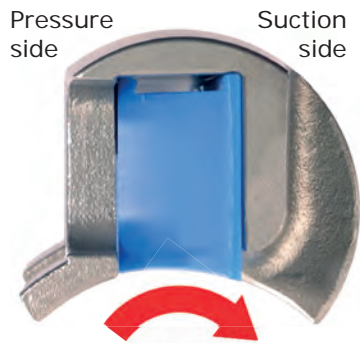
- Push the rear liner into position, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the rotor, the gate and the gate guide

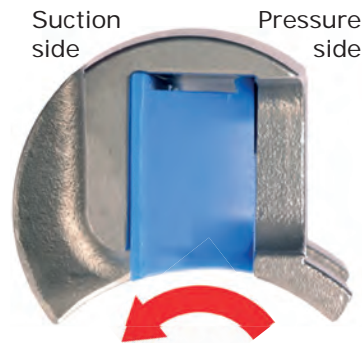


The gate and gate guide inverted to show the gate's position within the guide for counter-clockwise rotor rotation

The rotor



The gate and gate guide oriented for clockwise rotor rotation



The gate and gate guide oriented for counter-clockwise rotor rotation

- Check that the rotor O-ring is in position.
- Position the gate within the gate guide and hold as one unit.

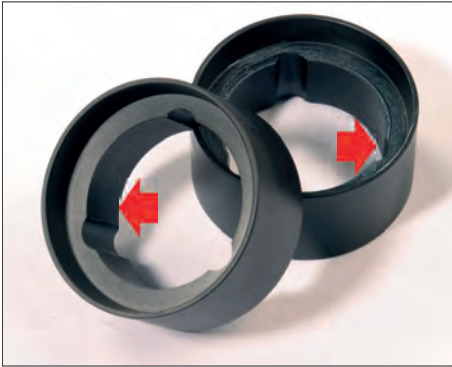


Check that the gate and gate guide are correctly oriented for the desired sense of rotor rotation. This is critical for proper operation.



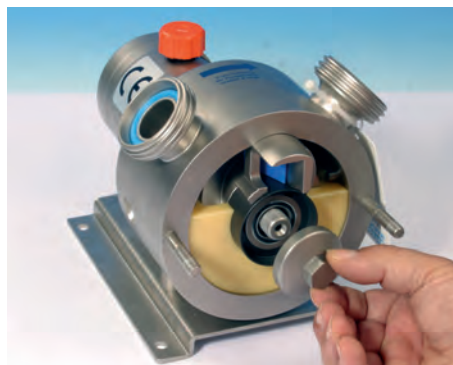
- Hold the rotor vane in the slot of the gate, with the larger diameter end of the rotor bush away from you. Position the rotor, the gate and the gate guide together. Push the assembly into position. The gate and gate guide slide freely into their channel; the splines within the rotor hub must be aligned with the shaft splines.
- Ensure that the rotor is pushed all the way home.

Fitting the front bushing and the front liner



- Push the front bushing into position, thick end (arrowed) first. (The two bushings are identical.) **Note:** Pumps are fitted with identical front and rear bushings.
- Push the front liner into position, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the locking nut



It is important to ensure that the shaft cannot rotate while the shaft nut is fitted. If necessary, it may conveniently be secured using a well-padded wrench on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw: (SPS 100: TL-SP10-010-31).

- Use a 17mm spanner to tighten the locking nut to 100Nm (**right-hand thread**).

Fitting the front cover



- Check that the front cover O-ring (arrowed above) is in its groove in the front cover.
- Fit the front cover over the shaft and the pump housing studs.
- Fit the cap nuts (**right-hand thread**) and washers to the pump housing studs. Use a 22mm spanner. Tighten them to 35Nm.

21.3 Dismantling and assembling the SPS 200

Dismantling the SPS 200

Note: The pictures show a pump with a cast iron power frame. Dismantling models with stainless steel power frame is similar. For exceptions, see "Dismantling the pump housing—SPS 200 pumps with a stainless steel power frame and a single mechanical seal" on page 58.

Removing the front cover



- Use a 22mm spanner to remove the cap nuts (right-hand thread) and washers.
- Lightly tap the two front cover pins if necessary and use them to pull off the cover.

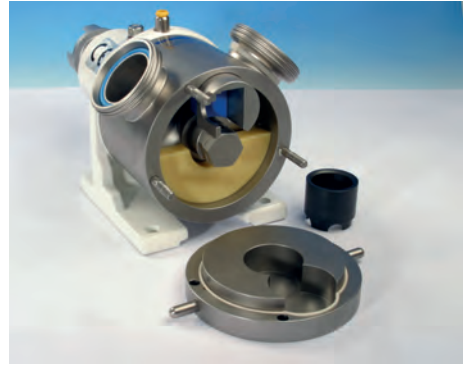
Removing the front support, PEEK or stainless steel



The PEEK front support



The stainless steel front support

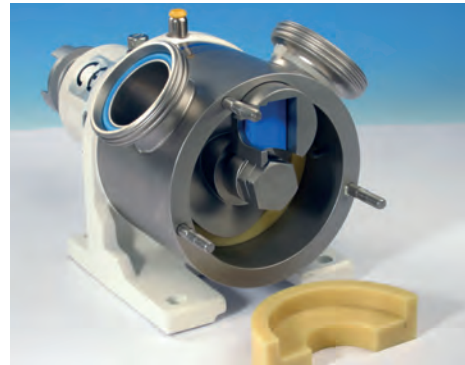


The front support may come off the shaft with the front cover, as pictured (PEEK support: top pictures; stainless steel support: lower pictures), or it may remain on the shaft. **Note:** the PEEK front support is breakable.

- Remove the front support.

You can now access the front cover O-ring (arrowed) in its groove in the front cover.

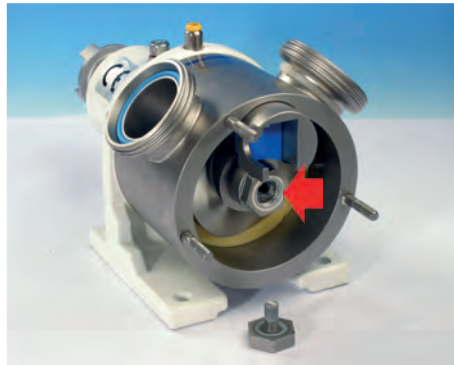
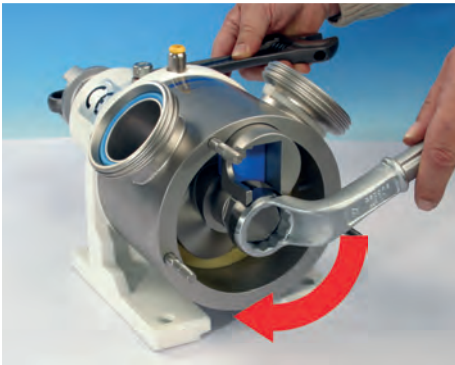
Removing the front liner



- Pull the front liner to remove it.

Note: You may find it convenient to turn the pump shaft and rotor a little to create space for your fingertips to grasp the top of the front liner.

Removing the shaft locking screw



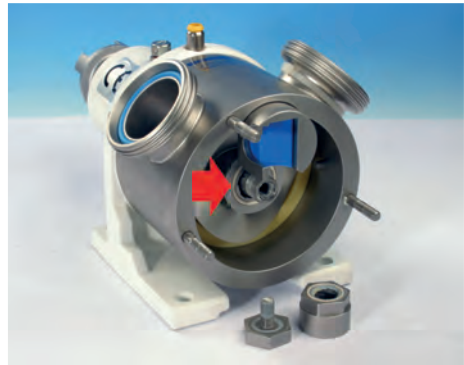
It is important to ensure that the shaft cannot rotate while the shaft locking screw is removed. It may be convenient to secure it using a tommy bar or a spanner handle between the spider castellations on the drive shaft. Alternatively, a well-padded wrench can be used on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw: (SPS 200: TL-SP20-010-31).

- Use a 32mm ring spanner to remove the locking screw from the end of the shaft (**left-hand thread**).
- You can now access the shaft nut O-ring in its groove in the shaft nut.



The shaft locking screw

Removing the shaft nut



It is important to ensure that the shaft cannot rotate while the shaft nut is removed. If the motor is fitted to the pump, its torque should be enough to secure the shaft. If it is not secure, uncouple the pump from the motor and secure the shaft using a tommy bar or a spanner handle between the spider castellations on the drive shaft. Alternatively, a well-padded wrench can be used on the shaft and the key or keyway.

- Use a 32mm ring spanner to remove the shaft nut from the end of the shaft (**right-hand thread**).
- You can now access the rotor front O-ring (arrowed) in its groove in the rotor front.

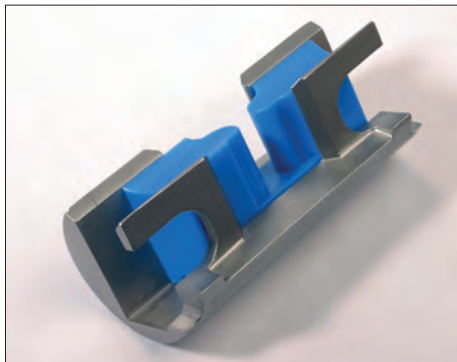


The shaft nut

Removing the rotor, the gate and the gate guide

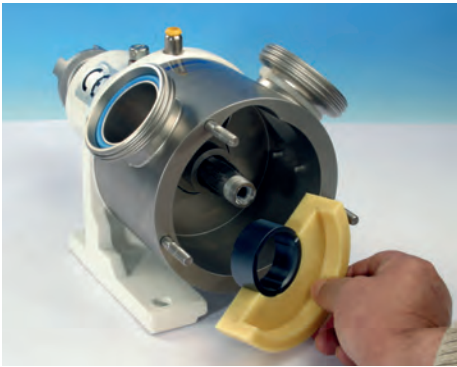


- Note the orientation of the gate and the gate guide so that they can be refitted in the same orientation. Use two hands to remove the rotor, the gate and the gate guide together.
- You can now access the rotor rear O-ring in its groove in the rotor rear.

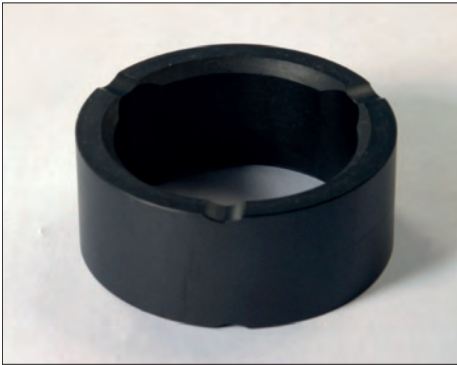


The gate and gate guide

Removing the rear liner and the backing ring—SPS 200 pumps with a single mechanical seal



- Pull the rear liner to remove it.
- The backing ring may remain on the shaft or it may come off the shaft with the rear liner.
- Remove the backing ring.



The backing ring

Removing the dynamic ring holder—SPS 200 pumps with a single mechanical seal



- Pull the dynamic ring holder to remove it.



The dynamic ring holder

Dismantling the pump housing—SPS 200 pumps with a cast iron power frame and a single mechanical seal

Note: See "Dismantling the pump housing—SPS 200 pumps with a stainless steel power frame and a single mechanical seal" on page 58 for dismantling the pump housing of a pump with a cast iron power frame.



- Use a 13mm spanner to loosen and remove the two screws (right-hand thread) and washers which secure the pump housing to the power frame.
- If necessary, gently tap the pump housing with a soft hammer to free it. Withdraw the pump housing carefully.



The pump housing is heavy.

Removing the seal and the static face—pumps with a single mechanical seal



- Remove the mechanical seal from the rear of the pump housing.
- Remove the static face from the mechanical seal.
- You can now access the seal housing O-ring in its groove in the pump housing (arrowed above), and the two O-rings in the mechanical seal (arrowed below).

Note: The mechanical seal is a tight push fit.



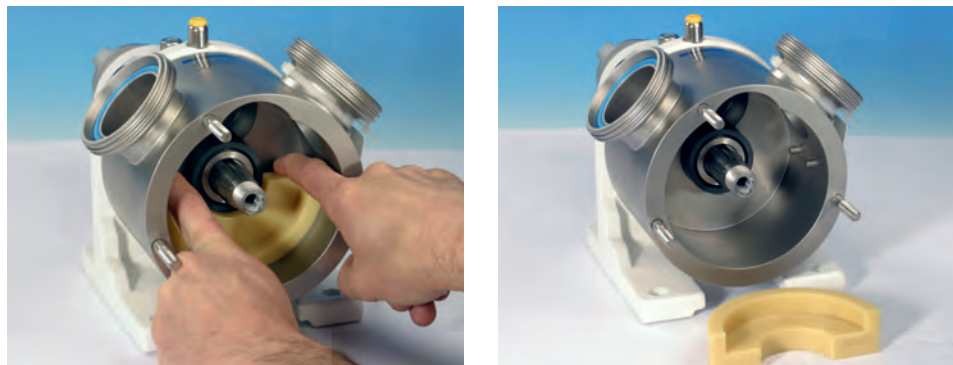
The static face

The mechanical seal

Fitting the seal—SPS 200 pumps with a single mechanical seal

- A graphic making clear how to disassemble and assemble the seal appears in "Seals" on page 119.

Removing the rear liner—SPS 200 pumps with a triple lip seal



- Pull the rear liner to remove it.

Removing the sealing system—SPS 200 pumps with a triple lip seal



- Pull the seal housing fitted with the shaft sleeve to remove it.



- Remove the shaft sleeve from the seal housing.

Removing the pump housing—SPS 200 pumps with a triple lip seal

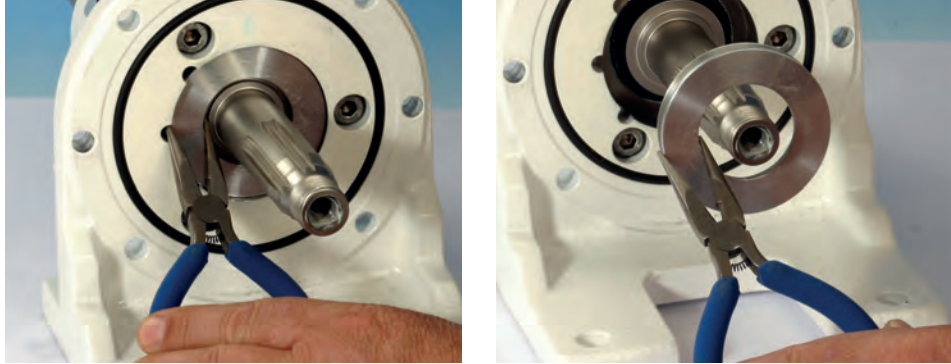


- Use a 13mm spanner to loosen and remove the two screws (right-hand thread) and washers which secure the pump housing to the power frame.
- If necessary, gently tap the pump housing with a soft hammer to free it. Withdraw the pump housing carefully.

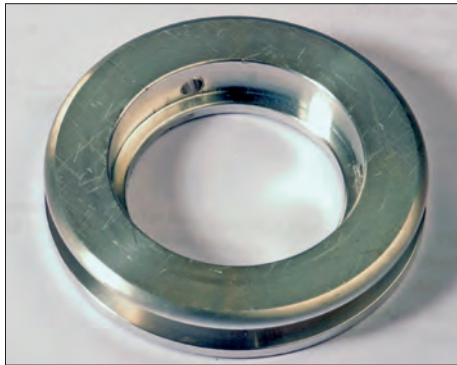


The pump housing is heavy.

Removing the distance ring—SPS 200 pumps with a triple lip seal



- The distance ring is a loose fit in its channel on the face of the power frame. Use a tool such as a pair of long-nose pliers to grasp the distance ring where recesses have been machined in the face of the power frame and withdraw it.



The distance ring

Fitting the seal—SPS 200 pumps with a triple lip seal

- A graphic making clear how to disassemble and assemble the seal appears in "Seals" on page 119.

Dismantling the pump housing—SPS 200 pumps with a stainless steel power frame and a single mechanical seal

Note: See "Dismantling the pump housing—SPS 200 pumps with a cast iron power frame and a single mechanical seal" on page 54 for dismantling the pump housing of a pump with a cast iron power frame.



- Use a 13mm spanner to loosen and remove the six screws (right-hand thread) and washers which secure the pump housing to the power frame.
- If necessary, gently tap the pump housing with a soft hammer to free it. Withdraw the pump housing carefully.

 **The pump housing is heavy.**

- Pull off the flush ring. Whichever flush ring is installed, the procedure is the same.

Dismantling the pump housing—SPS 200 pumps with a stainless steel power frame and a triple lip seal



- Remove the distance ring from the flush ring.

Assembling the SPS 200

Note: The pictures show a pump with a cast iron power frame. Assembly of models with stainless steel power frame is similar. For exceptions, see "Assembling the pump housing—SPS 200 pumps with a stainless steel power frame" on page 63

During assembly, check that all O-rings are properly positioned before fitting each component, and that all components are clean and lubricated.

Fitting the static face and the seal—SPS 200 pumps with a single mechanical seal



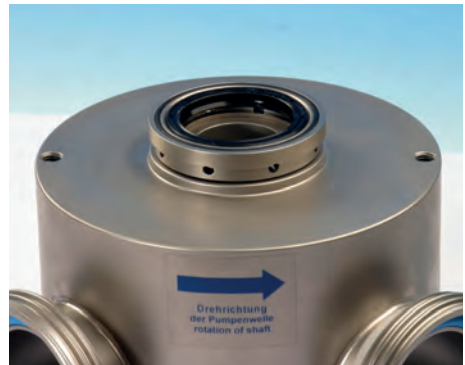
The mechanical seal

The static face

- Check that the seal housing O-ring is properly positioned in its groove in the pump housing (arrowed in bottom left picture), and that the two O-rings either side of the mechanical seal are properly positioned (arrowed above).



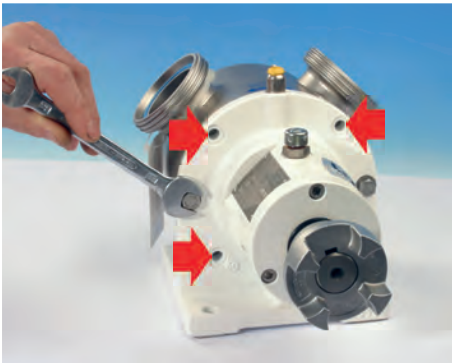
- Position the static face in the mechanical seal. The static face has two recesses (arrowed) which must be correctly aligned with lugs (arrowed) either side of its seat.



- Push the mechanical seal into the pump housing.

Note: The mechanical seal is a tight push fit.

Fitting the pump housing—SPS 200 pumps with a cast iron frame and a single mechanical seal



- Pass the pump housing, complete with mechanical seal and static face, over the shaft and position on the face of the power frame.



The pump housing is heavy.

- Fit the two 13mm screws (**right-hand thread**) and washers which secure the pump housing to the power frame. 10-2 assembly is shown here. Alternative screw positions (three of four arrowed) allow the pump housing to be positioned at 9-12 or 12-3 orientations. Tighten to 35Nm.

Fitting the dynamic ring holder—SPS 200 pumps with a single mechanical seal



The dynamic ring holder



- Push the dynamic ring holder over the pump shaft, narrow end first. The dynamic ring holder has an alignment lug inside it which must be aligned with the shaft splines.

Fitting the backing ring and the rear liner—SPS 200 pumps with a single mechanical seal



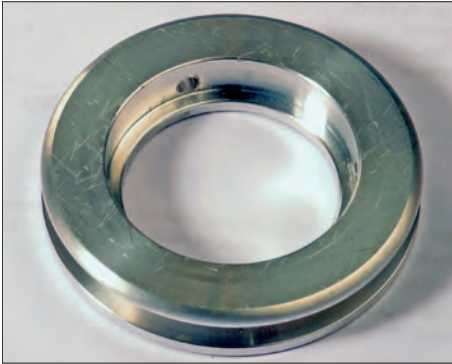
The backing ring

- Push the backing ring over the pump shaft and over the dynamic ring holder. The backing ring is reversible.



- Push the rear liner into position below the backing ring. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the distance ring—SPS 200 pumps with a triple lip seal

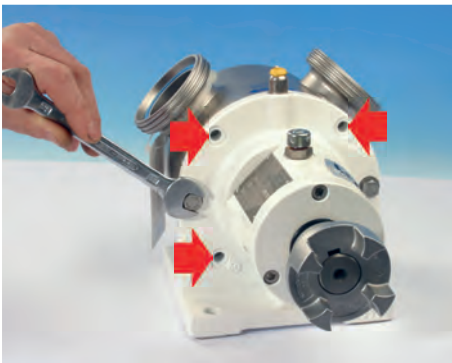


The distance ring with radiused edge up



- The distance ring is a loose fit in its channel on the face of the power frame. Position it with the radiused edge facing the power frame.

Fitting the pump housing—SPS 200 pumps with a cast iron frame and a triple lip seal



- Check that the seal housing O-ring is properly positioned in its groove in the rear of the pump housing.
- Pass the pump housing over the shaft and position on the face of the power frame.

Note: The pump housing may be positioned in three orientations. See "Possible pump orientations" on page 24.



The pump housing is heavy.

- Fit the two 13mm screws (right-hand thread) and washers which secure the pump housing to the power frame. 10-2 assembly is shown here. Alternative screw positions (three of four arrowed) allow the pump housing to be positioned at 9-12 or 12-3 orientations. Tighten to 35Nm.

Assembling the pump housing—SPS 200 pumps with a stainless steel power frame

Note: See "Fitting the pump housing—SPS 200 pumps with a cast iron frame and a single mechanical seal" on page 60 for assembling the pump housing of a pump with a cast iron power frame.



- Fit the flush ring. Whichever flush ring is installed, the procedure is the same. For single mechanical seal system the distance ring is not needed.
- Position the pump housing carefully.



The pump housing is heavy.

- Use a 13mm spanner to fit and tighten the screws (right-hand thread) and washers which secure the pump housing to the power frame.

Assembling the distance ring—SPS 200 pumps with a stainless steel power frame and a triple lip seal



- Fit the distance ring into the flush ring before fitting the flush ring.

Fitting the sealing system—SPS 200 pumps with a cast iron power frame and a triple lip seal



- Push the seal housing into the shaft sleeve.



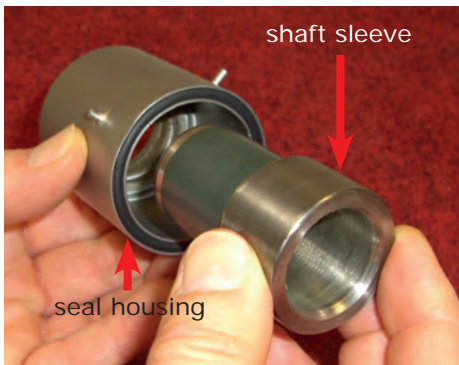
- Push the shaft sleeve fitted with the seal housing over the shaft and into position, the chamfered, lip-seal end of the shaft sleeve first. The shaft sleeve is a tight push fit. Be sure to push it all the way home. The shaft sleeve has an alignment lug inside it which must be aligned with the shaft splines.

Fitting the rear liner—SPS 200 pumps with a triple lip seal

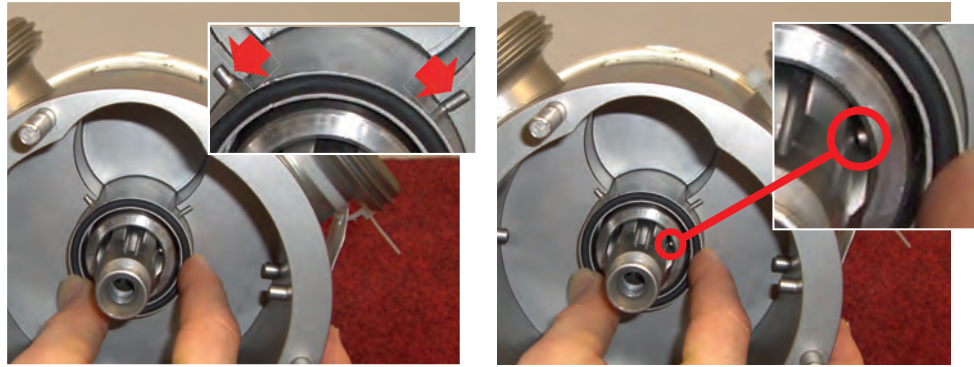


- Push the rear liner into position below the shaft sleeve, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the sealing system—SPS 200 pumps with a stainless steel seal housing for a triple lip seal



- Push the shaft sleeve into the seal housing (with the lip seals)



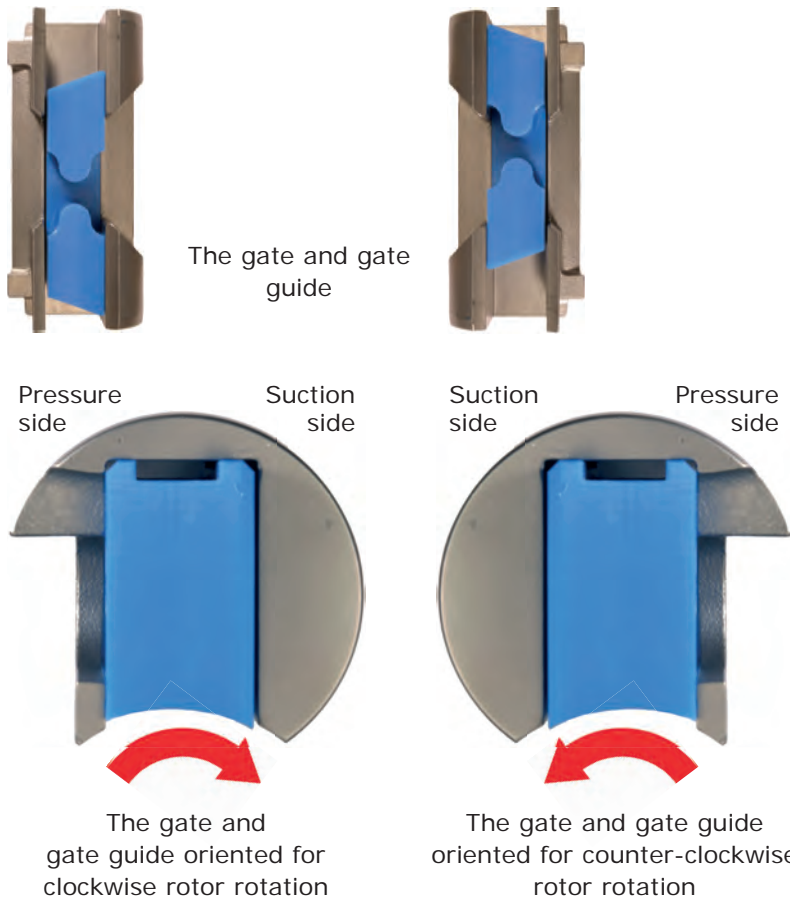
- Push the shaft sleeve fitted with the seal housing over the shaft and into position, the chamfered, lip-seal end of the shaft sleeve first. The seal housing's pins (arrowed) must be upward and central. The shaft sleeve is a tight push fit. Be sure to push it all the way home. The shaft sleeve has an alignment lug inside it (ringed) which must be aligned with the shaft splines.

Fitting the rear liner—SPS 200 Pumps with a triple lip seal



- Push the rear liner into position below the shaft sleeve, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

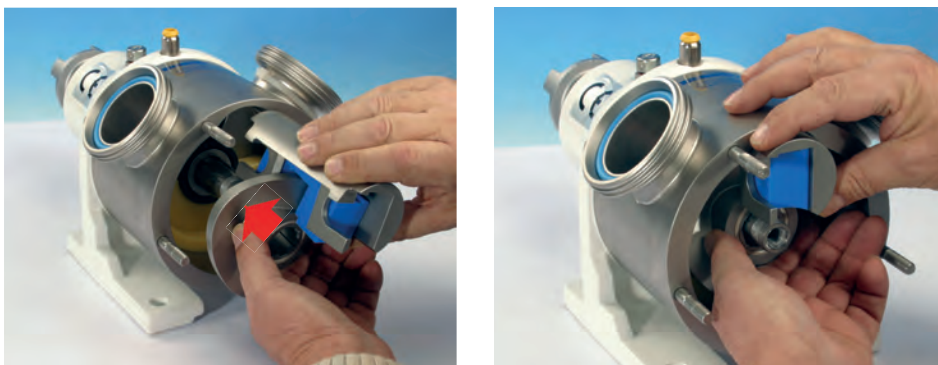
Fitting the rotor, the gate and the gate guide



- Check that the two rotor O-rings (visible one arrowed) are in position on both sides of the rotor.
- Position the gate within the gate guide and hold as one unit.



Check that the gate and gate guide are correctly oriented for the desired sense of rotor rotation. This is critical for proper operation.

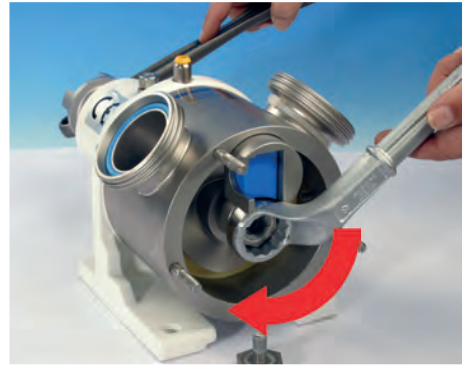


- Hold the rotor vane in the slot of the gate. Use two hands to position the rotor, the gate and the gate guide together. The rotor is reversible. Push the assembly into position. The gate and gate guide slide freely into their channel; the splines within the rotor hub must be aligned with the shaft splines.
- Ensure that the rotor is pushed all the way home.

Fitting the shaft nut—SPS 200 pumps



The shaft nut



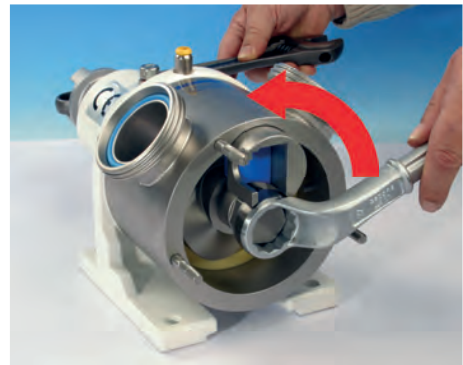
It is important to ensure that the shaft cannot rotate while the shaft nut is fitted. It may conveniently be secured using a tommy bar or a spanner handle between the spider castellations on the drive shaft. Alternatively, a well-padded wrench can be used on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw (SPS 200: TL-SP20-010-31).

- Check that the shaft nut O-ring (arrowed) is in position on the shaft nut.
- Fit the shaft nut (right-hand thread) over the shaft. Use a 32mm ring spanner to tighten it to 65Nm.

Fitting the shaft locking screw



The shaft locking screw



It is important to ensure that the shaft cannot rotate while the shaft locking screw is fitted. It may conveniently be secured using a tommy bar or a spanner handle between the spider castellations on the drive shaft. Alternatively, a well-padded wrench can be used on the shaft and the key or keyway.

- Fit the shaft locking screw (left-hand thread) to the shaft. Use a 32mm ring to tighten it to 45Nm.

Fitting the front liner



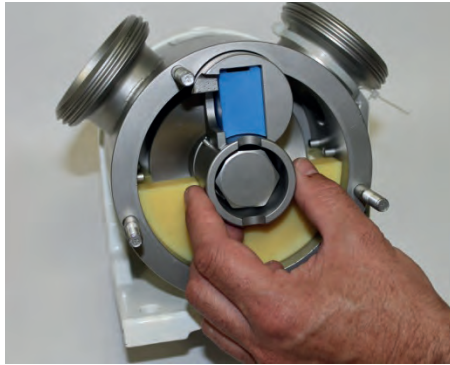
- Push the front liner into position, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the front support



The PEEK front support

- Position the PEEK front support, castellations first, in its recess in the front cover (the side with slots must face the front cover).
- Check that the front cover O-ring (arrowed) is in its groove in the front cover.



Stainless steel front support

Fitting the front cover



- Check that the front cover O-ring (arrowed on previous page) is in its groove in the front cover.
- Fit the front cover, complete with the front support, over the shaft and the pump housing studs.
- Fit the cap nuts (**right-hand thread**) and washers to the pump housing studs. Use a 22mm spanner. Tighten them to 35Nm.

21.4 Dismantling and assembling the SPS 250, SPS 300, SPS 400 and SPS 500

Dismantling the SPS 250 SPS 300 SPS 400 and SPS 500

Note: The SPS 250, SPS 400 and the SPS 500 are similar.

Note: The pictures show a pump with a cast iron power frame. Dismantling models with stainless steel power frame is similar. For exceptions, see "Dismantling the pump housing—pumps with a stainless steel power frame and a single mechanical seal" on page 75.

Removing the front cover



- Use a 22mm spanner to remove the cap nuts (**right-hand thread**) and washers.
- Lightly tap the two front cover pins if necessary and use them to pull off the cover.

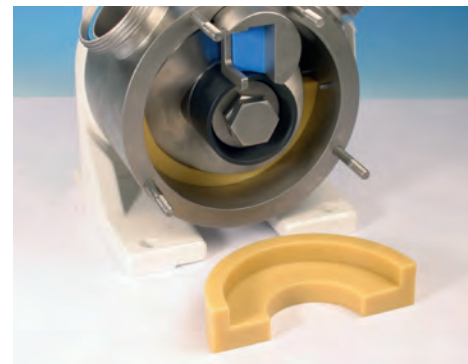


The cover is heavy.



- You can now access the front cover O-ring (arrowed) in its groove in the front cover.

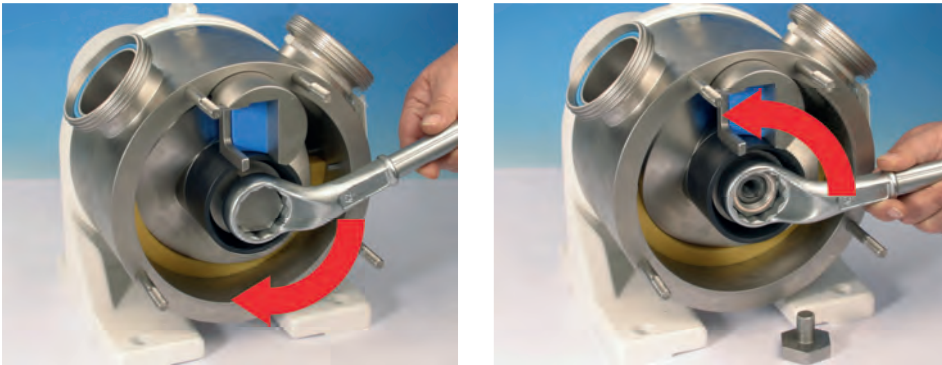
Removing the front liner



- Pull the front liner to remove it.

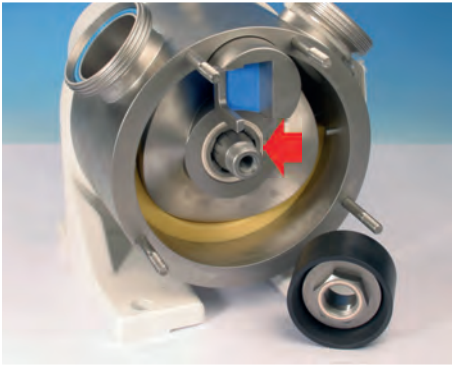
Note: You may find it convenient to turn the pump shaft and rotor a little to create space for your fingertips to grasp the top of the front liner.

Removing the shaft locking screw and the shaft nut

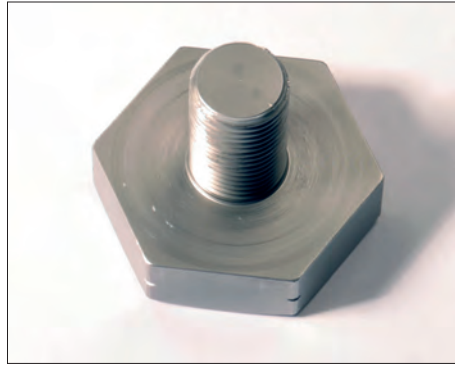


It is important to ensure that the shaft cannot rotate while the shaft locking screw and the shaft nut are removed. It may be convenient to secure it using a well-padded wrench on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw (SPS 250: TL-SP21-010-31, SPS 300: TL-SP25-010-31, SPS 400: TL-SP40-010-31 and SPS 500: TL-SP50-010-31)

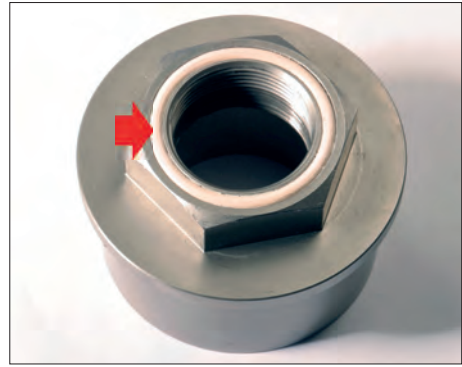
- Use ring spanner to remove the locking screw from the shaft (**left-hand thread**).
- Use ring spanner to remove the shaft nut from the shaft (**right-hand thread**). It will leave the shaft with the front support.
- You can now access the rotor front O-ring (arrowed) in its groove in the rotor front.



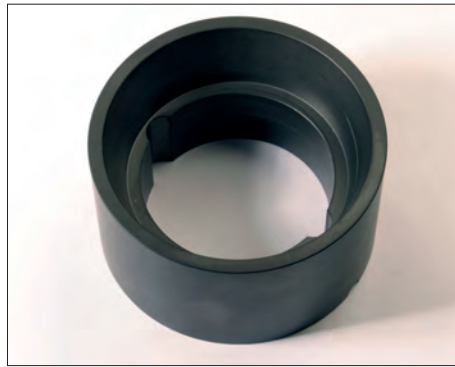
- Remove the shaft nut from the PEEK front support. **Note:** the PEEK front support is breakable.
- You can now access the shaft nut O-ring (arrowed) in its groove in the shaft nut.



The locking screw



The shaft nut



The front support

Removing the rotor, the gate and the gate guide



- Note the orientation of the gate and the gate guide so that they can be refitted in the same orientation. Use two hands to remove the rotor, the gate and the gate guide together.
- You can now access the rotor rear O-ring in its groove in the rotor rear.

Removing the rear liner and the backing ring—pumps with a single mechanical seal



- Pull the rear liner to remove it.
- Remove the backing ring.



The backing ring

Removing the dynamic ring holder—pumps with a single mechanical seal



- Pull the dynamic ring holder to remove it.



The dynamic ring holder

Removing the pump housing—pumps with a single mechanical seal



- Guide the optional special cylindrical tool (arrowed: TL-SP21-002-50, TL-SP25-002-50, TL-SP40-002-50 or TL-SP50-002-50 - available to order) over the shaft and push it home. This will give some protection to the shaft splines as the pump housing is removed. It is important not to damage the shaft while removing or installing the pump housing.
- Use a 17mm spanner to loosen and remove the two screws (**right-hand thread**) and washers which secure the pump housing to the power frame.
- If necessary, gently tap the pump housing with a soft hammer to free it. Withdraw the pump housing carefully.



The pump housing is heavy.

Removing the seal and the static face—pumps with a single mechanical seal



- Push the mechanical seal from the rear of the pump housing and remove it. **Note:** The mechanical seal is a tight push fit.
- Remove the static face from the mechanical seal.
- You can now access the seal housing O-ring in its groove in the pump housing (arrowed), and the O-ring in the mechanical seal (arrowed).



Pump housing O-ring

The static face

The mechanical seal

Removing the seal—pumps with a single mechanical seal

- A graphic making clear how to disassemble and assemble the seal appears in "Seals" on page 119.

Pumps with a triple lip seal

See the graphics in "Seals" on page 119 and "Front support versions" on page 129, and refer to the instructions for the SPS 200 pump triple lip seal disassembly in section "Removing the rear liner—SPS 200 pumps with a triple lip seal" on page 55. The SPS 250, SPS 300, SPS 400 and SPS 500 are similar.

Dismantling the pump housing—pumps with a stainless steel power frame and a single mechanical seal

Note: See page "Removing the pump housing—pumps with a single mechanical seal" on page 73 for dismantling the pump housing of a pump with a cast iron power frame.



- Guide the optional special cylindrical tool (arrowed: TL-SP21-002-50, TL-SP25-002-50, TL-SP40-002-50 or TL-SP50-002-50 - available to order) over the shaft and push it home. This will give some protection to the shaft splines as the pump housing is removed. Otherwise, it is important not to damage the shaft while removing or installing the pump housing.
- Use a 13mm spanner to loosen and remove the screws (right-hand thread) and washers which secure the pump housing to the power frame.
- If necessary, gently tap the pump housing with a soft hammer to free it. Withdraw the pump housing carefully.



The pump housing is heavy.

- Pull off the flush ring.

Assembling the SPS 250, SPS 300, SPS 400 and SPS 500

During assembly, check that all O-rings are properly positioned before fitting each component, and that all components are clean and lubricated.

Note: The SPS 300 model is pictured in this section. The SPS 250, SPS 300, SPS 400 and SPS 500 are similar.

Note: The pictures show a pump with a cast iron power frame. Assembly of models with stainless steel power frame is similar. For exceptions, see "Assembling the pump housing—pumps with a stainless steel power frame and a single mechanical seal" on page 81.

Fitting the pump housing—pumps with a single mechanical seal



Check that the seal housing O-ring is properly positioned in its groove in the pump housing (arrowed in bottom left picture, previous page).

Guide the optional special cylindrical tool (TL-SP21-002-50, TL-SP25-002-50, TL-SP40-002-50 or TL-SP50-002-50 - available to order) over the shaft and push it home. Push the front support locking screw (arrowed) through the end hole of the special tool and into the female thread on the end of the shaft: left-hand thread. Otherwise, it is important not to damage the shaft while removing or installing the pump housing. Tighten the locking screw by hand.

Pass the pump housing over the shaft and the special tool and position it on the face of the power frame.

Note: The pump housing may be positioned in three orientations. See "Possible pump orientations" on page 24.



The pump housing is heavy.



- Fit the two 17mm screws (right-hand thread) and washers which secure the pump housing to the power frame. 10-2 assembly is shown here. Alternative screw positions (three of four arrowed) allow the pump housing to be positioned at 9-12 or 12-3 orientations. Tighten to 40Nm. Remove the locking screw and the special tool.

Fitting the static face and the seal—pumps with a single mechanical seal



Pump housing O-ring



The static face



The mechanical seal

- Check that the seal housing O-ring is properly positioned in its groove in the pump housing (arrowed), and that the mechanical seal O-ring is properly positioned (arrowed).



- Position the static face in the mechanical seal. The static face has two recesses (arrowed) which must be correctly aligned with lugs (arrowed) either side of its seat.



- Push the mechanical seal into the pump housing.

Note: The mechanical seal is a tight push fit.

Fitting the dynamic ring holder—pumps with a single mechanical seal



The dynamic ring holder



- Push the dynamic ring holder over the pump shaft, narrow end first. The dynamic ring holder has alignment lugs inside it which must be aligned with the shaft splines.

Pumps with a single mechanical seal: fitting the backing ring and the rear liner



The backing ring



- Push the backing ring over the pump shaft and over the dynamic ring holder. The backing ring is reversible.

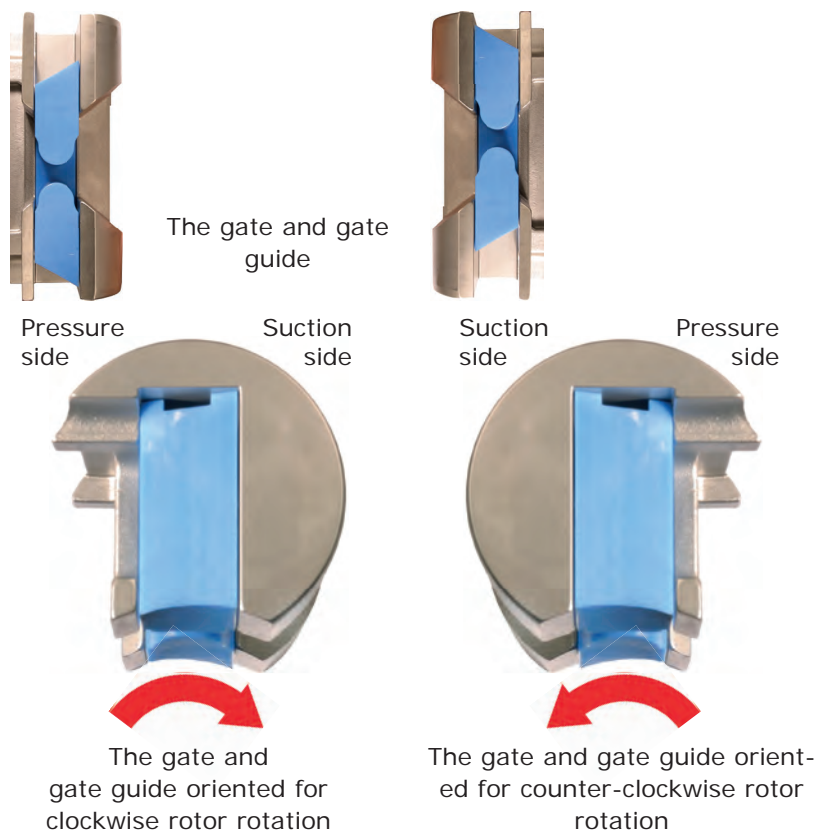


- Push the rear liner into position below the backing ring. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Pumps with a triple lip seal

See the graphics in "Pumps" on page 92 and "Front support versions" on page 129, and refer to the instructions for the SPS 200 pump triple lip seal assembly in section "Assembling the SPS 200" on page 58. The SPS 250, SPS 300, SPS 400 and SPS 500 are similar.

Fitting the rotor, the gate and the gate guide



- Check that the two rotor O-rings (visible one arrowed) are in position on both sides of the rotor.
- Position the gate within the gate guide and hold as one unit.

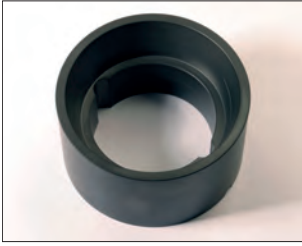


Check that the gate and gate guide are correctly oriented for the desired sense of rotor rotation. This is critical for proper operation.



- Hold the rotor vane in the slot of the gate. The rotor is reversible. Use two hands to position the rotor, the gate and the gate guide together. Push the assembly into position. The gate and gate guide slide freely into their channel; the splines within the rotor hub must be aligned with the shaft splines.
- Ensure that the rotor is pushed all the way home.

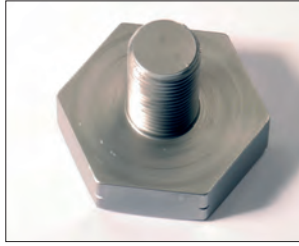
Fitting the front support, the shaft nut and locking screw



The PEEK front support



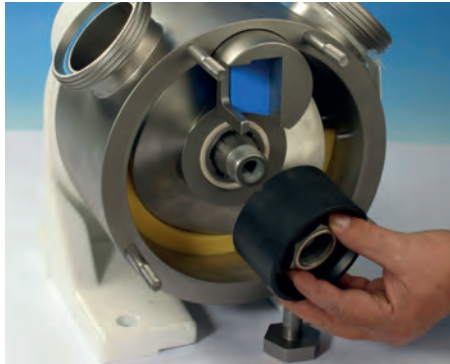
The shaft nut



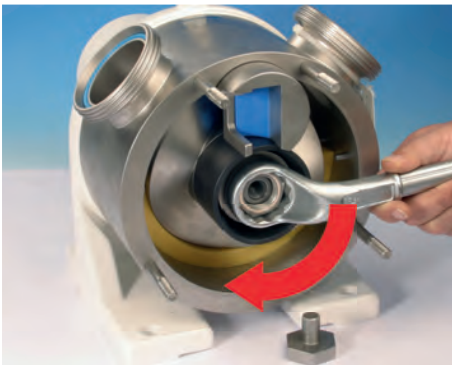
The shaft locking screw

It is important to ensure that the shaft cannot rotate while the shaft locking screw and the shaft nut are tightened. It may be convenient to secure it using a well-padded wrench on the shaft and the key or keyway. A blocking tool for the shaft is optionally available for easy opening of the locking screw (SPS 250: TL-SP21-010-31, SPS 300: TL-SP25-010-31, SPS 400: TL-SP40-010-31 and SPS 500: TL-SP50-010-31).

- Check that the shaft nut O-ring (arrowed) is in position on the shaft nut.

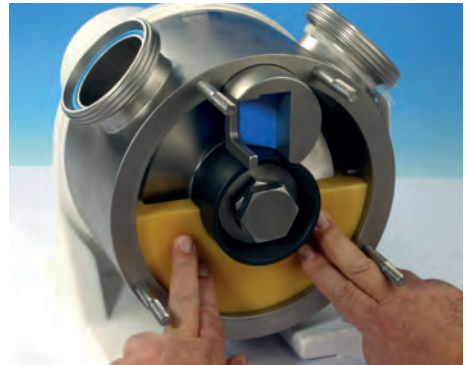


- Fit the shaft nut into the front support.
- Fit the shaft nut and front support over the shaft.



- Use the ring spanner to tighten it (right-hand thread) to 65Nm (SPS 250); 110Nm (SPS 300); 125Nm (SPS 400); 125Nm (SPS 500).
- Fit the shaft locking screw (left-hand thread) to the shaft. Use the ring spanner to tighten it to 45Nm (SPS 250); 95Nm (SPS 300); 105Nm (SPS 400); 105Nm (SPS 500).

Fitting the front liner



- Push the front liner into position, pushing evenly at both ends so that it does not jam. The anti-rotation pins within the pump housing (arrowed) guarantee that the liner is properly positioned. The two liners are identical.

Fitting the front cover



- Check that the front cover O-ring (arrowed) is in its groove in the front cover.
- Fit the front cover over the shaft, the front support and the pump housing studs.
- Fit the cap nuts (right-hand thread) and washers to the pump housing studs. Use a 22mm spanner. Tighten them to 45Nm (torque for other sizes see "Tightening torques" on page 89)

Assembling the pump housing—pumps with a stainless steel power frame and a single mechanical seal

Note: See "Fitting the pump housing—pumps with a single mechanical seal" on page 76 for assembling the pump housing of a pump with a cast iron power frame.



- Fit the flush ring.
- Guide the optional special cylindrical tool (arrowed: TL-SP21-002-50, TL-SP25-002-50, TL-SP40-002-50 or TL-SP50-002-50 - available to order) over the shaft and push it home. This will give some protection to the shaft splines as the pump housing is fitted. It is important not to damage the shaft while removing or installing the pump housing.



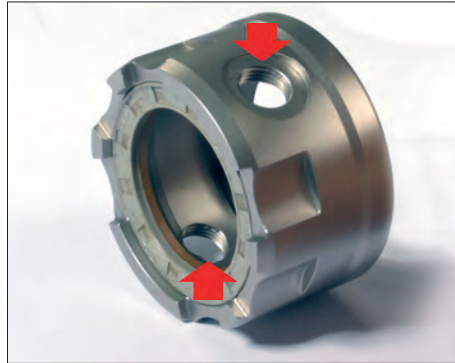
The pump housing is heavy.

- Use a 13mm spanner to fit and tighten the screws (right-hand thread) and washers which secure the pump housing to the power frame.

22 The static flushing device

22.1 SPS 100

Fitting the static flushing device—SPS 100 pumps



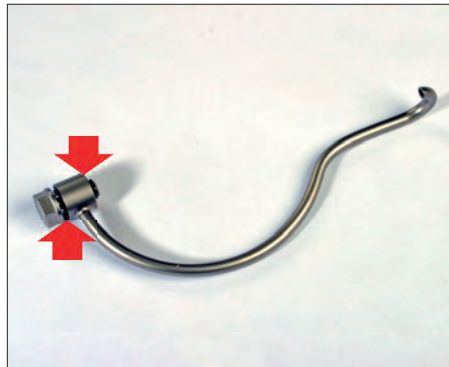
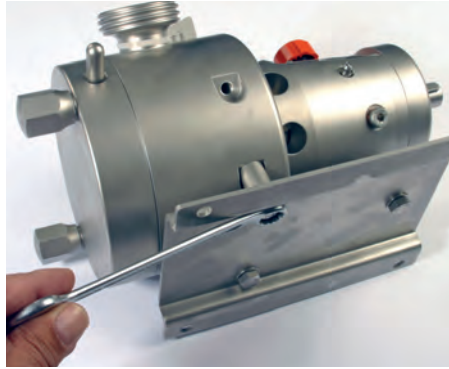
The tapped pump seal housing



The sight glass and the sight glass connection piece



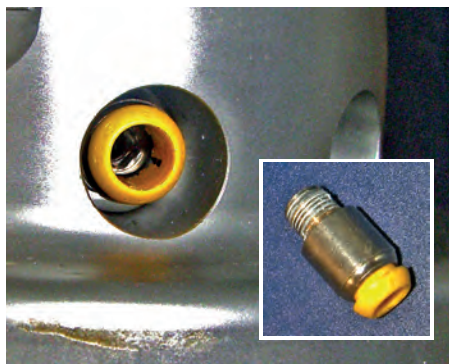
- The static flushing device can be fitted only to a SPS 100 pump with a pump seal housing which is tapped to take it (arrowed). See also "Assembling the SPS 100" on page 43.
- Pass the special L-shaped tool or a screwdriver through the top hole in the bearing housing and use it to rotate the pump seal housing until it is central to the top hole in the bearing housing.
- Fit the sight glass connection piece. Use a 17mm spanner to tighten it.
- Fit the sight glass.



The bent outlet connection piece

The bent outlet

- Use a 17mm spanner to tighten it.
- Use a 13mm spanner to remove the bolts, washers and spacers securing the baseplate. See "Changing the pump orientation" on page 24.
- Check that the O-rings (arrowed) are in place on the bent outlet. Fit the bent outlet connection piece and the bent outlet through the bottom hole in the bearing housing in the same way.
- Refit the baseplate.
- Fill the system with flushing fluid to the level of the top bend of the bent outlet.



Note: Nipples may be fitted in place of the static flushing device if desired. Use a 6mm Allen key to tighten them.

Removing the static flushing device—SPS 100 pumps

Note: The flushing device (if fitted) must be emptied and removed before dismantling the pump.

- To remove the static flushing device, pour the flushing fluid from the sight glass, and reverse the sequence of operations described above.

22.2 SPS 200, SPS 300, SPS 400 and SPS 500

Fitting the static flushing device—SPS 200, SPS 300 and SPS 400 pumps with cast iron power frame

The static flushing device for the SPS 300 is shown here. The static flushing devices for the SPS 200 and the SPS 400 are similar.



- Use a 6mm Allen key to remove the two nipples (arrowed) (if fitted) from the pump's power frame.
- Fit the sight glass connection piece in place of the top nipple. Use a 19mm spanner to tighten it. Fit the sight glass and tighten the retaining nut to hold it in position.
- Fit the bent outlet in place of the bottom nipple in the same way.
- Fill the system with flushing fluid to the level of the top bend of the bent outlet.

Removing the static flushing device—SPS 200, SPS 300 and SPS 400 pumps with cast iron power frame

Note: The flushing device (if fitted) must be emptied and removed before dismantling the pump.



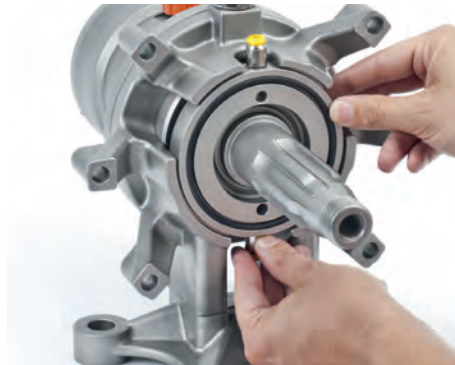
- Use a 19mm spanner to loosen the retaining nut holding the bent outlet in position (arrowed) enough to allow the bent outlet to be lowered into a horizontal position.
- Hold a vessel under the bent outlet. Drain until no more liquid runs out of the power frame.
- Remove the retaining nut holding the sight glass and its connection pieces in position and remove the sight glass and its connection pieces. Remove the bent outlet in the same way.

Fitting a flush ring without flush connections—SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 pumps with stainless steel power frame

The SPS 300 is shown here. Flushing options for the SPS 200, SPS 250, SPS 400 and the SPS 500 are similar.



Fitting a flush ring with flush connections—SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 pumps with stainless steel power frame



- Pass the tube through the space in the power frame. Connect it from the back to the dynamic flush system.

Fitting a flush ring with a static flush device—SPS 200, SPS 250, SPS 300, SPS 400 and SPS 500 pumps with stainless steel power frame



- Install the flush ring without the bent outlet.
- Fit the bent outlet to the connection on the back of the power end.
- Fill the system with flushing fluid to the level of the top bend of the bent outlet.

23 Tightening torques

SPS 100

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M8 DIN 912	10Nm / 7 lb-ft
Feet	M8 DIN 931	25Nm / 18.5 lb-ft
Grease nipple	M6 DIN 71412	10Nm / 7 lb-ft
Shaft—shaft nut	SW17	100Nm / 74 lb-ft
Front cover—cap nut	SW22	35Nm / 26 lb-ft

SPS 200

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M6 A2 70 DIN 931	7Nm / 5 lb-ft
Power frame—bearing housing	M8 A2 70 DIN 931	16Nm / 12 lb-ft
Power frame—plug	R 1/4" DIN 908	25Nm / 18.5 lb-ft
Pump housing—power frame	M8 A2 70 DIN 931	16Nm / 12 lb-ft
Shaft—shaft nut	SW32	65Nm / 48 lb-ft
Shaft—locking screw	SW32, LEFT-HAND THREAD	45Nm / 33 lb-ft
Front cover—cap nut	SW22	35Nm / 26 lb-ft

SPS 250

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M6 A2 70 DIN 931	7Nm / 5 lb-ft
Power frame—bearing housing	M8 A2 70 DIN 931	16Nm / 12 lb-ft
Power frame—plug	R 1/4" DIN 908	25Nm / 18.5 lb-ft
Pump housing—power frame	M8 A2 70 DIN 931	16Nm / 12 lb-ft
Shaft—shaft nut	SW42	65Nm / 48 lb-ft
Shaft—locking screw	SW42, LEFT-HAND THREAD	45Nm / 33 lb-ft
Front cover—cap nut	SW22	45Nm / 33 lb-ft

SPS 300

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M6 A2 70 DIN 931	7Nm / 5 lb-ft
Power frame—bearing housing	M10 A2 70 DIN 931	33Nm / 24.5 lb-ft
Power frame—plug	R 1/4" DIN 908	25Nm / 18.5 lb-ft
Pump housing—power frame	M10 A2 70 DIN 931	33Nm / 24.5 lb-ft
Shaft—shaft nut	SW42	110Nm / 81 lb-ft

Adjoining parts	Screw type	Torque
Shaft—locking screw	SW42, LEFT-HAND THREAD	95Nm / 70 lb-ft
Front cover—cap nut	SW22	45Nm / 33 lb-ft

SPS 400

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M6 A2 70 DIN 931	7Nm / 5 lb-ft
Power frame—bearing housing	M12 A2 70 DIN 931	56Nm / 41 lb-ft
Power frame—plug	R 1/4" DIN 908	25Nm / 18.5 lb-ft
Pump housing—power frame	M12 A2 70 DIN 931	56Nm / 41 lb-ft
Shaft—shaft nut	SW60	125Nm / 92 lb-ft
Shaft—locking screw	SW60, LEFT-HAND THREAD	105Nm / 77 lb-ft
Front cover—cap nut	SW22	45Nm / 33 lb-ft

SPS 500

Adjoining parts	Screw type	Torque
Bearing housing cover—bearing housing	M6 A2 70 DIN 931	7Nm / 5 lb-ft
Power frame—bearing housing	M12 A2 70 DIN 931	56Nm / 41 lb-ft
Power frame—plug	R 1/4" DIN 908	25Nm / 18.5 lb-ft
Pump housing—power frame	M12 A2 70 DIN 931	56Nm / 41 lb-ft
Shaft—shaft nut	SW60	125Nm / 92 lb-ft
Shaft—locking screw	SW60, LEFT-HAND THREAD	105Nm / 77 lb-ft
Front cover—cap nut	SW22	56Nm / 41 lb-ft

24 Parts lists

With the exceptions of the codes for springs, part codes are composed of three sections in the form xxx-yyyy-zz.

xxx is the pump type. yyyy is the part. zz is the material.

Where __ appears instead of an alphanumeric code in positions xxx and zz, select from the tables which follow.

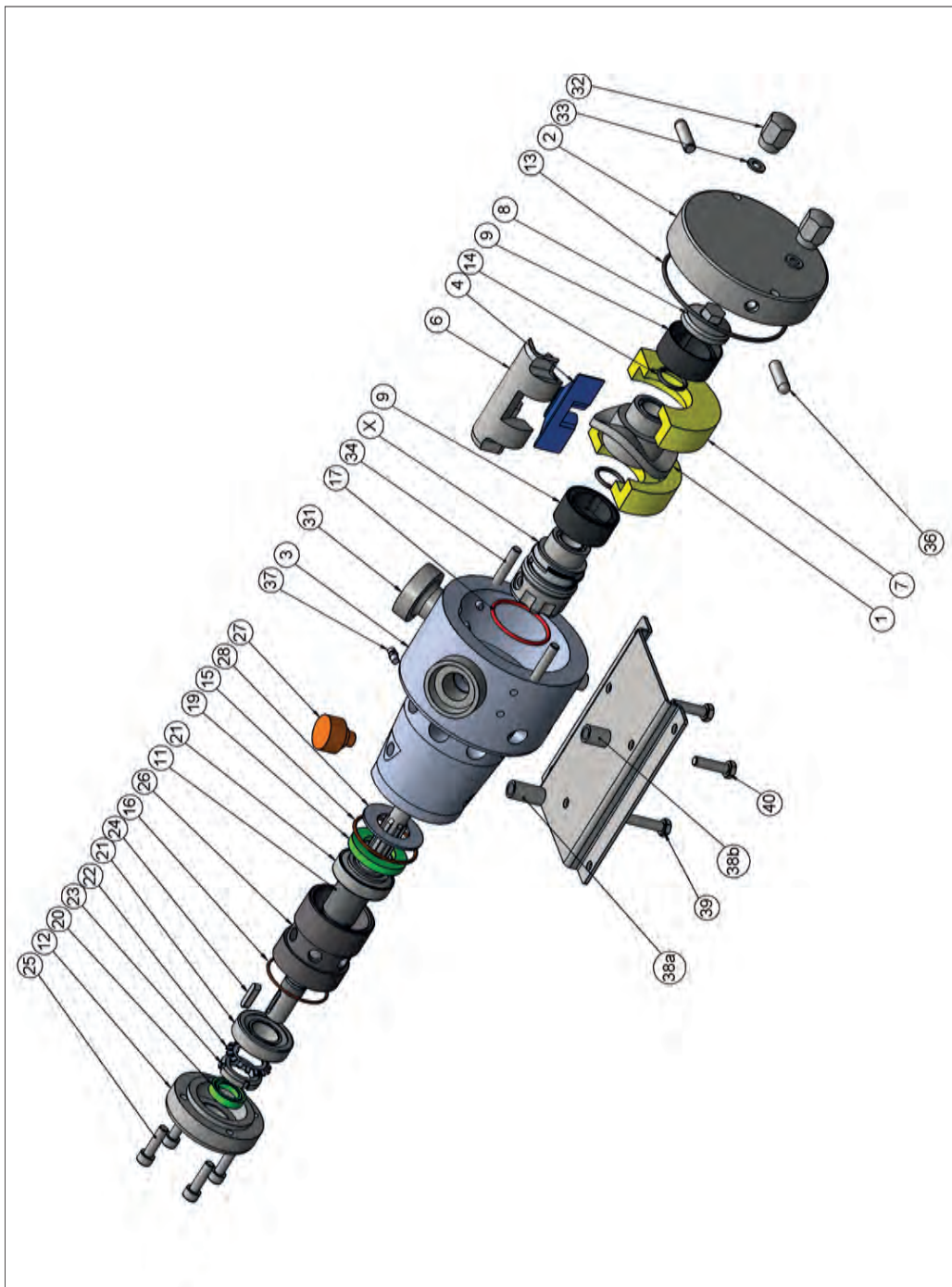
xxx: Pump type	
Code	Pump
S10	SPS 100
S20	SPS 200
S21	SPS 250
S25	SPS 300
S40	SPS 400
S50	SPS 500

yyyy: Part
See parts lists below

zz: Material	zz: Material
Code	Material
Elastomers	
80	NBR
82	EPDM
84	FPM / FKM
88	PTFE
Plastics	
46	MASOTRONIC-2051-MW: MWR
49	MASOTRONIC-2070-WR: WRP
50	MASOTRONIC-2800-PO or MASOTRONIC-2810-PA: polyamide
53	MASOTRONIC-2050-UH: UHMW
55	MASOTRONIC-2400-PP
59	MASOTRONIC-2090-PN: PEEK natural
62	MASOTRONIC-2080-PK: PEEK
63	MASOTRONIC-2681-HT: HTP Ultem
Carbide / carbon	
40	ceramic
41	silicon carbide
66	carbon

24.1 Pumps

SPS 100



Parts list for SPS 100

Number	Quantity	Part code	Item
1	1	S10-0100-10	Rotor
2	1	S10-0200-10	Front Cover
3	1	S10-0300-10	Pump housing
4	1	S10-0400-49	Gate, MASOTRONIC-2070-WR
	1	S10-0400-46	Gate, MASOTRONIC-2051-MW
6	1	S10-0700-10	Gate Guide
7	2	S10-1097-50	Liner oversized, MASOTRONIC-2800-PO
	2	S10-1097-62	Liner oversized, MASOTRONIC-2080-PK
8	1	S10-1094-10	Shaft Nut
9	2	S10-1095-55	Front Support (front- / back bushing), MASOTRONIC-2400-PP
	2	S10-1095-62	Front Support (front- / back bushing), MASOTRONIC-2080-PK
11	1	S10-1107-16	Shaft
12	1	S10-1108-10	Cover, Bearing Housing
13	1	S10-0010-80	O-ring, NBR
	1	S10-0010-82	O-ring, EPDM
	1	S10-0010-84	O-ring, FPM / FKM
14	1	S10-0011-80	O-ring, NBR
	1	S10-0011-82	O-ring, EPDM
	1	S10-0011-84	O-ring, FPM / FKM
15	1	S10-0012-80	O-Ring, Bearing Housing, NBR
16	1	S10-0023-80	O-Ring, Bearing Housing Cover, NBR
17	1	S10-0036-80	O-ring, NBR
	1	S10-0036-82	O-ring, EPDM
	1	S10-0036-84	O-ring, FPM / FKM
19	1	S10-0013-80	Oil Seal, Inboard, NBR
20	1	S10-0018-80	Oil Seal, Outboard, NBR
21	2	S10-0014-25	Tapered Roller Bearing
22	1	S10-0016-25	Tab Washer, Lock Nut
23	1	S10-0017-25	Lock Nut
24	1	S10-0019-25	Shaft Key
25	4	S10-0020-12	Cap Screw, Bearing Housing Cover
26	1	S10-1117-10	Bearing Spacer
27	1	80-1521-50	Vent Valve

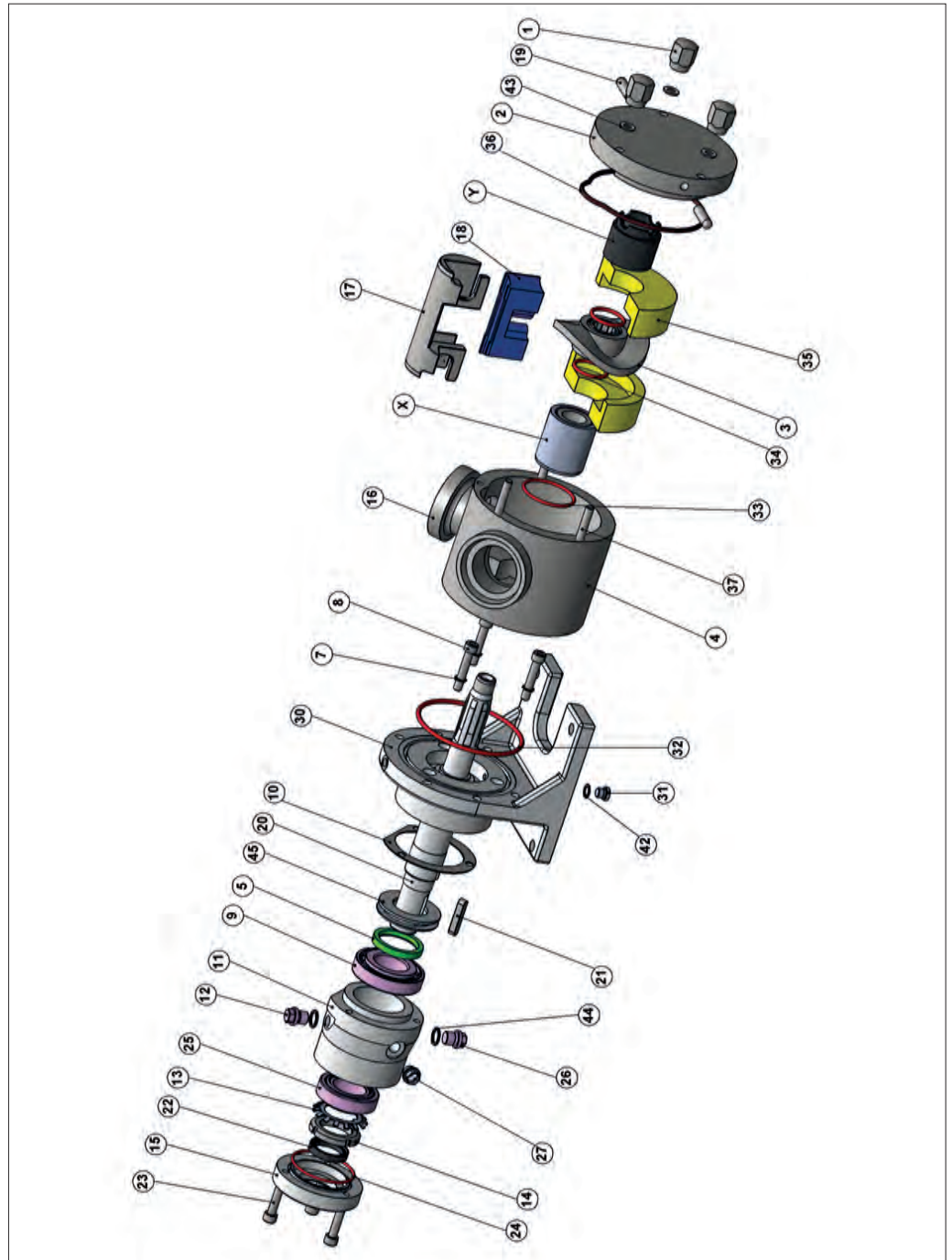
Number	Quantity	Part code	Item
28	1	S10-1109-12	Spacer Ring, Inboard Oil Seal
29	1	80-3600-12	Nameplate
30	4	80-3605-12	Grooved Pin
31	2	Integral with pump housing. Type depends on customer choice	Nozzles (on request)
32	2	S20-1600-12	Front Cover Nut
33	2	S20-1601-12	Washer, Front Cover Nut
34	2	S10-0029-12	Studs
35	4	S25-0301-10	Taper Pin
36	2	S10-0250-12	Front Cover Pin
37	1	S60-1501-12	Grease Nipple
38a	2	S10-1110-12	Mounting Plate, short
38b	1	S10-1152-12	Mounting Plate, long
39	1	S10-1111-12	Bolt, Mounting Plate
40	2	S10-0035-12	Bolt, Mounting Plate
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/Distance ring

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
1x S10-1700-##	1
1x S10-1750-##	1
2x S10-1751-##	2
1x S10-1752-##	1

SPS 200 with cast iron power frame



Parts list for SPS 200 with cast iron power frame

Number	Quantity	Part code	Item
1	3	S20-1600-12	Cap Nut
2	1	S20-0200-10	Front Cover
3	1	S20-0100-10	Rotor
4	1	S20-0300-10	Pump Housing
5	1	S20-2300-80	Lip Seal, NBR
6	1	S25-3900-25	Lifting Eye Bolt
7	3	S20-2100-33	Seal, Copper
8	3	S20-2200-12	Cap Screw
9	1	S20-2400-25	Bearing, Tapered Roller
10	1	S20-1401-30	Shim-Ring
11	1	S20-1400-20	Bearing Housing
12	1	S20-6000-25	Vent Valve
13	1	S20-2700-25	Tab Washer
14	1	S20-2800-25	Shaft Nut
15	1	S20-1500-20	Bearing Housing Cover
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S20-0700-10	Gate Guide
18	1	S20-0400-49	Gate MASOTRONIC-2070-WR
	1	S20-0400-46	Gate MASOTRONIC-2051-MW
19	2	S20-0250-12	Handle Pin
20	1	S20-1000-16	Shaft
21	1	S20-3200-25	Shaft Key
22	1	S20-3100-80	Lip Seal, NBR
23	3	S20-2900-12	Cap Screw
24	1	S20-3000-80	O-Ring, Bearing Housing, NBR
25	1	S20-2600-25	Bearing, Tapered Roller
26	1	S20-3700-25	Threaded Plug
27	1	S20-3800-51	Oil Level Glass
	1	S20-3700-25	Seal Plug (only for ATEX)
28	2	S20-1901-12	Washer
29	2	S20-1900-12	Hexagon Head Cap Screw
30	1	S20-1300-20	Power Frame
31	1	S20-2000-25	Lock Nut

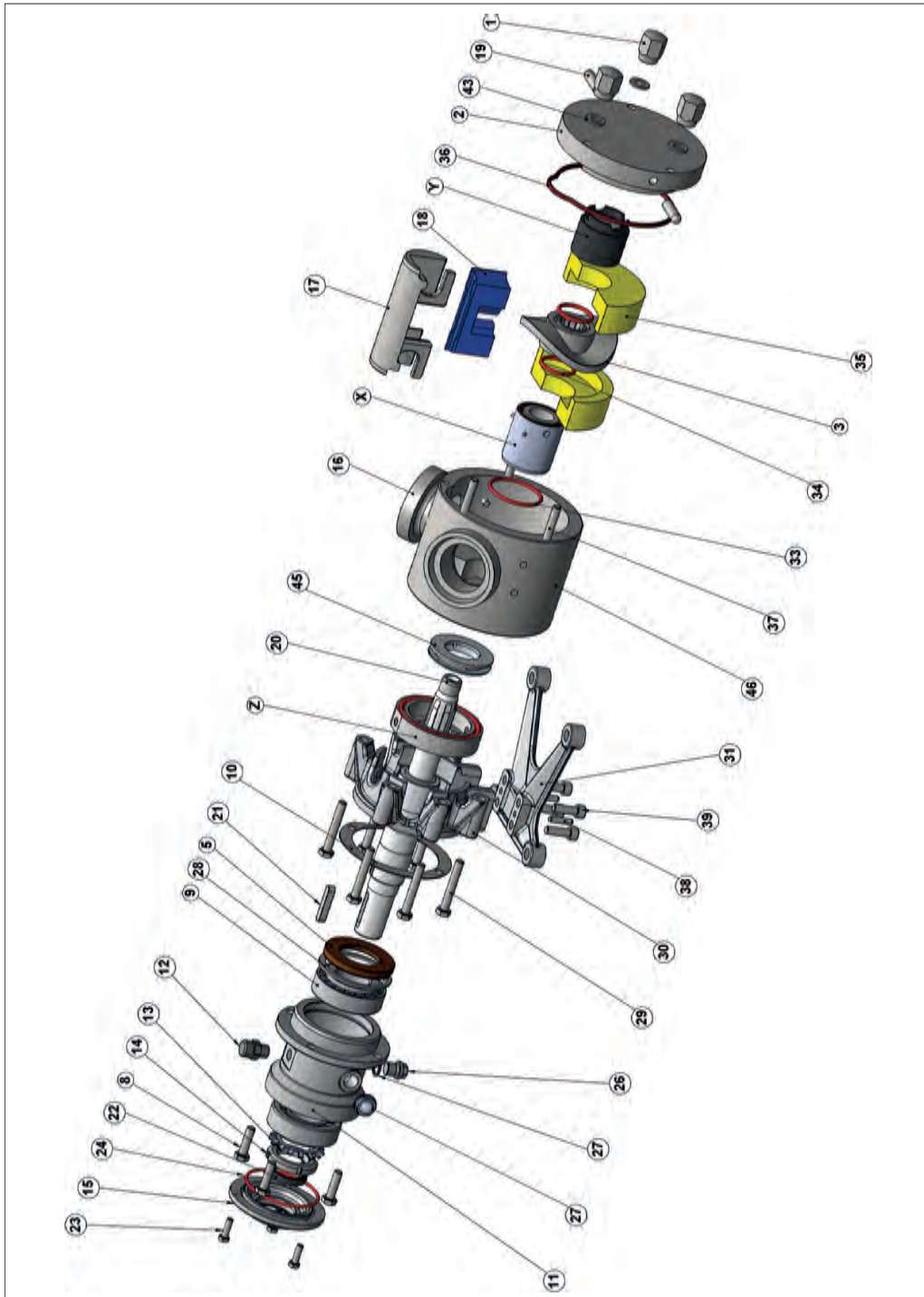
Number	Quantity	Part code	Item
32	1	S20-1753-80	O-Ring, Power Frame, NBR
	1	S20-1750-80	O-Ring, Pump Housing, NBR
33	1	S20-1750-82	O-Ring, Pump Housing, EPDM
	1	S20-1750-84	O-Ring, Pump Housing, FPM/FKM
	2	S20-1751-80	O-Ring, Rotor, NBR
34	2	S20-1751-82	O-Ring, Rotor, EPDM
	2	S20-1751-84	O-Ring, Rotor, FPM / FKM
	2	S20-1200-50	Liners, MASOTRONIC-2800-PO
35	2	S20-1200-62	Liners, MASOTRONIC-2080-PK
	2	S20-1200-63	Liners, MASOTRONIC-2681-HT
	1	S20-1701-80	O-Ring, Front Cover, NBR
36	1	S20-1701-82	O-Ring, Front Cover, EPDM
	1	S20-1701-84	O-Ring, Front Cover, FPM / FKM
37	3	S20-1800-12	Front Cover Studs
42	1	S20-2001-33	Seal, Copper
43	3	S20-1601-12	Washer
44	1	S20-3701-33	Seal, Copper
45	1	S20-0513-10	Distance Ring
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
1x S20-1700-##	1
1x S20-1750-##	1
2x S20-1751-##	2
1x S20-1752-##	1

SPS 200 with stainless steel power frame



Parts list for SPS 200 with stainless steel power frame

Number	Quantity	Part code	Item
1	3	S20-1600-12	Cap Nut
2	1	S20-0200-10	Front Cover
3	1	S20-0100-10	Rotor
4	1	S20-0300-10	Pump Housing
5	1	S20-2320-80	Lip seal, inboard
8	4	S20-2220-25	Cap Screw
9	2	S20-2420-25	Tapered Roller Bearing
10	1	S20-1421-30	Shim-Ring
11	1	S20-1420-12	Bearing Housing
12	1	S20-6000-50	Vent Valve
13	1	S20-2700-25	Tab Washer
14	1	S20-2800-25	Shaft Nut
15	1	S20-1520-12	Bearing Housing Cover
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S20-0700-10	Gate Guide
18	1	S20-0400-49	Gate MASOTRONIC-2070-WR
	1	S20-0400-46	Gate MASOTRONIC-2051-MW
19	2	S20-0250-12	Handle Pin
20	1	S20-1020-16	Shaft
21	1	S20-3200-25	Shaft Key
22	1	S20-3100-80	Lip Seal, NBR
23	3	S20-2920-25	Cap Screw
24	1	S20-3020-80	O-Ring, Bearing Housing, NBR
26	1	S20-2020-12	Threaded Plug
27	1	S20-3820-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
28	2	S20-5020-12	Snap ring
29	2	S20-1920-12	Hexagon Head Cap Screw
30	1	S20-1320-12	End plate, Power Frame
31	1	S20-1321-12	Base plate, Power Frame
33	1	S20-1750-80	O-Ring, Pump Housing, NBR
	1	S20-1750-82	O-Ring, Pump Housing, EPDM
	1	S20-1750-84	O-Ring, Pump Housing, FPM/FKM

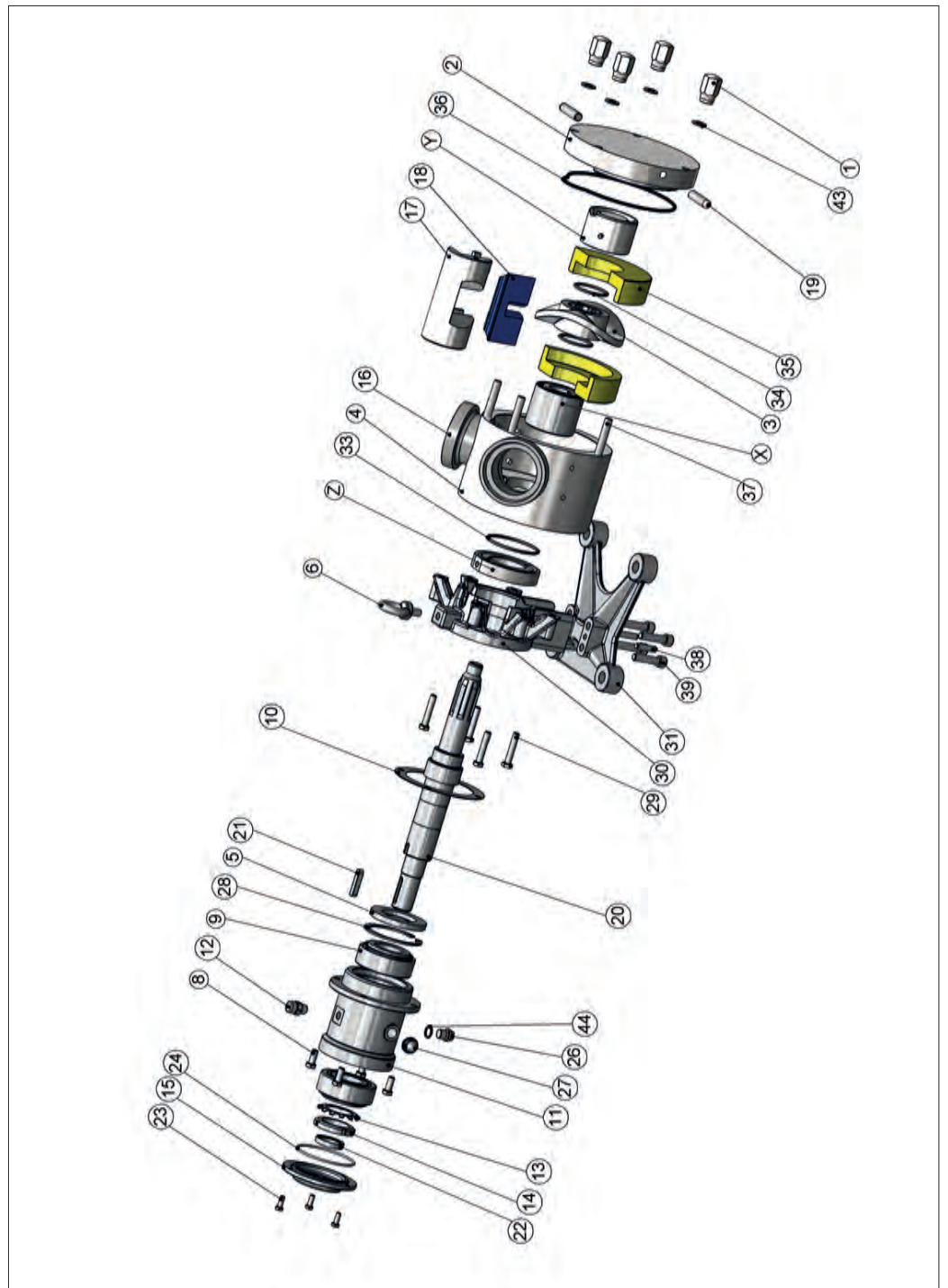
Number	Quantity	Part code	Item
34	2	S20-1751-80	O-Ring, Rotor, NBR
	2	S20-1751-82	O-Ring, Rotor, EPDM
	2	S20-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S20-1200-50	Liners, MASOTRONIC-2800-PO
	2	S20-1200-62	Liners, MASOTRONIC-2080-PK
	2	S20-1200-63	Liners, MASOTRONIC-2681-HT
36	1	S20-1701-80	O-Ring, Front Cover, NBR
	1	S20-1701-82	O-Ring, Front Cover, EPDM
	1	S20-1701-84	O-Ring, Front Cover, FPM / FKM
37	3	S20-1800-12	Front Cover Studs
38	2	S20-5010-12	Pin
39	4	S20-5001-12	Socket head cap screw
43	3	S20-1601-12	Washer
44	1	S20-3721-33	Seal, Copper
45	1	S20-0513-10	Distance Ring
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/Distance ring

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S20-1700-##	1
S20-1750-##	1
S20-1751-##	2
S20-1752-##	1

SPS 250 with stainless steel power frame



Parts list for SPS 250 with stainless steel power frame

Number	Quantity	Part code	Item
1	4	S21-1600-12	Cap Nut
2	1	S21-0200-10	Front Cover
3	1	S21-0100-10	Rotor
4	1	S21-0300-10	Pump Housing
5	1	S21-2320-80	Lip seal, inboard
6	1	S21-3920-12	Lifting bolt M12
8	4	S21-2220-12	Cap Screw
9	2	S21-2420-25	Bearing, Tapered Roller
10	1	S21-1421-30	Shim Ring
11	1	S21-1420-12	Support
12	1	S21-6000-50	Vent Valve
13	1	S21-2700-25	Tab Washer
14	1	S21-2800-25	Shaft Nut
15	1	S21-1520-12	Cover, bearing housing
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S21-0700-10	Gate Guide
18	1	S21-0400-49	Gate, MASOTRONIC-2070-WR
	1	S21-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S21-0250-12	Handle Pin
20	1	S21-1020-16	Shaft
21	1	S21-3200-25	Shaft Key
22	1	S21-3100-80	Lip Seal, NBR
23	4	S21-2920-12	Cap Screw
24	1	S21-3020-80	O-ring, bearing housing cover
26	1	S21-2020-12	Lock nut with hexagon socket
27	1	S21-3820-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
28	2	S21-5020-12	Snap ring
29	4	S21-1920-12	Cap Screw
30	1	S21-1320-12	End plate, Power Frame
31	1	S21-1321-12	Base plate, Power Frame

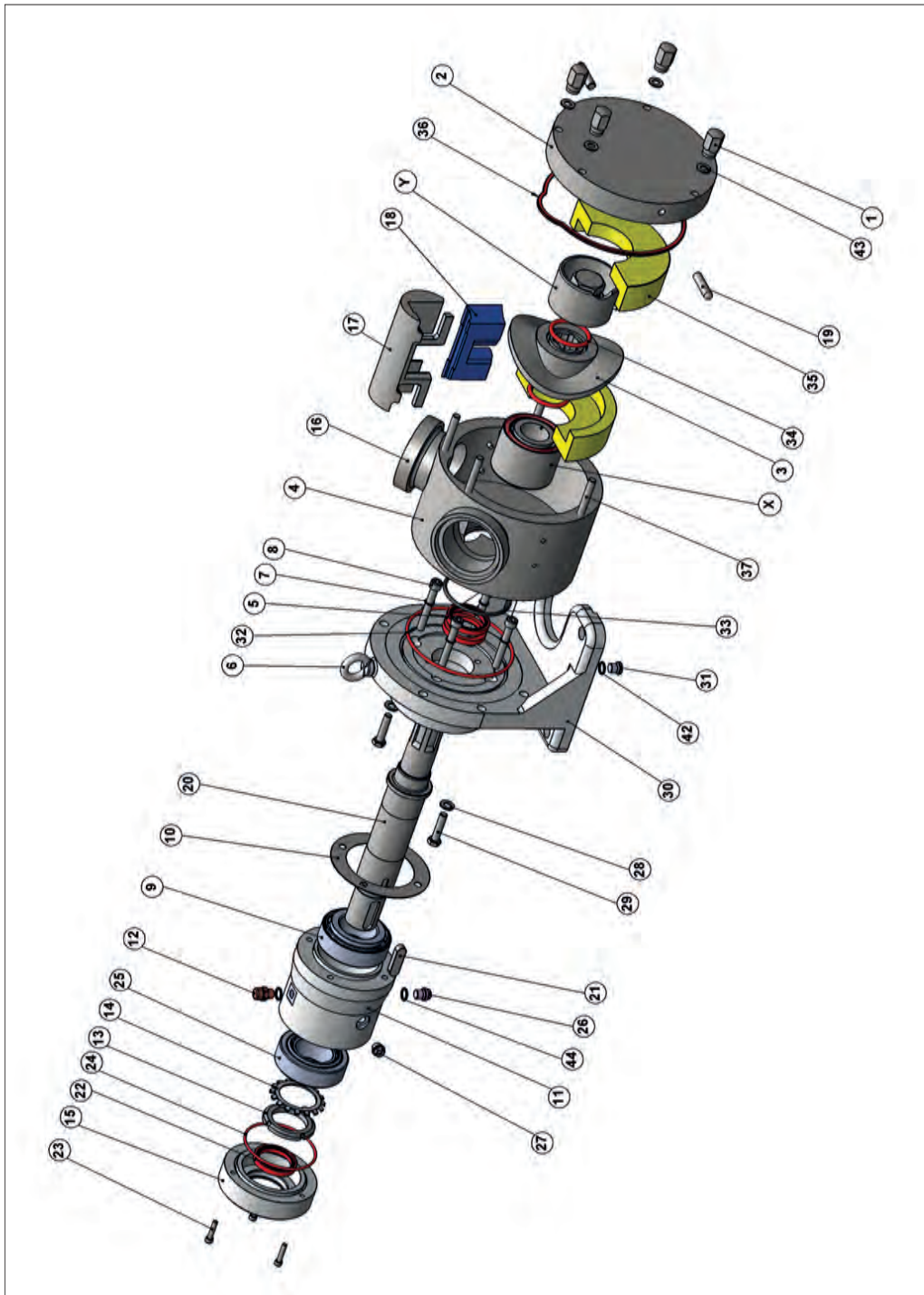
Number	Quantity	Part code	Item
33	1	S21-1750-80	O-Ring, Pump Housing, NBR
	1	S21-1750-82	O-Ring, Pump Housing, EPDM
	1	S21-1750-84	O-Ring, Pump Housing, FPM/FKM
34	2	S21-1751-80	O-Ring, Rotor, NBR
	2	S21-1751-82	O-Ring, Rotor, EPDM
	2	S21-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S21-1200-50	Liners, MASOTRONIC-2800-PO
	2	S21-1200-62	Liners, MASOTRONIC-2080-PK
	2	S21-1200-63	Liners, MASOTRONIC-2681-HT
36	1	S21-1701-80	O-Ring, Front Cover, NBR
	1	S21-1701-82	O-Ring, Front Cover, EPDM
	1	S21-1701-84	O-Ring, Front Cover, FPM/FKM
37	4	S21-1800-12	Front Cover Studs
38	2	S21-5010-12	Pin
39	4	S21-5001-12	Socket head cap screw
43	4	S21-1601-12	Washer
44	1	S21-3721-33	Seal, Copper
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/Distance ring

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S21-1700-##	1
S21-1750-##	1
S21-1751-##	2
S21-1752-##	1
S21-8505-##	1

SPS 300 with cast iron power frame



Parts list for SPS 300 with cast iron power frame

Number	Quantity	Part code	Item
1	4	S25-1600-12	Cap Nut
2	1	S25-0200-10	Front Cover
3	1	S25-0100-10	Rotor
4	1	S25-0300-10	Pump Housing
5	2	S25-2300-80	Lip Seal, NBR
6	1	S25-3900-25	Lifting Eye Bolt
7	4	S25-2100-33	Seal, Copper
8	4	S25-2200-12	Cap Screw
9	1	S25-2400-25	Bearing, Tapered Roller
10	1	S25-1401-30	Shim-Ring
11	1	S25-1400-20	Bearing Housing
12	1	S25-6000-25	Vent Valve
13	1	S25-2700-25	Tab Washer
14	1	S25-2800-25	Shaft Nut
15	1	S25-1500-20	Bearing Housing Cover
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S25-0700-10	Gate Guide
18	1	S25-0400-49	Gate, MASOTRONIC-2070-WR
	1	S25-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S25-0250-12	Handle Pin
20	1	S25-1000-16	Shaft
21	1	S25-3200-25	Shaft Key
22	1	S25-3100-80	Lip Seal, NBR
23	4	S25-2900-12	Cap Screw
24	1	S25-3000-80	O-Ring, Bearing Housing, NBR
25	1	S25-2600-25	Bearing, Tapered Roller
26	1	S25-3700-25	Threaded Plug
27	1	S25-3800-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
28	1	S25-1901-12	Washer
29	2	S25-1900-12	Hexagon Head Cap Screw
30	1	S25-1300-20	Power Frame
31	1	S25-2000-25	Lock Nut

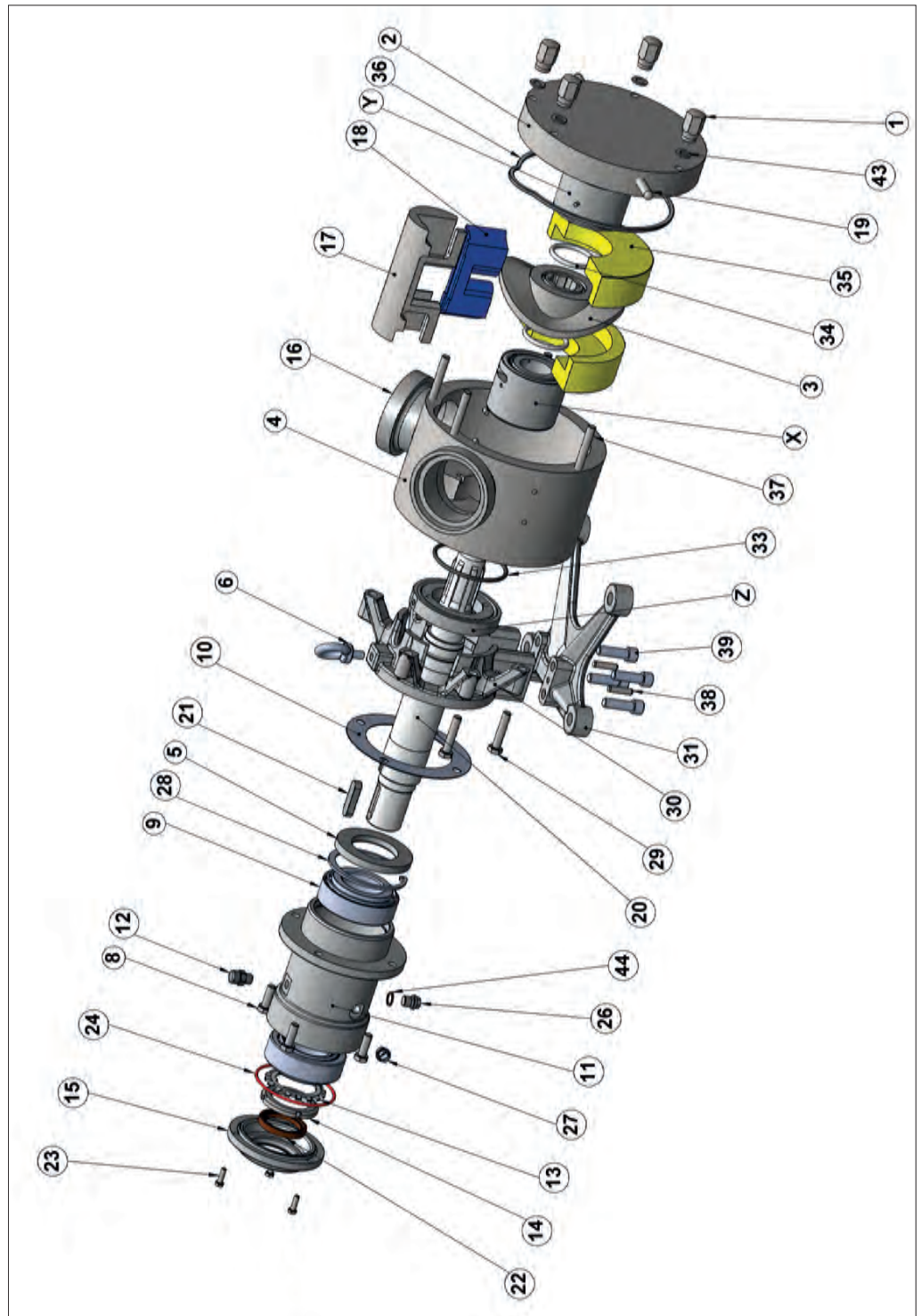
Number	Quantity	Part code	Item
32	1	S25-1753-80	O-Ring, Power Frame, NBR
	1	S25-1753-82	O-Ring, Power Frame, EPDM
	1	S25-1753-84	O-Ring, Power Frame, FPM/FKM
33	1	S25-1750-80	O-Ring, Pump Housing, NBR
	1	S25-1750-82	O-Ring, Pump Housing, EPDM
	1	S25-1750-84	O-Ring, Pump Housing, FPM/FKM
34	2	S25-1751-80	O-Ring, Rotor, NBR
	2	S25-1751-82	O-Ring, Rotor, EPDM
	2	S25-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S25-1200-50	Liners, MASOTRONIC-2800-PO
	2	S25-1200-62	Liners, MASOTRONIC-2080-PK
	2	S25-1200-63	Liners, MASOTRONIC-2681-HT
36	1	S25-1701-80	O-Ring, Front Cover, NBR
	1	S25-1701-82	O-Ring, Front Cover, EPDM
	1	S25-1701-84	O-Ring, Front Cover, FPM/FKM
37	4	S25-1800-12	Front Cover Studs
42	1	S25-2001-33	Seal, Copper
43	4	S25-1601-12	Washer
44	1	S25-3701-33	Seal, Copper
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S25-1700-##	1
S25-1750-##	1
S25-1751-##	2
S25-1752-##	1
S25-8505-##	1

SPS 300 with stainless steel power frame



Parts list for SPS 300 with stainless steel power frame

Number	Quantity	Part code	Item
1	4	S25-1600-12	Cap Nut
2	1	S25-0200-10	Front Cover
3	1	S25-0100-10	Rotor
4	1	S25-0300-10	Pump Housing
5	1	S25-2320-80	Lip seal, inboard
6	1	S25-3920-12	Lifting bolt M12
8	4	S25-2220-12	Cap Screw
9	2	S25-2420-25	Bearing, Tapered Roller
10	1	S25-1421-30	Shim Ring
11	1	S25-1420-12	Support
12	1	S25-6000-50	Vent Valve
13	1	S25-2700-25	Tab Washer
14	1	S25-2800-25	Shaft Nut
15	1	S25-1520-12	Cover, bearing housing
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S25-0700-10	Gate Guide
18	1	S25-0400-49	Gate, MASOTRONIC-2070-WR
	1	S25-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S25-0250-12	Handle Pin
20	1	S25-1020-16	Shaft
21	1	S25-3200-25	Shaft Key
22	1	S25-3100-80	Lip Seal, NBR
23	4	S25-2920-12	Cap Screw
24	1	S25-3020-80	O-ring, bearing housing cover
26	1	S25-2020-12	Lock nut with hexagon socket
27	1	S25-3820-51	Oil Level Glass
	1	80-0090-12	Seal Plug (only for ATEX)
28	2	S25-5020-12	Snap ring
29	4	S25-1920-12	Cap Screw
30	1	S25-1320-12	End plate, Power Frame
31	1	S25-1321-12	Base plate, Power Frame

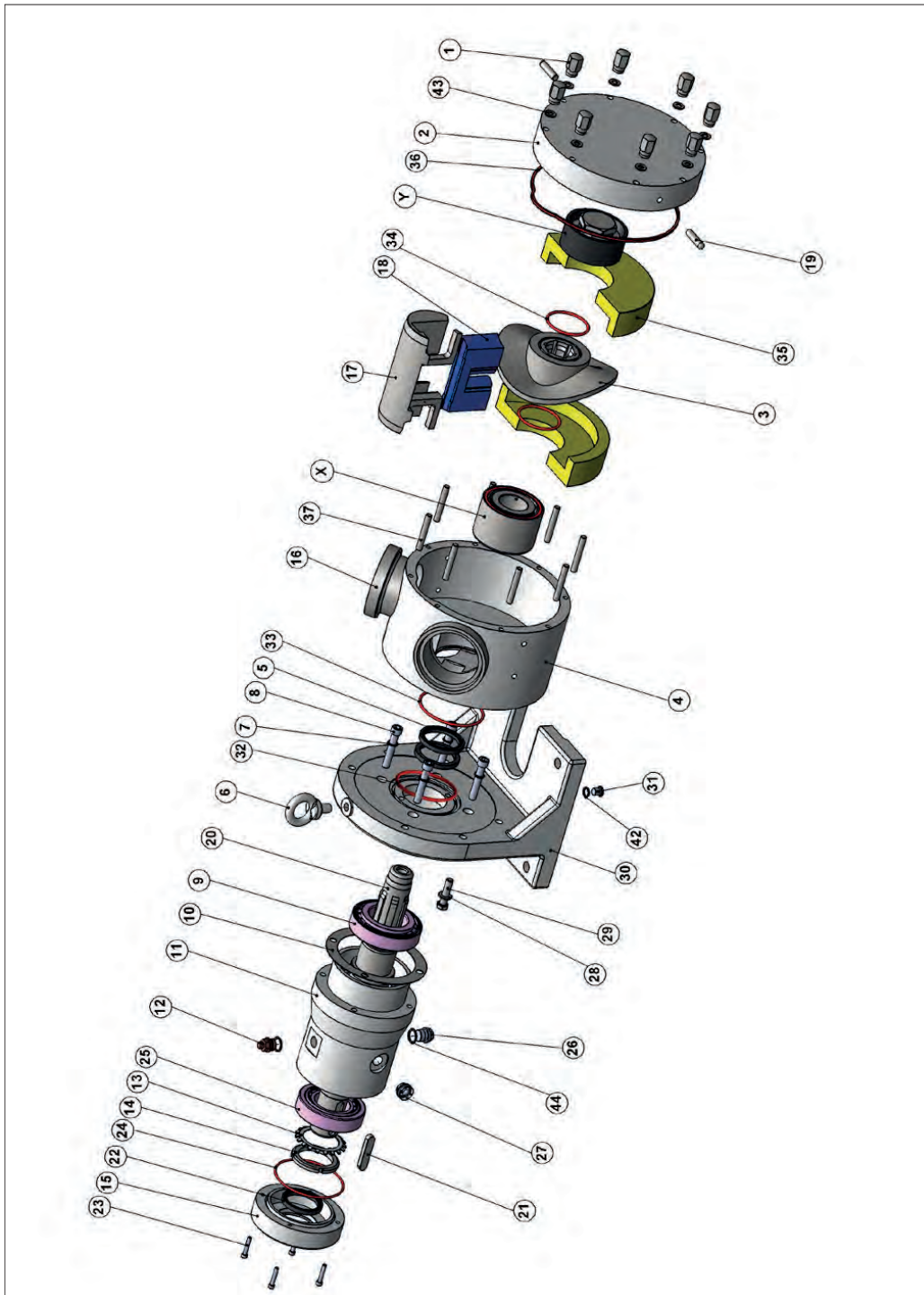
Number	Quantity	Part code	Item
33	1	S25-1750-80	O-Ring, Pump Housing, NBR
	1	S25-1750-82	O-Ring, Pump Housing, EPDM
	1	S25-1750-84	O-Ring, Pump Housing, FPM/FKM
34	2	S25-1751-80	O-Ring, Rotor, NBR
	2	S25-1751-82	O-Ring, Rotor, EPDM
	2	S25-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S25-1200-50	Liners, MASOTRONIC-2800-PO
	2	S25-1200-62	Liners, MASOTRONIC-2080-PK
	2	S25-1200-63	Liners, MASOTRONIC-2681-HT
36	1	S25-1701-80	O-Ring, Front Cover, NBR
	1	S25-1701-82	O-Ring, Front Cover, EPDM
	1	S25-1701-84	O-Ring, Front Cover, FPM/FKM
37	4	S25-1800-12	Front Cover Studs
38	2	S25-5010-12	Pin
39	4	S25-5001-12	Socket head cap screw
43	4	S25-1601-12	Washer
44	1	S25-3721-33	Seal, Copper
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/Distance ring

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S25-1700-##	1
S25-1750-##	1
S25-1751-##	2
S25-1752-##	1
S25-8505-##	1

SPS 400 with cast iron frame



Parts list for SPS 400 with cast iron frame

Number	Quantity	Part code	Item
1	8	S40-1600-12	Cap Nut
2	1	S40-0200-10	Front Cover
3	1	S40-0100-10	Rotor
4	1	S40-0300-10	Pump Housing
5	2	S40-2300-80	Lip Seal, NBR
6	1	S40-3900-25	Lifting Eye Bolt
7	4	S40-2100-33	Seal, Copper
8	4	S40-2200-12	Cap Screw
9	1	S40-2400-25	Bearing, Tapered Roller
10	1	S40-1401-30	Shim-Ring
11	1	S40-1400-20	Bearing Housing
12	1	S40-6000-25	Vent Valve
13	1	S40-2700-25	Tab Washer
14	1	S40-2800-25	Shaft Nut
15	1	S40-1500-20	Bearing Housing Cover
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S40-0700-10	Gate Guide
18	1	S40-0400-49	Gate, MASOTRONIC-2070-WR
	1	S40-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S40-0250-12	Handle Pin
20	1	S40-1000-16	Shaft
21	1	S40-3200-25	Shaft Key
22	1	S40-3100-80	Lip Seal, NBR
23	4	S40-2900-12	Cap Screw
24	1	S40-3000-80	O-Ring, Bearing Housing, NBR
25	1	S40-2600-25	Bearing, Tapered Roller
26	1	S40-3700-25	Threaded Plug
27	1	S40-3800-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
28	2	S40-1901-12	Washer
29	2	S40-1900-12	Hexagon Head Cap Screw
30	1	S40-1300-20	Power Frame
31	1	S40-2000-25	Lock Nut

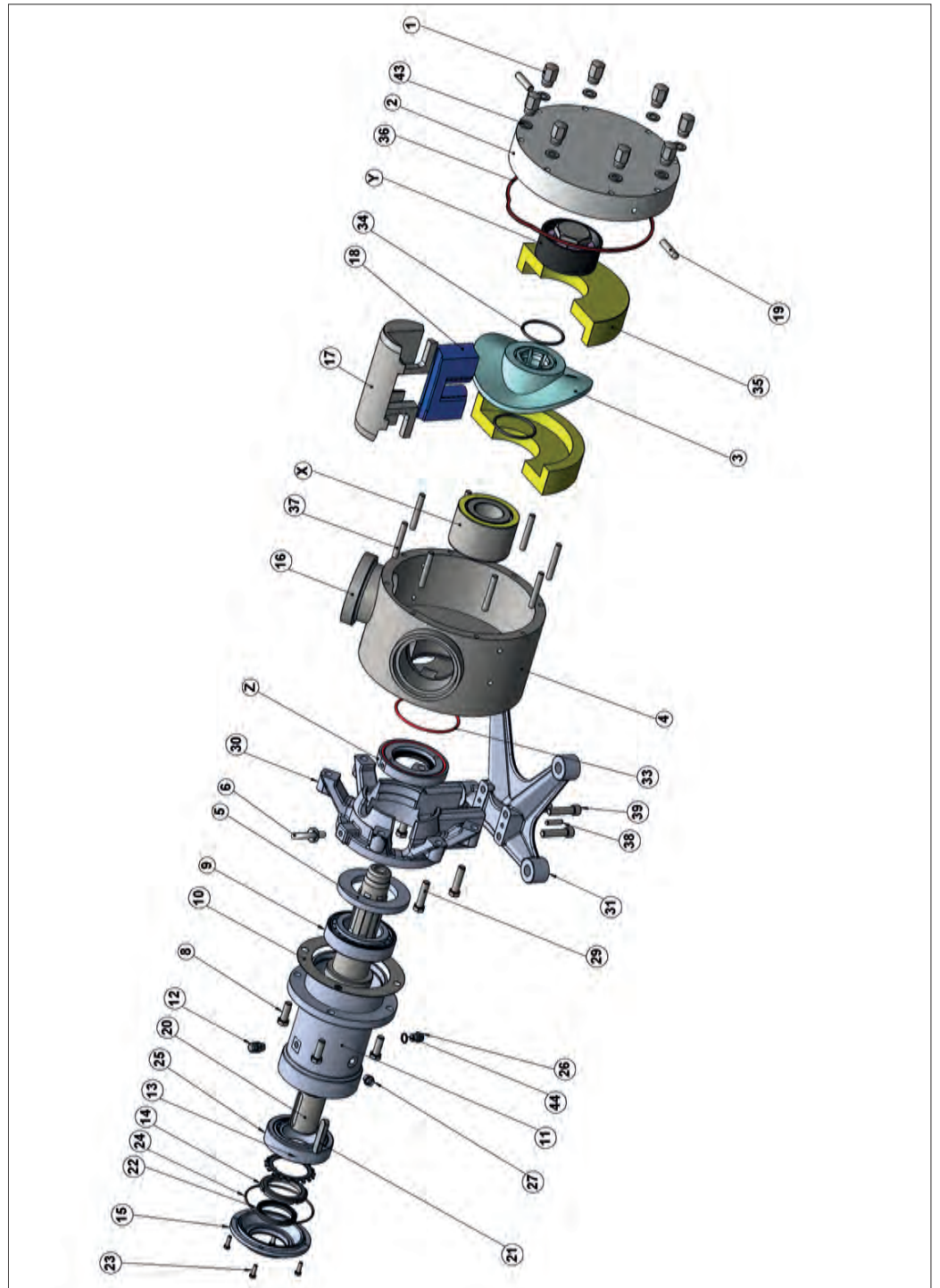
Number	Quantity	Part code	Item
32	1	S40-1753-80	O-Ring, Power Frame, NBR
	1	S40-1753-82	O-Ring, Power Frame, EPDM
	1	S40-1753-84	O-Ring, Power Frame, FPM/FKM
33	1	S40-1750-80	O-Ring, Pump Housing, NBR
	1	S40-1750-82	O-Ring, Pump Housing, EPDM
	1	S40-1750-84	O-Ring, Pump Housing, FPM/FKM
34	2	S40-1751-80	O-Ring, Rotor, NBR
	2	S40-1751-82	O-Ring, Rotor, EPDM
	2	S40-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S40-1200-50	Liners. MASOTRONIC-2800-PO
	2	S40-1200-62	Liners. MASOTRONIC-2080-PK
	2	S40-1200-63	Liners. MASOTRONIC-2681-HT
36	1	S40-1701-80	O-Ring, Front Cover, NBR
	1	S40-1701-82	O-Ring, Front Cover, EPDM
	1	S40-1701-84	O-Ring, Front Cover, FPM / FKM
37	8	S40-1800-12	Front Cover Studs
42	1	S40-2001-33	Seal, Copper
43	8	S40-1601-12	Washer
44	1	S40-3701-33	Seal, Copper
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S40-1700-##	1
S40-1750-##	1
S40-1751-##	2
S40-1752-##	1
S40-8505-##	1

SPS 400 with stainless steel frame



Parts list for SPS 400 with stainless steel frame

Number	Quantity	Part code	Item
1	8	S40-1600-12	Cap Nut
2	1	S40-0200-10	Front Cover
3	1	S40-0100-10	Rotor
4	1	S40-0300-10	Pump Housing
5	1	S40-2320-80	Lip Seal, NBR
6	1	S40-3920-12	Lifting Eye Bolt
8	4	S40-2220-12	Cap Screw
9	1	S40-2420-25	Bearing, Tapered Roller
10	1	S40-1421-30	Shim-Ring
11	1	S40-1420-12	Bearing Housing
12	1	S40-6000-50	Vent Valve
13	1	S40-2700-25	Tab Washer
14	1	S40-2800-25	Shaft Nut
15	1	S40-1520-12	Bearing Housing Cover
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S40-0700-10	Gate Guide
18	1	S40-0400-49	Gate, MASOTRONIC-2070-WR
	1	S40-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S40-0250-12	Handle Pin
20	1	S40-1020-16	Shaft
21	1	S40-3200-25	Shaft Key
22	1	S40-3100-80	Lip Seal, NBR
23	4	S40-2920-12	Cap Screw
24	1	S40-3020-80	O-Ring, Bearing Housing, NBR
25	1	S40-2600-25	Bearing, Tapered Roller
26	1	S40-2020-12	Threaded Plug
27	1	S40-3820-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
29	4	S40-1920-12	Cap Screw
30	1	S40-1320-12	End plate, Power Frame
31	1	S40-1321-12	Base plate, Power Frame

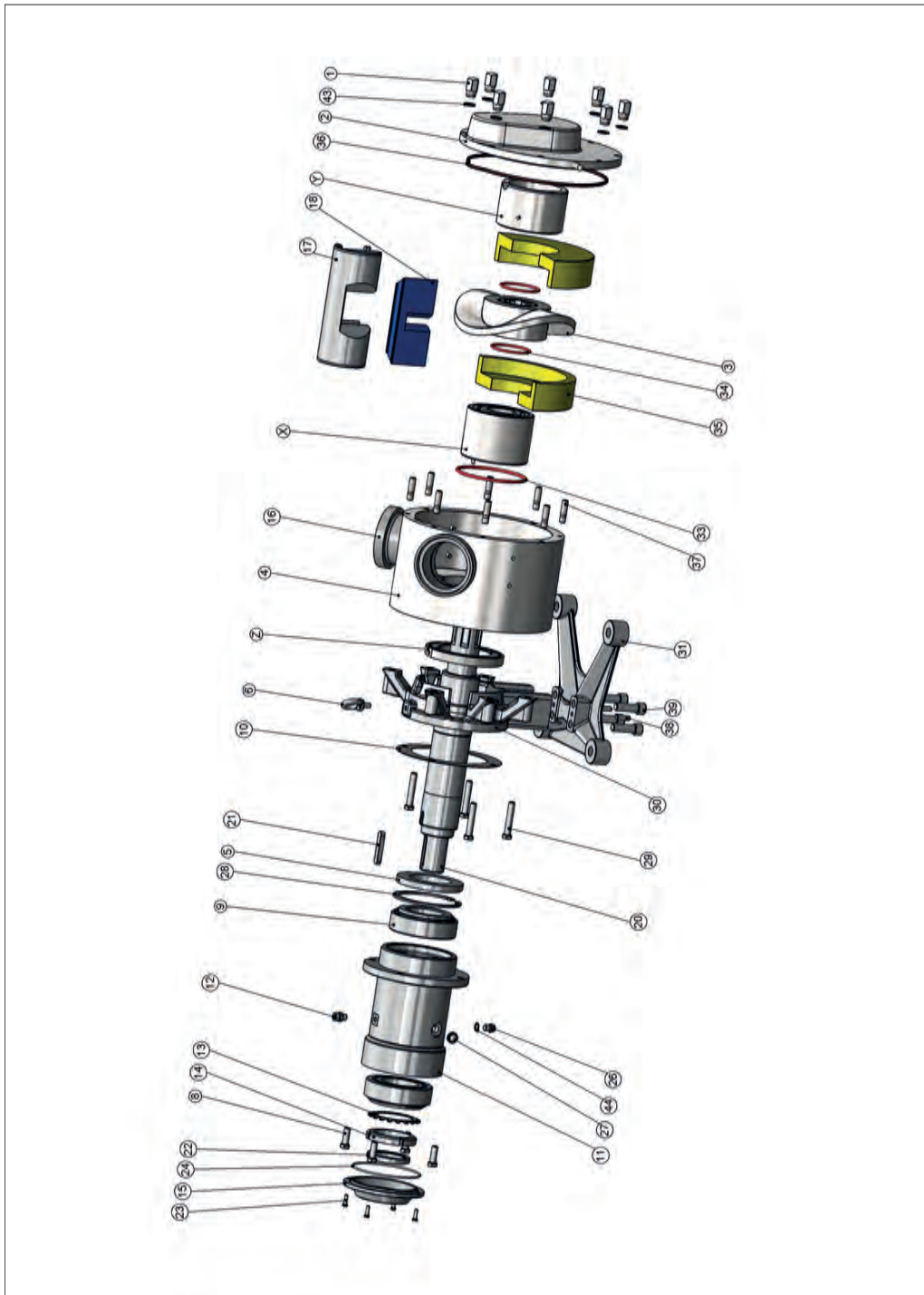
Number	Quantity	Part code	Item
33	1	S40-1750-80	O-Ring, Pump Housing, NBR
	1	S40-1750-82	O-Ring, Pump Housing, EPDM
	1	S40-1750-84	O-Ring, Pump Housing, FPM/FKM
34	2	S40-1751-80	O-Ring, Rotor, NBR
	2	S40-1751-82	O-Ring, Rotor, EPDM
	2	S40-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S40-1200-50	Liners. MASOTRONIC-2800-PO
	2	S40-1200-62	Liners. MASOTRONIC-2080-PK
	2	S40-1200-63	Liners. MASOTRONIC-2681-HT
36	1	S40-1701-80	O-Ring, Front Cover, NBR
	1	S40-1701-82	O-Ring, Front Cover, EPDM
	1	S40-1701-84	O-Ring, Front Cover, FPM / FKM
37	8	S40-1800-12	Front Cover Studs
38	2	S40-5010-12	Pin
39	4	S40-5001-12	Socket head cap screw
42	1	S40-2001-33	Seal, Copper
43	8	S40-1601-12	Washer
44	1	S40-372-33	Seal, Copper
X		"Seals" on page 119	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/distance ring

Please quote your pump's serial number when you order spare parts (see the type plate on the bearing housing; see "Pump specifications" on page 15)

Available wearing kits

O-ring kit	
Part code	Quantity
S40-1700-##	1
S40-1750-##	1
S40-1751-##	2
S40-1752-##	1
S40-8505-##	1

SPS 500 with stainless steel power frame



Parts list for SPS 500 with stainless steel power frame

Number	Quantity	Part code	Item
1	8	S50-1600-12	Cap Nut
2	1	S50-0200-10	Front Cover
3	1	S50-0100-10	Rotor
4	1	S50-0300-10	Pump Housing
5	1	S50-2320-80	Lip seal, inboard
6	1	S50-3920-12	Lifting bolt M12
8	4	S50-2220-12	Cap Screw
9	2	S50-2420-25	Bearing, Tapered Roller
10	1	S50-1421-30	Shim Ring
11	1	S50-1420-12	Support
12	1	S50-6000-50	Vent Valve
13	1	S50-2700-25	Tab Washer
14	1	S50-2800-25	Shaft Nut
15	1	S50-1520-12	Cover, bearing housing
16	2	Integral with pump housing. Type depends on customer choice	Nozzles
17	1	S50-0700-10	Gate Guide
18	1	S50-0400-49	Gate, MASOTRONIC-2070-WR
	1	S50-0400-46	Gate, MASOTRONIC-2051-MW
19	2	S50-0250-12	Handle Pin
20	1	S50-1020-16	Shaft
21	1	S50-3200-25	Shaft Key
22	1	S50-3100-80	Lip Seal, NBR
23	4	S50-2920-12	Cap Screw
24	1	S50-3020-80	O-ring, bearing housing cover
26	1	S50-2020-12	Lock nut with hexagon socket
27	1	S50-3820-51	Oil Level Glass
	1	80-0090-12	Oil Level Glass (only for ATEX)
28	1	S50-5020-12	Snap ring
29	4	S50-1920-12	Cap Screw
30	1	S50-1320-12	End plate, Power Frame
31	1	S50-1321-12	Base plate, Power Frame

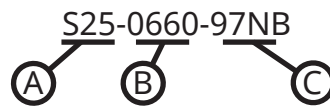
Number	Quantity	Part code	Item
33	1	S50-1750-80	O-Ring, Pump Housing, NBR
	1	S50-1750-82	O-Ring, Pump Housing, EPDM
	1	S50-1750-84	O-Ring,Pump Housing,FPM/FKM
34	2	S50-1751-80	O-Ring, Rotor, NBR
	2	S50-1751-82	O-Ring, Rotor, EPDM
	2	S50-1751-84	O-Ring, Rotor, FPM / FKM
35	2	S50-1200-50	Liners, MASOTRONIC-2800-PO
	2	S50-1200-62	Liners, MASOTRONIC-2080-PK
	2	S50-1200-63	Liners, MASOTRONIC-2681-HT
36	1	S50-1701-80	O-Ring, Front Cover, NBR
	1	S50-1701-82	O-Ring, Front Cover, EPDM
	1	S50-1701-84	O-Ring, Front Cover, FPM/FKM
37	8	S50-1800-12	Front Cover Studs
38	2	S50-5010-12	Pin
39	4	S50-5001-12	Socket head cap screw
43	8	S50-1601-12	Washer
44	1	S50-3721-33	Seal, Copper
X		"Seals" on the facing page	Seal System
Y		"Front support versions" on page 129	Front Support
Z		"Sealing/distance ring version" on page 133	Sealing/Distance ring

Available wearing kits

O-ring kit	
Part code	Quantity
S50-1700-##	1
S50-1750-##	1
S50-1751-##	2
S50-1752-##	1
S50-8505-##	1

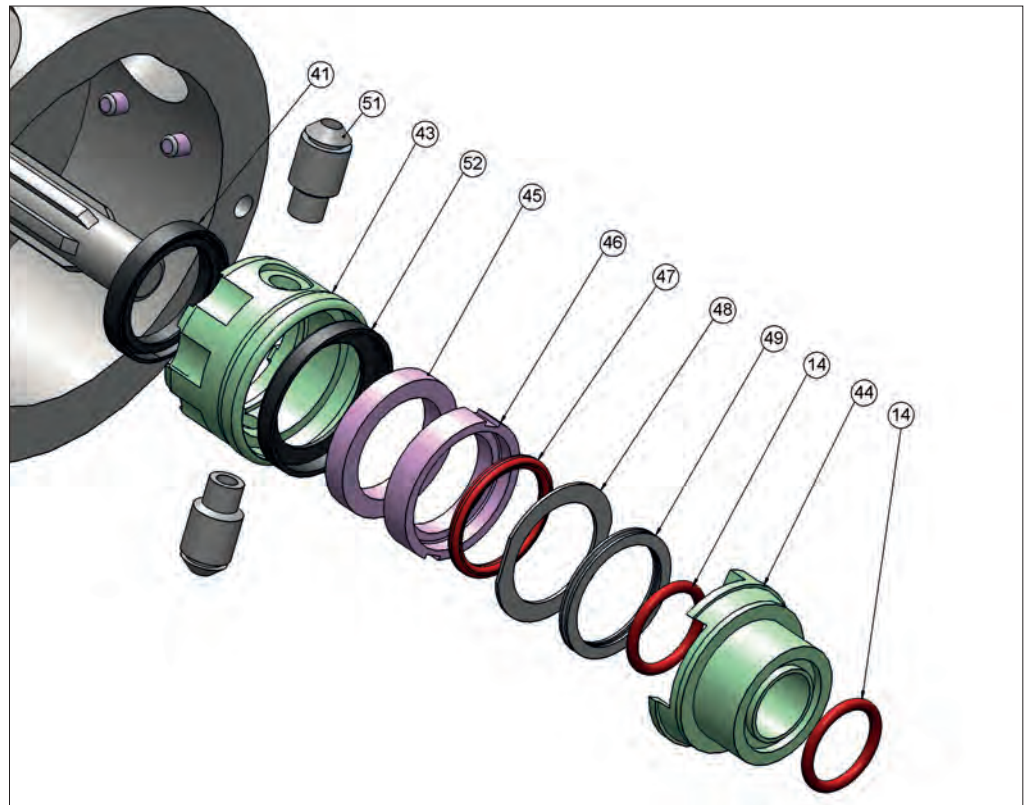
24.2 Seals

Mechanical seal system



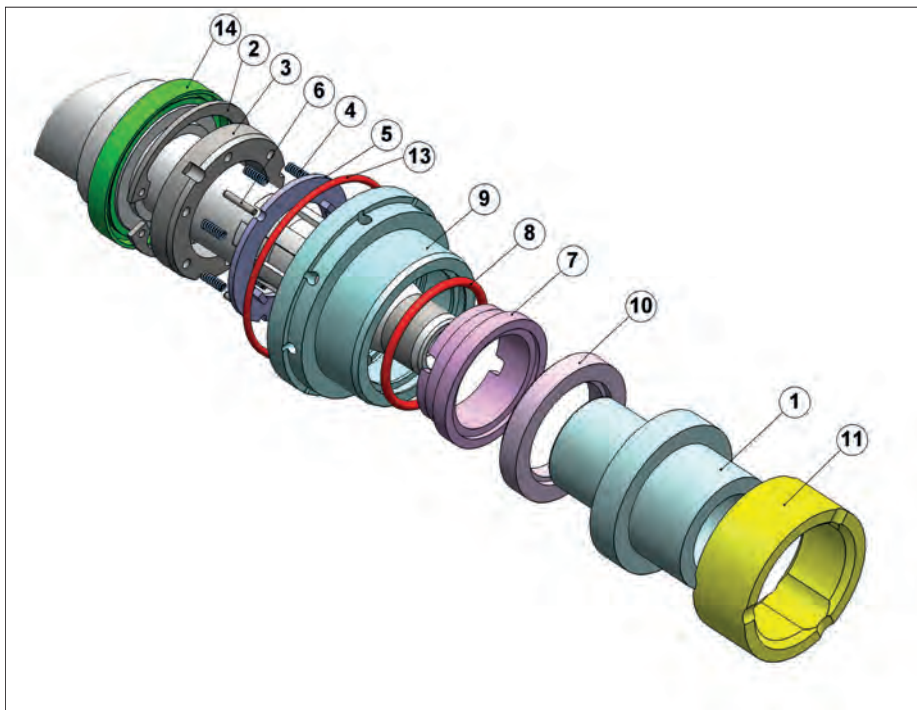
A	Pump size	S10: SPS 100 S20: SPS 200 S25: SPS 250 S40: SPS 400 S50: SPS 500 S60: SPS 600
B	Wearing kit type	0660: Single mechanical seal 0665: Double mechanical seal
C	Material of product contact items	95: SiC / SiC and FKM 95EP: SiC / SiC and EPDM 95NB: SiC / SiC and NBR 95PT: SiC / SiC and PTFE 97: SiC / CA and FKM 97EP: SiC / CA and EPDM 97NB: SiC / CA and NBR 97PT: SiC / CA and PTFE

Mechanical seal, single, SPS 100



Number	Quantity	Part code	Item
14	2	S10-0011-80	O-Ring, NBR
	2	S10-0011-82	O-Ring, EPDM
	2	S10-0011-84	O-Ring, FPM / FKM
41	1	S10-0037-80	Lip Seal, NBR
43	1	S10-0042-10	Stationary Ring Holder
44	1	S10-0043-10	Dynamic Ring Holder
45	1	S10-0045-41	Stationary Seal Face, SiC
46	1	S10-0046-41	Rotating Seal Face, SiC
47	1	S10-0047-84	O-ring, FPM / FKM
	1	S10-0047-82	O-ring, EPDM
48	1	S10-0048-10	Thrust Washer
49	1	S10-0049-10	Wave Spring
50	1	S10-0050-10	Tappet (pin)
51	1	S10-0039-34	Flush Port
52	1	S10-0038-80	Cup, NBR
	1	S10-0038-82	Cup, EPDM
	1	S10-0038-84	Cup, FPM / FKM

Mechanical seal, single, SPS 200

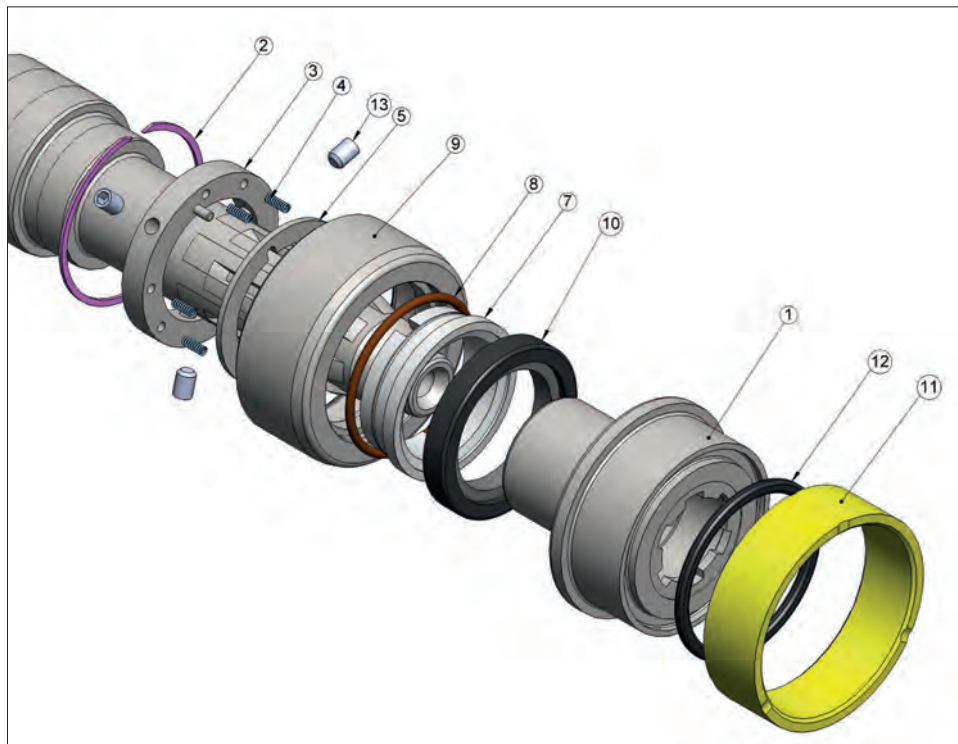


Number	Quantity	Part code	Item
1	1	S20-5210-10	Dynamic ring holder
2	1	S20-5223-12	Snap ring
3	1	S20-5220-10	Spring holder

Number	Quantity	Part code	Item
4	6	020P572.1420A1	Spring
5	1	S20-5230-10	Spring support
6	3	S20-5222-10	Straight pin
7*	1	S20-5245-41	Static surface, SiC
	1	S20-5245-66	Static surface, C
	1	S20-5246-80	O-ring, NBR
8*	1	S20-5246-82	O-ring, EPDM
	1	S20-5246-84	O-ring, FPM / FKM
9	1	S20-5200-10	Static ring holder
10*	1	S20-5240-80	Cup with dynamic surface, SiC - NBR
	1	S20-5240-82	Cup with dynamic surface, SiC - EPDM
	1	S20-5240-84	Cup with dynamic surface, SiC - FPM/FKM
11	1	S20-5250-50	Backing ring, polyamide
	1	S20-5250-55	Backing ring, PPS
	1	S20-5250-62	Backing ring, PEEK
13	1	S20-8500-80	O-ring, NBR
14	1	S20-2300-80	Lip seal, NBR

*Included in wearing kit. ("Mechanical seal system" on page 119).

Mechanical seal, single, SPS 250



SPS 250 (S21-064#-##)

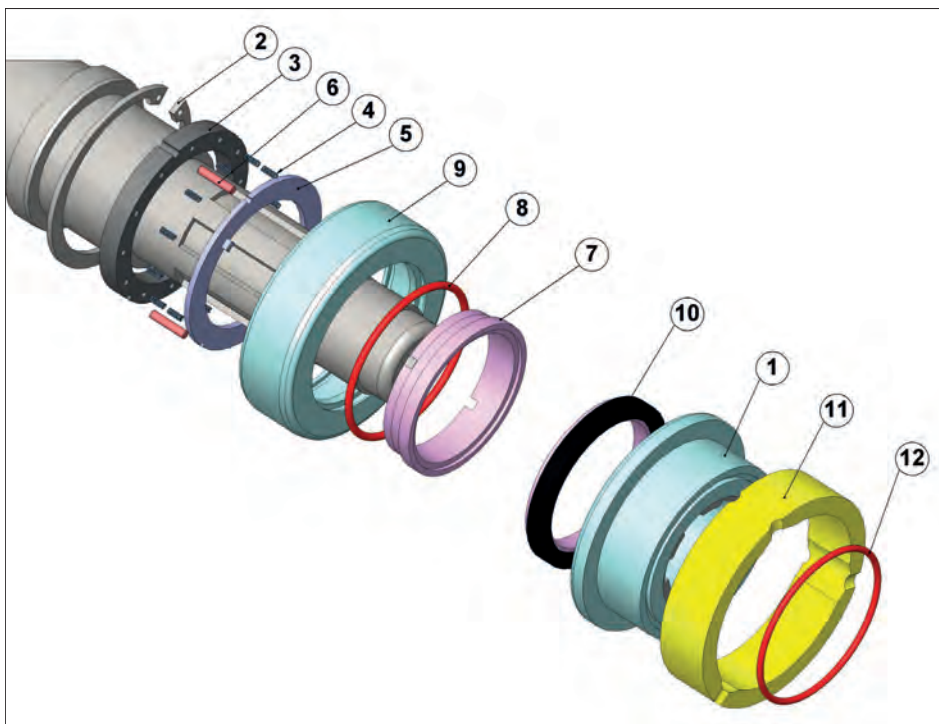
Number	Quantity	Part code	Item
1	1	S21-5210-10	Dynamic ring holder

SPS 250 (S21-064#-##)

Number	Quantity	Part code	Item
2	1	S21-5223-12	Snap ring
3	1	S21-5220-10	Spring holder
4	6	020P572.1420A1	Set screw
5	1	S21-5230-10	Spring support
7*	1	S21-5245-41	Static surface, SiC
	1	S21-5245-66	Static surface, C
	1	S21-5246-80	O-ring, NBR
8*	1	S21-5246-82	O-ring, EPDM
	1	S21-5246-84	O-ring, FPM / FKM
9	1	S21-5200-10	Static ring holder
10*	1	S21-5240-80	Cup with dynamic surface, SiC - NBR
	1	S21-5240-82	Cup with dynamic surface, SiC - EPDM
	1	S21-5240-84	Cup with dynamic surface, SiC - FPM/FKM
11	1	S21-5250-50	Backing ring, polyamide
	1	S21-5250-55	Backing ring, PPS
	1	S21-5250-62	Backing ring, PEEK
12	1	S21-8505-80	O-ring, NBR
	1	S21-8505-82	O-ring, EPDM
	1	S21-8505-84	O-ring, FPM / FKM
13	3	S21-5222-10	Straight pin

*Included in wearing kit. ("Mechanical seal system" on page 119).

Mechanical seal, single, SPS 300, SPS 400 and SPS 500



SPS 300 (S25-064#-##)			
Number	Quantity	Part code	Item
1	1	S25-5210-10	Dynamic ring holder
2	1	S25-5223-12	Snap ring
3	1	S25-5220-10	Spring holder
4	8	020P572.1420A1	Spring
5	1	S25-5230-10	Spring support
6	3	S25-5222-10	Straight pin
7*	1	S25-5245-41	Static surface, SiC
	1	S25-5245-66	Static surface, C
8*	1	S25-5246-80	O-ring, NBR
	1	S25-5246-82	O-ring, EPDM
	1	S25-5246-84	O-ring, FPM / FKM
9	1	S25-5200-10	Static ring holder
10*	1	S25-5240-80	Cup with dynamic surface, SiC - NBR
	1	S25-5240-82	Cup with dynamic surface, SiC - EPDM
	1	S25-5240-84	Cup with dynamic surface, SiC - FPM/FKM
11	1	S25-5250-50	Backing ring, polyamide
	1	S25-5250-55	Backing ring, PPS
	1	S25-5250-62	Backing ring, PEEK
12	1	S25-8505-80	O-ring, NBR
	1	S25-8505-82	O-ring, EPDM
	1	S25-8505-84	O-ring, FPM / FKM

*Included in wearing kit. ("Mechanical seal system" on page 119).

SPS 400 (S40-064#-##)			
Number	Quantity	Part code	Item
1	1	S40-5210-10	Dynamic ring holder
2	1	S40-5223-12	Snap ring
3	1	S40-5220-10	Spring holder
4	8	020P572.1420A1	Spring
5	1	S40-5230-10	Spring support
6	3	S40-5222-10	Straight pin
7*	1	S40-5245-41	Static surface, SiC
	1	S40-5245-66	Static surface, C
8*	1	S40-5246-80	O-ring, NBR
	1	S40-5246-82	O-ring, EPDM
	1	S40-5246-84	O-ring, FPM / FKM
9	1	S40-5200-10	Static ring holder

SPS 400 (S40-064#-##)

Number	Quantity	Part code	Item
10*	1	S40-5240-80	Cup with dynamic surface, SiC - NBR
	1	S40-5240-82	Cup with dynamic surface, SiC - EPDM
	1	S40-5240-84	Cup with dynamic surface, SiC - FPM/FKM
11	1	S40-5250-50	Backing ring, polyamide
	1	S40-5250-55	Backing ring, PPS
	1	S40-5250-62	Backing ring, PEEK
12	1	S40-8505-80	O-ring, NBR
	1	S40-8505-82	O-ring, EPDM
	1	S40-8505-84	O-ring, FPM / FKM

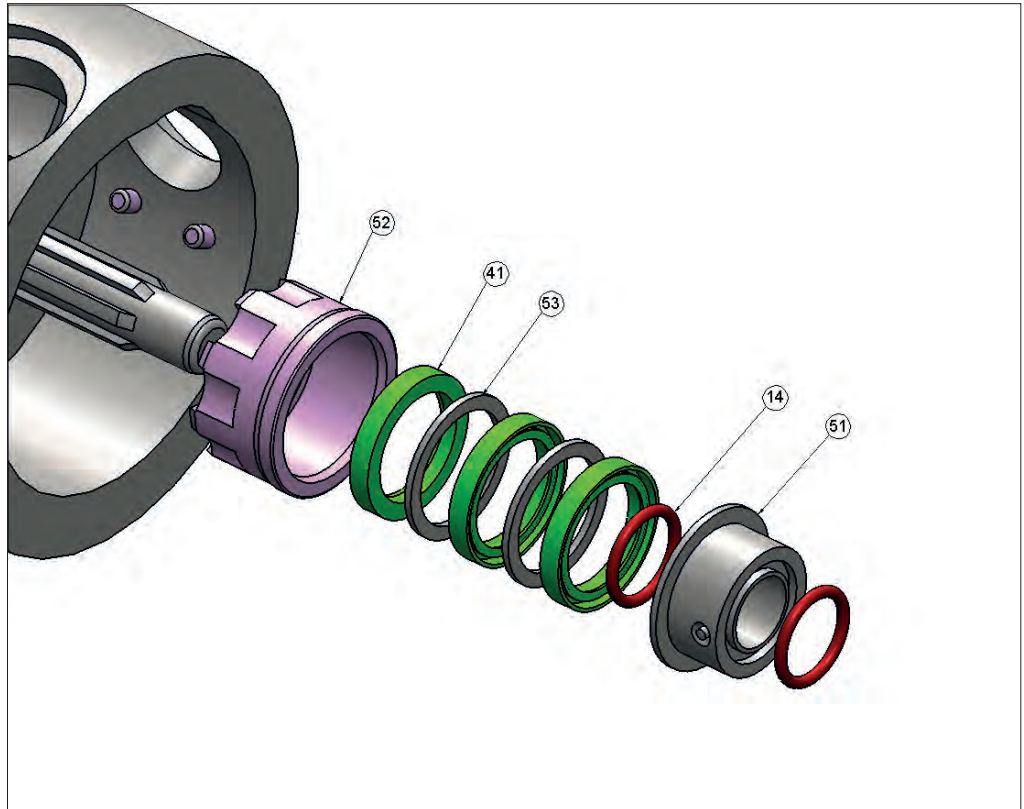
*Included in wearing kit. ("Mechanical seal system" on page 119).

SPS 500 (S50-064#-##)

Number	Quantity	Part code	Item
1	1	S50-5210-10	Dynamic ring holder
2	1	S50-5223-12	Snap ring
3	1	S50-5220-10	Spring holder
4	14	020P572.1420A1	Spring
5	1	S50-5230-10	Spring support
6	3	S50-5222-10	Straight pin
7*	1	S50-5245-41	Static surface, SiC
	1	S50-5245-66	Static surface, C
8*	1	S50-5246-80	O-ring, NBR
	1	S50-5246-82	O-ring, EPDM
	1	S50-5246-84	O-ring, FPM / FKM
9	1	S50-5200-10	Static ring holder
10*	1	S50-5240-80	Cup with dynamic surface, SiC - NBR
	1	S50-5240-82	Cup with dynamic surface, SiC - EPDM
	1	S50-5240-84	Cup with dynamic surface, SiC - FPM/FKM
11	1	S50-5250-50	Backing ring, polyamide
	1	S50-5250-55	Backing ring, PPS
12	1	S50-8505-80	O-ring, NBR
	1	S50-8505-82	O-ring, EPDM
	1	S50-8505-84	O-ring, FPM / FKM

*Included in wearing kit. ("Mechanical seal system" on page 119).

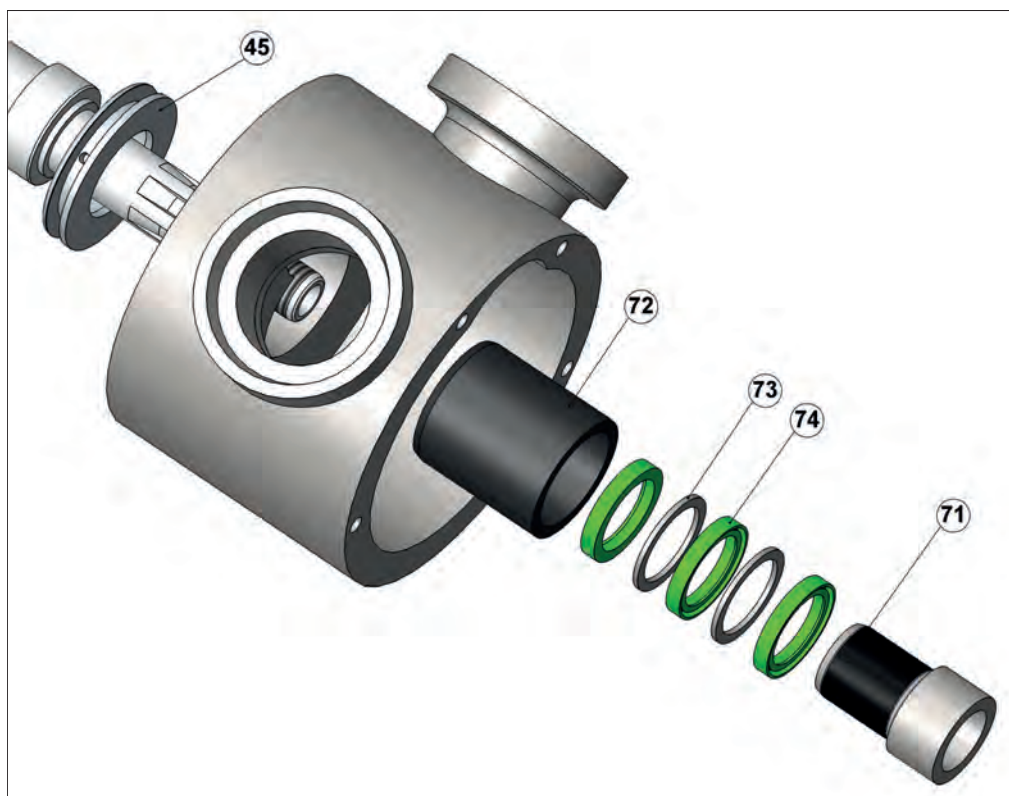
Lip seal assembly, triple lip seal system, SPS 100



SPS 100 (S10-0517-10##)

Number	Quantity	Part code	Item
	2	S10-0011-80	O-Ring, NBR
14	2	S10-0011-82	O-Ring, EPDM
	2	S10-0011-84	O-Ring, FPM / FKM
41	3	S10-0501-80	Lip Seal, NBR
51	1	S10-1194-10	Spacer, Lip Seal
52	1	S10-1116-10	Lip Seal Housing
53	2	S20-5310-10	Support Ring

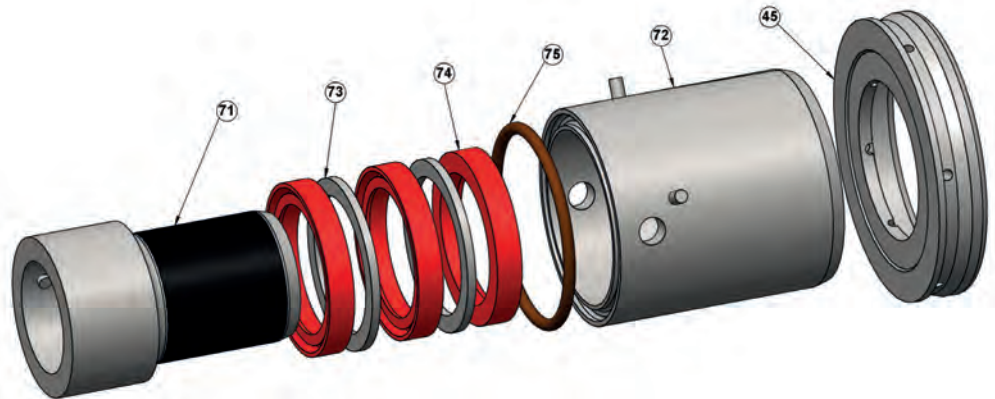
Lip seal assembly, triple lip seal system, SPS 200



SPS 200 (S20-0517-50## / -62## / -66##)

Number	Quantity	Part code	Item
45	1	S20-0513-10	Distance ring
71	1	S20-0610-10	Shaft sleeve
72	1	S20-0510-10	Seal housing, 1.4404
	1	S20-0510-62	Seal housing, Peek
	1	S20-0510-66	Seal housing, carbon
	1	S20-0510-50	Seal housing, polyamide
73	2	S20-5310-10	Support ring
74	3	S20-0501-80	Lip seal, NBR
	3	S20-0501-84	Lip seal, FPM / FKM

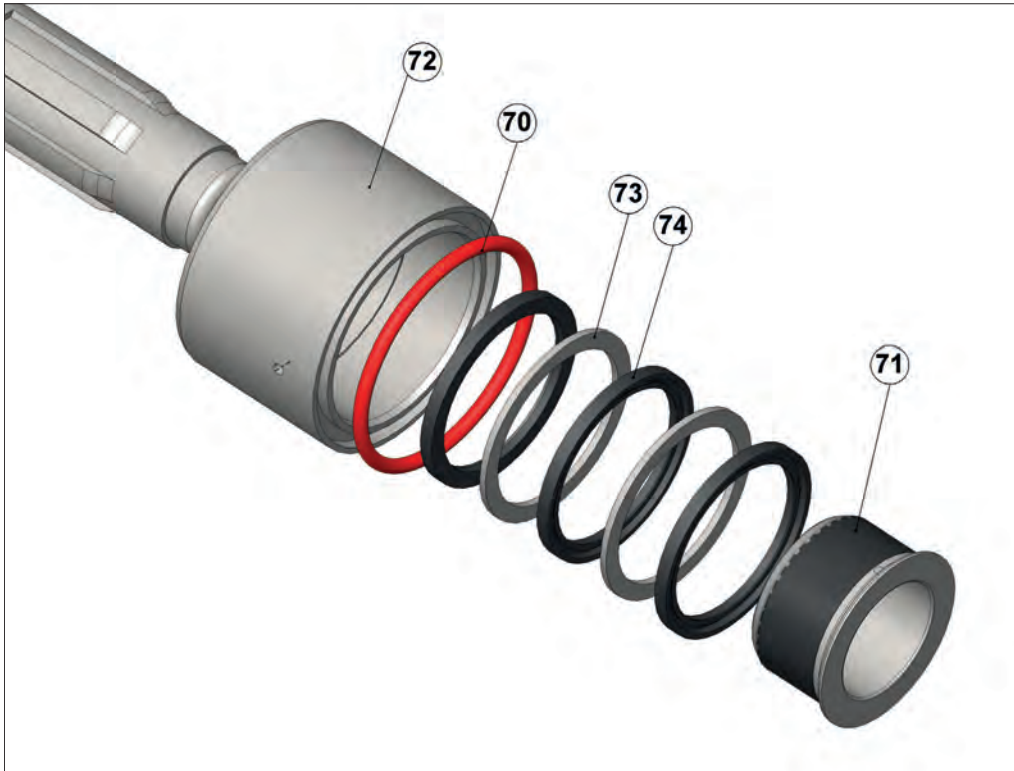
Lip seal assembly, triple lip seal system, SPS 200 with stainless steel housing



SPS 200 (S20-0517-10##)

Number	Quantity	Part code	Item
45	1	S20-0513-10	Distance ring
71	1	S20-0610-10	Shaft sleeve
72	1	S20-0510-10	Seal housing, 1.4404
	1	S20-0510-62	Seal housing, Peek
	1	S20-0510-66	Seal housing, carbon
	1	S20-0510-50	Seal housing, polyamide
73	2	S20-0503-10	Support ring
74	3	S20-0501-80	Lip seal, NBR
	3	S20-0501-84	Lip seal, FPM / FKM
75	1	020P515.4400A1	O-Ring, dynamic face

Lip seal assembly, triple lip seal system, SP250, SP300, SP400 and SP500



SPS 250 (S21-0517-10##)

Number	Quantity	Part code	Item
	1	025P374.2800A1	Insert Polyamide
70	1	025P374.2080A1	Insert Peek
	1	025P374.2090A1	Insert Peek Nature
71	1	S21-0610-10	Shaft sleeve
72	1	S21-0510-10	Seal housing
73	2	S21-5310-10	Support ring
74	3	S21-0501-80	Lip seal, NBR
	3	S21-0501-84	Lip seal, FPM / FKM

SPS 300 (S25-0517-10##)

Number	Quantity	Part code	Item
70	1	S25-4200-84	O-ring, FPM / FKM
71	1	S25-0610-10	Shaft sleeve
72	1	S25-0510-10	Seal housing
73	2	S25-5310-10	Support ring
74	3	S25-0501-80	Lip seal, NBR
	3	S25-0501-84	Lip seal, FPM / FKM

SPS 400 (S40-0517-10##)

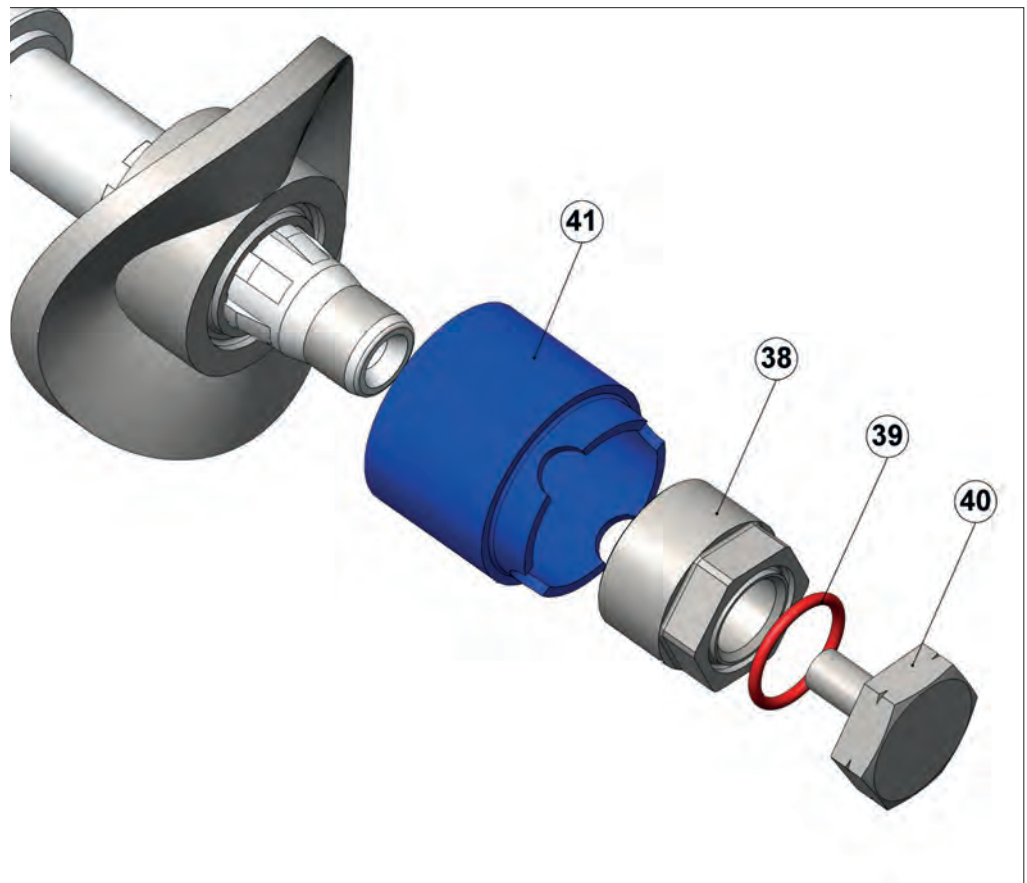
Number	Quantity	Part code	Item
70	1	S40-4200-84	O-ring, FPM / FKM

SPS 400 (S40-0517-10##)			
Number	Quantity	Part code	Item
71	1	S40-0610-10	Shaft sleeve
72	1	S40-0510-10	Seal housing
73	2	S40-5310-10	Support ring
74	3	S40-0501-80	Lip seal, NBR
	3	S40-0501-84	Lip seal, FPM / FKM

SPS 500 (S50-0517-10##)			
Number	Quantity	Part code	Item
	1	050P374.2800A1	Insert Polyamide
70	1	050P374.2080A1	Insert Peek
	1	050P374.2090A1	Insert Peek Nature
71	1	S50-0610-10	Shaft sleeve
72	1	S50-0510-10	Seal housing
73	2	S50-5310-10	Support ring
74	3	S50-0501-80	Lip seal, NBR
	3	S50-0501-84	Lip seal, FPM / FKM

24.3 Front support versions

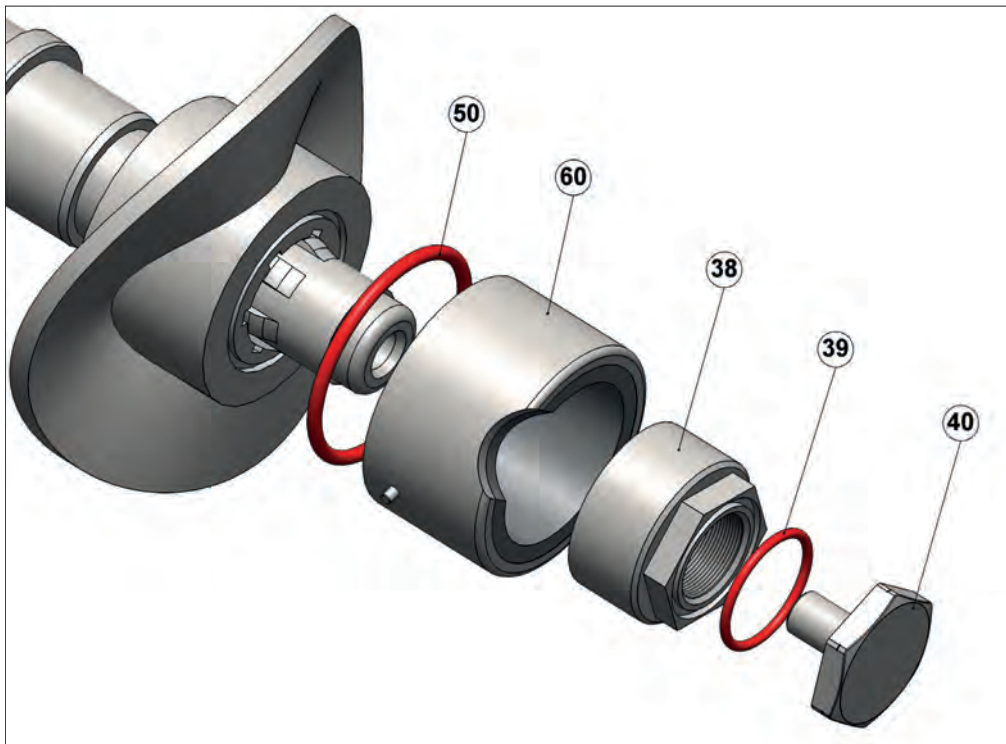
SPS 200



SPS 200 front support assembly (S20-0950-##)

Number	Quantity	Part code	Item
38	1	S20-0800-10	Shaft nut
39	1	S20-1752-80	O-ring, NBR
	1	S20-1752-82	O-ring, EPDM
40	1	S20-1752-84	O-ring, FPM / FKM
	1	S20-1100-10	Locking screw
41	1	S20-0900-10	Front support
	1	S20-0900-50	Front support polyamide
	1	S20-0900-55	Front support, PPS
	1	S20-0900-62	Front support, PEEK
	1	S20-0900-66	Front support, carbon

SP250, SP300, SP400 and SP500, fixed front support



SPS 250 front support assembly (S21-0950-10##)

Number	Quantity	Part code	Item
38	1	S21-0800-10	Shaft nut
39	1	S21-1752-80	O-ring, NBR
	1	S21-1752-82	O-ring, EPDM
40	1	S21-1752-84	O-ring, FPM / FKM
	1	S21-1100-10	Locking screw

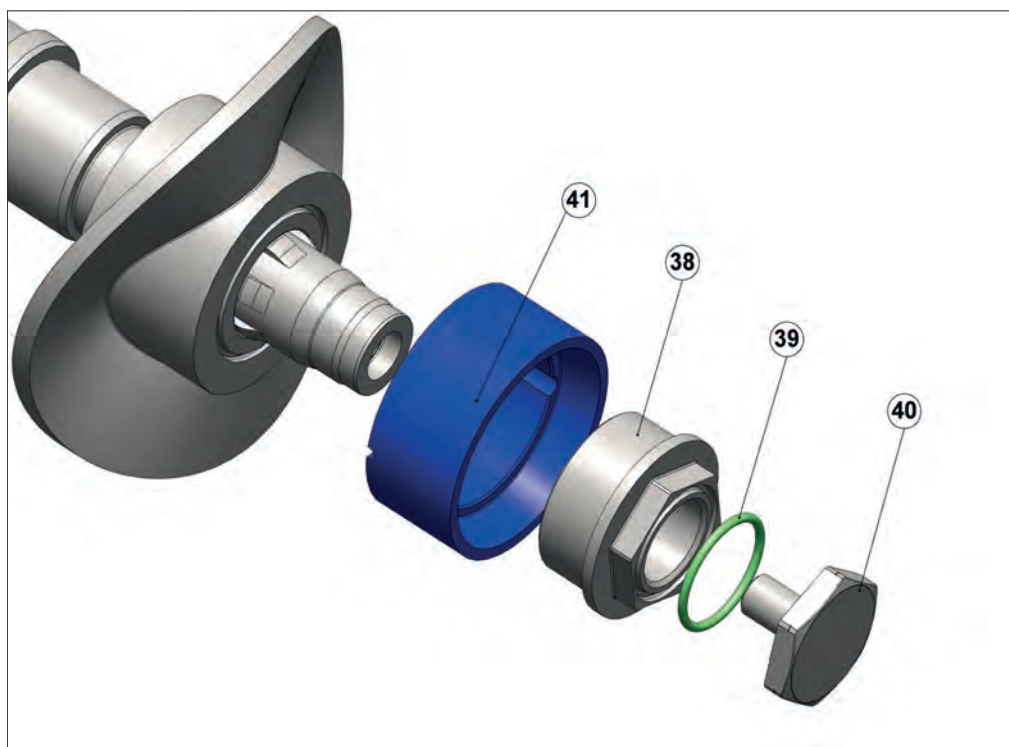
SPS 250 front support assembly (S21-0950-10##)			
Number	Quantity	Part code	Item
	1	025P374.2800A1	Insert Polyamide
50	1	025P374.2080A1	Insert Peek
	1	025P374.2090A1	Insert Peek nature
60	1	S21-0900-10	Front support

SPS 300 front support assembly (S30-0950-10##)			
Number	Quantity	Part code	Item
38	1	S25-0800-10	Shaft nut
39	1	S25-1752-80	O-ring, NBR
	1	S25-1752-82	O-ring, EPDM
	1	S25-1752-84	O-ring, FPM / FKM
40	1	S25-1100-10	Locking screw
50	1	S25-4200-84	O-ring, FPM / FKM
60	1	S25-0900-10	Front support

SPS 400 front support assembly (S40-0950-10##)			
Number	Quantity	Part code	Item
38	1	S40-0800-10	Shaft nut
39	1	S40-1752-80	O-ring, NBR
	1	S40-1752-82	O-ring, EPDM
	1	S40-1752-84	O-ring, FPM / FKM
40	1	S40-1100-10	Locking screw
50	1	S40-4200-84	O-ring, FPM / FKM
60	1	S40-0900-10	Front support

SPS 500 front support assembly (S50-0950-10##)			
Number	Quantity	Part code	Item
38	1	S50-0800-10	Shaft nut
39	1	S50-1752-80	O-ring, NBR
	1	S50-1752-82	O-ring, EPDM
	1	S50-1752-84	O-ring, FPM / FKM
40	1	S50-1100-10	Locking screw
50	1	050P374.2800A1	Insert Polyamide
	1	050P374.2080A1	Insert Peek
	1	050P374.2090A1	Insert Peek nature
60	1	S50-0900-10	Front support

SP250, SP300, SP400 and SP500, dynamic front support



SPS 250 front support assembly (S21-0950-##)

Number	Quantity	Part code	Item
38	1	S21-0820-10	Shaft nut
	1	S21-1752-80	O-ring, NBR
39	1	S21-1752-82	O-ring, EPDM
	1	S21-1752-84	O-ring, FPM / FKM
40	1	S21-1100-10	Locking screw
41	1	S21-0960-55	Front support, PPS
	1	S21-0960-62	Front support, PEEK

SPS 300 front support assembly (S25-0950-##)

Number	Quantity	Part code	Item
38	1	S25-0820-10	Shaft nut
	1	S25-1752-80	O-ring, NBR
39	1	S25-1752-82	O-ring, EPDM
	1	S25-1752-84	O-ring, FPM / FKM
40	1	S25-1100-10	Locking screw
41	1	S25-0960-55	Front support, PPS
	1	S25-0960-62	Front support, PEEK

SPS 400 front support assembly (S40-0950-##)

Number	Quantity	Part code	Item
38	1	S40-0820-10	Shaft nut
39	1	S40-1752-80	O-ring, NBR
	1	S40-1752-82	O-ring, EPDM
40	1	S40-1752-84	O-ring, FPM / FKM
	1	S40-1100-10	Locking screw
41	1	S40-0960-55	Front support, PPS
	1	S40-0960-62	Front support, PEEK

SPS 500 front support assembly (S50-0950-##)

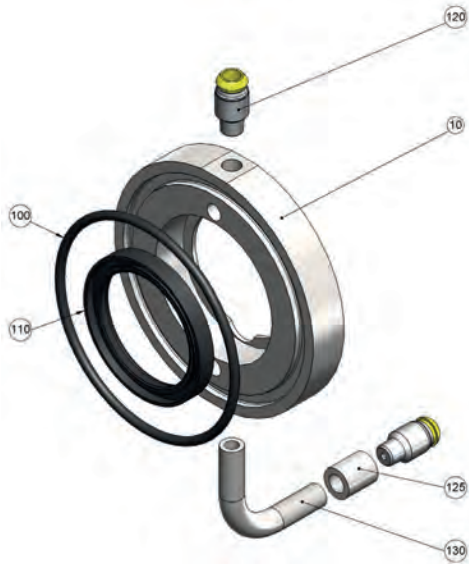
Number	Quantity	Part code	Item
38	1	S50-0820-10	Shaft nut
39	1	S50-1752-80	O-ring, NBR
	1	S50-1752-82	O-ring, EPDM
40	1	S50-1752-84	O-ring, FPM / FKM
	1	S50-1100-10	Locking screw
41	1	S50-0960-55	Front support, PPS

24.4 Sealing/distance ring version**SPS 200 (S20-1326-10)**

Number/Letter	Part code	Item
10	S20-1328-10	Distance ring
100	S40-1755-80	O-ring
120	S20-0504-34	Flushing port
200	S20-0513-30	Distance ring

SPS 200 (S20-1326-10)

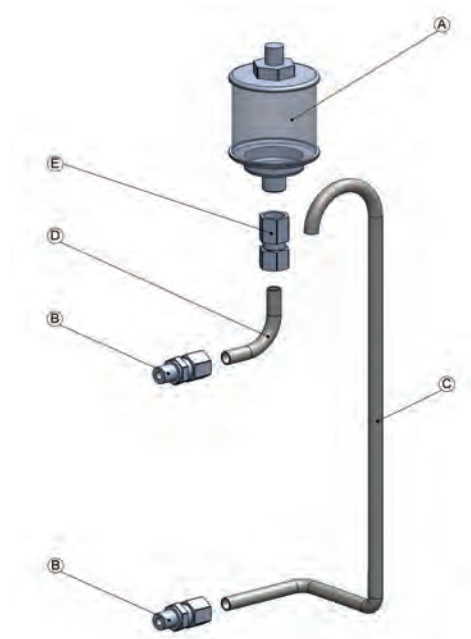
Number/Letter	Part code	Item
201	S20-2300-80	Lip seal
202	S20-8500-80	O-Ring

**SPS 250, SPS 300, SPS 400, SPS 500**

Number/Letter	Part code	Item
10	S__-1328-10	Distance ring
100	S__-1755-80	O-ring
110	S__-2321-80	Lip seal
120	80-0010-34	Flushing port
125	80-6005-10	Bushing
130	80-6004-10	Elbow 90 degrees

24.5 The static flushing device

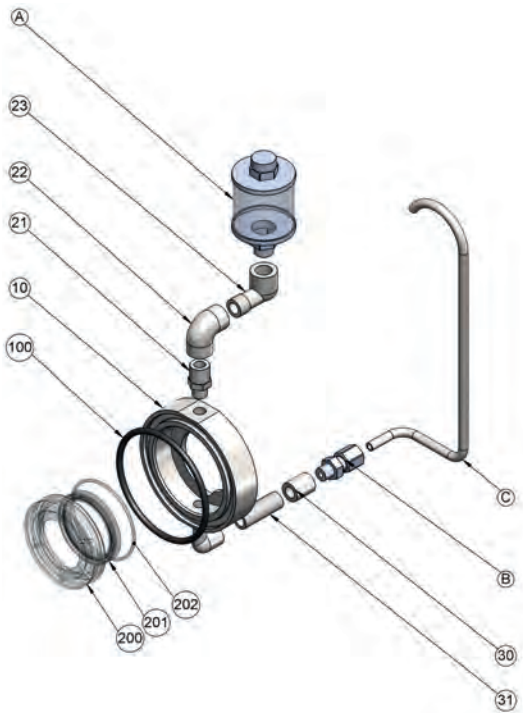
With cast iron power frame



SPS 200		
Letter	Part code	Item
A	80-0014-95	Sight glass
B	80-0011-10	Connection piece
C	22-0178-10	Flushing pipe, long

SPS 250, SPS 300, SPS 400, SPS 500		
Letter	Part code	Item
A	80-0015-95	Sight glass
B	80-0012-10	Connection piece
C	__-0178-10	Flushing pipe, long
D	__-0179-10	Flushing pipe, short
E	80-0013-10	Connection piece

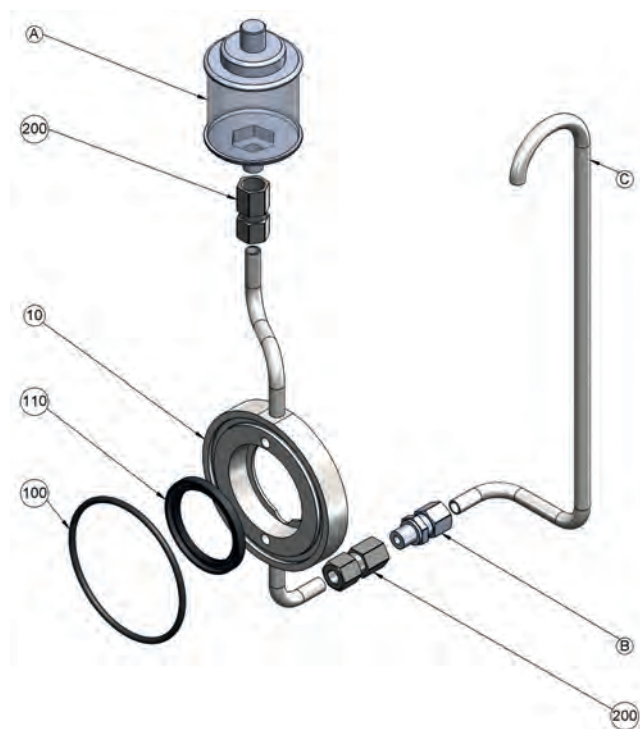
With stainless steel power frame



SPS 200 (S20-1327-10)

Number/Letter	Part code	Item
A	80-0014-95	Glass for static flush-system
B	80-0012-10	Adapter/pipe fitting
C	S20-0173-10	Flush pipe
10	S20-1328-10	Distance ring
21	S20-9001-10	Hexagon reducing nipple
22	S20-9002-10	Elbow 90°
23	S20-9003-10	Elbow
30	80-6005-10	Bushing
31	80-6009-10	Double nipple
100	S20-1755-80	O-ring
200	S20-0513-30	Distance ring
201	S20-2300-80	Lip seal
202	S20-8500-80	O-ring

With stainless steel power frame



SPS 250, SPS 300, SPS 400, SPS 500

Number/Letter	Part code	Item
A	80-0015-95	Glass for static flush-system
B	80-0012-10	Adapter/pipe fitting
C	S__-0173-10	nipple pipe, long
10	S__-1328-10	Distance ring
100	S__-1755-80	O-ring sealing
110	S__-2321-80	Lip seal
200	80-0013-10	Adapter/pipe fitting

24.6 Available wearing kits

O-ring kit Cxxx-1700-xx

Number	Quantity	Part code	Item
36	1	Sxx-1701-xx	Seal, pump housing
33	1	Sxx-1750-xx	O-Ring, back housing
34	2	Sxx-1751-xx	O-Ring, Rotor
39	1	Sxx-1752-xx	O-Ring locking screw
12	1	Sxx-8505-xx	O-Ring (only S21 up to S50)

Mechanical seal wearing kit product side (for atmospheric side contact MasoSine)

Part code	Item
S##-0660-95	Wearing Kit Mechanical Seal Product Side SiC/SiC-FKM
S##-0660-95EP	Wearing Kit Mechanical Seal Product Side SiC/CA-EPDM

Mechanical seal wearing kit product side (for atmospheric side contact MasoSine)

Part code	Item
S##-0660-97	Wearing Kit Mechanical Seal Product Side SiC/SiC-FKM
S##-0660-97EP	Wearing Kit Mechanical Seal Product Side SiC/CA-EPDM

25 Trademarks

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26 Disclaimers

The information contained in this document is believed to be correct but Watson-Marlow Limited Fluid Technology Group accepts no liability for any errors it contains and reserves the right to alter specifications without notice.

WARNING: This product is not designed for use in and should not be used for, patient-connected applications.

27 Publication history

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