

Manual - Technical Documentation



Watson-Marlow MasoSine - Pumps

EC 25 / EC 40 / EC 60

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Technical datasheet

Please remove all technical information from the technical Data Sheet.

For spare parts ordering refer to software component list.

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

1 General

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

EC 25 / EC 40 / EC 60

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

2 Purpose

The purpose of your pump is defined exactly in the delivery note. The warranty becomes null and void following any changes to the purpose, including changes to components and materials.

Always consult the manufacturer before any changes are to be made to the pump, its components or application.

3 Functioning principle

The functioning principle of the **Watson-Marlow MasoSine** Pump is ingeniously simple. The pump consists of modular components to allow for easy assembly, disassembly and in-line maintenance, preventing the need to return the pump for factory repair. The MASO-Sine pump's exclusive sinusoidal rotor creates four symmetrical pumping chambers that draw product through the pump. As product is drawn through in a continuous flow, it encounters the scrapergate and is discharged by product flowing behind it creating a continuous pulse-free laminar flow. The MASO-Sine pump's large pumping chambers maintain constant volumetric displacement throughout the entire pumping cycle that eliminates product compression and minimizes damage to large particles.

4 Safety instructions

4.1 Basic safety instructions

Failure to follow these safety instructions may result in damage to property, personal injury or death.

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

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

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

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

The following safety instructions must be observed absolutely.

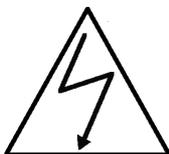
They are an essential and indispensable part of the user documentation. Non-compliance can result in loss of warranty claims.

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

4.2 Safety symbols



Safety instructions that must be followed. Failure to comply with these instructions may result in damage to property, personal injury or death.



Safety instruction for electrical voltage. Failure to comply with these instructions may result in damage to property, personal injury or death.



Safety instruction to prevent damage to the pump or system.

4.3 Obligation of the operator

Only persons who are familiar with the basic regulations concerning working safety and accident prevention, have read and understand this manual, and are instructed in handling the MASO-Sine pump are to be allowed to on or with the machine.

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

4.4 Organizational measures

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

All existing safety devices shall be checked regularly.

4.5 Obligation of the personnel

All persons who are authorized to work with or on the machine obligate themselves to observe the basic regulations concerning working safety and accident prevention before starting work. All persons to read and understand the safety chapter and warning notes in the operating instructions and to confirm by their signature that they have understood these. If there are any questions regarding this manual or the proper use and maintaining of the MASO-Sine pump, contact the factory before use..

4.6 Training of the personnel

Only trained and instructed personnel may work with or on the machine. The responsibilities of the personnel shall be defined clearly for assembly, disassembly, start-up, operation, maintenance and repair. Personnel under training may work on the machine only under supervision of an experienced person.

4.7 Informal safety measures

The operating instructions must be kept on file and be made readily available to all persons who work with or on the MASO-Sine pump. The generally valid as well as the local regulations for accident prevention and environmental protection shall be provided and observed in addition to the operating instructions. All safety and danger warnings on the machine shall be kept in legible condition. Contact the factory if additional manuals are required.

4.8 Dangers when handling the machine

The **Watson-Marlow MasoSine** Pump is built according to the state of the art and the recognized safety engineering rules at the time of manufacture. Danger to life and limb of the user or other persons or impairments to the machine or to other assets can arise if safety instructions are not followed.

The machine must be used only:

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

Faults which can impair safety must be rectified immediately.

4.9 Safety measures in normal operation

Operate the machine only if all safety devices are fully functioning. Before switching the machine on make sure that the starting machine can endanger no one. At least once per shift inspect the machine for “externally detectable damage” and for functioning of the safety devices.

4.10 Protective devices

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

Protective devices may be removed only

- After standstill **and** simultaneous protection against restarting the machine. Always follow proper LOCKOUT – TAGOUT procedures.
- The pump is not under pressure.
- All components are allowed to reach a comfortable temperature.

4.11 Dangers due to hazardous pumped material

In the case of hazardous pumped material as defined by MSDS, the corresponding regulations must be followed.

4.12 Dangers due to electrical energy



Follow proper LOCKOUT – TAGOUT procedures before handling electrical components.

Have work on the electrical supply performed only by a qualified electrician.

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

Keep the control cabinet closed always. Access is allowed only to authorized personnel

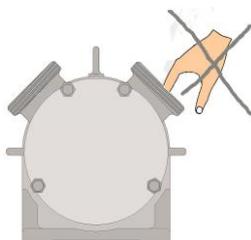
Only qualified personnel should handle electrical components.

4.13 Dangers due to hydraulic energy

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

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

4.14 Special danger points



This pump and equipment utilize rotating components that may pose potential injury. The user must protect the pump so that there is no exposure to rotating components. In the case of work on the stationary rotor, the drive must be secured against unintentional switching on. Follow proper LOCKOUT – TAGOUT procedures. Increased danger exists with dismantled pipes and opened pump.

4.15 Constructional changes to the machine

Make no changes, attachments or conversions to the machine without prior written approval of the manufacturer. All conversion measures require the written approval of the **Watson-Marlow MasoSine** Company. Damaged or improperly functioning parts should be immediately replaced. Use only original MASO-Sine parts. Use of parts not supplied by MASO-Sine or other aftermarket parts will void all warranties. Aftermarket parts are not authorized by **Watson-Marlow MasoSine** and void all certifications such as 3-A, USDA and FDA.

4.16 Noise of the machine

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

4.17 Maintenance and repair, troubleshooting

Perform specified adjustment, maintenance and inspection work in a timely manor to prevent possible damage. Inform operating personnel before starting the maintenance and repair work. Protect all plant parts and operating media connected before and after the machine such as compressed air and hydraulics and similar against unintentional start-up. Follow proper LOCKOUT – TAGOUT procedures before performing any maintenance. In all maintenance, inspection and repair work switch the machine free of voltage and secure the main switch against unexpected starting. Fasten and secure larger assemblies on replacement carefully to lifting gear. Be sure all fasteners are tightened to proper specifications. Use only original spare parts.



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

4.18 Maintenance of the bearings

- For pumps in series, **EC 25 and EC 40** both bearings must be replaced by new ones after running for 10,000 hours!
- For pumps in series **EC 60**, please refer to the enclosed table:

	200 rpm	400 rpm	600 rpm
3 bar	10000 hours	10000 hours	10000 hours
6 bar	10000 hours	9199 hours	6133 hours

4.19 Cleaning the machine

Handle substances and materials used correctly, especially

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

4.20 Faults

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

4.21 Use as intended

The accurate intention is listed in the order confirmation. Another use or use going beyond this is not as intended. If you want to change the product, the pressure, the speed or the temperature, you must firstly consult us or one of our representatives.

5 Safety instructions (ATEX)

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

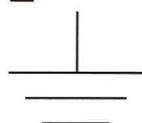
5.1 Safety signs

The following ATEX symbols are only given as an example.

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

 **Ex II 2G c IIB T4**

 **Ex II 2D c T=120°C**



Grounding symbol

5.2 Pump classification

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

5.3 Zone classification

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

5.4 Classification of the ex-atmospheres

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

5.5 Ignition protection

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

5.6 Temperature classes

For product temperature up to max. 95°C: **EX II 2 G c IIB T4**
EX II 2 D c T=120°C

5.7 Limit values for the pump

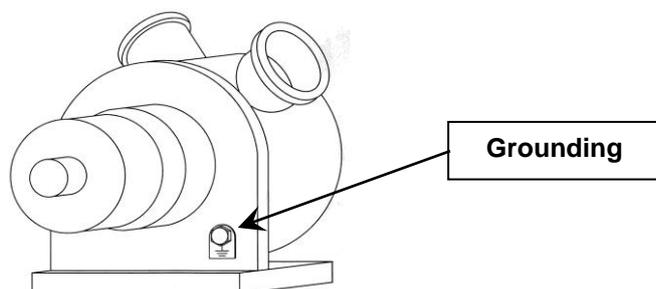
The limit values for the pump (max. speed, max. pressure, max. temperature) are stated in the data sheet (see page 4). These limit values must never be exceeded under any circumstances! This applies in particular when using a frequency converter. If the pumps are supplied without a drive, the following values apply!

	EC25	EC40	EC60
max. Pressure *	6 bar	6 bar	6 bar
max. Speed *	600 rpm	600 rpm	600 rpm
max. Temperature *	95°C*	95°C*	95°C*
Ambient temperature	-12°C bis +40°C	-12°C bis +40°C	-12°C bis +40°C

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

5.8 Grounding the pump

All supplied pumps are equipped with a grounding option. In particular in ex-areas, the pump must be grounded by fixing a grounding cable to the corresponding position (see diagram). In addition to the grounding of the pump, the motor also needs to be grounded! If the drive is not grounded, the pump aggregate may not be operated.



5.9 Material properties

Plastic parts that are fitted inside the pump react more to temperature changes than stainless steel parts. For this reason, the specified maximum medium temperature (T_m=95°C), for which the pump is designed, may not be exceeded. If the specified temperature is exceeded, this may cause a linear expansion and may block single components; this in turn could cause the pump to fail or could result in damage to parts of the pump. Also, excessive temperatures can accelerate the wear of dynamic parts and therefore reduce the lifespan of the plastic parts. Corrosion may occur to the Power Frame of the pump if the paintwork is damaged. Corrosion represents a hazard for the use of pumps in explosive areas (for measures, see Troubleshooting Chap. 21).

5.10 Pressure Conditions

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

5.11 Maintenance / Repair

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

5.12 Cleaning

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

5.13 Medium to be pumped

Chemicals that are combustibile below the temperature 120 degrees Celsius ($T_4/T=120^{\circ}\text{C}$) and Carbon disulphide must not be pumped.

5.14 Coupling

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

5.15 Drive

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

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

6 Warranty and liability

Basically our "General sales and delivery conditions" apply.

These are available to the operator at the latest since conclusion of the contract.

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

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

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

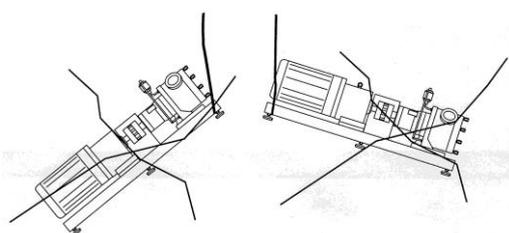
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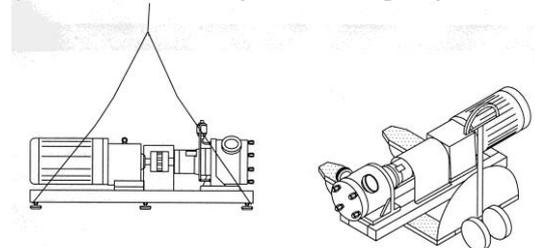
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7 Transport instructions

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



Wrong!

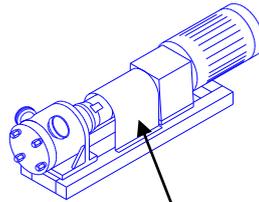


Right!

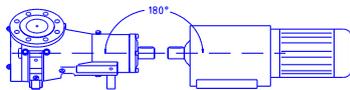
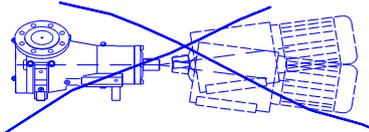
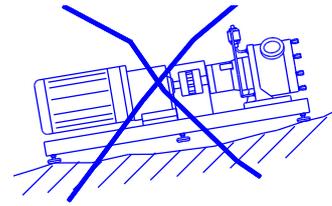
8 Installation



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



DO NOT LET RUN THE PUMP WITHOUT COUPLING GUARD!



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

Align the shaft of the pump with the shaft of the drive.

9 Connection to the piping

CAUTION

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

CAUTION

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

CAUTION

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

CAUTION

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

CAUTION

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

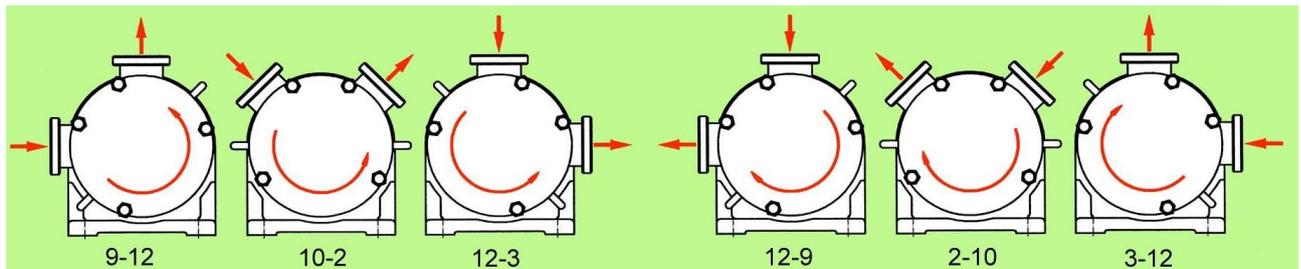
CAUTION

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

CAUTION!

The operator has to ensure that the pump can work free of cavitation!
Cavitation destroys the pump!

10 Possible connection positions

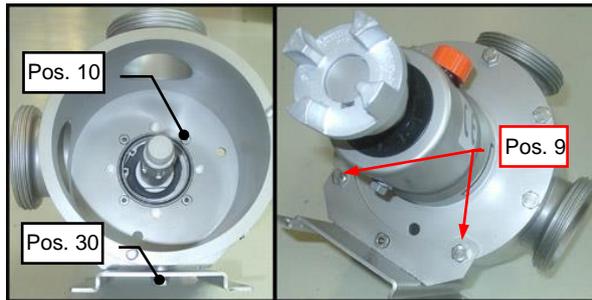


Counterclockwise rotation of the rotor and motor

Clockwise rotation of the rotor and motor

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

11 Changing the connection position



The standard nozzle configuration is set at the 10-2 position from the factory. To change the nozzle position, all internal parts must first be removed as in illustration 001. Remove the screw, Pos. 30, as well as the screws Pos.9 (2 pcs.). The housing and shaft can now be removed from the baseplate. Note: once removed from the base, the housing will be free and should be secured to prevent possible damage or personal injury. CAUTION: EC 40 AND EC 60 HOUSINGS WILL BE HEAVY. Rotate the pump housing into the desired position and replace the screws to reinstall the baseplate.

The bearing assembly must now be rotated so that the vent and oil sight glass are in the proper position. Remove the screws, Pos.10 (4 pcs.) and remove the shaft and bearing housing assembly from the pump housing. Rotate the bearing housing assembly until the vent is

in the vertical position and reinstall on the pump housing. Tighten the screws Pos.9 according to the specified torque. Mind that the shim kit, Pos. 24 is on the housing.

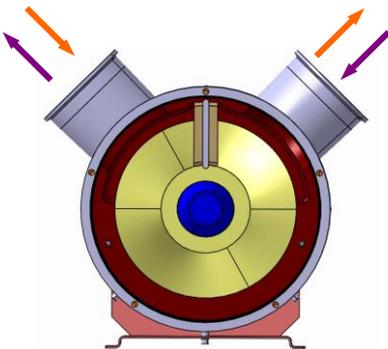
Torque for Pos. 9: EC 25 ⇒ 25 Nm EC 40 ⇒ 50 Nm EC 60 ⇒ 90 Nm

Observe that the pump is filled with product before starting to facilitate suction and to avoid dry run. (see chapter 12)!



When the connection position is changed, the motor must be protected against unintentional switching on!!

12 Changing the direction of rotation



Changing the direction of rotation for a EC 25, EC 40 and EC 60.

Due to construction, the pump is able to turn clockwise as well as counter clockwise. For doing this any conversion or modification is not necessary.

All you have to do is changing the direction of the gear motor.

13 Important: Observe before start-up!

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



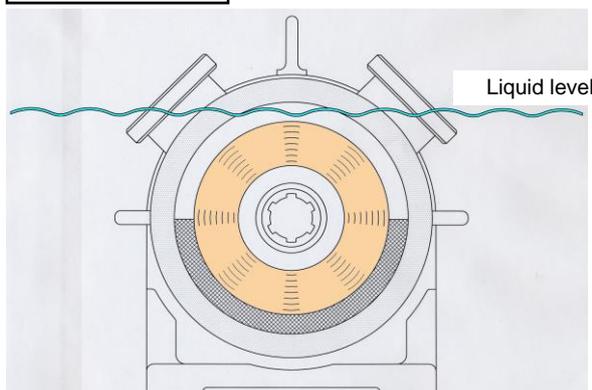
Observe the corresponding regulations in the case of hazardous pumped material (according to ArbStoffV).

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

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

CAUTION

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



The pump must always be filled with the corresponding medium before commissioning and during operation, with the liquid level above the rotor (see diagram).

Never let the pump run dry!!!



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

CAUTION

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

CAUTION

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

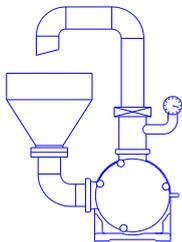
CAUTION

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

14 Cleaning

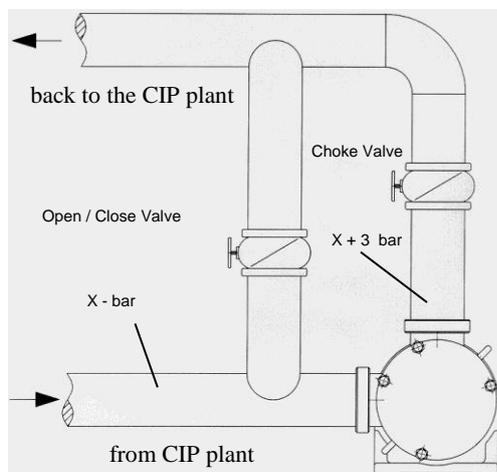
All **Watson-Marlow MasoSine** Pumps are fully capable of CIP cleaning. Please observe our CIP cleaning regulations.

14.1 Cleaning in own circuit with water, alkali, acid



1. Set control gear to maximum speed (at least 400 rpm).
2. Choke after the pump so that a counterpressure of 3 to 4 bar (44 to 58 psi) arises.
3. Should the required cleaning effect not be achieved after this process, it is necessary to dismantle the pump. This is done in a few minutes as described in detail in the operating instructions. Manual cleaning of the pump can be performed after complete dismantling of the pump.
Pay attention to parts sensitive to breakage!!

14.2 Cleaning in the CIP circuit



1. **Purging surge**
Open the choke valve and let the **Watson-Marlow MasoSine** Pump run with maximum speed to perform the first rough cleaning.
2. **Purging**
Set the choke valve so that the pressure side of the pump is at least 3.0 bar higher than the suction side.

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

14.3 Manual cleaning

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



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



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

14.4 Sterilization

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

15 Oil change

For pumps in the series **EC 25 / EC 40 / EC 60** check every day and in particular every time before starting up, that there is enough oil in the component bearing block. The oil sight glass in the support must be filled to the middle. Please use the following oil grade for your specific application! If the pump is to be used in an area that is combustible where ATEX applies, the oil viewing glass is replaced by a screwed plug.

Standard first filling of Watson-Marlow MasoSine Pumps

- For -10°C to 60°C / 14° F to 140° F

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

Oil grades for ex-zones

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

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

15.1 Filling volumes

EC 25 approx. 0,10 litre / US qt **EC 40** approx. 0,15 litre / US qt **EC 60** approx. 0,50 litre / US qt

16 Disposal

Send the old oil or old grease for treatment.

17 Spare parts

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

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

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

Please provide all data when ordering:

- | | |
|---------------|---------------|
| - Pump number | - Description |
| - Type | - Material |
| - Item No. | - Quantity |

Ask for our express delivery!

Watson-Marlow MasoSine

Postfach 100
Steinbeisstraße. 3
D-74358 Ilsfeld (Germany)
Telephone : +49 (0)7062 9560-0
Telefax : +49 (0)7062 64593
EMail : Info@masosine.com
Internet : http://www.masosine.com

18 Taking out of service

18.1 Provisional taking out of service

Short term:

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

Longer term:

Remove product residues carefully (cleaning) ⇒ Switch off main switch ⇒ Clean pump surface ⇒ Disconnect connections ⇒ Store the scraper in water.

18.2 Final putting out of service

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

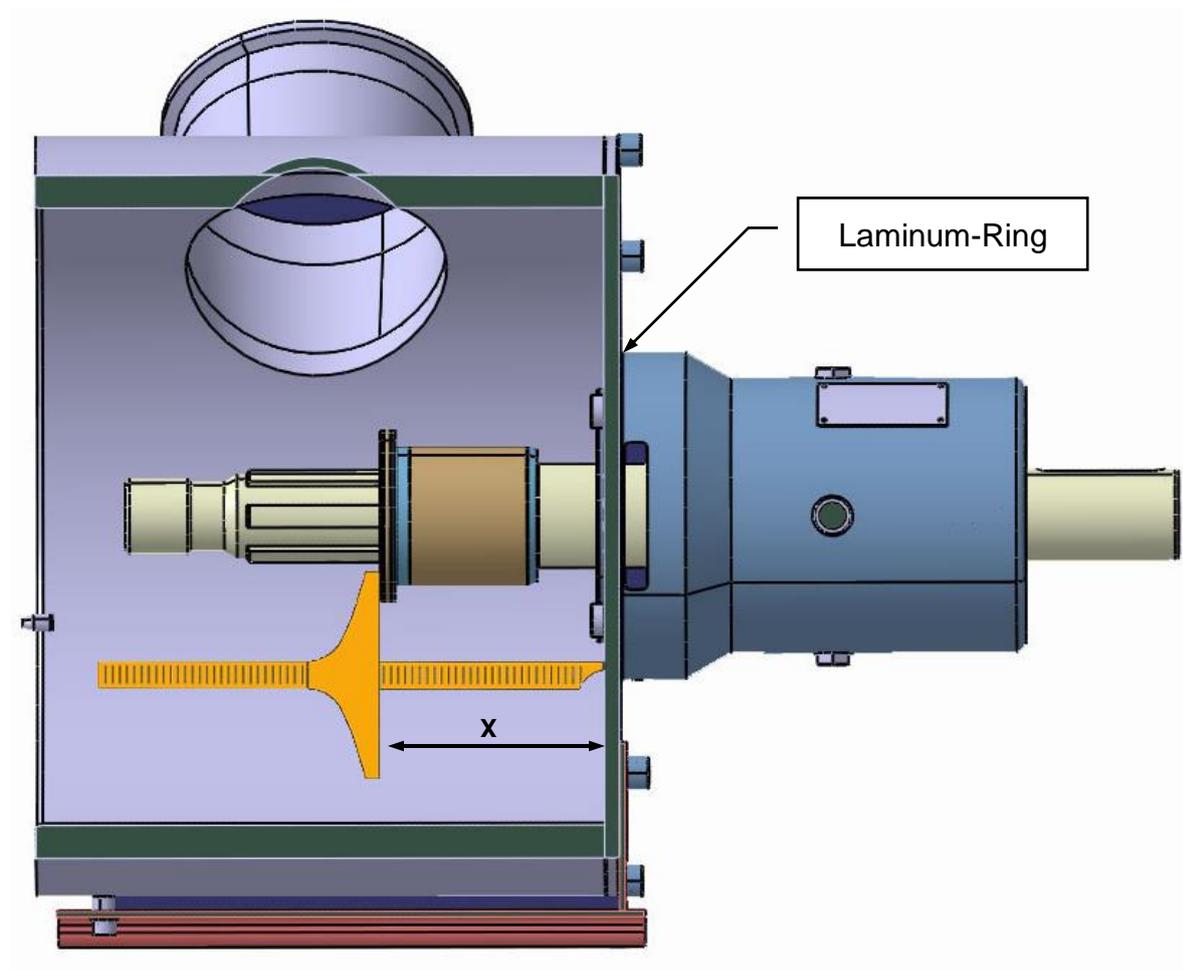
If you send us the remaining parts freight paid, we will dispose of the parts.

19 Troubleshooting

Error	Cause	Remedy
Pump does not draw in	Direction of rotation not correct	Check direction of rotation
	No wetting liquid in the pump	Fill pump with liquid
	Screw fastening not tight	Check screw fastening
	Suction pipe too long	Adapt suction pipe
	Pipe cross-section too narrow	Adapt suction pipe
	Seals leaking	Check all seals for damage
	Wear in the pump	Change wearing parts
	Motor speed not correct	Measure, regulate speed
Pump does not deliver	Direction of rotation not correct	Check direction of rotation
	Suction pipe is leaking	Check pipe system
	Motor speed not correct	Check speed based on output diagrams
	Wearing parts worn	Replace wearing parts
	Inserted closed gate valve	Check pipe system
Pump is noisy	Noises come from the drive / pump	Consult Watson-Marlow MasoSine
	Suction pipe too small (cavitation)	Shorten suction pipe or increase diameter, reduce speed
	Knocking noises from the pump head	Scrapergate wear
	Noises from bearing housing	Fill oil, change tapered roller bearings
	Coupling not aligned	Align coupling with hairline
Pump leaking at leakage hole Pump is noisy	Seal system leaking	Change Mechanical or Lip seal system
	O-ring seal leaking	Replace O-ring
	Lip seals on the bearing block leaking, oil escapes	Dismantle bearing block, replace radial shaft sealing rings
Pump leaking at the front housing	O-rings in the Liner not or wrongly installed	Install housing O-ring correctly or replace
Pump has blocked	Foreign body in the pump	Remove foreign body, examine pump for damage
	Power supply interrupted	Check electrical installations (fuses, drive)
	Defect on the drive	(Separate the coupling and turn the pump by hand)
Strong wear after short operating time	Solids in the pumped material	Frequent change of the wearing parts, change material pairing
	Pumped material is abrasive	Choose larger pump, reduce speed
Rotor has wear on one side	Rotor not tightened correctly on installation	Tighten closing nut firmly on block
	Adjusting dimensions changed after working on the bearing housing	Check and correct the adjusting dimensions (see page 12)
Pump not clean after CIP cleaning	Cleaning regulation not complied with	Choke on the pressure side Check differential pressure 3-4 bar
Rotor has seized on stator	Rotor not correctly tightened	Tighten closing nut firmly on block
	Temperature too high (thermal expansion)	Choose Liner with larger tolerances

20 Adjusting dimension

For the pumps of the series EC 25 / EC 40 / EC 60



Pump type	Adjusting dimension X
EC 25	53.00 mm ± 0.05 2.087" ± 0.002
EC 40	74.90 mm ± 0.05 2.949" ± 0.002
EC 60	120.75 mm ± 0.05 4.754" ± 0.002

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

One layer is 0.05 mm or .002" thick.

21 Tightening torques

WATSON-MARLOW MASOSINE PUMP EC 25

Flange - Bearing Housing	M6 DIN 7984	10 N•m 7 lb•ft
Flange - Pump Housing	M8 DIN 931	25 N•m 18 lb•ft
Adapter Plate - Pump Housing	M8 DIN 933	25 N•m 18 lb•ft
Shaft Nut - Pump Shaft	RIGHT-HAND THREAD SW30	80 N•m 59 lb•ft
Cap Nut / Wing Nut - Pump Housing	SW 22	45 Nm / 19 N•m 33 / 14 lb•ft
Oil Plug - Bearing Housing	R ¼" DIN 910	10 N•m 7 lb•ft

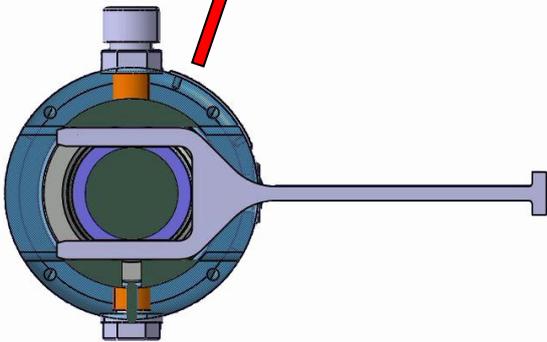
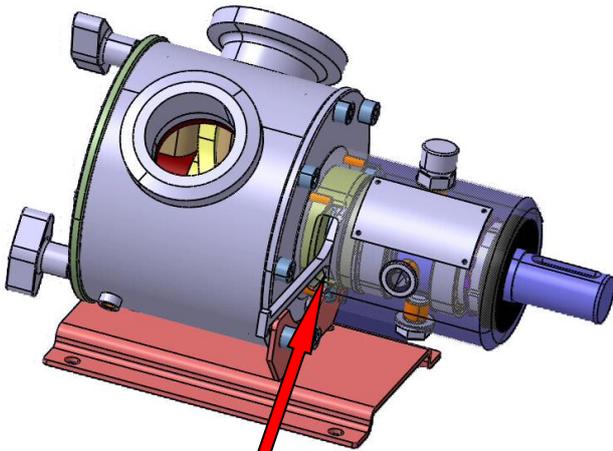
WATSON-MARLOW MASOSINE PUMP EC 40

Flange - Bearing Housing	M8 DIN 7984	25 N•m 18 lb•ft
Flange - Pump Housing	M10 DIN 933	50 N•m 37 lb•ft
Adapter Plate - Pump Housing	M8 DIN 933	25 N•m 18 lb•ft
Shaft Nut - Pump Shaft	RIGHT-HAND THREAD SW 38	108 N•m 80 lb•ft
Cap Nut / Wing Nut - Pump Housing	SW 22	45 Nm / 19 N•m 33 / 14 lb•ft
Oil plug - Bearing Housing	R ¼" DIN 910	10 N•m 7 lb•ft

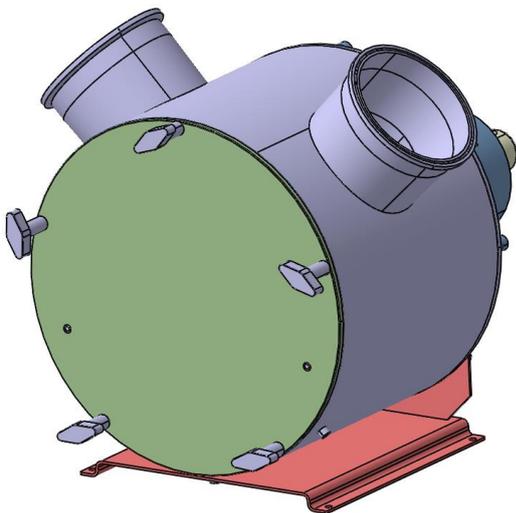
WATSON-MARLOW MASOSINE PUMP EC 60

Flange - Bearing Housing	M12 DIN 7984	90 N•m 66 lb•ft
Flange - Pump Housing	M12 DIN 933	90 N•m 66 lb•ft
Adapter plate - Pump Housing	M8 DIN 933	25 N•m 18 lb•ft
Shaft Nut - Pump Shaft	RIGHT-HAND THREAD SW 50	135 N•m 100 lb•ft
Cap Nut / Wing Nut - Pump Housing	SW 22	45 Nm / 34 N•m 33 / 25 lb•ft
Oil Plug - Bearing Housing	R ¼" DIN 910	10 N•m 7 lb•ft

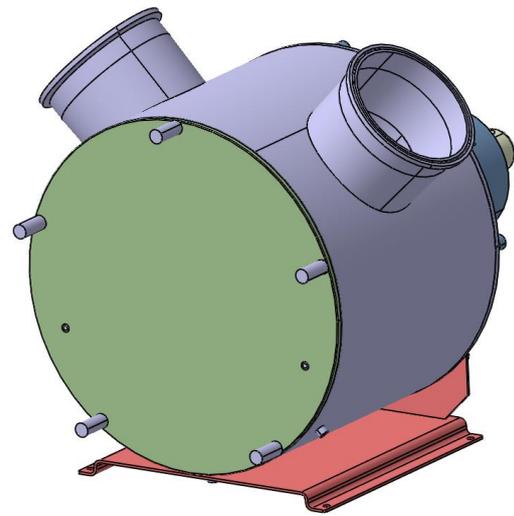
22 Dismantling



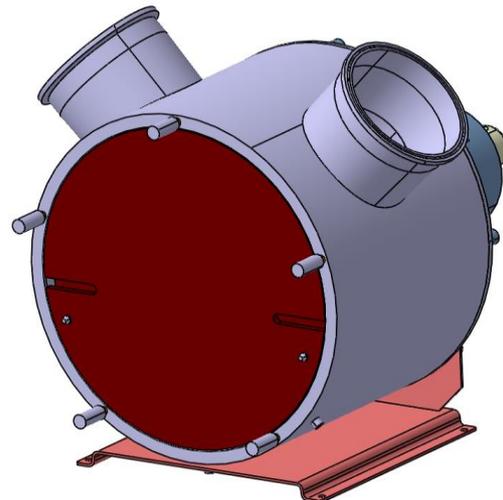
Before the work starts, the shaft has to be fixed against movement



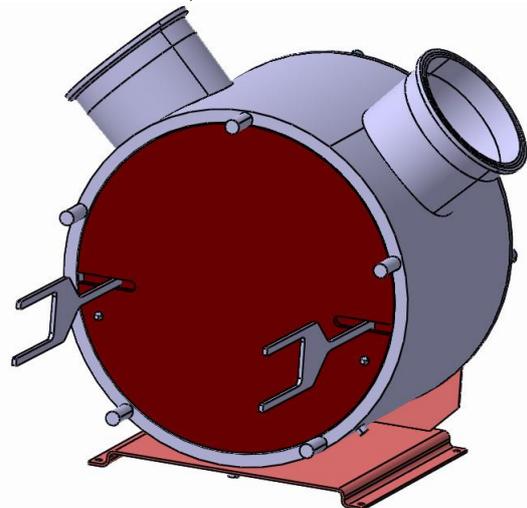
Remove Cap Nuts / Wing Nuts (RIGHT-HAND thread)



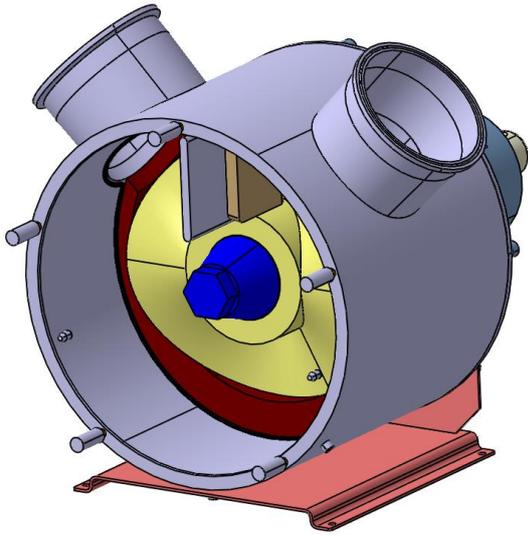
Remove the Front Cover to the front



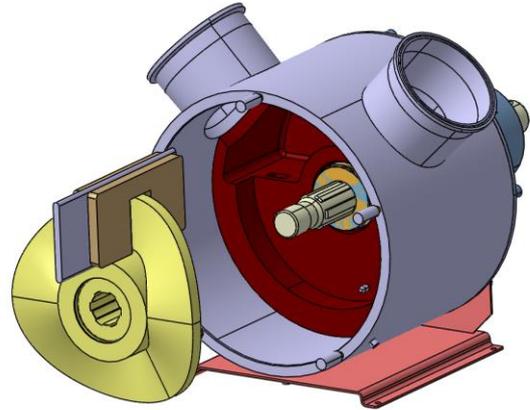
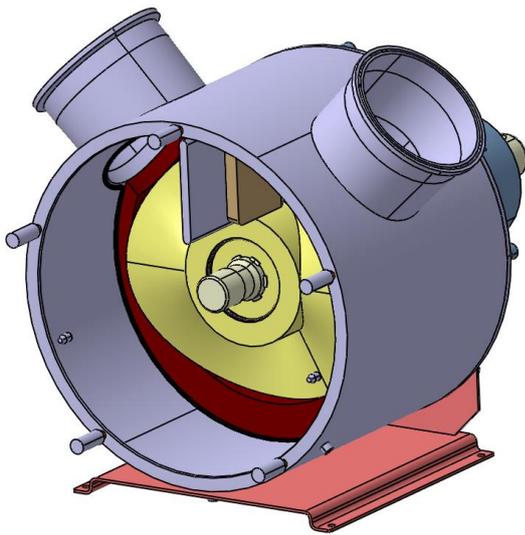
Remove the Liner, front



Compare the tool kit illustration

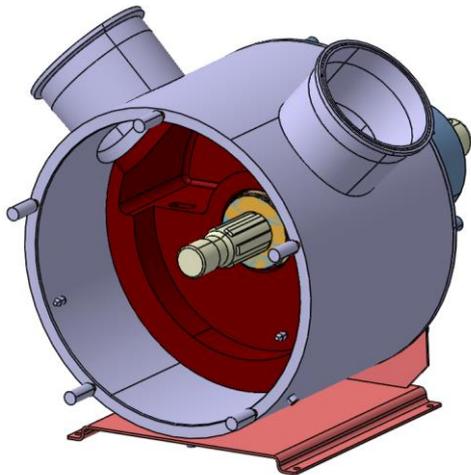


Loosen and remove the Shaft Nut

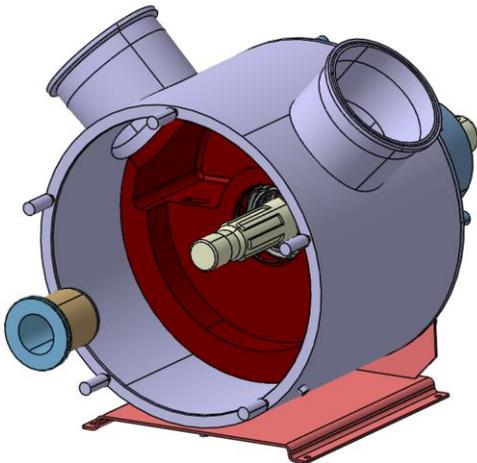


Remove the Rotor-Assembly, consisting of Rotor, Scraper and Guide Rail

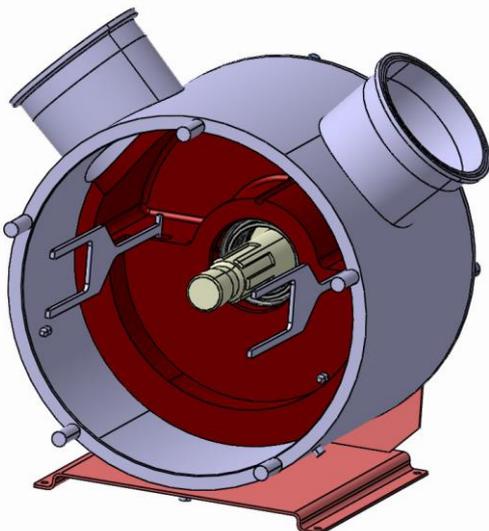
23 Dismantling „Lip Seal System“



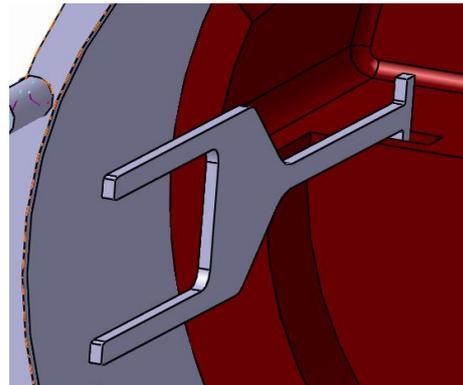
The Liner, back consists of the Lip Seal System



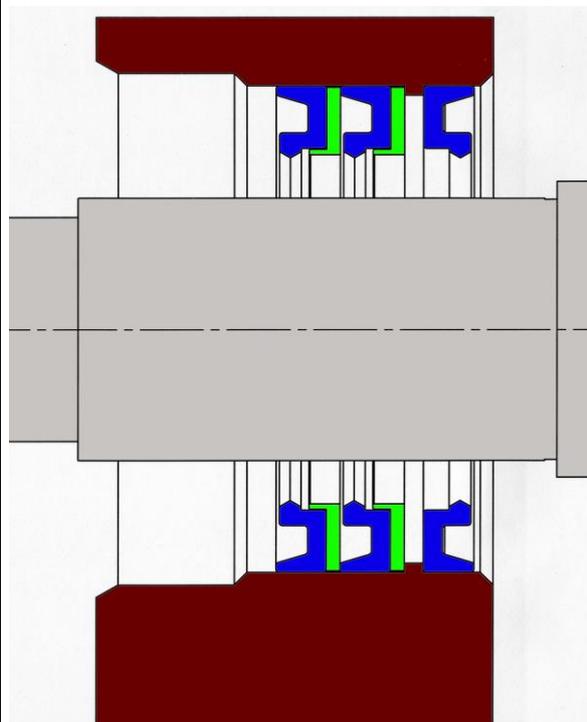
Remove the Shaft Sleeve



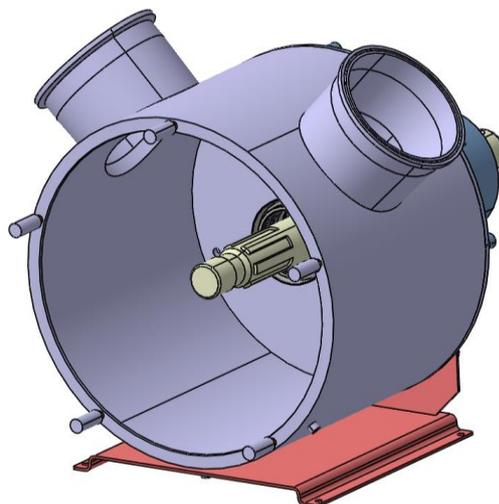
Remove the Liner, back with the aid of tool kit



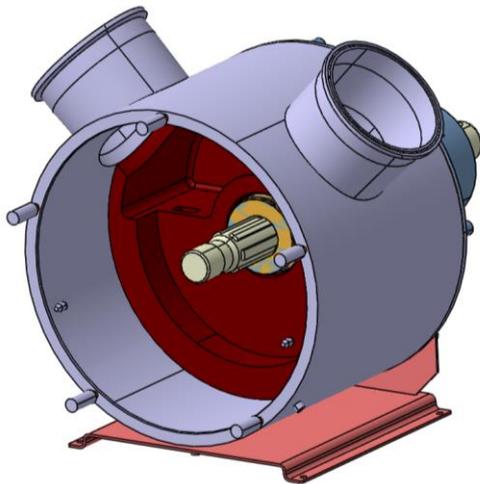
The nose of the tool has to be hooked in the groove of the Liner



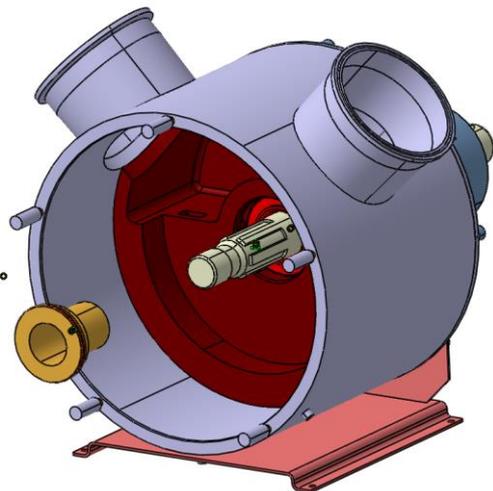
Take off the Lip Seals and Lip Seal Support Rings for exchanging



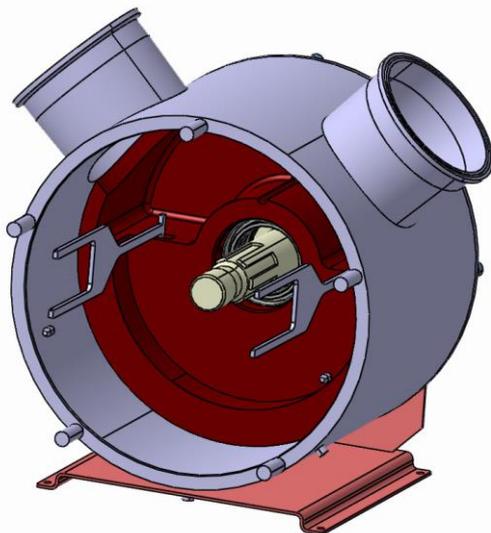
24 Dismantling „Mechanical Seal System“



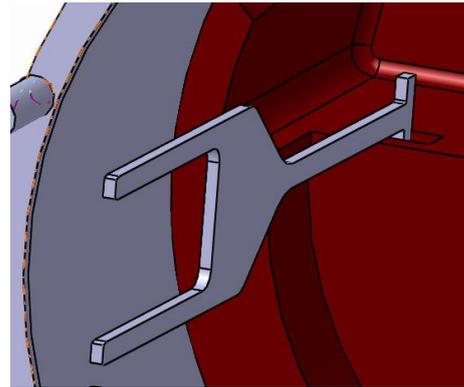
The Liner, back consists of the Mechanical Seal System



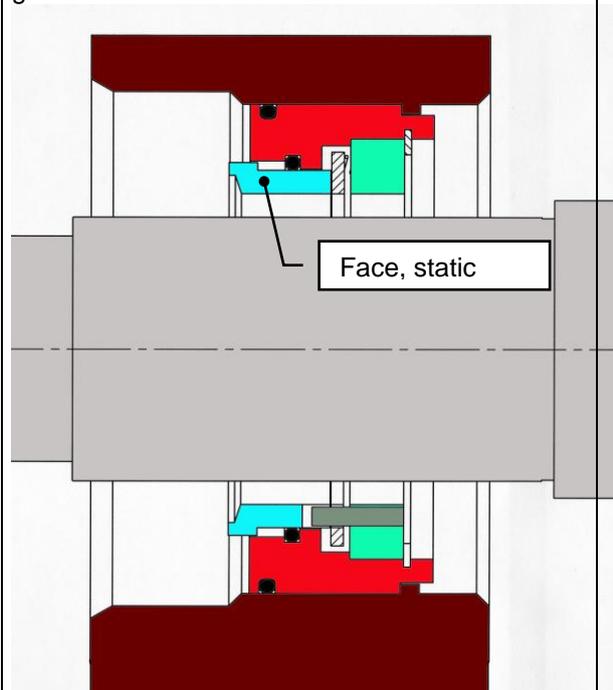
Remove the Dynamic Ring Holder together with Face, dynamic



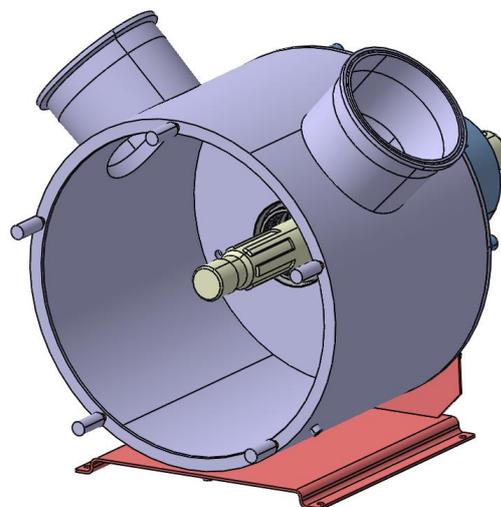
Remove the Liner, back with aid of tool kit



The nose of the tool has to be hooked in the groove of the Liner

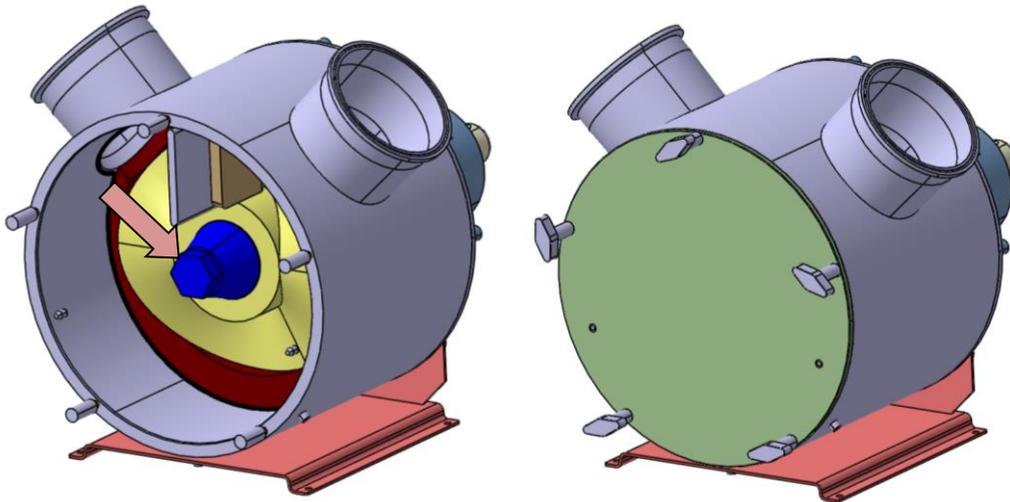


Remove carefully the Face, static



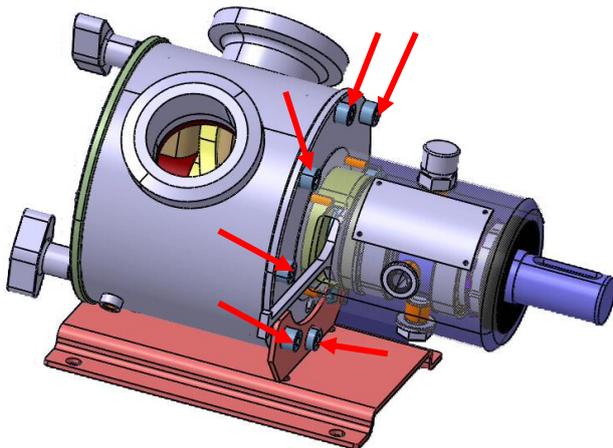
25 Assembly

The assembly needs to be done in the reversed instruction order as the disassembly. Following procedures need to be followed:



The pump needs to be completely assembled. The shaft nut (red arrow) needs to be mounted with the required torque.

EC25 = 80 Nm EC40 = 108 Nm EC60 = 138 Nm

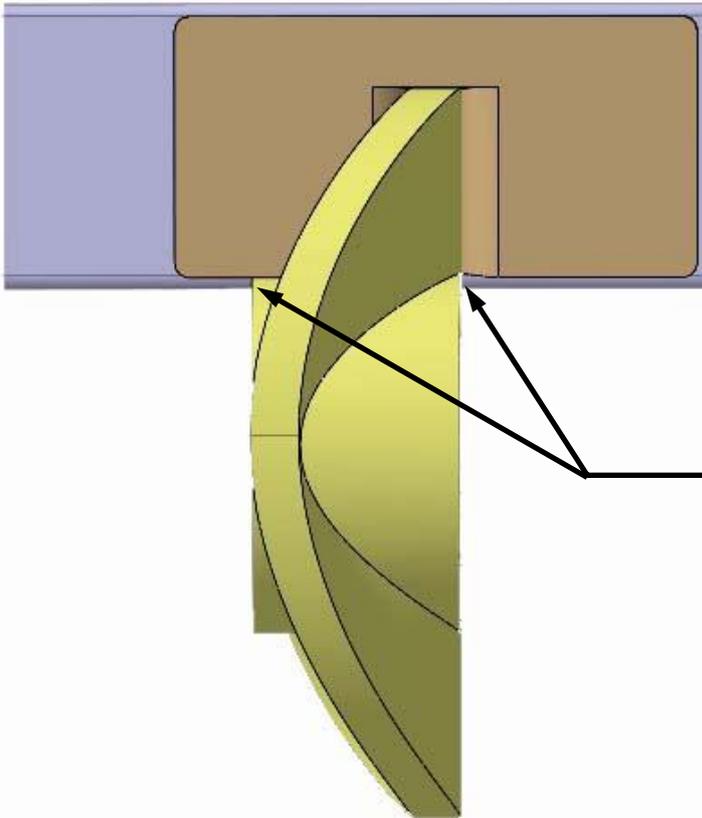


If the pump is completely disassembled and the flange is detached from the housing, the following steps must be done to ensure centering the liners to the shaft. Otherwise this may lead to a leakage of the sealing system.

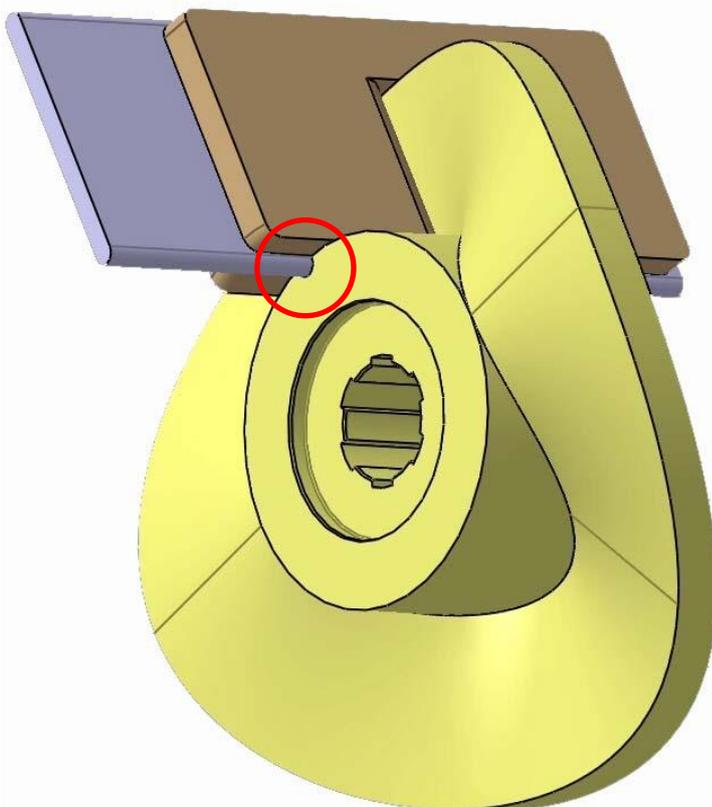
After complete assembly of the pump, the screws on the backside of the housing need to be released. The shaft should be turned 2 to 3 times and afterwards the screws can be fastened with the required torque. This allows the liners and the housing to align centered.

EC25 = 25 Nm EC40 = 50 Nm EC60 = 90 Nm

25.1 Assembly „Rotor-Assembly“

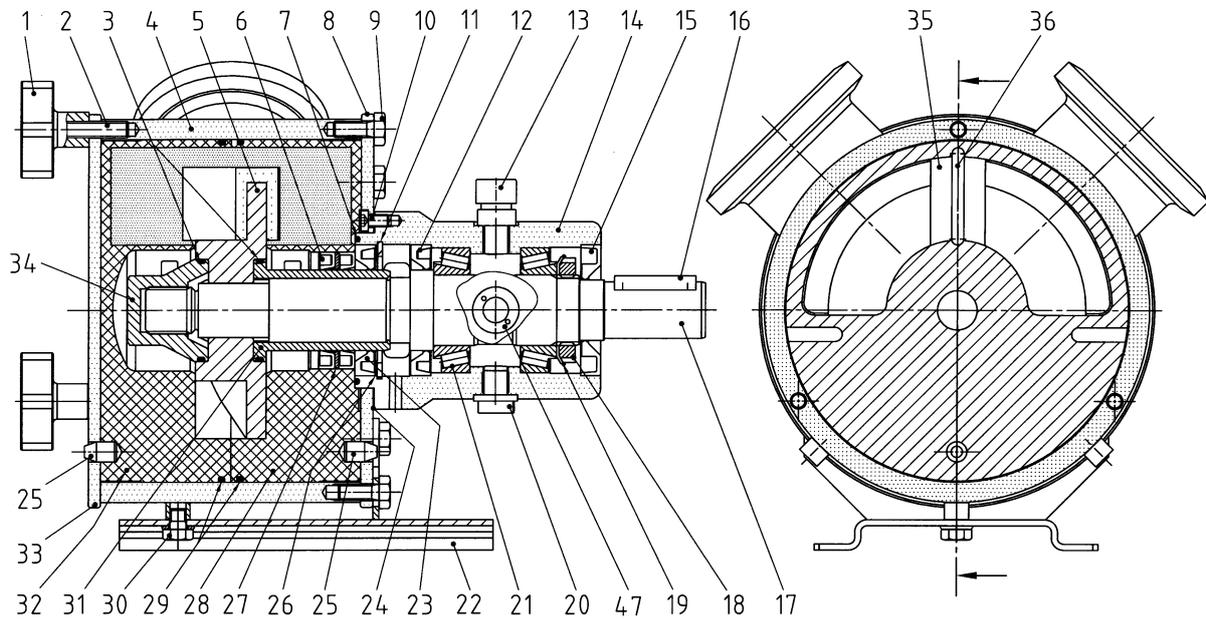


During mounting of the Rotor-Assembly the noses of the Guide rail mustn't be laid on the surface of the Rotor. To achieve this you have to fit Scraper and Guide rail in a position that the noses of the Guide rail are touching the gable end of the Rotor. After that you have to put the assembly unit non-violently into the Liner.

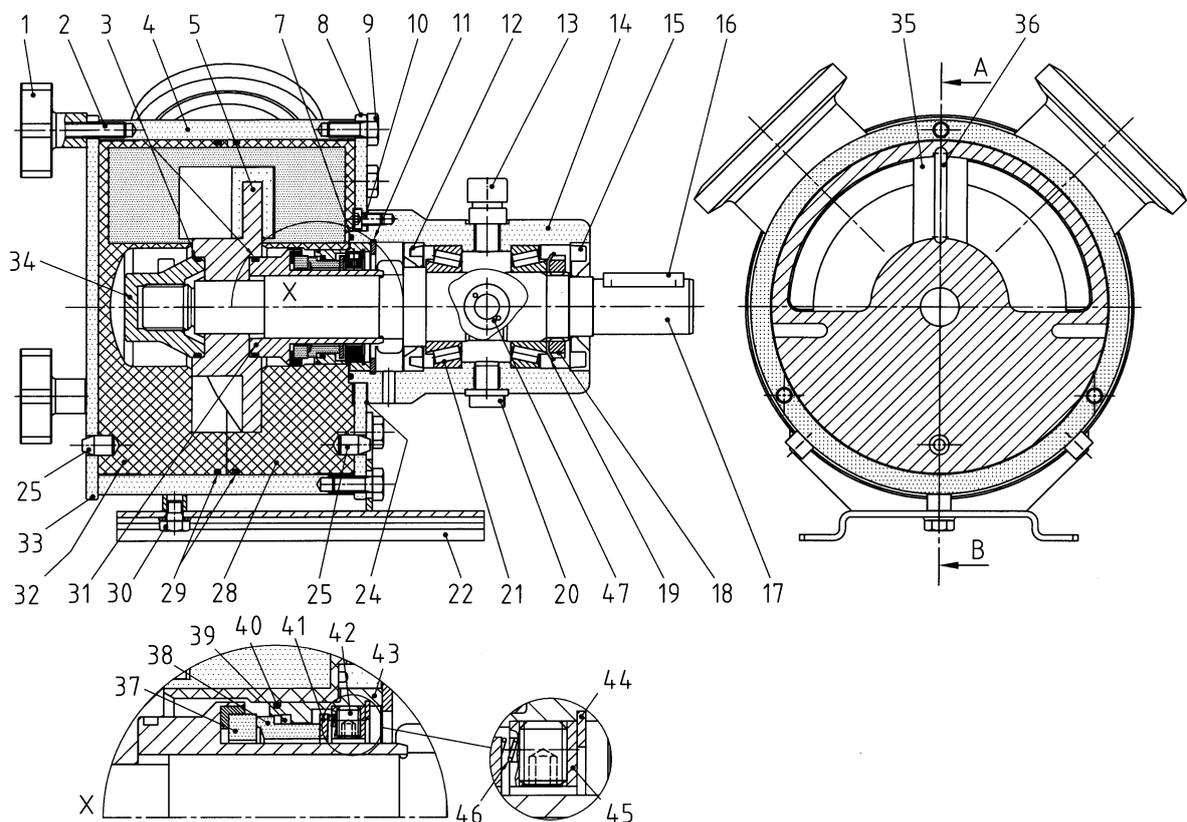


26 Pump sizes

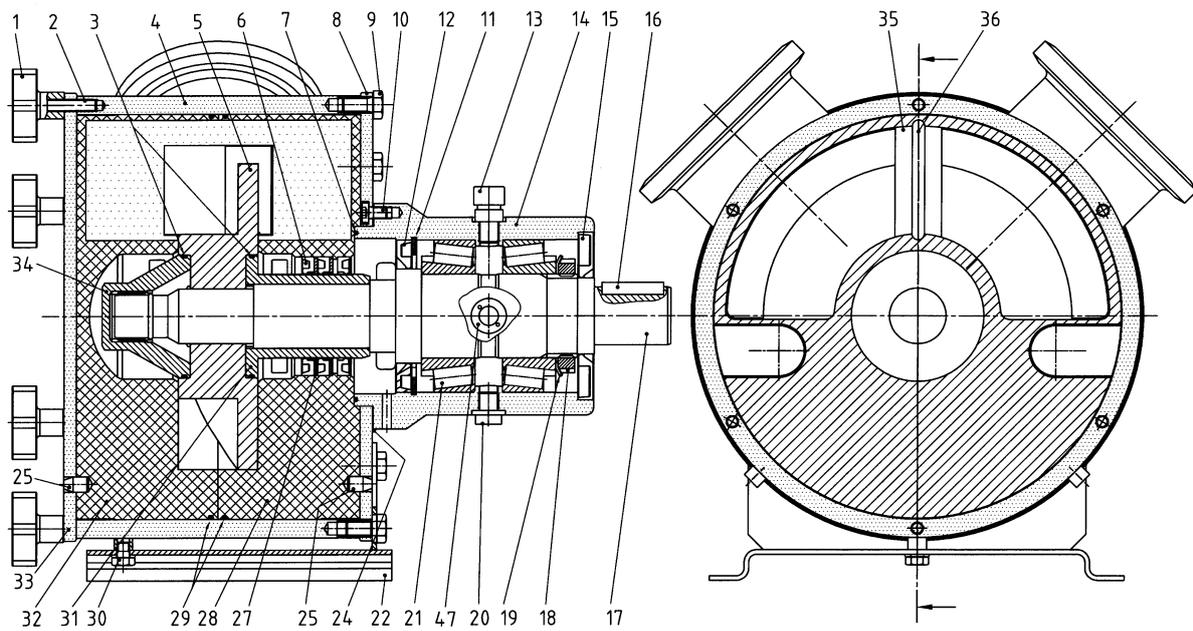
26.1 Cross section drawing EC 25 with Lip Seal System



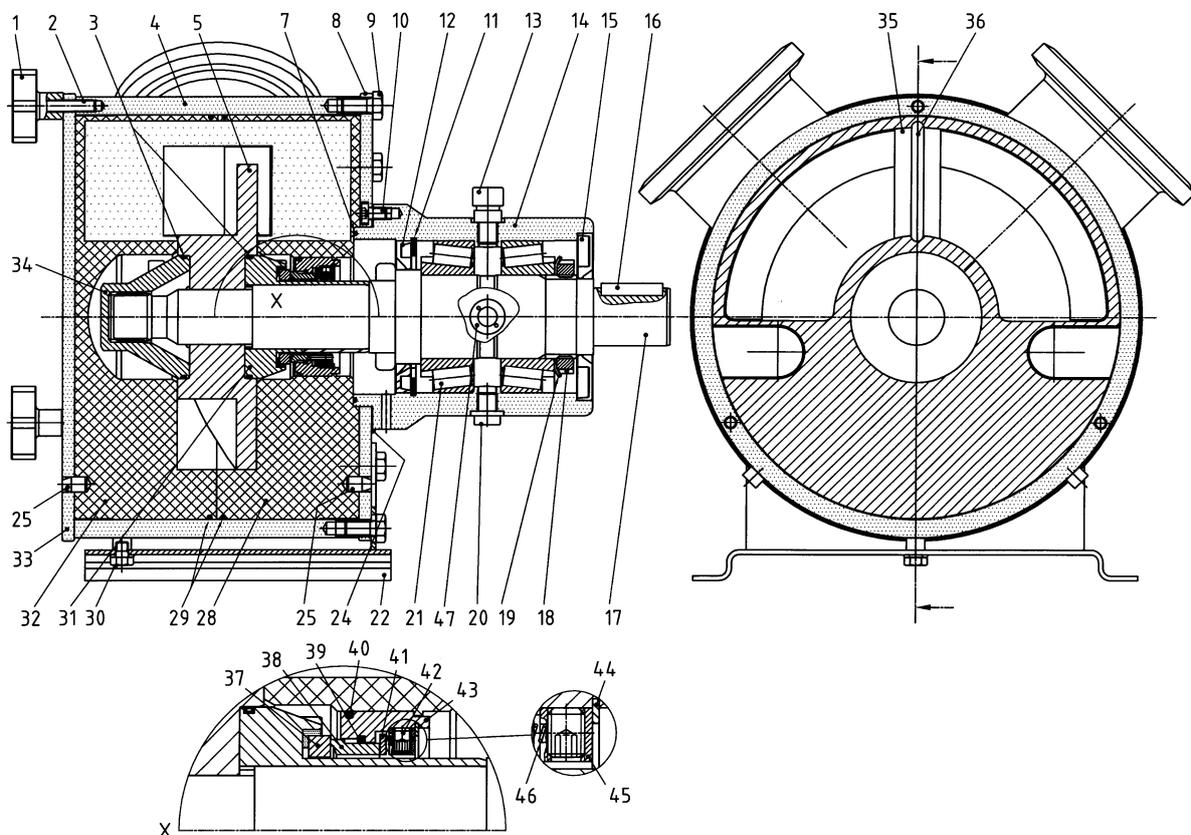
26.2 Cross section drawing EC 25 Mechanical Seal System



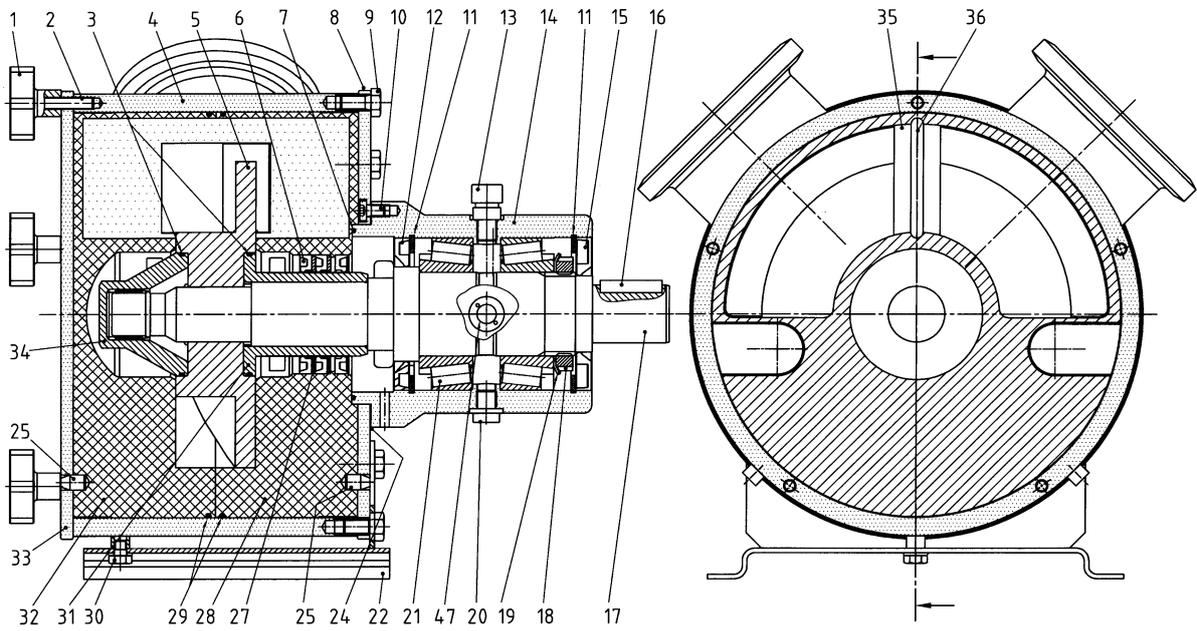
26.3 Cross section drawing EC 40 with Lip Seal System



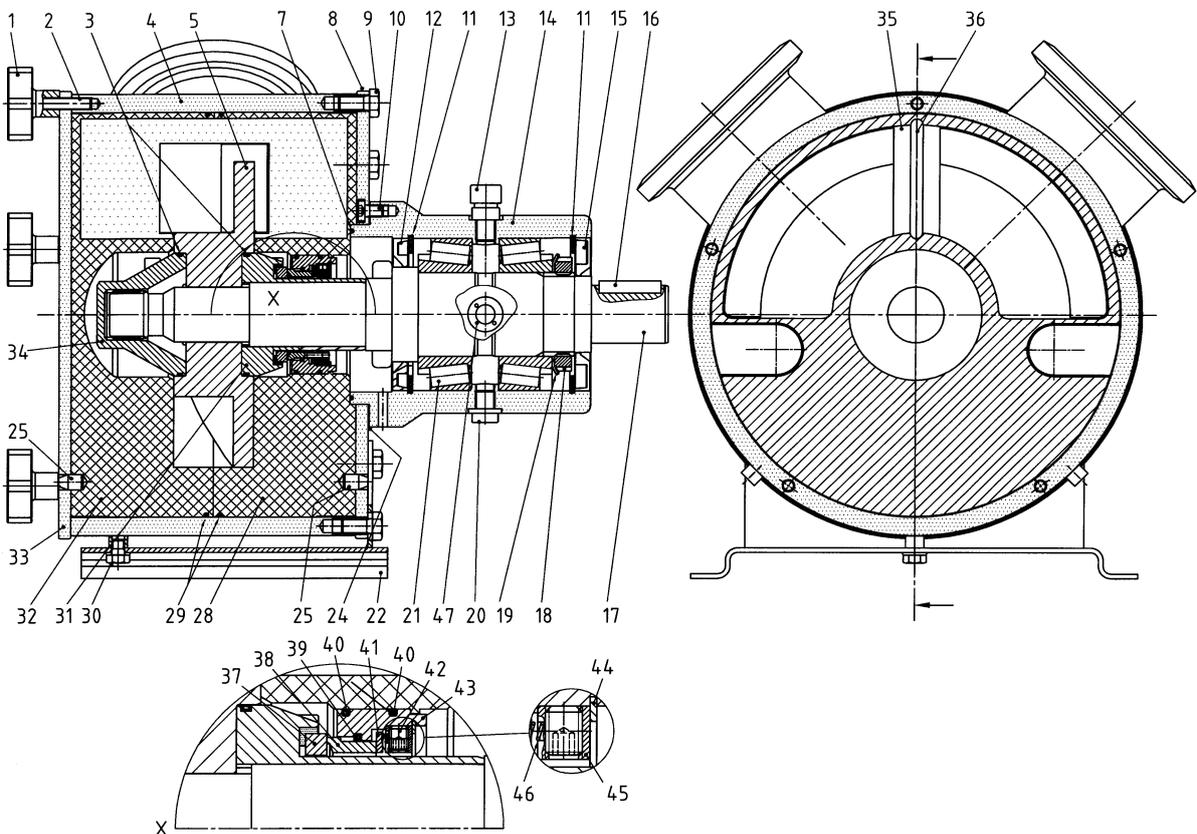
26.4 Cross section drawing EC 40 with Mechanical Seal System



26.5 Cross section drawing EC 60 with Lip Seal System



26.6 Cross section drawing EC 60 with Mechanical Seal System



26.7 Parts list for an EC 25 / EC 40 / EC 60 Pump

No.	Qty.	Item	Description	No.	Qty.	Item	Description
1	3	XX-1610-ZZ	Cap Nut EC 25	14	1	XX-1400-ZZ	Bearing Housing
1		XX-1600-ZZ	Wing Nut EC 25	15	1	XX-3101-ZZ	Lip Seal, Outboard
1	6	XX-1610-ZZ	Cap Nut EC 40	16	1	XX-3702-ZZ	Shaft Key
1		XX-1600-ZZ	Wing Nut EC 40	17	1	XX-1000-ZZ	Shaft
1	10	XX-1610-ZZ	Cap Nut EC 60	18	1	XX-2800-ZZ	Bearing Lock Nut
1		XX-1600-ZZ	Wing Nut EC 60	19	1	XX-3703-ZZ	Tabwasher
2	3	XX-1800-ZZ	Front Cover Stud EC 25	20	1	XX-3704-ZZ	Drain Plug
2	6	XX-1800-ZZ	Front Cover Stud 40	21	2	XX-2600-ZZ	Tapered Roller Bearing
2	10	XX-1800-ZZ	Front Cover Stud EC 60	22	1	XX-8000-ZZ	Mounting Plate
3	2	XX-3000-ZZ	O-Ring, Rotor	24	1	XX-1401-ZZ	Shims
4	1	XX-0300-ZZ	Pump Housing	25	4	XX-3705-ZZ	Safety Pin
5	1	XX-0100-ZZ	Rotor	28	1	XX-1200-ZZ	Liner, back
7	1	XX-3001-ZZ	O-Ring, Bearing Housing	29	2	XX-3002-ZZ	O-Ring, Liner
8	1	XX-1300-ZZ	Flange	30	1	XX-3707-ZZ	Bearing Housing Cap Screw
9	8	XX-3200-ZZ	Housing Mounting Bolt	32	1	XX-1250-ZZ	Liner, front
10	4	XX-3201-ZZ	Cap Screw, Bearing Housing	33	1	XX-0200-ZZ	Front Cover
11	1	XX-3700-ZZ	Snap Ring EC 25 / EC 40	34	1	XX-0800-ZZ	Shaft Nut
11	1	XX-3700-ZZ	Snap Ring EC 40	35	1	XX-0400-ZZ	Scrapergate
12	1	XX-3103-ZZ	Lip Seal, inboard	36	1	XX-0700-ZZ	Guide Rail
13	1	XX-3701-ZZ	Vent Valve	47	1	25-3800-ZZ	Oil Sight Glass

26.8 Parts list for the Lip Seal System EC 25 / EC 40 / EC 60

6	2	XX-3102-ZZ	Lip Seal EC 25	27	1	XX-3708-ZZ	Lip Seal Support Ring EC 25
6	3	XX-3102-ZZ	Lip Seal EC 40 / EC 60	27	2	XX-3708-ZZ	Lip Seal Support Ring EC 40
23	1	XX-3103-ZZ	Lip Seal EC 25	27	2	XX-3708-ZZ	Lip Seal Support Ring EC 60
26	1	XX-3706-ZZ	Spacer Ring EC 25	31	1	XX-0610-ZZ	Shaft Sleeve, Lip Seal

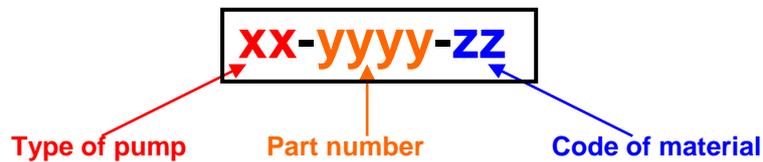
26.9 Parts list for the Mechanical Seal System EC 25 / EC 40 / EC 60

No.	Qty.	Item	Description	No.	Qty.	Item	Description
31	1	XX-3611-ZZ	Dynamic Ring Holder	42	4	XX-3606-ZZ	Set Screw EC 40 / EC 60
37	1	XX-3601-ZZ	Face dyn.	43	1	XX-3607-ZZ	Static Ring Holder
38	1	XX-3602-ZZ	Face stat.	44	1	XX-3608-ZZ	Snap Ring
39	1	XX-3603-ZZ	O-Ring, Face static	45	1	XX-3609-ZZ	Spring Retainer Ring
40	1	XX-3604-ZZ	O-Ring, Static Ring Holder	46	6	XX-3610-ZZ	Spring EC 25
41	1	XX-3605-ZZ	Spring Spacer	46	8	XX-3610-ZZ	Spring EC 40 / EC 60
42	3	XX-3606-ZZ	Set Screw EC 25				

Please ensure you quote the Type when ordering spare parts!
(See technical data sheet)

27 Code-Structure for spare part orders

Structure of the article number:



1. Type of pump

code	pump size
E25	EC 25
E60	EC 60
E40	EC 40

2. Part numbers: Please see attached technical data sheet.

3. Code of material

a. Elastomer

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

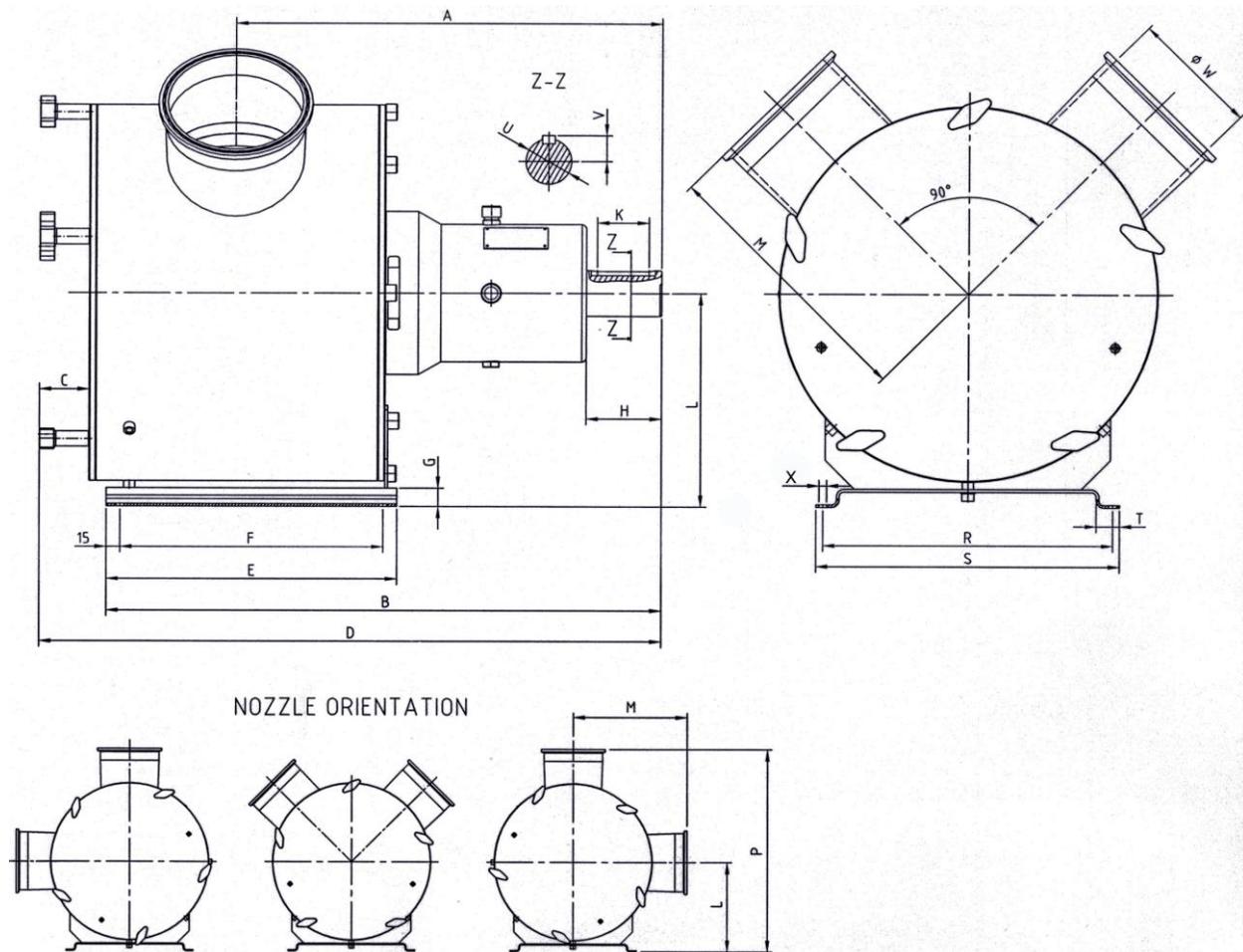
b. Plastics

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

c. Carbide / Carbon

Code	Material	Code	Material
40	ceramic	41	silicon carbide
66	carbon		

28 Dimensional drawings



28.1 Dimension table for pump with German Milk Fittings

		A	B	C	D	E	F	G	H	I	K	Fittings
EC 25	IN	9.25	11.42	1.38	13.35	7.28	6.11	0.59	2.05	3.46	1.27	NW 65
	mm	235	290	35	339	185	155	15	52	88	32,2	NW 65
EC 40	IN	11.65	15.04	1.38	16.97	7.87	6.69	0.79	1.97	5.12	1.19	NW 100
	mm	296	382	35	431	200	170	20	50	130	30.2	NW 100
EC 60	IN	18.23	23.71	2.13	25.75	12.41	11.22	0.79	3.22	5.91	2.21	NW 150
	mm	463	602	54	654	315	285	20	82	150	56,2	NW 150
		L	M	P	R	S	T	U	V	W	X	Fittings
EC 25	IN	4.67	6.3	10.94	4.92	5.51	0.91	1.1	0.67	2.37	0.36	NW 65
	mm	118,5	160	278	125	140	23	28	17	60,2	Ø 9	NW 65
EC 40	IN	6.81	8.66	15.47	10.04	10.63	1	1.5	0.87	3.83	0.36	NW 100
	mm	173	220	393	255	270	25,5	38	22	97,4	Ø 9	NW 100
EC 60	IN	9.21	12.4	21.61	12.41	12.99	1	1.97	1.12	5.78	0.36	NW 150
	mm	234	315	549	315	330	25,5	50	28,5	146,8	Ø 9	NW 150

28.2 Dimension table for pump with TRI-CLAMP (TC)

		A	B	C	D	E	F	G	H	I	K	Fittings
EC 25	IN	9.25	11.42	1.38	13.35	7.28	6.11	0.59	2.05	3.46	1.27	TC 2,5"
	mm	235	290	35	339	185	155	15	52	88	32,2	TC 2,5"
EC 40	IN	11.65	15.04	1.38	16.97	7.87	6.69	0.79	1.97	5.12	1.19	TC 4"
	mm	296	382	35	431	200	170	20	50	130	30,2	TC 4"
EC 60	IN	18.23	23.71	2.13	25.75	12.41	11.22	0.79	3.22	5.91	2.21	TC 6"
	mm	463	602	54	654	315	285	20	82	150	56,2	TC 6"
		L	M	P	R	S	T	U	V	W	X	Fittings
EC 25	IN	4.67	5.22	9.88	4.92	5.51	0.91	1.1	0.67	2.37	0.36	TC 2,5"
	mm	118,5	133	251	125	140	23	28	17	60,2	Ø 9	TC 2,5"
EC 40	IN	6.81	7.04	13.86	10.04	10.63	1	1.5	0.87	3.83	0.36	TC 4"
	mm	173	179	352	255	270	25,5	38	22	97,4	Ø 9	TC 4"
EC 60	IN	9.21	11.61	20.86	12.41	12.99	1	1.97	1.12	5.78	0.36	TC 6"
	mm	234	295	530	315	330	25,5	50	28,5	146,8	Ø 9	TC 6"

28.3 Dimension table for pump with RJT

		A	B	C	D	E	F	G	H	I	K	Fittings
EC 25	IN	9.25	11.42	1.38	13.35	7.28	6.11	0.59	2.05	3.46	1.27	RJT 2,5"
	mm	235	290	35	339	185	155	15	52	88	32,2	RJT 2,5"
EC 40	IN	11.65	15.04	1.38	16.97	7.87	6.69	0.79	1.97	5.12	1.19	RJT 4"
	mm	296	382	35	431	200	170	20	50	130	30,2	RJT 4"
		L	M	P	R	S	T	U	V	W	X	Fittings
EC 25	IN	4.67	5.75	10.39	4.92	5.51	0.91	1.1	0.67	2.37	0.36	RJT 2,5"
	mm	118,5	146	264	125	140	23	28	17	60,2	Ø 9	RJT 2,5"
EC 40	IN	6.81	7.56	14.37	10.04	10.63	1	1.5	0.87	3.83	0.36	RJT 4"
	mm	173	192	365	255	270	25,5	38	22	97,4	Ø 9	RJT 4"

28.4 Dimension table for pump with SMS (Swedish norm)

		A	B	C	D	E	F	G	H	I	K	Fittings
EC 25	IN	9.25	11.42	1.38	13.35	7.28	6.11	0.59	2.05	3.46	1.27	SMS 2,5"
	mm	235	290	35	339	185	155	15	52	88	32,2	SMS 2,5"
EC 40	IN	11.65	15.04	1.38	16.97	7.87	6.69	0.79	1.97	5.12	1.19	SMS 4"
	mm	296	382	35	431	200	170	20	50	130	30,2	SMS 4"
		L	M	P	R	S	T	U	V	W	Z	Fittings
EC 25	IN	4.67	5.67	10.31	4.92	5.51	0.91	1.1	0.67	2.37	0.36	SMS 2,5"
	mm	118,5	144	262	125	140	23	28	17	60,2	Ø 9	SMS 2,5"
EC 40	IN	6.81	7.91	14.72	10.04	10.63	1	1.5	0.87	3.83	0.36	SMS 4"
	mm	173	201	374	255	270	25,5	38	22	97,4	Ø 9	SMS 4"

28.5 Dimension table for pump with SMS (French norm)

		A	B	C	D	E	F	G	H	I	K	Fittings
EC 25	IN	9.25	11.42	1.38	13.35	7.28	6.11	0.59	2.05	3.46	1.27	SMS 2,5"
	mm	235	290	35	339	185	155	15	52	88	32,2	SMS 2,5"
EC 40	IN	11.65	15.04	1.38	16.97	7.87	6.69	0.79	1.97	5.12	1.19	SMS 4"
	mm	296	382	35	431	200	170	20	50	130	30,2	SMS 4"
		L	M	P	R	S	T	U	V	W	X	Fittings
EC 25	IN	4.67	5.67	10.31	4.92	5.51	0.91	1.1	0.67	2.37	0.36	SMS 2,5"
	mm	118,5	144	262	125	140	23	28	17	60,2	Ø 9	SMS 2,5"
EC 40	IN	6.81	7.72	14.52	10.04	10.63	1	1.5	0.87	3.83	0.36	SMS 4"
	mm	173	196	369	255	270	25,5	38	22	97,4	Ø 9	SMS 4"