These instructions should be read carefully before installing and commissioning the pump. Every JESCO pump is dimensioned, tested and supplied according to the data of the order. If the operating conditions change at a later date (e.g. different medium, viscosity, temperature, feed conditions, etc.) we must check and confirm, if necessary, in the specific case whether the pump can be operated correspondingly. We cannot accept any liability for damage caused by misuse or failure to observe the operating instructions.

General

Description of the pump

Centrifugal chemical pumps are used for pumping acids and alkalis and other low-viscosity, aggressive liquids and neutral media.

Before each pump is dispatched, it undergoes a thorough functional test, including measurement of the discharge rate, the pump head and the power consumption of the drive motor.

Each pump has a nameplate showing the type designation and rating, and a corresponding plate for the motor data. In the event of queries, please refer to these plates.

Description of mechanical seal

Mechanical seals basically consist of two perfectly plane surfaces. One surface rotates with the shaft, while the other one is stationary. The sealing effect is achieved by the direct contact between the two plane surfaces. The stationary counter-ring is normally fixed in position.

The sliding ring is able to move axially and radially in order to compensate the shaft deflections during operation. This axial mobility enables mechanical seals to be fitted within practicable manufacturing tolerances, the accuracy required being dependent on the design of the seal.

Type B2I

Single-acting, loaded, internal seal, independent of direction of rotation. Combination of sliding materials in silicon carbide (SiC). Bellows and secondary seals of EPDM or FPM. Metallic parts of stainless steel (1.4571) or Hastelloy C4.

Type B2Q

Single-acting, loaded, internal seal, independent of direction of rotation, with quenching chamber. The chamber is sealed from the atmosphere by a shaft sealing ring to prevent deposits and/or reduction of the temperature in the area of the mechanical seal.

Combination of sliding materials in silicon carbide (SiC). Bellows and secondary seals of EPDM or FPM. Metallic parts of stainless steel (1.4571) or Hastelloy C4.

Type B2D

Double-acting, loaded, internal seal, independent of direction of rotation, arranged back-to-back with sealing chamber. This arrangement is the most usual form of double-acting seals used with difficult, chemically particularly aggressive media. Combination of sliding materials in silicon carbide (SiC). Bellows and secondary seals of EPDM or FPM. Metallic parts of stainless steel (1.4571).

Quenching fluid

A clean, usually cold liquid is used for quenching, which must be highly compatible with the medium in order to prevent any chemical reaction. The quenching pressure should not exceed 0.5 bar.

Function of quenching:

- Prevention of crystallizing rings (air seal)
- Absorption of leakage
- Cooling of sliding rings
- Monitoring of leakage rate
- Lubricating film stabilization in vacuum operation

Important:

In order to avoid dry running of the radial seal on the atmosphere side, sealing systems fitted with a quenching chamber must always be supplied with quenching liquid (see quenching fluid installation).

Sealing liquid

For their operation back-to-back double-acting seals require a sealing liquid under pressure flowing through the sealing space from bottom to top. The sealing pressure must be 1 to 2 bar higher than the pressure of the medium to be sealed so that both seals only have to seal against the neutral sealing liquid. The sealing liquid must have good compatibility with the pumped medium.

Function of sealing:

- Prevention of contact between pumped liquid and atmosphere
- Formation of lubricating film between the sliding rings
- Cooling of sliding rings
- Monitoring of leakage rate

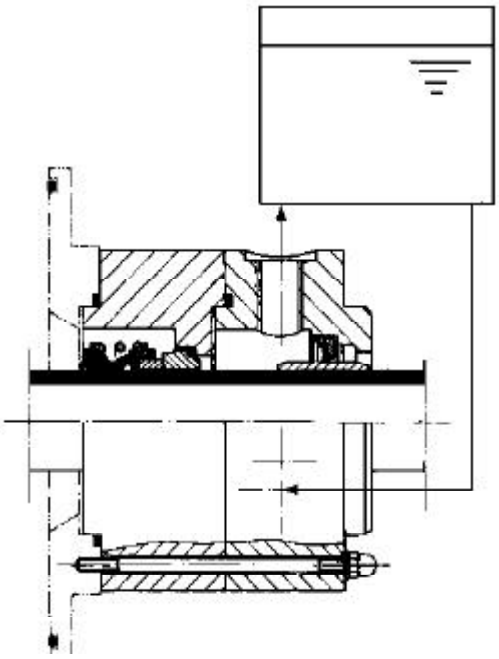
Important:

To avoid dry running of the mechanical seal on the atmospheric side, sealing systems provided with a sealing chamber must always be supplied with sealing liquid (see sealing liquid installation).

Supply systems for mechanical seals

Quenching fluid installation

The quenching chamber can be supplied as follows:



Quenching liquid from high level tank; circulation of liquid by thermo-siphon action or additional pumping device.

Requirements for quenching fluid:

- Compatible with medium to be sealed
- Suitable regarding corrosion resistance of all parts contacted
- Free from solid matter
- Must not tend to form deposits
- Good lubricating properties
- High specific thermal capacity
- High evaporation temperature
- Not affecting the environment
- Easy procurement and high availability
- Quenching pressure shoud not exceed 0.5 bar

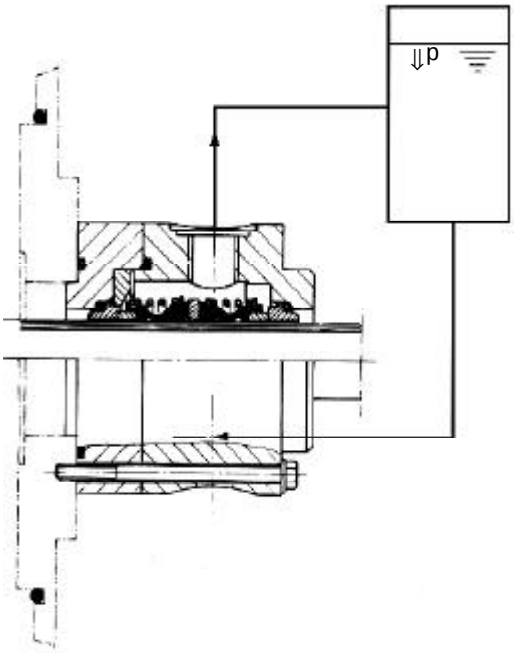
Sealing liquid installation

Double-acting mechanical seals basically need a sealing system, which meets the following requirements:

- The space between the mechanical seal on the product and atmospheric sides must be filled with clean sealing liquid.
- During operation the pressure of the sealing liquid must always be 1.0 to 2.0 bar higher than the pressure to be sealed.

Installation diagram for sealing chambers:

Sealing system with thermo-siphon circuit



Requirements for sealing liquid:

- Compatible with medium to be sealed
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- Free from solid matter
- Must not tend to form deposits
- Good lubricating properties
- High specific thermal capacity
- High evaporation temperature
- Not affecting the environment
- Easy procurement and high availability
- During operation the sealing pressure must always be 1.0 to 2.0 bar higher than the pressure to be sealed.

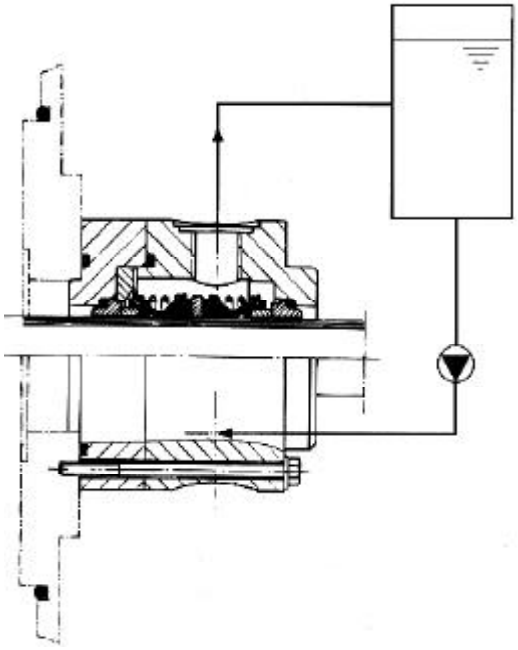
Note on temperature:

The outlet temperature must not exceed 60°C and should lie approx. 40°C below the evaporation temperature of the sealing liquid.

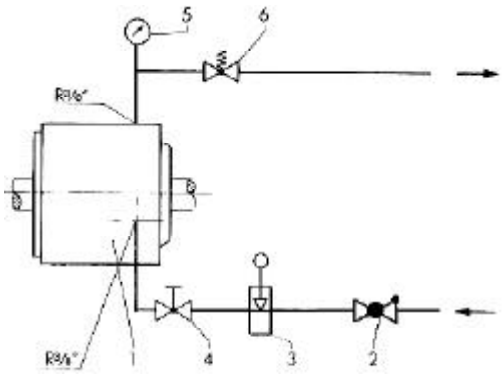
- A continuous exchange of liquid should take place to prevent overheating in the sealing chamber (by thermo-siphon action or circulating device).

The following functions of the sealing system result from these basic conditions:
• Generation of pressure in the sealing chamber
• Leakage compensation
• Circulation of sealing liquid

Sealing system with circulation device ouside the mechanical seal



Regulation of the sealing pressure
The sealing pressure can be regulated according to the following diagram:



Legend

1 Sealing chamber	4 Flow control valve
2 Non-return valve	5 Pressure gauge (0- 10 bar)
3 Float-type flowmeter	6 Backpressure valve

Transportation and storage of pump
No special precautions are necessary for transportation and storage of plastic centrifugal pumps under normal ambient conditions. At ambient temperatures below -10°C, however, it must be specially ensured that cast metal parts in particular are protected against impact stress by suitable packing. The pump connectors must be closed.

When putting a pump into service after several years of storage, the following measures must be taken:
- Check elastomer seals for elastic properties - replace if necessary.
- Check if the mechanical seals can be turned - otherwise, fill the pump head with water and check after a few minutes if they can be turned. If still not, you should repair the rnechanical seals.

Warranty
Every pump is given a functional test before dispatch with measurement of rate of delivery, pump head and power consumption of the drive motor. A warranty for durability of materials can only be provided if the exact operating conditions were known when the system was designed.

Excluded from the warranty are all sealing elements and damage resulting from non-observance of these operating and maintenance instructions.

Our "General Sales Conditions" have over-riding priority.

General technical safety information
The operating safety of the pump is only guaranteed if used for the intended purpose. Refer to data sheet.

Removal of environmentally hazardous leaking media conveyed must comply with the statutory regulations.

Avoid danger of accidents during installation and disassembly. Ensure the stability of the pump during installation. Secure installation parts against falling. Support or underlay loose components.
Connecting flanges, tapped holes and other openings on pumps must be closed during transportation and storage.

EC machine guidelines
- Any work done on the whole pump arrangement may only be carried out by authorized and trained personnel.
- According to the Machine Guidelines 89/392/EEC, these products are not regarded as machines; they can, however, be built into installations which are regarded as machines. In this case, please observe the following note!

CE

Note
We distinctly emphasize that operation is prohibited until it has been confirmed that the machine (plant) into which the products have been built corresponds to the conditions of the EC Machine Guidelines 89/392/EEC. A respective declaration of conformity is supplied with the product on request.

Installation
Fixing the pump
The pump should be mounted on a stable, flat supporting surface, using the appropriate screws at the base of the pump.

Nominal widths
The nominal widths of the pipes should be larger than those of the pump connections. The width of short pipes should be large enough to ensure that the resistance to flow is as small as possible, especially in the suction pipe. For long pipes the economical width should be determined from case to case.

Changes in cross-section and direction
Abrupt changes in cross-section and direction as well as unduly sharp bends should be avoided.

Supporting and flange mounting
Pipes should be connected to the pump without stress. They should be supported close to the pump and screwed on easily so as to avoid distortion.

Suction or intake pipe
Unequal nominal widths
Unequal nominal widths of suction connections and horizontal suction pipes should be compensated for by eccentric spacers.

Laying pipes
To prevent the formation of air pockets, the suction pipe must rise towards the pump, the intake line being layed with a slight downward gradient.
If local conditions do not permit the suction pipe to rise continuously, a venting device should be provided at its highest point.

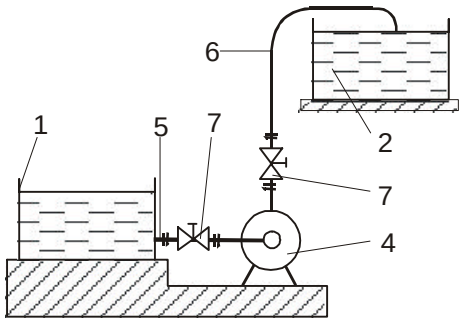
Foot valve and suction strainer (suction operation)
For suction operation the intake pipe must be equipped with a foot valve to prevent the pump and suction pipe from emptying at standstill.
The suction filter must be installed so that dirt from the swamp or air from the liquid cannot enter the pipe.

Shutoff valve
A shutoff valve should be integrated in the pressure pipe close to the pump to regulate the flow of pumped medium.

Prevention of reverse flow
When long pressure pipes or high pressures are involved, a backstop must be installed. The pump is mechanically relieved, and the pumped medium is prevented from flowing back. In this way harmful pressure surges on the pump and foot valve can be avoided.

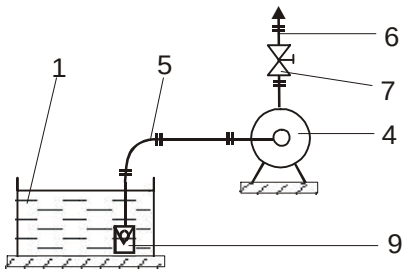
Suction action
Chemical motor pump units are not self-priming. They only operate satisfactorily when the medium flows to the pump. When the medium is clean, the pump can operate in the suction mode when a foot valve is used. When a priming chamber is provided, the suction mode is also possible (see examples of installations).

Examples of installations
Flooded operation
As long as the level of the tank liquid is maintained above the height of the pump head, the pump will not run dry. The level can be controlled reliably by a suitable level switch.



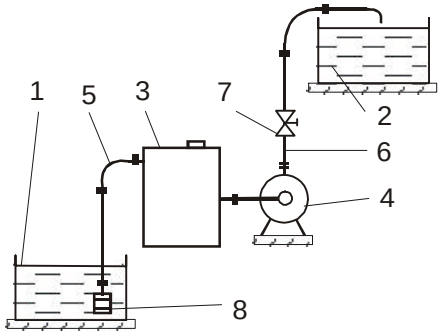
1 Storage tank 2 Receiving tank 4 Centrifugal pump
5 Suction pipe 6 Pressure pipe 7 Shutoff valve

Suction operation with non-return valve
The use of this suction mode is only recommended with clean media which ensuring the safe functioning of the non-return valve.



1 Storage tank 4 Centrifugal pump
5 Suction pipe 6 Pressure pipe
7 Shutoff valve 9 Non-return valve

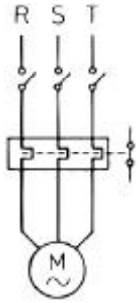
Suction operation with priming chamber
The priming chamber must be filled before starting. The level is maintained when the pump is running because the vacuum formed in the suction pipe primes the liquid into the priming chamber.
The volume of the priming chamber has to match the capacity of the pump as well as suction pipe volume.



Legend

1 Storage tank	2 Receiving tank
3 Priming chamber	4 Centrifugal pump
5 Suction pipe	6 Pressure pipe
7 Shut-off valve	8 Suction filter

Electrical connection
The electric motors mounted on the pump should be connected according to the instructions printed inside the terminal box cover. In addition to the usual fuses, each pump motor must be protected by a thermal motor protection switch (see fig.). The external electrical connection should be made by a qualified electrician in accordance with local regulations.



Motor data
3-phase motor with extended rotor shaft and reinforced bearings; otherwise to IEC Standards, speed 2900 rpm, voltage 3x230/400 V, enclosure IP55, insulation class F, mounting B3/B14.

Pump type	Rated motor output (kW)	Rated current (A) 230 V	400 V
MB 15 - 85	0.37	1.53	0.88
MB 20 - 100	1.1	4.3	2.5
MB 20 - 120	1.5	5.5	3.2
MB 25 - 140	2.2	7.8	4.5

Commissioning
Before the unit is started, it must be filled, vented and perfectly tight.

Filling and venting of the pump
The pump is filled and vented at the same time as the system. While filling, it is advisable to turn the pump shaft slowly by hand.

Direction of rotation
The motor must rotate in the direction indicated by the arrow on the motor casing. To check the direction of rotation the motor may be briefly switched on.
Rotation in the wrong direction affects the discharge capacity and can result in damage to the pump.

Starting
Shutoff valve
The shutoff valve in the pressure pipe must be closed.

Switching on the motor

Insufficient venting
If the discharge head does not rise with increasing speed, switch off the pump and re-vent the unit.

Adjusting the discharge values
After reaching the operating speed, the shutoff valve on the pressure side should be opened to such an extent that the necessary discharge values are attained.

The discharge flow can be increased provided that the maximum load of the motor is taken into account.

Operating against a closed shutoff valve
It is essential to avoid operation for any length of time against a closed shutoff valve, because apart from the pumped fluid becoming warm, the pump might be damaged.

ATTENTION - dry running
It is also essential to ensure that the mechanical seal does not run dry - even for a short time - as this can damage the sliding faces and prevent the shaft seal from functioning correctly.

Switching off the pump
Pressure pipe
If a non-return valve is fitted in the pressure pipe, the shutoff valve may remain open. If there is no non-return valve in the pressure pipe, the shutoff valve must be kept closed.

Motor
Switch off the motor.

Switching the pump on again
Before switching on again, make sure that the pump shaft is not rotating. If the shutoff valve in the pressure pipe is leaking or not fully closed, it is possible that the pump shaft may rotate backwards due to the reverse flow of the pumped medium.

Changing the operating data
Higher density of the pumped medium
If the density of the pumped medium is higher than assumed when ordering, or when the pump was originally dimensioned, it is essential to make sure that the motor is not overloaded.

Higher flow rate
If the flow rate is higher than mentioned in the order or originally dimensioned, it is important to ensure that the head is still adequate. If it is not, this could result in cavitation and thus damage to the pump.

Measures to be taken in the case of longer standstills
If the concentration of the pumped liquid is likely to change, or if it may crystallize when the pump is out of operation for a longer time, the pump must be emptied and flushed with a conserving liquid.

Maintenance
Chemical motor pump units of the MB series require hardly any maintenance. As a standard, they are fitted with a high-quality, maintenance-free mechanical seal which is automatically adjusted by spring action. The bearings of the electric motor are permanently lubricated. Therefore maintenance of the complete pump unit is reduced to a mere inspection of the following points at regular intervals:

- Does the pump attain the desired capacity (discharge flow/head)?
- Is any unusual noise or vibration of the pump or motor observed?
- Is the mechanical seal perfectly tight?
- Is the temperature rise of the motor normal?

Mounting and dismantling
JESCO centrifugal pumps should only be dismantled with reference to the sectional drawings provided.

Spiral casing
- Loosen fixing screws (7).
- Remove spiral housing (1) forwards.

Impeller
- Unscrew impeller cap (2a)
  (not for MB 1 5-85).
  (Caution: left-hand thread).
- Release fastening nut (2e).
- Remove impeller forwards from the motor shaft.
- For MB 15-85 unscrew impeller (2) (left-hand thread).

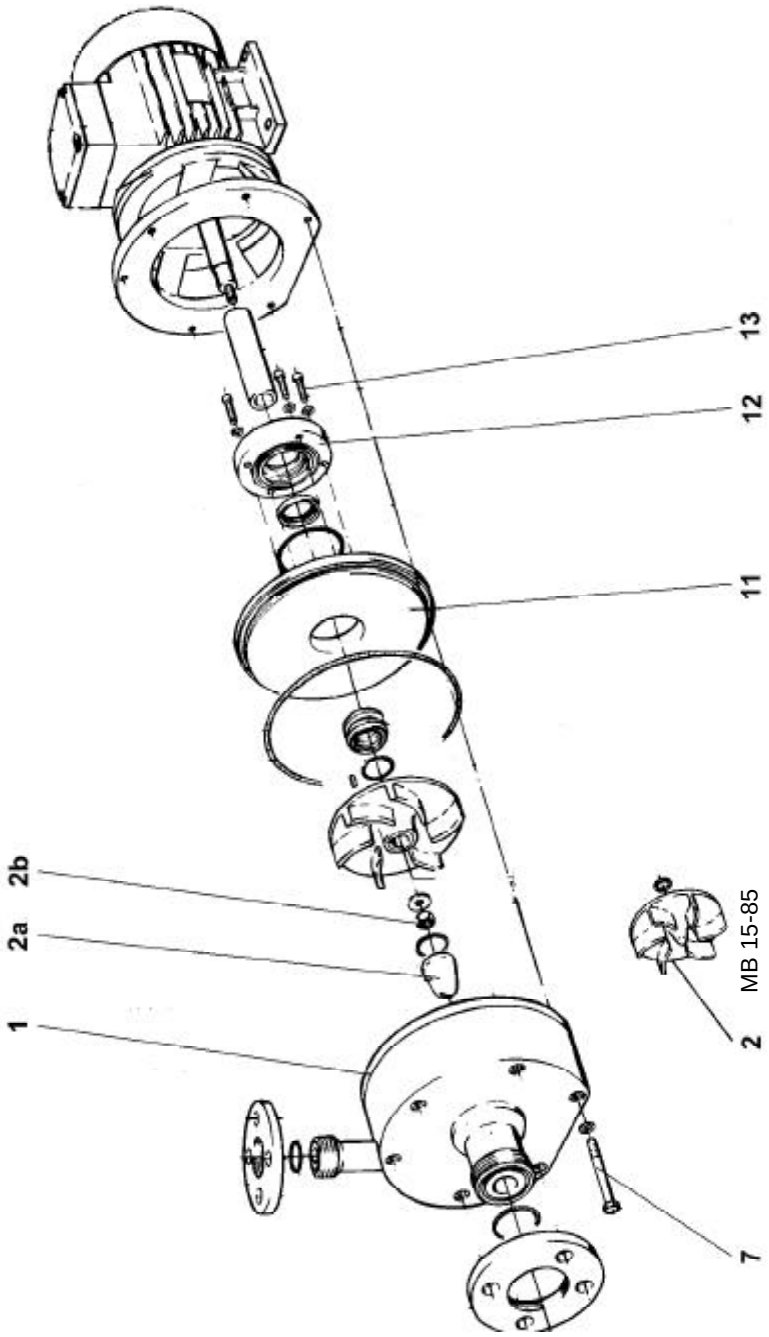
Mechanical seal
- Carefully remove back plate (11) forwards, together with the mechanical seal (see mechanical seal drawing).
- In order to dismantle the counter-ring flange of the mechanical seal, detach the flange from the back plate (12 resp. 43).
  (Loosen screws, 13 resp. 34).

Follow the relevant assembly instructions for mounting the mechanical seals used.

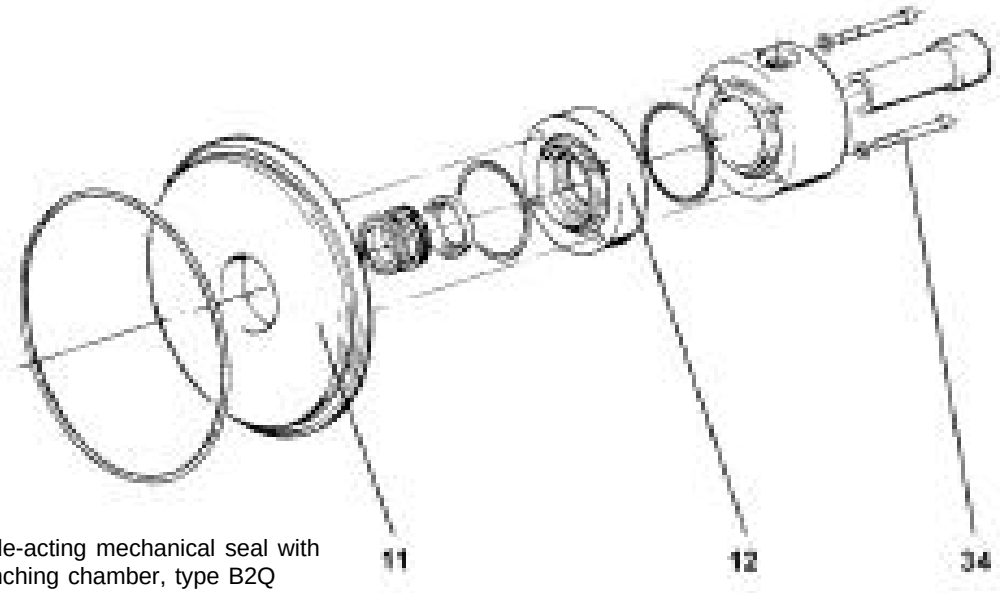
Mounting the pump
- The pump is assembled in reverse order.
- Ensure that the 0-rings are firmly seated. (Always use new 0-rings.)
- It is essential that assembly is stress-free.

Chemical Motor Pump Unit MB

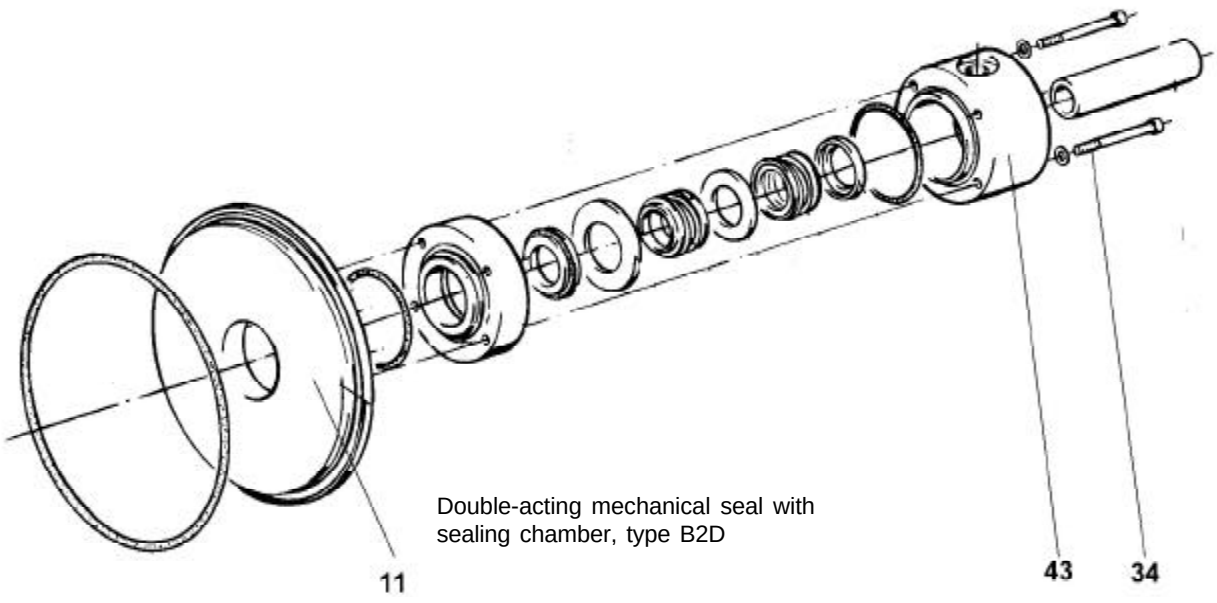
Version MB 15 - 85
Inner, single-acting mechanical seal type B2I



Chemical Motor Pump Unit MB



Single-acting mechanical seal with quenching chamber, type B2Q



Double-acting mechanical seal with sealing chamber, type B2D

5. Troubleshooting

In the event of any faults that occur the following overview may be treated as instructions on how to determine their possible causes.

If faults occur that are not mentioned here, or if they cannot be traced back to the causes listed and remedied, consult the supplier.

Fault	Cause	Remedy
Pump not pumping	Motor rotating in wrong direction	Exchange 2 mains leads
	Pump primes in air	Check suction pipe, foot valve and mechanical seal for leakage
	Pump not adequately filled	Fill pump to pressure connection
	Suction pipe contains air pockets	Lay the piping to that air can escape
	Existing back-pressure higher than maximum pump pressure	Use a larger pump
Pump discharge insufficient	Stop valve in suction and pressure pipe not fully open	Fully open the stop valve
	Piping or impeller blocked	Clean piping and the impeller
	Geodetic head too large	Use a larger pump
	Piping resistance greater than assumed	Lay pipes with larger cross-section or use a larger pump.
	Suction head too high (formation of steam in the pump, cavitation)	Clean suction strainer, foot valve and suction pipe, enlarge cross-section, or mount pump at a lower position.
	Viscosity of the pumped medium higher than assumed	Dilute or preheat (to observe max. operating temp.)
	Priming of air	Check suction pipe and mechanical seal for leakage Seal suction pipe, replace seal
Pump discharge too high	The head in the installation in lower than that of the pump	Throttle the stop valve on the pressure side Possibly install a smaller pump
Motor overloaded	Pump pumping too much	See above "Pump discharge too high"
	Solids in the pump	Open the pump and clean it
	Impeller fouling casing;Causes: - Impeller not fixesd tight enough - Impeller deformed by excessive-temperature	- Examine impeller fixing and tighten up if necessary - Replace impeller and eliminate reason for excess temperature
	Pump distorted	Connect piping free from stress
	Density or viscosity of medium too high	Check discharge data, fit a larger motor
Unsteady or noisy running	Pump discharge too high	See under "Pump discharge too high"
	Suction head too high	See under "Pump discharge insufficient"
	Cross section of suction pipe too small	Enlarge cross-section of suction pipe
	Stop valve on suction side throttled too severely	Open stop valve
	Motor bearing damaged	Examine bearing, renew if necessary
Shaft seal (mechanical seal) dripping	Mechanical seal worn	Install a new mechanical seal
	Mechanical seal unsuitable for the medium handled	Consult the supplier - install the appropiate mechanical seal
Pump dripping from casing	Piping does not fit into the pipe connections	Adjust the piping to match
	Sealing material unsuitable	Use correct sealing material
	Spiral casing leaking	Tighten up connections and fixing screws Examine O-ring and replace if neccessary