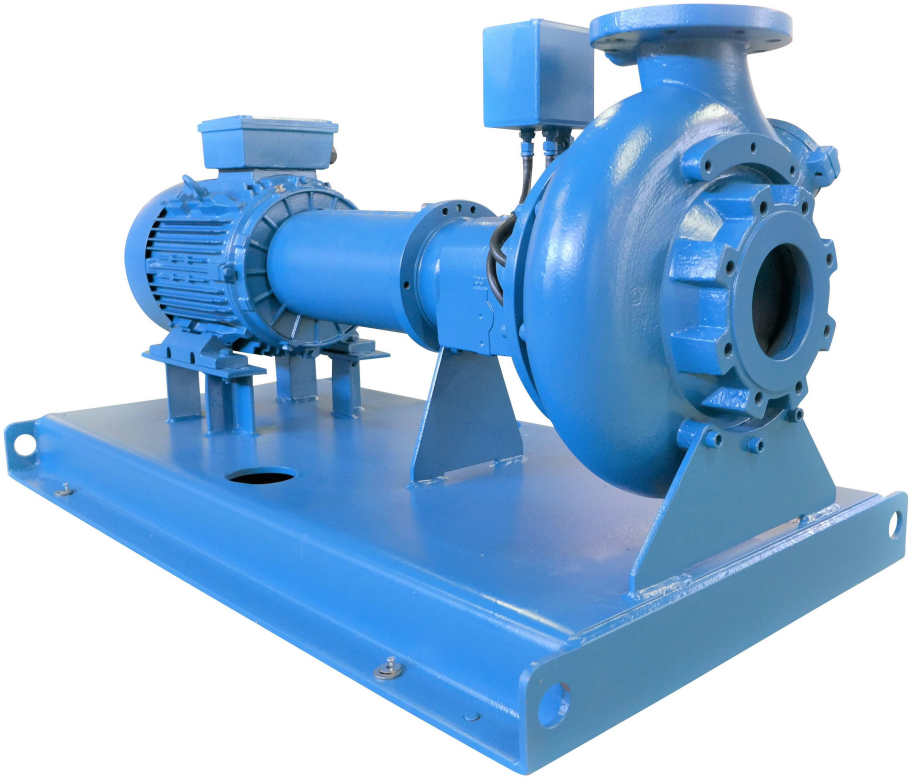
Operation & Maintenance Manual



Dry installed pump type BTP

Contents:

1 FOREWORD:

Congratulations on choosing a BTP pump, which will undoubtedly serve you both reliably and economically for a long time, providing you follow the Maintenance Instructions given in this manual.
Proper use and maintenance will prolong the operational life of your pump.
This manual contains different warnings and safety precautions.

Read this manual properly, so dangerous situations, physical injury or damage can be avoided.

The BTP-pump is designed for professional use only. Service and maintenance may only be executed by authorized staff, after reading this manual.

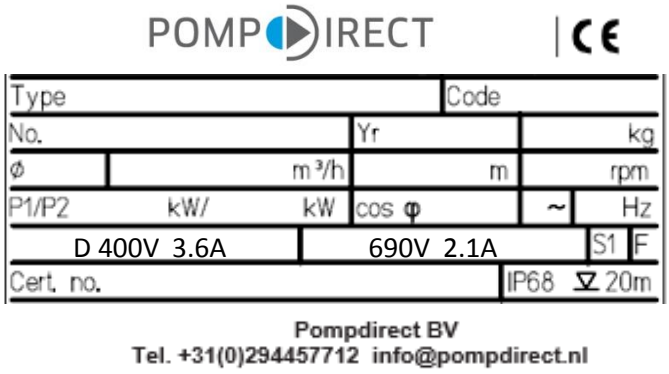
When ordering spare parts, always quote.

1. Pump type
2. Pump code
3. Serial number
4. Work order number

The main characteristics of the pump are given on the data-plate.

The front page of this book reveals, if applicable, a label containing all relevant information.

PUMP IDENTIFICATION



Data plate BTP

Basic version

Legenda:

Type	=	**Pump type**	**m3/h**	=	**Capacity in duty point**	**~**	=	**Number of phases**
Code	=	**Product code**	**m**	=	**Head in duty point**	**Hz**	=	**Frequency**
No.	=	**Serial number**	**rpm**	=	**Speed**	**Y of D**	=	**Connection (star or delta)**
Yr	=	**Year of production**	**P1**	=	**Rated electrical power**	**V**	=	**Voltage**
kg	=	**Weight [kg]**	**P2**	=	**Shaft power**	**A**	=	**Max. current**
Ø	=	**Impeller diameter**	**cos phi**	=	**Power factor**	**Cert. no.**	=	**For ATEX pumps only**

2. SAFETY AND ENVIRONMENT:

2.1 General safety instructions

- Only trained and authorized staff may install, and maintain the pump after carefully reading this manual.

- Only use the pump for its intended purpose and under the regulated circumstances.

- Don't go near rotating parts.

- Clean the pump before maintenance and inspection.

- Observe the local regulations when working with aggressive, corrosive, toxic, flammable and explosive chemicals.

- Never remove safety signs, keep them clean.

- Always connect to a grounded circuit.

- Before maintenance and inspection always disconnect the pump from the mains.

- Use a proper hoist for lifting and handling the pump.

- Never drop the loose cable end in water.

2.2 Environment

Parts which will be replaced during repair, maintenance or renewal, could contain materials which could be harmful to the environment.
Please be also aware that some of the components can be very useful for reuse.
The owner is responsible for careful disposal and processing of the materials.
Do this in according to the local environmental regulations.

2.3 Applied Symbols:

In this manual:


General warning
Danger!


Warning
Electrical hazard


Warning, agressive, corrosive, toxic, flammable and explosive chemicals


Warning
rotating parts


Warning
No public access


Warning
Safety sign


Attention !
Inportant for correct use


Environment
Advice


Important advice


Information referral


Safety shoe/boots and safety gloves
Recommended

On the pump:


Warning
Electrical hazard


Warning
rotating parts


EC-conformity symbol

3. TECHNICAL DATA:

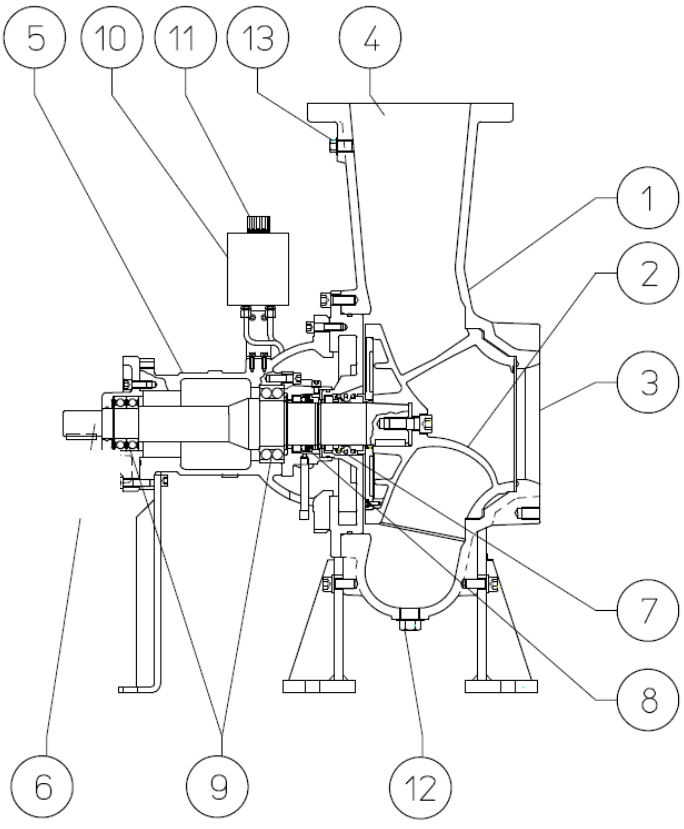
3.1 General:

The BTP pump is cast iron closed spiral vane impeller pump, designed to pump sewage and other solids containing waste water with low energy consumption.
The impeller is designed in such a way that fibrous materials will not hook onto the edge but slide along towards the impeller passage.

3.2 Construction:

- Two independent shaft seals, running in oil.
- Heavy duty bearings, greased for life.
- closed spiral vane impeller for low energy consumption.
- Vanes at the backside prevent solids entering the seal area and reducing the pressure on the seal.

3.3 Main parts:



BTP with bearing unit

1	Pump casing
2	Impeller
3	Suction
4	Delivery
5	Bearing housing
6	Pump shaft
7	Seal pump side
8	Seal motor side
9	Bearings
10	Oil tank
11	Plug with gauge rod
12	Drain plug
13	Connection pressure gauge

3.4 Sound level:

Depending on duty point and speed, the pump will produce a certain sound level.
Next to this the piping system may produce some noise and vibration.
By altering the pipe support and using rubber compensators the vibration will be reduced.

In the next table the sound levels of the BTP pumps are shown.

Sound levels BTP pumps		
Type	Speed [rpm]	Sound level [dB]
BTP62-40	960/1450	<70
BTP62-50	960/1450	<70

4. CHECK POINTS BEFORE INSTALLATION:

After unpacking the pump, follow out the following check points:

4.1 Delivery-check:

Check for possible transport damage.
Check for complete delivery.

When the delivery is incomplete or damaged, please contact your dealer immediately.

4.2 Oil level:

Check the oil level in the oil tank.
The oil plug has a gauge rod and the level should be between the two indications.

4.3 Power supply:

Before making the electrical connections, check if the line voltage and frequency are the same as on the pump data-plate.
If thermostats are supplied make sure that they are correctly connected.
For examples of electrical diagrams and pump cable coding, see appendix 1 and 2.

4.4 Motor protection:

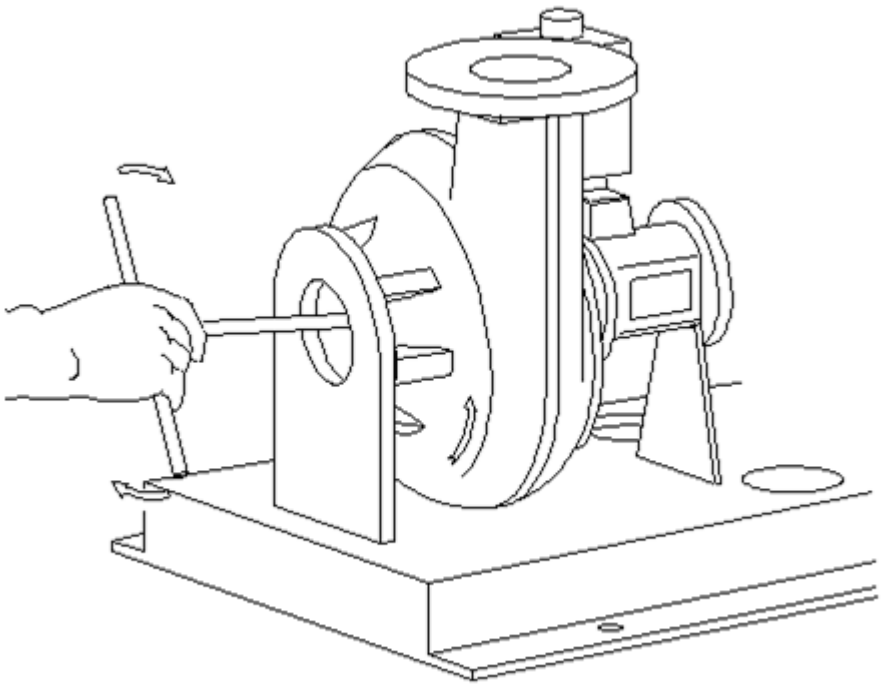
The pump should always be connected to the line by means of a suitable motor protection circuit breaker.
If the pump is started direct on line (DOL), the protection breaker should be set to the current, as given on the data-plate.
For star delta start (YD), it is preferable to install the over current relay directly after the main contactor. In this case, the pump is also adequately protected in star-connection.
The maximum setting of the over current relay is 0.6 x the current as given on the data plate.
It is preferable also to set the protection breaker at a 10% lower current, because all breakers require at least 110% of the adjusted current before tripping.

4.5 Motor check:

If you in doubt about the condition of the motor, “Megger” test motor windings against grounding wire.
The value should be at least 1 M-Ohm.

4.6 Pump seals:

Turn the impeller clockwise by hand, using a proper socket wrench.
Following this procedure sticking mechanical seal surfaces will be loosened smoothly.



4.7 Installation:

Check if all components for your installation are delivered. See also chapter 6.

5. FIRST PUMP START:

5.1 Direction of rotation:

A correct direction of rotation is essential for proper operation.

Check the direction of rotation with the arrow on the pump-casing.

This can be done by observing the direction of rotation of the motor or coupling.

5.2 Current-check:

The current must be checked during normal operation.
Apply an ammeter to one of the phase wires and check if the current is not higher than the value stated on the motor data-plate. If this is the case, check for:

- low voltage ?
- Specific gravity or viscosity too high ?
- blocked volute ?
- direction of rotation correct ?

If the problem cannot be solved contact your dealer or the manufacturer service department .

5.3 Start frequency:

When the pump is controlled by level regulation, the on and off levels should be adjusted in such a way that the pump does not make more than 20 starts per hour.

6. INSTALLATION OPTIONS:

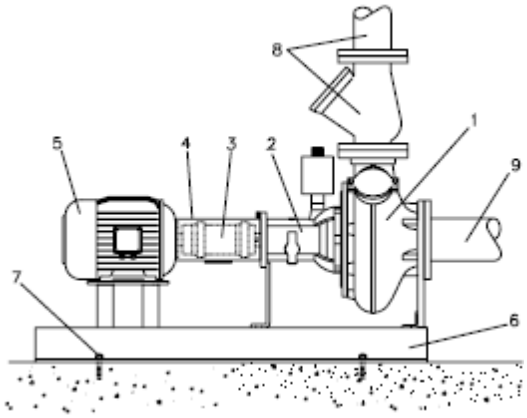
6.1 General:

For the BTP pumps the following installations are possible:

- Installation -H Horizontal, on base plate
- Installation -V Vertical, on support
- Installation -K V-belt driven

6.2 Installation - H:

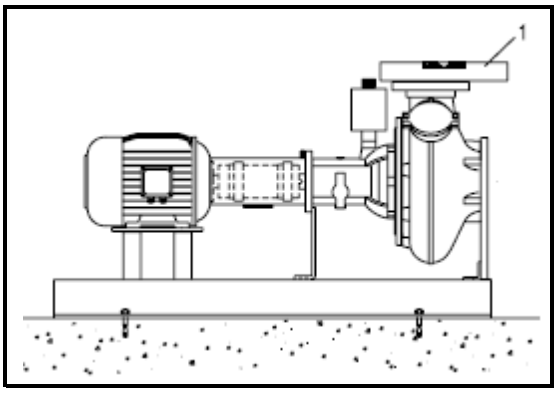
Horizontal installation on base plate.



The main parts are:

1. pump unit;
2. bearing unit;
3. flexible spacer coupling;
4. protection hood
5. electric motor;
6. base plate;
7. fixing bolts;
8. delivery pipe;
9. suction pipe;

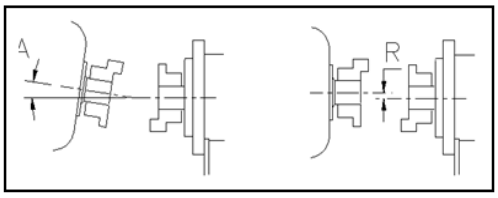
Checkpoints before operation:



- Fixation of the base-plate to the floor.
- Flanges straight horizontal and vertical see fig. pos 1.
- Pump and motor shaft aligned, see 6.2.1.
- Maximum flange forces and moments, see 6.5.
- Adjust start and stop levels in such a way that the pump does not make more than 20 starts per hour.

6.2.1 Alignment of pump and motor shaft:

After the base-plate is fixed to the floor, the alignment of pump and motor-shaft must be checked. When the base-plate is fixed to the floor, forces on the base-plate might have disturbed the alignment .

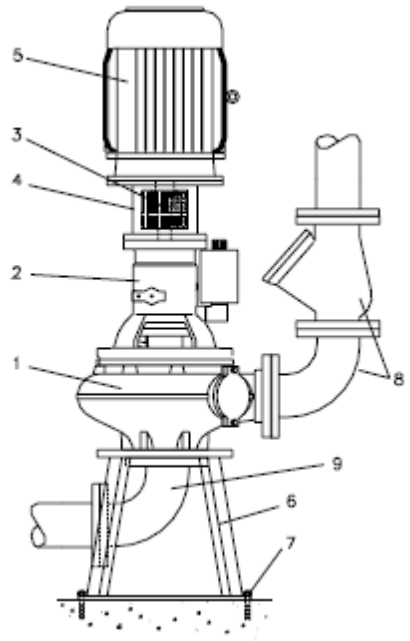


- Remove the protection hood, (pos 4).
- Check for:
  - 1 radial deflection (R) max. 0.4mm.
  - 2 angular deflection (A) max. 1°

To improve the alignment, use skims underneath the motor and pump fixing bolts. Re-install the protection hood in the original position.

6.3 Installation -V:

Vertical installation on support.



The main parts are:

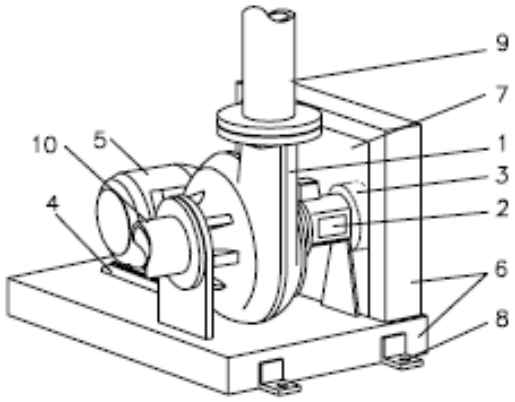
1. pump unit;
2. bearing unit;
3. flexible coupling;
4. motor support;
5. electric motor;
6. pump support;
7. fixing bolts;
8. delivery pipe;
9. suction pipe;

Check points before operation:

- Fixation of the base-plate to the floor, (pos. 7).
- Flanges straight horizontal and vertical
- Maximum flange forces and moments, see chapter 6.5.
- Adjust start and stop levels in such a way that the pump does not make more than 20 starts per hour.

6.4 Installation –K:

V-belt driven with motor and frame.



The main parts are:

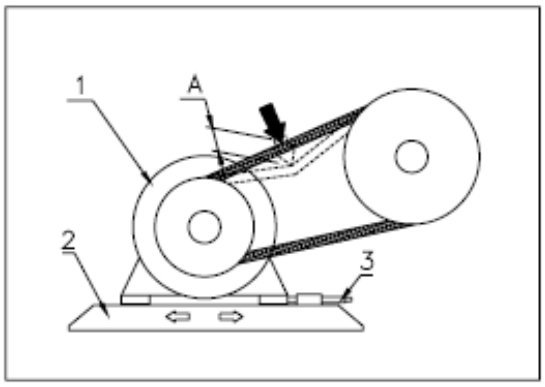
1. pump unit;
2. bearing unit;
3. pulleys;
4. tensioner;
5. electric motor;
6. frame;
7. protection plate;
8. fixing bolts ;
9. delivery pipe;
10. suction pipe;

Checkpoints before operation:

- Fixation of the base-plate to the floor, (pos. 8).
- Flanges straight horizontal and vertical
- Maximum flange forces and moments, see chapter 6.5.
- Adjust start and stop levels in such a way that the pump does not make more than 20 starts per hour.
- Correct tension of the V-belts. see .6.4.1

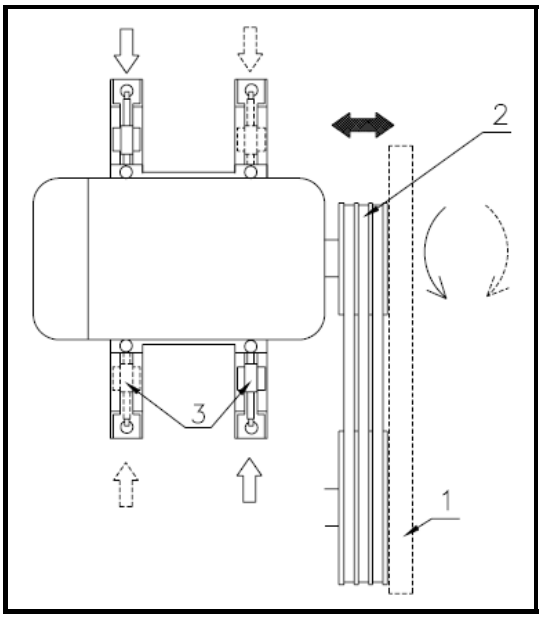
6.4.1 Tension of the V-belts:

Check the correct tension of the V-belts as follows:.



- Remove one of the protection plates.
- Put a force of 75N on one of the V-belts in the middle of the 2 pulleys, see fig.
- The pressing-in (A) must be about 1 cm .
- Is the value to small (tension too high), move the electric motor (1) towards the pump.
- Is the value too high (tension too low), move the electric motor away from the pump.
- The difference between the three belts may not be more than 0.5 cm.
- In that case renew all three V-belts.
- To move the electromotor, use the tensioning rail (2)
- Place both tensioners (3) underneath the motor.
- Loosen the motor fixing bolts a bit, and screw-in the tensioners (taut) or screw-out (slack), until the correct tension is reached.
- Retention the fixing bolts of the motor, and Re-check the tension again.

Check afterwards if both pulleys are still aligned (see fig).

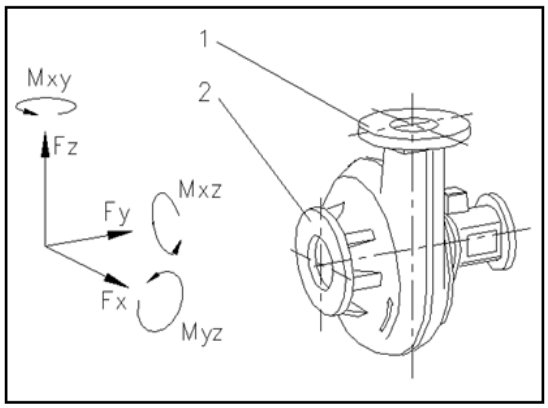


- Use a ruler (1) to align the pulleys.
- If necessary the motor pulley can be moved on the shaft.
- Loosen the 3 cup screws from the hub and push the pulley towards the motor to set it free from the shaft.
- Move the pulley to the right position and fasten the cup screws.
- Check the alignment again and repeat until the right position is achieved.
- When the motor-shaft is not parallel to the pump shaft, the motor can be rotated as shown Loosen the motor fixing bolts and use the tensioners (3) to rotate the motor. If necessary, one of the tensioners can be placed into the rail at the other side of the motor.
- Check the correct tension of the V-belts!
- Replace the protection plate.

The pump is now ready to use.

6.5 Maximum flange forces and moments:

Because of the pipeline system, specific forces on the discharge and suction flanges will occur.



1. Forces Fx, Fy and Fz
2. Moments Mxy, Mxz and Myz

The forces and moments may not exceed the values stated in the table below:

Pump type	Fx [N]	Fy [N]	Fz [N]	Mxy [Nm]	Mxz [Nm]	Myz [Nm]
BTP62-40	1400	1400	3000	1200	1200	1300
BTP62-50	1400	1400	3000	1200	1200	1300

7. MAINTENANCE

7.1 General:

Always disconnect the pump from the mains before inspection or disassembly.

Clean the pump thoroughly.

7.2 Maintenance schedule

- After the first 100 running hours:
- Check the oil (see chapter 7.4).
- If there is more than a few drops of water in it, contact your dealer.

- Every 6 months or 1000 running hours:
- Check the oil (see chapter 7.4).
- If there are more than a few cm^3 water in it, contact your dealer.

- Refresh the oil every year or when it is no longer transparent. (see chapter 7.5)

7.3 Lubricants:

- The bearings are greased for life and needs no refill.
- The oil reservoir is filled with Shell Tellus 32 or an equivalent.
  Viscosity: 32 cSt.
  When another kind of oil is used this is marked on a label on the pump.

7.4 Oil level:

Check the oil level in the oil tank.
The oil plug has a gauge rod and the level should be between the two marks.

7.5 Oil change:

Collection, storage and removal of the oil should be executed according to the regulations of the local authorities.

Always use the right kind of oil!

To drain the oil, remove one of the oil pipes, or use the drain pipe.

We advise to flush the system with fresh oil, before filling it up.

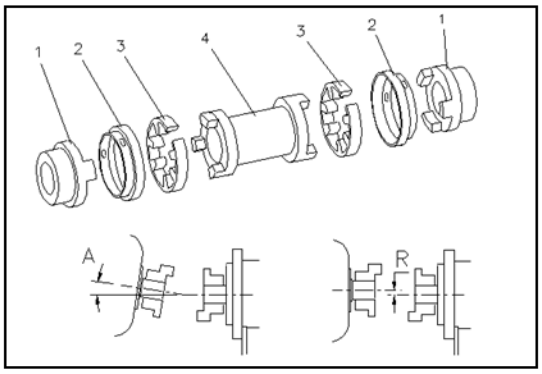
7.6 Flexible coupling:

Between motor and pump a flexible coupling is used to absorb vibrations and misalignment.

Also the dismounting of the bearing housing or motor will become easy.
(Not applicable for version -K).
For maintenance and renewal of elastomers version -H, see 7.6.1 and 7.6.2.
For version -V see 7.6.3 and 7.6.4

When working on the pump make sure it cannot start unexpectedly !

7.6.1 Flexible coupling installation -H:



- To check the coupling remove the protecting hood.
- Check if the spacer (4) has not too much clearance with regard to the flanges (1).
- Remove the rings (2) and check the elastomers for wear.
- Renew if necessary.
- Check the metal parts (1) and (4) for wear and renew if necessary (see 7.6.2).
- Check the alignment of motor- and pump shaft by using a ruler at the two flanges.
- Measure at several points.

Check for:

1. Radial deflection (R) max. 0.4mm.
2. Angular deflection (A) max. 1° See fig.

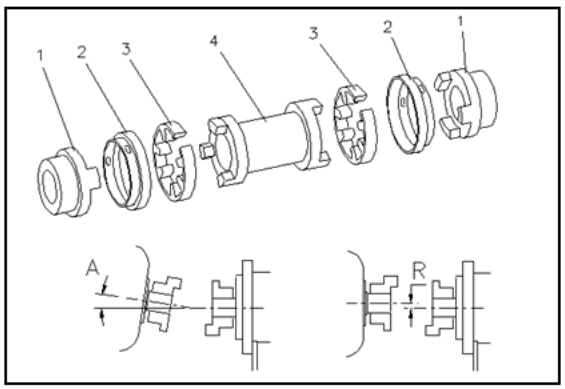
To correct the alignment, use skims underneath the motor and pump fixing bolts.

Re-install the spacer, elastomers, rings and protecting hood.

The pump is now ready to use.

7.6.2 Renewal of the coupling -H:

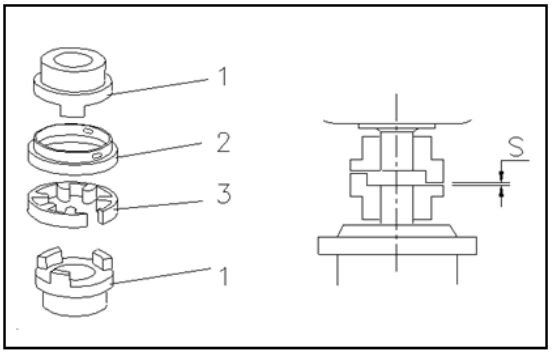
If necessary the coupling can be renewed as follows:



- Remove the rings (2) and elastomers (3).
- Remove the spacer (4).
- Loosen the cup screws from the flanges (1) and pull the flanges from the shaft with a proper tool.
- Heat-up the new flanges and put them on the shafts.
- The distance between the flanges must be about 5mm more than the length of the spacer (4).
- Fasten the cup screws from the flanges.
- Check the alignment of motor- and pump shaft (see 7.6.1)
- Place the new spacer, elastomers and rings.
- Replace the protecting hood.

The pump is now ready to use.

7.6.3 Flexible coupling installation -V:

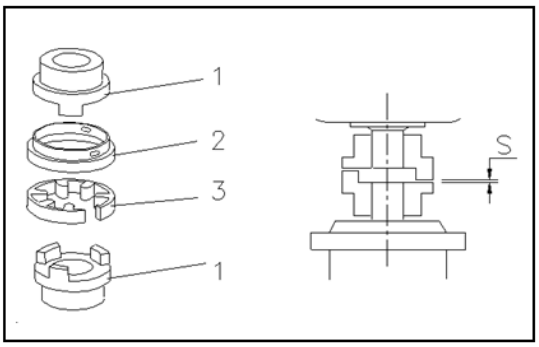


- To be able to check the coupling remove the protecting hoods from the motor support.
- Check if the coupling has not too much clearance with regard to the flanges (1).
- Remove the screws from the ring (2) and lift it.
- Remove the elastomer (3) and check for wear.
- Renew when necessary.
- Check the flanges for wear.
- Check if the distance between the flanges (S) is between 2 and 4 mm.
- Replace elastomer, ring and protecting hoods.

The pump is now ready to use.

7.6.4 Renewal of the coupling -V:

If necessary the coupling can be renewed as follows:



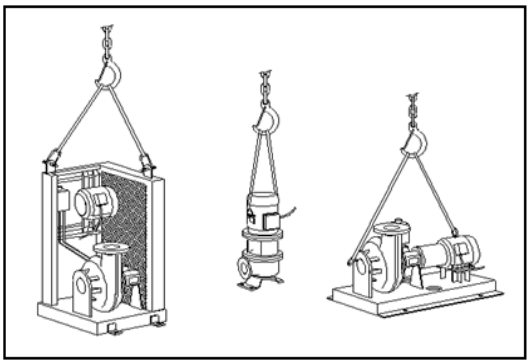
- Remove the protecting hoods from the motor support and remove the screws from the ring (2) and lift it.
- Remove the elastomer (3).
- Remove the motor fixing bolts and lift the motor.
- Loosen the cup screws from the flanges (1) and pull the flanges from the shaft with a proper tool.
- Heat-up the new flanges and put them on the shafts at the same position as the old ones.
- Fasten the cup screws from the flanges and replace the motor.
- Don’t forget to place the ring (2) !
- Check if the distance between the flanges is between 2 and 4 mm.
- Place the new elastomer.
- Replace ring and protecting hoods.

The pump is now ready to use.

8. TRANSPORT AND STORAGE:

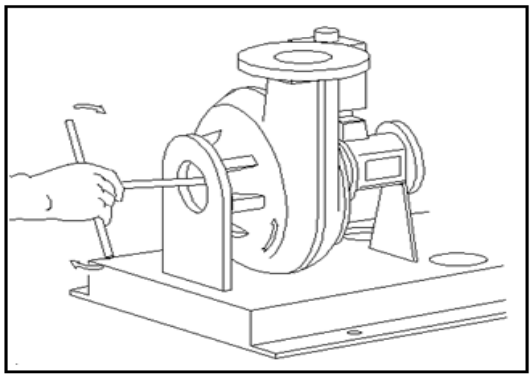
Always use a proper hoisting tool for lifting the pump.
Use the lifting eyes as shown in fig.9.1

To avoid oil spill, the pump must be transported and stored in the same position as the installation. Or a sealing plug should be used for the oil tank.



In case of long storage, the pump must be protected against moisture and heat.

Before storing the pump clean it with a water jet.

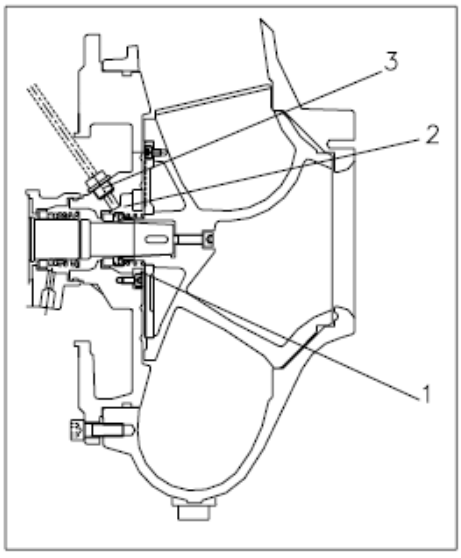


On a regular base (every three months), turn the impeller by hand, this is necessary to prevent sticking of the mechanical seal surfaces.

After 6 months of storage, a general inspection is advised, before installing the pump.

9. OPTIONS:

9.1 Seal flushing:



- Optional, the pump can be delivered with a seal flushing connection.
- A ring , pos. 1, is mounted in the seal housing, with a small fitting around the impeller hub or sealing parts.
- The flushing water inlet is connected to pos. 3.
- The flushing water keeps the sealing room pos.2 behind the impeller free from the pumped liquid.

- We advise to use an electromagnetic valve and a flow indicator in the flushing system so to be sure to have flushing water during pump operation.

The needed flushing pressure must be at least 2/3 of the pump pressure.

10. TROUBLE SHOOTING:


When working on the motor, make sure that the power is switched off.


Only qualified electricians may do the electrical work.


When working on the pump make sure it cannot start unexpectedly!


When starting the pump ensure nobody goes near rotating parts.

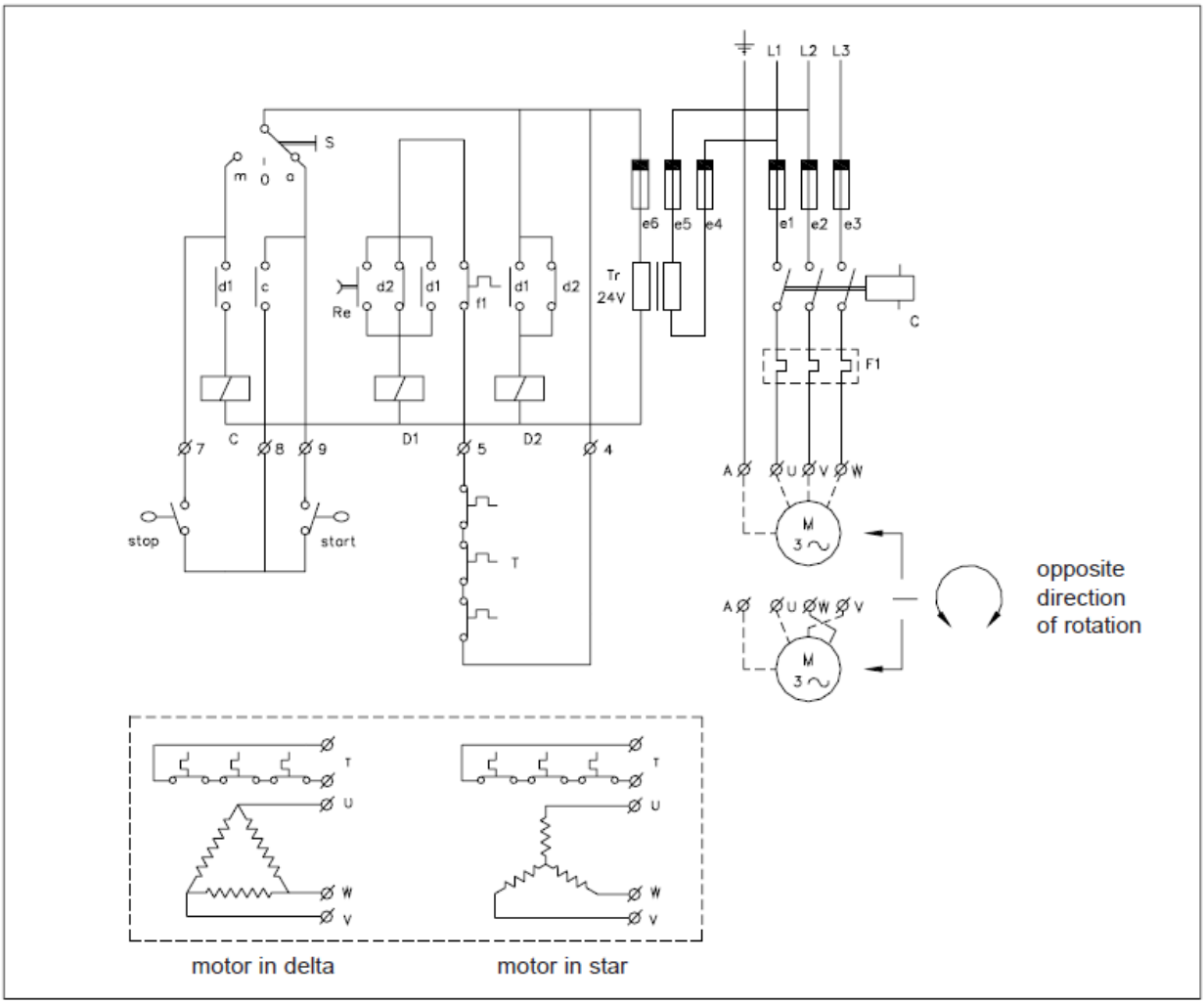

Observe the general safety instructions for opreation and maintenance and observe the local electrical and safety regulations!

Problem:	Possible cause:	Required action:	Checkpoints:
Pump does not start	No voltage on motor terminals	Check power supply	* Main power * Main isolator switch * Fuses * Main power protection relay
		Check motor protection	* Earth leakage relay * Motor protection relay * Motor temperature * Water in oil detector
		Check starts-and stop signals	* Too low waste water level * Obstructed level switches * Switches interchanged * Control panel
	Motor failure	Check motor wiring	* Phase resistance
	Impeller blocked	Check pump or impeller	* Impeller or volute blocked * Worn or broken impeller
Pump does not stop	No stop signal	Check level regulation	* Float switches * Control panel
	Wrong start and stop level	Check level regulation	* Obstructed level switches * Adjust start and stop level * Power supply not stable
Pump starts and stops repeated	Fault in power supply	Check power supply	* Low voltage * Not all 3 phases available * Setting of motor protection
	Fault in level regulation	Check level regulation	* Control panel * Float switches * Obstructed level switches
	Motor overloaded	Check cooling motor/pump	* Wrong direction of rotation * Impeller or volute blocked * Protection in automatic reset mode
Current too high	Fault in power supply	Check power supply	* Low voltage
	Pump failure	Check pump or impeller	* Impeller or volute blocked * Viscosity or spec. gravity too high
Pump runs but no flow or too low flow	Clogging or air lock	Check discharge	* Discharge obstructed * Valve fully or partly closed * Air pocket in pump or discharge
	Pump failure	Check pump	* Impeller or volute blocked * Pump is sucking too much air * Worn or broken impeller
	Fault in power supply	Check power supply	* Control panel * Fuses * Low voltage
	Too low capacity	Check discharge	* Discharge obstructed * Valve fully or partly closed * Air pocket in pump or discharge
High level alarm	Pump failure	Check pump	* Impeller or volute blocked * Pump is sucking too much air * Worn or broken impeller * Worn or broken bearings
	Fault in power supply	Check power supply	* Fuses * Control panel
	Motor failure	Check motor	* Continuity and isolation
			*** = If Applicable**


If the pump stil does not start, consult Technical expert:

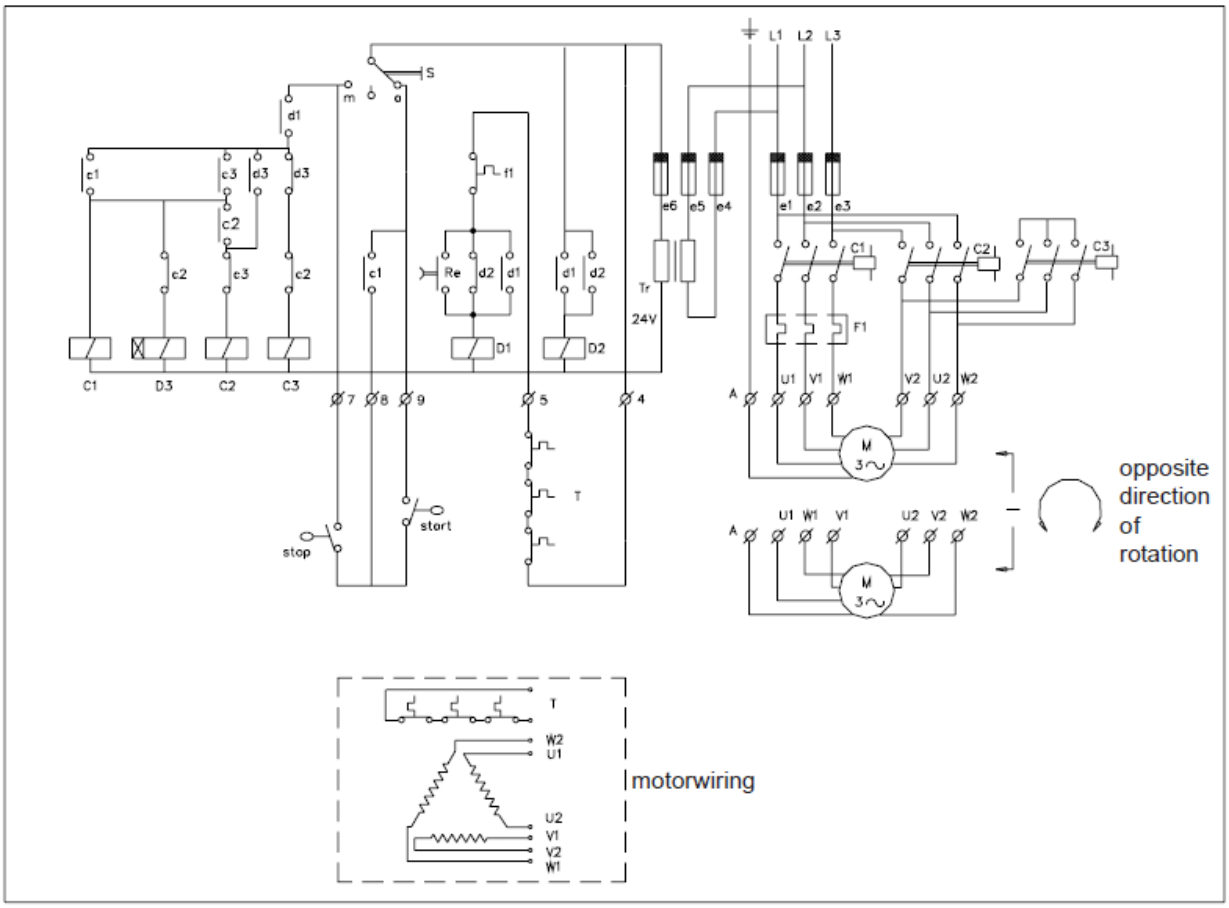
POMPDIRECT

APPENDIX 1; Example of a direct-on-line connection diagram:



CODING	
e1, e2, e3	Line fuses
e4, e5	Fuses, primary control-circuit
e6	Fuses, secondary control-circuit
C	Maincontactor
F1	Motor protection circuit breaker with manual reset
D1	Auxiliary relay for motor protection
D2	Auxiliary relay for power failure
Tr	Transformer
S	Manual-off -auto selector switch
Start	Level switch pump start
Stop	Level switch pump stop
Re	Reset push button
M	Pump motor
T	Thermostats (if fitted)

APPENDIX 2; Example of a star-delta connection diagram:



CODING	
e1, e2, e3	Line fuses
e4, e5	Fuses, primary control-circuit
e6	Fuses, secondary control-circuit
F1	Motor protection circuit breaker with manual reset
C	Maincontactor
D1	Relay delta connection
D2	Relay star connection
Tr	Transformer
S	Manual-off-auto selector switch
Start	Level switch pump start
Stop	Level switch pump stop
Re	Reset push button
M	Pump motor
T	Thermostats (if fitted)

Notes: