Operation & Maintenance Manual

Dry installed cutter pump type BSP

Contents:

1. FOREWORD:

This manual includes several warnings, installation guidelines and safety instructions.
Before installation, please read carefully to avoid dangerous situations, which can lead to severe physical injury, and which could also damage the pump.
The BSP22 cutter pump is typically designed to pump small quantities of waste water with high heads. Large solids are cut into small particles by triple blade rotating over a cutter plate.
The pump is equipped with a heavy duty epoxy coating for long operational use.

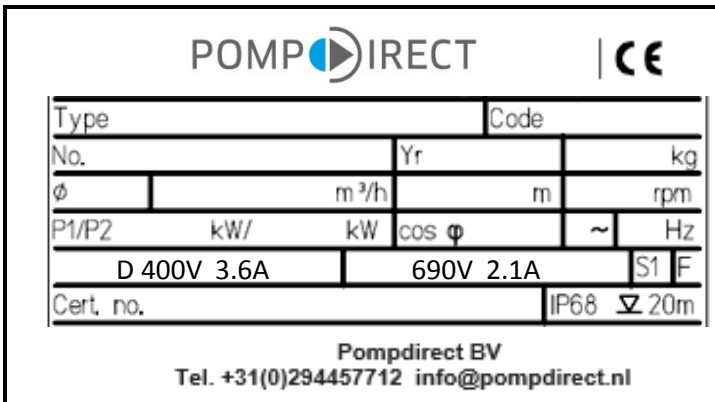
The BSP pumps are designed for professional use only.
Only trained and skilled personnel may install, maintain and operate the pump.

When ordering spare parts, always quote.

1. Pump type
2. Pump code
3. Serial number

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

2. PUMP IDENTIFICATION:



Data plate BSP

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**

3. SAFETY AND ENVIRONMENT:

3.1 General safety instructions before installation or maintenance:

- 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.






3.2 Environment

Parts which are replaced during repair, maintenance or renewal, could contain materials which could be harmful to the environment. Please take care regarding the disposal of these parts. Please execute this in accordance with the local environmental regulations.

3.3 Applied Symbols:

In this manual:


General warning
Danger!


Warning
Electrical hazard


Warning, aggressive, 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

4. TECHNICAL DATA:

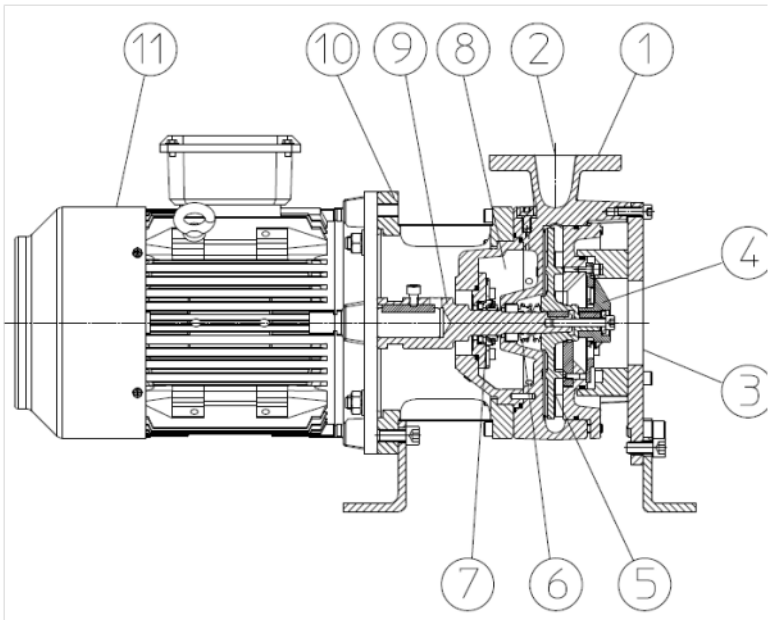
4.1 General:

The BSP pump is cast iron cutter pump, designed to pump small quantities of waste water with high heads. Large solids are cut into small particles. A knife is rotating over a cutter plate making scissors movements.

4.2 Construction:

- Two independent shaft seals, running in oil.
- Heavy duty bearings, greased for life.
- The hardened cutting mechanism cuts long fibrous materials into small parts.
- Vanes at the backside prevent solids entering the seal area and reducing the pressure on the seal.

4.3 Main parts:



BSP-HS short coupled version

1	Pump casing
2	Discharge
3	Suction
4	Cutter
5	Impeller
6	Shaft seal pump side
7	Shaft seal motor side
8	Oil housing
9	Shaft extension
10	Lantern piece
11	Motor

4.4 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.

The sound level of the BSP22 pump is less than 70 dB(A)

5. CHECK POINTS BEFORE INSTALLATION:

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

5.1 Delivery-check:

Check for possible transport damage.
Check for complete delivery.

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

5.2 Oil level:

Check the oil level, see chapter maintenance.

5.3 Power supply:

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

5.4 Motor protection:

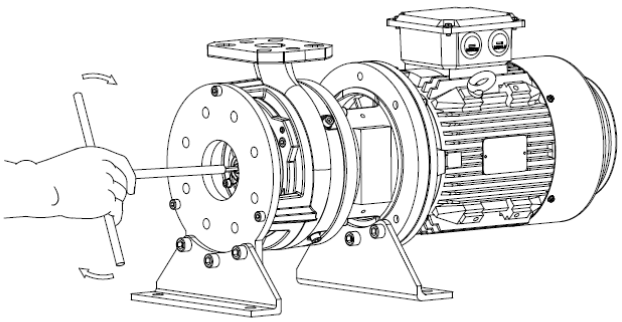
The pump should always be connected to the line by means of a suitable motor protection circuit breaker.
If the pump is started direct on line (DOL), the protection breaker should be set to the current, as given on the data-plate.
For star delta start (YD), it is preferable to install the over current relay directly after the main contact. 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.

5.5 Motor check:

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

5.6 Pump seals:

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



6. FIRST PUMP START:

6.1 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 shaft.

6.2 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.

7. INSTALLATION OPTIONS:

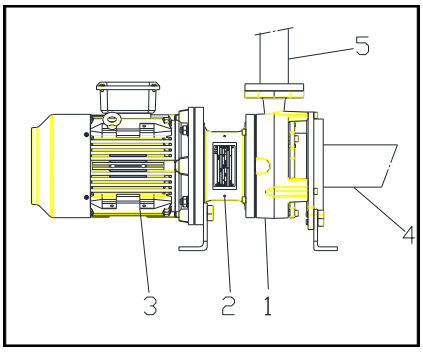
7.1 General:

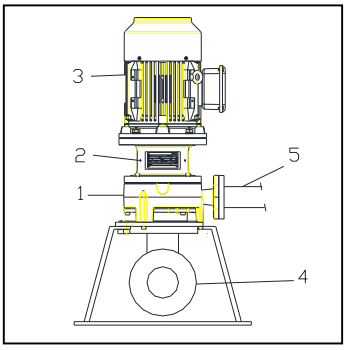
For the BSP pumps the following installations are possible:

- Installation -HS Horizontal, short coupled
- Installation -VS Vertical, short coupled

7.2 Installation –HS and installation –VS:

horizontal (-HS) of vertical (-VS)





main parts:

1 pump unit
2 lantern piece
3 motor
4 suction pipe
5 delivery pipe

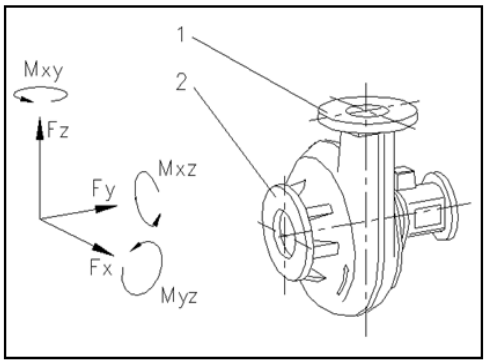
Checkpoints before operation:

- Fixation of the base-plate to the floor.
- Flanges straight horizontal and vertical.
- Maximum flange forces and moments, see 7.3.
- Adjust start and stop levels in such a way that the pump does not make more than 20 starts per hour.

7.3. 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. Torque Mxy, Mxz and Myz



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

Pump type	Fx [N]	Fy [N]	Fz [N]	Mxy [Nm]	Mxz [Nm]	Myz [Nm]
BSP22	1000	1200	900	900	900	1000

8. MAINTENANCE

8.1 General:

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

Clean the pump thoroughly.

8.2 Maintenance schedule

After the first 100 running hours:
- Check the oil and oil level
- If there is more than a few drops of water in it, contact your dealer.

Every 12 months or 1000 running hours:
- Check the oil.
- If there are more than a few cm^3 water in it, contact your dealer.

Refresh the oil when it is no longer clean.

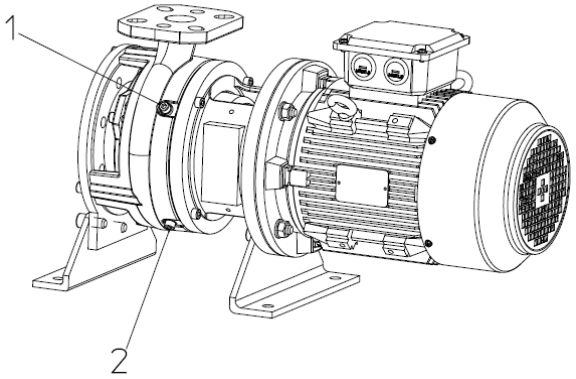
8.3 Lubricants:

- The bearings are greased for life and needs no refill.
- The oil reservoir is filled with Shell Tellus 32.
  Viscosity: 32 cSt.

  When another kind of oil is used this is marked on a label on the pump.

8.4 Oil level check:

Remove the filling plug (1).
The oil level should be at the lower side of the opening.



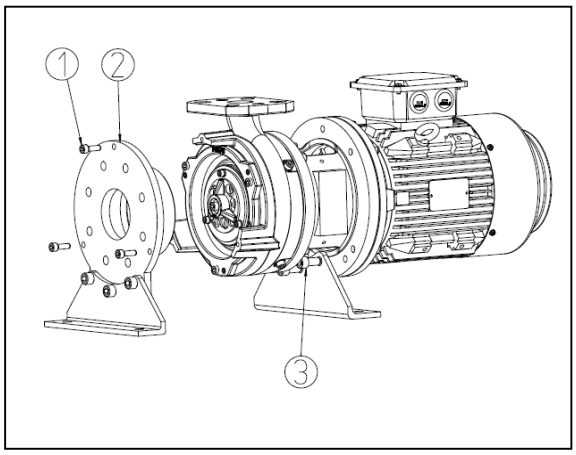
8.5 Oil change:

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 plug (2).
We advise to flush the system with fresh oil, before filling it up.

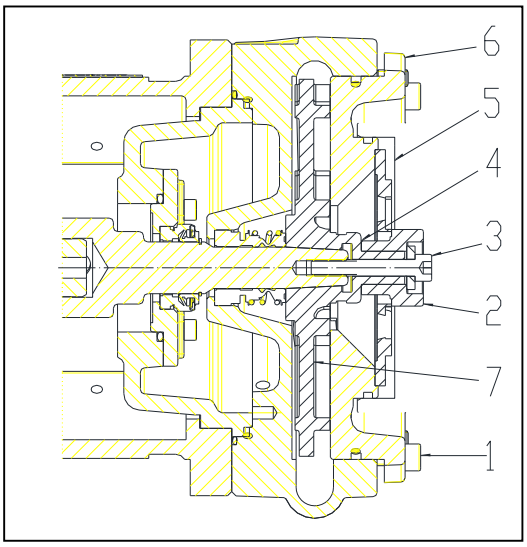
8.6 Adjustment of the cutting mechanism:



The pump is supplied with a correct adjusted cutting mechanism.
If due to wear the clearance between the knife and cutting disc is too large the clearance can be restored by adjusting the suction cover or knife.

Close suction and delivery valves and remove the 3 bolts (1) from the suction flange (2) and the 3 bolts from the motor support (3).

Now the pump can be removed.



The adjustment is realized with shims (4) between knife (2) and impeller (7).
Small corrections can be done by adjusting the suction cover. For this you can use the adjusting screws and bolts (1). The clearance should be about 0.1mm.

If for inspection or renewal suction cover is removed, re-assembling must take place in the next sequence:

1. Fix the impeller, without knife (2), on the shaft with a temporary thrust ring and bolt.
2. Turn back the adjusting screws (1) into the suction cover (6).
3. Put the suction cover with cutting disc (5) in the pump casing, and push it down until it touches the impeller vanes.
4. Fasten the three connecting bolts (1b) by hand and unscrew them half a turn.
5. Fasten the three adjusting screws (1) , to fix the suction cover.
6. Check that the impeller can rotate without much force.
7. Remove the temporary thrust ring and bolt, mount the knife (2) **without key**. Use shims (4) to correct the clearance. The clearance should be about 0.1mm.
8. Remount the knife **with key** and check clearance again.

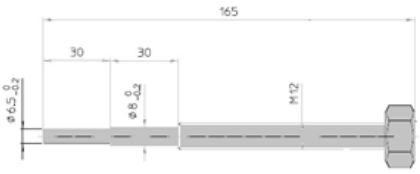
Now the pump is operational again.

When unscrewing or tightening the bolt (3) use a proper tool to block the knife without damaging it.

Take care of sharp edges when removing or mounting the knife!

8.7 Special tool:

Use a hand puller like Bacho 4614-1 with crossed legs to remove the impeller.
Change over the standard central screw with a customized screw
(Available if needed).



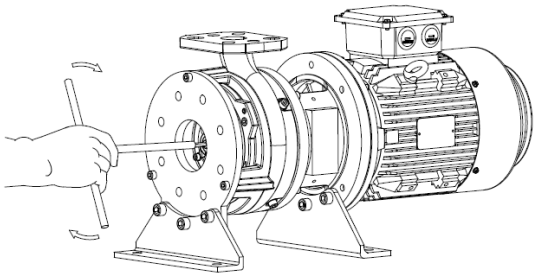
9. TRANSPORT AND STORAGE:

Always use a proper hoisting tool for lifting the pump.

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.

10. TROUBLE SHOOTING:

Make sure the mains are switched off during inspection.

Only trained and authorized people may install and maintain the pump.

Make sure the pump will not start unexpectedly.

Don't go near to rotating parts of the pump

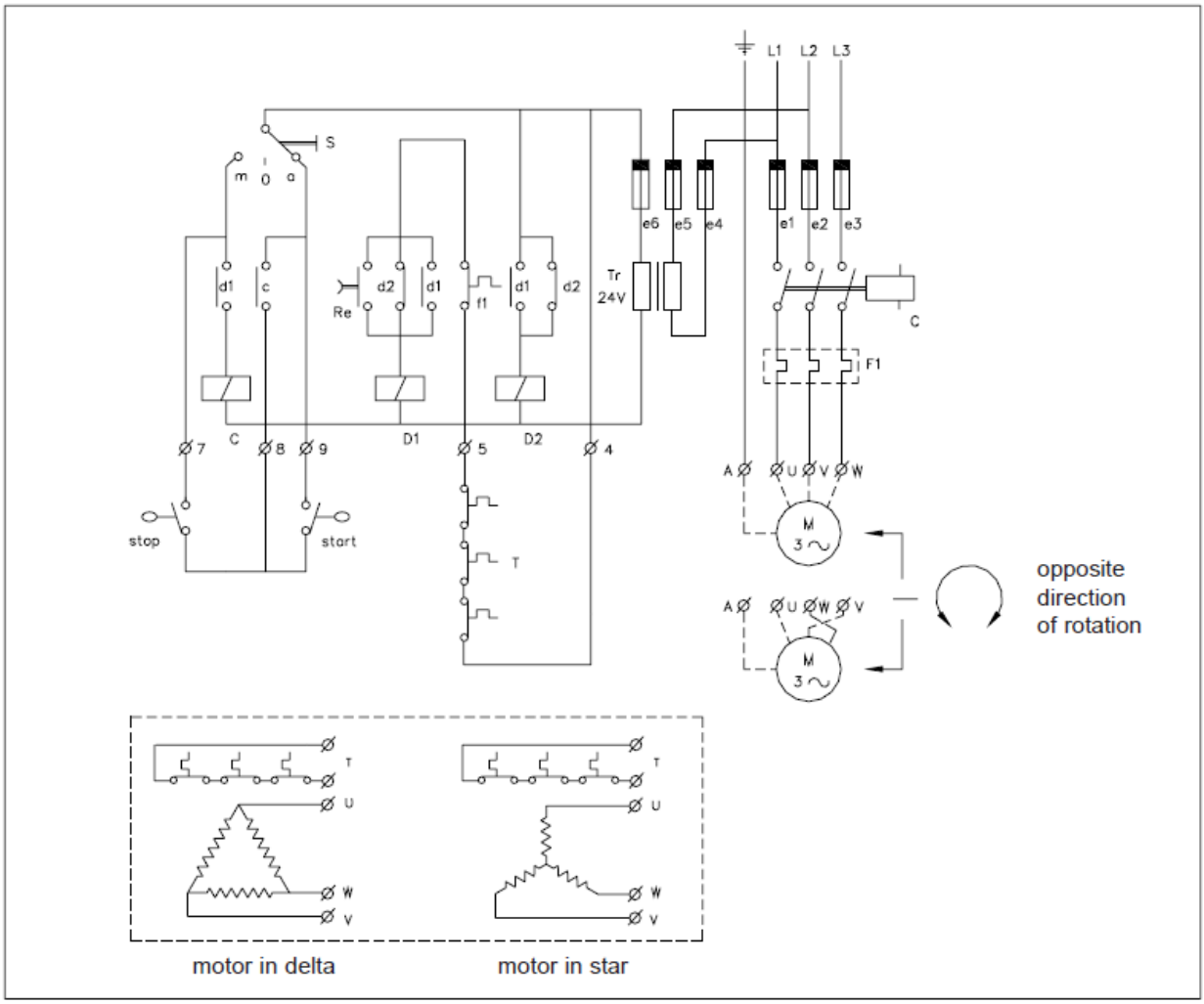
Observe the local regulations for installation, maintenance and repair!

Problem:	Possible cause:	Required action:	Checkpoints:
Pomp does not start	No voltage on the terminals	Check power supply	* main switch * installation switches * all auxiliary switches * voltage relay
		Check motor protection	* earth leakage relay * the auxiliary switches * motor protection relay * water in oil relais
		Check start- and stop signals	* too low level * obstructed level switches * engaged emergency stop * general electrical error
	Wrong pump cable connection	Measure cable wires	* check motor phases
	Blockage impeller	Check pump and/or impeller	* impeller or pump jamming
Pump does not stop	No stop signal	Check level switches	* level switches * general electrical error
	Wrong start / stop signal	Check level switches	* installation switches * level switches * settings level switches
Pump start and stops repeatedly	Fault in power supply	Check power supply	* main switch * installation switches * switch thermal protection
	Level control system not stable	Check level switches	* installation switches * level switches * settings level switches
	Motor overload	Check motor protection	* wrong direction of rotation * impeller blockage * motor protection relay
Motor current too high	Supply failure	Check power supply	* voltage monitoring relay
	Pump failure	Check pump	* impeller blockage * medium specific gravity too high
No flow or too low pump capacity	Jamming or airlock in discharge pipeline	Check discharge pipeline	* wrong direction of rotation * blockage in discharge * valves half open or closed
	Pump failure	Check pump	* pump draws air * impeller blockage * impeller loose or damage
	Fault in power supply	Check power supply	* main switch * installation switches * switch thermal protection
High level alarm	Pump failure	Check pump	* impeller blockage * impeller loose or damage * pump draws air * damaged bearings
	Supply failure	Check power supply	* switch thermal protection * fuses * level switches * settings level switches

If the pump still fails please contact:

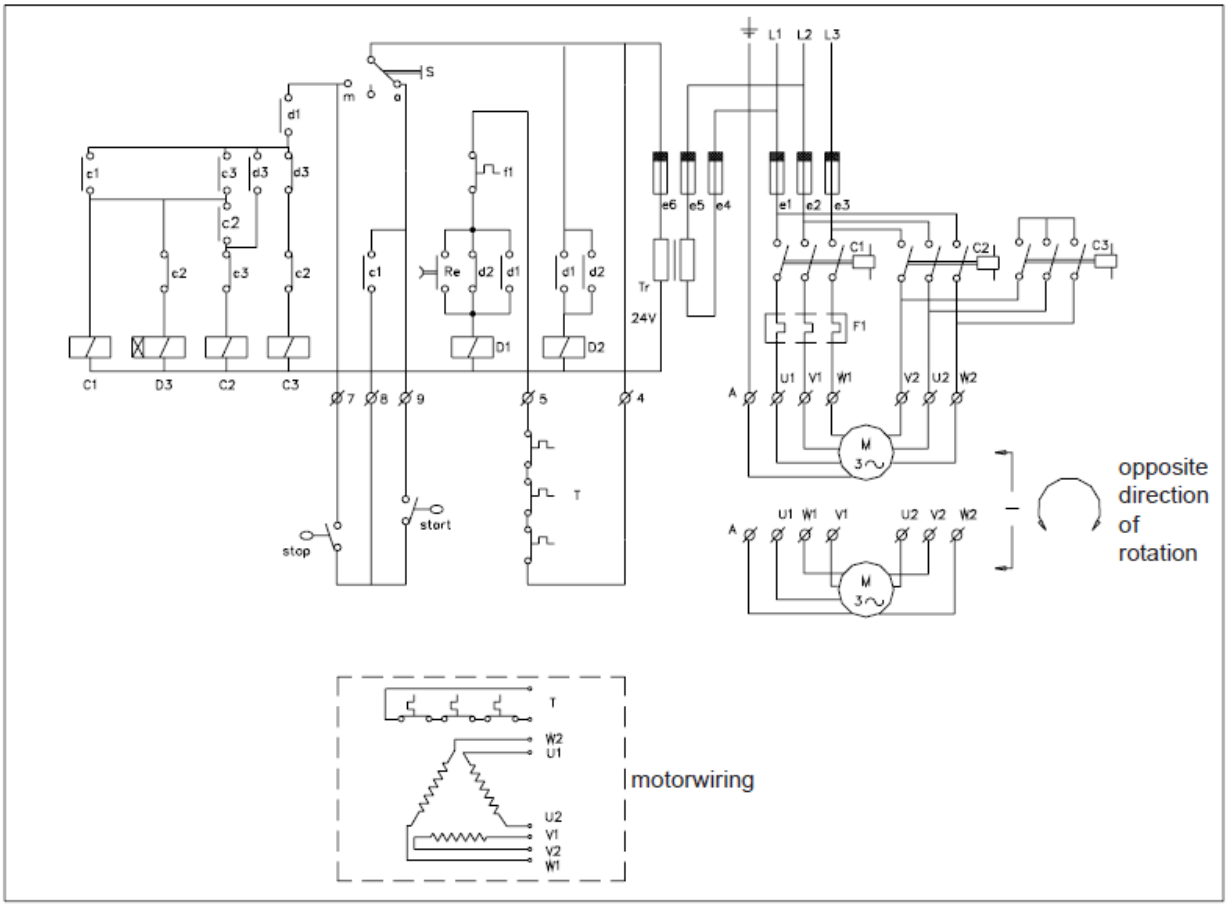
POMPDIRECT

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: