

**BTKF-I**



**SINGLE STAGE  
USER MANUAL**

## SAFETY INSTRUCTIONS



- You should absolutely obey the following safety instructions.

- Never touch the pump and pipes having temperature more than 80 °C. Necessary precautions should be taken for warning users. (E.g Warning signs and signboards )
- Never operate pump in reverse direction.
- Do not walk over pump or pipes which are connected to pump.
- Any operation which will be done in pump should be performed by at least two staffs.
- No works should certainly be done over without stopping pump group.
- Power coming to pumps should be off and you should be sure that it will not operate again before you make any work
- Absolutely install the safety guards which were dismantled before after work in pump has finished.
- Tensions and cracks in pipe system absolutely should not reach to pump.
- Do not make any operation while pump and pipes which are connected to pump are under pressure.
- Cloths of personnel who will work over should be suitable and/or they should use safety equipments.
- Never do any operations when pump is still hot.
- Electrical connection related with pump and auxiliary equipments should be suitable with local rules and made by authorized personnel.
- Operate pump with only specified conditions.
- Do not insert your hand and fingers into holes and spaces over pump body.
- Be always careful while working with pumps discharging hazardous liquids.

## BTKF-1 SERIES PUMPS

BTKF-I Series Pumps are centrifugal pumps having horizontal shaft, separable radial body, are single staged, scroll cased has closed impellor, and can be connected to straight pipe.

### Usage Areas of Motor Water Pump

Pumps are suitable for discharging liquids which are low viscose, whose flow temperature is up to 110°C and which are clean or a little dirty. (Max20mg/dm<sup>3</sup>) . In addition to others; main application areas are:

- Heating and Cooling Systems
- Water Supply
- Fire Extinguishing Plants
- Water Supply and Circulation Systems in Industrial Plants

### Explanation of Pump Codes

BTKF-I 40/200

Pump Type \_\_\_\_\_

Rated Diameter of Discharge Flange (DN-mm) \_\_\_\_\_

Number of Stages(piece) \_\_\_\_\_

### Technical information

Speed : Up to 3600 d/d rpm

Discharge Flange : DN40 ... DN200

Suction And Discharge Flange : TS EN 1092-2, EN 1092-2-EQV / PN16

Operational Temperature : -10°C ... 110°C

Ambient Temperature (Maximum) : +40°C

Body Pressure : 16 Bars

Isolation Class : F

Protection Class : IP55

Motor Connection : 3 Phase-380 V-50 Hz

## SHIPPING OF PUMPS

- Check whether all materials in delivery list are sent. .
- If there is damage during shipping please notify ERDURO Shipping Department and Transportation company.
- If there are missing materials, immediately inform ERDURO Shipping Department.
- . Check whether packaging is damaged during transportation.
- Please carefully take out packaged pump and accessories (if any). Check whether they are damaged during transportation.

## CARRYING

### General warnings.



Absolutely obey the following rules during transportation.

- . Use proper wooden crane, forklift, or hoisting mechanisms For unloading or loading wooden cases, packages, boxes and palettes depending on their weight and volume.
- Wear gloves, hard tip shoes and helmet during carrying works.
- Never stay under hoisting mechanism while loading or unloading pumps.

### Pump and Motor Group Loading/Unloading

Before loading/unloading pump group please determined the following properties.

- Please find the lifting points.
- Please consider total weight and centre of gravity.
- Please consider the packaging external dimensions
- During loading/unloading make accelerating and braking operations as it shall not cause any damage for working personnel.
- Load lifting capacity should be suitable with pump and pump group weight.
- You should never stay under or near lifted load.

- Pump should be hoisted as it is indicated in Figure 1 -1 and Figure 1 -2 for not causing any damage in pumps. Motor hanging ring should absolutely not be used while lifting complete group.
- Load should be kept in lifted position more than required time.
- Pump and pump group should always be lifted and carried in horizontal position

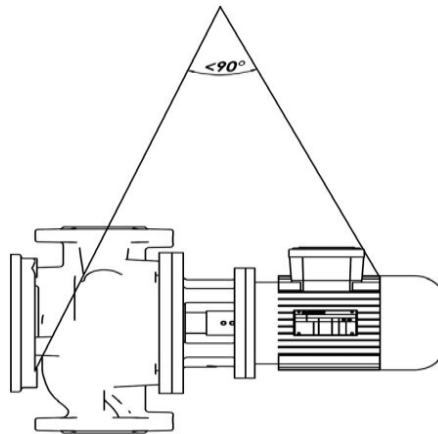


Figure 1 Pump carrying

## STORAGE

- If pump group is not immediately installed, it should be stored in a place which is clean dry and does not include freezing and explosion risk.
- If pump bearing are type which should be greased, they should be extra greased for preventing entry of moisture to bearings around shaft
- Pump should be protected from moisture, dust, dirt and foreign objects by covering with suitable material.
- Pump shaft should be rotated a few turns (e.g once a week) for preventing pitting around pump bearing surfaces and jamming of shaft.

## INSTALLATION

Installation of pump to its place and connection setup and balance should only be done by expert personnel. Failed installation and pump ground may cause failures.

This situations are not covered with warranty

Before installing the pump in its place,  
Suction and discharge flanges should properly be cleaned.

ATTENTION- Pump should be installed in a location where there is not explosion and frost hazard and has good air conditioning.

- There should be enough area around pump for reaching pump easily, for maintenance and there should be enough space and height to lift the pump if necessary.

- Pump suction pipe should be as short as possible.

If BTKF-I pumps are installed over a pipe which is well supported or over ground by means of base plate.

- BTKF-I pumps can be mounted to flat pipes vertically or horizontally.

Flow can be from upwards to downwards or reverse in pumps which are connected vertically. (Provided that pump flow direction has been connected correct)

Motor axis can be in vertical or horizontal position in pumps which are connected to horizontal pipe motor should never remain below the horizontal plane.

Pump which is installed over a pump ground can be mounted to a flexible pipe by means of base plate.

ATTENTION:- You should be carefully work at pump installation ground preparation and installation of pump group into its place. Incorrect and careless installation causes early wearing of pump parts and failures.

- Pump ground should be so heavy to absorb vibrations and sturdy to prevent bends and adjustments defects. Ground concrete should completely be solidified, completed its plug time and proper stud bolts are placed in pump frame fixing holes and proper fixing lugs should be placed for using in making connections with welding. Concrete and plate upper surface should be horizontal and very smooth.

- Place the pump group over concrete ground and put or remove steel wedges under frame and adjust the flanges. Provide that pump shaft completely in horizontal position.

- Tighten the anchorage stud bolts properly.

### Installation of Pipe Line Installation

## GENERAL

- Nominal diameter of pump discharge and suction pumps are not an indicator for correct diameters for discharge and suction pipes.

- It should be controlled that cracks and stresses and pipe weight do not effect pump.

- Flow rates generally should not exceed 2m/s in suction pipe and 3 m/s discharge pipe.
- Especially bottom backwater valve, silt trap, filter and check valves and similar elements should be chosen to having a larger passing area.
- For this reason, bolts of discharge and suction flanges should be loosen and it should be controlled whether pipe system exerts a stress over pump.
- Pipes and accessories having diameter less than pump opening diameter should absolutely not be used.
- Never use pumps as a support point or carrier for a pipe installation.
- Pipe system should be supported from points which are close to pump. Figure 2.
- Proper expansion equipments should be used for preventing additional forces to pump which may occur because of expansion in systems which operate in over vibrant and hot liquids.
- High speeds cause decrease in pressure which will cause cavitations conditions and excess friction losses in discharge pipe.
- Welding burrs, metal particles, which may occur during pipe equipment production sand, and oakum and similar foreign objects may present inside pump. Suction and discharge flanges should be closed with gasket without hole for preventing those materials enter into pump during installation. At the end of installation, all pipe parts should be dismantled, cleaned and dyed and installed again. If dirt retained is used at pump suction line, it should be removed and cleaned after first few days of operation and installed again.

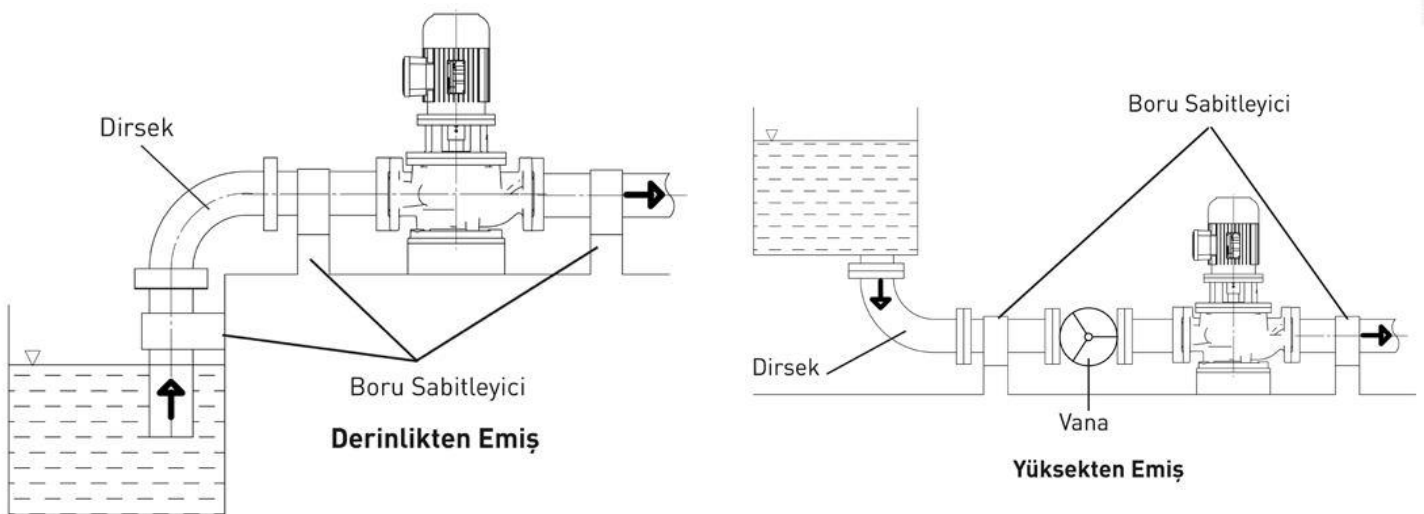


Figure 2

- Pipe connections should be made by flanges. Flanges gaskets should be produced from suitable material and should have suitable dimensions. Gaskets which will be used between flanges should be centered for not preventing water flow.

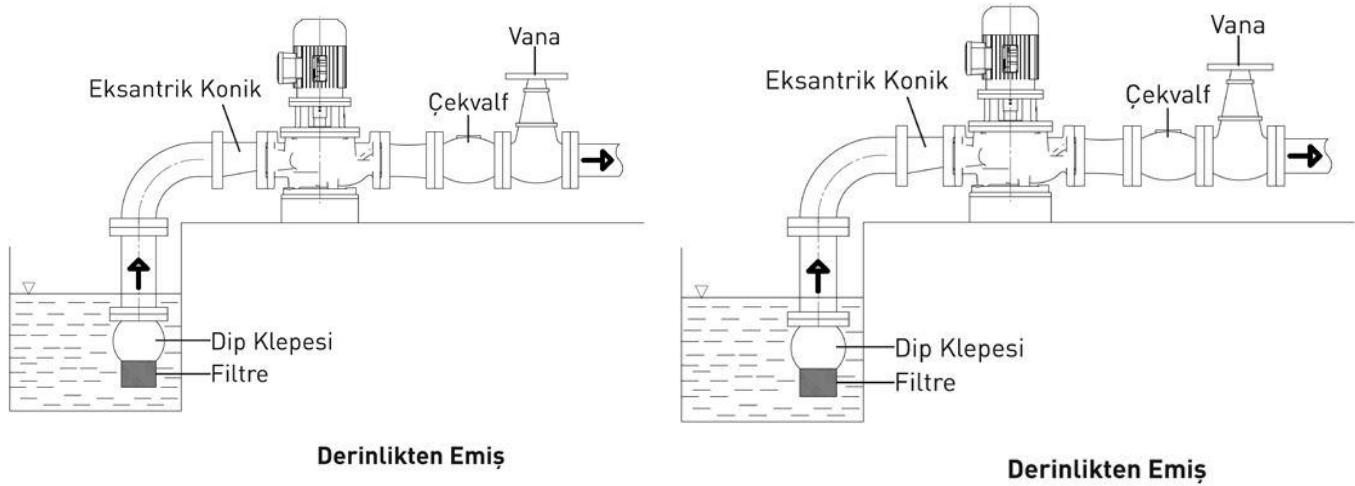


Figure 3

### Suction and Discharge Pipe Connections

- If pump is supplied from a tank which is higher than pump, there should be an isolation valve in suction pipe whose axis will be in horizontal position. This valve should be completely open while pump is in operation and should never be used as flow rate adjustment valve. (Attention: Closing valve may cause pump operation with cavitations. )

- Suction pipe should absolutely be impermeable and should not be arranged to cause any air wall. In this case if a tank is supplied from a tank which is higher than pump, (suction high installation) suction pipe should be slightly decreasing sloped towards pump and supplied from a tank which is lower than pump, suction pipe should be slightly increasing sloped towards pump.

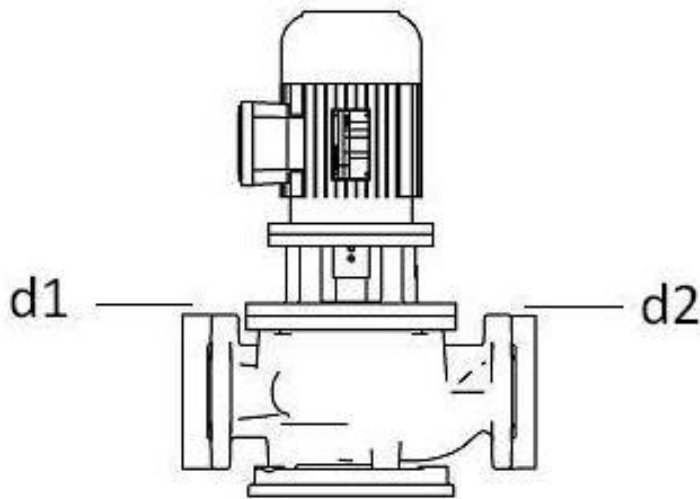
- Sharp bends should not be used, sudden direction changes and cross section narrowing should be avoided and suction pipe should be short as possible for keeping pump friction losses as low as possible. If there is need of cross section change in horizontal suction pipe, an intermediate eccentric conical part whose flat type is at upper side should be used.

-. If pump discharging height is more than 10 m or discharging line is very long, a check valve should be placed over discharging pipe between pump and isolation valve for protecting pump against water impulses and reverse flows during stop.

- A control valve which is close to pump should be connected for flow rate and discharge height adjustment.

- If pump discharging height is more than 10 m or discharging line is very long, a check valve should be placed over discharging pipe between pump and isolation valve for protecting pump against water impulses and reverse flows during stop.





**d1:** Suction Opening Pressure Meter Connection

**d2:** Discharge Opening Pressure Meter Connection

### By-Pass Valve Connection

- A by-pass valve should be placed over discharge pipe just after pump and before adjustment valve or outlet flange of pump if there is a case that pump will operate in conditions that pump discharge valve is completely closed (that is with zero flow rate) or almost closed (that is with very small flow rate). If such valve is not used and pumps operates with closed valve for a long time, power which is provided by motor will completely transform into heat energy and pass into discharged liquid. This may cause over heating and abnormal failures in pump.

## ELECTRICAL CONNECTIONS



- Electrical connections should be done by authorized electricians. National instructions, regulations and instructions of motor manufacturers should be obeyed.

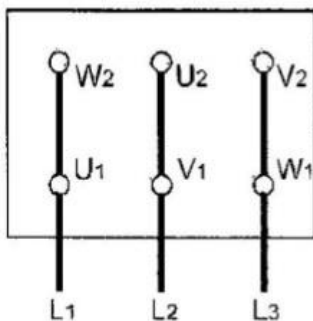
- Power cables should absolutely be installed as not having contact with pipe installation, pump and motor body.

- Motor shaft should be rotated by hand before making electrical conditions to control whether it rotates easily.

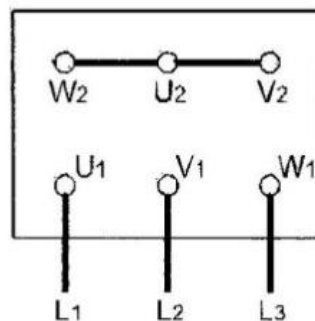
- It is recommended to use PTC (Passive Thermal Control-Thermistor) in motors. However usage of those depends on customer.

- Electrical motors should be protected against overloading by circuit breakers and/or fuses. Circuit breakers and/or fuses should be selected with respect to full load values those are written in nameplate on motor.

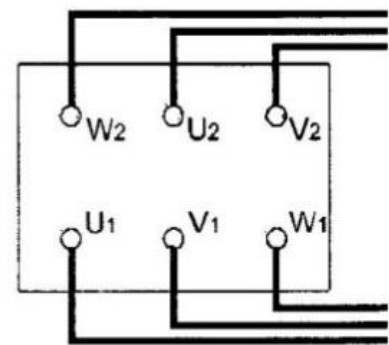
- Compare and control voltage, ampere and frequency values which are given in motor nameplate with line values.
- Motor connection scheme can be found in motor terminal box or in handbook.
- Motor electrical connections should be done according to local Electrical Regulations and earthing connection should absolutely be done.
- Protection class of motor body and control system cases in pump should be at least EN 60529 IP 22. In addition to this, protection class of motor bodies and control systems in pump group should be determined according to operational and environmental conditions.
- Safety precautions which are determined in "Safety Instructions" should be applied. All power connections should be disconnected before starting to any work.
- However usage of those depends on customer. If PTC is used ends of those should be connected to motor terminal box and later should be connected to PTC control device in motor control panel.
- Motor connection type changes according to motor mains power and connection type. Necessary connection types of jumpers in terminal box are displayed in Table 1 and Scheme 1a -1b and 1c



Scheme 1a



Scheme 1b



Scheme 1c

Start Type	Motor Power PN<4kW	Motor Power PN >4kW
	Mains Power 3~400V	Mains Power 3~400V
Direct	Y-connection (1b)	Δ-connection (1a)
Y/ Δ Star Delta	Impossible	Remove Jumpers (1c)

Table 1

Attention! Transition time from star to delta should be short in star-delta connected motors. In case that it is long damages may occur in pump and motors.

Motor Power	Y- Setup time
<30 kW >30 kW	<3 seconds <5 seconds

Table 2

- After all abovementioned operations are completed, pump rotor should be rotated a few turns for being sure that it rotates easily.
- All safety guards should be installed into their places. Pump should absolutely be not operated after this operation is made. This is obligatory for safety.

## FIRST START

### Controls Before Operation

- If there is bottom back flow water valve in pump with depth suction; one of the plugs in flanges is opened and suction pipe and pump is filled with water and its air is taken.
- This case does not cause problem in force feed pumps. Discharge valve is closed placement type of pump is considered and one of the plugs in flanges is opened and pumps suction valve is slowly opened and pump is completely filled and air is completely removed.
- If system includes vacuum pump, rise of water in suction pump by means of vacuum pump and filling pump is provided. When water reaches the highest level pump is started.
- Pump motor bearings are "Lifetime Greased " bearings so they do not need any control.
- Be sure that there is water in water tank and/or source.
- Be sure that pump and suction pipe is completely filled with water.
- ATTENTION! Never let pump run in dry conditions.

## Determination of Rotation Direction

- BTKF-I type pumps rotates in clockwise direction when you look from motor towards pump. This direction is shown with an arrow in pump body. Pump is operated for a short while and checked whether it rotates in correct direction. If protection guard is uninstalled during this operation, it should immediately be installed after this operation.

## Starting Pump

- Check that suction valve is open and discharge valve is closed.
- Close the circuit breaker and start the motor.
- Wait motor to reach full speed. (Wait motor to pass delta in motors operation with star-delta)
- Observe the ammeter in panel and slowly open discharge valve. (If discharge pipe is empty in first start, do not open discharge valve completely and open in controlled way by controlling that value in ammeter is lower than motor rated values.)
- After valve is completely opened control the value which is read from ammeter whether it is same with the value at operational point. If the ammeter value is less than operational value adjust it by closing the valve. If it is greater check the installation and static height.

**ATTENTION:** If any of following problems occur while pump operates in nominal speed; pump should immediately be stopped and trouble should be eliminated.

- 1) Pump operates with over vibration.
- 2) Pump and motor connection bearings have over temperature.
- 3) Pressure is not enough.
- 4) Pump discharges no water.
- 5) Flow rate continuously decreases.
- 6) Motor operates overloaded
- 7) Pump operates with very much noise.
- 8) Pump does not discharge sufficient water.

## Controls to be Made While Pump is Running

- Since pumps have mechanical seal it does not need any maintenance. A few amount of water may leak from mechanical seal but it is so small that it can not be noticed. If the amount of water coming from mechanical seal this means that seal surface is abraded and needs to be replaced. Lifetime of mechanical seal is mainly depends on cleanness of discharged water.

- Motor current should sometimes be controlled from ammeter over electrical panel which controls the motor. If current values are more than motor nameplate values there may be friction or squeezing in pump. Pump should immediately be stopped and mechanical and electrical controls should be done.
- If there are spare pumps in system, this type of pumps should be run for a short while at least once a week and controlled whether read for operation. Control with auxiliary elements if any.
- Pump should absolutely be run in closed valve condition (zero flow rate) for a long time.
- Pump should operate silent and without operation.
- Bearing temperatures should never exceed ambient temperature (more than 50°C). It should never exceed 80°C.
- Never operate pump without water.

## LUBRICATION

- Since motor bearings ARE "Lifetime Greases" it does not need any maintenance.

## DISMOUNTING PUMP AND REPAIR

**ATTENTION!**-Always disconnect the electrical connections before start any operation over pump and be sure that you have taken necessary precautions to prevent to operate mistakenly.

## DISMOUNTING PUMPS

- Close the isolation valves in suction and discharge lines.
- Uninstall the safety guards.
- Separate the pump group from pipe system by uninstalling the pump suction and discharge flange (and auxiliary pipes if any) connections.
- Separate scroll case from mechanical seal box. Be careful not to give harm to mechanical seal while doing this operation.
- Uninstall the impellor nuts and remove the impellor wedge. Use rust solvent if necessary.
- Take the intermediate bushing.
- Carefully remove the rotating parts of mechanical seal.
- Separate the mechanical seal box, and carefully remove the fixed elements of mechanical seal.
- Uninstall the motor carrier.

-Uninstall the pump shaft set screws and rigid coupling shaft bolts depending on connection type.

-Separate pump shaft from motor shaft.

### Installation of Pump

-. Pump installation operation is made by reverse order of pump dismounting process.

- Before starting to installation operation, apply lubricious materials such as graphite, silicone or similar slippery substances over contact surfaces or bolt surfaces. If you can not find those substances use liquid oil. (drinking water pumps excluding)

- Do not use gaskets which you had removed. Use new ones having same dimensions. Be careful that new gaskets and O-rings are in same dimensions.

-Place the motor as its shaft end will be upper side and connect the motor carrier to motor.

- Insert the pump shaft to the motor shaft by sliding.

-Place the seal box over motor carrier.

-Place the fixed elements of mechanical seal into seal housing.

-Insert the rotating parts of mechanical seal over pump shaft by sliding and place the intermediate bushing.

-Place the impellor wedge and insert the impellor and connect the impellor nuts.

-Connect the scroll case.

-Place the pump group over frame. Connect the suction and discharge pipes (and auxiliary pipes if any.)

-Connect the conductor plate if any.

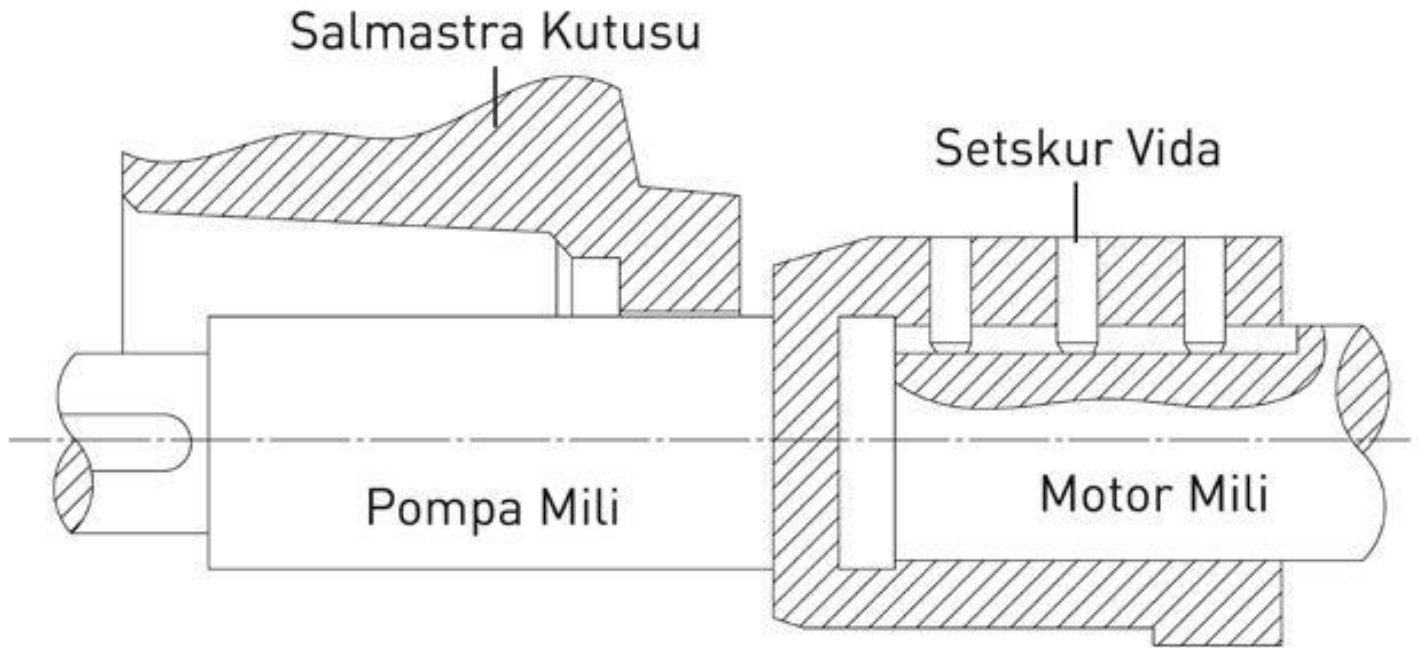
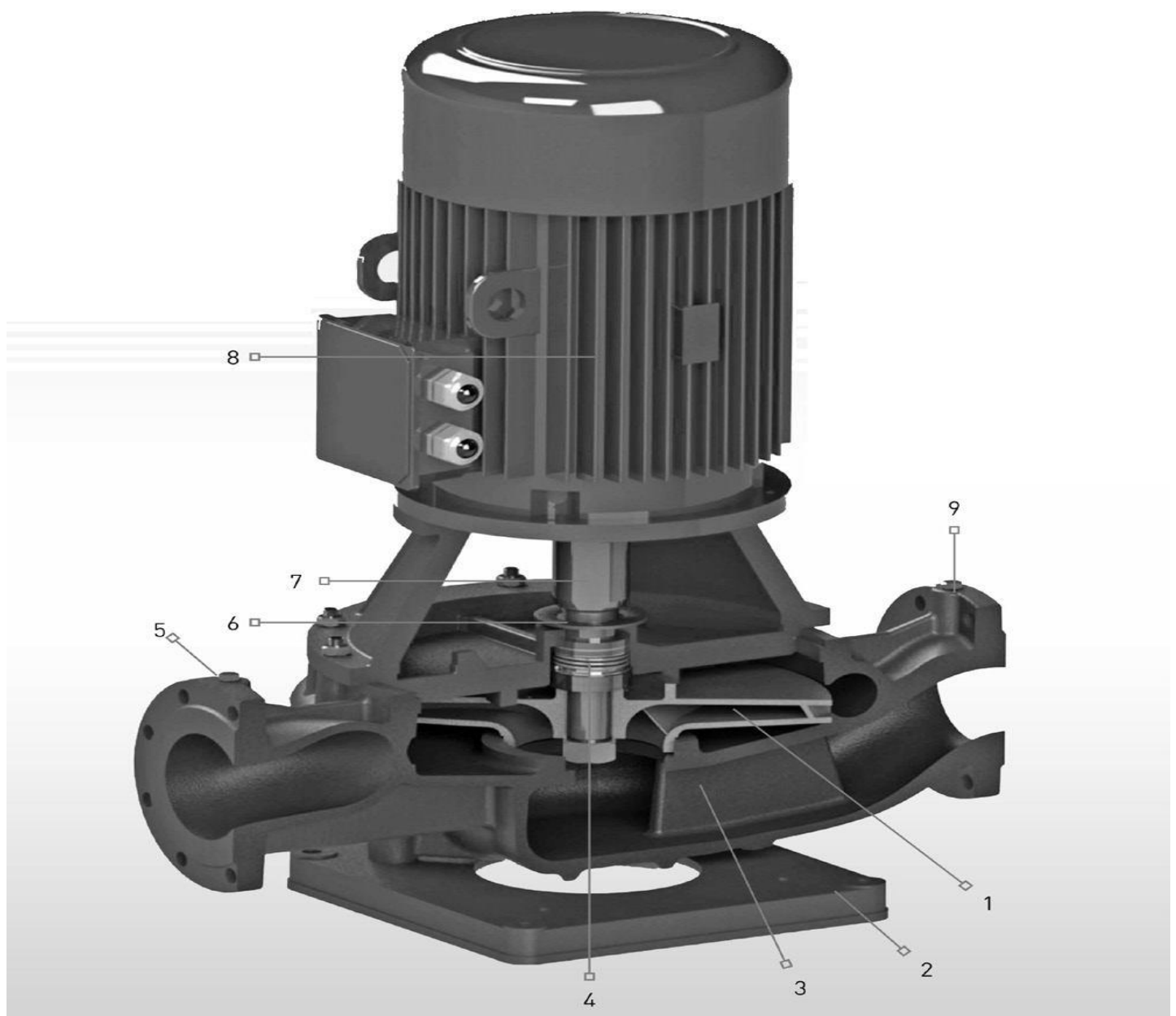


Figure 5

## Seals

- BTKF-I type pumps are always produced with mechanical seal.
- Water leakage does not occur in a mechanical seal which properly works. Generally if there is not any visible water leakage seals do not need maintenance. Besides this impermeability of mechanical seals should regularly be controlled.
- Absolutely obey the instructions of manufacturers where mechanical seals are used. never operate the seal in dry conditions.

## CROSS SECTION DRAWINGS



**Figure 6**

- |                 |                      |                    |
|-----------------|----------------------|--------------------|
| 1) Impellor     | 4) Mechanical Seal   | 7) Pump Shaft      |
| 2) Carrier Foot | 5) Discharge Opening | 8) Motor           |
| 3) Scroll Case  | 6) Splash rubber     | 9) Suction Opening |



## SPARE PARTS

- ERDURO warrants to provide the spare parts for BTKF-I Series pumps for 5(five) years beginning from production date. You can always easily obtain the spare parts you need.

- In spare parts order, it will be sufficient for you to inform the following values which are written in pump nameplate.

Pump Type : BTKF-I 40/200

Motor Power(P) and Revolution(n) :5,5 kW - 2900 d/d

Production Year and Serial No : 12/2011 - 201112-001

Flow rate(Q) and Manometric Height (Hm): 15 m<sup>3</sup>/h - 44 mSS

## REASONS FOR FAILURES AND TROUBLE SHOOTING

In this chapter failures which can be seen BTKF-I type pumps, possible reasons (Table 3 ) and trouble shooting methods (Table 4 ) are given.

**ATTENTION!** Control the accuracy of all measurement gauges before starting to eliminate the failure operation.

FAILURES	POSSIBLE REASONS
Started pumps never discharges water	3-6-8-12-11-14
Flow rate decreases or no water is discharged	4-2-7-15
Motor is overloading	9-10-16-22
Bearings have over temperature	17
There is vibration in pump	13-18-21-19
Noise level is high	1-5-20

Table 3

1	There is air in liquid	Swirls occur since depth of submersion pipe is not enough and there fore air can not be absorbed. Control the liquid level in suction tank and increase the depth of bottom/suction pipe back water valve.
2	Air pocket in suction pipe	Control the slope of suction pipe and whether there are suitable places for formation of air pockets, if any make necessary corrections.
3	There may be air in pump and/or suction line	Fill pump or suction pipe completely with liquid and repeat the start process
4	Air is not absorbed from seal, suction pipe, or connections. Pump absorbs liquid which is mixed with air	Control all connections in suction pipe. Check seals. If necessary feed seals with pressurized water. Check the submersion depth of suction pipe pr deep back water valve and increase submersion depth if necessary.

5	Pump operates with cavitations	NPSH of plant is very low. Check the water level in suction tank. Check whether there are over friction losses in suction line. Check whether isolation valve in suction line is completely open. If necessary place the pump in low levels and increase the load of pump at suction side
6	Suction depth is very much	If there is no obstacle which may cause clogging control the friction losses of suction line. If necessary use a suction pipe having larger diameter. If static suction depth is too much you should raise the height of water level in suction tank or pump should be places in lower levels.
7	Increase in discharge height	Check whether valves are completely open. Check whether there is an obstacle which may cause clogging in discharge pipe.
8	Pumps discharge height is insufficient	Actual discharge height of plant is higher than given values. Check the total static height and friction losses of discharge pipe. Using pipes having greater diameter may be solution. Check whether valves are completely opened.
9	Pump is operating at lower discharge height	Discharge height of plant is lower than given values. Lathe the impellor diameter according to manufacturer suggestions
10	Speed very much	Decrease the motor revolution if possible or Lathe the impellor diameter according to manufacturer suggestions
11	Pump rotates reverse	Check rotation direction of motor whether it is same with the direction which is indicated in pump body or nameplate
12	Impellor partially clogged	Clean the impellor
13	Impellor, check valve or filter clogged	Clean Impellor, check valve or filter
14	Impellor, partially filter clogged	Clean Impellor, or filter
15	Mechanical friction in pump	Check whether there are any obstacle or bend in pump rotor
16	Flow rate is less than pumps necessary flow rate	Increase the flow rate, use by pass valve or line if necessary
17	Worn or malfunctioned impellor	Replace the impellor
18	Imbalanced rotating parts	Adjust the balance of rotating parts
19	Pump operates out of its operation region	Check the operational region values
20	Shaft is bend	Check the shaft and replace if necessary
21	Motor Failure	Check the motor,. Motor is not suitable for its air conditioning position

Table 4

## INSTALLATION TYPES

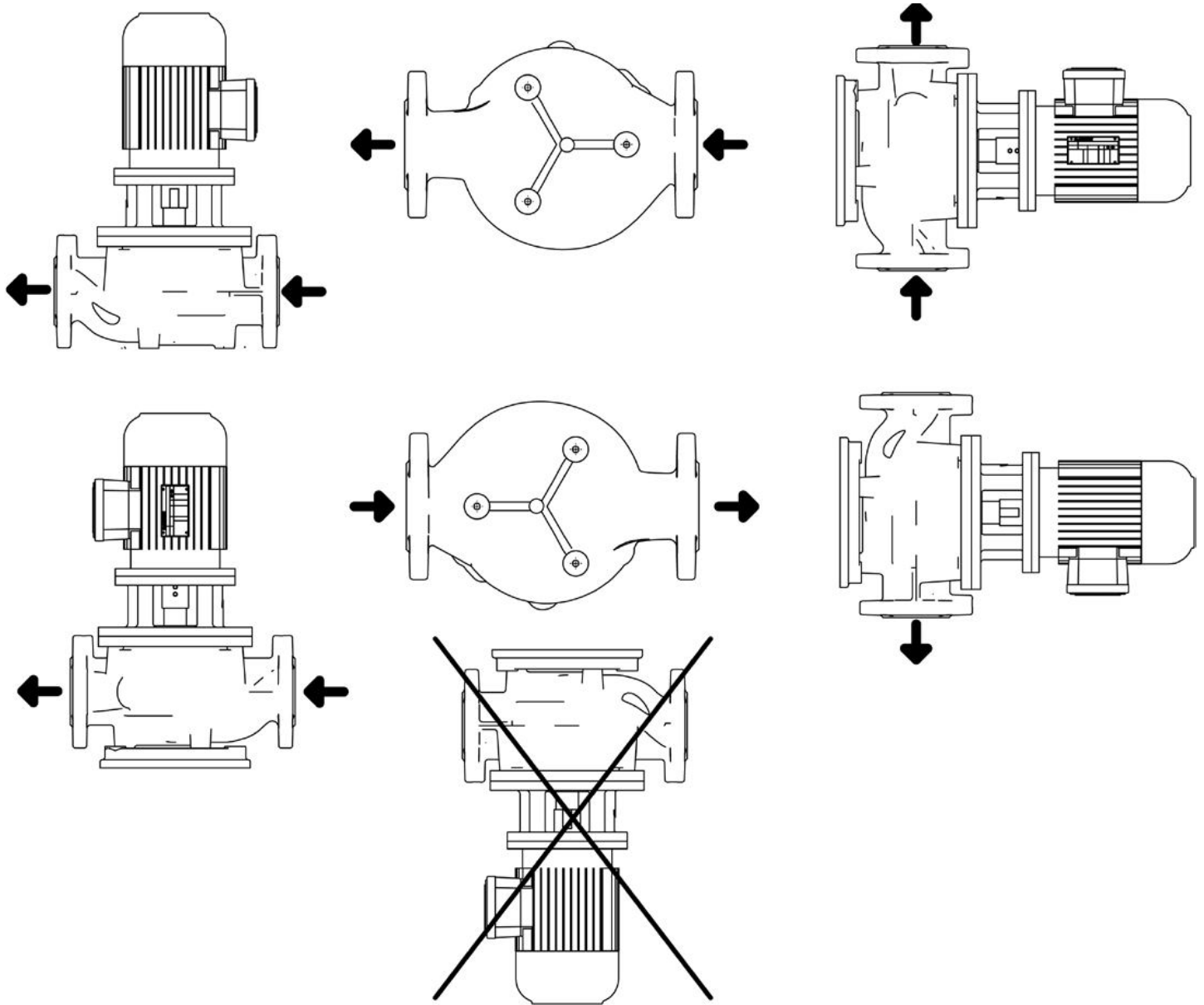


Figure 7

## TIGHTENING MOMENT

SCREW DIAMETER	MAXIMUM TIGHTENING MOMENT(Nm)	
	CLASS PROPERTIES	
	8.8	10.9
M4	3	4,4
M5	5,9	8,7
M6	10	15
M8	25	36
M10	49	72
M12	85	125
M14	135	200
M16	210	310
M18	300	430
M20	425	610
M22	580	820
M24	730	1050
M27	1100	1550
M30	1450	2100
M33	1970	2770
M36	2530	3560

## EXPECTED NOISE LEVELS

Motor Power PN (kW)	Sound Pressure Level (dB)	
	Pump and Motor	
	1450 rpm	2900 rpm
<0,55	63	64
0,75	63	67
1,1	65	67
1,5	66	70
2,2	66	71
3	70	74
4	71	75
5,5	72	83
7,5	73	83
11	74	84
15	75	85
18,5	76	85
22	77	85
30	80	93
37	80	93
45	80	93
55	82	95
75	83	95
90	85	95

\* It is the value which is measured from 1 m distance from the pump in a free area over the surface which reflects sound without having sound screen.

# Fluid Solutions



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