



ESC Series Split Case Double Suction Centrifugal Pump Installation, Operation And Maintenance Manual

1. INTRODUCTION AND SAFETY

1.1 Introduction

ESC series horizontal split case pumps with high efficiency and durability offer high performance in high flow applications. It has double suction which reduces axial force at suction. Discharge and suction flanges are on the same axis. The pump consists of two parts, top and bottom and is connected to each other by bolts. Without disconnecting the pump from the pipe installation these bolts can be removed and repair and maintenance operations can be done easily.

Areas of Usage

- Water Supply, Treatment and Pressurization
- Fire Fighting
- Agricultural Irrigation and Drainage
- HVAC
- Industrial facilities
- Mining
- Marine Applications

Pump Specifications

Pump Body	: GG25 Cast Iron
Pump Shaft	: AISI420 Stainless Steel
Impeller	: GG25 Cast Iron / Bronze
Sealing Type	: Gland packing / Mechanical Seal



Technical Specifications

Max. Flow Rate	: 1250 m ³ /h
Max. Discharge Head	: 225 mwc
Flange	: DIN 2501
Connection	: DN80 - DN200
Max. Operating Pressure	: 25 Bar
Max. Ambient Temp.	: 40°C
Temp. of Pumped Liquid	: 0 - 105°C
Fluid Quality	: Clean, solid abrasive particle-free, non-hard chemically neutral water

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance

CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

NOTICE:

Save this manual for future reference, and keep it readily available at the location of the unit.

1.1.1 Inexperienced Users

WARNING:

This product is intended to be operated by qualified personnel only.

Be aware of the following precautions:

- This product is not to be used by anyone with physical or mental disabilities, or anyone without the relevant experience and knowledge, unless they have received instructions on using the equipment and on the associated risks or are supervised by a responsible person.
- Children must be supervised to ensure that they do not play on or around the product.

1.2 Safety Terminology and Symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:



- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

Hazard Level	Indication
DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical Hazard	Magnetic Fields Hazard
 Electrical Hazard:	 Caution:





Hot surface hazard

Hot surface hazards are indicated by a specific symbol that replaces the typical hazard level symbols:

CAUTION:

Description of user and installer symbols

	Specific information for personnel in charge of installing the product in the system (plumbing and/or electrical aspects) or in charge of maintenance.
	Specific information for users of the product.

Instructions

The instructions and warnings that are provided in this manual concern the standard version, as described in the sales document. Special version Pumps may be supplied with supplementary instruction leaflets. Refer to sales contract for any modifications or special version characteristics. For instructions, situations, or events that is not considered in this manual or the sales document, contact the nearest Service Center.

1.3 Disposal of Packaging and Product

Observe the local regulations and codes in force regarding sorted waste disposal.

1.4 Warranty

For information about warranty, see the sales contract.

1.5 Spare Parts

WARNING:

Only use original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the guarantee.

CAUTION:

Always specify the exact product type and part number when requesting technical information or spare parts from the sales department.

For more information about the product's spare parts, visit sales network's website.

2. TRANSPORTATION AND STORAGE

1. Inspect the Delivery

1. Check the outside of the package for evident signs of damage.
2. Notify our distributor within eight days of the delivery date, if the product bears visible signs of damage.

Unpack the unit

1. Follow applicable step:
 - If the unit is packed in a carton, then remove the staples and open the carton.
 - If the unit is packed in a wooden crate, then open the cover while paying attention to the nails and straps.

2. Remove the securing screws or the straps from the wooden base.

2.1.1 Inspect the Unit

1. Remove packing materials from the product. Dispose of all packing materials in accordance with local regulations.
2. Inspect the product to determine if any parts have been damaged or are missing.
3. If applicable, unfasten the product by removing any screws, bolts, or straps. For your personal safety, be careful when you handle nails and straps.
4. Contact the local sales representative if there is any issue

2.2 Transportation Guidelines

Precautions

WARNING:

- Observe accident prevention regulations in force.
- Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.

Check the gross weight that is indicated on the package in order to select proper lifting equipment.

Position and fastening

The pump or pump unit can be transported only horizontally. Make sure that the pump or pump unit is securely fastened during transportation and cannot roll or fall over. Fig. 1

WARNING:

Do not use eyebolts screwed on the motor for handling the whole electric pump unit.

Do not use the shaft end of the pump or of the motor to handle the pump, the motor or the unit.

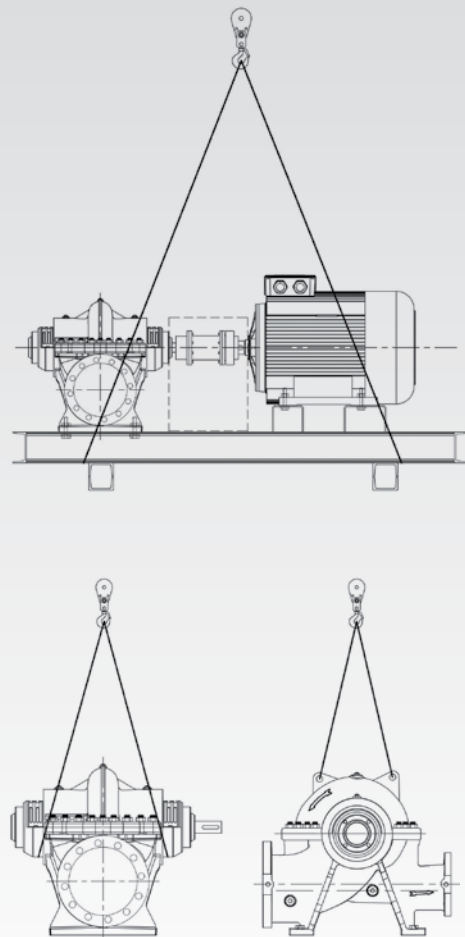


Figure 1

- Eyebolts screwed onto the motor may be exclusively used to handle the individual motor or, in case of a not balanced distribution of weights, to partially lift the unit vertically starting from a horizontal displacement.
- Pump unit must always be fixed and transported as shown in Figure 1 page 6 and the pump.

WARNING:

According to machinery directive 2006/42/EC, a pump and motor that are purchased separately and then coupled together result in a new machine. The person making the coupling is responsible for all safety aspects of the combined unit and for CE-marking.

2.3 Storage Guidelines**Storage location**

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

NOTICE:

Protect the product against humidity, heat sources, and mechanical damage.

NOTICE:

Do not place heavy weights on the packed product.

2.3.1 Long-Term Storage

If the unit is stored for more than 6 months, these requirements apply:

- Store in a covered and dry location.
- Store the unit free from heat, dirt, and vibrations.
- Rotate the shaft by hand several times at least every three months.

Refer to the drive unit and coupling manufacturers for their long-term storage procedures.

For questions about possible long-term storage treatment services, please contact your local sales and service representative.

Ambient temperature

The product must be stored at an ambient temperature from -5°C to +40°C (23°F to 104°F).

3.PRODUCT DESCRIPTION**3.1 Pump Design**

The pump is a horizontal pump with volute casing split cased coupled to standard electric motors or diesel engine.

The pump can be used for handling:

- Cold or warm water
- Clean liquids
- Liquids which are not chemically and mechanically aggressive to the pump materials.

The product can be supplied as a pump unit (pump and electric motor) or only as a pump.

NOTICE:

If you have purchased a pump without motor, make sure that the motor is suitable for coupling to the pump.

Intended use

The pump is suitable for:

- Water supply and water treatment
- Cooling and hot water supply in industries and building services
- Irrigation and sprinkler systems
- Heating systems
- Marine
- Mining
- District heating
- General industry

Improper use

WARNING:

Improper use of the pump may create dangerous conditions and cause personal injury and damage to property. An improper use of the product leads to the loss of the warranty.

Examples of improper use:

- Liquids not compatible with the pump construction materials
- Hazardous liquids (such as toxic, explosive, flammable, or corrosive liquids)
- Potable liquids other than water (for example, wine or milk)

Examples of improper installation:

- Hazardous locations (such as explosive, or corrosive atmospheres).
- Location where the air temperature is very high or there is poor ventilation.
- Outdoor installations where there is no protection against rain or freezing temperatures.

DANGER:

Do not use this pump to handle flammable and/or explosive liquids.

NOTICE:

- Do not use this pump to handle liquids containing abrasive, solid, or fibrous substances.
- Do not use the pump for flow rates beyond the specified flow rates on the data plate.

Special applications

Contact the local sales and service representative in the following cases:

- If the density and/or viscosity value of the pumped liquid exceeds the value of water, such as water with glycol; as it may require a more powerful motor.
- If the pumped liquid is chemically treated (for example softened, deionized, demineralized etc.).
- Any situation that is different from the ones that is described and relate to the nature of the liquid.

3.2 Pump Denomination

For an explanation of the denomination code for the pump and one example.

3.3 Nameplate

The nameplate is located on the bearing bracket. The name plate lists key product specifications.

The nameplate lists information regarding the impeller and casing material, the mechanical seal and their materials. For more information, see Figure 10-18 on page 34-41.

IMQ or TUV or IRAM or other marks (for electric pump only)

Unless otherwise specified, for products with a mark of electrical-related safety approval, the approval refers exclusively to the electrical pump.

3.4 Pump Description

ESC 80-370 / ESC 100-310G / ESC 100-375G / ESC 125-290 / ESC 150-290

3.5 Material

The metallic parts of the pump that come in contact with water are made of the following:

Material Code	Material Casing / Impeller	Standard / Optional
CC	Cast iron/Cast iron	Standard
CB	Cast iron/Bronze	Standard
DC	Ductile iron / Cast iron	Standard
DB	Ductile iron /Bronze	Standard

3.6 Mechanical Seal

Unbalanced single mechanical seal acc. EN 12756, version K.

3.7 Application Limits

Limits of operation

The operating limits of the pump unit regarding pressure, temperature, performance and speed are shown in the data sheet.

- Do not exceed the output given on the motor name plate.
- Avoid sudden changes in temperature (temperature shocks).
- The pump and motor should run evenly and without vibrations; check at least once a week.

Maximum number of starts per hour

kW	110	132	160	185	200	250	315
Starts per hour	6	5	4	3	3	2	2

Noise level

For the sound pressure levels of pump equipped with standard supplied motor.

ESC PUMP SOUND PRESSURE LEVEL [dB(A)]

PUMP TYPE	POWER [kW]	SPEED [rpm]	SOUND P. LEVEL [dB(A)]
ESC 80/370	110	2950	82
ESC 80/370	132	2950	83
ESC 80/370	185	2950	85
ESC 80/370	200	2950	86
ESC 100/310G	132	2950	83
ESC 100/310G	185	2950	85
ESC 100/310G	200	2950	87
ESC 100/310G	250	2950	88
ESC 100/375G	185	2950	86
ESC 100/375G	250	2950	90
ESC 100/375G	315	2950	92
ESC 125/290	110	2950	84
ESC 125/290	160	2950	86
ESC 125/290	185	2950	88
ESC 125/290	250	2950	91
ESC 150/290	160	2950	88
ESC 150/290	185	2950	90
ESC 150/290	250	2950	93
ESC 150/290	315	2950	95

Sound pressure level measurements were made with 50 Hz electric motors with noiseless environment.

4. INSTALLATION

Precautions

WARNING:

- Observe accident prevention regulations in force.
- Use suitable equipment and protection.
- Always refer to the local and/or national regulations, legislation, and codes in force regarding the selection of the installation site, plumbing, and power connections.

Electrical Hazard:

- Make sure that all connections are performed by qualified installation the regulations in force.
- Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.

Grounding (earthing)

Electrical Hazard:

- Always connect the external protection conductor to ground (earth) terminal before making other electrical connections.
- You must ground (earth) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the ground (earth) lead to verify that it is connected correctly.
- If the motor cable is jerked loose by mistake, the ground (earth) conductor should be the last conductor to come loose from its terminal. Make sure that the ground (earth) conductor is longer than the phase conductors. This applies to both ends of the motor cable.
- Add additional protection against lethal shock. Install a high-sensitivity differential switch (30 mA) [residual current device RCD].

4.1 Facility Requirements

4.1.1 Pump location

DANGER:

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

Guidelines

Observe the following guidelines regarding the location of the product:

- Make sure that no obstructions hinder the normal flow of the cooling air that is delivered by the motor fan.
- Make sure that the installation area is protected from any fluid leaks, or flooding.
- If possible, place the pump slightly higher than the floor level.
- The ambient temperature must be between 0°C (+32°F) and +40°C (+104°F).
- The relative humidity of the ambient air must be less than 50% at +40°C (+104°F).
- Contact the Sales and Service Department if:

- The relative air humidity conditions exceed the guidelines.
- The room temperature exceeds +40°C (+104°F).
- The unit is located more than 1000 m (3000 ft) above the sea level. The motor performance may need to be de-rated or replaced with a more powerful motor

Pump positions and clearance

Provide adequate light and clearance around the pump. Make sure that it is easily accessible for installation and maintenance operations.

Installation above liquid source (suction lift)

The theoretical maximum suction height of any pump is 10.33m. In practice, the following affect the suction capacity of the pump:

- Temperature of the liquid
- Elevation above the sea level (in an open system)
- System pressure (in a closed system)
- Resistance of the pipes
- Own intrinsic flow resistance of the pump
- Height differences

The following equation is used to calculate the maximum height above the liquid level which the pump can be installed:

$$(p_b \cdot 10.2 - Z) \geq \text{NPSH} + H_f + H_v + 0.5$$

P_b: Barometric pressure in bar (in closed system is system pressure)

NPSH: Value in meter of the pump intrinsic flow resistance

H_f: Total losses in meters caused by passage of liquid in the suction pipe of the pump

H_v: Steam pressure in meters that correspond to the temperature of the liquid T °C

0.5: Recommended safety margin (m)

Z: Maximum height at which the pump can be installed (m)

($p_b \cdot 10.2 - Z$) must always be a positive number.

NOTICE:

Do not exceed the pumps suction capacity as this could cause cavitation and damage the pump.

4.1.2 Piping Requirements

Precautions

WARNING:

- Use pipes suited to the maximum working pressure of the pump. Failure to do so can cause the system to rupture, with the risk of injury.
- Make sure that all connections are performed by qualified installation technicians and in compliance with the regulations in force.

NOTICE:

Observe all regulations issued by authorities having jurisdiction and by companies managing the public water supplies if the pump is connected to a public water system. If required, install appropriate backflow- prevention device on the suction side.

Piping Requirements Checklist

Check that the following requirements are met:

- All piping is independently supported, piping must not place a burden on the unit.
- Flexible pipes or unions are used, in order to avoid transmission of pump vibrations to the pipes and vice versa.
- Use wide bends, avoid using elbows which cause excessive flow resistance.
- The suction piping is perfectly sealed and airtight.
- If the pump is used in an open circuit, then the diameter of the suction pipe is suited to the installation conditions. The suction pipe must not be smaller than the diameter of the suction port.
- If the suction piping must be larger than the suction side of the pump, then an eccentric pipe reducer is installed.
- If the pump is placed above liquid level, a foot valve is installed at the end of the suction piping.
- The foot valve is fully immersed into the liquid so that air cannot enter through the suction vortex, when the liquid is at the minimum level and the pump is installed above the liquid source.
- Appropriately sized on-off valves are installed on the suction piping and on the delivery piping (downstream to the check valve) for regulation of the pump capacity, for pump inspection, and for maintenance.
- Appropriately sized on-off valve is installed on the delivery piping (downstream to the check valve) for regulation of the pump capacity, for pump inspection, and for maintenance.
- In order to prevent back flow into the pump when pump is turned off a check valve is installed on the delivery piping.

WARNING:

Do not use the on-off valve on the discharge side in the closed position in order to throttle the pump for more than a few seconds. If the pump must operate with the discharge side closed for more than a few seconds, a bypass circuit must be installed to prevent overheating of the liquid inside the pump.

For illustrations that show the piping requirements, see Figure 7 – 8 page 19.

4.2 Electrical Requirements

- The local regulations in force overrule these specified requirements.
- In the case of fire fighting systems (hydrants and/or sprinklers), check the local regulations in force.

Electrical connection checklist

Check that the following requirements are met:

- The electrical leads are protected from high temperature, vibrations, and collisions.
- The power supply line is provided with:
 - A short-circuit protection device
 - A mains isolator switch with a contact gap of at least 3 mm

The electrical control panel checklist

NOTICE:

The control panel must match the ratings of the electric pump. Improper combinations could fail to guarantee the protection of the motor.

Check that the following requirements are met:

- The control panel must protect the motor against overload and short-circuit.
- Install the correct overload protection (thermal relay or motor protector).

Pump Type	Protection
Three phase electric pump*	<ul style="list-style-type: none">• Thermal protection (must be supplied by the installer)• Short circuit protection (must be supplied by the installer)

The control panel must be equipped with a dry running protection system to which a pressure switch, float switch, probes, or other suitable device is connected.

- The following devices are recommended for use on the suction side of the pump:
When the liquid is pumped from a water system, use a pressure switch. When the liquid is pumped from a storage tank or reservoir, use a float switch or probes.
- When thermal relays are used, relays that are sensitive to phase failure are recommended.

The motor checklist

WARNING:

Read the operating instructions in order to ensure whether a protection device is provided if another motor other than the standard is used.

If the motor is equipped with automatic thermal protectors, be aware of the risk of unexpected starts in Connection to overload. Do not use such motors for fire-fighting applications.

NOTICE:

- Only use dynamically balanced motors with a half-sized key in the shaft extension (IEC 60034-14) and with normal vibration rate (N).
- The mains voltage and frequency must agree with the specifications on the data plate.

In general, motors can operate under the following mains voltage tolerances:

Frequency Hz	Phase ~	UN [V] ± %
50	1	220 - 240 ±6
	3	230/400 ±10
		400/690 ±10
60	1	220 - 230 ±6
	3	220/380 ±5
		380/660 ±10

Use cable according to rules with 3 leads (2+ ground) for single phase versions and with 4 leads (3+earth/ for three phase version.

4.3 Install the Pump

4.3.1 Mechanical Installation

Check the following before installation:

- Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class XC1 to EN 206 1.
- The mounting surface must have set and must be completely horizontal and even.
- Observe the weights indicated.

Install the pump set

For examples of horizontal installations Check that the foundation has been prepared in accordance with the dimensions given in the outline drawing/general arrangement drawing.

1. Position the pump set on the foundation and level it with the help of a spirit level that is placed on the discharge port. The permissible deviation is 0.2 mm/m.
2. Remove the plugs covering the ports.
3. Align the pump and piping flanges on both sides of the pump. Check the alignment of the bolts.
4. Fasten the piping with bolts to the pump.
5. Use shims for height compensation, if necessary. Always fit shims, if any, immediately to the left and right of the foundation bolts between the baseplate/foundation. For a bolt to bolt distance (L)>800 mm, fit extra shims halfway between the bolt holes.
6. Make sure that all shims lie perfectly flush. Fig . 2
7. Insert the foundation bolts into the holes provided.
8. Use concrete to set the foundation bolts into the foundation
9. Wait until the concrete has set firmly, and then level the baseplate.
10. Tighten the foundation bolts evenly and firmly. Fig . 3

Note:

- For baseplates, it is recommended to grout the baseplate with low-shrinkage concrete.
- If the transmission of vibration-damping supports between the pump and the foundation.

Mount the pump to a base frame

Be sure to check that the following are adhered to:

- Solid base frame which does not twist or vibrate during operation (resonance)
- Mounting surfaces of the pump feet and the motor on the base frame must be flat (machining is recommended)
- Safe fastening of pump and motor must be guaranteed.
- Adequate space between pump or motor shaft must be left depending on the used coupling.
- Between pump and base frame must be an adequate shimming, so that in case of replacement the same height between bottom and centerline can be adjusted. Fig.2

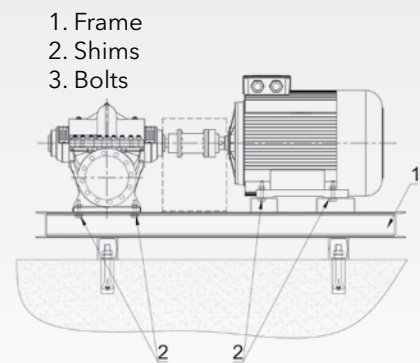


Figure 2

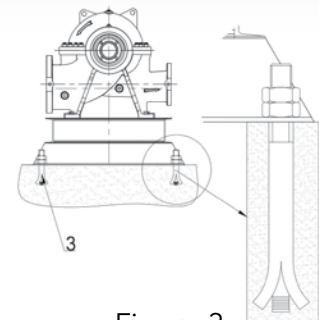


Figure 3

4.3.2 Piping Checklist

Check that the following are adhered to:

- The suction lift line has been laid with a rising slope, at positive suction head line with a downward slope towards the pump Fig. 8 page 19.
- The nominal diameters of the pipelines are at least equal to the nominal diameters of the pump ports.
- The pipelines have been anchored in close proximity to the pump and connected without transmitting any stresses or strains Fig. 7 page 19.

CAUTION:

Welding beads, scale and other impurities in the piping damage the pump.

- Free the piping from any impurities.
- If necessary, install a filter.

4.3.3 Coupling Alignment

After mounting to the foundation and the Connection of the piping, the coupling must be adjusted again, even if the unit was delivered completely mounted on the frame.

Remove the coupling guard

‘Wire mesh’ type and/or sheet type

For information see Fig. 4 on page 16.

1. Unscrew the fixing devices (2).
2. Open the lift guard (1).

- Do not loosen screws, washers and nuts.

‘Shell’ type

1. Unscrew the fixing devices – side (2).
2. Unscrew the fixing devices – up (2).
3. Remove the coupling guard – upper half (1).
4. Unscrew the fixing devices – low (2).
5. Remove the coupling guard.

Alignment

For information see Figure

1. Loosen screws of the support and pump foot.
2. Place the ruler (1) axially on both coupling halves.
3. Leave the ruler (1) in this position and turn the coupling by hand.

- The coupling is aligned correctly if the distances ‘a’ and ‘b’ to the respective shafts are the same at all points around the circumference.
- The radial and axial deviation between the two coupling halves must not exceed the values set by the manufacturer, during standstill as well as at operating temperature and under inlet pressure. Fig. 5

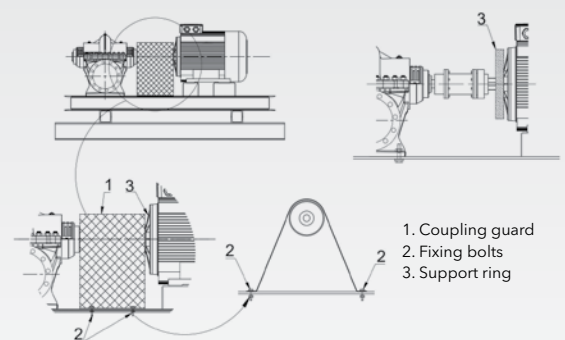


Figure 4

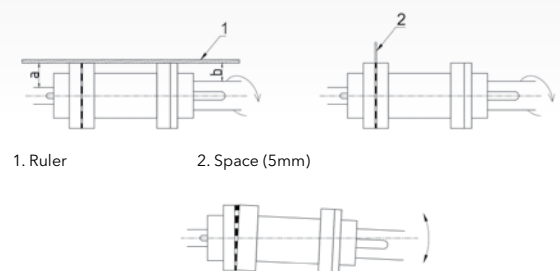


Figure 5

4. Check the distance between the two coupling halves around the circumference with a gauge (2).

- The coupling is aligned correctly if the distance between the two coupling halves is the same at all points around the circumference.
- The radial and axial deviation between the two coupling halves must not exceed the values set by the manufacturer, during stand still as well as at operating temperature and under inlet pressure.

5. Re-tighten screws of the support and pump foot without transmitting any stresses and strains.

Dial gauges can be used in the place of ruler and thickness gauge.

Contact the local sales and service representative for any requests or information.

NOTE: Check alignment of coupling again in operation warm condition and on system pressure if available and correct, if necessary. Be sure that the unit can be easily turned by hand.

NOTICE:

Improper alignment of the unit can lead to damages at coupling and unit.

Install the coupling guard

CAUTION:

Never operate the pump without the coupling guard correctly installed.

'Wire mesh' type

1. Open and place the guard (1) in a way that it envelops the bearing cover and the supporting/ adjusting ring (3).
2. Press the supporting/adjusting ring (3) axially to the motor.
3. Screw the fixing devices (2).

4.3.4 Electrical Installation

1. Remove the screws of the terminal box cover.
2. Connect and fasten the power cables according to the applicable wiring diagram.

For wiring diagrams, see figure 6.

The diagrams are also available on the back of the terminal box cover.

- a) Connect the ground (earth) lead.
Make sure that the ground (earth) lead is longer than the phase leads.
- b) Connect the phase leads.

3. Mount the terminal box cover.

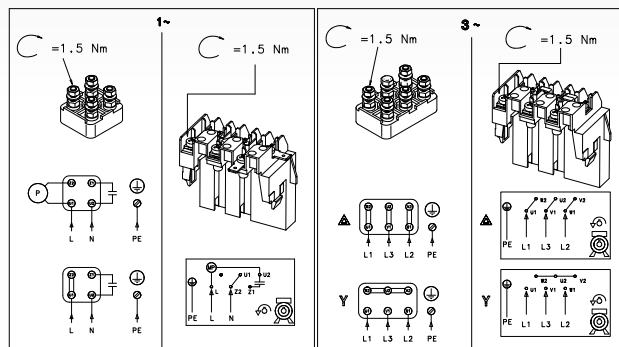


Figure 6

NOTICE:

Tighten the cable glands carefully to ensure protection against cable slipping and humidity entering the terminal box.

4. If the motor is not equipped with automatic reset thermal protection, then adjust the overload protection according to the list below.

- If the motor is used with full load, then set the value to the nominal current value of electric pump (data plate)
- If the motor is used with partial load, then set the value to the operating current (for example measured with a current pincer).
- If the pump has a star-delta starting system, then adjust the thermal relay to 58% of the nominal current or operating current (only for three-phase motors).

5. COMMISSIONING, STARTUP, OPERATION, AND SHUTDOWN

Precautions

WARNING:

- Make sure that the drained liquid does not cause damage or injuries.
- The motor protectors can cause the motor to restart unexpectedly. This could result in serious injury.
- Never operate the pump without the coupling guard correctly installed.

CAUTION:

- The outer surfaces of the pump and motor can exceed 40°C (104°F) during operation. Do not touch with any part of the body without protective gear.
- Do not put any combustible material near the pump.

NOTICE:

- Never operate the pump below the minimum rated flow, when dry, or without prime.
- Never operate the pump with the delivery ON/OFF valve closed for longer than a few seconds.
- Never operate the pump with the suction ON/OFF valve closed.
- Do not expose an idle pump to freezing conditions. Drain all liquid that is inside the pump. Failure to do so can cause liquid to freeze and damage the pump.
- The sum of the pressure on the suction side (mains, gravity tank) and the maximum pressure that is delivered by the pump must not exceed the maximum working pressure that is allowed (nominal pressure PN) for the pump.
- Do not use the pump if cavitation occurs.
- Cavitation can damage the internal components.

5.1 Installation Pump Body

For information about pump plugs, see picture 1. Installations with liquid level above the pump (suction head).

1. Close the on-off valve located downstream from the pump.
2. Remove the fill plug (13) or gauge plug (11) and open the on/off valve upstream until the water flows out of the hole. Close the fill or gauge plug (11&13). Fig. 7 - 8



Picture 1

Positive Priming Pump

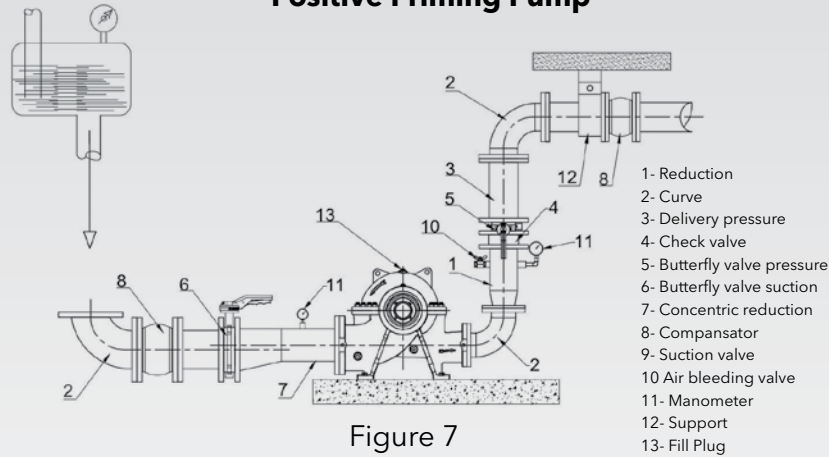


Figure 7

Negative Priming Pump

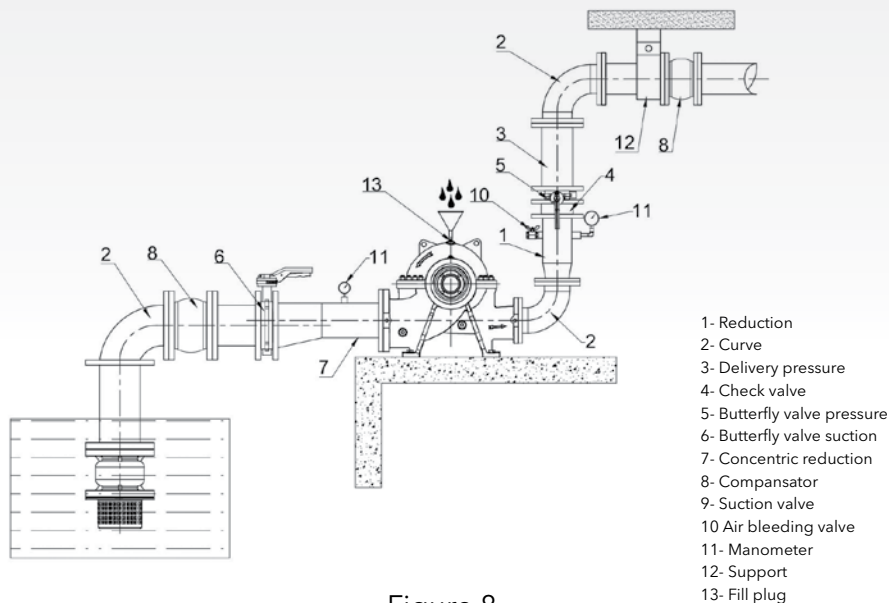


Figure 8

Installations with liquid level below the pump (suction lift)

For an illustration that shows where pump plugs are, see Picture 1.

1. All pipe system empty:
 - a) Open the on-off valve located upstream from the pump.
 - b) Remove the fill plug (13) and the gauge plug (11). Use a funnel to fill the pump through the fill hole until the water flows out of this hole.
 - c) Tighten the fill plug (13) and the gauge plug (11) page 19.
2. Filled discharge pipe system:
 - a) Open the on-off valve located upstream from the pump and open the on-off valve downstream.
 - b) Remove the gauge plug (11) until water flows out of this hole.
 - c) Tighten the gauge plug (11). Fig. 7-8 page 19.

5.2 Check the Rotation Direction (Three-phase Motors)

Follow this procedure before start-up.

1. Locate the arrows on the adaptor or the motor fan cover to determine the correct rotation direction.
2. Start the motor.
3. Quickly check the direction of rotation through the coupling guard or through the motor fan cover.
4. Stop the motor.
5. If the rotation direction is incorrect, then do as follows:
 - a) Disconnect the power supply.
 - b) In the terminal board of the motor or in the electric control panel, exchange the position of two of the three wires of the supply cable. For the wiring diagrams, see Figure 6 on page 17.
 - c) Check the direction of rotation again.

5.3 Start the Pump

The responsibility for checking the correct flow and the temperature of the pumped liquid rests with the installer or owner.

Before starting the pump, make sure that:

- The pump is correctly connected to the power supply.
- The pump is correctly filled according to instructions in fill the pump (chapter 5).
- The on-off valve located downstream from the pump is closed.

1. Start the motor.
2. Gradually open the on-off valve on the discharge side of the pump.

At the expected operating conditions, the pump must run smoothly and quietly. If not, refer to Troubleshooting on page 29-32.

6. MAINTENANCE

Precautions

Electrical Hazard: Disconnect and lock out electrical power before installing or servicing the unit.

WARNING:

- Maintenance and service must be performed by skilled and qualified personnel only.
- Observe accident prevention regulations in force.
- Use suitable equipment and protection.
- Make sure that the drained liquid does not cause damage or injuries.

1. Service

If the user wishes to schedule regular maintenance deadlines, they are dependent on the type of pumped liquid and on the operating conditions of the pump.

Contact the local sales and service representative for any requests or information regarding routine maintenance or service.

Extraordinary maintenance may be necessary to clean the liquid end and/or replace worn parts.

Pumps with greased for life bearings

Pumps with greased for life bearings do not require any scheduled routine maintenance.

Pumps with re-greaseable bearings

- Regrease at 4000 operating hours, but at least once per year. Clean lubrication nipples (SN) first.
- Use NLGI Grade 2 grease or equivalent.

Contact the local sales and service representative for any requests or information.

Motor bearings

After approximately five years, the grease in the motor bearings is so aged that a replacement of the bearings is recommended. The bearings must be replaced after 25000 operating hours or according to the motor supplier maintenance instructions, whichever is shorter.

Motor with regreaseable bearings

Follow motor supplier maintenance instructions.

Coupling

Check the clearance in the coupling elements regularly, at least once a year. We recommend checking every 1000 operating hours or every three months, whichever comes first.

6.2. Inspection Checklist

Check the coupling	Check the flexible elements of the coupling. Replace the relevant parts if there is any sign of wear and check the alignment.
Check the mechanical seal	Check for leakage of the mechanical seal. Re- place the mechanical seal if leakage is found.
Checking the bearing seals	Check correct seating of axial seal rings mounted on the shaft. Only gentle contact of the sealing lip shall be established.
Check for quiet running	Check frequently for quiet running of the pump with vibration measurement tools.

7.DISMANTLING AND REPAIR OF PUMP

7.1 General Remarks



Repair to the pump or pump system may only be carried out by authorised skilled personnel or by the manufacturer's specialist staff.



When disassembling the pump pay attention to chapter 1 and chapter 2.



If dangerous liquids are pumped the appropriate disposal of the handled liquid is necessary before the disassembly of the pump. Pay attention to the fact, that even in drained pumps there are remainders of the handled liquid. If necessary the pump must be flushed or decontaminated. Laws must be observed, otherwise danger to health is existing!

- Before the disassembly the pump has to be secured in such a way, that it can't be started.
- The pump casing must be drained and without pressure.
- All locking devices in the suction- and discharge-pipe must be closed.
- All parts must have taken on the temperature of the environment.



Secure disassembled pumps, units or single parts against tipping over or rolling off.



While disassembling the pump use of an open flame (blowlamp, etc.) only, when there is no danger of setting fire, cause an explosion or cause injurious vapours. Never apply heat to remove the impeller. Use of heat may result in severe physical injury and property damage.



Use original spare parts only. Pay attention to the right materials and the matching design.

7.2 General



Works, which require shocks (hammer), must only be performed outside the explosive atmosphere or only non-sparking tools must be used.

Carry out disassembly and mounting according to the appropriate sectional drawing (Technical Appendix page 33-41). You will only need common tools. Before disassembly check if required parts are ready. Disassemble the pump only so far, as required for the replacement of the repair part.

7.3 Disassembly of Upper Half of the Pump

- Drain volute casing through the drain plug. Pic.1
- Remove coupling guard.
- Remove spacer of the spacer type of coupling and the coupling by using excrator. Picture 2-3
- Loose and take all the bolts and the upper half at the pump casing. As the pumps are constructed for process design the volute half can stay on the base frame, unless the volute casing itself must be repaired.
- Hang the casing upper half a lifting device.
- Example see picture 4 for lifting recommendations.

7.4 Removal of Bearing Housing

Remove the inboard & outboard bearing houses. Pic. 5

- Remove retaining ring & bearing shim.
- Remove the ball bearings from the shaft using a puller pic. 6-7.

7.5 Reconditioning

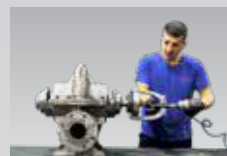
After disassembly all parts must be cleaned and checked for wear carefully. Worn or damaged parts must be replaced by new parts (spare parts). When reassembling the pump it is recommended to replace all seals.



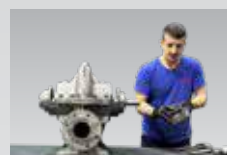
All PTFE-sealing elements and graphite sealings are intended for being used only once

In most cases it make sense, if damaged absolutely necessary, to renew the mechanical seal and the bearings.

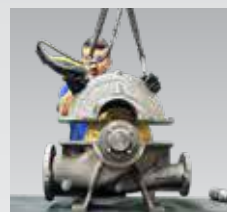
Deposits on the impeller, in the volute casing or on the casing cover seal chamber must be removed.



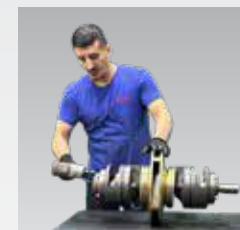
Picture 2



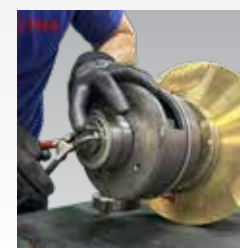
Picture 3



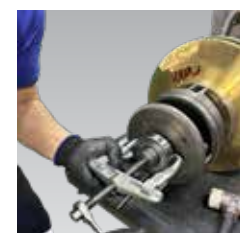
Picture 4



Picture 5



Picture 6



Picture 7

7.6 Removal of the Mech. Seal

Use the sectional drawing and data sheet of the mech. seal for this purpose.

- Remove and disassemble the pump according to the Installation, Operation and Maintenance Instructions including chapter 7.
- Remove the rotating part of the mech. seal from shaft. Pic.8

Remove the stationary part of the mech. seal out of the seal housing. Pic.9.

Remove the rotating part of the seal from shaft.



The reuse of mech. seals that have already been used for a longer time can lead to leaking at the seal faces after reinstallation. Therefore the replacement of The mech. seal with a new one is recommended. The removed mechanical seal can be reconditioned by the manufacturer and serve as a replacement mech. seal.



Picture 8



Picture 9

7.7 Installation of the Mech. Seal

Use the sectional drawing and data sheet of the mech. seal for this purpose page 37.



Only mech. seals that have a certificate of Conformity according to the Directive 94/9/ EC may be installed. On changing the mech. seal type or the mech. seal manufacturer, the data regarding max. operating temperature of the pumped medium and temperature class must be checked again.



Pay attention to the utmost cleanness! Especially the seal faces must be clean, dry and undamaged. Don't apply lubrication on the seal faces of the mech. seal.

If a lubricant is provided with the replacement mech. seal, you should use this.



Use mineral grease or oil only if you are completely sure that the elastomers of the mech. seal are oil resistant. Use no silicone.



Use only lubricants with which you are certain that no dangerous reaction can occur between the lubricant and the pumped medium.



Have all required parts prepared so that assembly can be completed quickly. The lubricants are only effective for a short time. After that, the axial mobility and thus the automatic adjustment of the elastomers is lost.



Never push elastomers over sharp edges. If necessary, use mounting devices.

- Press the stationary part of the mech. seal evenly into the seal housing. For this you can use a stamp with a soft surface, if necessary. Unequal load can lead to cracking of the seal face.
- Don't damage the seal face!
- Make certain that the stationary ring is in solid axial contact with the casing housing. The seal face must be installed perpendicular to the shaft.
- If a pin is present, make certain that it fits into the groove of the mech. seal without touching the mech. seal.
- Slide the rotating unit of the mech. seal onto the shaft. If you wish to use the impeller-side (sharp-edged) end for sliding on, you must use an installation tool with a corresponding slant diameter. (inside ØdL, outside Ød1).
- Fit the impeller side surface of the mech. seal precisely to dimension.

During installation, push the mech. seals with a bellows in such a way that the bellows is compressed and not stretched (danger of tearing apart!).

Use lubricant (Molykote, etc.) between the shaft and impeller only if you are certain that no dangerous reactions can occur between the pumped liquid and the lubricant.

Further assembly and installation of pump according to chapter 7.8 of Installation, Operation and Maintenance Instructions.

7.8 The Stuffing Box (soft packing sealed models)

Use the sectional drawing and seal housing for stuffing box fig.13 page.36 .

Remove and disassemble the pump according to the installation, operation and user manual. The stuffing box is the name given to the hole section which houses the seal around the pump shaft preserving the barrier between the inner and outer diameter of the pump shaft or sleeve, while allowing the shaft to turn in the casing in a way that allows movement and prevents leakage.

Within the stuffing box, a lantern ring is the simple circular component, which takes place between the packing rings of the pump's shaft to maintain the seal. The stuffing box should be provided 4 packing rigs + 1 lantern ring. By surrounding the lantern ring with the packing, a tight seal can be maintained within the compressor unit, and this collective part is commonly known as the gland.

The function of the stuffing box and lantern ring within all of designs not only provide a more efficient output from the pump but also to prevent contaminants, abrasives and chemicals from entering the pump.

Packing Rings

Sealing rings are present in pump that requires lubrication. The pump packing includes lantern rings that provide several vital functions:

- Facilitate lubrication distribution to the packing material
- Distribute cooling water to the packing rings
- Help flush chemicals from packing
- Keep the stuffing box clear of debris and contaminants

These tasks directly contribute to the life of the pump, making proper installation of lantern rings an essential part of your pump maintenance.

The Purpose Of The Lantern Ring

Within the workings of a pump, the ring lantern has one of the most important roles, as it simultaneously serves several different purposes. The importance of the pump lantern ring is also increased by the fact that the most common cause of pump failure is damage to the pump shaft or sleeve. This means that the quality and efficiency of the lantern ring is integral to the overall functionality of the whole system.

Another main advantage is that the lantern ring is designed for to add lubrication into the contact points to reduce friction. This again helps to reduce the wear on the parts and also helps to protect against corrosion and reduces the amount of excess heat generated within the system. The lantern ring designs also distribute water into the packing seal and shaft or shaft sleeve, which again further regulates the temperature by dispersing heat created. We recommend using original lantern ring.

An equally important purpose of the lantern ring is the increased running time that it allows the sealing system to be operational. The lantern ring not only provides greater durability, but the ease with which the staff can also be maintained means that servicing and repairs can be completed much quicker.

Lantern Ring Placement And Maintenance

The perforations in a lantern ring allow a cooling substance, usually water , to reach the packing and shaft or shaft sleeve of the pump. The lantern ring must be properly located in order to flush the shaft and avoid breakdowns. If a ring is improperly placed, it could actually block the cooling substance. Using a low quality lantern ring can save money but increase the chance that the ring becomes deformed by heat and collapse. So always use original lantern rings.

The pump packing includes lantern rings that provide several vital functions.

- Facilitate lubrication distribution on the packing material
- Distribute cooling water to the packing rings.
- Help flush chemicals from the packing.
- Keep the stuffing box clear debris and contaminants.

Pump maintenance is essential to ensure your pump functions well, but there are a few common maintenance mistakes involving lantern rings that you should note;

- Check to be sure you did not forget to reinstall lantern ring.
- Do not guess where the lantern ring was placed. Make a note before you remove all rings for maintenance
- Lantern ring should be lined up with the flushing hole in the stuffing box.
- Avoid temptation to add extra packing during maintenance as this leaves less space for the lantern ring to flush lubrication.

Making sure your packing rings are properly placed and have adequate space to perform their functions will keep the pump running well. Careful maintenance and quality packing rings will be worthwhile when you extend the life of your pump.

7.9 Removal of Impeller & Wear Rings



Note attached "Mounting Instruction for Shaft Sealing".

- After taking the wear rings and pulling seal shaft sleeve.
- Draw off the impeller with your hands carefully (picture 10).
- Remove key.



Be sure to locate pry bars or rubber base under impeller vanes to prevent damage to the impeller.

- For further dismantling the shaft assembly should be placed in the horizontal position (half shaft, see picture 5, page 23).
- Attention: Precautions should be taken to prevent the parts from tipping!



Picture 10



Picture 11

Disassembly

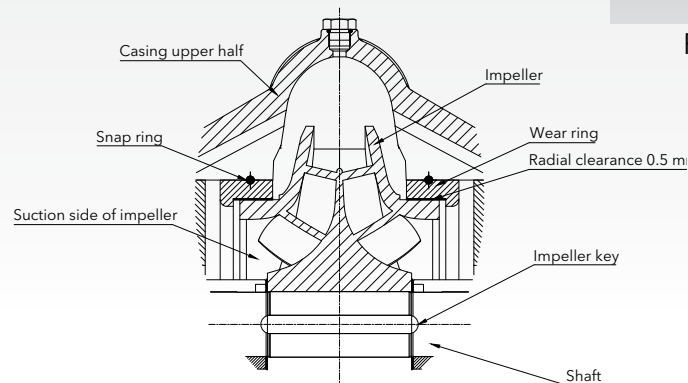


Figure 9

When the wear limits has been reached or exceeded, the worn parts must be replaced. For wear ring tolerances table see page 38.

For volute casings with a wear ring and cover seal chambers casings with a wear ring there are the following possibilities to restore the correct clearance:

- a) Renew impeller and wear rings. Then the original measures are restored.
- b) A customized wear ring (bored to fit) can be supplied to avoid replacement of the impeller. Please contact factory for details.

If the impeller is in good position, the wear rings can be replaced to renew pump performance. Please contact the factory for details and assistance.

7.10 Mounting

Re-assemble the pumps using the reverse order of steps as completed for pump disassembly. However the following observations should be considered:

- Pay attention to the utmost cleanliness when reassembling the pump.
- For tight tolerances, e.g. casing and bearing housing, as well as thread, use a suitable anti-galling compound (e.g. Molykote), so that the assembly and the next disassembly will be easier.



Anti-galling compound must be compatible with the pump.

- Screws should be tightened, with the following torque:

Location	Screw Size	Screw torque in Nm	
		Lubricated Threads	Dry Threads
Casing screws	M12	35	50
	M16	105	150
	M20	210	305
All other screws	M10	35	50
	M12	60	90
	M65	150	220

- For mounting of the mechanical seal see separate description "Installation of the mechanical seal".
- Before mounting new bearings, warm them up to 80°C in an oil bath or using a bearing heater. If necessary use a tube to force the inner ring onto the shaft by gentle taps with a hammer and/or use hydraulic press.
- Before mounting shaft assembly into the casing lower half insert the retaining ring inboard & outboard into the groove. The clearance between bearing outboard face and retaining ring groove should be 0,5-1 mm. If necessary adjust by using shims. Then insert the retaining rings outboard & inboard shaft bearings.
- Fasten the housing bearing inboard & outboard using the torque table, coming down.

- Place the gasket on to the casing lower half.
- After mounting the upper casing on to the lower casing turn the shaft and control the free moving of the pump in this way. The shaft sealings will cause slightly resistance when turning but there must not be any contact between metal parts (pic 6).

8. TROUBLESHOOTING

8.1 Troubleshooting for Users

The main switch is on, but the electric pump does not start.

Cause	Remedy
The thermal protector incorporated in the pump (if any) has tripped.	Wait until the pump has cooled down. The thermal protector will automatically reset.
The protective device against dry running has tripped.	Check the liquid level in the tank, or the mains pressure.

The electric pump starts, but the thermal protection trips a varying time after.

Cause	Remedy
There are foreign objects (solids or fibrous substances) inside the pump which have jammed the impeller.	Contact the Sales and Service Department.
The pump is overloaded because it is pumping liquid that is too dense and viscous.	Check the actual power requirements based on the characteristics of the pumped liquid and then contact the Sales and Service Department.

The pump runs but delivers too little or no liquid.

Cause	Remedy
The pump is clogged.	Contact the Sales and Service Department.

The troubleshooting instructions in the tables below are for installers only.

8.2 The Main Switch Is On, But The Electric Pump Does Not Start

Cause	Remedy
There is no power supply.	<ul style="list-style-type: none">• Restore the power supply.• Make sure all electrical connections to the power supply are intact.
The thermal protector incorporated in the pump (if any) has tripped.	Wait until the pump has cooled down. The thermal protector will automatically reset.
The thermal relay or motor protector in the electric control panel has tripped.	Reset the thermal protection.
The protective device against dry running has tripped.	Check the: <ul style="list-style-type: none">• Liquid level in the tank, or the mains pressure.• Protective device and its connecting cables.
The fuses for the pump or auxiliary circuits are blown.	Replace the fuses.

8.3 The Electric Pump Starts, But The Thermal Protector Trips Or The Fuses Blow Immediately After

Cause	Remedy
The power supply cable is damaged.	Check the cable and replace as necessary
The thermal protection or fuses are not suited for the motor current	Check the components and replace as necessary
The electric motor is short circuit.	Check the components and replace as necessary
The motor overloads	Check the operating conditions of the pump and reset the protection.

8.4 The Electric Pump Starts, But The Thermal Protector Trips Or The Fuses Blow a Short Time After

Cause	Remedy
The electrical panel is situated in an excessively heated area or is exposed to direct sunlight.	Protect the electrical panel from heat source and direct sunlight
The power supply voltage is not within the working limits of the motor.	Check the operating conditions of the motor
A power phase is missing.	Check the <ul style="list-style-type: none">• Power supply• Electrical connection

8.5 The Electric Pump Starts, But The Thermal Protector Trips a Varying Time After

Cause	Remedy
There are foreign objects (solids or fibrous substances) inside the pump which have jammed the impeller.	Contact the local sales and service representative.
The pumps delivery rate is higher than the limits specified on the data plate.	Partially close the on-off valve downstream until the delivery rate is equal or less than the limits specified on the data plate.
The pump is overloaded because it is pumping liquid that is too dense and viscous.	Check the actual power requirements based on the characteristics of the pumped liquid and replace the motor accordingly.
The motor bearings are worn.	Contact the local sales and service representative.

8.6 The Electric Pump Starts, But The System's General Protection is Activated

Cause	Remedy
A short circuit in the electrical system.	Check the electrical system.

8.7 The Electric Pump Starts, But The System's Residual Current Device (RCD) is Activated

Cause	Remedy
There is a ground (earth) leakage.	Check the insulation of the electrical system components

8.8 The Pump Runs But Delivers Too Little or No Liquid

Cause	Remedy
There is air inside the pump or the piping.	<ul style="list-style-type: none"> • Bleed the air
The pump is not correctly primed.	Stop the pump and repeat the prime procedure. If the problem continues: <ul style="list-style-type: none"> • Check that the mechanical seal is not leaking. • Check the suction pipe for perfect tightness. • Replace any valves that are leaking.
The throttling on the delivery side is too extensive.	<ul style="list-style-type: none"> • Open the valve.

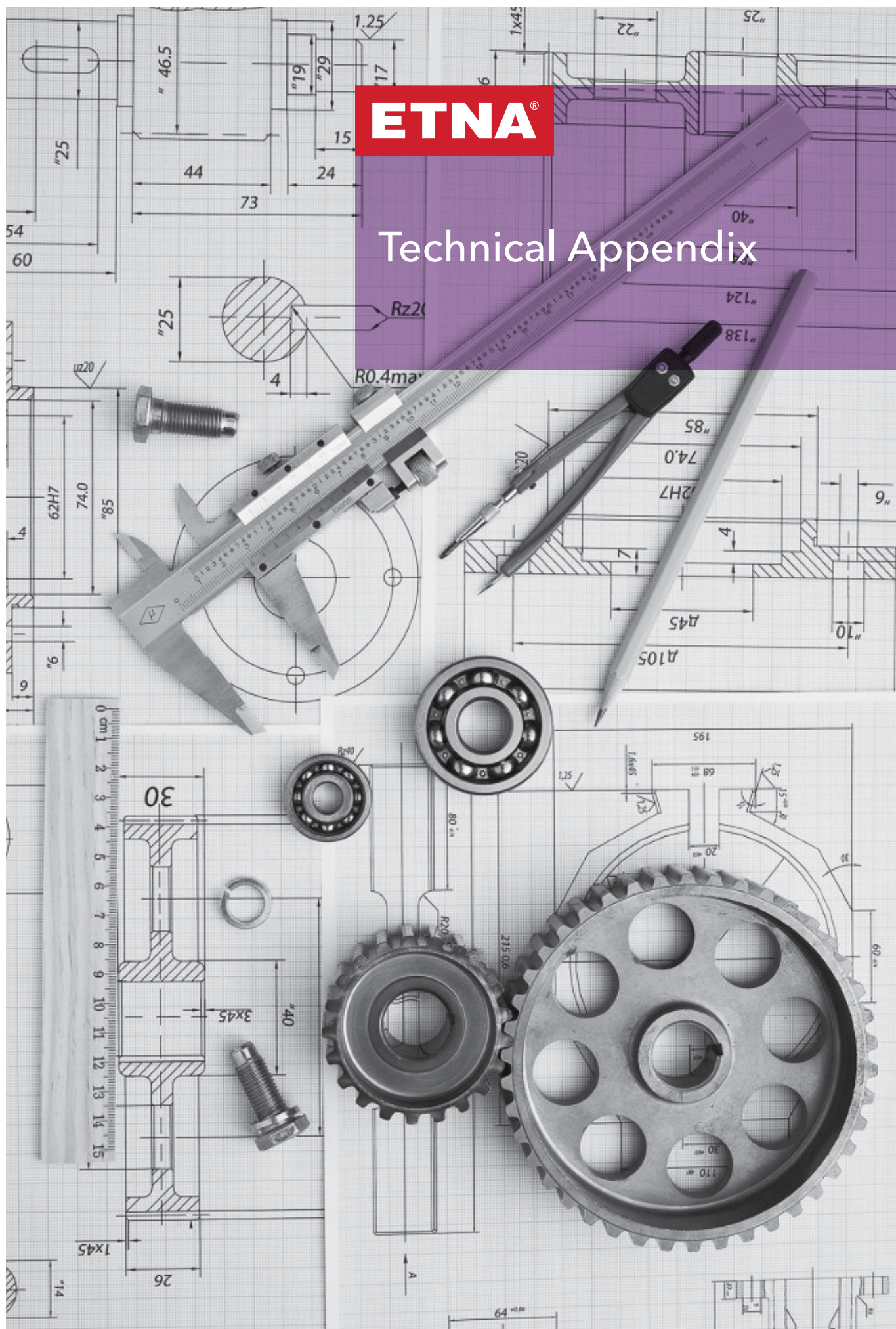
Cause	Remedy
Valves are locked in closed or partially closed position.	Disassemble and clean the valves.
The pump is clogged.	Contact the local sales
The piping is clogged.	Check and clean the pipes.
The rotation direction of the impeller is wrong (three-phase version)	Change the position of two of the phases on the terminal board of the motor or in the electric control panel
The suction lift is too high or the flow resistance in the suction pipes is too great.	Check the operating conditions of the pump. If necessary, do the following: <ul style="list-style-type: none"> • Decrease the suction lift • Increase the diam

8.9 The Electric Pump Stops, and Then Rotates in The Wrong Direction

Cause	Remedy
There is a leakage in one or both of the following components: <ul style="list-style-type: none"> • The suction pipe • The foot valve or the check valve 	Repair or replace the faulty component.
There is air in the suction pipe.	<ul style="list-style-type: none"> • Bleed the air.

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Technical Appendix

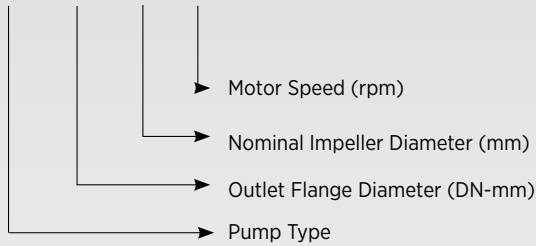


Motor Specifications

Network Connection	: 3*400V, 50Hz
Motor Speed	: 2900 rpm
Motor Power	: 90 - 315 kW
Motor Efficiency	: IE2
Protection Class	: IP55
Insulation Class	: F

Pump Identification Code

ESC 125 290 2900



Name Plate



Figure 10

1. Pump Type
2. Year of Production
3. Serial Number of Pump
4. Flow Range
5. Head Range
6. Pump Power
7. Speed

9. PACKING SEAL

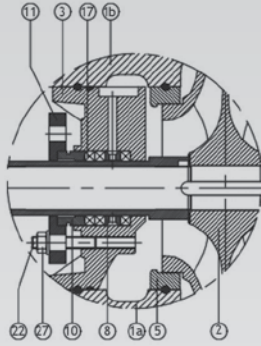


Figure 11

No	Material
1a	Casing Lower Half
1b	Casing Upper Half
2	Impeller
3	Cover Stuffing Box
5	Casing Ring
8	Lantern Ring
10	Gland
11	Gland Holder
17	Packing
22	Stud
27	Nut

PUMP TYPE	PACKING DETAIL	
	LENGTH	DIAMETER
ESC 80/370	260	10x10
ESC 100/310G	260	10x10
ESC 100/375G	260	10x10
ESC 125/290	260	12x12
ESC 150/290	260	12x12

BQ1VGG : Carbon/Silicon Carbide/FKM
 BQ1EGG : Carbon/Silicon Carbide/EPDM
 Q1Q1VGG : Silicon Carbide /Silicon Carbide/FKM
 Q1Q1EGG : Silicon Carbide /Silicon Carbide/EPDM
 U3AEGG : Tungsten Carbide/ Metal Impregnated Carbon /EPDM
 U3AVGG : Tungsten Carbide/ Metal Impregnated Carbon /FKM

10. MECHANICAL SEALS

Elastomer bellows seal with mounting dimensions according to EN 12756 and ISO 3069

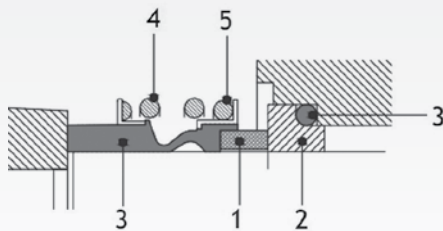
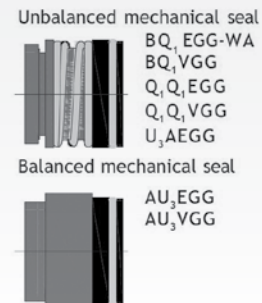


Figure 12



POSITION 1-2	POSITION 3	POSITION 4-5
B: Resin impregnated carbon	E: EPDM	G: AISI 316
A: Antimony impregnated carbon	V: FKM (FPM)	
Q1: Silicon carbide		
U3: Tungsten carbide		

11. ESC SECTION DATA OF SOFT PACKING SHEET

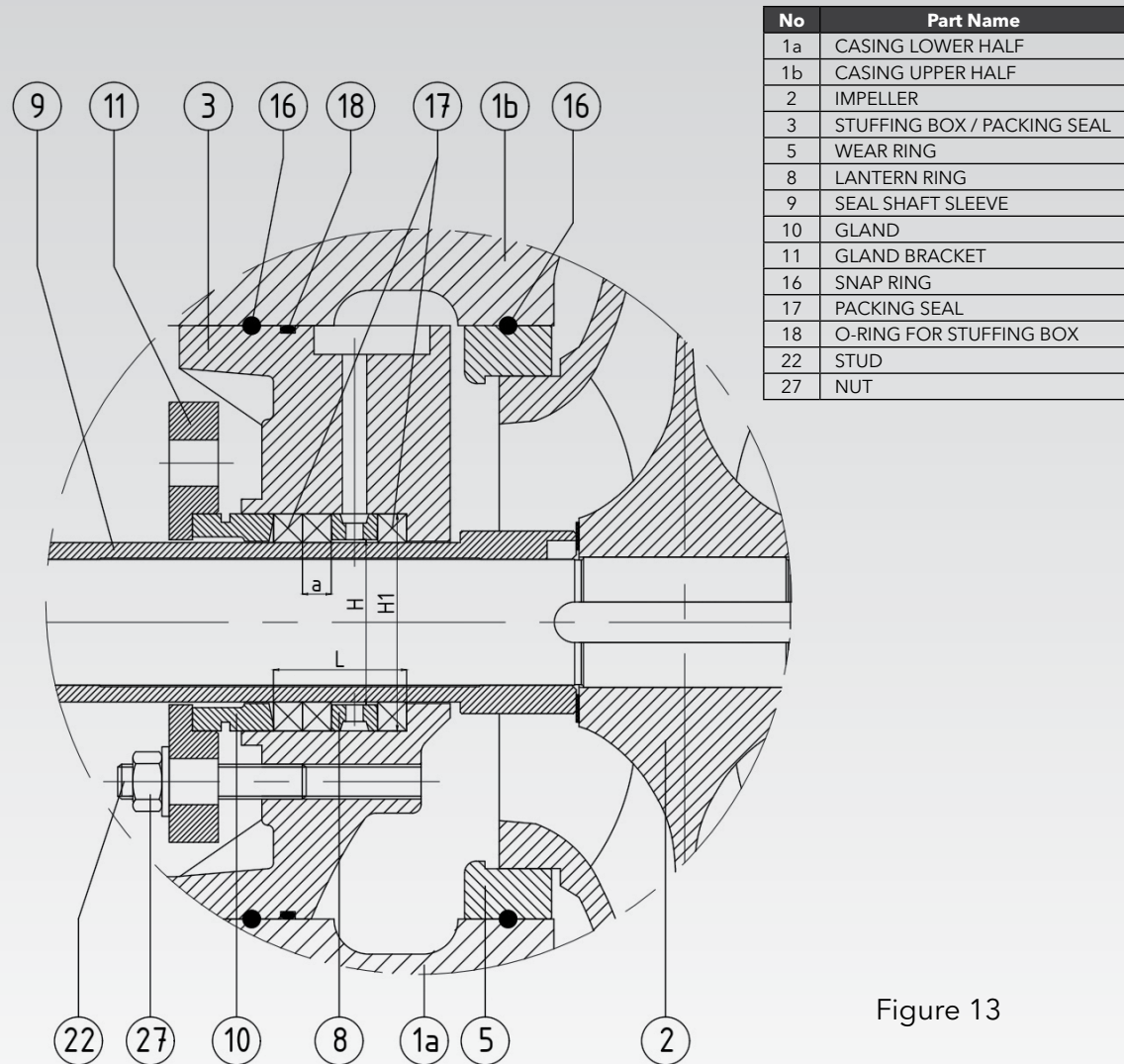


Figure 13

Type	Bearing (Motor Side)	Bearing (Dead Side)	Seal (Soft Packing) (H1xHxaxL)mm	Sealing
ESC 80-370	6308(40x90x23)	6308(40x90x23)	075x055x12x65	2x(4 Soft Packing + 1 Lantern Ring
ESC 100-310G	NU308(40x90x23)	6308(40x90x23)x2	075x055x12x65	2x(4 Soft Packing + 1 Lantern Ring
ESC 100-375G	NU308(40x90x23)	6308(40x90x23)x2	075x055x12x65	2x(4 Soft Packing + 1 Lantern Ring
ESC 125-290	6309 (45x100x25)	6309(45x100x25)	085x060x12x70	2x(4 Soft Packing + 1 Lantern Ring

12. ESC SECTIONAL DATA OF THE MECHANICAL SEAL SHEET

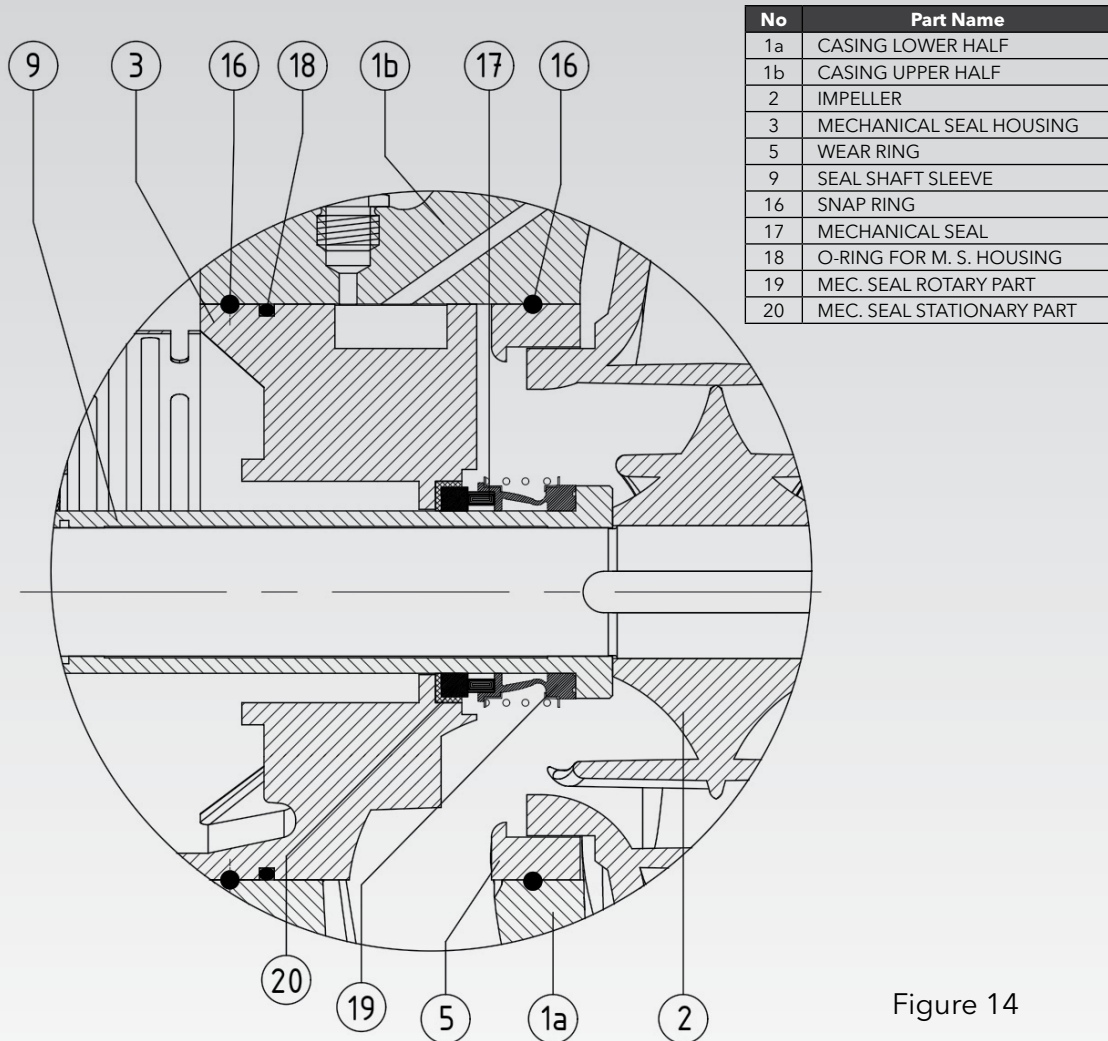
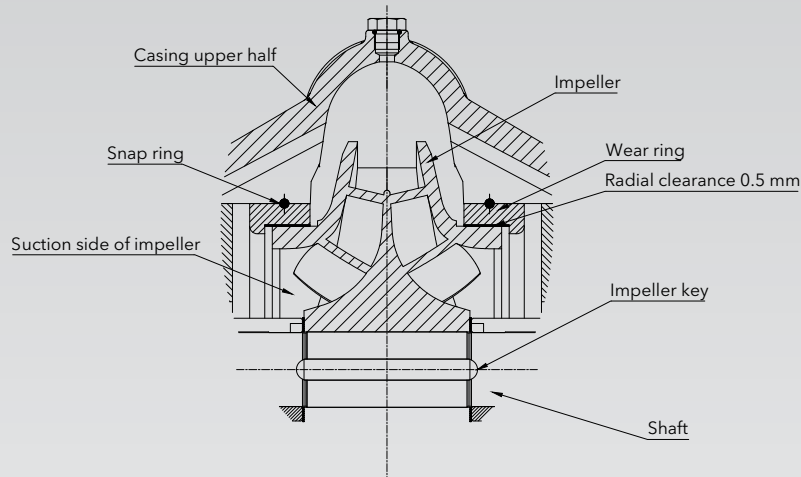


Figure 14

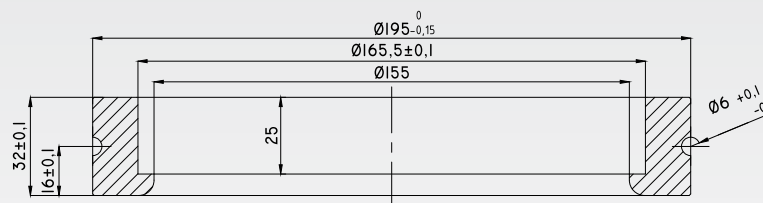
Type	Bearing (Motor Side)	Bearing (Dead Side)	Seal (Mechanical Seal)	Mechanical Seal Material
ESC 80-370	6308(40x90x23)	6308(40x90x23)	MG12-55	M106K / CE / EPDM / SUS304
ESC 100-310G	NU308(40x90x23)	6308(40x90x23)x2	MG12-55	M106K/ CE / EPDM / SUS304
ESC 100-375G	NU308(40x90x23)	6308(40x90x23)x2	MG12-55	M106K/ CE / EPDM / SUS304
ESC 125-290	6309 (45x100x25)	6309(45x100x25)	MG12-60	M106K/ CE / EPDM / SUS304

13. IMPELLER & WEAR-RINGS



When the wear limits has been reached or exceeded, the worn parts must be replaced.
For wear ring tolerances table see page 38.

14. ESC 80-370 - ESC 100-310G - ESC 100-375G WEAR RING AND O-RING



15. ESC 125-290 WEAR RING AND O-RING

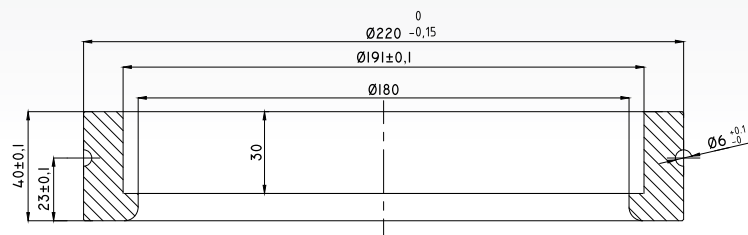


Figure 15

16. ESC PUMP EXPLODED VIEW SOFT PACKING SEALED MODELS

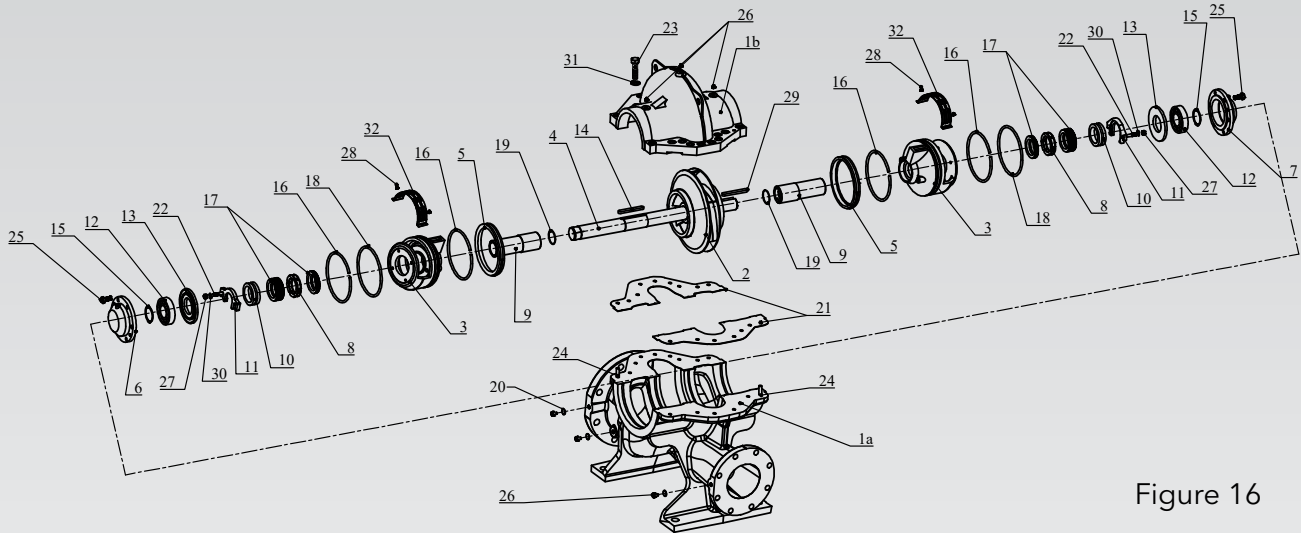


Figure 16

No	Part Name	Piece	Material
1a	Casing Lower Half	1	Gray Cast Iron / GG25
1b	Casing Upper Half	1	Gray Cast Iron / GG25
2	Impeller	1	Bronze / CuSn7
3	Cover Stuffing Box	2	Gray Cast Iron / GG25
4	Shaft	1	Stainless Steel / AISI 420
5	Casing Ring	2	Bronze / CuSn7
6	Housing Bearing Outboard	1	Gray Cast Iron / GG25
7	Housing Bearing Inboard	1	Gray Cast Iron / GG25
8	Lantern Ring	2	Bronze / CuSn7
9	Seal - Shaft Seal	2	Bronze / CuSn7
10	Gland	2	Bronze / CuSn7
11	Gland Holder	2	Gray Cast Iron / GG25
12	Bearing	2	Rulman Tablosuna Bakınız
13	Bearing Seal Cover	2	KK-T NBR
14	Impeller Key	1	DIN 6885-Ç45K
15	Retaining Ring	2	DIN 471
16	Ring	4	AISI 304
17	Packing	6	BURAFILON
18	O-Ring	2	NBR
19	O-Ring	2	NBR
20	O-Ring	7	NBR
21	Gasket Klingerit	2	t=1 mm
22	Stud	4	10.2
23	Bolt	14	DIN125A
24	Centring Pin	2	10.2
25	Bolt	8	10.2
26	Plug	7	G3/8"
27	Nut	4	8
28	Bolt	2	DIN125A
29	Motor Key	1	DIN 6885-Ç45K
30	Washer	4	DIN125A
31	Washer	14	DIN125A
32	Seal Guard Sheet	2	DIN 6885-A

Material	GG25	GG40	CuSn7	CuSn10	AISI 420	AISI 316	AISI 304
Part Name							
Casing Lower Half	◆	◇					
Casing Upper Half	◆	◇					
Impeller	◇		◆	◇			
Shaft					◆	◇	◇

◆ Standard Product
◇ Optional Product

* Wear rings are optional

17. ESC PUMP EXPLODED VIEW MECHANICAL SEALED MODELS

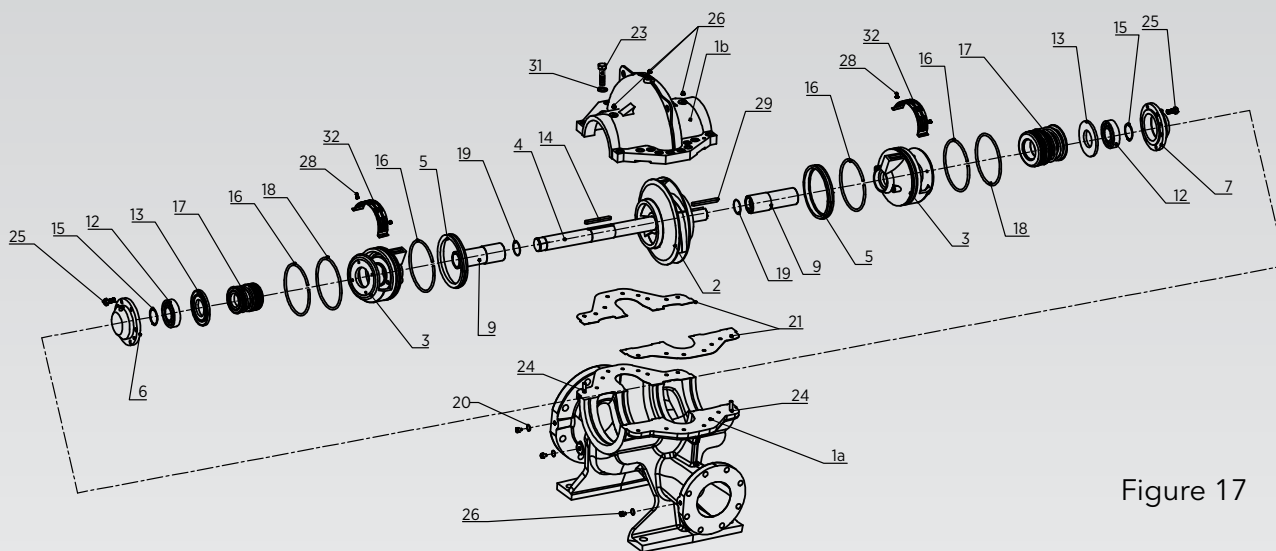


Figure 17

No	Part Name	Piece	Material
1a	Casing Lower Half	1	Gray Cast Iron / GG25
1b	Casing Upper Half	1	Gray Cast Iron / GG25
2	Impeller	1	Bronze / CuSn7
3	Cover Stuffing Box	2	Gray Cast Iron / GG25
4	Shaft	1	Stainless Steel / AISI 420
5	Casing Ring	2	Bronze / CuSn7
6	Housing Bearing Outboard	1	Gray Cast Iron / GG25
7	Housing Bearing Inboard	1	Gray Cast Iron / GG25
9	Seal - Shaft Seal	2	Bronze / CuSn7
12	Bearing	2	See the Bearing Table
13	Bearing Seal Cover	2	KK-T NBR
14	Impeller Key	1	DIN 6885-C45K
15	Retaining Ring	2	DIN 471
16	Ring	4	AISI 304
17	Mechanical Seal	2	M106K / CE / EPDM / SUS304
18	O-Ring	2	NBR
19	O-Ring	2	NBR
20	O-Ring	7	NBR
21	Gasket Klingerit	2	t=1 mm
23	Bolt	14	DIN125A
24	Centring Pin	2	10.2
25	Bolt	8	10.2
26	Plug	7	G3/8"
28	Bolt	2	DIN125A
29	Motor Key	1	DIN 6885-C45K
31	Washer	14	DIN125A
32	Seal Guard Sheet	2	DIN 6885-A

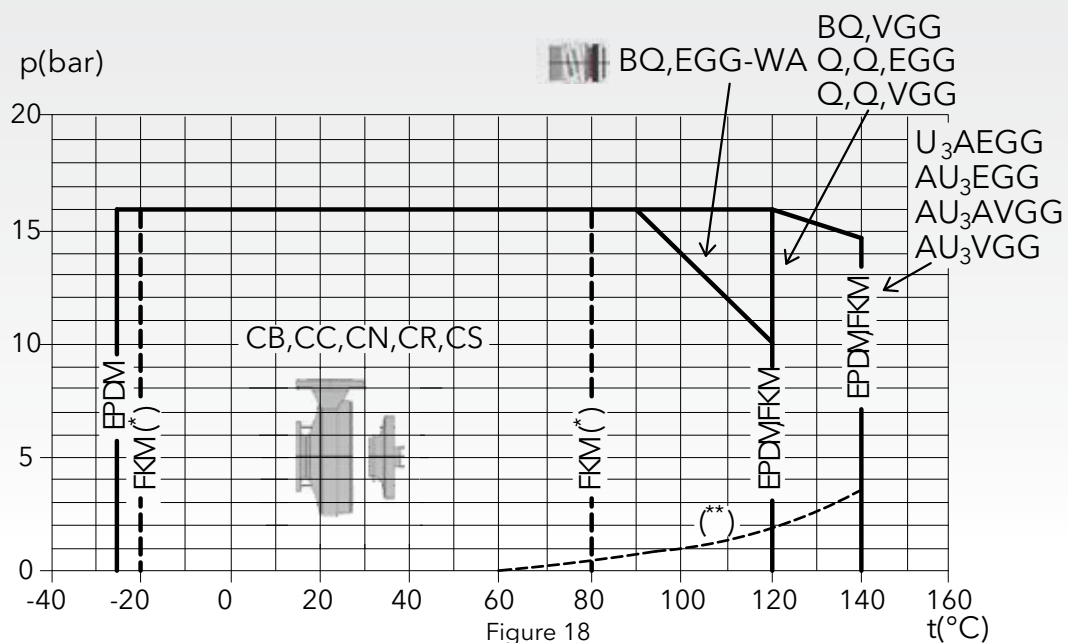
Part Name \ Material	Material						
	GG25	GG40	CuSn7	CuSn10	AISI 420	AISI 316	AISI 304
Casing Lower Half	◆	◇					
Casing Upper Half	◆	◇					
Impeller	◇		◆	◇			
Shaft					◆	◇	◇

◆ Standard Product
◇ Optional Product

* Wear rings are optional

18. PRESSURE / TEMPERATURE APPLICATION LIMITS FOR COMPLETE PUMP

TYPE	POSITION					Pressure (bar)	Range Temperature (°C)
	1	2	3	4	5		
	Rotating Assembly	Fixed Assembly	Elastomers	Springs	Other Components		
STANDARD MECHANICAL SEAL							
B Q1 E G G - WA	B	Q1	E	G	G	16/10	-25 ... +90/+120
OTHER TYPES OF MECHANICAL SEAL							
B Q1 V G G	B	Q1	V	G	G	16	-20 ... +120 *)
Q1 Q1 E G G	Q1	Q1	E	G	G	16	-25 ... +120
Q1 Q1 V G G	Q1	Q1	V	G	G	16	-20 ... +120 *)
U3 A E G G (Ø < 38)	U3	A	E	G	G	16	-25 ... +140
A U3 E G G (Ø > 38)	A	U3	E	G	G	16	-25 ... +140
U3 A V G G (Ø 38)	U3	A	V	G	G	16	-20 ... +140 *)
A U3 V G G (Ø > 38)	A	U3	V	G	G	16	-20 ... +140 *)
*) for hot water: max. +80 °C							



(*) hot water (**) minimum pressure required at mechanical seal
(hot water; could be different in case of other liquids)

NOTES

NOTES



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