

BEDU
≡ POMPEN ≡

**Instruction for installation,
operation & maintenance**

FM range



made for your process

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OPERATING & MAINTENANCE INSTRUCTIONS

1. INTRODUCTION

The following instructions contain important information on the operation, maintenance and installation of Bedu pumps. The observance of these directives is essential for the appropriate use of the machine.

1.1 Operating Instructions

Each pump is produced in relation to a specific order, and for this reason the serial number and the model indicated in this manual should be exactly the same as the model no. and serial no. indicated on the machine's nameplate.

1.2 The Company

The manufacturer of the pump is Bedu Pompen B.V.

1.3 Range, size, year of construction and serial Number

The range, the model no., year of construction, and the serial number are indicated in this manual, and are stated on the type plate of the machine.

1.4 Essential information for enquiries and orders

This information is required when inquiring about spare parts parts or placing orders:

- 1) Model of the machine.
- 2) Year of construction and serial Number.

1.5 Acoustic level pressure

The Acoustic level pressure is measured in accordance with OSHA CFR 1910.95 to assure that our machines does not exceed 85 dB (A).

The noises emission generated by the drive and the pipes are not included in the above emission value.

In order to maintain a noise emission level under 85 dB (A), the pump must be mounted correctly and not allowed to cavitate.

1.6 Operating Purposes

The pump must not be operated outside of the parameters specified in the order.

OPERATING & MAINTENANCE INSTRUCTIONS

2 Safety Precautions

These operating instructions contain safety precautions that must be observed. This manual should be read and understood by the mechanical fitter, as well other responsible operators prior to assembly and operation. The instructions should be safely kept at the operating site where the machine is being used.

Following are symbols commonly used to indicate areas of danger:

Safety Sign
Ranger to general Public



Safety Sign,
Electrical Hazard.



Danger from possible Injury by Machinery.



Danger from Suspended loads.



Damage to machinery.



Eyes protection sign.



OPERATING & MAINTENANCE INSTRUCTIONS

2.1 Personnel qualifications and training

The end user must ensure that the personnel responsible for the operation, maintenance, inspection and assembly are in possession of the appropriate qualifications for the tasks. Personnel lacking the appropriate skills and knowledge should receive the correct training and instruction.

2.2 Non-observance of safety precautions

Failure to comply with the safety instructions may lead to hazards to life and limb, as well as dangers for the environment and for the pump.

The following are just some examples of possible dangers resulting from failure to comply with the safety instructions:

1. Failure of important machine/plant functions.
2. Premature failure of components or machine/equipment malfunction
3. Danger to the environment from leakage of dangerous materials .
4. Danger to personnel from electrical, mechanical or chemical hazards.

2.3 Safety rules

During maintenance and repair work on the pump, please note the following:

- 1) Keep in mind the simple safety rules that we have included in this operating instructions
- 2) Keep in mind and adhere to applicable local and international rules and regulations.
- 3) Keep in mind and adhere to the internal safety precautions and indications.

Non observance can void product warranty.

2.4 Safety instructions for the end-user.

1. Personnel should use the appropriate personal protection equipment [ppe]
2. Protective guards for moving parts (e.g. coupling) must never be removed whilst the machine is in operation.
3. Leakages (e.g. in the shaft seal) of hazardous liquids (e.g. explosive, toxic, hot) must be drained in such a way that no danger arises for persons or for environment. Always observe the relevant statutory requirements
4. The risk of exposure to electrical power must be eliminated.
5. Where appropriate risk assessments and/or methods statements should be provided prior to any work being carried out

2.5 Safety Instructions for maintenance, Inspection and Assembly Work

1. The end user must ensure that all maintenance, inspection and installation work is performed by authorised and qualified personnel who understand the operating instructions and are properly trained.
2. Pumps or units which transfer dangerous substances must be decontaminated.
3. Work on a pump/machine should only be performed when it is disconnected and safely isolated from its power source, pressure has been relieved, and the complete unit has returned to room temperature. It is imperative that these procedures are adhered to before attempting work on the machine.
4. Immediately following completion of work, all safety and protective devices must be replaced in position and, where applicable, re-activated.
5. Refer to section 5 Assembly and installation.
6. Where appropriate risk assessments and/or methods statements should be provided prior to any work being carried out

OPERATING & MAINTENANCE INSTRUCTIONS

2.6 Unauthorised use of spare parts and/or modifications to the Pump

Modifications to the machines and/or its components are permitted only with the manufacturer's consent. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of the other components revokes any warrant and liability for consequences which may result.

2.7 Impermissible Modes of Operation

The operational safety of the machines supplied is warranted only for employment in accordance with the intended use. The machine should not be operated in any way exceeds design capacities.

2.8 Handling, storage and disposal of hazardous materials

The section gives information on handling, storage and disposal of materials used in the pumps which may be considered hazardous to your health.

The following table indicates what is used inside pump:

WHERE USED	LIQUID - PRODUCT	DANGER FOR
Bearings	anti-seize compounds	releases vapour
Stator - rotor	grease - Vaseline	hands and skin
Oil - general lubrication	seal - gearbox	eyes and skin
Pumps surface	Paint	releases dust and fumes if machined. Treat as fire hazardous.

All seek medical advice where appropriate

3 GENERAL DESCRIPTION OF THE PUMP

The progressive cavity pump supplied, is part of the " VOLUMETRIC PUMP FAMILY".

The inventor of that system was the professor René Moineau.

The main components of the pump are:

- the stator- a stationary part usually an alloy tube containing an injected elastomer
- the rotor - a rotating part usually made by a metallic material

The rotor has a single helix shape and the stator is formed as a double-helix with twice the pitch of the rotor. The interference fit between the rotor and stator creates a series of sealed chambers called cavities. When the rotor turns inside the stator, the medium is gently conveyed from the inlet to the outlet of the cavities.

The Bedu progressive cavity pump utilizes many positive characteristics:

- Bedu pumps have no suction or pressure valves, but do have a stable flow rate in proportion to the number of revolutions.
- Bedu pumps have a high suction capacity.
- Bedu pumps can transport all types of media including inhomogeneous, gaseous and abrasive media, as well as those that are not of a liquid consistency, or contain solids and fibrous material.
- Bedu pumps are capable of handling high-viscosity media.

Bedu progressive cavity pumps have also the following advantages:

- Self-priming even if not containing 100% liquid.
- Gentle handling of shear-sensitive products.
- Capacity is direct proportional to the pump speed.
- No pulsation, low noise and vibration.
- No significant torque increase when reaching maximum performance.
- Compact style construction.

The Bedu pump operates according to the positive displacement principle. Operation of the pump against an excessive pressure caused by closed valves, by high pressure losses in the piping or by product sedimentation will lead to the destruction of the pump, drive, pipe work and downstream equipment. Every progressive cavity pump must therefore be protected against overpressure. Safety valves with bypass pipes oil-filled contact manometers that deactivate the pump are appropriate protective devices.

4 Packing, Transportation and Storage.

4.1 Packaging and transportation

To transport and store the pump it is necessary that the personnel know and employ the appropriate means, hoists and tools, always observing the safety instructions.

Bedu pumps are shipped on skid-mounted wood-framed cardboard enclosures.

Upon receipt, inspect the pump for any transportation damage.

Check also:

- If the pump we supplied coincides with the model you ordered.
- If inside the packaging the 'Declaration of conformity' and the complete operating instructions are included.

Claims for damages should be reported to the freight carrier immediately.



Avoid suspending the complete pump unit by the bolts of the motor or gear box. These eye bolts should be used for lifting the motor and/or the gear box only.

Due to the variety of possible pump designs and applications, only general instructions can be given here. These should be adequate for experienced assembly or transportation personnel.



Use caution when lifting top heavy pumps. The centre of gravity may be above the points where the lifting gear is attached. If this is the case, secure additionally to prevent tipping over!

When moving the pump or unit on wheels, strictly adhere to the following:

- Lock out the motor drive to protect against unintended start-up;
- Move the pump unit carefully and slowly, especially where the ground is uneven. Hazards of tipping!
- Be careful not to allow flexible piping to bend or become kinked. Obstruction of flow will cause excessive discharge pressure.
- Where necessary, secure the pump unit with additional support blocks.

4.2 Storage

Pumps are packaged for transportation and short-term storage. In cases of prolonged storage, the pumps should be protected as follows until installation:

Stator: When stored for a long period, the elastomer along the contact line between the rotor and stator may become temporarily distorted (compression-set). This will increase the required starting torque. For this reason, the stator should be removed and stored in a cool, dry place in an air-tight package and protected from light.

Rotor: Support with wooden blocks and protect against damage from mechanical impact. For tool steel rotors: coat the surfaces with protective grease to avoid rusting.

Pump parts in : No protection necessary
Stainless steel

OPERATING & MAINTENANCE INSTRUCTIONS

Drives: Observe the instructions of the drive supplier

Store Room: The environment in which rubber products are being kept must be cool, dry, free of dust and well ventilated, and must not be stored in the open.

Rubber products should be kept in surroundings not having less than minus 10°C and not more than plus 15°C.

Store rooms should not be damp, and it must be ensured that there will be no condensation.

Recommended relative humidity is < 65%.

Rubber products must be protected against light, particularly direct sunlight or artificial light having a high UV portion.

Rubber products should be kept in a sealed package.

There must be no solvents, oil, grease, lubricants or any chemicals kept in the store room.

5 ASSEMBLY AND INSTALLATION

5.1 Mounting tools

No special tools are required for the assembly and installation of the pump.

5.2 Space requirements

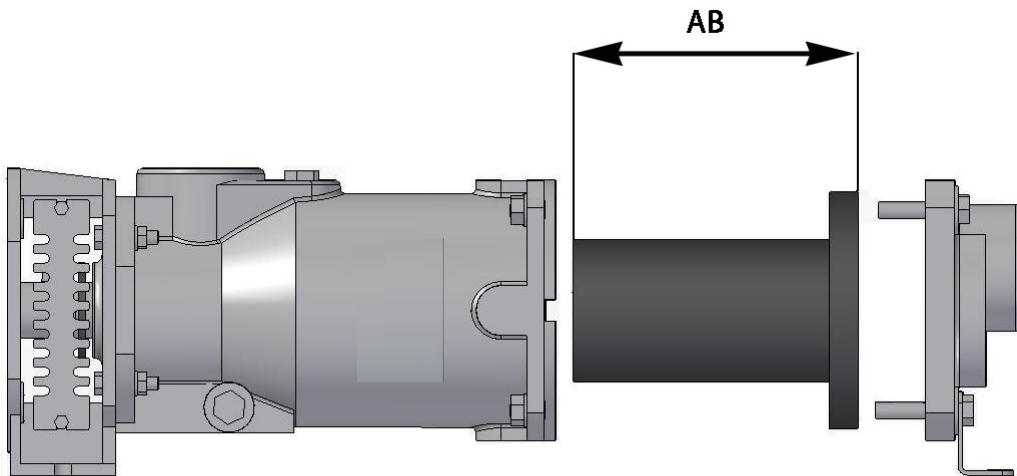
Customers are responsible for determining the space requirements. The following factors must be taken into consideration:

- Dimensions and weight of the machine.
- Required transportation and hoisting equipment.
- Possible piping layout should include an allowance for the space required to remove the rotor and stator.
- Freedom of movement to:
 - Operate the drive.
 - Speed and pressure indicators.
 - Space required for lubrication.
 - Disassembly of mechanical protective devices.
 - Space required for handling the mounting tools.



Space allowing disassembling of Stator and Rotor.

A specific space must be allowed for exchanging the stator. The required dimensions. See chart below for recommended disassembly dimensions:



5.3 Direction of Rotation

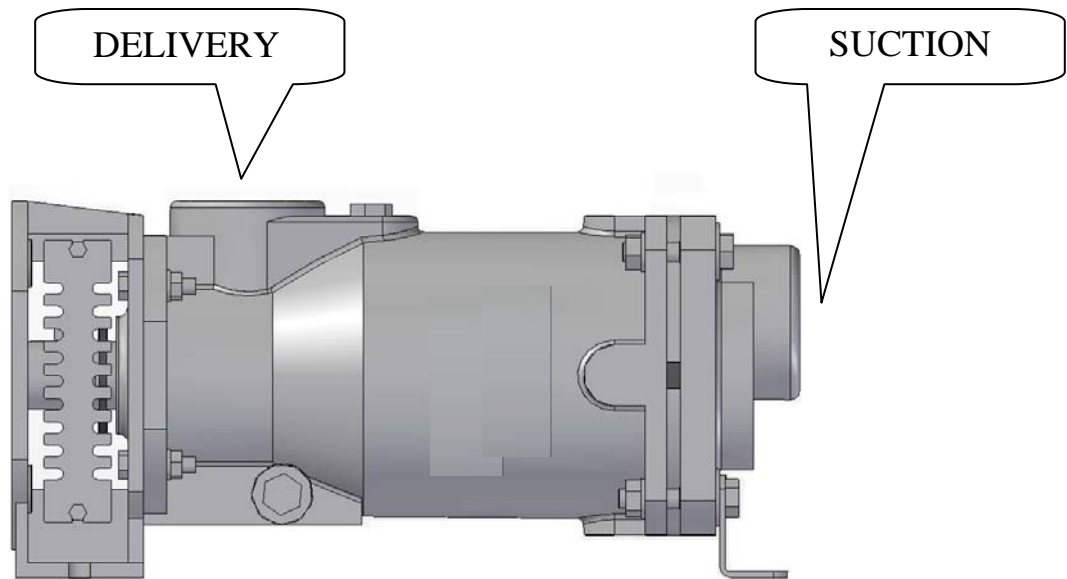


The rotational direction of the pump determines the flow direction of the conveying medium (check the diagram below). This direction is given on the name plate of the pump.

For the FM range it is NOT possible reverse the rotation (for more info contact our technical department).

OPERATING & MAINTENANCE INSTRUCTIONS

Following the drawing below:



5.5 Piping sizing

The pipe diameters on the suction and pressure sides must be dimensioned in accordance with the customer's pressure - loss calculation. The nominal size of the suction pipe should at least match that of the pump suction flange.

Prior to starting up the pump, ensure that all pipelines are free from foreign bodies. Installation residues (such as weld spatter, screws, steel chips etc) will lead to damage of the Bedu pump for which warranty claims will not be accepted.

5.6 Electrical connection



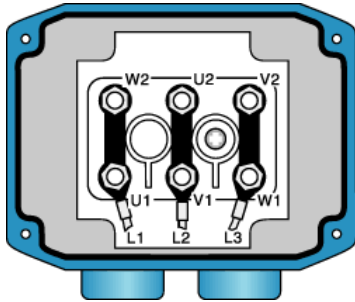
The electrical connections must be established in accordance with the manufacturer's specifications, as well as the safety specifications applying at the installation site.

On the name plate of the electric motors you will find voltage/frequency and kW data. The mains voltage and frequency must match the ratings indicated on the type and rating plates.

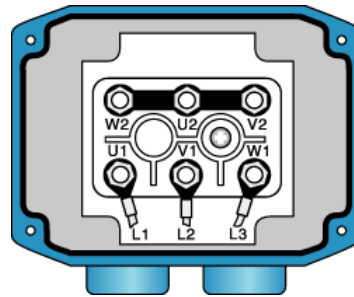
OPERATING & MAINTENANCE INSTRUCTIONS

Three-phase cage motor:

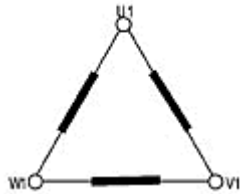
Delta connection



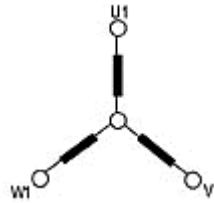
Star connection



Delta connection



Star connection



Switch on electric motor direct on line or use an adequate frequency inverter.



An increased starting torque is necessary due to the compression fit between the rotor and stator conveying elements. This means the electric motors that drive the progressive cavity pumps must always be started direct-on-line or with an adequate frequency inverter which is configured correctly for a constant torque application.

Ensure that customer-supplied frequency inverters comply with the starting torque and running power specified on the offer specifications.

Other important points to be observed:

- Always use a thermal motor safety switch.
- If possible, mount an isolating switch as close as possible to the pump.
- It is recommended to mount an earth leakage circuit breaker.

6 START-UP AND TEMPORARY SHUTDOWN

6.1 Start-up

Bedu progressing Cavity Pumps must be operated with the following precautions:

- Before initial start-up, regardless of rotation, make sure the pump housing and suction piping are filled with medium. Priming of the pump is necessary to lubricate the stator.



Never run the pump dry!
Even a few rotations in dry condition will damage the stator.

- Turn pump motor on and off briefly to check direction of rotation.



Bedu pumps are positive displacement progressing cavity pumps and have the potential to generate very high pressure capable of bursting vessels or pipes.



Excessive pressure can overload the drive train (shaft, joints, rotor) or exceed pressure limitations of the housing and their connections, resulting in damage or breakage.

Never run the pump with an inlet or outlet valve closed. Open valves and vents before starting the pump.

6.2 Temporary Shutdown

Following the temporary shutdown, the pump should be emptied and flushed when:



- The pump is installed in a location inside or outside where the medium has the potential to freeze.
- The medium has a tendency to solidify or harden.
- The medium tends to build up or become tacky on the shaft sealing area

Other suggestions:

Stator: When stored for an extended period, the elastomer along the contact line between the rotor and stator may become temporarily distorted (compression-set). This will increase the required starting torque. For this reason the stator should be removed and stored in a cool, dry place in an air-tight package and protected from light.

Rotor: After the stator has been removed. Cover the entire pump to protect from mechanical damage,



Prior to installation, thoroughly clean rotor to prevent damage caused by interaction of the grease, stator material and medium.

6.3 Stand-by pump

A stand-by pump is sometimes installed to eliminate downtime. Stand-by pumps should be operated occasionally to keep properly them conditioned for use.

7 MAINTENANCE

7.1 General Instructions

A requirement for the reliable operation of any pump is service and maintenance in compliance with instructions. Maintenance personnel must therefore have access to these operating instructions and adhere to them meticulously. Bedu will accept no liability for damages arising through non-observance of these operating instructions.



- The pumps should be regularly rinsed or cleaned if deposits of medium are likely to build up.



- If the pump needs to be disassembled, ensure that the pump and motor are switched off and cannot be turned on accidentally.

7.2 Lubrication

The Bedu pump does not require frequent lubrication.



- Maintenance and lubrication of the drive should be carried out according to the drive manufacturer's instructions.

7.3 Removal and Assembly of the Stator and the Rotor

Check that all maintenance, inspection and installation work is performed by authorised and qualified personnel who understand the operating instructions and are properly trained.

7.3.1 Preventive actions

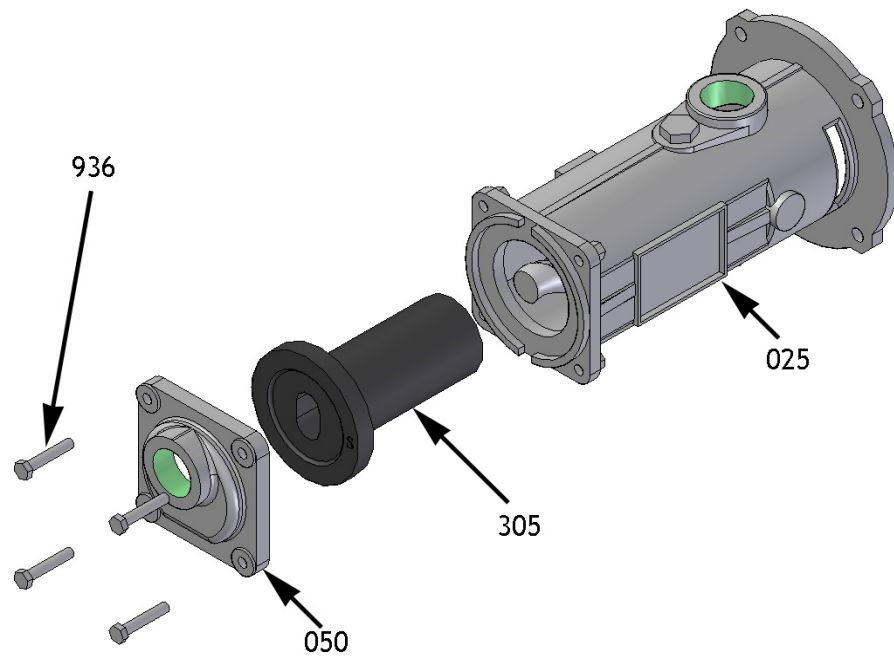


The pump with attached pipework should be empty and must be cooled off.

- Close all the valves and disconnect the pipework on the suction side and pressure side of the pump.
- Before commencing the dismantling of pumps parts, safeguard the pump against tipping over or falling down by fastening it at the lantern.
- Clean the delivery chamber.

7.3.2 Removal the Stator.

- Remove the screws (936) from the suction flange (050).
- Remove the suction flange (050).
* For stainless steel version: remove the tie rods (860).
- Remove the stator (305).
- Remove the screws (911) from the suction chamber (025).
- Remove the suction chamber (025).

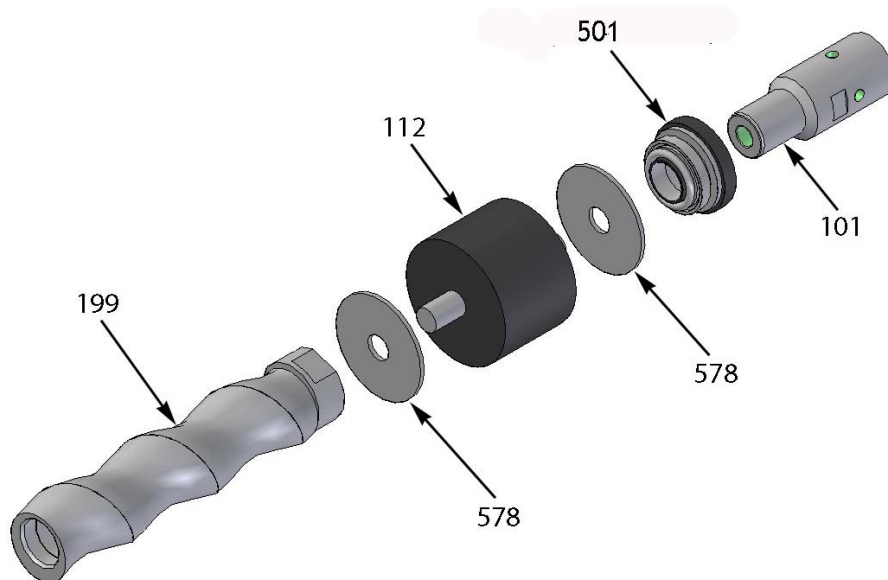


7.3.3 Assembly the stator.

- Reassemble the stator in reverse order (see point 7.3.2).
- Installing the stator will be easier when using glycerine as a lubricant.

7.3.4 Removal of rotor.

- Remove the stator (see point 7.3.2).
- Block the female drive shaft (101)
- Unscrew the rotor (199) from the joint (112).
- Remove the washer (578) from the joint (112).



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7.3.5 Assemble the Rotor.

- Reassemble the rotor in reverse order (see point 7.3.4). Apply thread-locking fluid to the screw of the joint (rotor side), insert the washer and screw the joint to the rotor (199).

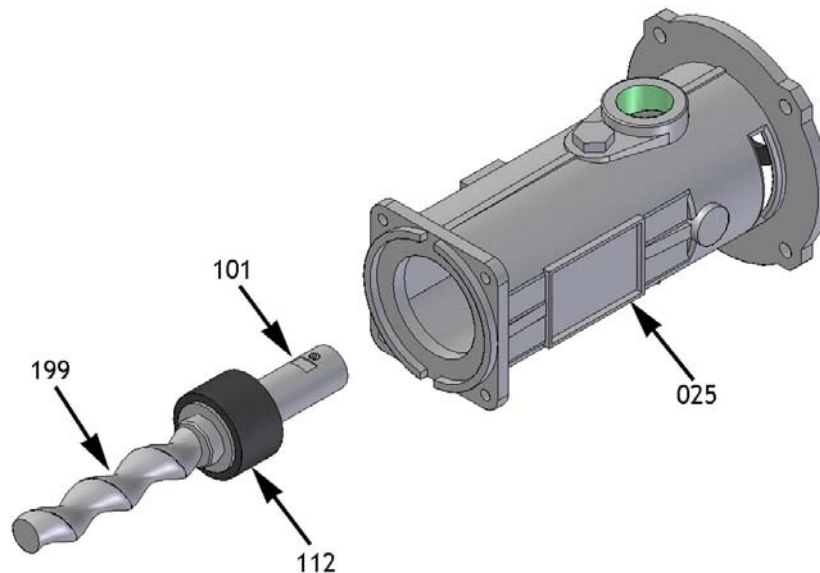
7.4 Removal and assembly of the joint.

7.4.1 Removal of the joint.

- Remove the stator (305), the suction chamber (025) and the rotor (199) - see point 7.3.2; 7.3.4) during this operations pay attention to the mechanical seal (501).
- Block the female drive shaft (101) and move the joint anti-clockwise - from the drive view.

7.4.2 Assemble the Joint.

- Apply thread-locking fluid to the screw of the joint (female shaft side), insert the washer and screw the joint to the female drive shaft (101).



7.5

Disassembly and assembly of the mechanical seal.

7.5.1 Disassemble the rotary mechanical seal faces.

- Repeat the operations 7.3.2
- Unscrew the two grub screw (832) on the female drive shaft and remove: rotor, joint, female drive shaft and the mechanical seal rotary faces.
- Repeat the operations 7.3.4; 7.4.1.
- Remove slowly the mechanical seal rotary faces from the female drive shaft.
- Remove the mechanical seal Flange (582) and take out the mechanical seal counter ring faces (501)

OPERATING & MAINTENANCE INSTRUCTIONS

7.6.3 Mechanical seal Reassembly

- When you conclude the operation 7.5.1 clean the female drive shaft (101) and all the parts of the mechanical seal, check if the mechanical seal is damaged - in this case change the mechanical seal.
- Clean the seal housing. *
- When you conclude the cleaning, insert the flange (582) and, with care, the mechanical seal counter ring faces (501) in the seal housing.
- Remount the female drive shaft, the mechanical seal rotary faces, the joint and the rotor - see operations 7.4.2 - 7.3.5 and 7.3.3.

* This explanation relates to a cast Iron pump. The stain steel pump has a flanged seal housing.

OPERATING & MAINTENANCE INSTRUCTIONS

8 Trouble - Shooting

Bedu progressive cavity pumps will be operate trouble-free if they are used in accordance with the offer and with this manual.

If operating problems arise, use this chart as a guide in locating the problem.

Trouble-shooting guide										
Pump will not start	No suction capability	Discharge output low	Discharge pressure low	Discharge output fluctuates	Pump is noisy	Pump jammed	Drive overloaded	Stator and Rotor service life too short	Shaft seal leaks	Possible causes and remedies
x							x			Pump or stator is new, too much static friction. 1) Fill the pump and if possible, turn the pump by hand. 2) If necessary lubricate the rotor and the stator.
x		x	x				x			Power supply incorrect. 1) Check motor nameplate data. Test voltage, phase and frequency.
		x					x	x		Discharge pressure too high. 1) Measure actual discharge pressure and compare to your specification.
x						x	x			Foreign matter or debris in pump. 1) Remove debris and correct any damage.
x						x	x	x		Temperature of pumped liquid too high, stator swells. 1) Reduce liquid temperature, if liquid temperature cannot be reduced, use an undersized rotor.
x						x	x	x		Liquid contains too many solids, causing blockages. 1) Check specification, increase liquid-to-solids ratio.
x						x	x	x		Chemical attack on the stator. 1) Check specification, If necessary change the stator with a correct one.
x						x	x	x	x	Liquid settles and hardens at pump shut-down. 1) Clean pump and rinse out after each use.
		x	x	x						Air in suction piping. 1) Check connections - If necessary increase NPSH.
	x	x	x	x						Suction pipe leaks. 1) Check seals and connections.

OPERATING & MAINTENANCE INSTRUCTIONS

Trouble-shooting guide										
Pump will not start	No suction capability	Discharge output low	Discharge pressure low	Discharge output fluctuates	Pump is noisy	Pump jammed	Drive overloaded	Stator and Rotor service life too short	Shaft seal leaks	Possible causes and remedies
		x	x							Pump speed too low. 1) If drive is variable speed, increase speed at pump.
		x	x	x	x			x		Discharge too high or suction head too low (cavitation). 1) Reduce suction losses; lower liquid temperature, install pump at lower elevation.
		x	x		x	x	x	x		Pump running dry. 1) Fill pump: provide dry run protection: relocate suction piping.
	x	x	x		x			x		Stator or Rotor worn out. 1) Check rotor and stator. Replace the worn out parts.
					x					Joints worn. 1) Replace the worn out pieces.
							x			Pump speed too high. 1) If drive is variable, set at lower speed.
							x			Viscosity too high. 1) Measure specific gravity and viscosity and compare to original specifications
x		x				x	x		x	Pressure head too high. 1) Check pressure head with manometer. Reduce the pressure head by increasing the pressure pipe diameter or by shortening the pressure pipe.
	x								x	Wrong direction of rotation. 1) Reverse polarity of drive motor.
	x								x	Mechanical seal worn or damage. 1) Replace the mechanical seal.
					x				x	Pump bearing worn (Housing bearing version). 1) replace bearings, lubricate seal

OPERATING & MAINTENANCE INSTRUCTIONS

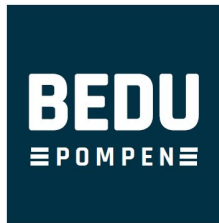
9 RECOMMENDED SPARE PARTS

In general, we have all spare parts subject to wear in stock. Our subsidiaries and exclusive representatives also hold a certain stock. We recommend keeping an amount of spare parts, corresponding to the pump, in stock on site as follows:

Description	Small Set	Large Set	Position Code
Rotor		1	199
Stator	1	1	305
Connecting rod (complete)		1	(120-401-912-708-790-951-403-447-717-435-415)
Mechanical seal		1	T..
Lantern O'ring	1	1	701

To ensure that you receive the part quickly, please provide the following information with your order:

- Specify the model number of your pump, serial number, and year of construction (see the plate on the pump).
- Identification part code - as per the parts drawing.



EC - Declaration of Conformity

Manufacturer Details

Tradename

Bedu Pompen BV

Address

Poort van Midden Gelderland Rood 10, 6666 LT, Heteren, Netherlands

Product Details

Product Name

Excentric screw pumps

Model (+series) Name

FM

Applicable Standards Details

Directives

2006/42/EC (Machinery Directive)
2014/35/EU (Low Voltage Directive)
2014/30/EU (Electromagnetic compatibility)

Standards

EN-ISO 12100:2010
EN-IEC 60204-1:2006
EN 809+A1/C1

Additional information

No further details.

Declaration

We hereby declare under our sole responsibility that the product(s) mentioned above to which this declaration relates complies with the above mentioned standards and Directives.

Business Unit Manager: Issued Date:

01/10 2014

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Marco Breunissen

Signature of representative(s)

The logo consists of the word "BEDU" in a large, bold, white sans-serif font, with "POMPEN" in a smaller, white sans-serif font below it. The text is centered within a dark teal square, which is itself centered within a white square border. The background of the entire page is a faded industrial scene with tall chimneys and complex piping.

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made for your process

- Expert advice
- A customer-oriented organization that adapts to the requirements and wishes of your organization
- Innovative and customized solutions
- Breakdownservice, 24 hours a day, 7 days a week
- Technical service with extensive test facilities, working from our own workplace or at your location
- A fast and appropriate solution for all your issues
- Wide range of liquid pumps
- Repair, maintenance and revision

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