

# DAF SERIES

Vertical Multistage Centrifugal Pumps

**PATENT  
PENDING**  
NO: 2019/06955



## Operating Manual

 **masdaf**





**EC DECLARATION OF CONFORMITY**  
**AT UYGUNLUK BEYANI**

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The undersigned Company certifies under its sole responsibility that the item of equipment specified below satisfies the requirements of the mainly Machinery Directive 2006/42/EC which is apply to it.  
The item of equipment identified below has been subject to internal manufacturing checks with monitoring of the final assessment by **MAS DAF MAKİNA SANAYİ A.Ş.**

*Aşağıda tanımlanmış olan ürünler için Makine Emniyeti yönetmeliği 2006 / 42 / AT' nin uygulanabilen gerekliliklerinin yerine getirildiğini ve sorumluluğun almış olduğunu beyan ederiz.*

*Aşağıda tanımlanan ürünler iç üretim kontrollerine bağlı olarak MAS DAF MAKİNA SANAYİ A.Ş. tarafından kontrol edilmiştir.*

**Equipment / Ürün** : Vertical Multistage Centrifugal Pumps / Dikey Çok Kademeli Santrifüj Pompalar

**Seri / Model-Tip** : DAF Series - DAF Serisi

**For pumps supplied with drivers/ Elektrikli Pompa Üniteleri**

**Related Directives / Yönetmelikler**

**2006/42/EC Machinery Directive / 2006/42/AT Makine Emniyeti Yönetmeliği**

**2014/35/EU Low Voltage Directive / 2014/35/AB Alçak Gerilim Yönetmeliği**

**2014/30/EU Electromagnetic Compatibility Directive / 2014/30/AB Elektromanyetik Uyumluluk Yönetmeliği**

**EUP 2009/ 125 /EC Electric Used Products Directive/ Elektrik Kullanan Ekipmanlar Direktifi (EUP)**

**Regulations applied acc. to harmonize standards / Uygulanan Uyumlaştırılmış Standartlar**  
**TS EN ISO 12100:2010, TS EN 809+A1, TS EN 60204-1:2018.**

We hereby declare that this equipment is intended to be incorporated into, or assembled with other machinery to constitute relevant machinery to comply with essential health and safety requirements of DirectiveThe machinery covered by this declaration must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with provisions of the directive.

*Ekipman, uygun bir makina oluşturmak amacıyla diğer ekipmanlar ile birleştirilirken ya da monte edilirken gerekli sağlık ve güvenlik yönetmeliklerine uyulması gerekmektedir.*

*Bu bildiri kapsamında yönetmelikte belirtilen bütün hükümler yerine getirilmeden makinanın devreye alınması gerekmektedir.*

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Yetkili Kişinin İmzası

## TABLE OF CONTENTS

## Page No

Introduction	3
1. Important Safety Precautions	3
2. General	4
3. Safe Operating Conditions	4
4. Transport and Storage	5
5. Assembly/Installation	5
6. Commissioning, Start up and Operating	6
6.1. Preparations Before Start up	6
6.2. Checking The Direction of Rotation	6
6.3. Start up Procedure	7
6.4. Shut Down Procedure	7
7. Maintenance	7
7.1. The Checks During the Operation	7
7.2. Service	7
7.3. Spare Parts	8
8. Disassembly, Repair and Reassembly	8
9. Possible Failures, Causes, Solutions	9
10. DAF Drawing for Dismantling	10

## INTRODUCTION



- This manual contains instructions for the installation, operation and maintenance of the DAF multistage in-line centrifugal pumps of **MAS DAF MAKINA SANAYI A.Ş.**
- Please read carefully this manual and apply all the instructions to operate pumps without problems. Pumps shall be used for their intended duties. In this manual, there are information on operating conditions, installation, starting-up, settings and main controls of pumps.
- These operating and maintenance instructions contain **MAS DAF MAKINA SANAYI A.Ş.**'s suggestions. The special operating and maintenance information of the plumbing that a pump is fitted to is not considered in these instructions. This information must be given by the plumbing constructors only.
- Please refer to instructions of plumbing constructors.**
- Please pay attention to the warnings in this manual and ensure that it is read before the installation-start up process. **MAS DAF MAKINA SANAYI A.Ş.** is not responsible for the accidents resulting from negligence.
- If you cannot find an answer to your questions in this manual, it is suggested that you contact **MAS DAF MAKINA SANAYI A.Ş.** Please inform us about the rated value and especially the serial number of the pump when you get in contact for help.
- The safety instructions in this manual cover the current national accident protection regulations. Beside all of these, an operation, work and safety measure imposed by the customer has to be applied.

### The Signs Used in This Operation Manual



Read the instructions carefully in this operating manual and keep it for your future reference.



Warning sign against the electrical risks.



Sign for the operator's safety.

## 1. IMPORTANT SAFETY PRECAUTIONS

In order to minimize the accidents during the mounting and putting into service of the pump, the following rules have to be applied:

- Do not work without taking safety measures relevant to equipment. Cable, mask and safety band must be used when necessary.
- Be sure there is adequate amount of oxygen and there is no toxic gaseous around
- Before using welding or any electrical equipment make sure that there is no risk of explosion.
- Check the cleanliness of the area to take care of your help. (Dust, smoke, etc.)
- Do keep in mind that there is a risk of having accidents related to electricity
- Do not lift the pump before you check the transport equipment.
- Be sure you have a by-pass line
- Use helmet, eye glasses and protective shoes for your safety
- Place a protective barrier around the pump within the necessary safety area
- Dust, liquids and gaseous that may cause overheating, short circuit, corrosion and fire must be kept away from the pump unit.
- By checking the noise level of the pump unit, necessary measures to avoid noisy operation of the pump that can have harmful effects on the personnel and environment.
- Be careful about the direction of transport and storage.
- Cover appropriately the moving parts to avoid possible injury of the personnel. Mount the coupling guard and belting before starting-up the pump
- All the electrical and electronic applications must be performed by authorized person conforming EN60204-1 and /or domestic instructions.
- Protect the electrical equipment and motor against overloading
- If flammable and explosive liquids are pumped, ground connection of electricity should be carried out properly
- Do not expose the pump unit to sudden temperature variations
- All personnel who work with the waste water system need to be vaccinated in case of contagious diseases.
- If the pump contains hazardous liquids, one must use protective helmet against the risk of splatter. One also must accumulate the liquid in a proper container against any risk of leakage.

**All Other Health and Safety Rules, Laws and Regulations Must Be Applied**

## 2. GENERAL

### 2.1. Definition of Pump and Usage Areas

The DAF multistage in-line centrifugal pumps are designed for the following applications:

- Water supply systems,
- Booster sets in high rise buildings and industry,
- Water treatment systems,
- Industrial facilities for process water,
- Sanitary and cleaning installations,
- Irrigation plants,
- Fire extinguishing plants,

Thin, non-explosive, non-corrosive liquids, containing no solid particles or fibres. When pumping liquids with a density and/or viscosity higher than that of water, motors with correspondingly higher outputs must be used, if required.

### CAUTION

**Please contact MAS DAF MAKINA SANAYI A.Ş. for liquids that have different chemical and physical specifications.**

#### Technical specifications of DAF type pumps

Operating Pressure:	16 bar (max)
Capacity:	2-60 m <sup>3</sup> /h
Hm:	20-150 m.
Speed:	2900 RPM
Liquid Temperature	0°C to +60°C

### 2.2. Performance Information

Actual performance of the pump can be obtained from the order page and/or from the test report. This information is given on the pump label. The performance curves given in the catalog are valid for water whose density and viscosity are  $\rho=1 \text{ kg/dm}^3$  and  $\nu=1 \text{ cst}$ . respectively. For those liquids whose densities and viscosities are different from those of water, please consult with **MAS DAF MAKINA SANAYI A.Ş.** since the performance curves vary with density and viscosity

### CAUTION

**Do not operate the pump with a motor that has a different power except for the given catalog and label values.**

The pump is not to be operated at off-design point given in the order and supplied from the firm. It is necessary to ensure that the instructions are obeyed for the safe running of the pump.

### 2.3. Warranty Conditions

The entire products in our selling program are

warranted by **MAS DAF MAKINA SANAYI A.Ş.**

The warranty conditions will only be valid when all the instructions about installation and start-up operations of the pump unit are taken into account.

### 2.4. Test

All Pumps are dispatched for sale when all the performance and pressure tests are completed. Proper assurance of material and fault-free operation of pumps whose performance tests are made is under the warranty of **MAS DAF MAKINA SANAYI A.Ş.**

### 2.5. Pressure Limit



Pressure at the discharge flange must not exceed 16 Bar. A special order is necessary for applications with higher pressures.

## 3. SAFE OPERATING CONDITIONS

This manual contains main safety instructions for the installation, operation and maintenance. It must be read by the personnel who are responsible for installation and operation. This manual should always be kept near the installation location. It is important to comply with safety precautions stated in page 1 along with the general safety instructions as well as preventive measures repeated in other sections of this manual.

### 3.1. Training of Personnel

Installation, operation and maintenance personnel must have necessary knowledge in order to accomplish the given job. The responsibility, adequacies and controlling duties of such personnel must be determined by the customer. It has to be certain that these personnel comprehend totally the content of the operating manual. If the personnel do not have enough knowledge, required training must be given by the customer. If training support is needed by the customer, it will be provided by the manufacturer/seller.

### CAUTION

Untrained personnel and unwillingness to comply with safety instructions may be risky for both machine and environment. **MAS DAF MAKINA SANAYI A.Ş.** is not responsible for this kind of damages.

### 3.2. Hazardous Conditions That May Occur When One does not Comply With the Safety Instructions

Incompliance with safety regulations may put the personnel, the environment and the machine in danger and thus may cause damages. Incompliance with safety regulations may give rise to situations listed below.

**Important operational functions of the factory may stop. Maintenance may get difficult. One may get injured by electrical, mechanical or chemical hazards.**

### 3.3. Safety Measures for Operator

Dangerous, hot or cold components in the pump area must be covered so that one cannot touch them. Moving components of the pump (such as coupling) must be covered so that one cannot touch them. Those covers must not be dismantled while the pump is running. Dangers that results from electrical connections must be removed. To get more information about this subject, you can refer to domestic electrical instructions.

### 3.4. Safety Measures for Maintenance and Installation

The customer must assure that all maintenance, check and installment tasks are performed by qualified personnel. Repair work must only be performed while the machine is not running. The pump and its auxiliary system must be cleaned thoroughly if it contains hazardous liquids. At the end of the repair work, all safety and protective equipment must be re-installed.

### 3.5. Spare Parts Replacement

Replacement of spare parts and all modifications must be done after contacting with the manufacturer. Spare parts and accessories certified by the manufacturer are important for the safe operation of the system.

**Notice:** MAS DAF MAKINA SANAYI A.Ş. is not responsible from the usage of improper spare parts.

## 4. TRANSPORT AND STORAGE

Suction, discharge and all auxiliary fittings must be closed during transport and storage. Dead-end covers must be removed while the pump unit is being installed.

### 4.1. Transport

Pump and pump group must be carried safely to the installation location by lifting equipments.

### CAUTION

Current general lifting safety instructions must be applied. Please use a suspension system shown in figure while you are carrying and lifting the pump unit. The suspension rings may be broken because of the excessive load and may result in a damage of the pump. Prefer fabric cable for suspension.



Incorrect lifting may damage the pump unit and cause injuries.

### Damages caused in transport

Check the pump when it is delivered to you. Please let us know of there is any damage.

### 4.2. Storage



**Please keep the unit clean and dry area during storage.**

If the pump is out of use for a long time, please consider the instructions below.

1. If there is water inside the pump, drain it.
2. Clean the pump casing and impeller by jetting clean water for a short time.
3. Empty water inside the pump casing, suction line and discharge line.
4. Add small amount of antifreeze inside the pump casing if it is not possible to empty it completely. Rotate the pump shaft by hand to mix the antifreeze.
5. Close the suction and discharge exits with gasket
6. Spray an anti-corrosive into the pump casing.
7. Rotate the pump shaft by hand once in every month, in order to protect it from freezing and to lubricate the bearings.

## 5. ASSEMBLY / INSTALLATION

### 5.1. Installation

The pump should be installed with the motor shaft vertical. Ensure that an adequate supply of cool air reaches the motor cooling fan. Arrows on the pump base show the direction of flow of liquid through the pump.

Counter flanges, gaskets, bolts, rigid coupling sets are available as accessories and have to be ordered separately.

Rigid coupling sets are available with threaded sockets or sockets for welding. Isolating valves should be fitted either side of the pump to prevent the system being drained if it is necessary to clean, repair or replace the pump.

Install the pipes in such a way that air locks are avoided, especially on the suction side of pump. Correct Pipework shown in Figure 1.

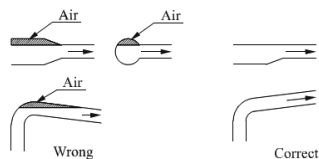


Figure 1: Section Conditions

Care should be taken while fitting the pipes so that any tension caused by variations in temperature does not affect the pump.

If the pump is installed with long pipes, these should be adequately supported before and after the pump.

If there is any risk of the pump being choked by sediments leaves, twigs, etc. measures should be taken to prevent this, a strainer should be fitted at the suction side of the pump.

In the case of installations in which the discharge pipe has been installed horizontally, or it slopes downwards away from the pump, which can or must be drained in certain periods, the pump should be protected against dry-running. This can be done by fitting a loop with a vacuum valve close to the pump.

The highest point of the loop should at least be in level with the lower edge of the pump motor.

The discharge pipe can then be drained independently of the pump and vice versa.



**The pump should not be run with a closed discharge valve as this will cause an increase in temperature/formation of steam in the pump which may cause damage to the pump.**

If there is any danger of the pump running with a closed discharge valve, a minimum liquid flow through the pump should be ensured by connecting a bypass/a drain to the discharge pipe. The drain can be connected to a tank.

## 5.2. Electrical Connection

- The electrical connections should be carried out by a qualified electrician.
- To make sure the motor is suitable for the power supply; cables of the motor must be connected to power supply according to the figure on the terminal box and the motor nameplate.
- Motor shall be connected with a fast and effective motor starter, to ensure that the motor will not be damaged by lack of phase, unstable voltage or overload. The motor shall earth reliably.

### CAUTION

Before take apart the terminal box cover or dismantle pump, make sure that the power supply is switched off.



#### Warning – Electrical connection and safety devices

- The pump units should be connected to the power supply by the appropriately rated power cables according to the motor ratings.
- The pump units should always be equipped with safety

devices as required in the standards (EN 809 and/or EN60204-1) as well as by the national rules of the country where the pump is used.

- Despite the rules of any country, the power supply to the pump unit must be equipped with at least following electrical safety devices with appropriate ratings:
  - Emergency switch
  - Circuit breaker (as a supply disconnecting (isolating) device as well as an over current protective device)
  - Motor overload protection



Do not start the pump until it has been filled with liquid.

## 6. COMMISSIONING, START UP AND OPERATING

### CAUTION

It is prohibited to run without liquid, which will damage mechanical seal and sliding bearing.

### CAUTION

Do not start your pump dry (WITHOUT WATER).

- Fill water in pump in inverse pouring system.

Close the pump outlet valve, release air vent screw on the pump head and open the inlet valve slowly until stable water flows from the air vent screw. Then fasten the screw.

- Fill water in pump when liquid level is lower than pump. Before installing, pump and pipes must be filled with liquid fully and air vented.

### 6.1. Check the rotary direction

Switch on the power supply and view the rotary direction by viewing the motor fan. From the motor end, pump shall run counter-clockwise.

### 6.2. Check before pump start-up

- Check whether the pump is fixed securely.
- Check whether pump is filled with water fully and check whether liquid can flow freely.
- Check whether the voltage of power supply is stable.
- Check whether it turns correctly.
- To make sure all pipe lines are connected tightly and can supply water normally.
- The valves in the inlet pipe line are completely opened.
- The outlet valve shall be opened slowly after the pump is started up.
- Check the operation pressure if pressure meter is installed.
- Check all the controls for normal operation. If the pump is controlled by pressure switch, check and adjust the starting pressure and stopping pressure. Check the full load current to make sure it not surpasses the max allowed current

## 6.3. Frequency of pump starts

- Pump should not be started too frequently. It is suggested pump shall not be started more than 100 times per hour if the motor power is less or equal to 4 kW. When motor power is big than 4 kW, pump shall not be started more than 20 times in one hour.
- Suggestion: When pump running; flow should be controlled at the range of 0.5-1.3 times of rated flow.
- There should be no noise when pump running. If there is something wrong, stop pump and check it and repair.

## 6.4. Frost protecting

Pump can be used in the system with anti-frozen measures. If the pump is installed in easily frozen environment, suitable antifreeze shall be added to the transferring liquid to prevent pump from being damaged. If antifreeze is not used, pump shall not be used during periods of frost. Pump should be drained when stops using.

## 6.5. The following should be checked regularly for pump.

- Pump working and operating pressure
- Possible leakage
- Possible motor overheat
- Cleaning/replacement of all strainers (If strainers fit)
- The switch off time of motor overload
- Frequency of starts and stops
- All control operation

If find faults, check system according to "Possible Failures, Causes, and Solutions"

- Pump shall be cleaned and kept appropriately when it is not used for a long time.
- Pump shall be prevented from being corrupted and damaged in storage.

## 7. MAINTENANCE

### CAUTION

Maintenance operations must be done by authorized personnel with protective clothing only. The personnel must also beware of high temperatures and harmful and/or caustic liquids. Make sure that the personnel read carefully the manual.

- The instructions in Safety Precautions must be executed during maintenance and repair
- Continuous monitoring and maintenance will increase the engine's and pump's lives.

The instructions below should be applied.

### 7.1. The Checks During the Operation

- Pump must never be operated without water.
- Pump must not be operated for a long time with the

discharge valve closed (zero capacity).

- Bearing temperature must never exceed 80°C if the ambient temperature is 30°C
- Precautions must be taken against flare up when the component temperatures are over 60°C. "Hot Surface" warnings must be placed over necessary areas.
- All the auxiliary systems must be in use while the pump is operating.
- There is no need for excessive maintenance because of using mechanical seal. Water leakage from the mechanical sealing indicates the fact that the sealing is worn out and therefore needs to be replaced.
- If the system consists of a substitute pump, keep it ready by operating it once a week. Check also the auxiliary systems of the substitute pump.

### 7.1.1. Component Check

#### 7.1.1.1. Mechanical Seal

Mechanical seals are used in DAF type pumps. Mechanical Seals are absolutely leak-proof and needs less maintenance than soft packing.

#### Mechanical seal;

1. Provides leak proof operation in heavy operating conditions (in waste water pumps, chemical process and refinery pumps).
2. Easily mountable and needs less maintenance.
3. Does not cause wearing on the shaft
4. Sealing operation does not depend on the quality of shaft finishing.

#### 7.1.1.2. Drive

Apply to the operating instructions of the motor manufacturer.

#### 7.1.1.3. Auxiliary Components

Check regularly the fittings and the gaskets, replace the worn out pieces.

### 7.2. Service

Our Customer Service Department offers after-sale service. Manager should employ authorized and trained personnel for mounting/dismounting procedures. Before these procedures, one must make sure that pump interior is clean and empty.

This criterion is also valid for the pumps which are sent to our factory or to our service points.



**Maintain the safety of the personnel and the environment in every field procedure.**

### 7.3. Spare Parts

The spare parts of DAF type pumps are guaranteed for 10 years by **MAS DAF MAKINA SANAYI A.Ş.**

In your spare parts requests, please indicate the below listed values that are indicated on your pump's label.

**Pump type and size:**  
**Motor power and speed:**  
**Pump serial number:**  
**Capacity and head:**

### 8. DISASSEMBLY, REPAIR AND REASSEMBLY



Before starting work on the pump set, make sure it is disconnected from the mains and can not be switched on accidentally.

Follow the safety precautions outlined in "Important Safety Precautions".

- Fit discharge head on the motor. Fit mechanical seal. The faces of mechanical seal should be lubricated.
- Fit the impellers, diffusers etc. in position according to the drawing. Then fit impeller cover, tighten nuts, fit seal circle on every diffusers.
- Fit suction head, stay bolts, tighten the nuts of stay bolts.
- Rotate the motor fan by hand to ensure that the shaft is not choked.
- Reverse the process above can disassemble a pump.

## 9. POSSIBLE FAILURES, CAUSES, SOLUTIONS

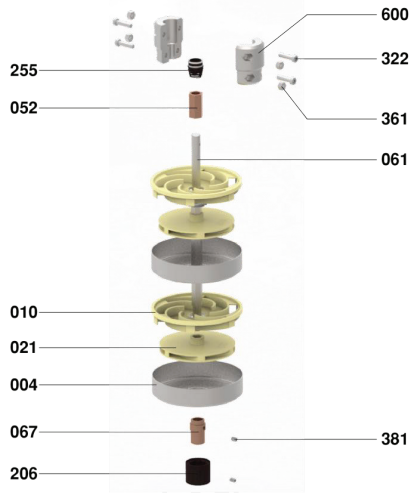
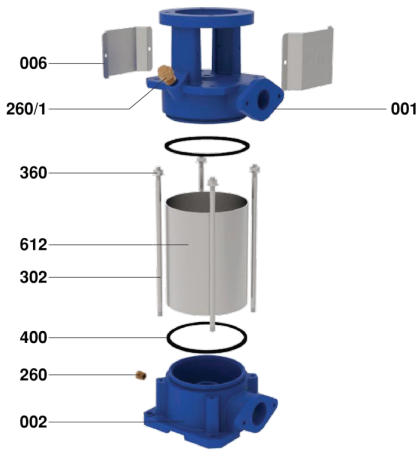
Possible failures and solution strategies are listed in the table below. Please apply to the Customers' Service Department of our company when a generic solution is not found to your problem.



**While the failures are repaired the pump must always be dry and un-pressurized.**

POSSIBLE FAILURE	CAUSES	SOLUTIONS	REMARKS
Motor does not run when started.	<ul style="list-style-type: none"> <li>a) Power supply failure.</li> <li>b) Fuses are blown.</li> <li>c) Motor is overloaded.</li> <li>d) Main contacts of starter are not connected well or the coil is defective.</li> <li>e) Control circuit is defective.</li> <li>f) Motor is defective.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check power supply.</li> <li>b) Replace fuses.</li> <li>c) Check system.</li> <li>d) Replace motor starter.</li> <li>e) Check control circuit.</li> <li>f) Repair.</li> </ul>	
Overload device of motor starter trips out immediately when power supply is switched on.	<ul style="list-style-type: none"> <li>a) Fuses are blown.</li> <li>b) Contacts of overload device are faulty.</li> <li>c) Cable connection is loose or faulty.</li> <li>d) Motor winding is defective.</li> <li>e) Pump mechanically blocked.</li> </ul>	<ul style="list-style-type: none"> <li>a) Replace fuses.</li> <li>b) Check motor starter.</li> <li>c) Check cables and power supply.</li> <li>d) Replace motor.</li> <li>e) Check and repair pump.</li> </ul>	In the case of d) and e), users shall not disassemble the pump by themselves.
Overload device trips out occasionally.	<ul style="list-style-type: none"> <li>a) The setting of overload is too low.</li> <li>b) Periodic power supply faults.</li> <li>c) Low voltage at peak times.</li> </ul>	<ul style="list-style-type: none"> <li>a) Reset overload setting.</li> <li>b) Check power supply.</li> <li>c) Add regulator.</li> </ul>	
Motor starter has not tripped out but the pump does not run.	<ul style="list-style-type: none"> <li>a) Contacts of starter are not contacted well or the coil is faulty.</li> <li>b) Control circuit are defective</li> </ul>	<ul style="list-style-type: none"> <li>a) Change motor starter.</li> <li>b) Check control circuit.</li> </ul>	
Pumped water does not flow constantly.	<ul style="list-style-type: none"> <li>a) Suction pipe is too small.</li> <li>b) There is not sufficient water in pump water inlet.</li> <li>c) Liquid level is low.</li> <li>d) Pump inlet pressure is too low compared with water temperature, pipeline loss and flow.</li> <li>e) Suction pipe is blocked by impurities.</li> </ul>	<ul style="list-style-type: none"> <li>a) Enlarge inlet pipeline.</li> <li>b) Improve system and increase coming water.</li> <li>c) Try to lift liquid level.</li> <li>d) Improve system and try to increase the inlet pressure.</li> <li>e) Check and clear impurities.</li> </ul>	
Pump runs but gives no water.	<ul style="list-style-type: none"> <li>a) Suction pipe is blocked by impurities.</li> <li>b) Foot valve or check valve is closed.</li> <li>c) Leakage in suction pipe.</li> <li>d) There is air in suction pipe or pump.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check and clean suction pipe.</li> <li>b) Check and repair foot valve or check valve.</li> <li>c) Check and repair suction pipe.</li> <li>d) Refill liquid, release air.</li> </ul>	
Pump runs backwards when switched off.	<ul style="list-style-type: none"> <li>a) Leakage in suction pipe.</li> <li>b) Foot valve or check valve is defective.</li> <li>c) Foot valve is blocked in opened or partly opened position.</li> <li>d) There is air in suction pipe.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check suction pipe.</li> <li>b) Check and repair foot valve or check valve.</li> <li>c) Check and repair foot valve.</li> <li>d) Check and repair suction pipe and release air.</li> </ul>	
Abnormal vibration or noise from pump.	<ul style="list-style-type: none"> <li>a) Leakage in suction pipe.</li> <li>b) Suction pipe is too small or suction pipe is partly blocked by impurities.</li> <li>c) There is air in suction pipe or pump.</li> <li>d) The comparison of the delivery head of device with delivery head of pump is very low.</li> <li>e) Pump mechanically blocked.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check and repair suction pipe.</li> <li>b) Enlarge or check situation pipe.</li> <li>c) Refill liquid to the pump and vent air.</li> <li>d) Improve system or choose another pump model.</li> <li>e) Check and repair pump.</li> </ul>	In the case of e), users shall not disassemble the pump by themselves.

## 10. DAF DRAWING FOR DISMANTLING



PART NO	PART NAME	PART NO	PART NAME
001	Discharge Casing	260	Blind Plug
002	Suction Casing	260/1	Air Relief Cock
004	Stage Casing	302	Stud
006	Coupling Cover Plate	322	Coupling Bolt
010	Diffuser	360	Stud Nut
021	Impeller	361	Coupling Nut
052	Mechanical Seal Sleeve	381	Set-Screw
061	Shaft (Hex.)	400	Shield Gasket
067	Bottom Nut	600	Coupling
206	Bottom Rubber	612	Stainless Shield
255	Mechanical Seal		





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